

# FY 2015-16 Progress Report

on activities of the

Florida Fish and Wildlife Conservation Commission

Endangered and Threatened Species Management and  
Conservation Plan



Endangered and Threatened Species Management and Conservation Plan  
FY 2015-16 Progress Report

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Endangered and Threatened Species Management and Conservation Plan  
FY 2015-16 Progress Report

FLORIDA'S ENDANGERED AND THREATENED SPECIES  
MANAGEMENT AND CONSERVATION PLAN  
FY 2015-16 PROGRESS REPORT

Prepared by Staff of the Florida Fish and Wildlife Conservation Commission

Nick Wiley, Executive Director

January 31, 2017

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## **EXECUTIVE SUMMARY**

This document constitutes the 38<sup>th</sup> 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 [s.379.2291(5), Florida Statutes]. 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 in Florida. Federal- and State-designated Endangered and Threatened species, as well as State-designated Species of Special Concern, are collectively referred to as listed species in this report.

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 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/about/inside-fwc/legislative-affairs/archive-reports/>.

This report covers Fiscal Year (FY) 2015-16, a period from July 1, 2015, to June 30, 2016. It includes a description of FWC's criteria for research and management priorities, statewide policies pertaining to listed species, a funding request for FY 2017-18, a progress report providing a description of agency actions for listed species, and a description of FWC's citizen awareness program as it relates to listed species. The progress report section includes reports of staff activities relating to 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 activities, and permitting for listed species. Please contact FWC's Species Conservation Planning Section Leader or Assistant Listed Species Coordinator if you would like more information concerning this report. Contact information is listed below.

FWC would like to express our appreciation to each person who contributed to this report. Special appreciation is expressed to Caly Coffey for her preparation of this report, and Melissa Tucker for her editorial review.

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## SUMMARY OF PROTECTED WILDLIFE LISTS

The first Florida Endangered Species List for wildlife was created 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. Updated Threatened species rules approved by FWC Commissioners went into effect on November 8, 2010, creating the Florida Endangered and Threatened Species List. Species listed through FWC's listing process are now all contained in a single-category called State-designated Threatened (ST). This single-category is designed to eliminate controversy about what a species is called and instead focus attention on the conservation actions needed to improve the species' status. Florida's Species of Special Concern (SSC) List has been temporarily retained to allow time to assess these species under Florida's listing process to determine whether they should be listed as State-designated Threatened species or removed from the list (see the Threatened Species Management System and Listing Process section on page 2 for details). In addition, all Florida species listed under the U.S. Endangered Species Act by the U.S. Department of the Interior's Fish and Wildlife Service (USFWS) or the National Oceanic and Atmospheric Agency's Marine Fisheries Service (NOAA-Fisheries) are now included on the Florida Endangered and Threatened Species List as Federally-designated Endangered (FE), Federally-designated Threatened (FT), Federally-designated Threatened Due to Similarity of Appearance [FT(S/A)], or Federally-designated Nonessential Experimental species (FXN).

Rule 68A-27.003, Florida Administrative Code (F.A.C.), contains the official Florida Endangered and Threatened Species List. Rule 68A-27.005, F.A.C, contains the State-designated Species of Special Concern List. Currently, FWC lists 147 fish and wildlife species (**Table 1**) as FE (52), FT (31), FXN (1), FT(S/A) (4), ST (17), or SSC (42). There is no duplication in species listing between the two lists. Collectively, these 147 species are referred to as Florida's listed species. FWC did not conduct management or research activities on all listed species this year; therefore, this report does not contain discussion of all listed species. Appendix A contains a complete listing of Florida's listed fish and wildlife species as of June 30, 2016. Changes to the list may occur throughout the year; a compilation of Florida's current listed species is available at <http://myfwc.com/media/1515251/threatened-endangered-species.pdf>. The rules noted above are available at the F.A.C. website (<https://www.flrules.org/gateway/ChapterHome.asp?Chapter=68A-27>).

At the Federal level, NOAA-Fisheries is responsible for listing most marine species and the USFWS is responsible for other species. The Federal list of animals and plants is administered by USFWS and published in Chapter 50 of the Code of Federal Regulations: animals in 50 Code of Federal Regulations 17, and plants in 50 Code of Federal Regulations 23. Additional information regarding Federal listings for NOAA-Fisheries and USFWS may be located at <http://www.nmfs.noaa.gov/pr/species/index.htm> and <http://www.fws.gov/endangered/species/us-species.html>, respectively. The Florida Department of Agriculture and Consumer Services (FDACS) has a Florida Statewide Endangered and Threatened Plant Conservation Program (<http://www.freshfromflorida.com/Divisions-Offices/Florida-Forest-Service/Our-Forests/Forest-Health/Florida-Statewide-Endangered-and-Threatened-Plant-Conservation-Program>). It also includes a list of Florida's Federally-listed plant species that may be accessed at <http://www.freshfromflorida.com/Divisions-Offices/Florida-Forest-Service/Our-Forests/Forest-Health/Florida-Statewide-Endangered-and-Threatened-Plant-Conservation-Program>.

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Threatened-Plant-Conservation-Program/Florida-s-Federally-Listed-Plant-Species.

**Table 1.** Summary of Florida’s Protected Wildlife List as of June 30, 2016.

Number of species listed by FWC as Federally-designated Endangered (**FE**), Federally-designated Threatened (**FT**), Federally-designated Threatened Due to Similarity of Appearance [**FT(S/A)**], Federally-designated Nonessential Experimental Population (**FXN**), State-designated Threatened (**ST**), or State-designated Species of Special Concern (**SSC**).

STATUS DESIGNATION	FISH	AMPHIBIANS	REPTILES	BIRDS	MAMMALS	INVERTEBRATES	TOTAL
FE	3	1	4	8	23	13	52
FT	2	1	6	6	1	15	31
FT(S/A)	0	0	1	0	0	3	4
FXN	0	0	0	1	0	0	1
ST	3	0	7	5	2	0	17
SSC	6	4	6	16	6	4	42
<b>TOTAL</b>	<b>14</b>	<b>6</b>	<b>24</b>	<b>36</b>	<b>32</b>	<b>35</b>	<b>147</b>

## **STATUTORY REQUIREMENTS**

### **CRITERIA FOR RESEARCH AND MANAGEMENT PRIORITIES**

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-27.0012, 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 State listing action. In addition to the listing process, FWC uses a species ranking process that was developed by FWC and published in Wildlife Monographs in 1990 (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 of conservation measures and the amount of effort previously expended on them, which then is used to help in prioritizing agency resources. FWC also maintains a list of Species of Greatest Conservation Need, which uses a set of scientific core criteria and identifies the broad range of Florida's species that are at-risk or could become at-risk in the future. In addition to these tools, FWC must also consider available funding sources, legislation, court rulings, grant agreements, and approved management plans when setting priorities for allocating resources for the management and conservation of Florida's State-listed species.

### **STATEWIDE POLICIES PERTAINING TO LISTED SPECIES**

Listing Actions (Brad Gruver) – During FY 2015-16, a biological review group was appointed to perform a biological status report on the Miami tiger beetle. In addition, biological status reviews were performed on the three species of alligator snapping turtle after recent research showed that there were three species in Florida instead of one.

Completed biological status reports, species action plans, and completed management plans are available at <http://myfwc.com/wildlifehabitats/imperiled/biological-status/>, <http://myfwc.com/wildlifehabitats/imperiled/species-action-plans/>, and <http://myfwc.com/wildlifehabitats/imperiled/management-plans/>, respectively.

Threatened Species Management System, the Listing Process, and Management Plans (Claire Sunquist and Brad Gruver) – Rules implementing the Threatened Species Management System, including a revised listing process, became effective on November 8, 2010. These rules are available at <https://www.flrules.org/gateway/ChapterHome.asp?Chapter=68A-27>. In fall 2010, FWC conducted biological status reviews for all State-designated Threatened or State-designated Species of Special Concern that had not recently been evaluated. FWC Commissioners approved updated species listing recommendations in June 2011, based on these biological status reviews. Management planning for State-designated Threatened species and State-designated Species of Special Concern is nearly complete, with expected finalization by

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November 2016. FWC Commissioners will decide on final listing rule changes upon management plan approval.

As of June 30, 2016, there were 59 State-designated Threatened species and State-designated Species of Special Concern. Gopher tortoise management and permitting is proceeding under the revised ten-year management plan, approved in September 2012, and the revised permitting guidelines, approved in February 2015. The Panama City crayfish has a draft management plan and permitting guidelines nearing completion. The remaining 57 State-listed species are included in the new management planning approach for at-risk species. The focus for on-going at-risk species management planning is to utilize an integrated management approach to improve resource utilization and cooperation with partners and provide a long-term strategy for conservation and management of at-risk species. This integrated model includes a multi-species plan (the Imperiled Species Management Plan) that allows FWC to identify potential or real conflicts, recognize opportunities, and achieve efficiencies in a way that single-species management at this volume would not allow.

FWC is developing the Imperiled Species Management Plan in phases. The initial phase summarizes, in species action plans, the species conservation actions necessary to address identified threats for individual or small groups of similar species (e.g., wading birds). These species action plans do not contain all of the elements required in a management plan and instead serve as a compilation of conservation actions for each species. FWC worked with subject matter experts and stakeholders to develop the species action plans that were completed in November 2013. The second phase, completed in fall 2014, focused on developing integrated conservation strategies and determining how to implement the plans. Integrated conservation strategies aim to address common threats and needs for multiple species in order to achieve efficiencies and align current and future resources.

The third phase of planning includes the development of the final Imperiled Species Management Plan, along with associated rule changes and permitting guidelines. In addition to a summary of the species action plans and the integrated conservation strategies, the Imperiled Species Management Plan describes FWC's approach to cohesive implementation; outlines six main objectives for the ten-year plan; identifies how progress will be monitored; and addresses the ecological, social, and economic impacts of the Imperiled Species Management Plan. The second draft of the Imperiled Species Management Plan released in November 2015, generated over 400 comments from partners and stakeholders. The July 2016, updated draft Management Plan is available at <http://myfwc.com/media/4037021/Draft-Imperiled-Species-Management-Plan.pdf>, with the formal public comment period running through September 2, 2016. Species guidelines outlining conservation measures and permitting standards are currently under development for several species and will continue through 2017 and 2018. FWC will present the final Imperiled Species Management Plan, associated rule changes, and species guidelines for final FWC Commission approval in November 2016. Partners and stakeholders have been integral in the development of the species action plans and draft Imperiled Species Management Plan. FWC will continue to engage and update stakeholders and incorporate their input into the finalization of the Imperiled Species Management Plan, along with the associated rule changes and permitting guidelines. Independent Economic Assessments have been conducted relating to the rule changes associated with Rule. 68A-27 F.A.C., species conservation measures and permitting guidelines for the Florida sandhill crane, the white-crowned pigeon, and the Everglades mink. Additional information on these resources may be accessed at <http://myfwc.com/wildlifehabitats/imperiled/management-plans/>.

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Since FY 2013-14, the Legislature has authorized recurring Threatened and Nongame Species Management funding. FWC uses these funds to conduct activities to improve the status of Florida's State-designated Threatened and nongame species, focusing on the development and implementation of management plans, research and monitoring programs, and undertaking conservation actions. This funding has allowed FWC to conduct conservation actions and/or monitoring for State-listed species such as the Homosassa shrew, Florida mouse, Sherman's fox squirrel, Eastern chipmunk, blackmouth shiner, saltmarsh topminnow, harlequin darter, Panama City crayfish, Worthington's marsh wren, reddish egret, and American oystercatcher. FWC also utilizes these funds for conservation actions for the Federally-designated Endangered Florida grasshopper sparrow, and habitat management to benefit sandhill species at several wildlife management areas (WMAs). Funding also provides volunteer coordinators to assist with citizen science projects for the Southeastern American kestrel and the Florida bonneted bat, and technicians have conducted stewardship activities for listed shorebirds (snowy plover, American oystercatcher, black skimmer, and least tern) at designated Critical Wildlife Areas across the State.

## **REQUIRED LEGISLATION**

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

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**FUNDING REQUEST**

Recommended Funding Level (*Charlotte Jerrett*) – The recommended level of funding for FWC Endangered and Threatened species programs in FY 2017-18 is \$31,131,941 (**Table 2**). This includes funding to maintain and enhance current programs and continuation of awards from Federal grants designed to assist in development of recovery programs.

**Table 2.** FWC Endangered and Threatened Species Funding Request for FY 2017-18.

<b><u>Funding Source</u></b>	<b><u>Amount</u></b>
<b>Nongame Wildlife Trust Fund (NWTF)</b>	<b>\$4,145,304</b>
<b>Florida Panther Research &amp; Management Trust Fund (FPRMTF)</b>	<b>\$1,108,772</b>
<b>Save the Manatee Trust Fund (STMTF)</b>	<b>\$3,836,602</b>
<b>Marine Resources Conservation Trust Fund (MRCTF)</b>	<b>\$8,632,524</b>
<b>Land Acquisition Trust Fund (LATF)</b>	<b>\$1,785,580</b>
<b>State Game Trust Fund (SGTF)</b>	<b>\$1,416,313</b>
<b>Federal Grants (FGTF)</b>	<b>\$8,254,244</b>
<b>Grants and Donations Trust Fund</b>	<b>\$1,952,602</b>
<b>Total</b>	<b>\$31,131,941</b>

## PROGRESS REPORT

FWC's mission is "managing fish and wildlife resources for their long-term well-being and the benefit of people." Management of listed species 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 populations 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.

In 2010, FWC completed biological status reviews on 61 State-listed species (including the Florida black bear, which is no longer listed in Florida) to vet their status against the newly adopted listing criteria. Review groups looked at: 1) population size and trends; 2) distribution and range; 3) threats to the species; 4) published population viability models; and 5) specific aspects of the species' life history that may influence the range-wide and Florida-specific status of the species. After the completion of the biological status reviews, FWC developed species action plans for the species that did not have existing management plans. Species action plans describe individual species threats and conservation needs. Some species met the State-designated Threatened species listing threshold, and their status will change once FWC Commissioners approve the Imperiled Species Management Plan (the culmination of all of the species action plans) and associated rule changes, which is expected to be considered in November 2016. Appendix A contains a complete list of listed species' scientific and common names, and Appendix D provides the same information for non-listed species.

### MAMMALS

#### **Beach Mice** (*Jeff Gore and Ryan Pawlikowski*)

Several subspecies of the old-field mouse, collectively known as beach mice, inhabit coastal dune habitat along the Atlantic Coast and northwest Gulf Coast of Florida. Beach mice also occur along the coast of Alabama. Due to extensive development of their coastal habitat, as well as impacts from hurricanes and non-native predators, all but one of the beach mouse subspecies are listed as Federally Endangered or Threatened by the USFWS. In Florida, these include the Choctawhatchee beach mouse, Anastasia Island beach mouse, St. Andrew beach mouse, Perdido Key beach mouse (all Federally-designated Endangered), and the Southeastern beach mouse (Federally-designated Threatened).

Gulf Coast Conservation and Population Monitoring – FWC, Florida Department of Environmental Protection's (FDEP) Florida Park Service, Gulf Islands National Seashore, the St. Joe Company, and Tyndall Air Force Base continued a long-term monitoring program for beach mice in FY 2015-16 at 11 sites along the northwest Gulf Coast of Florida (**Table 3**).

The mean detection rate (percentage of stations with tracks per sampling period) varied from 56% at Deer Lake State Park to 93% at Perdido Key State Park (**Table 3**). Most sites had

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mean detection rates above 80%, which indicates most of the available habitat is occupied by beach mice. On the other hand, the same four sites (Deer Lake State Park, Grayton Beach State Park, Topsail Hill State Park, and Rish State Park) that had the lowest detection rates in FY 2015-16 also had the lowest rates in FY 2014-15.

The high detection rate for Perdido Key beach mice is particularly encouraging, because less than ten years ago populations of the Perdido Key beach mouse were at perilously low levels and were restricted to the eastern end of the island. Since 2010, however, beach mice have been detected throughout the three large public lands on Perdido Key and even in some areas in between. The improved status of Choctawhatchee beach mice at Grayton Beach State Park is also encouraging. Beach mice were absent here until 2011 when mice were reintroduced from nearby Topsail Hill Preserve State Park. Track monitoring in FY 2011-12 indicated the reintroduced mice had established a new population and expanded throughout most of the available habitat. Monitoring during FY 2015-16 indicates that the mice are still present throughout most of the park, although detection rates are relatively low.

**Table 3.** Mean percentage of track stations with beach mouse tracks in FY 2015-16 at 11 coastal locations in northwest Florida.

<b>Sampling Locations</b>	<b>Subspecies</b>	<b>Number of Stations</b>	<b>Monitoring Interval</b>	<b>Percent of Stations with Tracks</b>
Billy Joe Rish Park (Gulf County)	St. Andrews	21	2 month	71
Deer Lake (Walton County)	Choctawhatchee	16	1 month	56
East Crooked Island (Gulf County)	St. Andrews	42	1 month	80
Grayton Beach (Walton County)	Choctawhatchee	45	1 month	58
Gulf Islands National Seashore (Escambia County)	Perdido Key	80	2 month	86
Perdido Key State Park (Escambia County)	Perdido Key	81	2 month	93
Shell Island East (Bay County)	Choctawhatchee	30	1 month	92
Shell Island West (Bay County)	Choctawhatchee	20	1 month	87
St. Joseph Peninsula State Park (Gulf County)	St. Andrews	40	2 month	90
Topsail Hill Preserve (Walton County)	Choctawhatchee	32	1 month	74
Water Sound (Walton County)	Choctawhatchee	4	1 month	63
West Crooked Island (Bay County)	Choctawhatchee	30	1 month	83

East Coast Beach Mouse Conservation – The Southeastern beach mouse historically occurred from Volusia County south to Broward County, and possibly as far south as Miami Beach. The current distribution of this mouse is likely restricted to Volusia and Brevard counties, and perhaps scattered locations in Indian River, St. Lucie, and Martin counties. Since field surveys to detect beach mice had not been conducted in St. Lucie and Martin counties in



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more than ten years, FWC used track tubes to determine the presence of Southeastern beach mice along approximately 13 miles of suitable beach dune habitat in southeast Florida. Track surveys north of St. Lucie Inlet were completed in FY 2015-16. Rodent tracks were found in Avalon State Park, Fort Pierce Inlet State Park, and Pepper Beach, but could not be confirmed as beach mouse tracks. Subsequent trapping at those sites resulted in captures of cotton rats, but no beach mice. Therefore, the current southern extent the range of the Southeastern beach mouse remains undetermined.

In FY 2015-16, FWC participated in several meetings with conservation partners regarding beach mice. Two meetings with the USFWS identified conservation priorities for Southeastern beach mice and discussed defining habitat and potential conservation actions to implement. FWC also met with multiple agencies to address the status of Anastasia Island beach mice and the impacts of beach management activities. At two subsequent meetings, FWC met with Federal, State, private, and academic partners to discuss plant propagation guidelines for dune restoration, beach lighting impacts, non-native and invasive predators, population assessment methods, and the status of beach mouse populations.

Development Impacts – During FY 2015-16, FWC consulted with landowners and State and Federal agencies regarding development at several sites in beach mouse habitat on both the Atlantic and Gulf coasts. FWC also continued collaboration with University of Florida researchers conducting a study, funded by the Florida Department of Transportation, to identify potential impacts to beach mice from a proposed widening of State Road 292 on Perdido Key. The study will assess direct mortality associated with road crossings as well as indirect effects that the road has on long-term persistence of the subpopulations on each side of the road.

**Florida Mouse** (*Travis Blunden, Terry Doonan, and Jayde Roof*)

The Florida mouse is currently listed in Florida as a State-designated Species of Special Concern. In 2010, FWC and external experts conducted a biological status review, and it was determined that the species did not meet the criteria for State listing. The species will remain a State-designated Species of Special Concern until FWC Commissioners approve the Imperiled Species Management Plan, which is expected to be considered in November 2016.

Florida mice occur primarily in fire-maintained, dry, upland scrub, and sandhill habitats. The Florida mouse is unique among rodents found in Florida because these mice usually construct their burrows within burrows of the gopher tortoise. In those habitats where Florida mice occur, frequent, prescribed burning is a necessary management tool to maintain good quality habitat.

Assessing the Genetic Structure of the Statewide Florida Mouse Population for More Effective Conservation and Management – FWC is collaborating with researchers from the University of Florida to assess statewide Florida mouse genetics. Genetic analyses conducted for this study will determine whether any local populations are genetically unique, which is necessary to understand the places or situations in which relocations authorized through permitted gopher tortoise relocation activities will be potentially viable. Further, this work will produce good information on the extent of gene flow, or connectivity, among local populations, across the range of the Florida mouse, which is needed for better management of this species across its

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range. Genetic analyses also will help to identify and prioritize areas of high conservation value for Florida mice throughout the state.

Field sampling this year has added over 113 new Florida mice samples. Through the first three years of this project, University of Florida researchers have genotyped 626 Florida mice representing 41 capture locations. Preliminary results indicate genetic diversity is higher in the southern parts of the species' range (i.e., the Lake Wales Ridge) than in the northern parts of the range (e.g., the Brooksville Ridge). Genetic differentiation was high among sampled locations, even at scales of only a few kilometers.

Surveys on Andrews Wildlife Management Area in Levy County – Andrews WMA contains limited habitat suitable for the Florida mouse. During FY 2015-16, FWC conducted a Florida mouse survey on the 33-acre restoration area near the southeast corner of Andrews WMA. FWC conducted the surveys between April 26-27, 2016, and nine Florida mice were captured.

Survey at Guana River Wildlife Management Area in St. Johns County – In March 2016, WMA staff conducted a presence/absence survey for Florida mice. Four separate areas of scrub were surveyed for four nights. No Florida mice were caught during 320 trap nights. This was the second unsuccessful attempt to find them on the WMA.

Survey at Salt Lake Wildlife Management Area in Brevard County – In February 2016, WMA staff conducted a presence/absence survey for Florida mice. Four separate areas of scrub or scrubby flatwoods were surveyed for four nights. Despite recording 320 trap nights, no Florida mice were caught. This was the second unsuccessful attempt to find them on the area.

### **Eastern Chipmunk** (*Chris Winchester*)

The eastern chipmunk is a State-designated Species of Special Concern. Chipmunks are common throughout much of the Eastern U.S., but are uncommon in Florida. Historical data suggests chipmunks occur only in northwest Florida and may be restricted to upland, hardwood forest habitat. Data collected by FWC in 1990 found chipmunks in Escambia, Santa Rosa, Okaloosa, Walton, and Holmes counties along the Backwater, Yellow, Escambia, and Choctawhatchee river watersheds. The estimated chipmunk distribution at that time was 877 square miles.

In order to evaluate the Eastern chipmunk's population status in Florida and determine management needs, FWC used multiple survey methods, targeting both public and private lands, to evaluate current chipmunk population status in Florida. Using the data collected from various survey methods, FWC estimated the extent of occurrence (or range) and area of occupancy (area occupied within range boundaries) of chipmunks in Florida, and developed a predictive habitat model. Chipmunk extent of occurrence in Florida is 2,531 square miles, which is 48% larger than the previous estimate. Chipmunk area of occupancy in Florida is 254 square miles, which suggests chipmunks are uncommon and occupy only about ten percent of the total area within their range. Based on the predictive habitat model, chipmunks are more likely to occur in more northern and western portions of northwest Florida, and in areas with hardwood forest near streams. In June 2015, FWC completed a final report on chipmunk research in Florida and submitted a biological status review. In the final report, FWC biologists determined that

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chipmunks have not declined in range over the last 25 years in Florida, but do have specific habitat preferences that may limit occupancy within their range. Based on the criterion and listing measures specified in the biological status review, FWC biologists recommended that chipmunks not be listed as State-designated Threatened and no longer required listing as a State-designated Species of Special Concern.

**Everglades Mink** (*Chris Winchester*)

The Everglades mink is a State-designated Threatened subspecies. Between July 2014 and June 2016, FWC biologists conducted field surveys on three mink subspecies in Florida: Gulf salt marsh mink, Atlantic salt marsh mink, and Everglades mink. The Everglades mink is one of four subspecies of mink in Florida and is known to occur in the freshwater marshes and wet forests of the Everglades. Historical data describing mink distribution is limited and largely anecdotal. Previous attempts to detect mink in Florida were unsuccessful, suggesting effective survey methods are lacking. In order to learn more about Everglades mink distribution, an effective survey method needs to be developed. To meet this need, FWC biologists evaluated the efficacy of camera traps and spotlighting as methods for detecting mink in Florida. In addition, a website (<https://public.myfwc.com/hsc/mink/getlatlong.aspx>) was created for the public to report mink sightings, which can be used to guide survey efforts and supplement field data.

Atlantic salt marsh mink and Gulf salt marsh mink were detected on camera traps in Nassau, Duval, Dixie, Levy, and Citrus counties between October 2013 and May 2016. In July 2014, FWC began surveys for Everglades mink at Fakahatchee Strand Preserve State Park, Picayune Strand State Forest, and Big Cypress National Preserve in South Florida. Everglades mink were detected on one transect during spotlight surveys along Janes Scenic Drive in Fakahatchee Strand and were also detected on two of 438 (less than one percent) camera traps, both of which were trail cameras attached to trees. No Everglades mink were detected on floating camera traps. Camera traps effectively detected Atlantic and Gulf salt marsh mink. Neither camera traps nor visual surveys were particularly effective in detecting Everglades mink. Future Everglades mink surveys will focus on surveying additional public lands outside of Fakahatchee Strand.

**Homosassa Shrew** (*Terry Doonan and Katherine Teets*)

The Homosassa shrew is currently listed in Florida as a State-designated Species of Special Concern. This subspecies of the Southeastern shrew was originally thought to have a range limited to a single locality near Homosassa Springs in Citrus County. In 1991, an analysis of museum specimens confirmed the subspecies status of the Homosassa shrew, but expanded the range to include the northern two-thirds of peninsular Florida. The study stressed that future work was warranted because of the very limited number of specimens from Florida included in the analysis. In 2010, FWC conducted a status review for the Homosassa shrew and recommended that it remain a State-designated Species of Special Concern until more information could be collected on its distribution, abundance, and threats.

Status and Distribution of the Homosassa Shrew in Florida – The goal of this project was to obtain data needed to reassess the listing status. FWC obtained several types of data. First,

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FWC contacted natural history museums for historical records of shrew specimens from Florida. Records were obtained from ten museums and from multiple other sources, including other FWC staff, Florida Natural Areas Inventory, and Florida Department of Environmental Protection (FDEP). Altogether, FWC obtained records for 858 shrews, though only 87 were Homosassa shrews.

In addition, field surveys for Homosassa shrews were conducted by FWC on five public conservation areas: Fort White Wildlife and Environmental Area (WEA) in Gilchrist County, Andrews Wildlife Management Area (WMA) in Levy County, Caravelle Ranch WMA in Putnam and Marion counties, Lafayette Forest WEA in Lafayette County, and Holton Creek WMA in Hamilton County, using drift fence arrays with pitfall traps. Additional data were obtained from another study using similar survey procedures on three additional areas: Ocala National Forest in Marion County, Camp Blanding WMA in Clay County, and Suwannee Ridge WEA in Hamilton County. Total trapping effort was 686,448 trap nights across all sites, producing 12 Homosassa shrews, which were captured across five conservation areas.

Multiple lines of evidence from this project indicate the accepted range is a reasonable estimate of the extent of occurrence for the Homosassa shrew. The number of habitats where Homosassa shrews were recorded shows there is a large area of occupancy within that extent of occurrence. These results indicate an apparent low rate of occurrence for the Homosassa shrew, which may be consistent with results from other recently published studies. FWC summarized these results in a draft final report that is still under review.

#### **Sherman's Short-tailed Shrew** (*Chris Winchester*)

The Sherman's short-tailed shrew is one of two species of short-tailed shrew that occurs in Florida and is considered endemic, occurring only in Florida. The species is believed to be restricted to a small area in southwest Florida from the vicinity of Royal Palm to just north of Fort Myers. In 2010, FWC and external experts conducted a biological status review that determined the Sherman's short-tailed shrew met the criteria to be listed in Florida as a State-designated Threatened species due to limited geographic range. No current data on range or occupancy are available which can be used to evaluate population status.

Between December 2014 and July 2016, FWC surveyed for Sherman's short-tailed shrew on publicly managed lands in Charlotte and Lee counties. All captured shrews were identified by species and either tissue samples (e.g. tail tip) or whole carcasses collected for future genetic analysis. A total of 255 least shrews and two short-tailed shrew were captured. The two short-tailed shrew specimens were captured on the Corkscrew Regional Ecosystem Watershed Wildlife and Environmental Area (WEA) in Lee County. This location is at the edge of the presumed range of the Sherman's short-tailed shrew, but genetic analysis is required to confirm that the specimens are Sherman's short-tailed shrew, and not the more common related species. Future surveys will focus on capturing additional short-tailed shrew specimens in order to properly evaluate the population status of the Sherman's short-tailed shrew.

#### **Sanibel Island Rice Rat** (*Terry Doonan*)

The Sanibel Island rice rat was identified as a unique subspecies in 1978. In 2010, a genetic analysis of marsh rice rats throughout the southeastern United States confirmed the Sanibel Island rice rat as a unique subspecies. The Sanibel Island rice rat occurs only on Sanibel

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Island and is currently a State-designated Species of Special Concern. In 2010, FWC and external experts conducted a biological status review that determined the Sanibel Island rice rat met the criteria to be listed in Florida as a State-designated Threatened species. A species action plan was completed in November 2013. The species action plan identifies habitat loss; habitat degradation and habitat fragmentation as major threats to the status of this species; and stated that development of a reliable monitoring program for detecting rice rats needs to be an initial focus for plan implementation. On Sanibel Island, the Sanibel Island rice rat is believed to exist mostly in freshwater, open marsh habitat that forms in swales across the island (swales are long, narrow, usually shallow, trough-like depressions in the ground that formed naturally). The freshwater marshes in the swales are extremely important to the existence of the Sanibel Island rice rat, but much of that habitat has been lost or degraded through construction of ditches in the past, and by invasion of woody brush.

Filling Data Gaps to Address the Status and Management of the Sanibel Island Rice Rat – FWC funded The University of Florida to conduct a three-year project beginning in FY 2015-16. This project addresses four objectives: 1) Determine the current distribution of the Sanibel Island rice rat; 2) Identify habitat features that influence the occurrence, colonization, and extirpation of Sanibel Island rice rat; 3) Evaluate the effects of habitat management activities on the occurrence and activity of Sanibel Island rice rats; and 4) Determine the most appropriate methods for a reliable monitoring program for the Sanibel Island rice rat population. To complement this project, FWC funded an additional project to restore significant areas of freshwater marsh habitat. The work is funded by a contract to Ding Darling National Wildlife Refuge and the Sanibel-Captiva Conservation Foundation, the organizations that manage a large proportion of the habitat potentially occupied by the Sanibel Island rice rat on Sanibel Island. This two-year project also began in FY 2015-16.

The first year of field work for this project was completed during FY 2015-16. Sanibel Island rice rats were captured at multiple study sites, both by photographs from game cameras as well as by standard live trapping of individuals. Heavy rains limited the effectiveness of the restoration activities carried out in the freshwater marsh habitat. The second year of field work surveying for the Sanibel Island rice rat will continue in FY 2016-17.

**Florida Bonneted Bat** (*Jeff Gore, Jennifer Myers, and Kathleen Smith*)

The Florida bonneted bat was Federally-listed by the USFWS as an Endangered species in October 2013. The Florida bonneted bat is the largest and rarest bat species in Florida. Florida bonneted bats have been known to occur in the Miami area since the 1930's; however, only one roost was known outside Miami (in a bat house at a private residence in Ft. Myers) until 2006. That year bonneted bats were detected through acoustic surveys by the Florida Bat Conservancy on Babcock-Webb Wildlife Management Area (WMA) in Charlotte County.

During FY 2015-16, emergence counts were conducted in July 2015 (86 bats in six roosts), August 2015 (53 bats in five roosts), and September 2015 (79 bats in five roosts) at bat houses on Babcock-Webb WMA. Also in FY 2015-16, FWC monitored bat houses during the bat maternity season to determine in which houses Florida bonneted bats gave birth and how many young were produced. Approximately 36 pups were observed in seven bat houses in FY 2015-16 compared to 22 pups counted in FY 2014-15. FWC will continue simultaneous emergence counts and monitoring for young in FY 2016-17.

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FWC and partners have funded three collaborative research projects involving the University of Florida for bonneted bats on Babcock-Webb WMA. A project to develop a survey protocol for the Florida bonneted bat and to identify habitats important for roosting and foraging was concluded in FY 2015-16. A portion of the grant also involved monitoring the bonneted bats occupying bat houses on Babcock-Webb WMA to determine survival rates. Data collection for this study ended in December 2015 after a total of 175 bonneted bats (60 males and 115 females) were captured. University of Florida researchers completed analysis of survival rates in FY 2015-16 and will publish results in FY 2016-17.

The second collaborative project, initiated by FWC in FY 2014-15, was designed to study the social structure of bonneted bat colonies and to identify factors that influence the roosting activity of the bats at Babcock-Webb WMA. During three capture sessions in FY 2015-16, FWC and University of Florida captured a total of 233 Florida bonneted bats, including 85 bats (36 male, 49 female) that were captured for the first time and PIT-tagged. Bats were captured at eight of the 13 bat houses on Babcock-Webb WMA and at one roost in a tree cavity. The number of bats in individual occupied houses ranged from six to 30.

A third research project exploring the effects of prescribed fire on Florida bonneted bats was initiated in FY 2014-15. This project includes acoustic monitoring and telemetry to evaluate how bonneted bats utilize habitat relative to prescribed fire. Babcock-Webb WMA is one of four study areas included in this project. During FY 2015-16, the University of Florida deployed acoustic detectors on Babcock-Webb WMA to monitor bat use in burned and unburned habitat. In addition, FWC helped capture bats on Babcock-Webb WMA and the University of Florida placed radio tags and Global Positioning Satellite (GPS) tags on captured Florida bonneted bats. This project is ongoing and results will become available during FY 2016-17.

FWC and partners hosted the third meeting of the Florida Bonneted Bat Working Group in May 2016. Forty-two people representing 15 organizations met to discuss ongoing research, monitoring, and conservation across the species' range. The Working Group plans to continue meeting annually to coordinate conservation activities among partners.

Corkscrew Regional Ecosystem Watershed Management Area in Lee County – Florida bonneted bat acoustical surveys were conducted on the Flint Pen Strand unit of the Corkscrew Regional Ecosystem Watershed Management Area in Lee County. Surveys were conducted to determine if Florida bonneted bats were present on the management area, and to provide the USFWS and the South Florida Water Management District with this information prior to conducting a hydrologic restoration in Flint Pen that would require them to mitigate for the presence of the Endangered bat.

A total of 202,327 acoustical survey files were analyzed by hand from 324 survey nights. Of those, 28 files contained Florida bonneted bat calls, which indicated presence. At least one bat pass from a Florida bonneted bat was detected at each of the seven survey locations.

### **Gray Bat** (*Jeff Gore*)

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

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Gray bats occupy different caves in summer and winter based upon temperature, and historically some bats migrated out of Florida during winter. No gray bats have been observed or captured at summer roosts in Florida during survey attempts since 1990.

Gray bats formerly roosted in winter in two Florida caves, and hibernating bats could be readily counted at both sites. During the most recent winter count on February 15, 2016, biologists found no gray bats in the former primary wintering cave (Old Indian Cave) in Florida Caverns State Park in Jackson County. On the same day, FWC also found no gray bats in the secondary cave adjacent to the park where gray bats previously roosted in some winters. In addition, FWC observed no gray bats in any of the 71 caves in northwest Florida that they visited during FY 2015-16 as part of a broader study of the use of caves by wintering bats. Although thousands of gray bats previously wintered in Florida's caves, no more than nine gray bats have been found hibernating in the state in any year since 2002.

Surveys that are more frequent or more intensive might provide evidence that gray bats are still present, but winter cave surveys are limited to once annually to minimize disturbance of the hibernating bats. Currently, the number of gray bats in Florida remains, at best, critically low, and the species may well already be absent from the state. Because the roost caves are protected, factors other than human disturbance of roosts are likely responsible for the decline. Interestingly, in other parts of their range, gray bat numbers have increased and very large colonies are present in caves in northern Alabama, northern Georgia, Tennessee, and other locations in the Southeast. Because some gray bats in Florida were known to migrate to northern caves each winter to hibernate, it is possible that protection and stabilization of the large summer colonies of gray bats in northern caves has led to bats no longer migrating to Florida.

**Big Cypress Fox Squirrel** (*Kathleen Smith*)

The Big Cypress fox squirrel is a State-designated Species of Special Concern in Florida. Big Cypress fox squirrel nest surveys were conducted by FWC from February-May 2016 on the Corkscrew Regional Ecosystem Watershed Management Area in Lee County. The objective of the surveys was to identify fox squirrel nests in trees that were slated for removal as a result of the South Florida Water Management District's hydrologic restoration project on the management area.

A total of 114 suspected fox squirrel nests were located within the survey area. Seventy-eight percent of the nests were found in bald cypress trees, 20% were found in South Florida slash pine trees, 1% in Myrsine, and 1% in Sweet Bay.

**Sherman's Fox Squirrel** (*Elina Garrison and Dan Greene*)

The Sherman's fox squirrel is a State-designated Species of Special Concern in Florida. Monitoring of Sherman's fox squirrels in Florida is difficult because of their large home ranges, low population densities, and the difficulty in live-trapping individuals. One of the major threats to the Sherman's fox squirrel is the loss, fragmentation, and degradation of remaining habitat. The species action plan for the Sherman's fox squirrel specifies the need for identifying and evaluating the extent of the remaining habitat, which includes a need to identify priority habitats and to develop management and monitoring guidelines.

During FY 2015-16, as part of the multi-year University of Florida and FWC study investigating the ecology and conservation of fox squirrels in Florida, genetic variation

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evaluation continued on the four subspecies in Florida. Genetic variation and structure were assessed based on DNA collected from 237 individuals from 43 counties. Preliminary results confirm that two distinct genetic populations occur in Florida. The most isolated subspecies is the Big Cypress fox squirrel, which is a State-designated Threatened species and occurs only in southwestern Florida. The second population, which occurs north of the Caloosahatchee River and is primarily considered to be Sherman's fox squirrels, does not appear to be genetically distinct from Bachman's or southeastern fox squirrels in Florida.

Data analyses, manuscript preparation, and publication related to other objectives of the University of Florida/FWC fox squirrel project were completed during FY 2015-16. These included evaluation of survey methods for fox squirrels, determining their state-wide distribution including observations in atypical habitats, identifying a technique to passively identify individuals from camera-trap photographs, an assessment of densities, evaluating citizen versus professional data for modeling their distributions, integrating models that unite local and regional data, and investigating habitat use and how management practices influence presence of fox squirrels.

**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 once roamed across eight southeastern states. Unregulated harvest of panthers through the mid-1900s along with subsequent habitat loss and fragmentation due to the growth of the human population, have reduced the size of the 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 likely fewer than 30 panthers still living in South Florida. Small population size and geographic isolation from other puma populations made the Florida panther vulnerable to extinction due to inbreeding. Therefore, in 1995, FWC, with the approval of the USFWS, began a genetic restoration plan by temporarily releasing eight female pumas from Texas into the wild in South Florida to increase the genetic diversity of the remnant population. These releases mimicked natural genetic exchange among panthers and other puma subspecies that likely last occurred in the 19<sup>th</sup> century. The benefits accrued to the Florida panther population via genetic restoration have played a pivotal role in the subsequent increase in the population size since 1995. FWC estimates that the Florida panther population is currently between 100-180 adults and subadults in South Florida.

FWC and its partner, Big Cypress National Preserve (BCNP), continue to monitor the genetics and population parameters of the Florida panther. Biologists annually capture a sample of panthers between November and February and fit them with collars containing radio transmitters. These radio-collared panthers are monitored three times a week and their locations are recorded. Since 1981, 243 panthers have been radio-collared, providing essential data for the management and conservation of the population. Biologists collected radio telemetry data on 28 Florida panthers in FY 2015-16. In addition to monitoring adult panthers by radio telemetry, FWC and BCNP biologists visit dens of radio-collared female panthers to mark and collect biological samples from newborn kittens. These work-ups included weighing, determining gender, administering de-wormers, marking them with passive integrated transponders (PIT) tags (a chip placed below the skin, for tracking and identifying individual panthers), and collecting tissue and fecal samples to assess their physical and genetic health. During FY 2015-16, FWC



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and BCNP biologists visited seven panther dens and documented 15 kittens (seven males, eight females). Since 1992, 462 kittens have been handled at dens.

During FY 2015-16, 48 wild Florida panthers are known to have died, including six female radio-collared panthers and 42 (26 males, 12 females, four unknown sex) uncollared panthers. Thirty-eight of the 48 panthers died after being hit by vehicles, three were killed by other panthers, six died from undetermined causes, and one died of starvation after orphaning. In addition to these mortalities, biologists removed two panther kittens (female UCFP253 and male UCFP261) from the wild permanently after they were orphaned. Both are now in permanent captivity at the Palm Beach Zoo (Palm Beach County) and Homosassa Springs Wildlife State Park (Citrus County), respectively.

FWC is currently involved in several collaborative research projects focusing on issues related to Florida panther conservation and management. Among these are: a population viability analysis that involves individual-based models; testing novel methods of estimating home ranges using GPS data; assessing genetic restoration using whole genome sequencing; evaluating the presence and significance of various parasites and environmental contaminants in panthers; determining mortality factors; assessing the efficacy of panther rehabilitation; and evaluating the diet of panthers from scat and stomach contents. Research projects involving FWC are also playing an integral role on several subteams of the USFWS Panther Recovery Implementation Team in hopes of improving the science involved with monitoring progress towards recovery. FWC assisted with the completion of several collaborative research projects during FY 2015-16 including: deriving a technique of using information from panther road mortalities and telemetry locations to obtain a population estimate for the current breeding range; the efficacy of uniquely identifying panthers on trail camera photos; and assessing pathogen exposures among populations of wild and domestic cat species.

FWC continues to assess innovative techniques that could potentially provide statistically robust estimates of the panther population size, a task that is notoriously difficult for wide-ranging, endangered large carnivores like the Florida panther. Collaborative efforts have identified two promising protocols. A methodology that relies on a combination of trail camera surveys and marked panthers was initiated in the spring of 2014. Preliminary analyses indicate that this method may have utility for estimating a range-wide panther population size with reasonable levels of precision. Additional work on improving the statistical model should finalize this project during FY 2016-17, and results will be submitted for publication in a peer-reviewed journal. The second technique, that incorporates panther road mortality data and telemetry locations, has been applied to data collected by FWC from 2000-2012. The appeal of this method is that it permits both a retrospective and current assessment of the range-wide panther population size. While this methodology provided the first true estimate of the population size of Florida panthers across the entire breeding range, the confidence intervals associated with the estimate were wide due to sample sizes. Future research may focus on deciphering how to improve the precision of estimates calculated with this methodology. A manuscript describing this research was published in the *Journal of Applied Ecology* in 2015.

FWC investigates human-panther interactions in accordance with the Interagency Florida Panther Response Plan, which may be accessed at [http://www.floridapanther.net.org/images/field notes/EA for the Panther Response Plan FINAL\\_PUBLISHED.pdf](http://www.floridapanther.net.org/images/field_notes/EA_for_the_Panther_Response_Plan_FINAL_PUBLISHED.pdf). FWC verified that panthers were responsible for preying upon domestic animals (called depredations) in 23 separate events during FY 2015-16. In some cases, multiple animals were killed or injured during a single event. These 23 verified panther depredation

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events all occurred in Collier, Hendry, and Lee counties, and the majority of depredations occurred in Golden Gate Estates, east of Naples in Collier County. During depredation investigations, FWC provides assistance and advice to affected residents on how they can reduce the risk of panther attacks on pets and livestock. FWC, as a member of the Interagency Florida Panther Response Team, also documented three panther encounters. An encounter is defined as an unexpected direct meeting or a series of meetings over a short period between a human and a panther. The three encounters occurred when: 1) A juvenile panther was found resting next to a house; 2) A homeowner trying to get his/her dog back to the house found that the dog was watching a panther standing near a deer carcass; and 3) Another juvenile panther entered a lanai through a broken pet door and then exited on its own.

FWC contracted with the University of Florida to explore human dimension issues related to panther population expansion. The primary objective of this research was to integrate natural sciences and economics to investigate which different types of panther habitat conservation incentives appeal to landowners. Conserving panther habitat on private lands is essential for advancing panther recovery throughout its range. This work is completed and the final report provided insights into which incentives (financial incentives, regulatory relief, and/or assistance) landowners prefer and the potential costs of implementing these incentives.

FWC provided information and reviews of numerous road and development projects throughout southern Florida during FY 2015-16. FWC reviews road projects to minimize the disruption of panther habitat and corridors, and provides recommendations to reduce the risk of panther-vehicle collisions. Similarly, FWC reviews plans for urban development to minimize the loss of panther habitat and to reduce the likelihood of human-panther interactions.

FWC launched a new website in August 2012 where the public can report panther sightings and upload pictures or videos of those sightings: <http://www.myfwc.com/panthersightings>. As of the end of FY 2015-16, people submitted over 3,400 records of panther sightings. Most records (75%) did not include evidence that would permit verification by FWC that the animal seen was a panther. Of the records that included photographs, FWC verified 47% as panthers and 23% as bobcats. Other purported sightings of panthers were determined to be other animals such as coyotes, dogs, foxes, house cats, otters, and a monkey (*Rhesus macaque*).

An extensive collection of additional panther reports and publications on current panther management and research may be found at the following websites:

<http://www.floridapanther.net.org> and  
<https://www.fws.gov/verobeach/ListedSpeciesMammals.html>.

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

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. Florida's efforts to conserve the manatee are funded primarily by the Save the Manatee Trust Fund that derives approximately one-third of its funds from the sale of specialty license plates. Conservation efforts are guided by the Florida Manatee Sanctuary Act of 1978 [s. 379.2431(2), F.S.], the Florida Manatee Management Plan approved by FWC Commissioners in December 2007 (which may be accessed at <http://myfwc.com/media/415297/manateemgmtplan.pdf>), and the USFWS Florida Manatee

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Recovery Plan of 2001 (which may be accessed at [http://ecos.fws.gov/docs/recovery\\_plan/011030.pdf](http://ecos.fws.gov/docs/recovery_plan/011030.pdf)).

In 2004, FWC and USFWS established the Manatee Forum, a diverse stakeholder group, with the goal of reducing litigation by establishing areas of common ground, identifying problems or conflicts, developing potential solutions, and accepting differences through increased communication. During FY 2015-16, the Manatee Forum met twice, once in November 2015 and once in May 2016. During the November meeting, the presentation topics included manatee warm-water habitat, habitat restoration, and manatee use of springs located along the St. Johns River. The May meeting included information about the USFWS proposed manatee reclassification, manatee entanglement in fishing gear and other debris, and FWC rule review of Collier County's manatee protection zone rule. 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 very valuable to all parties.

*Management Activities* – FWC and USFWS continue to work closely on manatee issues, particularly human-related threats and habitat enhancement. For more information regarding manatee conservation efforts, please see the Save the Manatee Trust Fund 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>, which describe progress and activities of the Manatee Management Plan. This manatee report covers programs such as Manatee Protection Plans, Manatee Protection Zones, permit reviews, habitat, population assessment, and behavioral ecology. FWC's Florida Manatee Management Plan directs management activities, and it focuses on five program areas: Manatee Protection Plan, Manatee Protection Zones, permit reviews, manatee habitat, and outreach (provided in the outreach portion of this report).

Manatee Protection Plans (MPPs) – Development of these plans involves FWC working closely with county governments and the USFWS to develop and implement comprehensive county-based MPPs. FWC's Executive Director approves MPPs with concurrence by the USFWS. During FY 2015-16, FWC, in collaboration with Flagler County and the USFWS, completed the Flagler County MPP. FWC continues to assist Charlotte County in developing their first MPP. The USFWS and the local advisory committee have approved the final draft of this plan. Charlotte County has held two public meetings to collect public comments, and the final adoption of the plan by the County may occur by late summer 2016. FWC also continues to assist Miami-Dade County with informal input, when requested, while they assess revisions to their plan.

Protection Zones – FWC develops boating speed and safe haven zones statewide to protect manatees. Extensive work, involving county governments, stakeholder groups, and the public is required in order to develop and authorize these zones. FWC Commissioners approve final protection zone rules. During FY 2015-16, FWC completed work on manatee protection zones for western Pinellas County. Following review of the report from the Local Rule Review Committee and publication of a proposed rule in December 2014, FWC Commissioners approved a final rule at the end of FY 2014-15 (at their June 2015 meeting). Two rule challenges were filed in August and the rule was reconsidered at the November 2015 Commission meeting; however, FWC Commissioners approved a change to resolve the challenges. A final rule was filed for adoption with the Department of State in December 2015. Small rule changes in two other counties also were completed this fiscal year, one at the request

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of Citrus County to address a regulatory marker issue on the Homosassa River and the other at the request of Flagler County to expand the zone near Lehigh Canal in association with a planned boat facility development in the area. The changes for Citrus County were filed for adoption with the Department of State in April 2016, while the changes for Flagler County were filed for adoption in May 2016. FWC also continued work to review the existing rule for Collier County, as well as met with the County, the USFWS, local governments, interested stakeholder groups, and residents to discuss available data and potential protection needs. In addition, during FY 2015-16, FWC held a public meeting in March 2016, and the County formed a Local Rule Review Committee that met seven times and submitted its report to FWC in May 2016 (FWC participated in all seven meetings). As of the end of FY 2015-16, FWC was reviewing the Committee's report with the intent of preparing a draft rule proposal for consideration by FWC Commissioners in late 2016.

Permit Reviews – FWC produced 237 final comment or assistance letters for proposed permitting projects reviewed during FY 2015-16. These biological opinions provide recommendations to regulatory agencies on ways to reduce impacts to manatees. Several of the permit review efforts focused on maintenance and expansions of Florida ports. Implementation of the boat facility siting portion of FWC-approved MPPs is accomplished during permit reviews and helps expedite the process. Distribution of public information about manatees is also completed through these comments, as facilities are required to post informational signs on manatees and distribute written materials to vessel operators.

Manatee Habitat – During FY 2015-16, FWC participated in various intergovernmental groups and task forces regarding minimum flows at springs, invasive aquatic plant control, seagrass monitoring and protection, water control structure-related mortalities, and other habitat-related concerns.

One example of a manatee habitat project is a collaborative effort with the Southwest Florida Water Management District and the USFWS on a shoreline stabilization project at Three Sisters Spring, which is an important manatee warm-water refuge in Crystal River. This project is expected to be completed by the fall of 2016. Additionally, FWC is working with the U.S. Army Corps of Engineers, Sarasota County, and many other partners to complete engineering and modeling required to plan for the restoration and enhancement of Warm Mineral Springs' downstream run, considered the most important manatee natural warm-water refuge along Florida's southwest coast. This project will improve access and habitat quality for manatees, and the engineering work is expected to begin in fall of 2016.

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

FWC researchers and law enforcement officers respond to statewide reports of manatee carcasses and injured manatees. FWC is strategically located in five coastal field stations in order to maintain response capabilities on a statewide basis. During FY 2015-16, 466 manatee carcasses were documented in Florida. All but 35 of these carcasses were recovered and examined in order to determine causes of death. Collision with watercraft accounted for 99 of the 466 cases. Other causes of manatee death are those associated with near-term or newborn (perinatal) issues, cold stress, natural causes, and human influence. An interactive searchable web-based database with manatee mortality information is available at:

<http://myfwc.com/research/manatee/rescue-mortality-response/mortality-statistics>.

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During FY 2015-16, FWC and cooperators rescued 88 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; FWC provides partial reimbursement for their costs. As of the end of FY 2015-16, 46 of these rescued manatees were released back into the wild, 22 died, and 20 were still being treated. FWC participated as a contributing organization to multi-agency efforts to release and track rehabilitated manatees rescued due to injury, cold stress, or other problems. As part of that partnership, FWC participated in almost every rescue, transport to rehabilitation facilities, pre-release health assessment, and release of rehabilitated manatees in various parts of the state. The information obtained from manatee rescues, rehabilitations, treatments, and necropsies contributes to manatee conservation efforts by identifying important continuing and emerging threats to the species.

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; conducting aerial surveys used to determine regional distribution and abundance of manatees and assessing habitat use; and estimating survival, population growth, and reproductive rates through photo-identification and the recent application of genetic markers.

The annual statewide manatee survey [required annually, weather permitting, by s. 379.2431(4)(a), F.S.] was conducted in winter 2016, when 6,250 manatees were counted by a teams of observers from multiple organizations. Results from the traditional survey provide a minimum number of manatees known to be alive using warm water and winter habitats on a particular survey day. The inability to account for manatees not seen during the fly over (related to weather and water conditions, and manatee behavior) results in counts that vary widely across surveys and are, consequentially, of limited utility. Concerted effort has therefore been put forth over the past several years to improve the ability to estimate manatee abundance. For more information about previous survey counts, please refer to <http://myfwc.com/research/manatee/projects/population-monitoring>.

In 2015, FWC accomplished a key goal of its Manatee Management Plan. A primary conservation goal of the plan was to “implement peer-reviewed and statistically sound methods to estimate the manatee population and monitor trends.” The findings, published in the journal *Biological Conservation*, represent a significant improvement over the traditional survey approach discussed above. The new abundance survey is a benchmark achievement in monitoring Florida manatees. The new survey design accounts for key sources of bias and variation and provides an estimate of the Florida manatee population. Estimates can be used to track population changes over time and as part of population projection models to provide valuable feedback to conservation managers.

Genetic testing offers a means of identifying individual manatees; its application could greatly enhance existing monitoring and assessment studies. FWC continues to analyze data and make modifications to the sampling strategy in order to assess the potential of this technique. The manatee genetic-ID database currently includes 1,595 unique individuals identified by skin samples collected from live manatees in our southwest Florida pilot study area.

Behavioral Ecology – 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. During FY 2015-16, FWC, along with the U.S. Geological Survey and Mote Marine Laboratory, finalized a report regarding how manatees responded to a major change at a

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traditionally used Florida Power and Light power plant near Titusville in Brevard County. Part of the report included results from monitoring efforts using telemetry and environmental variables to describe fine-scaled movements and habitat use. Biologists captured, tagged, and tracked 57 manatees with GPS during the five winters from 2010-15.

Florida Sea Grant awarded FWC funds to advance a quantitative framework to evaluate vessel collision risk for marine mammals in Florida, including manatees. The work integrates various aspects of collision risk such as probability of intersection between boats and animals. Data streams include information on manatee depth and behavior via telemetry devices. The modeling effort is expected to help aid in the future assessment and design of speed zones that help to protect Florida's marine mammals from traumatic injury and death. A paper that presents a quantitative framework for estimating the probability of encounters between marine wildlife (i.e. manatees and right whales) and vessels was published in the peer-reviewed scientific journal *Methods in Ecology and Evolution*. Another paper that documents a study on the effect of manatees' diving behavior on their risk of collision with watercraft was published in the online peer-reviewed scientific journal *PLoS ONE*. The study showed that manatees were found, on average, only 3.6 feet below the surface, demonstrating how vulnerable this species is to vessel strikes.

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

The North Atlantic right whale is a Federally-designated Endangered species in Florida. The only known calving grounds for this species are off the coast of northeast Florida and southeast Georgia. The calving season for the North Atlantic right whale is approximately November 15-April 15. During the calving season, FWC collaborates with Federal, State, and non-governmental partners to carry out field research, including aerial surveys, biopsy sampling, tagging, disentanglement, and stranding events. Most of this work is supported by funds from the National Oceanic and Atmospheric Agency's National Marine Fisheries Service (NOAA-Fisheries) and is aimed at documenting the seasonal presence of right whales, mitigating vessel-whale collisions, and assessing population dynamics. FWC is one of a handful of major contributors to the North Atlantic Right Whale Catalog (<http://rwcatalog.neaq.org/Terms.aspx>), the central repository for archiving and maintaining photographs and sighting data on North Atlantic right whales. Photographs are used to identify individual whales based on the callosity (a natural growth of cornified skin) pattern on their head as well as scars caused by vessel strikes and entanglement in fishing gear. Over time, population demographics, reproductive success, mortality, and trends in health and scarring are monitored, in part, through this photo identification research. FWC has also worked closely with partners to compile years of southeastern U.S. aerial survey data into a geographic information system (GIS). Analyses of these spatial data help scientists and managers to evaluate right whale residency patterns and distribution in the calving area in relation to environmental factors such as sea surface temperatures and water depth, and human activities such as vessel traffic and fishing activity. FWC also analyzes ship traffic data to help monitor compliance with vessel speed regulations and conduct risk assessments.

During the 2015-16 calving season, FWC conducted 56 aerial surveys and 24 vessel cruises. Through collaborative efforts with NOAA-Fisheries, the Georgia Department of Natural Resources, the Sea to Shore Alliance, and volunteer sighting networks, 34 unique North Atlantic right whales were documented (including 14 newborn calves), and 15 North Atlantic right

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whales were biopsy sampled (including 13 calves). FWC participated in North Atlantic right whale satellite tagging with NOAA's Southeast Fisheries Science Center; tags were attached to four right whales. FWC also worked with volunteer sightings networks in Florida to confirm sightings of whales reported by the public, as well as mitigate human interaction with whales.

No North Atlantic right whale carcasses or entanglements were detected in the southeastern U.S. during this calving season, but two injured adult females were documented in poor health. FWC and other partners responded to a mother-calf pair that swam into Sebastian Inlet and remained there for about 28 hours.

## **BIRDS**

**Audubon's Crested Caracara** (*Dawn Dodds, Jason Huckabee, Tiffany Thornhill, and Andrew West*)

The Audubon's crested caracara is a Federally-designated Threatened species.

Dinner Island Ranch Wildlife Management Area, Spirit of the Wild Wildlife Management Area, and Okaloacoochee Slough Wildlife Management Area in Hendry and Collier Counties – FWC continued Audubon's crested caracara nest surveys during FY 2015-16. The surveys were conducted from January to March using FWC's standard monitoring protocol. During the surveys, no additional crested caracara nests were located at Dinner Island Ranch Wildlife Management Area (WMA). Nest checks were performed, however, at five nests previously found during past surveys. Only one nest was determined to be active. No nests were located on Spirit of the Wild or Okaloacoochee Slough Wildlife Management Areas.

Fisheating Creek Wildlife Management Area in Glades County – FWC began Audubon's crested caracara nest surveys on Fisheating Creek WMA during FY 2012-13. The surveys were initiated to comply with the USFWS wildlife monitoring requirements for the Cowbone Marsh Restoration Project. During the FY 2015-16 surveys, four crested caracara nests were located with two fledging young.

**Black Rail** (*Amy Schwarzer*)

The black rail is a secretive marsh bird that inhabits high salt marsh and shallow freshwater marshes throughout Florida. The Eastern subspecies is currently undergoing review for Federal listing due to declining numbers and range contraction in portions of its U.S. range. The species' current status and distribution in Florida, as well as trends at historically occupied sites, is unknown.

During FY 2015-16, at the request of the USFWS, FWC coordinated surveys on 13 conservation lands, from the Panhandle to Central Florida, for black rails. Sites included six historically occupied sites as well as new sites with potentially suitable habitat. Not all partners have reported data yet, but, overall detections were quite low for FWC contracted; birds were detected at only 12 of 203 survey points. Detections were spread out across multiple areas, however, and black rails were confirmed as being present on seven of the 13 conservation lands surveyed, including all six historically occupied sites.

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**Everglade Snail Kite** (*Tyler Beck*)

The Everglades snail kite is a Federally-designated Endangered bird that inhabits freshwater marshes and lakes. In Florida, core snail kite habitat includes the Everglades, Lake Okeechobee, the Kissimmee Chain of Lakes, and the upper St. Johns marsh. In recent years, Lake Istokpoga in Highlands County and storm water treatment areas in Palm Beach and Hendry counties have also seen significant levels of snail kite nesting. The Everglades snail kite population crashed in the 2000s, going from over 3,000 birds at the end of the 1990s to approximately 600 by 2008. Since then, the population has been steadily increasing, and the most recent population estimate is roughly 2,100 birds, but the population is still about half what it was less than 20 years ago. The snail kite population decline was primarily caused by low levels of reproduction and too few young surviving to breeding age.

The primary focus of management efforts in the past several years has been to increase nesting success and juvenile survival through a suite of habitat management and conservation activities. Nesting sites in primary lake habitats are managed annually to reduce predator access by isolating nest patches from shorelines and working with water managers to maintain flooded conditions under nests throughout the nesting season. Invasive and exotic plant management is closely coordinated around nesting habitats to eliminate potential disturbances from management activities and to improve nesting and foraging habitats through proactive plant management. Snail kite nesting locations are marked with warning signs if they occur in places with high levels of recreational use or near residential areas, and tourism, angling, and hunting activities are coordinated to reduce disturbances. Foraging perches are also distributed around nesting sites, providing more stable platforms for young snail kites learning to feed themselves and to eat large exotic snails.

Large-scale habitat management activities involve multiple agencies. FWC works closely with partners to improve Everglades habitats, lake watersheds, water regulation schedules, and to improve connectivity between large water bodies. Although habitat conditions have improved for snail kites since their population crash, it is also clear that at least some of the recent population increase has been due to the presence of the exotic apple snail, which reproduces in large numbers and can tolerate a wide range of habitat conditions. There are risks involved, however, with relying on an exotic species to assist in achieving recovery goals. Therefore, FWC must continue to conserve and restore native apple snail habitat, and more information is needed about the long-term impact that exotic apple snails may have on snail kite ecology and habitat. FWC is conducting multiple studies to assess the impact of habitat management and water level control on the snail kite prey population and nesting effort. FWC's work with partners on hydrologic and vegetation management will continue to play a critical role in snail kite recovery efforts.

**Florida Grasshopper Sparrow** (*Tina Hannon, Karl Miller, and Erin Ragheb*)

The Florida grasshopper sparrow is a Federally-designated Endangered species endemic to the dry prairie plant communities of Florida. Florida's dry prairie is a distinct 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 grasshopper sparrow to



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Federally Threatened when ten protected locations contain stable, self-sustaining populations of more than 50 breeding pairs each.

The Florida grasshopper sparrow is not known to exist at more than four locations, including: the Three Lakes Wildlife Management Area (WMA) and the Kissimmee Prairie Preserve State Park in Osceola County, the Avon Park Air Force Range (Federal land) in Highlands and Polk counties, and a parcel of privately owned land in Osceola County. The Kissimmee Prairie Preserve State Park and Avon Park Air Force Range populations are currently near extirpation. The population on the Three Lakes WMA has also witnessed a large decline over the last several years, but active reproduction continues. Population levels on additional private lands are currently unknown but are being assessed by FWC and the USFWS.

Management and Research on Three Lakes Wildlife Management Area in Osceola County – Surveys for the Florida grasshopper sparrow have been conducted on the Three Lakes WMA during the spring since FY 1990-91. During FY 2015-16, point count surveys estimated there were at least 35 different male Florida grasshopper sparrows at the main site, which is a substantial decrease from the 53 detected in FY 2014-15. The overall declining trend of detected males across the last several years is of great concern to FWC and USFWS. Monitoring will continue on the Three Lakes WMA in FY 2016-17.

In an effort to restore and maintain the dry prairie, oak trees and cabbage palms were mulched on 133 acres of the prairie; oaks resprouting within previous tree removal areas were cut and sprayed with herbicide to prevent re-encroachment into these areas; and oaks outside of historic mesic hammocks were cut down by WMA staff. In addition, an interagency working group, a graduate student from the University of Maryland, Baltimore County, and FWC are conducting intensive research in an attempt to determine the primary causes for the Florida grasshopper sparrow's decline and taking measures to increase survival and productivity.

Demographic Monitoring at Three Lakes Wildlife Management Area in Osceola County – The fourth season of Florida grasshopper sparrow demographic research by FWC was conducted during FY 2015-16 and will continue in FY 2016-17. This project has been a cooperative effort involving FWC, USFWS, and members of the Florida Grasshopper Sparrow Working Group.

During FY 2015-16, as part of the continued effort to color-band the entire male population, seven adult males, ten females, three independent fledglings, and 62 nestlings from successful nests were newly captured and color-banded. In addition to these new captures, 42 males and 12 females banded prior to 2016 were resighted in 2016. Together, the number of color-banded individuals observed at least once at Three Lakes WMA in 2016 is 49 adult males and 22 adult females, as well as 62 fledged nestlings and three independent fledglings of unknown sex. All known adult males have been color-banded so far in the FY 2015-16 breeding season, but several females remain unbanded.

Having most of the study population uniquely marked has allowed FWC to collect valuable data on dispersal. One adult male newly banded at Three Lakes WMA in April 2016 was detected on a private ranch property May-June 2016. Another male banded at Three Lakes WMA as a nestling in 2015 was detected at Kissimmee Prairie Preserve State Park in April 2016. This male was resighted back at Three Lakes WMA May-June 2016. No birds banded at other sites have been observed dispersing to Three Lakes WMA. Frequent movements of territorial males across management unit boundaries have been observed within the study area. Careful

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documentation of these movements will be used to understand habitat management preferences (particularly after prescribed burning events).

So far in FY 2015-16, FWC has located and monitored 50 Florida grasshopper sparrow nests (46 of these were protected with fences; see below). Of these nests, four remain active, 23 survived to fledge young, 14 flooded, one failed to hatch, and six were depredated.

Unseasonably severe rain events on May 4, May 17, and June 7-8, 2016 resulted in population-wide flooding and nest loss early in the breeding season. Five of six monitored nests failed as a result of the unexpected May 4, 2016 storm. In anticipation of the May 17<sup>th</sup> storm event, five eggs from one nest were collected preemptively by USFWS and provided to the Rare Species Conservatory Foundation in Loxahatchee, Florida, for addition to the captive breeding effort. During and after the May 17<sup>th</sup> storm, one fledgling, three nestlings, and 21 eggs were collected from nine nests and provided to the Foundation for captive hatching and rearing once it was determined that success in the wild was unlikely. Only one of 11 monitored Florida grasshopper sparrow nests was lost to flooding during the June 7-8, 2016 storm. The flooding of six nests was prevented prior to this storm by manually elevating an island of sod (eight inch radius) containing the nest by approximately two inches. Naturally elevated nests, or nests with older (more than five days old) nestlings were not lifted. This emergency action was completed in approximately ten minutes and all breeding females resumed normal behaviors at the nests after manipulation as verified by camera footage. No additional nests have been lost to flooding since the June 7-8, 2016 storm because of drier conditions overall.

Surveillance of Grassland Bird Nests Using Video Systems – So far in FY 2015- 16, miniature nest cameras have been placed at the entrances of 49 ground-nesting birds (39 Florida grasshopper sparrows, five Bachman’s sparrows, two Eastern meadowlarks, and three common ground doves) at Three Lakes WMA. Twenty-three of these nests have successfully fledged young, three are still active, one was abandoned, one failed from band picking, one failed from nestling leg entanglement, thirteen were flooded, and eight were depredated. Five depredated nests were consumed by two nine-banded armadillos, a corn snake, a spotted skunk, and a black racer. Only the corn snake successfully scaled a predator deflection fence to depredate nestling Florida grasshopper sparrows (see below). The data provided by these nest cameras has been invaluable to our understanding of the predator community and will be critical when planning future management strategies.

The Effectiveness of Predator Deflection Fencing at Increasing Nest Survival of Ground-Nesting Birds – To date, 46 Florida grasshopper sparrow nests have been fenced, and four Florida grasshopper sparrow and 25 Bachman’s sparrows were unfenced. Preliminary results suggest that nest survival is substantially increased by fence installation. The probability of nest failure by predation is 8.23 times more likely for unfenced nests than fenced nests (89% vs. 12% when calculated across 21-day nest cycle). Only four predators have breached the fences after 489 fenced exposure days in FY 2015-16 (two corn snakes [one partial depredation and one complete] and two unknown predators). When all sources of failure are considered, the probability of survival is 5.94 times greater for fenced nests than unfenced nests (44% vs. 7%, 21-day survival probability). An estimated additional 46 dependent fledglings were produced through the protection measures applied to these nests.

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**Florida Sandhill Crane** (*Tim Dellinger*)

The Florida sandhill crane is non-migratory and confined to Florida and adjacent parts of southern Georgia, primarily the Okefenokee Swamp. This subspecies is State-designated Threatened due to population decline throughout its range in recent decades. Furthermore, the Florida sandhill crane subspecies was petitioned for Federal listing as Endangered by the Center for Biological Diversity in 2010.

Monitoring and Management Protocol Development – In FY 2013-14, FWC began range-wide road surveys to measure the regional productivity of Florida sandhill cranes. In 2014 and 2015, FWC documented 404 adults and 89 young, and 369 adults and 92 young birds, respectively. In all survey years, Osceola and Okeechobee county routes were regional crane strongholds. Another round of surveys will continue in FY 2016-17.

Habitat Management to Improve Productivity – In 2013, FWC began a study to examine whether habitat manipulation of dry prairie can enhance crane productivity. The study area is in Osceola County and consists of marshes surrounded by dry prairie on Three Lakes Wildlife Management Area (WMA) and marshes surrounded by improved pasture on an adjacent private ranch. The Three Lakes study site has suitable marshes for cranes to breed; these marshes, however, are surrounded by unsuitable habitat consisting of a dense ring of palmetto. The dry prairie also consists of sparse to dense palmetto. FWC roller-chopped one-half of the Three Lakes study site to determine if this management tool could be used to increase sandhill crane productivity by reducing palmetto density.

FWC collected nesting and productivity data in FY 2013-14, 2014-15, and 2015-16 via aerial surveys. In 2015, there were 18 nests: ten on the private ranch, and eight on Three Lakes dry prairie. No chicks survived to fledging age (approximately 60 days). Prior to the start of the FY 2015-16 breeding season, a total of 413.5 acres of palmetto were roller-chopped on the Three Lakes study site, roughly one-quarter of the study site. During the FY 2015-16 breeding season, FWC monitored 11 nests on the private ranch and four on Three Lakes dry prairie. Two of the private ranch nests fledged chicks, but none fledged on Three Lakes, nor were any marshes adjacent to roller-chopped areas used for nesting. Another quarter of the Three Lakes study site was roller-chopped in the winter of FY 2015-16 for a total of 785 roller-chopped acres. During the FY 2015-16 breeding season, FWC monitored 16 nests on the private ranch, three on Three Lakes dry prairie, and one in the Three Lakes roller-chopped area. No chicks survived to fledging at any of the sites. FWC will continue to monitor nesting and document usage of roller-chopped areas in FY 2016-17.

**Florida Scrub-Jay** (*Jonny Baker, Nancy Dwyer, Craig Faulhaber, Norberto Fernandez, Allan Hallman, Brad Kolhoff, Karl Miller, Dwight Myers, Steve Shattler, David Turner, Matt Vance, and Andrew West*)

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. Scrub-jay populations are thought to have declined by as much as 90% since the late 1800s due to habitat loss and degradation. Florida scrub-jays rely on fire to maintain low and open habitat. Typical habitat management efforts include controlled burning and mechanical

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treatments such as roller chopping and cutting of trees that have encroached on scrub-jay habitat. 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. Since 80% of the species found in scrub have habitat requirements similar to those of Florida scrub-jays, conservation actions aimed at scrub-jays are likely to benefit many other species.

Conservation Coordination – During FY 2015-16, the Florida Scrub-jay Conservation Coordination Project continued to work with partners to enhance range-wide conservation efforts. FWC provided assistance with surveys looking at the dispersal and population status of scrub-jays in Ocala National Forest in the summers of 2015 and 2016, and spring of 2016. FWC facilitated communication and information exchange among partners via regional working groups focused on conservation of scrub-jays and their habitat. FWC organized, or assisted in organizing, a total of three working group meetings and field trips for regional working groups. These working groups provide an excellent opportunity for participants to network, share ideas and experiences, and learn about new developments. In addition, FWC: developed management plans and guidelines to assist partners with scrub-jay conservation efforts; participated in updating the Federal Recovery Plan for the species; continued revising the FWC’s Scrub Management Guidelines to help land managers determine the best ways to restore and manage scrub-jay habitat; and drafted new guidelines for banding Florida scrub-jays and submitted the draft to FWC leadership for approval. FWC also helped organize the annual Florida Scrub-Jay Festival to celebrate and raise awareness about the Florida scrub-jay and its habitat. The annual festival moves around the state from year to year to reach out to different audiences.

Ocala National Forest in Central Florida – The status and trend of Florida scrub-jays in this crucial population remain uncertain because of unique challenges stemming from forest management practices. Harvest rotations for sand pines sustain the scrub-jay population by continually creating openings in the scrub, but also limit the potential carrying capacity for the region. During 2011, FWC and partners developed and implemented an annual monitoring protocol for tracking scrub-jay population density and productivity in harvested stands in the Ocala National Forest; the monitoring program has been in place ever since.

During FY 2015-16, FWC continued a post-reproductive monitoring program on long-term study sites. Using a partnership of biologists and volunteers, the team surveyed 18 forest stands and mapped 72 scrub-jay family groups containing 177 adults and 76 juveniles. Productivity was above average this breeding season, with an average of more than one juvenile per family group.

FWC continues to study the demographics and dispersal of scrub-jays in this unique landscape. By fall of 2015, 17 records of natal dispersal were documented. Ten (59%) of these were relocations within the same stand or within the next closest suitable stand, but three were long-distance movements of three to nine miles. Data on density, productivity, and dispersal were used to make recommendations to the U.S. Forest Service for how to locate new “Scrub-Jay Management Areas” within the forest landscape.

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Arbuckle and Walk-in-the-Water Wildlife Management Areas in Polk County – The Arbuckle Wildlife Management Area (WMA) and the Walk-in-the-Water WMA are part of the Lake Wales Ridge State Forest and encompass nearly 20,000 acres 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. The Florida Department of Agriculture and Consumer Services (FDACS) is the lead management agency on these areas, and FWC is a cooperating agency. FDACS and FWC manage both tracts using prescribed fire and nearly half of these areas are potentially suitable for Florida scrub-jays.

During FY 2015-16, 13 scrub-jay groups were located on Arbuckle WMA. The number of groups (13), total number of birds (41), and mean group size (3.15) all increased, but the number of juveniles (.85) per group decreased from previous years.

During FY 2015-16, nine scrub-jay groups were located on Walk-in-the-Water WMA. The total number of scrub-jays (18) and the number of groups (nine) increased, while the mean group size (2.0) and the number of juveniles per group (.11) decreased from previous years.

In FY 2013-14, FDACS applied for and received grant funding from The Nature Conservancy to enhance Florida scrub-jay habitat on Walk-in-the-Water WMA, with support from FWC. The objective was to reduce the density and height of oak species using mechanical equipment (chainsaws) and herbicide. A total of 64 acres were treated mechanically, chemically, and then burned in 2016. FDACS and FWC will continue to monitor the results of these treatments and apply additional prescribed fire and mechanical treatment, if needed, in the future.

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 Florida scrub-jay. Historically, two locations around Camp Blanding (Kingsley Lake scrub site and the Lowry Lake scrub site) have had up to four scrub-jays present. One scrub-jay was observed during FY 2015-16 at the Lowry Lake scrub site during the survey period July 9-27, 2015. Camp Blanding is considered the northern most population of the Florida scrub-jay.

Cedar Key Scrub Wildlife Management Area in Levy County – FWC currently assists the Florida Department of Environmental Protection (FDEP) in the monitoring and management of Florida scrub-jays on the Cedar Key Scrub WMA. As many as five family groups of scrub-jays have been documented in and around Cedar Key Scrub WMA; four within the WMA, and one outside the WMA. The monitoring program includes monthly monitoring of birds at specific sites, a Jay Watch route, banding chicks of the year, and sexing the adults through territorial and nesting behavior. None were found during FY 2015-16, though there are sightings of individuals on private lands adjacent to the WMA.

Fisheating Creek Wildlife Management Area in Glades County – FWC began Florida scrub-jay surveys as part of Audubon of Florida's Jay Watch program in 2009. One adult scrub-jay was observed during the FY 2015-16 surveys. Although the scrub-jay was seen on the WMA, it is also utilizing the conservation easement next to the property. This is the first siting of a scrub-jay on the WMA since 2012 when one adult was seen in about the same location. Recent management actions of roller chopping 13 acres to reduce maturing oaks and prescribed burns of 36 acres within scrub habitat have improved WMA habitat for scrub-jays.

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Half Moon Wildlife Management Area in Sumter County – FWC continued to monitor Florida scrub-jays on the 9,500-acre Half Moon WMA. Volunteers from the Audubon of Florida's Jay Watch program have contributed to surveys each summer. Six Florida scrub-jays were observed during FY 2015-16 by Jay Watch.

Habitat management has focused on growing-season prescribed burning; roller chopping palmetto; and mowing, cutting, or applying herbicide to overgrown oak trees. Half Moon likely harbors a maximum of 500 acres of potential scrub-jay habitat, which consists of scrubby and mesic flatwoods. This may be marginal habitat as no true scrub exists in the area. In November 2015, approximately 90 acres of potential scrub-jay habitat was roller-chopped.

Salt Lake Wildlife Management Area in Brevard County – During FY 2015-16, seven individuals in three family groups were recorded at Salt Lake WMA. There was no documented recruitment in FY 2015-16. This is the same number of individuals in three groups reported in FY 2014-15. All of the scrub-jay family groups are located in proximity to the Salt Lake WMA boundaries, and each family group has territories that extend onto adjacent public and private properties. Monitoring efforts are scheduled to continue into FY 2016-17.

During FY 2015-16, approximately 96 acres of scrub, scrubby flatwoods, and mesic flatwoods in need of management were identified and prescribed fire was applied. Management activities slated for FY 2016-17 include the continued use of prescribed fire on approximately 200 acres 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 in cooperation with 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 Wildlife and Environmental Areas (WEAs).

Annual monitoring of Florida scrub-jays during FY 2015-16 occurred at three mitigation parks in the southwest region. Moody Branch WEA in Manatee County was monitored using Jay Watch. Five groups of scrub-jays consisting of 13 individuals were located during the surveys; a decrease of four individuals from the previous year, and this included five juveniles. Land management activities in scrub-jay habitat on Moody Branch WEA included prescribed fire on 173 acres, 279 acres of treatment of exotic plants, 60 acres mowed to control weedy species, and 107 acres of forested habitat mechanically treated to control sand pine and hardwood encroachment. Scrub-jay monitoring at Hickey Creek WEA in Lee County utilized Jay Watch for the second year in FY 2015-16. Monitoring efforts revealed two groups of scrub-jays consisting of six individuals, with one juvenile being confirmed after the nesting season. Additional birds were occasionally observed just off the site in a residential area. The population increased by one bird from the previous year. Management actions include 81 acres of prescribed burning within oak scrub and 28 acres of mechanical treatments to reduce mature oaks. The Platt Branch WEA in Highlands County was monitored by FWC and has a scrub-jay population that consists of seven groups with 18 individuals. Group numbers were the same as

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the previous year with one additional individual observed in 2016; five of the scrub-jays were juveniles. Management efforts included burning 694 acres. Mechanical treatments included mowing 75 acres of scrub and large oaks to improve habitat. Four plots of ½-acre each were planted with scrub oaks within an old pasture to facilitate restoration as scrub-jay habitat.

Lake Wales Ridge Wildlife and Environmental Area in Highlands and Polk Counties – The Lake Wales Ridge WEA in Highlands and Polk counties consists of 19 tracts, 12 of which contain known groups of Florida scrub-jays. FWC monitors scrub-jay populations on select tracts of the Lake Wales Ridge WEA in cooperation with Archbold Biological Station and Jay Watch.

During FY 2015-16, the number of scrub-jay groups increased at Carter Creek from two groups in 2013 to six groups. Total number of groups also increased at Henscratch from three groups in 2013 to five groups. Total number of groups also increased at McJunkin, from 15 groups in 2013 to 21 groups. Meanwhile, total number of groups declined at Gould Road and Lake Placid Scrub. At Gould Road, the total number of groups decreased from nine in 2013 to seven groups. The number of groups at Lake Placid Scrub decreased from 33 in 2013 to 32 groups. An increase from 19 groups in 2013 to 24 groups was reported for Silver Lake/Sun n' Lakes. Archbold surveys for the Silver Lake/Sun n' Lakes tracts extended beyond FWC managed lands and may not reflect an actual increase within FWC boundaries.

During FY 2015-16, Jay Watch volunteers and FWC surveyed Royce Unit, Clements, Highland Park Estates, and Silver Lake/Sun 'n Lakes tracts of the WEA. Data showed an increase in number of groups from ten in 2014 to 11. Highland Park Estates also experienced an increase in number of groups, from four in 2014 to six. Silver Lake/ Sun 'n Lake experienced a decline in number of groups, from 15 in 2014 to 14.

Controlled burns during FY 2015-16 included approximately 534 acres of occupied or potential scrub-jay habitat at the Carter Creek, Silver Lake, Lake Placid Scrub, Henscratch, and McJunkin tracts. Four acres of potential habitat were planted with oak seedlings and/or dibbled with acorns at the Royce Unit, as part of a Disney-funded habitat restoration project.

**Limpkin** (*Morgan Wilbur*)

The limpkin is State-designated Species of Special Concern in Florida. In FY 2013-14, FWC initiated testing of a draft protocol to detect trends in abundance and changes in occupancy of limpkins utilizing the Wacissa River spring run in Jefferson County. FWC conducted three surveys on March 15, April 19, and May 11, 2016. On March 15, nine limpkins were observed (seven males and two females); on April 19, 18 limpkins were observed (14 males and four females); and on May 11, 14 limpkins were observed (ten males and four females). This is the highest number of individual limpkins observed since FWC implemented this survey methodology.

**Marsh Birds** (*Pamela Boody, Matthew Goode, Paul Miles, Catherine Ricketts, Amy Schwarzer, and Mark Winland*)

Escribano Point Wildlife Management Area in Santa Rosa County – During FY 2015-16, FWC initiated a survey for the Louisiana seaside sparrow and Marian's marsh wren (State-designated Species of Special Concern) to determine occupancy on Escribano Point WMA.

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FWC did not detect either species during survey efforts, but staff from the Florida Natural Areas Inventory documented seven Marian's marsh wrens singing in salt marsh adjacent to Escribano Point WMA on April 19, 2016.

John C. and Mariana Jones/Hungryland Wildlife and Environmental Area in Martin and Palm Beach Counties – The Management Plan for the John C. and Mariana Jones/Hungryland Wildlife and Environmental Area (Hungryland WEA) calls for monitoring of limpkins, a State-designated Species of Special Concern, to establish a baseline and track relative abundance over time. FWC conducted marsh bird surveys on Hungryland WEA using a call/playback method for the following focal species: black rail, least bittern, king rail, purple gallinule, common moorhen, pie-billed grebe, and limpkin. Three transects were surveyed three times each during March and April. All focal species surveyed for were detected. The Everglades snail kite (Federally-designated Endangered) and Florida sandhill crane (State-designated Threatened) were opportunistically detected during the surveys.

Apalachicola River Wildlife and Environmental Area in Gulf and Franklin Counties – Since the spring of 2012, FWC has conducted surveys for secretive marsh birds at the Apalachicola River WEA (ARWEA). Surveys on the ARWEA target the following species: black rail, least bittern, king rail, clapper rail, common moorhen, purple gallinule, American coot, pied-billed grebe, and limpkin (a State-designated Species of Special Concern). In 2016, clapper and king rails and least bittern were most the most commonly detected species. FWC also recorded all other bird species detected during each survey with a particular focus on Marian's marsh wren (a State-designated Species of Special Concern). At 12 out of 13 (92%) survey points, FWC detected at least one marsh wren.

Worthington's Marsh Wren and MacGillivray's Seaside Sparrow in Northeast Florida – Worthington's marsh wren and MacGillivray's seaside sparrow are two subspecies of salt marsh songbirds that occur in northeast Florida. Worthington's marsh wren is a State-designated Species of Special Concern and a proposed State-designated Threatened subspecies, while the MacGillivray's seaside sparrow is currently undergoing review for Federal listing. Historically, both subspecies occurred from Nassau County south to Volusia County. Both subspecies have undergone considerable range contraction in the last 50 years, and their narrow coastal distribution makes them especially vulnerable to habitat loss and fragmentation. The two subspecies overlap in their habitat requirements and can therefore be surveyed together.

Surveys conducted in summer 2015 found and monitored 336 marsh wren nests and 26 seaside sparrow nests. Reproductive research for summer 2016 is on going, as the breeding season does not end until August 2016. In addition to nest success, FWC researchers also radio-tagged 16 marsh wren fledglings to examine survival during the first 21 days after fledging. Both the reproductive and post-fledging survival studies will continue until the end of the 2017 breeding season.

### **Osprey** (*Tim Dellinger and Karl Miller*)

Most North American ospreys breed throughout temperate areas and winter in the tropics. The subpopulation resident in southern Florida has characteristics that set it apart from the majority of the subspecies. Monroe County ospreys, as well as some individuals living in



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Collier, Lee, and Miami-Dade counties, are non-migratory, and their timing of nest initiation does not overlap with the rest of the North American population. Furthermore, while most osprey populations in North America are common, widespread or increasing, the southern coastal population has been in a steady decline since the 1970's. FWC listed the Monroe County population as a State-designated Species of Special Concern in 1987.

Genetics and Conservation – In FY 2013-14, FWC and Virginia Commonwealth University began a study to determine if the southern coastal population is a distinct subspecies using population genetic methods. In February 2014, FWC began collecting feather samples from ospreys; samples consisted of either shed feathers from below nests and/or plucked contour feathers from nestlings. Osprey feathers were collected from 182 locations through July 2014 and genetic analyses was completed in November 2015. Preliminary results suggest it is very unlikely that analyses will confirm Florida's non-migratory population as genetically distinct from osprey in the rest of Florida.

The winter-nesting, non-migratory subpopulation along the southernmost coast of Florida (primarily in Monroe County), is declining; the late-winter-or-spring-nesting, migratory subpopulation is stable or increasing. Although genetically they do not appear to be distinct, the demographic relationship between the southern coastal Florida population and other osprey in northern Florida remains unknown. The number of breeding pairs of osprey in Monroe County has been declining for decades, even though subpopulations that are more northerly are stable or increasing. Ongoing evaluation of whether to include this taxon on the State list of Threatened species will likely need to consider both the genetic affinity of the taxon (this study) as well as the Regional Assessment of Subpopulations in the Biological Status Review. Regardless of whether the population remains listed, the conservation and management actions identified in the species' action plan are likely to benefit osprey in southern Florida.

Assessing Florida Osprey Diets – In conjunction with FWC's genetic project, Virginia Commonwealth University researchers will use part of feathers collected in a stable isotope analysis to assess the diet of ospreys. The feathers' chemical structures will provide information as to what prey species are being consumed at the various sample locales. This study may provide insight into potential causes of declines of South Florida osprey populations. FWC expects results from Virginia Commonwealth University in March 2017.

**Other Listed Birds** (*Jeannette Parker, Kathleen Smith, and Andrew West*)

Migratory Bird Point Counts in Fisheating Creek Wildlife Management Area in Glades County – FWC conducted migratory bird counts on Fisheating Creek Wildlife Management Area (WMA) to comply with the USFWS wildlife monitoring requirements for the Cowbone Marsh Restoration Project. During the FY 2015-16 counts, 120 species were observed including Audubon's crested caracara (Federally-designated Threatened), bald eagle, Everglade snail kite (Federally-designated Endangered), Florida sandhill crane (State-designated Threatened), limpkin, little blue heron, roseate spoonbill, snowy egret, tricolor heron, white ibis (all State-designated Species of Special Concern), and wood stork (Federally-designated Threatened).

Breeding Bird Surveys on Corkscrew Regional Ecosystem Watershed Wildlife and Environmental Area in Lee and Collier Counties – FWC biologists conducted their third year of

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breeding bird surveys on Corkscrew Regional Ecosystem Watershed Wildlife and Environmental Area (WEA) between April and May 2016. The objective of the surveys is to document breeding bird distributions on the WEA. Survey methods were designed to be comparable with the Breeding Bird Atlas, a large scale, collaborative effort focused on recording the breeding distributions of all bird species in the country.

A total of 1,012 birds and 53 species were observed including several State-listed species such as white ibis, limpkins, Florida sandhill cranes, snowy egrets, and little blue herons.

Mangrove Cuckoo Land Bird Surveys on the Florida Keys Wildlife and Environmental Area in Monroe County – Mangrove cuckoo surveys were conducted on the Florida Keys WEA. Little is known of this species and in order to track population trends in the Keys, baseline population estimates must be established. During FY 2015-16, surveys were conducted from April through June 2016 using a standardized protocol. Although the mangrove cuckoo is not a State or Federally-listed species, the State-designated Threatened white-crowned pigeon was documented during these surveys. During FY 2015-16, 105 individual survey points were established, with a total of 207 surveys conducted. Surveys will continue into FY 2016-17 so that all potential habitat on the WEA may be surveyed.

**Red-cockaded Woodpecker** (*Diana Alix, Caly Coffey, Craig Faulhaber, Norberto Fernandez, Matthew Goode, Chris Green, Allan Hallman, Jon Hoch, Paul Miles, Hana Nardi, Catherine Ricketts, Steve Shattler, and Valerie Sparling*)

Conservation Planning – The red-cockaded woodpecker is a Federally-designated Endangered species. 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; however, 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 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 USFWS and FWC under the Federal Endangered Species Act. Since red-cockaded woodpeckers are protected under the Endangered Species Act, 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. An agreement 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, maintained by FWC, continues to enroll landowners. By the end of FY 2015-16, there were 17 signed agreements that comprised 20 different properties in the program with a total of 100,202 acres committed for habitat management by the landowners.

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At the close of the 2016 red-cockaded woodpecker breeding season, 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. Large red-cockaded woodpecker populations in Florida continue to be well managed. 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.

Meetings of the red-cockaded woodpecker working group and implementation of the statewide Red-cockaded Woodpecker Safe Harbor program will continue until the species meets its conservation goals.

Babcock/Webb and Yucca Pens Unit Wildlife Management Area in Charlotte and Lee Counties – The annual tree cavity survey conducted in FY 2015-16 revealed 45 active red-cockaded woodpecker clusters. Annual roost checks confirmed 37 potential breeding pairs, which is an increase of two groups from the previous year. There were eight solitary bird clusters, which is an increase of two from the previous year. Thirty-four potential breeding pairs attempted nesting; nine nests failed with three re-nesting, one successfully. Thirty-nine nestlings were banded (three were not banded) with 31 confirmed fledglings. Fourteen artificial cavities were installed, between eight active clusters, to bring all active clusters up to, and in many cases to exceed, the minimum of four suitable cavities per cluster. Three intra-population translocations of juvenile females were conducted; none were observed during subsequent nest search visits. FWC completed controlled burns on 18,908 acres; mowed around nine clusters to reduce fuel-load (vegetation) levels within 200 feet of the cavity trees; and roller chopped 1,264 acres to improve future connectivity.

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. Camp Blanding has 35 RCW clusters. During FY 2015-16, 33 clusters were active. Camp Blanding Forestry and FWC cooperatively burned a total of eleven red-cockaded woodpecker clusters and surrounding foraging area during FY 2015-16. FWC did not assist in artificial cavity inserts installed during FY 2015-16; however, five inserts were installed or replaced by Camp Blanding staff. Camp Blanding staff banded 68 birds, and 57 chicks were fledged.

Citrus Wildlife Management Area in Citrus County – Of the 82 active clusters in FY 2015-16, 66 nested and 59 were successful in fledging 109 young. Although the number of potential breeding groups on the area has leveled off, it was still a high of 73, which is the highest to date, one more than in FY 2014-15. Color banding continued with 116 nestlings banded during the FY 2015-16 nesting season.

Habitat management on Citrus included prescribed burns on 9,040 acres (2,933 acres were growing season burns), hardwood control, protecting cavity trees from fire, and installing or replacing artificial cavity inserts. About 50% of the clusters received fire in the past year. Encroaching hardwoods were cut and treated with herbicide in at least 20 clusters. WMA staff and volunteers protected, by mechanical means, over 400 cavity trees from fire in 45 clusters. Six inserts were replaced in clusters needing them while ten new inserts were installed in established or historic clusters. Another 21 inserts were cleaned and/or repaired.

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Citrus WMA is the furthest south of any donor population. In October 2015, 12 young-of-the-year from Citrus were translocated to other areas: four pairs went to Dupuis Wildlife and Environmental Area (WEA), one pair to Picayune Strand State Forest, and one pair to Triple N and Bull Creek WMAs. Up to six pairs will again be available from Citrus this fall to augment smaller populations to the south.

J. W. Corbett Wildlife Management Area in Palm Beach County – During FY 2015-16, FWC determined the number of active clusters, monitored active clusters for nests, color-banded nestlings and adults, and determined fledging success. Artificial cavities were installed, replaced, and maintained in existing clusters. Four new recruitment clusters were installed in order to accommodate translocated birds in the fall and five new clusters were added to supplement existing groups and encourage expansion into recently restored areas. A total of 42 artificial cavities were installed.

Habitat management included burning 6,594 acres and maintaining a three-year, growing-season burn rotation within occupied red-cockaded woodpecker habitat. Habitat restoration within red-cockaded woodpecker habitat included treating 16,846 acres of exotic plant species.

There were 29 active clusters and 21 potential breeding groups during the 2016 nesting season. Fourteen potential breeding groups attempted nesting and 11 clusters successfully fledged 15 birds. Corbett WMA received five pair of birds from Fort Stewart in fall 2015.

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

Three Lakes WMA supported 41 potential breeding groups during FY 2015-16 breeding season. This is down from 43 potential breeding groups in FY 2014-15. During the FY 2015-16 breeding season, 60 red-cockaded woodpecker nestlings were banded, 28 of the 43 nesting attempts were successful, and 44 of the 67 chicks survived to fledge the nest. One new cavity insert box was installed, and nine cavity insert boxes were replaced in order to augment existing nesting and roosting cavities. A total of 14 insert boxes were cleaned and maintained in FY 2015-16. Habitat management activities that enhance red-cockaded woodpecker habitat included prescribed fire on 9,963 acres, mechanical treatment (including roller chopping and mowing) on 22 acres, and exotic plant treatment. FWC pre-burned around cavity trees in an effort to protect them during prescribed fires.

The Herky Huffman/Bull Creek and Triple N Ranch WMAs supported 17 potential breeding groups during the FY 2015-16 breeding season. The number of potential breeding groups has been increasing since FY 2004-05, when FWC began yearly translocations of birds to the properties. In October 2015, eight individuals were translocated to Triple N Ranch and Herky Huffman/Bull Creek WMAs. Three of the translocated individuals remain in the area; one of which attempted to nest. During FY 2015-16, 11 of the 16 nesting attempts were successful and 23 nestlings were banded. Eighteen of the 23 chicks survived to fledge the nest. Eight cavity insert boxes were installed, and 17 cavity insert boxes were replaced in order to augment existing nesting and roosting cavities. Sixteen cavity insert boxes were cleaned and maintained in FY 2015-16. Habitat improvements by FWC included prescribed fire on 12,409

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acres, roller chopping and mowing on 904 acres, and invasive plant control on 1,627 acres. To protect red-cockaded woodpecker cavity trees during prescribed fires, FWC pre-burned around each tree.

Babcock Ranch Preserve in Charlotte County – Population monitoring of red-cockaded woodpeckers in FY 2015-16 was conducted by FWC. The annual tree cavity survey revealed ten active red-cockaded woodpecker clusters. Roost checks confirmed eight potential breeding groups, and two clusters occupied by solitary birds. All eight breeding groups attempted nesting, with only one nest failure. The seven successful nests produced 12 nestlings. All 12 nestlings were banded, nine of which were confirmed as fledglings. In addition, ten of the 23 known adults were banded. Controlled burns were conducted on 9,972 acres within red-cockaded woodpecker habitat.

Big Cypress National Preserve in South Florida – Big Cypress National Preserve (BCNP) in Collier County supports the largest, southern-most population of red-cockaded woodpeckers. This population continues to be documented and monitored cooperatively by the National Park Service and FWC.

Annual monitoring continued in the fall of 2015, with tree and cavity surveys to determine cluster status and activity. During the spring of 2016, FWC completed the ninth red-cockaded woodpecker translocation from BCNP to Lostman's Pines sub-population in BCNP in Monroe County. Six artificial cavities were installed in three cavity-limited clusters and two artificial cavities were replaced in one cavity-limited cluster. Three adult red-cockaded woodpeckers were banded by FWC in FY 2015-16. Two new clusters were also discovered, bringing the total number of known red-cockaded woodpecker clusters in BCNP to 117.

Monitoring continued into the summer with nest checks, nestling banding, fledge checks, and roost checks. FWC monitored 40 of 117 potential clusters for productivity based on access and cluster activity. Out of 35 potential breeding groups, 29 groups attempted nesting with 24 of those successfully hatching chicks. Thirty chicks made it to banding age (seven to ten days old) and 12 of those fledged with ten still unknown. Helper birds were observed in 17 of the monitored clusters. Additional clusters were surveyed for signs of activity during the breeding season and at least 87 were active.

FWC has fall 2016 translocation plans in place, and will be working with cooperating agencies to continue translocations from BCNP. FWC also plans to augment additional cavity-limited clusters and continue to closely monitor clusters for the remainder of the 2016 breeding season.

Goethe State Forest in Levy County – FWC currently assists FDACS in monitoring and managing the red-cockaded woodpecker population on the Goethe State Forest WMA. During FY 2015-16, there were 65 active clusters of red-cockaded woodpeckers, producing 63 chicks.

Other management actions included replacing 12 inserts that were dilapidated or otherwise un-usable in existing clusters. Approximately 333 acres of forestland, around existing clusters were mowed to help change the fire regime from dormant season burns to growing season burns. A total of 16,700 acres of forestlands were burned during FY 2015-16 to enhance habitat for the red-cockaded woodpecker and other wildlife.

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Tate's Hell Wildlife Management Area in Franklin and Liberty Counties – During FY 2015-16, FWC mechanically cleared 15 acres to reduce the hardwood midstory surrounding two clusters. FWC assisted FDACS on three burns of the 42,734 acres accomplished. FDACS burned 6,438 acres that contained red-cockaded woodpecker clusters and foraging habitat (11 clusters in nine compartments), 4,349 acres of which were burned during the growing season. Thirty artificial cavities were installed in December-January. Nine cavity-limited clusters were augmented. Two new recruitment clusters were permitted this year.

From March through early July 2016, FWC monitored 63 clusters for red-cockaded woodpecker activity, of which 51 were documented as active clusters. Active trees within each cluster were then surveyed for nests. Forty-one (80.4%) of the active clusters contained eggs, up from 37 nests (75.5%) in FY 2015-16. Seven (17.1%) nest attempts failed. Ten clusters were recorded as active but did not produce eggs or chicks. Thirty-four nests contained nestlings. FWC banded 73 of 76 nestlings in 33 clusters (one nest with chicks was detected after chicks were too big to band). FWC attempted fledge checks in the 33 clusters with banded young and confirmed survival in 27 nests. Overall survival rate was 66.7%. In clusters where young were detected during fledge checks, the survival rate was 81%. These numbers should be taken cautiously as fledge checks in Tate's Hell WMA are challenging due to high vegetation.

Apalachicola River Wildlife and Environmental Area in Franklin County – Apalachicola River Wildlife and Environmental Area (ARWEA) supports a relatively small, but stable population of red-cockaded woodpeckers. During FY 2015-16, and before the breeding season began, ARWEA staff mowed vegetation around cavity trees in eight red-cockaded woodpecker clusters, reducing hardwood and shrub competition to promote the grassy ground cover favored by this species. A total of eight new artificial cavities were installed in trees across five different clusters, enhancing nest site selection within those clusters and providing roosting trees for helper birds.

During the 2016 breeding season, ARWEA staff monitored both natural and artificial cavities within ARWEA's ten clusters to document reproductive success. Nine clusters were active with eight clusters having potential breeding groups. These eight potential breeding groups all laid at least one clutch of eggs. Seven of these clutches successfully hatched, but only six clusters had nestlings that successfully fledged. ARWEA staff banded 16 nestlings (three females, five males, eight unknown), and believe 13 fledged. This breeding season, two fewer birds fledged than in FY 2014-15 (15 fledged), but this year's productivity is still higher than the ten fledged in FY 2013-14, and six in FY 2012-13.

In FY 2015-16, ARWEA staff documented a three-year old female, originally banded nearly three miles north in Apalachicola WMA, that successfully fledged two nestlings at an ARWEA cluster. This same female was first observed at ARWEA last year when she successfully fledged three nestlings.

John G. and Susan H. DuPuis, Jr. Wildlife and Environmental Area in Martin and Palm Beach Counties – Of the six birds translocated from Citrus Wildlife Management Area in the fall of 2015, three remained on the area. In spring 2016, thirteen potential breeding groups produced 13 fledglings. An additional six to eight woodpeckers will be translocated in fall 2016. Old cavities have been replaced and new cavities installed to bring the total number of cluster locations to 28. Habitat management activities to reduce midstory height and enhance red-cockaded woodpecker habitat will continue.

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Platt Branch Mitigation Park Wildlife and Environmental Area in Highlands County –

The population consisted of seven active clusters in FY 2015-16, which was stable from FY 2014-15. Four red-cockaded woodpeckers were translocated in FY 2014-15 from the Croom WMA, with 50% staying within the population and one new breeding pair forming. One new recruitment cluster was established at the WEA in FY 2014-15. There were six potential breeding groups during the 2016 breeding season, which was an increase of one pair. One additional group was adjacent to the WEA on private property. Nesting success was monitored during the spring of 2016, with five pairs nesting successfully and eight nestlings banded. Six birds were confirmed to have fledged. The fourth year in a row of the initial translocations have been important in the stabilizing of the population. Controlled burns were conducted on 694 acres and 80 acres of pines were planted for future foraging habitat. Mechanical fuel reduction was completed around all active clusters within the WEA.

**Reddish Egret** (*Andrew Cox and Amy Schwarzer*)

The reddish egret is currently listed as a State-designated Species of Special Concern. A biological status review conducted in 2011 determined that the species should be listed as State-designated Threatened because of its extremely small population size, potential negative population trend, and localized breeding distribution. Furthermore, the species' narrow coastal distribution makes it especially vulnerable to habitat loss, habitat fragmentation, and disturbance. The species will be listed as State-designated Threatened once the Imperiled Species Management Plan is approved by FWC Commissioners, and is expected to be considered for approval in November 2016.

During FY 2015-16, FWC and two partners (Audubon of Florida and the Avian Research and Conservation Institute) initiated a study to evaluate the population status of reddish egrets in Florida. FWC and partners conducted repeated surveys of colonies in four core breeding areas (Florida Bay, lower Florida Keys, Tampa Bay & southwest Florida, and Merritt Island National Wildlife Refuge) and targeted surveys in other areas of the state. Other local, State, and Federal partners also contributed to the survey and helped provide statewide survey coverage. Extensive nesting data that will document nesting success as well as breeding season patterns were also collected, with data quality assurance and analysis currently ongoing.

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

The roseate tern is a Federally-designated Threatened seabird. In Florida, 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, their main stronghold and ground colony in the Florida Keys, was submerged under one to two feet of water and no longer available as a nesting site for roseate terns.

In the spring of 2006, FWC attempted to provide the birds displaced from Pelican Shoal to 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 colonially nesting birds to nesting areas and to restore seabird colonies. FWC did not place decoys and call broadcasting equipment at the Dry Tortugas after

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2010 in order to determine if the terns would nest there on their own. Only twelve nests were recorded in 2011, no nest counts were conducted in 2012, 63 nests were recorded in 2013, and seven nests in 2014. FWC did not record any roseate tern nests at the Dry Tortugas National Park in 2015. FWC also surveyed seven gravel roofs and structures in 2016 that contained roseate terns nesting colonies. One of the structures was on an abandoned bridge that is cut off on both ends. FWC estimates the total roseate tern population for Florida at 95 pairs based on peak nest numbers during the first wave of nests. Productivity was very low and difficult to assess at most sites. The highest number of fledged chicks was 49. No chicks were banded during FY 2015-16.

**Shorebirds** (*Naomi Avissar, Janell Brush, and Nancy Douglass*)

Twenty species of shorebirds and seabirds breed in Florida, two of which are currently listed as State-designated Threatened (snowy plover and least tern), and two are State-designated Species of Special Concern (black skimmer and American oystercatcher). Biological status reviews conducted in 2011 determined that all four of these species should be listed as State-designated Threatened. A draft species action plan for listed shorebirds was completed in November 2013 (<http://myfwc.com/media/2720106/Imperiled-Beach-Nesting-Birds-Species-Action-Plan-Final-Draft.pdf>). The status change for the black skimmer and American oystercatcher will occur when the Imperiled Species Management Plan is approved by FWC Commissioners, which is expected to be considered in November 2016. If the plan is approved, the black skimmer and American oystercatcher will also be listed as State-designated Threatened.

In addition, more than 40 species of shorebirds and seabirds winter in Florida. Two species of non-breeding shorebirds are Federally-listed: the red knot is Federally-listed as Threatened and the piping plover is Federally-listed as Endangered.

Florida Shorebird Alliance – The Florida Shorebird Alliance is organized into 12 regional partnerships that work locally to ensure important shorebird and seabird sites are surveyed and monitored. During the 2015 nesting season, Alliance partners collectively monitored 840 miles of coastline, and posted 164 seabird colonies and 953 shorebird nests (see Florida Shorebird Database section for more information on monitoring).

The Shorebird Partnership Coordinator publishes a monthly e-newsletter (the Wrack Line), maintains an email list-serve of over 20,000 contacts, coordinates training and data quality control for the statewide shorebird-monitoring program, and manages the Alliance website ([www.FLShorebirdAlliance.org](http://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 coordination and information sharing between regional partnerships.

Florida Shorebird Database – The Florida Shorebird Database, which may be accessed at [www.flshorebirddatabase.org](http://www.flshorebirddatabase.org), was launched in spring 2011 to serve as the central repository for data collected on shorebirds and seabirds in Florida. Over 950 monitoring partners from throughout the state have registered accounts in the Database and many of these partners collect and report breeding data. During the 2015 nesting season, partners entered 14,115 data records in the Database. Monitoring data are available online to anyone with an account, thereby



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allowing researchers, managers, conservationists, and permit reviewers to use information to help conserve shorebirds and seabirds.

A group of select partners are also participating in non-breeding shorebird and seabird surveys. In early 2014, FWC drafted an official non-breeding protocol to be used by partners statewide. Members of the Florida Shorebird Alliance, in particular those from the Panhandle partnership, started using the protocol in 2014. USFWS has adopted the monitoring protocol and data entry as part of the permit requirements for beach restoration projects. This program continues to grow with the need for standardized data and the convenience of a centralized data repository.

**Seaside Sparrows** (*Andrew Cox and Carolyn Enloe*)

Biological status reviews conducted by FWC in 2011 recommended that Scott's seaside sparrow and Wakulla seaside sparrow be listed as State-designated Threatened subspecies upon FWC Commission approval, and they were included in FWC's draft Saltmarsh Songbird Species Action Plan. These non-migratory salt marsh specialists are two of five recognized subspecies of seaside sparrow that breed in Florida; the other three include the MacGillivray's seaside sparrow, the Federally-Endangered Cape Sable seaside sparrow, and the Louisiana seaside sparrow.

During FY 2015-16, FWC initiated a study to re-examine the subspecies relationships of seaside sparrows in Florida as outlined in the species action plan for salt marsh songbirds. To date, FWC has collected 147 genetic samples across 14 sites. Phenotypic data including morphometrics (analysis of form), audio recordings of vocalizations and detailed photographs were also collected to supplement data obtained from genetic material. Other local, State, and Federal partners: (USFWS, National Park Service, Florida Department of Environmental Protection, and Southwest and Northwest Florida Water Management Districts) contributed to the project by providing access to their lands, housing, and assistance with sample collection. FWC and collaborators at the University of Florida will use DNA analyses to determine the relatedness of sparrows in these populations. A preliminary analysis to inform next year's sampling effort is currently underway. Results from this project will be used to refine taxonomic designations of seaside sparrow, which may affect listing status, and therefore future conservation and management priorities.

**Southeastern American Kestrel** (*Barbara Almario, Jonny Baker, Eric Dennis, Norberto Fernandez, Allan Hallman, Randy Havens, Nathan Lambert, Anni Mitchell, and Jennifer Myers*)

The Southeastern American kestrel is a State-designated Threatened non-migratory falcon closely tied to sandhills, scrub, pasture, and prairies in the southeastern U.S. This subspecies has undergone a range reduction and population decline throughout its range in recent decades. The kestrel's current population size is estimated to be approximately 1,350-1,500 breeding pairs. 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

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managers, bird watchers, and others through talks, web sites, and printed media; and 7) Conducting additional research on kestrel breeding habitat requirements.

Two of the major threats identified in the Species Action Plan for kestrels are a lack of cavities for nesting and lack of suitable foraging habitat. Addressing these threats requires coordinated efforts of internal staff and external partners for both population management and habitat management. This project provides the necessary coordination to enhance conservation efforts for this threatened species.

Nest box installation is an effective form of population management for kestrels (and is a high priority, urgent action identified in the species action plan.

During FY 2015-16, FWC worked with subject matter experts to develop a first draft of the goal, scope, and measureable objectives for a Southeastern American kestrel monitoring partnership. These are a work in progress and will continue to be refined in FY 2016-17.

FWC worked with species experts to draft an initial landscape-scale analysis identifying important areas within Kestrel Management Units for strategic placement of nest boxes. The goal of this analysis is to provide guidance to staff and partners on nest box placement at the landscape scale, aiming to increase the efficacy and efficiency of partner and volunteer efforts. This initial analysis will continue to be refined in FY 2016-17. During FY 2015-16, FWC drafted a document to assist in the placement of kestrel nest boxes at the local scale. Revisions and further development of this document will continue into FY 2016-17.

Bell Ridge Longleaf Wildlife and Environmental Area in Gilchrist County – In FY 2015-16, nine kestrel nest boxes were maintained and monitored by FWC on Fort White WEA during the spring breeding season. Breeding kestrels did not use any nest boxes. Other species observed utilizing the boxes include southern flying squirrels, great-crested flycatchers, and Eastern screech owls.

Big Bend Wildlife Management Area in Taylor County – Monitoring of 29 kestrel nest boxes was completed during the spring and early summer of 2016 on the Tide Swamp, Spring Creek, and Hickory Mound Units of Big Bend WMA. None of the 29 boxes were used for kestrel nesting, but all boxes were occupied with great crested flycatchers, Eastern screech owls, and a southern flying squirrel. One dead kestrel was found in a nest box, but there was no evidence that it had begun to nest. The cause of mortality is unknown.

Blackwater Wildlife Management Area in Okaloosa and Santa Rosa Counties – In March 2009, FWC installed and monitored ten Southeastern American kestrel nest boxes within open fields and wildlife openings throughout Blackwater WMA. Additional boxes have been installed since 2009, along with predator guards, to encourage use by kestrels. In 2015, one box was installed at a food plot; however, staff have not documented kestrels using this box. Occupancy by kestrels has varied over time with one box used in 2009, two boxes in 2010 and 2011, four in 2012, seven in 2013 and 2014, and six in 2015.

During FY 2015-16, FWC removed one kestrel nest box, relocated two nest boxes, and added three nest boxes, increasing the total number of nest boxes monitored to 23. Throughout the nesting season, six boxes had sign of kestrel use, 21 unhatched kestrel eggs were observed, and five live kestrel chicks were observed. Monitoring and maintenance of kestrel boxes will continue next fiscal year.

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Camp Blanding Wildlife Management Area in Clay County – During February 2016, 56 nest boxes were cleaned and surveyed. All boxes were then checked for usage and maintained monthly during April to June. Twenty-eight nest boxes were verified as having been or currently being used by kestrels. All 28 nests monitored were successful. A total of 108 eggs were laid and 68 kestrel chicks fledged. Twenty-two unhatched eggs remained. Hatch success rate was 63%. Twelve chicks (eight males and four females) were banded by FWC, and genetic feather samples taken as part of the University of California at Los Angeles' American Kestrel Genoscape Project. Other wildlife utilizing the nest boxes were southern flying squirrels, gray squirrels, great crested flycatchers, Eastern screech owls, and Eastern bluebirds.

Fort White Wildlife and Environmental Area in Gilchrist County – In FY 2015-16, nine Southeastern American kestrel nest boxes were maintained and monitored by FWC on Fort White WEA during the spring breeding season. No nest boxes were used by breeding kestrels. Other species observed utilizing the boxes include southern flying squirrels, great-crested flycatchers, and Eastern screech owls.

Jennings State Forest Wildlife Management Area in Clay and Duval Counties – Activities to enhance the survival of the State-designated Threatened Southeastern American kestrel on Jennings State Forest WMA consist of providing and maintaining nest boxes and conducting surveys. The 26 existing boxes were cleaned and maintained in February 2016. FWC conducted two visits during nesting season (April-May). No kestrel activity was noted. Other animals utilizing boxes were southern flying squirrels, gray squirrels, Sherman's fox squirrels, great-crested flycatchers, Eastern screech owls, and Eastern bluebirds.

Twin Rivers State Forest Wildlife Management Area in Madison County – Eleven nest boxes were checked for usage in March, April, May, and June 2016. Kestrel eggs were identified in five boxes, though two of those instances were re-nest attempts from failed nests. Of all the nesting attempts, only one box hatched and fledged two kestrel chicks. Boxes with failed nests are being evaluated. Boxes not used by kestrels this season were used by other wildlife including tufted titmice, Eastern bluebirds, and gray squirrels.

Watermelon Pond Wildlife and Environmental Area in Alachua County – Monitoring of seven kestrel nest boxes was completed during FY 2015-16 on Watermelon Pond WEA. Two of the seven boxes were used for kestrel nesting, with seven eggs in each box. Both nests failed and no young fledged.

Nest Box Maintenance in the Southwest Region – During FY 2015-16, FWC maintained and monitored 51 kestrel nest boxes on FWC-managed lands in the Southwest Region during the spring breeding system. These lands include: Chassahowitzka WMA, Perry Oldenburg WEA, Janet Butterfield Brooks WEA, and Chinsegut WEA, all in Hernando County; Hilochee WMA in Lake and Polk counties; Moody Branch WEA in Manatee County; Lake Wales Ridge WEA in Highlands and Polk counties; Crooked Lake WEA in Polk County; and Platt Branch WEA in Highlands and Glades counties. Breeding kestrels used eight nest boxes across all Southwest Region areas. Chassahowitzka WMA had three active boxes; Perry Oldenburg WEA and Lake Wales Ridge WEA had two active boxes; and Crooked Lake WEA had one active box. Other

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species encountered included Eastern screech owls, Eastern bluebirds, red-bellied woodpeckers, wood duck, great-crested flycatchers, and bees.

**Wading Birds** (*Pamela Boody, Matthew Goode, Jason Huckabee, Aubrey Pawlikowski, Catherine Ricketts, Kathleen Smith, Valerie Sparling, Tiffany Thornhill, and Morgan Wilbur*)

Seven species of wading birds in Florida are currently listed as State-designated Species of Special Concern – the little blue heron, reddish egret, roseate spoonbill, tricolored heron, snowy egret, white ibis, and limpkin. Biological status reviews determined that four (little blue heron, reddish egret, roseate spoonbill, and tricolored heron) should be listed as State-designated Threatened, but the other three should not (snowy egret, limpkin, and white ibis). Although the recent biological status review determined limpkins should not be listed as State-designated Threatened and should be removed from the State-designated Species of Special Concern list, the authors of the review cautioned that limpkins may be close to meeting listing criteria and that more information is needed.

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. In order to monitor the number and distribution of nests over time and identify areas that should be protected during land management activities, FWC conducts an aerial survey of nesting colonies in the spring of each year. Of six previously identified wading bird colonies, three were active, which is the same number of active colonies as FY 2014-15. Of the six colonies, no more than five have ever been active at the same time. FWC found one new colony during this fiscal year. The wading bird colonies are typically mixed with listed species and non-listed species including great egret, little blue heron, snowy egret, and yellow-crowned night-heron.

Fitzhugh Carter Tract of Econfina Creek Wildlife Management Area in Washington County – Numerous water bodies and associated wetlands on the Fitzhugh Carter Tract of Econfina Creek WMA provide excellent nesting and foraging habitat for the many species of wading birds found in the Florida panhandle, several of which are listed species. In particular, Little Deep Edge Pond supports nesting of various species of colonial-breeding wading birds. State-designated Species of Special Concern that have used this rookery in previous years include the little blue heron, tricolored heron, and snowy egret. FWC monitor the rookery annually from April to July to document species use, number of adult birds present, and number of chicks produced (**Table 4**). Adult use and chick production does not seem to follow any discernable trend to date, although data show little blue herons use this colony more frequently than tricolored herons or snowy egrets.

Last fiscal year, FWC documented a new wading bird rookery on Dykes Mill Pond. During FY 2015-16, FWC observed 13 great blue heron and two anhinga nests in this colony that produced at least 13 and six juveniles, respectively.

FWC annually documents multiple incidental observations of white ibis, a State-designated Species of Special Concern, on area water bodies. FWC also occasionally observes wood storks, a Federally-designated Endangered species, using area water bodies, although they are not necessarily documented every year. Increases in wood stork observations tend to coincide with drought conditions, which concentrate prey as water levels recede. The wading

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bird rookeries at the Carter Tract will continue to be monitored annually during the nesting season (April-July) and incidental observations of at-risk wading bird species throughout the property will also be documented.

**Table 4.** Annual little blue heron and tricolored heron use of the Little Deep Edge Pond wading bird rookery, Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

Year	Little Blue Herons (LBH)			Tricolored Herons (TH)			Snowy Egrets (SE)		
	LBH Adults	LBH Nests	LBH Chicks	TH Adults	TH Nests	TH Chicks	SE Adults	SE Nests	SE Chicks
2008	8	3	0	2	unknown	0	0	0	0
2009	1	0	0	0	0	0	3	0	0
2010	0	0	0	0	0	0	0	0	0
2011	20	14	34	1	1	1	2	2	5
2012	7	4	6	0	0	0	0	0	0
2013	5	3	4	0	0	0	0	0	0
2014	14	6	6	0	0	0	0	0	0
2015	7	4	3	0	0	0	0	0	0
2016	13	13	15	0	0	0	3	1	0

Dinner Island Ranch, Okaloacoochee Slough, and Spirit-of-the-Wild Wildlife Management Areas in Hendry and Collier Counties – Aerial surveys were flown in a helicopter over the three WMAs once a month for three months during the Spring of 2016. Foraging aggregations (25) and roosting locations (four) were recorded; of those, one aggregation was observed on Spirit-of-the-Wild, two were on Okaloacoochee Slough, and the remainder on Dinner Island Ranch (excluding four observations on Okaloacoochee Slough State Forest). One nesting colony was identified on Okaloacoochee Slough State Forest. Several species have been documented including white ibis, great egret, snowy egret, little blue heron, tricolored heron, and wood stork.

J.W. Corbett Wildlife Management Area in Palm Beach County – Wading bird rookeries were surveyed for activity on J.W. Corbett WMA during FY 2015-16. The larger of two recently active rookeries was confirmed to be active and nests of anhingas, snowy egrets, white ibis, great egrets, black-crowned night-herons, cattle egrets, and tricolored and little blue herons were observed. One rookery historically solely composed of little blue herons was inactive this season. Surveys were conducted March through April of 2016 using a call/playback method for the following focal species: black rail, least bittern, king rail, purple gallinule, common moorhen, pie-billed grebe, and limpkin. All focal species were detected.

Apalachicola River Wildlife and Environmental Area and Box-R Wildlife Management Area in Gulf and Franklin Counties – FWC conducts an aerial survey of nesting colonies within the lower Apalachicola River basin in the spring of each year. FWC completed aerial surveys on April 26-27, and May 25-26, 2016. FWC detected seven nesting colonies, which is the same number as in 2015, two more than in 2014, and one more than in 2013. FWC documented wood storks at one site (approximately 75 nests), little blue herons at one site (at least eight nests),

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great blue herons at six sites (approximately 36 nests total), and great egrets at two sites (approximately 75 nests total).

Corkscrew Regional Ecosystem Watershed Wildlife and Environmental Area in Lee and Collier Counties – During FY 2015-16, FWC identified and monitored six nesting wading bird colonies ranging from two to nine nesting species per colony. Nesting effort was observed from these species: great egrets (405), cattle egrets (358), little blue herons (49), anhingas (29), black-crowned night herons (17), tricolored herons (13), snowy egrets (nine), green herons (four), and a roseate spoonbill.

FWC also identified 90 foraging aggregations consisting of 6,926 individuals. Foraging groups primarily included white ibis, snowy egret, wood storks, roseate spoonbills, little blue herons, tricolored herons, sandhill cranes, and a limpkin.

Additionally, 2,863 total roosting individuals were observed in and around the area. Roosting species primarily consisted of white ibis, great egrets, wood storks, cattle egrets, snowy egrets, and roseate spoonbills.

John C. and Mariana Jones/Hungryland Wildlife and Environmental Area in Martin and Palm Beach Counties – FWC conducted aerial nest colony surveys during the breeding season to document species use on Hungryland WEA. Two nest colonies were located, supporting anhinga, great blue heron, and great egret nests. Florida sandhill cranes nests were also observed during the surveys. Little blue heron, limpkin, roseate spoonbill, snowy egret, tricolored heron, white ibis, and wood stork were opportunistically observed foraging on the area throughout the year.

**White-crowned Pigeon** (*Ricardo Zambrano*)

The white-crowned pigeon, a State-designated Threatened species, nests on mangrove islands and forages in deciduous forests in Monroe and Miami-Dade counties. Tropical hardwood hammock and pine rockland forests have been severely reduced and fragmented and remain under threat. The majority of the known nesting islands are protected within the Keys Refuge Complex in the Lower Florida Keys and Biscayne National Park. Flight line counts, which are counts of adults flying in from foraging for fruits and flying back to their nests in the morning were performed monthly from June to August 2015. Based on highest counts, approximately 115 nests occurred within Biscayne National Park. In June 2016, FWC initiated a project in the upper Florida Bay to determine the presence and absence of nesting white-crown pigeons on the mangrove islands. Thirty-five islands were checked for nesting pigeons. Islands which had the most number of potential nesting pigeons will be more intensively monitored in subsequent years.

**Whooping Crane** (*Tim Dellinger*)

Non-Migratory Population – The whooping crane in Florida is a Federally-designated Nonessential Experimental Population that is not essential for the continued existence of the species. 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.

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In 2015, a pair from the non-migratory population produced a chick in Lake County that survived past the fledging age (approximately 90 days). During the 2016 breeding season, twins fledged from the pair's nest in Lake County. FWC plans to capture and tag all three fledglings during the 2016 winter and translocate them in early 2017 to the growing Louisiana non-migratory population.

**Wood Stork** (*Josh Agee, Tim Dellinger, and Morgan Wilbur*)

The wood stork was listed as Federally Endangered in 1984 due to declines in range and population size that occurred during the mid-1900s. As a result of a population increase, range expansion, and minimization or removal of threats, wood storks were down-listed to Federally Threatened in June 2014.

Monitoring in Central and South Florida – FWC surveys 28 wood stork colonies annually. The colonies are located in cypress swamps and on islands in lakes, borrow pits, rivers, lagoons, and bays in eight counties from Orange to Charlotte. Surveys occur in late April to early May. In recent years, FWC counted approximately 2,900 nests, an estimated 20% of the U.S. nesting population. In May 2016, FWC discovered a new colony in Orange County with 65 nests, and counted approximately 2,170 total nests in all active colonies.

L. Kirk Edwards Wildlife and Environmental Area in Leon County – Lower Lake Lafayette located within the L. Kirk Edwards WEA is home to the Chaires wood stork colony. The annual aerial survey of the colony was conducted on May 23, 2016. The colony was active during FY 2015-16, with approximately 25 nests observed.

In April 2016, FWC also monitored two additional wood stork colonies (Ochlockonee North and Ochlockonee South) that occur on private property in western Leon County. There were no nests observed at the location of the Ochlockonee North colony and approximately 275 nests at the Ochlockonee South colony. This is comparable to the 290 estimated nests FWC observed in 2015.

Little Gator Creek Wildlife and Environmental Area in Pasco County – Little Gator Creek WEA in Pasco County has a ten-acre wood stork and wading bird nesting colony. FWC uses water control structures and pumps to manage water levels in the basin marsh that contains the colony. This maintains suitable conditions for wood stork and wading bird nesting, and allows the colony to persist, even during drought years. Wood storks have nested intermittently in the colony for several years, including four of the last seven.

FWC conducted weekly site visits during the breeding season (January to April) in FY 2015-16. Wood storks were not observed nesting in the colony during FY 2015-16.

## **AMPHIBIANS**

**Flatwoods Salamanders** (*Diane Alix, Barbara Almario, Justin Davis, Kevin Enge, Matt Goode, Kelli Herrick, Pierson Hill, Diana Pepe, Catherine Ricketts, Fred Robinette, Brooke Talley, and Mark Windland*)

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Flatwoods salamanders are two closely related species endemic to pine forests of the lower Southeastern Coastal Plain. In Florida, the reticulated flatwoods salamander occurs west of the Apalachicola River and is a Federally-designated Endangered species. The frosted flatwoods salamander occurs east of the Apalachicola River and is a Federally-designated Threatened species. Surveys since 1990 indicate that 20 of the 22 documented reticulated flatwoods salamander populations occur in Florida; the other two occur in southern Georgia. Of those 20, nine (45%) occur, in part, on public land with four on Department of Defense lands: Eglin Air Force Base (Eglin) and Hurlburt Field in Okaloosa County, and Navy Outlying Landing Field Holley in Santa Rosa County.

During FY 2015-16, FWC collaborated with the U.S. Forest Service to conduct comprehensive surveys of known and potential breeding ponds of the frosted flatwoods salamander in the Apalachicola National Forest in Liberty and Franklin counties. Biologists surveyed 292 potential breeding ponds and found flatwoods salamander larvae in 21 (7%). Of the 77 previously documented breeding ponds surveyed, biologists found larvae in only 15 (19%). This year's surveys were characterized by very low larval densities (1.6 per pond) that are consistent with the trend of rapid decline and disappearance of populations in the Apalachicola National Forest.

During FY 2015-16, FWC also conducted larval dipnet surveys for the reticulated flatwoods salamander on public lands within its potential range that have recent or historical records. Surveys were unsuccessful at three known sites on Yellow River Marsh Preserve State Park, Yellow River Wildlife Management Area (WMA), and Garcon Point WMA, all in Santa Rosa County. FWC and Florida Natural Areas Inventory, however, documented five new breeding populations on Escribano Point WMA in Santa Rosa County using a combination of drift-fence arrays and larval dipnet surveys. This represents the second largest population remaining within their range and the largest population of reticulated flatwoods salamanders on State land.

FWC edited the five-year reviews of frosted and reticulated flatwoods salamander for the USFWS in July 2015. FWC participated in a multi-agency recovery team to address conservation needs of flatwoods salamanders and presented a poster on flatwoods salamander natural history, conservation, and management at the annual meeting of the Southeastern Partners for Reptile and Amphibian Conservation.

Hurlburt Field Habitat Restoration in Okaloosa County – Ephemeral wetlands serve as breeding and larval habitat for flatwoods salamanders as well as a variety of other rare plant and wildlife species. These systems have degraded over time due to a shift away from natural fire regimes. To restore degraded wet flatwoods habitat, FWC removes woody vegetation from the site and treats cut stumps with herbicide to minimize re-sprouting. Ideally, FWC then uses prescribed fire to prevent regeneration of woody vegetation, maintain an open canopy, and foster native herbaceous groundcover.

Wetland habitats on Eglin and Hurlburt Field are ecologically connected. Proposed restoration sites are part of a large wetland complex that includes 14 known breeding wetlands on Eglin and 13 known breeding wetlands on Hurlburt Field, for 27 total breeding wetlands that constitute a single population. Successful restoration of this wetland complex will ensure connectivity of the most extensive habitat known for this species anywhere in its geographic range. In 2010, FWC coordinated with the Department of Defense and Virginia Tech to restore approximately 28 acres of wetland habitat on Eglin through woody vegetation removal and



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herbicide treatment. In FY 2015-16, approximately six acres were treated, bringing the total acres restored since 2010 to 34. An additional 23.1 acres are scheduled for restoration treatments in FY 2016-17. Funds should be available through 2020 to continue annual restoration work on Hurlburt Field, ultimately working towards a 76-acre goal.

Apalachicola Wildlife Management Area in Franklin, Liberty, Leon, and Wakulla Counties – Apalachicola WMA contains more breeding sites for the frosted flatwoods salamander than any other area and is therefore a priority for habitat restoration efforts. Since 2011, FWC has worked cooperatively with the U.S. Forest Service and The Nature Conservancy to restore breeding sites for the flatwoods salamander on Apalachicola WMA. The number of breeding sites and approximate acreage that have received restoration treatments are as follows: 19 sites (21 acres) in 2011, seven sites (12 acres) in 2013, one site (one acre) in 2014, and 13 sites (22 acres) in 2015. In FY 2015-16, FWC funded restoration treatments in 17 breeding sites totaling approximately 15 acres. FWC will continue working with partner agencies to restore additional sites next fiscal year.

Escribano Point Wildlife Management Area in Santa Rosa County – Reticulated flatwoods salamanders were first documented on Escribano Point WMA in October 2015 when one adult was captured in a drift fence during a baseline amphibian and reptile survey. During October and November 2015, 11 total adults were captured in three drift fence arrays, and one sub-adult was captured in April 2016.

Additionally, from February to April 2016, FWC and a Florida Natural Areas Inventory researcher conducted larval dip netting surveys following a standardized protocol. A total of 36 wetlands were sampled, with larval flatwoods salamanders documented in five ponds. One notable sampling event captured 48 larvae in one pond during 15 minutes of sampling.

To aid in further management efforts, FWC ranked ponds as “confirmed,” “highly likely,” “potential,” “unlikely,” or “unsuitable.” Rankings were based on presence of flatwoods salamanders, vegetation in and around the ponds, hydroperiod, and proximity to confirmed breeding ponds. Ponds classified as “confirmed,” “highly likely,” and “potential” will receive priority for sampling in future years with a yearly sampling target, while ponds ranked as “unlikely” or “unsuitable” will receive less priority unless habitat conditions within or around the pond improve.

Pine Log and Point Washington Wildlife Management Areas in Bay, Washington, and Walton Counties – FWC sampled potential amphibian breeding ponds on Pine Log (Bay and Washington counties) and Point Washington (Walton County) WMAs from January to April 2016 in an attempt to re-confirm two documented reticulated flatwoods salamander breeding ponds and locate any new breeding habitat. The number of sampled ponds was reduced from 98 in FY 2014-15 to 34 in FY 2015-16. The reduction of sampled ponds is a result of a new categorization system and the implementation of additional sampling techniques. In FY 2015-16, FWC chose ponds to sample based on the presence of mole salamander larvae, ornate chorus frogs, and suitable habitat characteristics. Biologists surveyed ponds in FY 2015-16 using drift fences set parallel to pond edges, minnow traps, and dip nets. No reticulated flatwoods salamanders were captured.

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Yellow River Wildlife Management Area in Okaloosa and Santa Rosa Counties – Yellow River WMA contains a Federally-designated Critical Habitat Unit for the reticulated flatwoods salamander. Three potential breeding ponds that form a wetland complex connected by wet prairie are sampled by FWC twice a year. Since 2010, FWC, FDACS, and USFWS have collaborated in the restoration of the wetland complex. Previous management and restoration activities included removal of undesirable woody vegetation from the three pond basins; herbicide application to control resprouting vegetation along pond margins; thinning adjacent slash pine plantation; establishing fire lines in the surrounding uplands; and implementing prescribed burns within uplands and pond basins.

FWC sampled the known and potential breeding ponds within the wetland complex in January and April of 2016; however, no larval flatwoods salamanders were detected. FWC will continue to collaborate with FDACS to manage and improve potential flatwoods salamander habitat.

Apalachicola River Wildlife and Environmental Area in Gulf and Franklin Counties – Numerous ephemeral ponds dot the landscape of the Franklin County portion of Apalachicola River Wildlife and Environmental Area (ARWEA). These ponds are potential habitat for the frosted flatwoods salamander, but were degraded by agricultural and timber practices such as bedding, ditching, and fire exclusion prior to State acquisition. FWC has worked towards restoring habitat for the frosted flatwoods salamander, with the goal that individuals could eventually migrate from known populations within Apalachicola WMA, just to the north of ARWEA. In 2003, FWC made an initial assessment of the ponds' suitability as flatwoods salamander habitat considering the pond itself, the ecotone, the upland habitat surrounding the pond, and the overall hydrology of the site. Based on the findings of this assessment, FWC targeted 49 ponds for restoration in FY 2010-11 to encourage the growth of grassy species, which are favored by flatwoods salamanders. This restoration in combination with ongoing mechanical treatments and prescribed fire in the uplands adjacent to the ponds will continue to improve the likelihood that ARWEA can support flatwoods salamanders. No flatwoods salamanders were captured during sampling in FY 2015-16.

Tate's Hell Wildlife Management Area in Franklin and Liberty Counties – Frosted flatwoods salamanders were documented on Tate's Hell WMA in 1984 and 1985 but have not been captured since 2000-01. Since 2014, FWC has cooperated with FDACS to improve potential breeding habitat for flatwoods salamanders on Tate's Hell WMA. In the spring of 2015, four potential breeding ponds with significant hardwood encroachment, totaling approximately four acres, were selected for restoration. Ponds were located in the Sumatra Tract and within a grassy wet savannah already in growing season rotation for prescribed burning. Hardwoods less than five inches in diameter were cut and removed from the pond. Herbicide was applied to the stumps shortly after cutting to prohibit regrowth. Prescribed fire was applied in late April to promote the growth of herbaceous groundcover. All four ponds were prescribed burned along with the three that received restoration treatments last fiscal year.

**Florida Bog Frog** (*Barbara Almario, Justin Davis, and Mark Winland*)

The Florida bog frog is a State-designated Species of Special Concern in Florida.

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Escribano Point Wildlife Management Area in Santa Rosa County – FWC has been conducting nighttime call surveys for the Florida bog frog at Escribano Point WMA since 2009. Bog frogs were not detected in FY 2015-16 and have not been documented on Escribano Point WMA since surveys began in 2009.

Yellow River Wildlife Management Area in Okaloosa and Santa Rosa Counties – Ten survey points were initially established in 2009 along three creeks (Garnier, Julian Mill, and Burnt Grocery) on Yellow River WMA. FWC have documented bog frogs at the Garnier Creek right of way every year since surveys began in 2009.

During the winter of FY 2012-13, FWC, in cooperation with FDACS, initiated restoration on one acre of habitat along Garnier Creek. Using an experimental approach, five 0.2-acre treatment plots were established by hand-cutting woody vegetation and immediately stump-treating with herbicide. Treatment plots were paired with five reference plots of equal size that did not receive treatment. In June of 2015, biologists heard bog frogs calling from two plots. The last call surveys in the experimental and reference plots were conducted in July 2015, with bog frogs detected in three of the plots.

In April of 2016, staff installed fifteen automated bioacoustic recorders along Garnier Creek. One recorder was installed in each of the five experimental plots, and remained in each plot through August 2016. The remaining ten recorders were distributed along the untreated length of Garnier Creek between the right of way and experimental plot 5 and were incrementally moved south along the creek at the end of each month (May, June, and July) in order to maximize coverage of the untreated area. The recordings will be analyzed in FY 2016-17, with results guiding future habitat restoration efforts along Garnier Creek.

**Gopher Frog** (*Traci Castellón, Anna Deyle, Kevin Enge, and Anna Farmer*)

The gopher frog is currently listed in Florida as a State-designated Species of Special Concern. This species did not meet the criteria for listing during the 2010 biological status review. The gopher frog is recommended for removal from the Florida Endangered and Threatened Species List when FWC Commissioners approve the Imperiled Species Management Plan and associated rules, which is expected to be considered in November 2016.

During FY 2015-16, FWC surveyed 296 ponds on 44 public or conservation lands and two private lands for gopher frogs, finding tadpoles in 109 ponds on 25 public lands (**Table 5**). Surveys during FY 2015-16 primarily focused on a new gopher frog monitoring project that will track the status of gopher frogs in 100 wetlands over time and answer natural history questions about wetland use by this species. Additional suitable and known breeding wetlands were surveyed during monitoring activities for this and other amphibian monitoring projects. Notable survey findings were 22 new breeding ponds found on 12 public conservation lands, including the discovery of the first breeding ponds at Oscar Scherer State Park in Sarasota County.

Dr. Thomas Devitt, a researcher from the University of California at Berkeley, was contracted to conduct genetic analyses using microsatellite DNA of 1,191 gopher frog samples (primarily tadpole tail tips) collected during previous years by FWC as part of a genetic assessment of Florida populations. Preliminary results showed a high level of genetic diversity in Florida, particularly within populations. Distinct genetic clusters in the Panhandle and the Peninsula are separated by the low-lying region near the Aucilla River. A third cluster was

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identified from St. Sebastian River Preserve State Park in Brevard and Indian River counties, but this might be due to closely related individuals with similar genetics being sampled.

Until recently, FWC policy allowed the translocation of the gopher frog and other commensal species with gopher tortoises that were being moved to recipient sites as part of gopher tortoise permitting for lands slated for development. Concerns about the potential for disease transmission and other possible negative impacts led to an interim policy in 2012 that limited translocation to on-site movements until the effects of translocation could be studied. FWC is conducting a pilot study to assess the effects of translocation on gopher frog survivorship and behavior using radio-telemetry to track movements and survival of translocated and non-translocated animals. This initial study will provide valuable information on whether translocation of gopher frogs from development sites is feasible and allow FWC to evaluate research methods and determine if a large-scale study is feasible.

The pilot study was initially attempted from July 2013 through May 2014 at Jennings State Forest in Clay County, but low numbers of captures led to a revision of the project design and a renewed attempt beginning in October 2015 in Ocala National Forest in Marion County. Since the final revision, transmitter attachment and translocations have been successful, and the project is proceeding. To date, 13 translocated frogs have been successfully monitored. FWC will reinstate trapping in October 2016 in an effort to increase the sample size to a minimum of 20 translocations. At the end of the project, the movement and survival of translocated animals will be compared with that of non-translocated frogs using data from 13 frogs monitored during this study and 11 frogs monitored previously in Ocala National Forest by collaborators from the University of Florida.

**Table 5.** Number of ponds visited, number of ponds dipnetted, and number of ponds containing gopher frog tadpoles on various properties in FY 2015-16.

<b>Property</b>	<b>No. Ponds Visited</b>	<b>No. Ponds Surveyed</b>	<b>No. Gopher Frog Ponds</b>
<u>Northwest Region</u>			
Apalachicola National Forest	32	31	17
Blackwater River State Forest	1	1	0
Eglin Air Force Base	15	14	12
Private Land #1 – Jefferson County	6	6	0
Private Land #2 – Jefferson County	6	6	0
Santa Rosa Outlying Landing Field	1	1	0
<u>North Central Region</u>			
Big Bend WMA, Spring Creek Unit	5	3	2
Camp Blanding Military Reservation	18	10	6
Cary State Forest	4	4	1
Goethe State Forest	10	9	4
Jennings State Forest	18	7	3
Longleaf Flatwoods Reserve	2	2	0
Osceola National Forest	1	1	0
Pumpkin Hill Creek Preserve State Park	2	2	0
Watermelon Pond - Metzger Tract	1	1	0

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<b>Property</b>	<b>No. Ponds Visited</b>	<b>No. Ponds Surveyed</b>	<b>No. Gopher Frog Ponds</b>
<u>Northeast Region</u>			
Bull Creek WMA	5	5	3
Charles Bronson State Forest	2	2	1
Etoniah Creek State Forest	6	6	1
Guana River WMA	3	3	0
Guana Tolomato Matanzas National Estuarine Research Reserve	1	0	0
Helen and Anna Cruikshank Sanctuary	1	1	0
Lake Panasoffkee	2	1	0
Little Big Econ State Forest	3	3	3
Merritt Island National Wildlife Refuge	4	4	2
Ocala National Forest	53	46	20
Ordway-Swisher Biological Station	15	9	5
Rock Springs Run State Reserve	8	5	2
St. Sebastian River Preserve State Park	4	4	0
Savage/Christmas Creek Preserve	2	2	0
Seminole State Forest	8	8	2
Split Oak Forest Mitigation Park WEA	2	2	0
Triple N Ranch WMA	17	16	10
University of Central Florida	2	2	0
Welaka State Forest	3	2	0
<u>Southwest Region</u>			
Al-Bar Ranch	1	1	0
Allen David Broussard Catfish Creek Preserve State Park	3	3	2
Archbold Biological Station	3	3	1
Avon Park Air Force Range	2	2	1
Chassahowitzka WMA	6	6	4
Conner Preserve	1	1	0
Green Swamp West	3	3	0
Lake Wales Ridge State Forest	6	6	4
Lake Wales Ridge WEA - Sun N Lakes Tract	1	1	1
Oscar Scherer State Park	1	1	1
Starkey Wilderness Preserve	2	2	1
<b>Total</b>	<b>292</b>	<b>248</b>	<b>109</b>

Corkscrew Regional Ecosystem Watershed Wildlife and Environmental Area in Lee and Collier Counties – Beginning in May 2016, FWC biologists began conducting frog acoustical surveys on Corkscrew Regional Ecosystem Watershed Wildlife and Environmental Area (WEA) in Lee and Collier counties. Data are being collected and analyzed to determine if gopher frogs are present on the area.

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**Pine Barrens Treefrog** (*Kevin Enge, Bess Harris, and Paul Moler*)

The Pine Barrens treefrog is currently listed in Florida as a State-designated Species of Special Concern. The species will be removed from Florida's Endangered and Threatened Species List once FWC Commissioners approve the Imperiled Species Management Plan and associated rule changes, which is expected to be considered in November 2016. In Florida, this species occurs only in Santa Rosa, Okaloosa, Walton, and Holmes counties. The Florida population was Federally-designated as Endangered in 1977 but was removed from Federal listing in 1983 after State surveys found the species to be much more common and widespread than known at the time of Federal listing.

Pine Barrens treefrogs breed in acidic seepage habitats. Nighttime surveys are conducted by listening for calling males at breeding sites. A current project involves revisiting breeding sites identified in the 1978-1981 surveys to assess the status of the species. As part of an occupancy modeling study to better understand detection variability at occupied sites, four FWC biologists conducted surveys for calling frogs in FY 2013-14 at 31 historical and 39 potential breeding sites on Blackwater Wildlife Management Area (WMA) in Okaloosa and Santa Rosa counties. FWC found 37 new breeding sites, including 22 new sites on Blackwater WMA. In FY 2015-16, FWC visited seven historical sites that were inactive in the earlier resurvey; three of these revisited sites were again inactive and four were active. A final report prepared during FY 2015-16 will be revised in FY 2016-17 to reflect these additional data.

**Striped Newt** (*Anna Farmer, Bess Harris, Pierson Hill, and Brooke Talley*)

The striped newt is a candidate for Federal protection under the Endangered Species Act, and it is not currently protected in Florida. It is endemic to northern Florida and southern Georgia, where it is patchily distributed and has been extirpated from many parts of its former range. This species spends most of its time in xeric uplands but migrates to temporary, fishless wetlands to lay their eggs in grassy wetland vegetation. This species can breed at any time of the year but generally breeds during the fall or winter months. FWC generally monitors this species during April-June when both adults and larvae can be detected in the breeding wetlands, increasing the chance of detection.

During April-June 2016, FWC surveyed 182 wetlands on 16 public or conservation lands and two private lands for striped newts, finding larvae or adults in just 23 of these ponds (**Table 6**). Prior to April, FWC found larval and adult striped newts in four additional ponds in Jennings State Forest (Clay County) and Ocala National Forest (Marion County) while conducting surveys for other amphibians during the fall and winter. Notable survey results were the discovery of five new breeding ponds at Triple N Ranch WMA (Osceola County), bringing the total number of known breeding ponds to eight for this location. Striped newts were also detected for the second time at Merritt Island National Wildlife Refuge (Volusia County). During FY 2015-16, four gilled adults and two larvae were found in the same pond, suggesting the existence of a larger breeding population. In April and May 2016, FWC and Coastal Plains Institute staff rediscovered a population of striped newts in the Munson Sandhills of Apalachicola National Forest (Leon County) that was believed to be extirpated. Two larvae and four adults were discovered at a single pond there. This represents the first observation of a native adult striped newt in Apalachicola National Forest in ten years and the first sign of successful reproduction in 18 years. The low number of observations of striped newts during this survey period may have

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been due to dry conditions that may have limited the breeding activity of the species. Twenty-seven percent of the wetlands visited were dry during the April-June surveys.

FWC also worked with collaborators at the University of Central Florida and the University of Georgia on a project to assess gene flow between striped newt populations and their genetic health. During FY 2015-16, 142 genetic samples were collected for this project while conducting amphibian monitoring surveys for this and other species. These samples include individuals from key properties, including individuals from recently discovered populations at Merritt Island National Wildlife Refuge, Triple N Ranch, Big Bend WMA (Taylor County), and a private land in Jefferson County, as well as individuals from the recently rediscovered population at Apalachicola National Forest. The samples will be analyzed by collaborators at the University of Georgia. This study will help FWC understand the management needs of this species and the degree of isolation and health of the remaining populations.

FWC assisted with the ongoing reintroduction program for striped newts in the Munson Sandhills of the Apalachicola National Forest. The program, led by the Coastal Plains Institute in cooperation with the U.S. Forest Service, involves releasing zoo-raised newts into former breeding ponds where they are presumed to have been extirpated. FWC augmented the effort by adding a mark-recapture component to the project. Newts were individually marked before their release in order to estimate their detectability and survival. In early 2016, 141 newts were marked and released into four ponds. Monthly recapture rates were low, suggesting low detectability and/or survival. Three returning adults from previous years' release events were captured, and natural reproduction was documented for the first time during the five-year project.

During FY 2015-16, FWC conducted four surveys for striped newts on Jennings WMA in Clay and Duval counties and Camp Blanding WMA in Clay County. Striped newts were detected in several of the known ponds on each WMA.

**Table 6.** Number of ponds visited, number of ponds dipnetted, and number of ponds containing striped newts on various properties in FY 2015-16.

<b>Property</b>	<b>No. Ponds Visited</b>	<b>No. Ponds Surveyed</b>	<b>No. Striped Newt Ponds</b>
<u>Northwest Region</u>			
Apalachicola National Forest	24	22	1
Private Land #1– Jefferson County	6	6	2
Private Land #2 – Jefferson County	6	6	0
<u>North Central Region</u>			
Big Bend WMA, Spring Creek Unit	3	2	1
Camp Blanding Military Reservation	15	5	0
Goethe State Forest	6	5	0
Jennings State Forest	18	7	4
Ordway-Swisher Biological Station	15	9	4
Pumpkin Hill Creek Preserve State Park	2	2	0
<u>Northeast Region</u>			
Bull Creek WMA	5	5	0

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<b>Property</b>	<b>No. Ponds Visited</b>	<b>No. Ponds Surveyed</b>	<b>No. Striped Newt Ponds</b>
Guana River WMA	3	3	0
Guana Tolomato Matanzas National Estuarine Research Reserve	1	0	0
Merritt Island National Wildlife Refuge	4	4	1
Ocala National Forest	41	33	7
Rock Springs Run State Reserve	8	5	0
Seminole State Forest	5	5	0
Triple N Ranch WMA	18	17	7
University of Central Florida	2	2	0
<b>Total</b>	<b>182</b>	<b>138</b>	<b>27</b>

## REPTILES

### **American Crocodile** (*Jason Waller and Amanda West*)

The American crocodile is currently a Federally-designated Threatened species in Florida. The population has experienced tremendous growth since 1975, when the species was listed as Endangered under the Federal Endangered Species Act. Crocodile sightings have been documented as far north as Cocoa Beach in Brevard County on the east coast and Lake Tarpon in Pinellas County on the west coast. With the increasing crocodile population (estimated between 1,500 and 2,000 non-hatchlings), a commensurate increase in crocodile-human conflicts has been documented. FWC manages these conflicts on a case-by-case basis with human safety being the highest priority, while also recognizing the needs of a recovering species. During FY 2015-16, FWC received 129 complaints regarding the American crocodile. Most of these complaints were resolved by educating the public through telephone calls and site visits.

FWC has crocodile response agents who respond to crocodile calls, some of which require capture of the crocodile. A total of 15 individual crocodiles were captured during FY 2015-16. One male crocodile was taken to the Miami Zoo for surgery and rehabilitation, but it expired from injuries sustained from a poaching incident. This crocodile was 11 feet total in length. One young male was captured and translocated twice after each time getting into the same residence's koi pond. This crocodile was 4.3 feet in total length. Seven additional crocodiles (four females and three males) were captured and translocated to a site deemed suitable by FWC. Translocated animals ranged from 4.2 to 10.3 feet in length, for an average of 6.9 feet. Six crocodiles (one male, four females, and one unknown) were captured and removed from human-interaction situations and released near their capture site. Those animals ranged in size from 4.0 to 10.7 feet in length.

FWC was involved in the recovery of eight American crocodile carcasses (four males, one female, and three unknown) during FY 2015-16. The animals ranged from 3.3 to 12.1 feet in length. The cause of death for two of the animals was attributed to wounds inflicted by automobile traffic. One died due to wounds inflicted during intraspecific fighting. Five carcasses were too decomposed to determine cause of death.



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**Alligator Snapping Turtle** (*Kevin Enge, Matthew Goode, Pierson Hill, Jonathan Mays, and Catherine Ricketts*)

The alligator snapping turtle is the largest freshwater turtle in North America and is currently listed in Florida as a State-designated Species of Special Concern. FWC turtle regulations prohibit its harvest in Florida, and possession of an alligator snapping turtle requires an FWC permit. The alligator snapping turtle was petitioned for Federal protection by the Endangered Species Act in 2012, and is under review. In 2014, a paper described two new species, the Suwannee (*Macrochelys suwanniensis*) and Apalachicola (*M. apalachicola*) alligator snapping turtles, based upon differences in genetics and the morphology of skulls and shells. Florida is the only state with all three species. Biological status reviews conducted on all three species determined that the Suwannee and the nominate species warranted listing as State-designated Threatened, whereas the Apalachicola species did not warrant listing. These recommendations are yet to be adopted by the FWC Commission but all three species are currently protected from harvest. A manuscript has been submitted summarizing the results of a population study on the Suwannee alligator snapping turtle. A section of the Suwannee River in Gilchrist County was trapped by FWC on April 2-3, 2016. Nine traps captured two male and one female alligator snapping turtles, all of which were recaptured individuals from the prior FWC population study that were last captured in 2012.

Status Survey of the Apalachicola Alligator Snapping Turtle – The USFWS provided funds to Georgia and Florida to assess their status. FWC subsequently conducted population studies on the newly recognized Suwannee alligator snapping turtle in 2014 and on the newly recognized Apalachicola alligator snapping turtle in 2015 that demonstrated their relative abundances among river reaches and between watersheds within their respective ranges.

In 2015, FWC completed the status report on the Apalachicola snapping turtle. A total of 88 turtles (plus three recaptures) was trapped, marked, measured, and released in 308 trap nights from the Apalachicola, Choctawhatchee, and Ochlockonee rivers in the Panhandle. No alligator snapping turtles were detected in 26 trap nights in the Ocklawaha River in Marion County. The status report and other qualifying information have been provided to the USFWS to be considered when making a final Federal listing decision.

Apalachicola River Wildlife and Environmental Area in Gulf and Franklin Counties – The purpose of this monitoring is to provide data that will serve as an indicator for measuring management success and identifying threats and population changes. From July 2015 to July 2016, Apalachicola River Wildlife and Environmental Area (ARWEA) staff captured six unmarked turtles from six different locations and recaptured one individual that was originally captured 11 months earlier approximately ¼ mile from where it was originally captured. Since 2008, 35 turtles have been captured, 16 male (46%), 17 female (48%), one juvenile (3%) and one unknown (3%).

**Barbour's Map Turtle** (*Matthew Goode, Pierson Hill, Jonathan Mays, Catherine Ricketts and Brooke Talley*)

The Barbour's map turtle is currently listed in Florida as a State-designated Species of Special Concern. A biological status review in 2010 determined that the Barbour's map turtle

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met the criteria to be listed as State-designated Threatened. A draft species action plan for the Barbour's map turtle was completed in November 2013. The species status will change when FWC Commissioners approve the Imperiled Species Management Plan and associated rules changes, which is expected to be considered in November 2016. The USFWS was petitioned in 2010 to list the Barbour's map turtle Federally as Threatened, and FWC received a USFWS grant to determine its status.

In order to evaluate the status and distribution of the Barbour's map turtle in Florida, FWC surveyed for Barbour's map turtles from April 2014 to October 2015. Surveys were conducted in the Choctawhatchee, Chipola, Apalachicola, and Ochlockonee rivers in the Panhandle, and in the Ocklawaha River in the peninsula; baseline data for comparison were available from portions of the known range. A total of 5,917 map turtles was observed along 312 river-miles in the Panhandle, and the known range was expanded by 47 river-miles. No map turtles were detected in 25 river-miles in the Ocklawaha River. On the middle Apalachicola River, repeated surveys covered six 1.25-mile sections (7.5 miles total), and map turtle abundance was estimated at 2,079 individuals (or 278.8 turtles/mile). Repeated surveys on the Ochlockonee River estimated abundance along five three-mile sections below Lake Talquin in Leon and Gadsden counties (15.5 miles total) at 292 map turtles (or 18.8 turtles/mile).

Consideration of Commercializing Protected Freshwater Turtles – FWC worked with stakeholders to consider commercializing protected freshwater turtle species. FWC met with turtle breeders, biologists, and Florida Department of Agriculture and Consumer Services (FDACS) personnel to evaluate the proposal, later determining that commercialization would not be a conservation benefit to these species at this time. Species under consideration include: alligator snapping turtle, Barbour's map turtle, and Suwannee cooter.

Apalachicola River Wildlife and Environmental Area in Gulf and Franklin Counties – Staff of the Apalachicola River Wildlife and Environmental Area (ARWEA) conducts surveys for basking Barbour's map turtles in the fall of each year. The survey routes cover approximately 36 miles along sections of the Apalachicola, Brothers, and Chipola rivers in the Panhandle. FWC completed the fall 2015 surveys between October 29th and November 4<sup>th</sup>. A total of 1,563 turtles were counted during this survey period, the highest number observed since annual surveys began in 2009. The Chipola River section continues to have the most turtles with 1,087 observed in 2015. This number is much higher than the 507 counted in 2014; however, environmental factors including the river's water height and the difference between air and water temperature likely influence the number of turtles out basking and thus FWC's ability to detect them. For example, in 2015, water in the Chipola River was lower (around 2.5 feet) than in 2014 (around 5.5 feet), exposing more of the downed limbs and logs upon which turtles bask.

**Gopher Tortoise** (*Barbara Almario, Travis Blunden, Deborah Burr, Traci Castellón, Scott Cooney, Samantha Dupree, Michelina Dziadzio, Norberto Fernandez, Alan Hallman, Kelli Herrick, Alex Kalfin, Rachel King, Nathan Lambert, Rick McCann, Aubrey Pawlikowski, Fred Robinette, Eric Seckinger, Eric Sievers, Sandra Smalley, Kathleen Smith, Scotland Talley, and Mark Winland*)

The gopher tortoise is listed as a State-designated Threatened species in Florida. The gopher tortoise is in decline across its range in the southeastern United States. It is Federally-

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listed as Threatened in Mississippi, Louisiana, and portions of Alabama, and is a candidate for listing in the eastern part of its range (South Carolina, Georgia, Florida, and eastern Alabama). Both tortoises and their burrows are protected in Florida, and gopher tortoises must be relocated before land clearing or development can occur.

Management – Increased efforts have been made to engage Florida residents in gopher tortoise conservation. FWC offers four types of volunteer opportunities for Florida residents to help protect and conserve the gopher tortoise. These volunteer opportunities include gopher tortoise mortality data collection, waif (removed from the wild but origin is unknown) gopher tortoise transportation, silt fence installation, and surveying for humane relocation associated with incidental take permits.

The mortality data collection program engages Florida residents in conservation efforts by asking volunteers to notify FWC of any deceased or injured gopher tortoises that are found. Mortality data is submitted to FWC via an online web form that may be accessed at <https://public.myfwc.com/HSC/GopherTortoise/GTMortality.aspx>. This data allows FWC to determine gopher tortoise mortality “hotspots” throughout the state. During FY 2015-16, 180 gopher tortoises were reported as sick or dead, and vehicles were the leading cause of the mortality. Student interns also use this data to create a map, which illustrates potential mortality “hotspots” throughout Florida by using Geographic Information Systems (GIS).

The incidental take permit relocation program mobilizes volunteers to conduct burrow surveys at development sites permitted for incidental take. During FY 2015-16, FWC trained 13 volunteers for the incidental take permit relocation program. The program acts as an incentive by reducing the gopher tortoise relocation timeline, potentially increasing participation from developers permitted to otherwise take tortoises incidental to a development project. The program was implemented in the spring of 2016 in coordination with the FWC volunteer program, and may allow volunteers to trap, mark, and transport tortoises in the future.

The gopher tortoise volunteer program has also utilized student interns from Florida State University since 2011, who contributed approximately 1,016 hours during FY 2015-16 to help implement actions in the Gopher Tortoise Management Plan. Many of these actions may not have otherwise been accomplished with existing staff resources, while also benefitting the interns by exposing them to professional experiences in wildlife conservation and working in a government agency. Examples of projects completed by interns during FY 2015-16 include: an analysis assessing the usage of permit types offered; creating a “Gopher Tortoise Day” website (<http://gophertortoisedayfl.com/>) to encourage adoption of a resolution proclaiming April 10<sup>th</sup> as Gopher Tortoise Day in counties and municipalities throughout Florida; researching agency records of previously-issued incidental take permits to promote humane relocation; and developing a reference guide for State Attorneys to assist in prosecuting gopher tortoise violations. FWC is recruiting citizen scientists to assist in gopher tortoise conservation efforts by submitting photos of their gopher tortoise sighting to FWC using the “Florida Gopher Tortoise” Smartphone App (<http://myfwc.com/wildlifehabitats/managed/gopher-tortoise/app/>). The goal of this app is to increase public awareness and citizen participation in gopher tortoise conservation throughout Florida. Citizens can also use the app to learn more about the life history of the species, report wildlife issues, and test their gopher tortoise knowledge with a quiz. During FY 2015-16, a new version of the app was released, available on both iPhone<sup>TM</sup> and Android<sup>TM</sup>. Citizens can view an interactive map online and on their mobile device, that displays where other

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citizen scientists have documented gopher tortoises. To date, citizen scientists have submitted photos for over 899 gopher tortoise locations.

A new fact sheet addressing upper respiratory tract disease in gopher tortoises was created this year and added to the extensive educational materials available and distributed. Approximately 4,810 gopher tortoise brochures and fact sheets have been distributed including 3,230 of *A Guide to Living with Gopher Tortoises* that were distributed to local governments, schools, nature centers, and Florida residents. The poster *Got Gophers, Get Permits* is continuously distributed to planning councils, county and city building departments, and local permitting offices. More than 933 *Safe Roads for People and Tortoises* placards have been distributed and are available at Florida visitor centers, State parks, highway rest stops and local parks. All publications are also available to download at [www.MyFWC.com/GopherTortoise](http://www.MyFWC.com/GopherTortoise), and at each of FWC's regional offices.

FWC hosted and/or participated in 28 outreach events including: four local government workshops, three law enforcement training events, wildlife festivals, several county 4-H events, Eighth Street Elementary School in Marion County, St. Marks Stone Crab Festival in Wakulla County, Oakland Heritage Festival in Lake County, Earth Day Celebration in Tallahassee, and an event at Marion Therapeutic Riding Association in Marion County. Additional training will help FWC officers address wildlife complaints related to gopher tortoises in an effective and consistent manner statewide. Working with law enforcement and FWC's Legal Office, a gopher tortoise student intern created a Law Enforcement Field Guide for conducting investigations of gopher tortoise incidents and violations. This field guide will assist FWC officers in consistent response to wildlife violations involving gopher tortoises.

FWC hosted the 8<sup>th</sup> annual Gopher Tortoise Candidate Conservation Agreement meeting in Cocoa Beach, FL, on June 7-8, 2016. This meeting brought together 48 Federal, State, and private partners to discuss the status of gopher tortoise populations range-wide. The goal of the Gopher Tortoise Candidate Conservation Agreement is to organize a cooperative range-wide approach to gopher tortoise management and conservation in its eastern range, and ultimately prevent the Federal listing of the gopher tortoise under the Endangered Species Act. Topics of discussion at the meeting included: trend assessment using data reported by signatories, the number and distribution of viable populations needed to prevent Federal listing, a Department of Defense crediting strategy, and the designation of priority areas for conservation using soil suitability, land cover, and urban development, as well as many other issues. Site visits to Kennedy Space Center, Cape Canaveral Air Force Station, and Merritt Island National Wildlife Refuge in Brevard County were also conducted to learn about management and restoration efforts at those properties. Next year's meeting will be hosted by Georgia Department of Natural Resources.

Since implementation in 2008, the recipient site permit program (a voluntary program in which landowners may use their lands with suitable habitat to receive gopher tortoises from development sites), approximately 16,039 acres of gopher tortoise habitat have been protected through permanent conservation easements. Under these permits, private landowners can accept gopher tortoises relocated off development sites, and assess a monetary charge to the developer for accepting the tortoise(s). In exchange, the recipient site landowners agree to manage and protect the habitat for gopher tortoises in perpetuity. Currently, 40 recipient sites with an available capacity of 16,670 tortoises are permitted. An additional four recipient site permit applications are currently under review with potential available capacity for an additional 1,488 tortoises on 776 acres of gopher tortoise habitat. During FY 2015-16, 6,843 tortoises were

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relocated under FWC-issued permits.

During FY 2015-16, FWC continued with efforts to identify solutions for waif tortoises. One solution includes identifying willing landowners to care for waifs on their property and designating the land as a “waif tortoise recipient site.” Waif sites were established in Bay, Manatee, Miami-Dade, and Okaloosa counties, and four tortoises have found permanent homes at the Manatee County site, Perico Preserve. Additionally in FY 2015-16, previously permitted Sabal Bluff (Lake County) and Circle B Bar Reserve (Polk County) waif recipient sites received ten and five tortoises, respectively. FWC is currently in the process of developing additional waif sites by working with private landowners to establish sites in Pasco and Wakulla counties. FWC is working with wildlife rehabbers to place waifs at designated waif recipient sites, or releasing them back to their origin if location information is known. Under a Memorandum of Agreement (Agreement) with the South Carolina Department of Natural Resources, there is also an ongoing effort to restock depleted gopher tortoise populations on public lands in South Carolina through the FWC waif program. FWC worked with South Carolina during FY 2015-16 to amend the Agreement, which extended it by two years and increased the number of gopher tortoises transferable to South Carolina by an additional 100 tortoises. During FY 2015-16, 13 juvenile and five adult tortoises were relocated to Aiken Gopher Tortoise Heritage Preserve under supervision of South Carolina.

FWC works closely with public agencies, non-profit organizations, and private landowners to identify and provide incentives for gopher tortoise conservation on private lands. FWC regularly participates in workshops that promote conservation opportunities and habitat management incentives for private landowners to benefit from having wildlife on their property. To address special situations that provide more flexibility and furthers the objectives of the Gopher Tortoise Management Plan, FWC has entered into two Memorandum of Agreements and one Memorandum of Understanding (Understanding) with other State and Federal agencies. These agreements and understandings document the cooperation between the different entities to develop and implement voluntary and cooperative strategies for the purposes of conservation, management, research, and recovery of gopher tortoises throughout the state. FWC and St. Johns River Water Management District entered into an Agreement that provides a comprehensive approach to the relocation, management, and conservation of gopher tortoises located on U.S. Army Corps of Engineers flood control levees within the St. Johns River watershed. The levees were found to be deficient due to the presence of gopher tortoise burrows. The Agreement described the processes to be followed to facilitate the conservation of the gopher tortoises from the levees. FWC also entered into an Agreement with the Florida Forest Service to establish a 155-acre recipient site within the Withlacoochee State Forest in Citrus County. The public conservation land recipient site was established to receive gopher tortoises from the adjacent Department of Transportation’s Suncoast Parkway Phase 2 site, thereby maintaining the resident gopher tortoise population on public lands. The Agreement described the processes to be followed and to facilitate the establishment and management of gopher tortoises relocated onsite in the state forest. An Understanding with the U.S Forest Service, the Fish and Wildlife Foundation of Florida, and Wiregrass Ecological Associates was established to facilitate a research study involving the relocation of gopher tortoises from development sites to the Apalachicola National Forest.

FWC coordinated with researchers on several projects outlined in the Gopher Tortoise Management Plan during FY 2015-16. FWC assisted with the development and funding (through the Fish and Wildlife Foundation of Florida) and issued a scientific collecting permit

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for a University of Central Florida study to assess the impacts on gopher tortoises of being temporarily excluded from the Sabal Trail Natural Gas Pipeline project area in Central Florida. FWC coordinated with the U.S. Forest Service and Wiregrass Ecological Associates to create an Understanding and amend a gopher tortoise research site and a scientific collecting permit to determine how gopher tortoises respond to being relocated to different areas at Apalachicola National Forest. Along with the large-scale restoration objective, the research study will evaluate site fidelity of relocated gopher tortoises on Apalachicola National Forest in response to different habitat management treatments. The research site is permitted to receive up to 2,820 gopher tortoises from donor sites throughout the state, and will expire December 31, 2021. Another project that was funded took place at the Kennedy Space Center and examined the use of movement corridors by gopher tortoises as a response to sea level rise and identified barriers to these movements. The latest report for this project stated that railroad tracks appeared to be barriers to gopher tortoise movement.

To better understand gopher tortoise population distribution and trends in Florida, under a three-year contract (funded in part by a Federal grant) with The Joseph W. Jones Ecological Research Center, 26 select public conservation lands in Florida were surveyed between August 2014 and February 2016, seven of which were completed during FY 2015-16. Under this contract, 58 staff from the Florida Department of Environmental Protection (FDEP), Florida Department of Agriculture and Consumer Services (FDACS), Florida National Areas Inventory, FWC, and Hillsborough and Polk counties were trained to use this survey method. Little Talbot Island State Park in Duval County had the highest population density (1.8 tortoises/acre), and Withlacoochee State Forest Croom Tract in Hernando County had the largest population estimate (8,221 tortoises). Burrow occupancy ranged from 20% at Blackwater River State Forest West Boundary Unit in Santa Rosa County to 71% at Hilochee Wildlife Management Area (WMA) in Lake and Polk counties. Burrow size class distributions indicated a predominance of adult burrows (greater than 23 centimeters in width) in most populations. Gopher tortoise interns and staff input survey data into a GIS database to identify, monitor, and track potential viable and supporting populations throughout Florida. Of the 26 conservation lands monitored during the three-year contract, 19 sites met the criteria for a viable population (at least 250 adult tortoises, at least 0.16 tortoises/acres, and at least 250 acres of continuous gopher tortoise habitat). Future monitoring will focus on surveying additional public conservation lands to locate viable populations statewide, as well as locate populations that may become viable with increased management.

During FY 2015-16, \$71,911.00 in funding was provided to assist local governments with gopher tortoise habitat management activities on more than 587 acres of conservation lands. Some habitat management and improvement activities conducted included fire line preparation, prescribed burns, selective tree removal, roller chopping, disking, planting beneficial species, and controlling exotic and invasive plants via the utilization of herbicide applications.

Wildlife Management Area and Wildlife and Environmental Area Activities – Split Oak Forest WEA (Orange and Osceola counties) staff and volunteers conducted a burrow survey in four management units covering approximately 113 acres on the WEA. Surveyors found 176 burrows in these units. This yields a rough estimate of 80-90 tortoises or less than one per acre. Additional management units will be surveyed in FY 2016-17.

During FY 2015-16, a gopher tortoise survey was conducted on a recently burned 82-acre unit of the Corkscrew Regional Ecosystem Management WEA in Collier County. The objective

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of the survey was to estimate population size and density of gopher tortoises on the area. Gopher tortoises and burrows were identified by walking predetermined transects spaced 1,775 feet apart. A total of 77 gopher tortoise burrows were scoped and 20 gopher tortoises were found. The tortoise density estimate was 0.32 tortoise/acre with the abundance estimate of 26 tortoises within the 82 acres of the WEA.

On Jennings State Forest WMA in Clay and Duval counties, a gopher tortoise burrow survey was conducted on Jennings State Forest in October 2015. This survey was part of a quinquennial (occurring once every five years) survey of a 183-acre block that is divided into four quadrants. During the FY 2015-16 survey, 864 gopher tortoise burrows were observed. Of these 864 burrows, 456 (53%) were active, 228 (26%) were inactive, and 180 (21%) were abandoned. The results showed very little difference from the survey performed in 2010, which found 830 burrows, 416 (50%) were active, 235 (28%) were inactive, and 179 (22%) were abandoned. With the population only increasing by 4% over five years and habitat conditions remaining the same, it suggests that the population could be approaching carrying capacity.

In March and April 2015, FWC conducted an initial survey for gopher tortoises on Escribano Point WMA in Santa Rosa County in 128 acres of potential habitat. No gopher tortoises or burrows were detected during this survey. During the winter of FY 2015-16, researchers from the Florida Natural Areas Inventory surveyed approximately six miles of randomly selected transects through all potential tortoise habitat on the WMA as part of a baseline reptile and amphibian survey. No tortoises or burrows were detected during this survey.

FWC continued a multi-year comprehensive burrow survey, designed to evaluate the entire 200,000 acres of Blackwater WMA in Okaloosa and Santa Rosa counties. The purpose of the survey is to provide FDACS, the lead land manager on the area, with habitat improvement recommendations.

During FY 2015-16, FWC surveyed approximately 1,179 acres of potential gopher tortoise habitat and located 190 burrows. To date over 87,000 acres of habitat have been surveyed with 3,782 burrows located. Only 14.5% of gopher tortoise burrows have been classified as abandoned. Once all suitable habitat has been surveyed, FWC will survey subsamples of gopher tortoise populations and habitats within each management unit on Blackwater WMA to assess whether forest management efforts have influenced gopher tortoise population sizes, distributions, and recruitment.

FWC monitored and assessed the status of gopher tortoises on Pine Log WMA and Point Washington WMA, both located in Bay, Washington, and Walton counties. FWC delineated clusters of tortoises and tortoise habitat on the WMAs to facilitate management. Pine Log WMA contains 15 clusters (2,749 acres) that FWC monitored annually prior to FY 2015-16. Point Washington WMA, surveyed on a three-year rotation, contains 33 clusters (15,427 acres).

During FY 2015-16, FWC focused on habitat improvement and maintenance, rather than on population monitoring. FWC allocated \$35,000 to improve nearly 350 acres of tortoise habitat on Pine Log WMA. Within some of the more robust tortoise clusters on the area, as determined by previous monitoring efforts, sand pine and scrub oak will be cut down and herbicide will be applied to prevent regrowth. In cooperation with FDACS, FWC plans to continue gopher tortoise habitat restoration on both WMAs in the future. FWC will resume annual gopher tortoise surveys in FY 2016-17.

Mitigation Park Program – The goal of mitigation parks is to provide an off-site alternative for resolving certain wildlife resource conflicts. Most mitigation park facilities are

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developed in cooperation with other local, State, and Federal agencies, usually following the signing and execution of an Understanding. The Understanding'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 Wildlife and Environmental Areas (WEAs).

Gopher tortoise monitoring was contracted through the Jones Center for surveys. The initial pilot survey was conducted for Hickey Creek WEA in Lee County and the full survey was completed for Bullfrog Creek WEA in Hillsborough County in FY 2015-16.

In Central Florida, at Crooked Lake WEA in Polk County, 104 acres were treated for exotic plants and 75 acres were mowed and mechanically treated for habitat improvement. Perry Oldenburg WEA in Hernando County received 60 acres of exotic plant control and 158 acres were thinned of pines and large hardwoods as part of an ongoing logging operation. Gopher tortoise management at Janet Butterfield Brooks WEA in Hernando County included 116 acres that were prepared for burning by shredding hardwood saplings in addition to installing 0.9 acres of firebreaks. An additional 100 acres of exotic vegetation was treated at the site. Bullfrog Creek WEA in Hillsborough County had 80 acres mechanically treated to control hardwoods and weedy species.

In south-central Florida at Platt Branch WEA in Highlands County, controlled burns were completed on 694 acres, herbicide was used on 190 acres of exotic vegetation, and 75 acres were mechanically treated. Moody Branch WEA in Manatee County had 153 acres of gopher tortoise habitat burned, 50 acres mowed to control weedy species, and 288 acres shredded to control sand pine and hardwood encroachment. At Hickey Creek WEA in Lee County, 81 acres were prescribed burned and an additional 28 acres of mature oak scrub were mechanically treated.

In north-central Florida, a habitat restoration project to reduce the density of mid-story hardwoods was completed in spring 2016 on Bell Ridge Longleaf WEA in Gilchrist County. In FY 2015-16, growing season prescribed fire was used to maintain and enhance 372 acres of gopher tortoise habitat on Bell Ridge Longleaf WEA (restoration covered an area of 176 acres), 113 acres on Branam Field WEA in Duval County, 616 acres on Fort White WEA in Gilchrist County, and 483 acres on Suwannee Ridge WEA in Hamilton County. In FY 2015-16, dormant season prescribed fire was used to maintain and enhance 352 acres of gopher tortoise habitat on Fort White WEA, 716 acres on Lafayette Forest WEA in Lafayette County, and 225 acres on Suwannee Ridge WEA. A pine thinning and hardwood chipping project was completed on 341 acres of degraded gopher tortoise habitat at Lafayette Forest WEA. It is expected that this management action will prevent over-shading of native groundcover and allow these acres to be maintained with prescribed fire. A habitat restoration project to reduce the density of understory hardwoods was completed in spring 2016 on Lafayette Forest WEA. This restoration covered an area of 60 acres. A herbicide application was used to control re-sprouting hardwoods and to prevent over shading of native groundcover while promoting the growth of desirable species through reduced competition. This restoration effort will allow prescribed fire to be the main habitat management tool used for maintaining gopher tortoise habitat. Ongoing habitat restoration efforts occurred on Watermelon Pond WEA in Alachua County. These efforts include seeding 40 acres with wiregrass, planting longleaf pine seedlings on 70 acres, treating



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343 acres with herbicide to eradicate non-native pasture grasses, and applying prescribed fire to 235 acres.

In FY 2015-16, FWC contracted the Florida Natural Areas Inventory to conduct gopher tortoise surveys within 1,063 acres of sandhill restoration sites on the Spring Creek and Tide Swamp Units of the Big Bend WMA in Taylor and Dixie counties. Transects totaling 212 acres were surveyed representing a sample of approximately 20% of the restoration sites. On Spring Creek, the estimated population is 204 tortoises in 721 acres of habitat or approximately 0.28 tortoises per acre. On Tide Swamp, the estimated population is 218 tortoises in 342 acres of habitat or approximately 0.64 tortoises per acre. While tortoise densities are relatively low on both areas, populations are expected to increase as habitat restoration progresses and matures. The estimated tortoise density on Tide Swamp is double the estimate on Spring Creek, which is likely a reflection of the fact that restoration efforts began earlier on Tide Swamp and the quality of habitat is better. FWC also contracted the Florida Natural Areas Inventory to conduct a gopher tortoise survey in suitable habitat on the Half Moon WMA in Sumter County. This survey is a follow up to a similar survey conducted in 2008. Transects totaling 421 acres were surveyed representing a sample of approximately 17.6% of the 2,397 acres of suitable habitat mapped on Half Moon WMA. The estimated population is 632 tortoises or approximately 0.26 tortoises per acre. This estimate is similar to the 2008 estimate of 601 tortoises.

Habitat Restoration Projects – The Lake Wales Ridge WEA consists of 19 tracts in Highlands and Polk counties. All tracts contain habitat suitable for the gopher tortoise and gopher tortoises have been observed on all tracts of the WEA. FWC obtained a grant from the Disney Worldwide Conservation Fund to restore gopher tortoise habitat on 20 acres of degraded scrub vegetation at the Royce Unit, beginning in FY 2013-14. Permanent photopoint locations were established to document vegetation changes over time. Restoration began with hand pulling of invasive exotic plants and planting of native scrub oak acorns and saw palmetto fruits. During FY 2015-16, FWC transplanted 2,400 potted native plants into the restoration site. Control of exotic species continued with herbicide applications and hand pulling. Photopoint monitoring documented progress at quarterly intervals. Volunteers also collected and planted acorns and other native plants in pots to grow in the WEA's greenhouse. In addition to the gopher tortoise habitat restoration site, habitat was improved or maintained across the WEA via prescribed burning of 1,637 acres. Prescribed burns and chainsaw treatments reduce canopy height and density, thereby allowing sunlight to penetrate to the ground level plants that gopher tortoises eat.

Gopher tortoise surveys and monitoring continued in May 2016 on the Fitzhugh Carter Tract of Econfina Creek WMA in Washington County. The 2,175-acre tract contains approximately 1,200 acres of tortoise habitat. During FY 2015-16, FWC surveyed 439 burrows and documented 80 new burrows. FWC classified 40 percent of burrows as “active” or “possibly active.” The number of “active” burrows increased by 16 while the number of “possibly active” burrows decreased by three between 2015 and 2016 (**Table 7**). Gopher tortoise burrow surveys on the Carter Tract have revealed a continuous cycle of burrow creation and abandonment over time. Restoration activities designed to continue to improve and maintain habitat include prescribed burning, scrub oak reduction, herbicide application, and planting of native groundcover (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 on the Carter Tract.

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FWC will continue to conduct surveys annually on the area from May to July. Future work will provide comparative data on tortoise population trends within the Carter Tract following land management and mitigation strategies.

**Table 7.** Gopher tortoise active and possibly active burrow counts and status for the last five years (2012-2016) at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, FL.

<u>Burrow Status</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>
Active	92	85	102	117	133
Possibly Active	28	38	28	45	42
Total	120	123	130	162	175

Statewide Gopher Tortoise Pilot Survey Monitoring – During FY 2015-16, FWC contracted Florida Natural Areas Inventory to conduct a series of gopher tortoise pilot surveys at selected WMAs and WEAs. The intent of these surveys was to designate WMAs/WEAs that could be used as part of a statewide monitoring effort for gopher tortoises in Florida. Florida Natural Areas Inventory surveyed 14 total WMAs/WEAs, including Apalachee WMA in Jackson County; Big Bend WMA, Jena, Spring Creek, and Tide Swamp Units in Taylor County; Chassahowitzka WMA in Hernando County; Crooked Lake in Polk County; Escribano Point WMA in Santa Rosa County; Half Moon WMA in Citrus County; Hickey Creek WEA in Lee County; L Kirk Edwards WEA in Leon County; Lafayette Forest WEA in Lafayette County; Lake Wales Ridge WEA, Clements, Lake Placid, McJunkin, Royce, and Sun Ray Units in Polk and Highlands counties; Salt Lake WMA in Brevard County; Suwannee Ridge WEA in Hamilton County; Three Lakes WMA in Osceola County; and Triple N Ranch WMA in Osceola County.

From September 2015 to December 2015, Florida Natural Areas Inventory contractors surveyed a total of approximately 194 miles of transects at 17 sites, and scoped 560 burrows, in which 277 tortoises were encountered. Tortoises were encountered at all but two of the survey sites (Escribano Point WMA [no burrows observed] and Big Bend WMA-Jena Unit [one burrow scoped but unoccupied]). Encounter rate ranged by site from 1,591 feet/tortoise at Suwannee Ridge WEA to 8,930 feet/tortoise at Big Bend WMA-Spring Creek Unit. Based upon these results, FWC received approval for a statewide gopher tortoise monitoring plan on WMAs and WEAs to continue full surveys on 20 areas over the next five to ten years.

**Sea Turtles** (*Beth Brost, Simona Ceriani, Allen Foley, Robert Hardy, Shigetomo Hirama, Anne Meylan, Robbin Trindell, and Blair Witherington*)

FWC continues to maintain management and research programs to foster the recovery of the five species of sea turtles that occur along Florida’s coast: leatherback, hawksbill, and Kemp’s ridley (all Federally-designated Endangered), and the green and loggerhead (Federally designated Threatened). FWC interacts frequently with a diversity of stakeholders in State and Federal agencies, local governments, conservation organizations, citizens, and academic programs, including working with the Florida Department of Environmental Protection (FDEP), the Water Management Districts, the USFWS, and the U.S. Army Corps of Engineers during environmental commenting. FWC served on several scientific advisory committees, governing boards, working groups, and committees during FY 2015-16, including: the Archie Carr Sea

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Turtle Refuge Working Group; FDEP Beach Management Agreement for Palm Beach Island; the Florida Sea Turtle License Plate Grants Committee; the USFWS International Working Group for the Conservation of the Northwest Atlantic Loggerhead Populations; the steering committee and working group for FDEP's Beaches Habitat Conservation Plan; Summit on Green Turtle Fibropapillomatosis Steering Committee; university graduate committees; the Interamerican Convention for the Protection and Conservation of Sea Turtles; and the International Union for the Conservation of Nature's Marine Turtle Specialist Group. FWC reviewed all proposals submitted to the small grants program of the Florida Sea Turtle License Plate. FWC also served as advisors for the Federal Green Turtle Critical Habitat Team.

Management Activities – During FY 2015-16, FWC continued to work closely with the Federal Government, State regulatory agencies, volunteer conservation groups, and local governments to implement the State's responsibilities in accordance with the Marine Turtle Protection Act [s. 379.2431(1), Florida Statutes] and the USFWS' Recovery Plans for five species of sea turtle (also known as marine turtles) in Florida.

In January 2016, FWC hosted the 19<sup>th</sup> Annual Marine Turtle Permit Holder Workshop in Jacksonville, Florida. Over 400 permit holders and volunteers along with local government, State, and Federal agency staff attended this meeting, which was co-hosted by the Sea Turtle Conservancy.

FWC worked with 35 businesses (from California, Florida, Georgia, Minnesota, Texas, Wisconsin, and Canada) to identify lighting options that are appropriate for use adjacent to Florida's sea turtle nesting beach. FWC assessed 90 fixtures and bulbs and listed them on FWC's website so that beachfront property owners, local governments, and beach businesses have access to beach lighting options that limit impacts to nesting and hatchling sea turtles.

During FY 2015-16, FWC and FDEP worked together to implement an early restoration project, "Restoring the Night Sky," to offset impacts to sea turtle nesting habitat due to response injury that occurred during the Deep Water Horizon Event. This project includes reducing light sources on and around northwest Florida's conservation lands and assisting local governments in their efforts to reduce the impact of beachfront lighting on sea turtles, their nests, and nesting beaches. An educational campaign including social media, billboards, and radio announcements is being implemented in northwest Florida under a contract with Sachs Media Group. Several local governments, including Franklin County, Gulf County, and the City of Destin, are using grant funds to enhance compliance with their local lighting ordinances by hiring additional staff or providing information and appropriate bulbs and fixtures to beachfront properties.

During FY 2015-16, FWC reviewed 194 applications as requested by FDEP, water management districts, and the State Clearing House to ensure consistency of approved activities with State statutes requiring protection of sea turtles, their nests, and nesting habitat. Projects reviewed included coastal construction control line applications, environmental resource permit applications, joint coastal permit applications, and Federal documents submitted to the State Clearing House. FWC participated in the development of the Florida Statewide Beaches Habitat Conservation Plan (in cooperation with FDEP).

During FY 2015-16, FWC reviewed and approved approximately 210 renewals, new applications, and amendment requests for conservation activities with sea turtles. FWC issued 27 authorizations to hold sea turtles for rehabilitation, educational display, or research. FWC coordinated the review and approval of requests for monitoring associated with FDEP-authorized activities and oversaw review and approval of 45 permit requests for new or modified research

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involving Threatened and Endangered sea turtles, for 40 distinct research projects. Twenty-two permits or amendments were processed to authorize educational turtle walks, allowing the public to observe nesting loggerhead sea turtles during June and July on the southeast and the southwest Florida coasts.

FWC coordinated transfer and release of sea turtles undergoing rehabilitation and assisted with coordinating sea turtle releases; this included 54 sea turtles that stranded in New England. The turtles then were transferred to Florida for rehabilitation.

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

Research Activities – FWC coordinated the Florida portion of the Sea Turtle Stranding and Salvage Network (Network), an 18-state program administered by the National Oceanic and Atmospheric Agency's National Marine Fisheries Service (NOAA-Fisheries). The Network is responsible for gathering data on dead, sick, or injured (i.e., stranded) sea turtles.

During FY 2015-16, 2,372 dead or debilitated sea turtles were documented (1,384 green turtles, 743 loggerheads, 186 Kemp's ridleys, 22 hawksbills, eight leatherbacks, and 29 sea turtles not identified by species). FWC responded to 1,985 reports regarding sea turtle concerns (primarily reports of dead, sick, or injured sea turtles), transported 125 sick or injured sea turtles to rehabilitation facilities, and conducted necropsies on 268 carcasses. Sixteen training workshops, involving 566 participants, were held around the state to teach volunteers how to document stranded sea turtles. Real-time Florida sea turtle stranding data were readily available on a dedicated website (<http://ocean.floridamarine.org/SeaTurtle/fltssn/>) for use by various entities such as NOAA-Fisheries, FWC law enforcement, and protected species management personnel.

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. Assessments of nesting abundance and reproductive output are coordinated through 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, assess data collection error rates, analyzes data trends, and serves as a clearinghouse for information on sea turtle populations and habitats. During FY 2015-16, six workshops were presented around the state to 1,109 participants providing training on how to conduct nest surveys.

Two 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 survey 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 sea turtles and nesting beach habitats, and to identify important areas for land acquisition or enhanced protection. In 2015, 215 survey areas were monitored, comprising 838 miles of beaches. Statewide, in 2015, the program documented 89,295 loggerhead nests, 37,341 green turtle nests, 1,493 leatherback nests, no hawksbill nests, and 14 Kemp's ridley nests. A Statewide Atlas of Sea Turtle Nesting Occurrence and Density is now available on the FWC website at <http://myfwc.com/research/wildlife/sea-turtles/nesting/nesting-atlas/>. This resource provides a summary of the geographic distribution of sea turtle nest occurrence and nest density throughout the state during the last five years, and occurrence data for all species of sea turtles

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since 1979.

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 27 years at 478 index beach zones, surveyed daily during each 109-day nesting season (May-August). These efforts currently provide more than six million records in the Index Nesting Beach Survey Program database. The program provides a reliable way to detect changes in the abundance of Florida sea turtles. In 2015, the program documented increasing trends in nesting for loggerheads, green turtle, and leatherbacks.

The Hatchling Orientation Index Program provides data on how accurately hatchling sea turtles crawl toward the ocean after emerging from the nest. These hatchlings typically move towards the brightest and most open horizon. On a natural beach at night, this leads them to the water. Unfortunately, artificial lighting overrides other orientation cues, and strongly attracts crawling hatchlings. This causes the hatchlings to move away from the water, either increasing the time it takes them to reach the water (wasting energy and exposing them for a longer period of time to predators on the beach), or leading them to their deaths (going into parking lots or roadways or dying from dehydration). The Program objectively assesses conditions on sea turtle nesting beaches related to the effects of artificial lighting on hatchlings, identifies problem areas and allows for evaluations of efforts to reduce the problem of artificial lighting. During FY 2015-16, Program data were collected from hatchling emergences at 415 nest sites on 17 beaches around Florida.

In June 2016, 92 loggerheads and one Kemp's ridley were captured during an annual eight-day sampling session in Florida Bay. This work was conducted as part of a study of sea turtles in Florida Bay. The primary elements of this study include assessments of relative and absolute abundances, health assessments and monitoring of fibropapillomatosis (a disease specific to turtles), studies of growth, determinations of sex ratios and genetic identities, and studies of residency and movements. All captured turtles were measured and tagged. A little more than half (48) of the loggerheads had been previously tagged, providing data on growth and residency in Florida Bay. All turtles were released shortly after capture. This project has been conducted continuously since 1990. Some individual turtles have now been captured numerous times over periods as long as 20 years.

In addition to capturing live animals at sea and monitoring trends in nest numbers and hatchling production on the nesting beach, FWC is studying where adult female loggerheads reside and forage when they are not nesting on Florida beaches. Understanding the link between nesting and foraging areas is critical to the development of appropriate management and conservation strategies for sea turtles. FWC uses a combination of satellite telemetry and tissues collected on nesting beaches to identify foraging areas used by Florida loggerheads. The isotopic method has been validated and is much cheaper than satellite telemetry, allowing increased sample size and better representation of the nesting population. The project aims to identify foraging hotspots and determine the relative importance of foraging areas to the Florida nesting aggregation and how it changes among years. The project relies on the established Florida permit-holder system and involves the collection of non-viable unhatched eggs from a subsample of loggerhead nests inventoried for the FWC hatchling production program. More than 200 nests have been sampled annually across Florida since 2013. The results of the first two years of the study indicate that most females forage within the U.S. Economic Exclusive Zone (<http://oceanservice.noaa.gov/facts/eez.html>) and are concentrated in the Florida Keys, on

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the Southwest Florida continental shelf, the waters off east-central Florida, and on the continental shelf between Delaware and North Carolina. The Great Bahamas Banks are the main foraging area used by loggerheads nesting in Florida outside of U.S. jurisdiction. Results indicate a considerable variability in relative importance of foraging areas to the Florida nesting aggregation.

In addition to conducting in-water studies, FWC also maintains an electronic inventory of in-water sea turtle research and monitoring projects. FWC maintains this database in close collaboration with the sea turtle research community. The database currently serves State and Federal conservation managers by providing information on in-water sea turtle research and a connection to the researchers responsible for conducting the work. For more information on the Sea Turtle Research Program, please visit <http://myfwc.com/research/wildlife/sea-turtles/>.

**At-Risk Snake Surveys** (*Diane Alix, Barbara Almario, Kelli Herrick, Aubrey Pawlikowski, Fred Robinette, and Mark Winland*)

Blackwater Wildlife Management Area (WMA) in Okaloosa and Santa Rosa counties; Pine Log WMA in Bay and Washington counties; Point Washington WMA in Walton County; the Fitzhugh Carter Tract of Econfina Creek WMA in Washington County; and Tate's Hell State Forest in Franklin and Liberty counties are all within the range of several upland at-risk snake species, such as the Federally-designated Threatened Eastern indigo snake and the State-designated Species of Special Concern Florida pine snake. All four WMAs are within the range of two snake species that were recently petitioned for Federal listing: the Eastern diamondback rattlesnake and Southern hognose snake. Tate's Hell State Forest is within the range of three snake species that were recently petitioned for Federal listing: the Eastern diamondback rattlesnake, Apalachicola kingsnake, and Southern hognose snake.

Blackwater and Yellow River Wildlife Management Areas in Okaloosa and Santa Rosa Counties – FWC conducted a fall trapping season during September to November 2015 in the same location as the spring 2015 surveys. During this time, 19 individuals of seven snake species were captured, including one Eastern diamondback rattlesnake and one Florida pine snake.

In March 2016, FWC expanded the project to three new trap sites, including one site on Yellow River WMA. The new locations cover a greater diversity of upland habitat. Between March and June 2016, FWC captured 118 individuals comprising 11 snake species. These species included five Florida pine snakes and two Eastern diamondback rattlesnakes. FWC will continue upland snake trapping in FY 2016-17 with locations expected to change on a yearly basis.

Escribano Point Wildlife Management Area in Santa Rosa County – Escribano Point WMA is within the range of at-risk snake species such as the Eastern indigo snake (Federally-designated Threatened) and Florida pine snake (State-designated Species of Special Concern). Additionally, the WMA is within the range of two snake species that were recently petitioned for Federal listing, the Eastern diamondback rattlesnake and Southern hognose snake.

In April 2015, FWC developed a road-cruising survey route (24 miles long) for listed and at-risk snakes. Between July 2015 and June 2016, staff completed six surveys. FWC did not detect any listed species during FY 2015-16 surveys, but did document one adult Eastern

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diamondback rattlesnake on Escribano Point WMA and one adult Florida pine snake on adjacent Eglin Air Force Base property, approximately 500 feet from the WMA boundary.

Pine Log and Point Washington Wildlife Management Areas in Bay, Washington, and Walton Counties – Large snake traps deployed on Pine Log WMA did not capture any listed snake species during FY 2015-16. Point Washington WMA did not have any captures in FY 2015-16. FWC will relocate trap arrays during FY 2016-17 in an attempt to increase catch and decrease the possibility of trap avoidance.

Fitzhugh Carter Tract of Econfina Creek Wildlife Management Area in Washington County – During FY 2015-16, drift arrays captured 61 individuals of nine snake species. In March 2016, FWC caught an adult Florida pine snake, and incidentally documented two other adult pine snakes in May approximately ¾ mile south of the trap capture. This allows FWC to conclude that Florida pine snakes are likely inhabiting several areas on or near the Carter Tract. Also in FY 2015-16, FWC documented two Eastern diamondback rattlesnakes while using a camera to survey gopher tortoise burrows on the northern boundary of the property.

Tate's Hell State Forest in Franklin and Liberty Counties – FWC conducted surveys from November 2014 through October 2015 for two weeks of every month, including July-October of 2015. FWC did not document any listed snake species during this survey, but did detect Eastern diamondback rattlesnakes, which is an at-risk species. Incidental observations of note include another Eastern diamondback rattlesnake and two observations of Apalachicola kingsnakes.

**Eastern Indigo Snake** (*Eric Dennis, Kevin Enge, Alan Hallman, and Brooke Talley*)

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. During FY 2015-16, a paper was published describing the Gulf Coast indigo snake, which has a larger geographical range in Florida than the Eastern species and differs both genetically and in the shape of some head scales. During FY 2015-16, FWC continued adding new observations to the existing indigo snake database. During drift-fence surveys to assess the status of Federally-petitioned upland snake species, two indigo snakes were trapped at Twin Rivers State Forest in Madison County, and one indigo snake was trapped at Camp Blanding Military Reservation in Clay County. FWC provided data on live or dead indigo snakes found on roads to The Orianne Society (a privately funded organization to conserve indigo snakes), which has been tasked by the USFWS to examine effects of roads on the species.

FWC is collaborating with The Orianne Society, Central Florida Zoo in Sanford, Atlanta Zoo, Auburn University, The Nature Conservancy, Georgia Department of Natural Resources, and the USFWS to reintroduce indigo snakes into Apalachicola Bluffs and Ravines Preserve in Liberty County. The last verified record of the species from the Florida Panhandle was in 1999 on Eglin Air Force Base in Okaloosa County. A Conserve Wildlife specialty license grant will help fund tracking the fate of reintroduced snakes, which will be produced and raised in captivity for at least one year before being released. FWC will assist with the reintroduction and tracking of snakes. In April 2016, FWC approved an application that will allow the collection of 24

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pregnant female snakes from the Gulf region of Florida over a three-year period. These females will be held at the Orianne Center for Indigo Conservation in Lake County until eggs are laid, and then returned to their point of capture and released. The hatchlings will be used to establish a colony with new genetics from the Gulf region of Florida, which is crucial to future releases at Apalachicola Bluffs and Ravines Preserve.

**Florida Pine Snake and Short-tailed Snake** (*Kevin Enge and Jonathan Mays*)

The Florida pine snake is currently listed in Florida as a State-designated Species of Special Concern, but it will be listed as State-designated Threatened if the FWC Commissioners approve the Imperiled Species Management Plan and associated rules, which is expected to be considered in November 2016. The short-tailed snake, which is only found in Florida, is currently listed as State-designated Threatened and will remain so after FWC Commissioners approve the draft species action plan, which is also expected to be considered in November 2016. FWC prepared 90-day findings for the USFWS in response to a petition to list the Florida pine snake, short-tailed snake, and Southern hognose snake as Federally Threatened. The short-tailed snake is restricted to sandhill and scrub habitats, and the Florida pine snake is found in these two habitats as well as other well-drained habitats with an open canopy or no canopy of trees. The Florida pine snake is large (up to 7.5 feet), whereas the short-tailed snake is small (less than two feet) and extremely slender. Both species are seldom seen because they spend much of their time underground.

In 2013, FWC received a USFWS grant to determine the status of the Florida pine snake, Southern hognose snake, and Eastern diamondback rattlesnake. A total of 2,273 records of these three species and the short-tailed snake was compiled from museum, Florida Natural Areas Inventory, and FWC survey databases before beginning this project. From 2013-15, FWC conducted road and drift-fence surveys for these species, but the most effective method of obtaining records was soliciting sightings from the public, land managers, biologists, and snake enthusiasts. The FWC website allowed people to enter their observations on the Rare Snake Registry (<https://public.myfwc.com/fwri/raresnakes/UserHome.aspx?id>). In FY 2015-16, FWC added 201 more records: 30 Southern hognose snakes, four short-tailed snakes, 42 Florida pine snakes, and 125 Eastern diamondback rattlesnakes. The total number of records from 2000 through 2016 is 181 Southern hognose snakes, 81 short-tailed snakes, 420 Florida pine snakes, and 1,352 Eastern diamondback rattlesnakes. In September-November, FWC monitored two drift-fence arrays each at Apalachicola National Forest (Leon County), Twin Rivers State Forest (Madison County), Camp Blanding Military Reservation (Clay County), and Jennings State Forest (Clay County). Traps yielded two Southern hognose snakes from one array in Apalachicola National Forest and one pine snake each from Camp Blanding and Twin Rivers. In addition, FWC found a live short-tailed snake in Ocala National Forest, Marion County, while conducting striped newt surveys. Photos received and dead specimens collected were vouchered in the Florida Museum of Natural History. FWC completed potential habitat models for the three nonvenomous snake species, and The Orianne Society has been contracted to develop the potential habitat model for the Eastern diamondback rattlesnake using records provided by FWC. The final report for this upland snake status survey will be completed in October 2016.



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**Florida Keys Reptiles** (*Kevin Enge and Jonathan Mays*)

A one-year pilot status survey began in July 2015 for seven State-listed reptile species in the Florida Keys (Florida Keys mole skink, Key ringneck snake, Rim Rock crowned snake, Lower Keys population of the striped mud turtle, Florida brown snake, Peninsula ribbon snake, and red rat snake); three of which (striped mud turtle, red rat snake, and Peninsula ribbon snake) will be removed from Florida's Endangered and Threatened Species List if FWC Commissioners approve the Imperiled Species Management Plan and associated rule changes, which is expected to be considered in November 2016. The survey addressed various tasks identified in these plans, including determining current distribution, assessing effective survey methods, and collecting genetic samples for future taxonomic studies. Baited crayfish traps were used to trap for striped mud turtles, and 69 individuals were captured along with 28 recaptures. Sixteen cover boards yielded seven mole skinks on Bahia Honda Key and one ringneck snake on Big Pine and Cudjoe keys. Pedestrian surveys detected 15 red rat snakes, 13 ribbon snakes, and 14 striped mud turtles, whereas road surveys detected 20 red rat snakes, two ribbon snakes, and two striped mud turtles. Raking debris and sand in coastal areas produced 15 mole skinks on Big Pine Key, two on Boot Key, one on Geiger Key, and one on Sawyer Key. Surveys failed to find Rim Rock crowned snakes and Florida brown snakes, which are the rarest of the seven target species.

Locality records were also obtained from an FWC webpage soliciting sightings (<https://public.myfwc.com/fwri/flkeysreptiles/default.aspx>) and the National Key Deer Refuge. The webpage was advertised by two FWC media releases and local radio and newspaper interviews of FWC. This webpage produced one mole skink and ribbon snake record, three ringneck snake records, four striped mud turtle records, and 22 red rat snake records. All photos and dead specimens collected were vouchered in the Florida Museum of Natural History. FWC collected 18 genetic samples of the Florida Keys mole skink that will be provided to the University of Central Florida for a classification assessment of mole skinks, which is being funded by the USFWS. FWC prepared 90-day findings for the USFWS on the status of the Key ringneck snake and Rim Rock crowned snakes.

**Florida Scrub Lizard** (*Kevin Enge*)

In 2012, the Florida scrub lizard was Federally-petitioned for listing as a Threatened species, and the USFWS provided funds to FWC in 2015 to conduct a two-year status survey. The species occurs in three disjunct areas: the Mount Dora Ridge from Putnam to Osceola County; the Lake Wales, Winter Haven, and Bombing Range ridges in southeastern Lake, Polk, and Highlands counties; and the Atlantic Coast Ridge from Brevard to Broward County. Populations once occurred as far south as northern Miami-Dade County and on the southwestern Gulf Coast in Lee and Collier counties. The Gulf population has been extirpated from Marco and Estero islands and may no longer occur near Naples, in Collier County.

Approximately 600 sites were identified for surveys. In FY 2015-16, scrub lizards were not detected in 18 sites in Lake County or in seven sites in Broward County, but were detected in three of 52 sites in Brevard County, two of 21 sites in Indian River County, ten of 30 sites in St. Lucie County, eight of 36 sites in Martin County, and two of 39 sites in Palm Beach County.

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## FISH

### **Freshwater Fish** (*Kate Harriger, Jeanne-Marie Havrylkoff, and John R. Knight*)

Bluenose Shiner – The bluenose shiner is currently listed in Florida as a State-designated Species of Special Concern. A species action plan has been completed for this species. The bluenose shiner occurs in several watersheds throughout Florida. During FY 2015-16, a total of four bluenose shiners were collected – one from Escambia River, one from Yellow River, and two from Holmes creek (Choctawhatchee River watershed) in the western Panhandle. Genetic analysis to determine evolutionary distinction between the bluenose shiner population in the St. Johns drainage (eastern Florida) and populations in western Florida, Alabama, Mississippi, and Louisiana is ongoing.

Crystal Darter – The crystal darter is currently listed in Florida as State-designated Threatened. A species action plan has been completed for this species. The crystal darter is only known to occur in the upper section of the Escambia River near Century, Florida, in the western Panhandle. Crystal darters were not collected during FY 2015-16. The most recent crystal darter collections from the Escambia River were from 2011, 2009, and 2004, despite extensive sampling 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.

Blackmouth Shiner – The blackmouth shiner is currently listed in Florida as State-designated Threatened. A species action plan has been completed for this species. During FY 2015-16, 369 blackmouth shiners were captured. Blackmouth shiners were collected from four new locations in the Blackwater River watershed in Santa Rosa County, but none were collected from the Shoal River in Okaloosa County despite extensive surveys. Future research will involve monitoring populations in the Blackwater River, continued surveys in the Shoal River, and assessing genetic diversity and population structure across the range of the species.

Harlequin Darter – The harlequin darter is currently listed in Florida as a State-designated Species of Special Concern. A species action plan has been completed for this species. While restricted in range (only the Escambia River watershed in the western Panhandle), the species is regularly collected from both tributaries and the mainstream Escambia River when suitable habitats (submerged woody debris) are present. Only one harlequin darter was collected from the mainstream Escambia River during FY 2015-16. Additionally, work to estimate the population size of harlequin darters in the Escambia River watershed was continued. FWC researchers captured and tagged 655 harlequin darters and recaptured 112 individuals (17%) during a mark-recapture study in Pine Barren Creek in Escambia County. A final status assessment for harlequin darters in the Escambia River watershed is expected in 2017.

Saltmarsh Topminnow – The saltmarsh topminnow is currently listed in Florida as a State-designated Species of Special Concern. A species action plan has been completed for this species. Saltmarsh topminnows occur in the estuarine reaches of western Panhandle rivers from the Perdido Bay to the Yellow River. FWC collected 1,565 saltmarsh topminnows during FY 2015-16 from the Perdido, Escambia, and Blackwater bays. Surveys also occurred in Choctawhatchee Bay in Okaloosa and Walton counties during FY 2015-16, but no saltmarsh topminnows were collected.

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Southern Tessellated Darter – The Southern tessellated darter is currently listed as a State-designated Species of Special Concern. A species action plan has been completed for this species. Southern tessellated darters are only known to occur in the Ocklawaha River watershed (a tributary to the St. Johns River) in north-central Florida. Five Southern tessellated darters were collected during sampling in FY 2015-16 in Orange Creek and Little Creek. Prior genetic analyses suggest the Southern tessellated darters in the Ocklawaha River watershed have low genetic diversity and a small population size due to a long (hundreds of generations) isolation from other populations. Future work will involve determining appropriate listing status and conservation actions needed for this species.

**Smalltooth Sawfish** (*Gregg Poulakis and Rachel Scharer*)

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 20<sup>th</sup> Century it became rare throughout its North American range. FWC attributes this decline to two main factors: 1) bycatch in commercial and recreational fisheries; and 2) life history parameters that include late maturity and production of small numbers of young. Smalltooth sawfish in Florida are currently primarily found only from Charlotte Harbor in Charlotte County to the Florida Keys in Monroe County.

During FY 2015-16, FWC performed sampling for smalltooth sawfish in the Charlotte Harbor estuarine system, which is located on the southwest Gulf Coast. Monthly sampling for smalltooth sawfish was conducted in the Caloosahatchee River in Lee County and in upper Charlotte Harbor using a multi-gear approach. FWC captured and released 66 smalltooth sawfish, including seven recaptures. Total lengths ranged from approximately two and a half to six feet; all of these sawfish were immature.

For more information on FWC's Smalltooth Sawfish Research and Monitoring, including access to publications on specific topics, please visit <http://research.MyFWC.com/sawfish>.

**Sturgeon** (*Kate Harriger, Jeanne-Marie Havrylkoff, and John R. Knight*)

Atlantic Sturgeon Activities – The Atlantic sturgeon was Federally-listed as an Endangered species in 2012. The USFWS, National Oceanic and Atmospheric Agency's National Marine Fisheries Service (NOAA-Fisheries), and the U.S. Geological Survey (USGS) conduct most of the monitoring and management of this species. FWC did not incidentally collect any Atlantic sturgeon during FY 2015-16. Three Atlantic sturgeon carcasses were reported to FWC; two from the St. Johns River mouth region and one from coastal Flagler County. Photos, size, and samples for genetic analysis were obtained from the Flagler County specimen, and all data was reported to the Atlantic Sturgeon Salvage Network, through NOAA-Fisheries. FWC will provide any future collections of the species and any associated information to these Federal agencies in order to assist with population monitoring and management of this species.

Gulf Sturgeon Activities – The Gulf sturgeon is a Federally-designated Threatened species in Florida. Monitoring and management of this species is also primarily conducted by NOAA-Fisheries, USGS, and USFWS. FWC does, however, coordinate field activities with

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these agencies. While conducting alligator gar research from the Yellow River in the Panhandle, researchers incidentally collected ten adult sturgeon during sampling in summer 2016. These fish were inspected for tags, measured, weighed, and released. FWC submitted all information collected, including capture location, to USFWS.

## **INVERTEBRATES**

### **Black Creek Crayfish** (*Ashley Ballou and David Cook*)

The Black Creek crayfish is currently listed in Florida as a State-designated Species of Special Concern, but it will be listed as State-designated Threatened if FWC Commissioners approve the Imperiled Species Management Plan and associated rules, which is expected to be considered in November 2016. This species is endemic to Clay County, Florida, where the majority of its known range is in the Black Creek drainage. All documented occurrences have been within the lower St. Johns River watershed basin.

In the fall of 2015, FWC, in collaboration with partners, conducted surveys for Black Creek crayfish at 17 locations, 16 of which did not have historical occurrence records. Surveys consisted of finding locations with suitable Black Creek crayfish habitat and using dip nets to survey the stream in either direction from the starting point. These surveys resulted in three new occurrence locations for this species.

### **Panama City Crayfish** (*David Cook and Justin Davis*)

The Panama City crayfish is a small freshwater crustacean found exclusively within an estimated 51-square-mile portion of central Bay County in the Florida Panhandle. Historically, the Panama City crayfish thrived in wet pine flatwoods with an open, vegetative understory. Development and incompatible silviculture practices have resulted in habitat loss and degradation. The Panama City crayfish is currently a State-designated Species of Special Concern. FWC worked during FY 2015-16 to update the State's Draft Management Plan for the Panama City Crayfish (<http://myfwc.com/media/3395300/Panama-City-Crayfish-Draft-Management-Plan-February-2016.pdf>), which includes the recommendation to reclassify the species to that of State-designated Threatened. The draft Plan has as its conservation goal to ensure the long-term conservation of the Panama City crayfish throughout its range so that it no longer warrants listing by the State of Florida. The Plan's conservation objectives are: 1) To secure at least 2,000 acres of occupied habitat throughout the species range in conservation easements that are managed in perpetuity; and 2) Close data gaps on what constitutes a viable population and other population parameters.

During FY 2015-16, FWC provided subject matter expertise for development, construction, and other land-use conversion and maintenance activities with the potential to impact the Panama City crayfish, consulting with the Florida Department of Transportation (FDOT), USFWS, Bay County, City of Lynn Haven, environmental consultants, and public and private landowners to provide guidance on proposed projects and to prevent the unauthorized take of Panama City crayfish. FWC also developed a draft Species Conservation Measures and Permitting Guidelines document (<http://portal2.fwc.state.fl.us/sites/HSC/SpeciesCP/protected/Panama%20City%20Crayfish/PCC%20draft%20species%20guidelines%2028%20July%202016.docx>) that includes recommended

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conservation practices and presents options for addressing activities that may impact the Panama City crayfish or its habitat. Both the Management Plan and Permitting Guideline documents are expected to be finalized and presented to the FWC Commissioners for consideration in November 2016.

FWC annually survey for Panama City crayfish, with the majority of surveys taking place on Panama City crayfish management areas and other existing or potential conservation easements to assess Panama City crayfish response to habitat restoration efforts and fluctuating groundwater levels. These surveys continued in FY 2015-16 and genetic samples were collected as part of a cooperative effort for a USFWS/University of Florida project to analyze Panama City crayfish population size and connectivity. FWC also conducted annual vegetation surveys on three of the four Panama City crayfish management areas to document habitat response to restoration efforts.

Restoring Panama City crayfish habitat on properties held under conservation easement reduces the need for protection under the Endangered Species Act, and moves the species towards recovery goals proposed in the draft management plan. Sites targeted for management expand the Panama City crayfish's area of occupancy, thereby improving the resiliency of this species within its small historic range. To date, four Panama City crayfish management areas have been established: Talkington Preserve, Marjorie's Magical Marsh/Symone's Sanctimonious Swamp, City of Lynn Haven, and D&H/Deerpoint Elementary; each have undergone varying levels of restoration to date. Constraints and contractor issues precluded completion of planned habitat restoration on the Marsh/Swamp easement and a prescribed burn on the D&H/Deerpoint. A partnership with the City of Lynn Haven and the USFWS, a right-of-way was cleared and low water crossing installed to allow access for future restoration work on the City of Lynn Haven easement. FWC also partnered with the USFWS to plant 500 wiregrass plugs and spread native wet flatwoods herbaceous species seed stock across the Marsh/Swamp easement to promote establishment of natural ground cover and fine fuels to facilitate future prescribed burns. A contract has been established to continue habitat restoration work on Panama City crayfish management areas through 2020, and two easements have been identified as being eligible for receiving mitigation burns through a partnership with the FDEP'S Forest Service in FY 2016-17.

**Miami Blue Butterfly** (*Ricardo Zambrano*)

The Miami blue butterfly was State-designated Threatened until April 2012 when it was listed as Federally-Endangered by the USFWS. The butterfly historically ranged from Hillsborough County to the Dry Tortugas in Monroe County on the Gulf Coast, and from Merritt Island in Brevard County to the Florida Keys. Currently, it is found only in two populations in the Key West National Wildlife Refuge in extreme South Florida.

During FY 2015-16, progress on implementing the 2010 Miami Blue Butterfly Management Plan continued to be severely limited due to the 2010 loss of both the wild population at the Florida Department of Environmental Protection's (FDEP) Bahia Honda State Park (due to inclement weather and predation by non-native green iguanas) and the captive population (due to inclement weather that affected their food supply) at the University of Florida. Planned research to use captive-raised Miami blue butterflies to develop techniques to successfully reintroduce the species 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.

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On October 26, 2015, FWC led the Imperiled Butterflies of Florida Work Group, which is composed of several agencies and organizations dedicated to the protection and recovery of at-risk butterflies. During FY 2015-16, FWC continued to be members of the Miami Blue Butterfly Recovery Team and to assist with survey efforts in the Key West National Wildlife Refuge. A Recovery Plan is currently under review by the USFWS. The University of Florida also has permits underway to perform Miami blue host trials and predator studies, which will lead to historical reintroductions to Bahia Honda State Park.

The Miami Blue Butterfly Management Plan is available at <http://myfwc.com/media/1349003/MiamiBlueButterflyManagementPlanRevised.pdf>.

### **Schaus Swallowtail Butterfly** (*Ricardo Zambrano*)

The Schaus swallowtail butterfly (Schaus) is a Federally-designated Endangered species. The species has historically been most commonly seen at Biscayne National Park in Miami-Dade County and North Key Largo in Monroe County, but its numbers in recent years have shown a dramatic decline. Surveys conducted by FWC, the North American Butterfly Association, and the National Park Service in 2011 yielded only 35 Schaus seen at Biscayne National Park and six seen on North Key Largo. In 2012, the USFWS contracted the University of Florida's Maguire Center for Lepidoptera Research to conduct surveys, and that year there were only four verified Schaus adult sightings, all on Elliott Key in Biscayne National Park. This precipitous decline, down from the 41 sighted in 2011, prompted concern that the species may be in imminent danger of extinction.

In October 26, 2015, FWC led pre-planning meetings for the 2016 Schaus flight season through the Imperiled Butterflies of Florida Work Group. The committee agreed to concentrate intensive survey efforts within Biscayne National Park with the goals being to: 1) Build on existing population trend data; 2) Help evaluate recovery and reintroductions; 3) Continue reintroductions on Elliott Key; and 4) Conduct extensive surveys on Key Largo. A follow up conference call on January 20, 2016, finalized logistics for the 2016 Schaus' swallowtail flight season, in which the University of Florida and the Florida Department of Environmental Protection (FDEP) took the lead.

The University of Florida monitored the Elliott Key population while volunteers, FDEP, and FWC covered Key Largo. Overall, an estimated 36 adults were observed on Key Largo in 2016, which is down from 60 that were observed in 2015.

### **Florida Tree Snail** (*Jeannette Parker*)

The Florida tree snail is a State-designated Species of Special Concern, but it will be listed as State-designated Threatened if FWC Commissioners approve the Imperiled Species Management Plan and associated rules, which is expected to be considered in November 2016. Florida tree snail surveys were conducted on the Florida Keys Wildlife and Environmental Area (WEA) in Monroe County. Determining the presence or absence of the Florida tree snail aids FWC in making management decisions. Surveys were conducted throughout the year using a standardized monitoring protocol. FWC designated 1,043 acres as suitable habitat. Since suitable habitat on the WEA is non-contiguous, the 1,043 acres was separated into 129 individual units, ranging in size from 1-64 acres. During FY 2015-16, 41 units were surveyed. Florida tree

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snail presence was documented on ten of the 41 units. Surveys will continue through FY 2016 17, until all units have been surveyed.

## **OTHER WORK**

### **Wildlife Conservation, Prioritization, and Recovery** (*Scott Cooney*)

FWC is taking a pro-active, science-based approach to evaluating management needs of at-risk species on FWC-managed lands. FWC is implementing this approach through the Wildlife Conservation Prioritization and Recovery Program. This program integrates conservation planning, population viability analysis results, and geospatial analytical techniques to model potential habitat on FWC-lead areas. Using this information, FWC determines where focal species conservation can be affected on each Wildlife Management Area (WMA) or Wildlife and Environmental Area (WEA). FWC integrates the outcome of the landscape level assessment with area-specific and expert knowledge to produce species management strategies.

During FY 2015-16, FWC completed one workshop covering one WMA, Escribano Point WMA in Santa Rosa County. FWC initiated the drafting of strategies from the workshop. All associated strategies were completed during FY 2015-16.

During FY 2015-16, FWC also finalized four strategies covering five additional areas. Properties covered by these completed strategies include: Split Oak Forest WEA in Osceola and Orange counties, Crooked Lake Mitigation Park WEA in Polk County; Tosohatchee WMA in Seminole County; Platt Branch Mitigation Park WEA in Highlands County; and Hickey Creek Mitigation Park WEA in Lee County. In addition, the Herky Huffman/Bull Creek WMA and Triple N Range WMA Strategy was updated to include additional actions for gopher tortoises.

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 each area's management plan.

### **Coordination and Assistance** (*Caly Coffey, Brad Gruver, Richard Kiltie, Erin Leone, Kristin Rogers, Paul Schueller, and Colin Shea*)

Coordination – Listed species coordination during FY 2015-16 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. The USFWS and National Oceanic and Atmospheric Agency's National Marine Fisheries Service (NOAA-Fisheries) jointly provided funding for coordination 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 authorities through telephone calls, emails, written correspondence, and agency commenting. Section 6 Cooperative Agreements with USFWS and NOAA-Fisheries were administered, including preparing emergency handling

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reports, preparing and executing Section 6 grants, and developing the renewal packets for the Cooperative Agreements. Section 6 provides funding to States and Territories with cooperative agreements, for species and habitat conservation actions on non-Federal lands.

FWC's Listed Species Website, <http://myfwc.com/wildlifehabitats/imperiled/>, includes, among other things, copies of previous legislative reports, the current list of listed species, information on listed species permits, and listed species management plans.

Reviews and Assistance for Transportation Projects – FWC performed 126 reviews of highway projects during FY 2015-16, which included projects reviewed through the Florida Department of Transportation's Efficient Transportation Decision Making Process and assistance letters outside of the Process, including 75 written letters. 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 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 a review of 1,222 projects and provided written assistance on 502 of those projects for public and private land and water use planning activities that had the potential to impact listed fish and wildlife species and their habitats during FY 2015-16. 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; environmental impact statements; power plant site applications; and ten-year plan reviews. The content of consultations was based on established best management practices, species management guidelines, and GIS analysis. In addition, FWC contributed to the development of comprehensive habitat-based management plans, and coordinated landscape-level planning with local, State, and Federal agencies to provide benefits to species and habitats of greatest conservation need.



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**Critical Wildlife Areas** (*Carol Rizkalla*)

Critical Wildlife Areas (CWAs) are established by FWC under rule 68A-14.001, FAC, to protect concentrations of listed and at-risk 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 evaluates the need for potential CWAs, produces or revises establishment orders, and coordinates 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 and multiple partners including other State and Federal agencies, local governments, and nongovernmental organizations.

During FY 2015-16, all active and potentially active CWAs that could be posted were posted with appropriate signage as necessary. Active CWAs were monitored in FY 2015-16 by FWC 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. FWC provides species expertise, assistance, and available management and educational materials when partnering with other groups in these efforts.

Sixteen of the 20 established CWAs supported populations of listed and other important wildlife species during FY 2015-16 (**Table 8**). 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 (Caspian terns, royal terns, and American oystercatchers); Bird Island in Martin County (wood stork and brown pelicans); and Fort George Inlet in Duval County (royal terns). 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.

During FY 2015-16, one new CWA was established at Second Chance in Collier County to protect nesting shorebirds. FWC Commission directed FWC to find other areas across the state that warrant CWA protection. FWC and partners identified 14 potential new sites and five existing CWAs which require re-establishment to more effectively protect wildlife.

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Table 8. Critical wildlife areas (CWAs) in Florida during FY 2015-16, with relevant information about each.

FWC Region CWA name	County	Closure period	Primary taxa	Status <sup>a</sup>	Managed Area within Boundary
<b>Southwest</b>					
Alafia Bank	Hillsborough	1 Dec. to 1 Sept.	Great blue heron, great egret, snowy egret, little blue heron, willet, tricolored heron, reddish egret, cattle egret, black-crowned night heron, yellow-crowned night heron, white ibis, glossy ibis, brown pelican, roseate spoonbill, American oystercatcher, cormorant	30, 140, 30, 5, 5, 50, 5, 30, 30, 50, 6000, 140, 325, 145, 7, 150 nests	16 acres (ac) (6.5 hectares [ha])
Little Estero Island	Lee	1 April to 1 Sept.	Least tern, Wilson's plover, snowy plover, American oystercatcher	16, 1, 0, 2 nests	6 ac (2.4 ha)
Myakka River	Sarasota	1 March to 1 Nov.	Wood stork, great egret, great blue heron, cattle egret, anhinga, snowy egret, little blue heron	61, 28, 2, 0, 2, 0, 0 nests	1 ac (0.4 ha)
<b>North Central</b>					
Amelia Island	Nassau	1 April to 1 Sept.	Least tern, black skimmer, Wilson's plover, American oystercatcher, willet	7, 0, 12, 0, 0 nests	10 ac (4 ha)
Bird Islands	Duval	1 April to 1 Sept.	Black skimmer, gull-billed tern, least tern, American oystercatcher, Wilson's plover	24, 4, 129, 3, 5 nests	6 ac (2.4 ha)
Fort George Inlet	Duval	1 April to 1 Sept.	Royal tern, black skimmer, Wilson's plover, laughing gull, gull-billed tern, sandwich tern, American oystercatcher	6706, 2, 5, 4152, 0, 48, 3 nests	10 ac (4 ha)
<b>Northwest</b>					
Tyndall	Bay	Year-round	Least tern, black skimmer, snowy plover, Wilson's plover, American oystercatcher, willet, piping plover <sup>c</sup>	4, 0, 24, 12, 0, 3 nests	200 ac (81 ha)
Alligator Point	Franklin	15 Feb. to 31 Aug.	Snowy plover, Wilson's plover, American oystercatcher, least tern, willet	1, 2, 2, 0, 0 nests	66 ac (26.7 ha)
St. George Causeway	Franklin	1 April to 31 Aug.	Least tern, Caspian tern, gull-billed tern, royal tern, sandwich tern, American oystercatcher, black skimmer, brown pelican	53, 103, 0, 700, 200, 5, 0, 472 nests	32 ac (13 ha)
Gerome's Cave	Jackson	1 March to 1 Sept.	Southeastern myotis bat	~1000 individuals	2 ac (0.8 ha)
<b>South</b>					
Deerfield Island Park	Broward	Year-round	Gopher tortoise	12 individuals	56 ac (23 ha)
ABC Islands	Collier	Year-round	Brown pelican, little blue heron, great blue heron, tri-colored heron, great egret, reddish egret, snowy egret, cattle egret, black-crowned night heron, anhinga	30, 2, 15, 39, 120, 10, 24, 35, 5, 8 nests	75 ac (30 ha)
Big Marco Pass	Collier	Year-round	Least tern, black skimmer, snowy plover, Wilson's plover, wintering shorebirds <sup>c</sup>	350, 488, 0, 5 nests	30 ac (12 ha)
Caxambas Pass	Collier	1 April to 31 Aug.	Least tern, black skimmer, Wilson's plover, wintering shorebirds <sup>c</sup>	Inactive	1 ac (0.4 ha)
Rookery Island	Collier	Year-round	Heron, egrets, brown pelican	Inactive	1 ac (0.4 ha)
Second Chance	Collier	1 March to 1 Sept	Least tern, black skimmer, Wilson's plover	60, 8, 2	3 ac (1.2 ha)
Bill Sadowski	Dade	Year-round	Foraging shorebirds and wading birds	~1000 individuals	700 ac (283 ha)
Bird Island	Martin	Year-round	Brown pelican, wood stork, roseate spoonbill, American oystercatcher, cormorant, great egret.	66, 24, 2, 1, 18, 6 nests	7.5 ac (3 ha)
Pelican Shoal	Monroe	1 April to 1 Sept.	Roseate tern, bridled tern	Inactive	1 ac (0.4 ha)
<b>Northeast</b>					
Matanzas Inlet	St. Johns	1 April to 1 Sept.	Least tern, Wilson's plover, willet	Inactive	28 ac (11 ha)

<sup>a</sup>Counts or estimates of peak numbers of individuals and/or nest attempts at each site during the closed period in FY 2015-2016.

<sup>b</sup>Inactive means the site was either not used, or not available for use, by wildlife during FY 2015-2016.

<sup>c</sup>Monitoring to count or estimate numbers of wintering shorebirds was not conducted.

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**Florida's Landowner Assistance Program** (*Joe Prenger*)

Florida's Landowner Assistance Program (LAP), in cooperation with the USFWS, 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. LAP's emphasis is on priority habitats located primarily in focal areas, thus ensuring that Federal dollars are being targeted in the most efficient and equitable manner to properties with the greatest potential benefits for listed species.

During FY 2015-16, FWC's LAP assisted more than 729 landowners, including providing written evaluations of effects from proposed agricultural practices to listed species on 215 projects. Many of the landowners also received financial assistance through State or Federal cost-share or easement programs such as the U.S. Farm Bill and USFWS Partners for Fish and Wildlife Programs. LAP worked in cooperation with the U.S. Department of Agriculture's Natural Resources Conservation Service, USFWS, 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 during FY 2015-16, public conservation land managers including the U.S. Department of Defense and county governments received assistance with development or review of management plans for their conservation lands.

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

**Law Enforcement** (*Lieutenant Blake Hoelscher*)

FWC's Division of Law Enforcement continued statewide enforcement activities to protect specific Endangered and Threatened species during FY 2015-16. 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 directed toward the enforcement of the 500-yard approach restriction to protect North Atlantic right whales; 222 water patrol hours were dedicated to right whale protection;
- 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;

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- 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 71,300 water patrol hours were dedicated to manatee enforcement, resulting in 2,211 citations and 1,870 warnings;
- In addition, 22 citations and 52 warnings were issued separate from manatee citations, involving Endangered species, Threatened species, and Species of Special Concern;
- Continued partnering with other governmental agencies and citizen groups to work through issues concerning the Florida panther in southwest Florida;
- Assisting with increasing public awareness of gopher tortoises, Perdido Key beach mice, sea turtles, and other species; and
- Completing training of three K-9s Officers and three K-9s to become Port Inspection units. These units have the ability to detect certain turtle, snake, and other potential Endangered/Threatened species as they arrive or await deportation in Florida's ports.

**Permitting and Assistance** (*Angela T. Williams*)

During FY 2015-16, FWC provided Federal agencies, other State agencies, environmental consultants, and regional and local regulatory authorities with assistance and guidance regarding projects that impact listed fish, bird, and land dwelling species on managed Federal, State, private 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 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 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).

Overall, FWC provided science-based and regulatory guidance to ensure that permitted activities would either result in a net conservation benefit or prove not to be detrimental for the involved species. Additional information regarding species guidelines, policies, and permit applications may be accessed at <http://myfwc.com/license/wildlife/protected-wildlife/>.

**Coastal Wildlife Conservation Initiative** (*Fara Ilami*)

The Coastal Wildlife Conservation Initiative (CWCI) is an FWC-led, multi-agency [Florida Department of Environmental Protection (FDEP), Florida Department of Economic Opportunity, and the University of Florida's Institute of Food and Agriculture Sciences] strategy that began in May 2007. The goal of the CWCI is to initiate a statewide, cooperative process to provide 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.

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During FY 2015-16, the CWCI and partners identified regional priority projects and collaborated on a variety of efforts for conservation of coastal wildlife. For example, the CWCI used a community-based social marketing approach to reduce impacts to shorebirds from mechanical beach cleaning at important nesting beaches while emphasizing the importance of wrack (marine vegetation that washes up on the shore and is used as a source of food and cover for many species) in beach habitats. Some of the outreach products developed for this purpose included a Beach Wrack Identification Guide and materials for a campaign entitled “Grow a Better Beach”, which promotes the reduction of mechanical beach cleaning to allow beneficial vegetation to grow and stabilize the beach. The CWCI also developed guidelines for beach cleaning practices that minimize impacts to protected shorebirds. The CWCI is undertaking conservation actions identified in species action plans for State-listed species (e.g., brown pelican, imperiled beach-nesting birds, saltmarsh songbirds, wading birds, and mangrove rivulus). Priority issues include: 1) Continuing the campaign on the importance of wrack in beach habitats; 2) Addressing Critical Wildlife Areas (areas where important congregations of wildlife can be protected from human impacts during critical parts of their life cycle); 3) Management of beach vegetation at targeted sites to better suit nesting seabirds and shorebirds; 4) Developing training materials to encourage the use of “living shorelines” (replacing traditional “hardened” methods of shoreline stabilization, such as seawalls, with more natural “living” shorelines that not only provide shoreline stabilization but also habitat for wildlife while maintaining natural coastal processes); and 5) Creating strategies to address the effects of dogs on coastal wildlife.

## CITIZEN AWARENESS PROGRAM

Compiled and edited by *Diane Hirth*

Contributors: *Bonnie Abellera, Naomi Avissar, Jonny Baker, Kelly Broderick, Deborah Burr, Anita Forester, Whitney Gray, Alex Kalfin, Mark Lotz, Ron Mezich, Gary Morse, Kevin Oxenrider, Carol Lyn Parrish, Joe Prenger, Kelly Richmond, Sharon Tatem, Lisa Thompson, Margaret Thompson, Robbin Trindell, Alicia Wellman, and Andy Wraithmell.*

**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 regularly provide information to and interact with the public about listed species by conducting citizen awareness programs throughout the agency to fulfill the statutory requirement. The following summarizes these efforts for listed species from July 1, 2015, to June 30, 2016.

**Highlights** – FWC engaged in major efforts promoting citizen awareness of listed or at-risk species and their habitats in FY 2015-16. Examples include:

**FWC's Landowner Assistance Program (LAP) works in partnership with private landowners to conserve Florida's fish, wildlife and habitats, including conservation of Endangered and Threatened species.** A new video introduces two north Florida landowners, including Helen Roth, the 2015 Florida Land Steward of the Year, and Bill Boothe, talking about their partnership with the LAP and how it helped them successfully restore their land to conserve Florida wildlife such as the State-designated Threatened gopher tortoise. The video is on YouTube at <https://www.youtube.com/watch?v=Okiy-ZDVKvE> and [www.MyFWC.com/LAP](http://www.MyFWC.com/LAP). It is being used as a tool when LAP reaches out to private landowners who may be interested in partnering with FWC to conserve fish, wildlife and habitats. The new "A guide to private lands partnerships" brochure also was created to explain how private landowners can benefit from partnering with LAP.

**The "Don't Cut the Line! Reel. Remove. Release." campaign was kick-started in early 2016 with the launch of [MyFWC.com/Unhook](http://MyFWC.com/Unhook).** There, people can find step-by-step instructions on how to safely unhook a pelican or other seabird, information on wildlife rehabilitators, and how to prevent seabird entanglement. FWC's draft Imperiled Species Management Plan conserves 57 species, including seabirds, shorebirds, and wading birds subject to entanglement such as the brown pelican, little blue heron, and roseate spoonbill. The sustained effort to promote "Don't Cut the Line! Reel. Remove. Release" includes new signs on fishing piers and boat ramps, stickers for tackle boxes, and educational outreach by staff and volunteers. The popular Sunshine State Parkway fishing piers on Tampa Bay were hot spots for pelican entanglements, but anglers on the piers are responding to educational outreach. There are fewer entanglements now, and when they happen, fishermen know there is a way to safely unhook the bird.

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**FWC's Great Florida Birding and Wildlife Trail debuted a newly designed and reorganized website in February 2016 at <http://floridabirdingtrail.com/go/>.** The visually compelling website includes an interactive "Where do you want to go?" Trip Planner for the many state residents and visitors who want to know where to go to see Florida's diversity of birds and their habitats in different areas of the state. Birds are featured on the website using beautiful photos, information on species' behavior and habitats and where to find them "on the trail." The new website features the Federally-designated Threatened Florida scrub-jay on its home page.

**Florida celebrated its first Gopher Tortoise Day on April 10, 2016.** This year, Florida, for the first time, joined other southeastern states in celebrating April 10, as Gopher Tortoise Day to raise awareness about this State-designated Threatened keystone species. Over 350 wildlife species use the extensive burrows of gopher tortoises for shelter, including Endangered and Threatened species such as the Eastern indigo snake, gopher frog, and Florida mouse, plus hundreds of invertebrates like beetles and crickets. A website with the new Gopher Tortoise Day logo was created at <http://gophertortoisedayfl.com/>. It is packed with "how to" tools, including how to host a gopher tortoise event, a sample Gopher Tortoise Day resolution, educational materials, and fun facts. FWC sent out a press release (<http://gophertortoisedayfl.com/news-release/>) and a Gopher Tortoise Day Facebook post. The goal is for Gopher Tortoise Day to become a tradition in Florida.

**FWC panther team removed two panther kittens from the wild, that were rehabilitated and then placed in permanent captivity.** A male panther only several months old was found in late January 2016, near Lehigh Acres in Lee County. The 125-acre Sakata Seed America Research Station where the kitten was found includes 50 acres of natural habitat where a diversity of native wildlife has been observed. The kitten got separated from its mother and could not safely be reunited. The kitten was removed from the wild and rehabilitated at the Naples Zoo in Collier County, which now provides temporary care to orphaned or injured panthers. The panther, now named Sakata, is permanently placed at the Ellie Schiller Homosassa Springs Wildlife State Park in Citrus County. In November 2015, an approximately four-month-old kitten was captured in Collier-Seminole State Park in Collier County. Its mother had been struck and killed by a vehicle three weeks earlier. While an earlier sighting of this family group indicated there were three kittens, only the one found was known to have survived. Because of her young age, this panther kitten was not a suitable candidate for rehabilitation and release. Also initially maintained at the Naples Zoo, the panther now is permanently placed at the Palm Beach Zoo in Palm Beach County. Their stories were shared with the public on social media.

**What a year for sea turtle nesting in Florida!** Green turtles broke a new Index Nesting Beach Survey record with approximately 28,000 nests on 26 index beaches as of October 2015. FWC trained and authorized surveyors across the state to monitor nests on a set of index beaches that span nearly 200 miles and are the focus of the Index Nesting Beach Survey program. Green turtle nesting has increased exponentially over the past 27 years. The positive news for green sea turtle nesting was featured in an October 9, 2015, Facebook post by FWC's Fish and Wildlife Research Institute. Nearly 85,000 people received the Facebook post highlighting the progress of this Federally-designated Threatened species.

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**For over 20 years, FWC has been detectives, tracking the travels of manatees along Florida’s coasts and rivers.** To track manatees, researchers attach a buoyant radio tag to a padded belt around the tail. The tag contains a satellite-linked Global Positioning System (GPS) transmitter. The GPS-transmitted locations then provide a detailed record of the manatee’s movements and migratory behavior. Wildlife managers use the tracking data to improve the management strategies used for continued recovery of this large aquatic mammal. The newest manatee decal, available for a \$5 donation from local tax collectors’ offices around the state and through FWC, highlights a manatee with a tracking device. It was designed to be aesthetically pleasing on a kayak, paddleboard, surfboard, canoe, motor boat, personal watercraft, or vehicle. Manatee decal funds are used for conservation of this Federally-designated Endangered species.

**Florida panther mating pair seen in Hendry County.** Donna McMurrer got the surprise of her life on the morning of August 16, while birding in Hendry County. She heard some rustling in a grove nearby and looked over to see a male Florida panther staring directly at her. She heard more sounds coming from the grove, and out walked a female Florida panther. The mating pair remained in the area for about ten minutes, and Donna took photos and submitted them to FWC's panther sighting registry at <https://publictemp.myfwc.com/HSC/PantherSightings/Default.aspx>. FWC’s Facebook post on this panther encounter drew an audience of 130,914 people.

**Media Relations – FWC news releases reach substantial regional, statewide, and national audiences:**

<u>Source</u>	<u>Audience # Reached</u>
Daily newspapers	8,129
Weekly newspapers	7,818
Magazines	7,661
Online publications	7,899
Radio	7,272
TV	7,483

Note: Numbers reflect individual reporters; editors and producers receiving FWC news releases via email.

During FY 2015-16, FWC issued many news releases on Endangered and Threatened species. FWC news releases are posted online at [MyFWC.com/News](http://MyFWC.com/News). Examples include:

- Check the box; do something nice for manatees, sea turtles, July 1, 2015
- Workshop set for gopher tortoise conservation in Central Florida, July 14, 2015
- Storms impacting sea turtles on southwest Florida’s Gulf Coast, August 12, 2015
- FWC Commissioners agree on strategic priorities for panther conservation, September 2, 2015
- Slow down for manatees migrating to warmer waters, October 29, 2015
- Have fun helping wildlife, wild places when holiday shopping, November 24, 2015
- FWC announces January 20 deadline for comment on plan conserving 57 imperiled species, January 13, 2016



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- Celebrate only bird found exclusively in Florida at upcoming Scrub-Jay Festival, February 9, 2016
- FWC working with private landowners to conserve wildlife, February 11, 2016
- Statewide manatee count consistent with previous survey, February 25, 2016
- Nesting sea turtles, flashing cell phone photos a bad mix, February 29, 2016
- Don't cut the line! Reel. Remove. Release., March 2, 2016
- Help beach-nesting shorebirds by giving them space, March 22, 2016
- FWC announces May start of sea turtle nesting season on many Florida beaches, April 29, 2016
- FWC goes big to conserve Florida wildlife, April 25, 2016
- Florida panther released back into the wild at Big Cypress National Preserve, May 27, 2016

**Social Media** – FWC's Facebook site reached more than 120,000 followers as of June 30, 2016. The newer FWC Fish and Wildlife Research Institute Facebook site reached more than 22,000. FWC's Great Florida Birding Trail Facebook site now has more than 14,000 "Likes" each. Overall, FWC's use of social media and its social media audiences grew significantly during FY 2015-16:

- Flickr photo views reached more than ten million
  - YouTube video views reached nearly two million
  - Twitter followers grew to more than 29,000
  - Instagram followers reached more than 28,000
- \*(FWC uses two Twitter, two YouTube and two Flickr accounts to highlight imperiled species, so numbers were combined.)

**FWC's social media is meant to be fun as well as educational to keep its audiences interested in stories about Florida wildlife.** In August 2015, for example, more than 69,000 people saw "Who'd wear a mink coat in this hot weather" on the State-designated Threatened Everglades mink Facebook post, and over 66,000 people saw "Post-storm first aid for sea turtles" on Facebook. An October 26, 2015 Facebook post, "Baby it's cold outside," on manatees migrating to warm water sites pulled in one of the largest audiences of the year; more than 648,500 people.

**Other social media sites under the FWC umbrella:** Florida kids share their excitement about conserving "Sea Turtles!" in a fun new one-minute video posted on YouTube at <https://www.youtube.com/watch?v=g3pSXuJh1kM>.

The Great Florida Birding & Wildlife Trail Facebook page, <https://www.facebook.com/floridabirdingtrail>, is packed with photos and information on at-risk birds, such as this burrowing owl.

**GovDelivery and Websites** – The public in today's world turns to email and the Internet for instant information on Florida's listed species and their habitats.

**Approximately 1.4 million people regularly receive emails from FWC, including news and updates on Endangered and Threatened species.** GovDelivery, which FWC began

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using in 2013, lets the public sign up for emails or text updates on topics they choose. MyFWC.com visitors just click on the “Sign Up” tab on all pages to get started. GovDelivery helps increase citizen awareness of Endangered and Threatened species. There were 1,429,949 FWC GovDelivery subscribers as of June 30, 2016.

**Citizen interest in the Federally-designated Endangered Florida panther is high.**

FWC now provides the option for anyone signing up for FWC’s GovDelivery to check boxes indicating whether they want notifications of panther mortalities and panther depredations. These panther mortality and depredation updates go out on a regular basis as close to the time of occurrence as possible. People are referred to the Panther Pulse database on [http://www.floridapanther.net.org/index.php/pulse/#.WItu\\_6MzVLM](http://www.floridapanther.net.org/index.php/pulse/#.WItu_6MzVLM), where they can see more detail about the incidents, including whether the panther depredation was near where they live or work. More than 6,500 people signed up to receive these updates. There also is the GovDelivery option to receive panther news, which reaches an audience of 28,000.

**MyFWC.com/Manatee has been updated with the latest information and the use of better visuals.** Newly created or refreshed web pages include: Florida Manatee Facts and Information, <http://www.myfwc.com/education/wildlife/manatee/facts-and-information/>, and a major update of the Signs page, which evolved into Education for Marinas (Boat Facilities) <http://www.myfwc.com/wildlifehabitats/managed/manatee/education-for-marinas/>. Manatee research staff also updated their radio telemetry and tracking web page, <http://www.myfwc.com/research/manatee/research/radiotelemetry-tracking/>, to coincide and support the 2016-2017 manatee decal focusing on tracking manatees. Animation of a manatee tracked for three days near a warm water site is a great educational addition to the web page.

**Florida’s network of shorebird conservation partners keeps expanding.** The Florida Shorebird Alliance has grown to over 20,000 members and 12 local partnerships spread over the state. The Alliance website, [www.flshorebirdalliance.org](http://www.flshorebirdalliance.org), features resources and opportunities for partners and volunteers, and the “Wrack Line” newsletter. Alliance partners conduct shorebird and seabird monitoring statewide, and promote citizen awareness of shorebirds by volunteering as Bird Stewards on the beach and participating in outreach and training. The Alliance is a key promoter of the new “Don’t Cut the Line! Reel. Remove. Release.” campaign to educate people on helping hooked and entangled shorebirds and seabirds.

**Fairs, Festivals and Events** – FWC shows up at places where kids, families, retirees, and tourists are having fun in order to share the excitement and importance of conserving Florida wildlife, including Endangered and Threatened species.

**Sharing the diversity of marine life, by making it fun and interesting, attracted more than 12,600 visitors to the latest MarineQuest, the 21<sup>th</sup> anniversary of this popular event.** FWC’s Fish and Wildlife Research Institute’s annual open house was held October 15-17, 2015. More than 1,600 students in grades 4-8 and their teachers attended, as well as over 11,000 additional visitors. Students toured lab stations managed by FWC scientists. Hands-on displays and activities drew students into the world of marine science. Displays spotlighted

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listed species such as the manatee, panther, North Atlantic right whale, and sea turtles. Visitors participated in the simulated rescue of a manatee.

**An estimated 200,000 people visited FWC's exhibit at the 2016 Florida State Fair in Tampa, February 4-15, 2016.** The agency exhibit featured a live panther and alligator snapping turtle. Listed species displays included information on all five sea turtle species, plus black skimmers, American oystercatchers, least terns, and snowy plovers. A museum-style beach-nesting display, complete with sand, included a simulated hatching sea turtle nest and messages about the importance of shielding beach lighting for turtles and the threats facing beach-nesting shorebirds. Volunteers emceed the Wildlife Challenge Quiz for about 1,800 fairgoers.

**The South Florida Fair in January 2016 had 500,000 people come through the gate.** FWC's booth promoted a full range of agency activities, including wildlife conservation.

**FWC helped organize the seventh annual Florida Scrub-Jay Festival on February 13th, 2016 to celebrate and raise awareness about the Federally-designated Threatened Florida scrub-jay and its habitat.** The festival at Oscar Scherer State Park included guided walks, tours through the scrub, prescribed fire demonstrations, environmental exhibitors, and a panel of experts answering questions.

**People flocked to the Great Florida Birding & Wildlife Trail's second Chipola Feather Fest in northwest Florida.** Over 100 people participated in the April 15-18, 2016 event. Birders spotted over 150 species such as American oystercatcher, black skimmer, brown pelican, least tern, little blue heron, piping plover, red-cockaded woodpecker, snowy plover, tricolored heron, snowy egret, and wood stork.

**Publications, Exhibits and Signs** – Sharing compelling stories and critical information about Florida wildlife in writing and pictures is an inviting challenge.

**The “Don't Cut the Line. Reel. Remove. Release.” campaign is trying multiple tactics to educate boaters and anglers on how to safely remove hooks and fishing line from shorebirds and seabirds.** It ordered 20,000 stickers for tackle boxes, which are being handed out. The campaign also is putting up signs on fishing piers, including ones in State parks, to spread the word about this effort, including how to prevent bird entanglements. (Photo by Brandon Volbrecht/FDEP).

**FWC's manatee program increased its outreach to visitor centers, parks, and libraries.** This effort resulted in an opportunity to set up two-month displays in two different libraries over the summer. Both manatee and panther displays were used at the libraries. This outreach will continue during the upcoming fiscal year to include more sites and community spaces for displays. Library staff was very appreciative of the displays and noted the displays were popular with patrons of all ages.

**A new gopher tortoise fact sheet on a disease affection tortoises is available at <http://myfwc.com/media/4044508/URTD-Fact-Sheet.pdf>.** By explaining how to identify and

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handle tortoises with upper respiratory tract disease, this information should help prevent the spread of this disease.

**Volunteer Opportunities** – FWC volunteers contribute greatly to the success of the State’s conservation of Endangered and Threatened species. There is on-going multi-year citizen science participation in shorebird/seabird monitoring and stewarding; Florida scrub-jay surveys on public and private lands for Jay Watch, an Audubon of Florida program; monitoring of a subset of the red-cockaded woodpecker population in the Ocala National Forest; and a nest box program for the Southeastern American kestrel that augments habitat to provide more nesting opportunities. Examples of newly initiated volunteer efforts in FY 2015-16 include:

**Volunteers conducted surveys for the Florida bonneted bat, with the help of partners from the Florida Bat Conservancy, Cyndi and George Marks, and a grant from Bat Conservation International.** Citizen scientists conducted acoustic surveys to detect the presence of the Federally-designated Endangered Florida bonneted bat to help fill gaps in data used to determine their geographic range. Surveys were conducted in DeSoto, Hardee, Highlands, Okeechobee, and Polk counties. Ten citizen scientists and 13 natural resource professionals participated in the surveys, which included five conservation lands and 11 private residences.

**Volunteers helped create ground nesting habitat for State-designated Threatened least terns at Grassy Flats Preserve in Palm Beach County.** This preserve is a manmade spoil island in the intercostal waterway in Lake Worth. The island was created in 2014, and then in 2015, ten least tern nests were documented on the island. Unfortunately, only one of the original ten nests was successful. To optimize nesting habitat during the 2016 nesting season, Palm Beach County Environmental Resource Management, FWC, and volunteers removed all vegetation that had recruited to the island and laid down more than 100 cubic feet of gravel and shell material. Least tern decoys were used to recruit least terns to nest in the area, a strategy that has used successfully in other areas. The decoys used at this site were constructed by FWC volunteer Jordi Baneres, who also participated in restoration of the island. Volunteers played a large role in counting 32 least tern nests and two American oystercatcher nests in late spring of 2016. The major increase of nesting birds over the past year suggests the island restoration successfully improved nesting habitat for least terns.

**Volunteers assisted in the restoration and management of a Critical Wildlife Area.** Martin County number 2 (MC2) is a two-acre spoil island located in the Indian River Lagoon in Martin County. The island was listed as a Critical Wildlife Area in 2014 by FWC due to the high number of at-risk birds that utilize the island for nesting or roosting. Volunteers planted 100 green buttonwood trees and other native plants, removed balsam apple vine, and conducted bird surveys outside of the breeding season. The planting of the buttonwood trees greatly increases the amount of nesting and roosting habitat for birds. Nesting and roosting survey data is key to protecting and conserving this critical wildlife habitat.

**Volunteers participated in wading bird surveys.** Volunteers conducted wading bird surveys at Key Biscayne in Miami-Dade County, and at Green Cay Nature Center and

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Wakodahatchee Wetlands, two properties owned and managed by Palm Beach County. Wakodahatchee Wetlands has some of the highest wood stork nesting numbers in South Florida. Green Cay commonly has wood storks roosting as well, along with a large number of other at-risk wading bird species. Counts of adults and young are important, but the number of nests observed is the key to identifying the colony's success. For example, some of the adults counted may not be nesting, but foraging in the wetlands. FWC and volunteers recorded the highest nesting success at Wakodahatchee, with 59 nests reported during the peak breeding season.

**Gopher tortoise burrow surveys conducted in Hernando and Polk counties to facilitate land management improvements.** A recently purchased orange grove was surveyed to identify gopher tortoise burrows prior to tree felling at the Crooked Lake Wildlife Environmental Area (WEA) in Polk County. Volunteers surveyed 21 acres identifying 57 active burrows. In Hernando County, a 65-acre area was surveyed at the Perry Oldenburg WEA prior to tree thinning activities to ensure that heavy machinery did not compromise any gopher tortoise burrows. Also, a 76-acre parcel of land was surveyed at the Tenoroc Fish Management Area in Polk County. Volunteers identified more than 200 gopher tortoise burrows.

**Community Meetings, Workshops, and Presentations** – FWC interacts with communities, including homeowners, private landowners, businesses, and stakeholders on an array of issues involving living with Florida's listed species.

**Living with Wildlife Workshop held in Naples, November 21, 2015.** Due to changing personnel of the organizing committees and budgetary constraints, the Florida Panther Festival was not held in Naples in fall 2015. Instead, a workshop on Living with Wildlife was offered. Talks and hands-on training sessions highlighted this event. People learned about living with Florida panthers and black bears, how to build animal enclosures to keep pets and livestock safe from Florida's predator animals, and other deterrent methods. They also were introduced to financial assistance programs. This smaller venue reached a targeted audience, allowing for education and information for the people needing it most in this area.

**Sea turtle permit holders, volunteers, partners, and staff shared information at an annual meeting.** The recent 19th annual Florida Marine Turtle Permit Holder Meeting, co-hosted by FWC and the Sea Turtle Conservancy in February 2016, was attended by 430 citizen scientists, biologists, sea turtle researchers, staff from local governments, and sea turtle rehabilitation facilities. These people are key partners in helping FWC achieve a 2015 conservation success – a record number of nearly 28,000 green sea turtle nests, the highest number documented since monitoring began on Florida's core sea turtle nesting beaches in 1989. The meeting honored the over 1,000 volunteers who assist FWC in sea turtle conservation in Florida each year by monitoring the nesting beaches, responding to stranded sea turtles and conducting rehabilitation, research or educational work. Topics presented at the Jacksonville meeting included: updates on sea turtle nest and stranding numbers by FWC, funding opportunities related to the Deepwater Horizon oil spill settlement; information on the Florida Beaches Habitat Conservation Plan; updates from sea turtle biologists with the USFWS and National Marine Fisheries Service; and marine turtle research, conservation, and education projects funded from the Sea Turtle License Plate Grants Program.

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**Regional workshops reached local governments wanting to help conserve gopher tortoises.** FWC held six regional workshops in July and August 2015, to present opportunities for local governments to help conserve gopher tortoises in Florida. The goal of the workshops was to identify ways cities and counties could participate in protecting one of Florida's State-designated Threatened species. Partnerships involving cities, counties, and FWC have led to important projects to help conserve Florida gopher tortoises and their extensive burrows, which shelter many other native wildlife species. This was the seventh year of the workshops, which have been held in 33 counties to date. At the North Port workshop, over 75 people attended, including representatives of the City of North Port, The Sierra Club, Port Charlotte and North Port Friends of Wildlife, The Conservancy of Southwest Florida, and the City of Cape Coral.

**School-based Programs and Presentations** – FWC regularly reaches out to school-aged children to get them energized and excited about the wildlife in Florida and what they can do to help conserve native species.

**Over 20,000 youth in kindergarten through 12<sup>th</sup> grade were introduced to topics in conservation education through Project WILD workshops in FY 2015-16.** To reach that level of engaging schoolchildren in wildlife conservation, 1,124 teachers completed a Project WILD workshop led by facilitators. The facilitators collectively put in 900 hours of volunteer time. Sixty-three workshops were held in 15 counties, with participants coming from over 40 counties. Project WILD's growth and sustainability depends on trained and committed volunteers. The facilitator group consists of a mix of young and old, retired and still working, K-12 formal and non-formal educators, college professors, city and park employees, and more. In FY 2015-16, 19 new facilitators were brought into the WILD network through a weekend train-the-trainer event held in February 2016, at the Ocala Adventure Camp. Of the 19 trained, more than half already have initiated or assisted with a WILD workshop. Additionally, five more were added to the facilitator pool through the process of mentorship. Each of the mentees have been working alongside an experienced WILD facilitator.

## APPENDIX A. LISTED WILDLIFE SPECIES IN FLORIDA AS OF JUNE 30, 2016

### VERTEBRATES

#### FISH

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

#### AMPHIBIANS

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

#### REPTILES

Common Name	Scientific Name	Status
Alligator snapping turtle	<i>Macrochelys temminckii</i>	SSC
American alligator	<i>Alligator mississippiensis</i>	FT(S/A)
American crocodile	<i>Crocodylus acutus</i>	FT
Atlantic salt marsh snake	<i>Nerodia clarkii taeniata</i>	FT
Barbour's map turtle	<i>Graptemys barbouri</i>	SSC

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

## **BIRDS**

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



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

## **MAMMALS**

<b>Common Name</b>	<b>Scientific Name</b>	<b>Status</b>
Anastasia Island beach mouse	<i>Peromyscus polionotus phasma</i>	FE
Big Cypress fox squirrel	<i>Sciurus niger avicennia</i>	ST
Caribbean monk seal	<i>Monachus tropicalis</i>	FE
Choctawhatchee beach mouse	<i>Peromyscus polionotus allophrys</i>	FE
Eastern chipmunk	<i>Tamias striatus</i>	SSC
Everglades mink	<i>Neovison vison evergladensis</i>	ST
Finback whale	<i>Balaenoptera physalus</i>	FE

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

## INVERTEBRATES

### CORALS

Common Name	Scientific Name	Status
Boulder star coral	<i>Orbicella franksi</i>	FT
Elkhorn coral	<i>Acropora palmate</i>	FT
Lobed star coral	<i>Orbicella annularis</i>	FT
Mountainous star coral	<i>Orbicella faveolata</i>	FT

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Common Name	Scientific Name	Status
Pillar coral	<i>Dendrogyra cylindricus</i>	FT
Rough cactus coral	<i>Mycetophyllia ferox</i>	FT
Staghorn coral	<i>Acropora cervicornis</i>	FT

**CRUSTACEANS**

Common Name	Scientific Name	Status
Black Creek crayfish (Spotted royal crayfish)	<i>Procambarus pictus</i>	SSC
Panama City crayfish	<i>Procambarus econfinae</i>	SSC
Santa Fe Cave crayfish	<i>Procambarus erythrops</i>	SSC
Squirrel Chimney Cave shrimp	<i>Palaemonetes cummingi</i>	FT

**INSECTS**

Common Name	Scientific Name	Status
American burying beetle	<i>Nicrophorus americanus</i>	FE
Bartram's scrub-hairstreak	<i>Strymon acisbartrami</i>	FE
Cassius blue butterfly	<i>Leptotes cassius theonus</i>	FT(S/A)
Ceraunus blue butterfly	<i>Hemiargus ceraunus antibubastus</i>	FT(S/A)
Florida leafwing butterfly	<i>Anaea troglodyta floridalis</i>	FE
Miami blue butterfly	<i>Cyclargus thomasi bethunebakeri</i>	FE
Nickerbean blue butterfly	<i>Cyclargus ammon</i>	FT(S/A)
Schaus' swallowtail butterfly	<i>Heracles aristodemus ponceanus</i>	FE

**MOLLUSKS**

Common Name	Scientific Name	Status
Chipola slabshell (mussel)	<i>Elliptio chipolaensis</i>	FT
Choctaw bean	<i>Villosa choctawensis</i>	FE
Fat threeridge (mussel)	<i>Amblema neislerii</i>	FE
Florida treesnail	<i>Liguus fasciatus</i>	SSC
Fuzzy pigtoe	<i>Pleurobema strodeanum</i>	FT
Gulf moccasinshell (mussel)	<i>Medionidus penicillatus</i>	FE
Narrow pigtoe	<i>Fusconaia escambia</i>	FT
Ochlockonee moccasinshell (mussel)	<i>Medionidus simpsonianus</i>	FE

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<b>Common Name</b>	<b>Scientific Name</b>	<b>Status</b>
Oval pigtoe (mussel)	<i>Pleurobema pyriforme</i>	FE
Purple bankclimber (mussel)	<i>Elliptoideus sloatianus</i>	FT
Round ebonyshell	<i>Fusconaia rotulata</i>	FE
Shinyrayed pocketbook (mussel)	<i>Lampsilis subangulata</i>	FE
Southern kidneyshell	<i>Ptychobranthus jonesi</i>	FE
Southern sandshell	<i>Hamiota australis</i>	FT
Stock Island tree snail	<i>Orthalicus reses [not incl. nesodryas]</i>	FT
Tapered pigtoe	<i>Fusconaia burki</i>	FT

## 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 Non-essential Experimental Population  
 FT(S/A) = Federally-designated Threatened Species Due to Similarity of Appearance  
 ST = State-designated Threatened  
 SSC = State-designated Species of Special Concern

### LIST NOTATIONS

- <sup>1</sup> Lower Keys population only.
- <sup>2</sup> Monroe County population only.

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

<u>Term</u>	<u>Acronym</u>
Apalachicola River Wildlife and Environmental Area	ARWEA
Big Cypress National Preserve	BCNP
Critical Wildlife Area	CWA
Coastal Wildlife Conservation Initiative	CWCI
Deoxyribonucleic acid	DNA
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
Manatee Protection Plans	MPP
National Oceanic and Atmospheric Agency's Marine Fisheries Service	NOAA-Fisheries
National Wildlife Refuge	NWR
Passive Integrated Transponder	PIT
U.S. Geological Survey	USGS
U.S. Fish and Wildlife Service	USFWS
Wildlife and Environmental Area	WEA
Wildlife Management Area	WMA

## **APPENDIX C. FWC'S FISH AND WILDLIFE RESEARCH INSTITUTE'S PUBLICATIONS DURING FY 2015-16.**

FWC strives to produce high-quality publications and has been doing so since the Florida State Board of Conservation's first publication in 1948. That first paper in an Education Series dealt with red tide, which is still a topic of research at FWC's Fish and Wildlife Research Institute (Institute). Since then, more than 1,000 published works have documented the findings of Institute scientists. These contributions have appeared in various scientific journals or as publications of the Institute. The publications and reprint issues are exchanged with libraries throughout the world. While supplies last, the Institute sends single copies of the publications in print, at no cost, to individuals who request them. Many publications are also made available for download from the Institute website <http://myfwc.com/research/publications/scientific/new/>.

Castellón, T.D., B.B. Rothermel, and S.Z. Nomani. 2015. A comparison of line transect distance sampling methods for estimating gopher tortoise population densities. *Wildlife Society Bulletin* 39:804–812.

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

Common Name	Scientific Name
<b>INVERTEBRATES</b>	
Apple snail	<i>Pomacea insularum</i>
Honey bee	<i>Apis mellifera</i>
<b>FISH</b>	
Alligator gar	<i>Atractosteus spatula</i>
Common snook	<i>Centropomus undecimalis</i>
Fat snook	<i>Centropomus parallelus</i>
Lake Eustis pupfish	<i>Cyprinodon hubbsi</i>
Smallscale tarpon snook	<i>Centropomus pectinatus</i>
Swordspine snook	<i>Centropomus ensiferus</i>
<b>AMPHIBIANS</b>	
Dwarf salamanders	<i>Eurycea quadridigitata</i>
Louisiana seaside sparrow	<i>Ammodramus maritimus fisheri</i>
Mole salamander	<i>Ambystoma talpoides</i>
Ornate chorus frog	<i>Pseudacris ornata</i>
Peninsula newt	<i>Notophthalmus viridescens piaropicola</i>
Pig frog	<i>Lithobates grylio</i>
Pinewoods treefrog	<i>Hyla femoralis</i>
Striped newt	<i>Notophthalmus perstriatus</i>
<b>REPTILES</b>	
Apalachicola alligator snapping turtle	<i>Macrochelys apalachicola</i>
Apalachicola kingsnake	<i>Lampropeltis getula meansi</i>
Black racer	<i>Coluber constrictor</i>
Corn snake	<i>Elaphe guttata</i>
Eastern diamondback rattlesnake	<i>Crotalus adamanteus</i>
Florida scrub lizard	<i>Sceloporus woodi</i>
Gulf Coast indigo snake	<i>Drymarchon kolpobasileus</i>
Southern hognose snake	<i>Heterodon simus</i>
Suwannee alligator snapping turtle	<i>Macrochelys suwanniensis</i>
Yellow rat snake	<i>Pantherophis alleghaniensis</i>
<b>BIRDS</b>	
American avocet	<i>Recurvirostra americana</i>
American coot	<i>Fulica americana</i>
American white pelican	<i>Pelecanus erythrorhynchos</i>
Anhinga	<i>Anhinga anhinga</i>
Bald eagle	<i>Haliaeetus leucocephalus</i>
Black-crowned night-heron	<i>Nycticorax nycticorax</i>



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Common Name	Scientific Name
Black rail	<i>Laterallus jamaicensis</i>
Caspian tern	<i>Hydroprogne caspia</i>
Cattle egret	<i>Bubulcus ibis</i>
Clapper rail	<i>Rallus crepitans</i>
Common ground dove	<i>Columbina passerina</i>
Common moorhen	<i>Gallinula chloropus</i>
Eastern bluebird	<i>Sialia sialis</i>
Eastern meadowlark	<i>Sturnella magna</i>
Eastern screech owl	<i>Otus asio</i>
Glossy ibis	<i>Plegadis falcinellus</i>
Great blue heron	<i>Ardea herodias</i>
Great-crested flycatchers	<i>Myiarchus crinitus</i>
Great egret	<i>Ardea alba</i>
Great white heron	<i>Ardea herodias occidentalis</i>
Green heron	<i>Butorides virescens</i>
Gull-billed tern	<i>Geochelidon nilotica</i>
King rail	<i>Rallus elegans</i>
Least bittern	<i>Ixobrychus exilis</i>
Louisiana seaside sparrow	<i>Ammodramus maritimus fisheri</i>
MacGillivray's seaside sparrow	<i>Ammodramus maritimus macgillivraii</i>
Magnificent frigatebird	<i>Fregata magnificens</i>
Marbled godwit	<i>Limosa fedoa</i>
Purple gallinule	<i>Porphyryla martinica</i>
Pie-billed grebe	<i>Podilymbus podiceps</i>
Red-bellied woodpecker	<i>Melanerpes carolinus</i>
Red knot	<i>Calidris canutus</i>
Royal tern	<i>Sterna maxima</i>
Sanderling	<i>Calidris alba</i>
Sandwich tern	<i>Thalasseus sandvicensis</i>
Tricolored heron	<i>Egretta tricolor</i>
Tufted titmouse	<i>Baeolophus bicolor</i>
Western sandpiper	<i>Calidris mauri</i>
Whimbrel	<i>Numenius phaeopus</i>
Wilson's plover	<i>Charadrius wilsonia</i>
Wood duck	<i>Aix sponsa</i>
Yellow-crowned night-heron	<i>Nyctanassa violacea</i>
<b>MAMMALS</b>	
Atlantic salt marsh mink	<i>Mustela vison lutensis</i>
Bachman's fox squirrel	<i>Sciurus niger bachmanii</i>
Cotton rat	<i>Sigmodon hispidus</i>
Eastern gray squirrel	<i>Sciurus carolinensis</i>
Eastern spotted skunk	<i>Spilogale putorius</i>
Florida black bear	<i>Ursus americanus floridanus</i>

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Common Name	Scientific Name
Gulf salt marsh mink	<i>Mustela vison halilimnetes</i>
Least shrew	<i>Cryptotis parva</i>
Nine-banded armadillo	<i>Dasypus novemcinctus</i>
North American river otter	<i>Lontra canadensis</i>
Old-field mouse	<i>Peromyscus polionotus</i>
Puma	<i>Puma concolor stanleyana</i>
Short-tailed shrew	<i>Blarina sp.</i>
Southeastern fox squirrel	<i>Sciurus niger niger</i>
Southern flying squirrel	<i>Glaucomys volans</i>
Southeastern myotis bat	<i>Myotis austroriparius</i>
Tri-colored bat	<i>Perimyotis subflavus</i>
Tufted titmouse	<i>Baeolophus bicolor</i>
Virginia opossum	<i>Didelphis virginiana</i>
<b>PLANTS</b>	
Bald cypress	<i>Taxodium distichum</i>
Cabbage palm	<i>Sabal palmetto</i>
Laurel oak	<i>Quercus laurifolia</i>
Longleaf pine	<i>Pinus palustris</i>
Myrsine	<i>Myrsine guianensis</i>
Oak trees	<i>Quercus spp.</i>
Sand pine	<i>Pinus clausa</i>
Saw palmetto	<i>Serenoa repens</i>
Seagrass	Order: Alismatales
Scrub oak	<i>Quercus spp.</i>
South Florida slash pine	<i>Pinus elliotti</i>
Sweet bay	<i>Magnolia virginiana</i>
Toothache grass	<i>Ctenium aromaticum</i>
Turkey oak	<i>Quercus laevis</i>
Wiregrass	<i>Aristida stricta</i>

## APPENDIX E. GLOSSARY OF TERMS

### DEFINITIONS

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

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

**Area of Occupancy** – The area within its `extent of occurrence` which is occupied by a taxon, excluding cases of vagrancy. In some cases the area of occupancy is the smallest area essential at any stage to the survival of existing populations of a taxon.

**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.

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

**Commensal** – A species that has a symbiotic relationship with another species where the commensal benefits (nutrients, shelter, etc.) and the other is unharmed.

**Depredation** – 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.

**Extent of Occurrence** – The area contained within the shortest continuous imaginary boundary, which can be drawn to encompass all the known, inferred, or projected sites of present occurrence of a taxon, excluding cases of vagrancy.

**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 FWC Commission rule by virtue of designation by the U.S. Departments of Interior or Commerce as Endangered under the Federal Endangered Species Act.

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**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 FWC 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 FWC Commission business.

**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.

**Helper Bird** – Usually a previous male offspring of either the breeding male or both breeders. Helpers participate in territory defense, constructing and maintaining nest and roost cavities, incubating eggs, feeding and brooding nestlings, removing fecal sacs from the nest cavity, and feeding fledglings.

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

**Keystone species** – A species that plays a unique and crucial role in the structure of an ecosystem and the way it functions. Without their existence, the ecosystem would be dramatically different or cease to exist altogether.

**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.

**Metapopulation** – A group of spatially separated populations of the same species that interact at some level.

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

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

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

**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.

**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.

**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.

**State-designated Species of Special Concern** – As designated by 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 FWC 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 declined 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.

**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.

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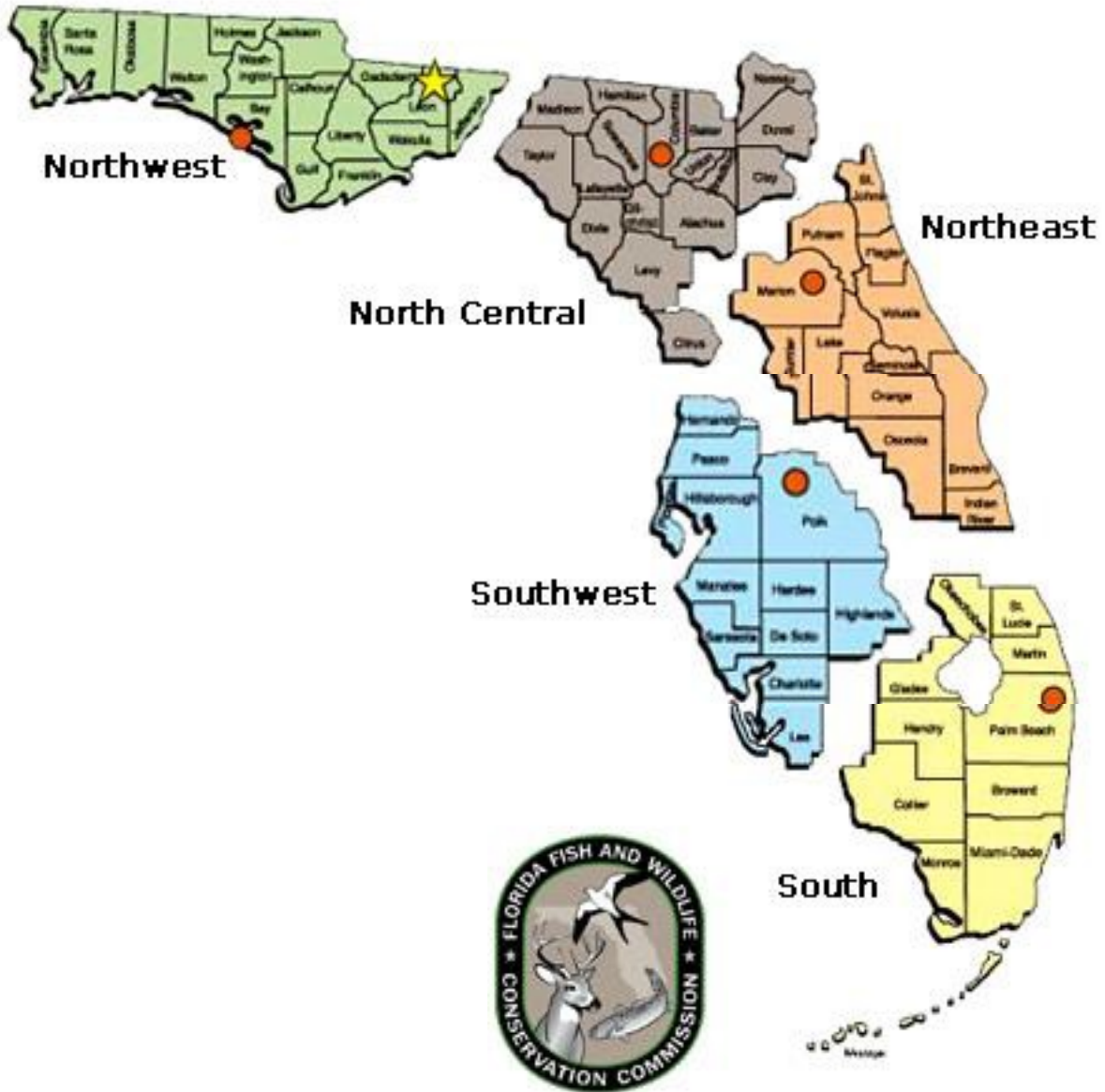
**Transect** – A path along which one records and counts occurrences of species, vegetation, and other relevant factors of a study.

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

**Trap Night** – A trap night is defined as one trap or camera set for one night.

**Waif Gopher Tortoise** – A gopher tortoise that has been removed from the wild, but is not associated with a permitted relocation effort and is generally from an unknown location.

## APPENDIX F. MAP OF FWC'S REGIONS



- ★ Headquarters
- Regional Offices

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# APPENDIX G. MAP OF FWC'S MANAGED AREAS

