

FY 2014-15
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 2014-15 Progress Report

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Endangered and Threatened Species Management and Conservation Plan
FY 2014-15 Progress Report

FLORIDA'S ENDANGERED AND THREATENED SPECIES
MANAGEMENT AND CONSERVATION PLAN
FY 2014-15 PROGRESS REPORT

Prepared by Staff of the
Florida Fish and Wildlife Conservation Commission
Nick Wiley, Executive Director

December 14, 2015

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EXECUTIVE SUMMARY

This document constitutes the 37th progress report and update of the Florida Endangered and Threatened Species Management and Conservation Plan as required by the Florida Endangered and Threatened Species Act of 1977 [§379.2291(5), Florida Statutes]. 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) 2014-15, a period from July 1, 2014, to June 30, 2015. It includes a description of FWC's criteria for research and management priorities, statewide policies pertaining to listed species, a funding request for FY 2016-17, 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 staff 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 the 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. 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). 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).

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 145 fish and wildlife species (**Table 1**) as FE (51), FT (30), FXN (1), FT(S/A) (4), ST (17), or SSC (42). There is no duplication in species listing between the two lists. Collectively, these 145 species are referred to as Florida's listed species. FWC staff 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, 2015. 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>) that maintains a list of Florida's Federally-listed plant species. This list may be accessed

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at <http://www.freshfromflorida.com/Divisions-Offices/Florida-Forest-Service/Our-Forests/Forest-Health/Florida-Statewide-Endangered-and-Threatened-Plant-Conservation-Program/Florida-s-Federally-Listed-Plant-Species>.

Table 1. Summary of Florida’s Protected Wildlife list as of June 30, 2015.

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 | 12 | 51 |
| FT | 2 | 1 | 6 | 5 | 1 | 15 | 30 |
| 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 |
| TOTAL | 14 | 6 | 24 | 35 | 32 | 34 | 145 |

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*). – FWC was under a two-year listing moratorium in 2010 while staff completed biological status reviews of 60 State-listed species and began drafting species action plans for those 60 species. As of November 2012, FWC is no longer under a State listing moratorium.

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.

On December 11, 2014, FWC received a request to evaluate the Miami tiger beetle for emergency listing. Following staff review, FWC sent a response to the petitioners on March 2, 2015, indicating that the Miami tiger beetle did not meet FWC criteria for emergency listing due to a lacking of imminent threats that would alter the continued existence of the species, but that it may meet criteria for listing as a State-designated Threatened species. On June 29, 2015, FWC received a petition, or species evaluation request, for the Miami tiger beetle. The species evaluation request is currently under review.

On May 26, 2015, FWC received a request to evaluate the status of two newly described species of alligator snapping turtle – the Suwannee alligator snapping turtle and the Apalachicola alligator snapping turtle. In June, the FWC Commissioners appointed a biological review group and the species evaluation request is currently under review.

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Threatened Species Management System, the Listing Process, and Management Plans (Laura Barrett 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, staff 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 June 2016. The FWC Commissioners will decide on final listing rule changes upon management plan approval.

As of June 30, 2015, 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.

Staff is developing the Imperiled Species Management Plan (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 the Agency'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 initial draft of the Imperiled Species Management Plan released in February 2015 generated over 500 comments from partners and stakeholders. The June 2015 updated draft Management Plan is available at <http://myfwc.com/media/3056386/Draft-ISMP-June-2015.pdf>, with plans for a formal public comment period in late 2015. Species guidelines outlining conservation measures and permitting standards are currently under development for several species and will continue through 2016. Staff will present the draft Imperiled Species Management Plan, associated rule changes, and species guidelines to the FWC Commissioners in

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fall 2015, with plans to seek final FWC Commissioner approval in spring 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.

Since FY 2013-14, the Legislature has authorized additional recurring Threatened and Nongame Species Management funding. FWC uses these funds to conduct activities to improve the status of Florida's threatened and nongame species, focusing on the development and implementation of management plans, research and monitoring programs, and undertaking conservation actions. The additional influx of funding has allowed staff 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. The Agency also utilizes these funds for conservation actions for the significantly at-risk and Federally-listed 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 the FWC Endangered and Threatened species programs in FY 2016-17 is \$28,874,593 (**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 Budget Request for FY 2016-17.

| Funding Source | Amount |
|--|---------------------|
| Nongame Wildlife Trust Fund (NWTF) | \$3,142,395 |
| Florida Panther Research & Management Trust Fund (FPRMTF) | \$1,339,074 |
| Save the Manatee Trust Fund (STMTF) | \$3,837,295 |
| Marine Resources Conservation Trust Fund (MRCTF) | \$8,981,122 |
| Land Acquisition Trust Fund (LATF) | \$769,928 |
| State Game Trust Fund (SGTF) | \$1,062,028 |
| Federal Grants (FGTF) | \$7,327,061 |
| Grants and Donations Trust Fund | \$2,415,690 |
| Total | \$28,874,593 |

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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 staff completed biological status reviews on 61 State-listed species 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. The completed biological status reviews are available at <http://myfwc.com/wildlifehabitats/imperiled/biological-status/>. After the completion of the biological status reviews, staff developed species action plans for the species that did not have existing management plans. Completed species action plans are available at <http://myfwc.com/wildlifehabitats/imperiled/species-action-plans/>. Species action plans describe individual species threats and conservation needs. Some species met the threatened species listing threshold, and their status will change once the FWC Commissioners approve the Imperiled Species Management Plan (the culmination of all of the species action plans) and associated rule changes. Appendix A contains a complete list of listed species' scientific and common names, and Appendix D provides this 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 by the USFWS. In Florida, these include the Choctawhatchee beach mouse, Anastasia Island beach mouse, St. Andrew beach mouse, and Perdido Key beach mouse (all Federally-designated Endangered), and the Southeastern beach mouse (Federally-designated Threatened).

Gulf Coast Conservation and Population Monitoring – FWC, the 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 2014-15, at 11 sites along the northwest Gulf Coast of Florida (**Table 3**). At each site, staff placed track tubes made of plastic pipe on the sand at regularly spaced points within the dune habitat. Inside each tube was a paper strip, an inkpad, and seed for bait; mice entered

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the baited tubes and left ink tracks on the paper. Monitoring consisted primarily of checking the papers for mouse tracks. Each baited tube was considered a track station, and staff checked the stations for mouse tracks at one or two-month intervals. FWC used the track data to monitor the distribution of mice at a site and to compare relative occupancy rates among sites. Staff monitored the size of the population of beach mice only indirectly, by observing the proportion of stations where mice left tracks. The percent of stations with tracks is not a precise measure for distinguishing population trends among sites, but it is a useful coarse indicator of population status based upon the area known to be occupied by mice.

In FY 2014-15, the mean detection rate (percentage of stations with tracks per sampling period) varied from 57% at Topsail Hill Preserve to 95% at Perdido Key State Park (**Table 3**). Deer Lake and Topsail Hill Preserve had a reduction in detection rate by 16% and 12% respectively when compared to FY 2013-14. The changes in detection rates were most likely caused by an increase in human disturbance and predators in each area. FDEP staff at both areas continued to maintain signs and roped off “no access” areas into dune habitat, and the United States Department of Agriculture revised their predator control schedule for these areas as of January 1, 2015. Of the other sampling locations, six sites had a slightly smaller proportion of stations with tracks in FY 2014-15 compared to the previous year, but the three other monitored sites had the same or a larger percentage of tracks. Compared to substantial declines in some recent years, in FY 2014-15, beach mouse populations in northwest Florida were relatively stable across the primary locations where they occur.

Table 3. Mean percentage of track stations with beach mouse tracks in FY 2014-15 at 11 coastal locations in northwest Florida.

| Sampling Locations | Subspecies | Number of Stations | Monitoring Interval | Percent of Stations with Tracks |
|--|-------------------|---------------------------|----------------------------|--|
| Billy Joe Rish Park (Gulf County) | St. Andrews | 21 | 2 month | 71 |
| Deer Lake (Walton County) | Choctawhatchee | 16 | 1 month | 61 |
| East Crooked Island (Gulf County) | St. Andrews | 42 | 1 month | 90 |
| Grayton Beach (Walton County) | Choctawhatchee | 45 | 1 month | 72 |
| Gulf Islands National Seashore (Escambia County) | Perdido Key | 80 | 2 month | 92 |
| Perdido Key State Park (Escambia County) | Perdido Key | 81 | 2 month | 95 |
| Shell Island East (Bay County) | Choctawhatchee | 30 | 1 month | 91 |
| Shell Island West (Bay County) | Choctawhatchee | 20 | 1 month | 91 |
| Topsail Hill Preserve (Walton County) | Choctawhatchee | 32 | 1 month | 57 |
| Water Sound (Walton County) | Choctawhatchee | 4 | 1 month | 94 |
| West Crooked Island (Bay County) | Choctawhatchee | 30 | 1 month | 89 |

The high detection rate for Perdido Key beach mice is particularly encouraging because just a few years ago these beach mouse populations were at perilously low levels and were

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restricted to the eastern end of the island. Now the mice occur throughout the three large public lands on Perdido Key. The continued presence of beach mice at Grayton Beach State Park in Walton County is also an encouraging finding. In April 2011, 43 Choctawhatchee beach mice were captured at Topsail Hill Preserve State Park and moved to Grayton Beach State Park where they had been absent for several years. 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 2014-15 indicates that the mice are still present throughout most of the park.

Perdido Key Beach Mouse Conservation – Perdido Key beach mice are currently present in most of the available habitat across Perdido Key, but at several times in the past few decades their population was reduced to a very small number of individuals. The past reductions in the number of mice likely removed some genetic variation from the population and therefore there is concern that the population now has little genetic diversity (i.e., the mice are all closely related). If true, this might influence the survival of individuals and reduce the chances that the population will persist after catastrophic events such as hurricanes. During FY 2011-12, FWC collaborated with biologists from the University of Florida to investigate the genetic diversity among beach mice across Perdido Key. FWC collected tissue for genetic analysis from mice trapped across Perdido Key, and in FY 2013-14, University of Florida researchers completed the genetic analysis; University of Florida and FWC researchers completed a draft manuscript describing the study results. Analyses showed, as expected, that mice in the oldest population at Gulf Islands National Seashore were more genetically diverse than mice in the more recently established populations at Gulf State Park and Perdido Key State Park. More importantly, researchers found strong evidence that mice had been dispersing among the three populations. This has important conservation implications because it means that some of the habitat corridors, particularly the front beach berms, are allowing mice to move between populations. The movement of mice between populations helps to maintain or improve the genetic diversity within each population, and it increases the probability that a population will persist or be naturally re-established following a catastrophic decline. In FY 2014-15, FWC, USFWS, and University of Florida researchers completed a five-day trapping session to assess beach mouse populations on public and private lands across Perdido Key. Genetic samples were collected from all individuals trapped and were sent to the University of Florida for analysis to determine if mice are moving between populations on public land. A preliminary analysis of captures during this trapping session indicate the beach mouse population is at its highest level since Hurricane Ivan made landfall on Perdido Key in September 2004. During the recent trapping session, researchers also collected 20 beach mice from the Gulf Islands National Seashore Perdido Key Unit, and transferred them to existing captive breeding programs at three Florida zoos to enhance genetic diversity. The captive populations allow reintroduction of the animals to Perdido Key if hurricanes decimate existing wild populations.

Southeastern Beach Mouse Conservation – In October 2014, FWC participated in a meeting of the Southeastern Beach Mouse Working Group to set conservation objectives and identify priority actions. At that meeting and later, FWC provided input on plans to enhance habitat for beach mice at Pelican Island National Wildlife Refuge in Indian River County. FWC also provided comments on plans to reintroduce beach mice to public lands at Smyrna Dunes in Volusia County and Sebastian Inlet in Brevard and Indian River counties. The Southeastern

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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. Because field surveys to detect beach mice had not been conducted in St. Lucie and Martin counties in more than ten years, however, during FY 2014-15, FWC staff in southeast Florida proposed to use track tubes to determine the presence of Southeastern beach mouse along approximately 13 miles of suitable beach dune habitat. Track surveys were initiated north of St. Lucie Inlet and will be completed in fall 2015. Staff found various rodent tracks in Avalon State Park, Fort Pierce Inlet State Park, and Pepper Beach, but only captured cotton rats in subsequent trapping. Although FWC could not confirm the presence of Southeastern beach mice in this area, more intensive trapping is needed before considering beach mice extirpated.

Development Impacts – Because habitat loss is a primary cause for the decline of beach mouse populations, working with land development projects within beach mouse habitat is a critical component of beach mouse conservation. FWC works with the USFWS, developers, local governments, landowners, and land managers to identify ways to mitigate the loss of beach mouse habitat while allowing development activities to continue. During FY 2014-15, FWC biologists consulted with landowners and State and Federal agencies regarding development at several sites in beach mouse habitat on both the Atlantic and Gulf coasts. FWC collaborated with University of Florida researchers in continuing 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 in Escambia County. 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 (*Dave Bove and Terry Doonan*)

The Florida mouse is currently listed in Florida as a State-designated Species of Special Concern. 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 habitats where Florida mice occur, frequent, prescribed burning is a necessary management tool to maintain good quality habitat. Although prescribed burning is important for maintaining habitat quality, little is known about the short-term impacts such fires have on resident Florida mouse populations. Environmental changes post-fire may influence survival rates, movement patterns, and reproduction of Florida mice.

Since 2012, FWC has been using standard live trapping procedures to study the effects of prescribed burning on Florida mouse populations. Staff has conducted the study at the Bell Ridge Wildlife and Environmental Area (WEA) in Gilchrist County. These methods involve setting live traps, baited with seeds, outside selected gopher tortoise burrows during four-day trapping sessions. FWC conducted trapping sessions every three to four months (seasonally) from February 2012 through November 2014. Staff conducted prescribed burns in February 2012, after the first trapping session, and again in April 2014. Preliminary results suggest that the Florida mouse population size increased immediately after burn events, but then declined slowly over time. Those results suggest short-term changes in survival, movement, and/or

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reproduction in the months following fire, but that the benefits are temporary. In FY 2015-16, FWC will complete data analyses and write a final report.

Assessing the Genetic Structure of the Statewide Florida Mouse Population for More Effective Conservation and Management – FWC initiated an ongoing project in FY 2013-14 to study the genetics of the statewide Florida mouse population. As a commensal (a species that benefits directly from an association with another species) of the gopher tortoise, Florida mice may be translocated during permitted gopher tortoise relocation activities; these genetic analyses will identify the limitations of moving Florida mice between sites and habitats. Further, this work will produce information on the extent of gene flow, or connectivity, among local populations, across the range of the Florida mouse – information necessary for better management of this species across its range. Genetic analyses also will help to identify and prioritize areas of high conservation value for Florida mice throughout the State.

In FY 2014-15, FWC conducted sampling at 20 locations for a total of 4,290 trap nights. The number of Florida mice captured ranged from zero to 24 (total = 125, average = 6.25 per site). Staff conducted genetic analyses on those mice, as well as unanalyzed mice collected in the previous year. Through the first two years of this project, FWC has funded the analysis of samples from 522 Florida mice collected at 37 locations throughout Florida. Preliminary results indicate that much of the observed genetic variation is found within locations, relative to variation found among locations. Similarly, sample locations separated by shorter distances tended to be more clustered. To continue this work, FWC obtained funding from a State Wildlife Grant in FY 2014-15. This funding will allow FWC to study genetic variation across the rest of the statewide Florida mouse population. In FY 2015-16, FWC will use this funding to collect and analyze samples from additional locations in other parts of the State.

Surveys on Hernando County Wildlife and Environmental Areas – Perry Oldenburg WEA, Janet Butterfield Brooks WEA, and Chinsegut WEA contain habitat suitable for the Florida mouse. The establishment of baseline data for the Florida mouse population on these properties is essential in the planning and execution of mechanical and prescribed fire treatments in order to best manage for this species. During FY 2014-15, FWC conducted Florida mouse surveys on these areas using FWC's Standard Monitoring Protocol for Florida Mouse Occupancy Surveys. Staff conducted the surveys between March 25, 2015, and April 10, 2015, and detected Florida mice on all areas. Eleven Florida mice were captured on Perry Oldenburg WEA, five on Janet Butterfield Brooks WEA, and one on Chinsegut WEA.

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 rare in Florida. Historical data suggest chipmunks occur only in northwest Florida and may be restricted to upland, hardwood forest habitat. Data collected by FWC biologists in 1990 found chipmunks in Escambia, Santa Rosa, Okaloosa, Walton, and Holmes counties along the Blackwater, Yellow, Escambia, and Choctawhatchee river watersheds. The estimated chipmunk distribution at that time was 877 square miles. An extensive survey of chipmunk distribution has not been conducted since 1990, and the status of the chipmunk population in Florida is unknown.

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In order to evaluate the Eastern chipmunk's population status in Florida and determine management needs, FWC biologists have utilized multiple survey methods, targeting both public and private lands. In 2012, FWC created a website (<https://public.myfwc.com/hsc/chipmunk/getlatlong.aspx>) where residents of Florida could report Eastern chipmunk sightings. The website includes a Google Maps tool for reporting the exact location of the sighting and a comments section for providing detail on the reported sighting. FWC uses the comments and contact information submitted with the sighting location to verify the sighting. The agency advertised the website address and its purpose to the public using local media resources. Since its launch in the summer of 2012, the public has reported 155 chipmunk sightings on the website, with reports from six counties: Escambia, Santa Rosa, Okaloosa, Walton, Holmes, and Jackson.

During FY 2014-15, FWC used a letter survey to assess chipmunk use of private lands. Staff sent four hundred letters to randomly selected landowners throughout Escambia, Santa Rosa, Okaloosa, Walton, Holmes, Washington, and Bay counties. Letters included a short questionnaire asking whether chipmunks occurred on the recipient's property. Of the 400 letter surveys sent, 126 were returned with a reply, seven of which (5.5%) reported a chipmunk sighting on the property. Chipmunk sightings were reported in Santa Rosa, Okaloosa, Holmes, Washington, and Escambia counties.

Finally, during FY 2014-15, FWC used camera traps to survey for chipmunks on public and private lands. Public land surveys included the Blackwater River State Forest, Escambia Wildlife Management Area (WMA), and the Choctawhatchee WMA, overlapping Escambia, Santa Rosa, Okaloosa, and Holmes counties. Camera surveys focused on patches of upland, hardwood forest near rivers and streams, specifically targeting suspected chipmunk habitat. Staff placed multiple camera traps at 53 sites on public land, totaling 208 cameras set for 14 days each (2,912 trap nights – a trap night is defined as one trap or camera set for one night). Chipmunks were detected on 14 of 53 (26.0%) sites surveyed with cameras. Detections occurred in Blackwater River State Forest in Santa Rosa and Okaloosa counties, and on the Escambia River WMA in Escambia County. No chipmunks were detected in the Choctawhatchee WMA in Holmes County. FWC surveyed ten privately owned properties with camera traps as well, with chipmunks detected on two of the ten properties. Staff visited an additional 20 private properties; however, landowners would not grant access or were unavailable to request permission for access.

Using the data collected from the various survey methods during FY 2014-15, FWC biologists 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. Current chipmunk extent of occurrence in Florida is 2,531 square miles, which is 48% larger than the previous estimate from 2002. Chipmunk area of occupancy in Florida is 254 square miles, which suggests chipmunks are uncommon and occupy only about 10% 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 biologists completed a final report on chipmunk research in Florida; in the final report, FWC biologists determined that 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. The original biological review group, appointed by the FWC Commissioners in 2010, was reconvened to review the updated information. Based on the criterion and listing measures specified in the biological status review, found that the chipmunk

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did not meet any criteria for listing as a State-designated Threatened species in Florida. Staff recommended in the biological status report that chipmunks not be listed as State-designated Threatened and no longer required listing as a State-designated Species of Special Concern. The biological status report is currently being peer reviewed.

Everglades Mink (*Chris Winchester*)

The Everglades mink is a State-designated Threatened subspecies. The Everglades mink is one of four subspecies of mink in Florida and is known to occur in the fresh water 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 during FY 2014-15, allowing comparisons of methodology across all subspecies. FWC staff also created a website (<https://public.myfwc.com/hsc/mink/getlatlong.aspx>) for the public to report mink sightings, a useful tool to guide survey efforts and supplement field data. The website includes a Google Maps tool for reporting the exact location of each mink sighting and a comments section for providing sighting details, as well the opportunity to attach pictures. Staff used comments, pictures, and contact information submitted with the sighting location to evaluate the validity of the sighting. FWC advertised the website address and its purpose to the public, using local media resources, when it first became active.

Between July 2014 and June 2015, FWC biologists conducted field surveys on three mink subspecies in Florida: Gulf salt marsh mink, Atlantic salt marsh mink, and Everglades mink. Research on Gulf and Atlantic salt marsh mink began in 2013. In July 2014, FWC biologists received a State Wildlife Grant to conduct Everglades mink research and began surveys for Everglades mink in South Florida. For both the Gulf and Atlantic salt marsh mink, floating camera traps were used to collect data on mink occurrence. For the Everglades mink, FWC biologists evaluated camera traps and spotlight surveys as methods for detecting mink.

FWC biologists conducted camera trap surveys of both Atlantic and Gulf salt marsh mink between October 2013 and June 2015. Camera traps consisted of a trail camera placed within a bucket on a floating platform, methods which were developed by researchers at the University of Florida. Camera trap surveys were conducted in salt marsh habitat in Duval, Nassau, and St. John's counties in northeast Florida, and in Dixie, Levy, and Citrus counties along the Gulf Coast.

FWC biologists conducted camera trap surveys for Everglades mink between July 2014 and June 2015 using two types of camera traps. First, floating camera traps were used to survey in salt marsh and fresh water swamp. Second, biologists attached trail cameras to trees and focused them on small water holes within forested wetlands. All Everglades mink camera trap surveys occurred in Fakahatchee Strand Preserve State Park in Collier County.

In addition to camera trap surveys, FWC biologists conducted spotlight surveys of Everglades mink in Fakahatchee Strand along roads and trails in April and May 2015. In total, FWC biologists surveyed three transects, two nights each. A single night's survey involved traveling along a predetermined route and spotlighting for mink along the edges of roads and trails. Staff conducted the surveys at night. Surveys began just after sunset, and lasted two hours

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each night. Mink were detected by their distinctive, yellow eye-shine, and their location was recorded.

Between June 2012 and June 2015, the public reported 340 sightings on the mink website. Sightings occurred throughout the State with 32 sightings reported in the Everglades region. Overall, FWC deemed less than 30% of the sightings valid based on comments and pictures submitted. Most of the sighting reports were North American river otters, which are more common than mink but similar in appearance.

Between October 2013 and June 2014, FWC biologists detected Atlantic salt marsh mink on 50 of 274 (18%) camera traps. Gulf salt marsh mink were detected on 34 of 293 (12%) camera traps between September 2014 and June 2015. Staff detected mink with camera traps in Nassau, Duval, Dixie, Levy, and Citrus counties.

Everglades mink were detected on one transect during spotlight surveys along Janes Scenic Drive in Fakahatchee Strand. Staff also detected Everglades mink on two of 333 (less than one percent) camera trap photos, 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 spotlighting was particularly effective in detecting Everglades mink. Future Everglades mink surveys will focus on surveying additional public lands outside of Fakahatchee Strand and incorporate daytime visual surveys, a method currently being used by State Park biologists.

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. However, the study stressed the need for future work because of the very limited number of specimens from Florida included in the analysis.

Status and Distribution of the Homosassa Shrew in Florida – The goal of this status and distribution project during FY 2014-15 was to obtain data needed to reassess the listing status of the Homosassa shrew, a species of long-tailed shrew found in Florida. As an initial step, FWC queried ten natural history museums for records of shrew specimens from Florida. Staff obtained records for 564 least shrews and 326 short-tailed shrews, but only 73 long-tailed shrews; of those 73, 70 were collected within the accepted range of the Homosassa shrew.

FWC also contacted biologists and other experts believed to have knowledge of surveys conducted previously for terrestrial vertebrate species using methods expected to result in the capture of shrews. Records were obtained from multiple sources, including other FWC staff, Florida Natural Areas Inventory, and the Florida Department of Environmental Protection's (FDEP) Florida Park Service, for surveys conducted on 44 separate conservation areas from 1990-2013 (though survey dates were unknown for about 15% of the reports received). Altogether, from prior surveys, FWC obtained records for 468 least shrews, 297 short-tailed shrews, but only 87 long-tailed shrews; of those 87, 59 were collected within the accepted range of the Homosassa shrew. In addition, FWC biologists collected owl pellets (remains of prey

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consumed by owls) and dissected them, searching for shrew skulls. FWC obtained 11 owl pellets from different locations, but none contained Homosassa shrew skulls.

In FY 2014-15, FWC biologists continued surveys for Homosassa shrews using drift fence arrays with pitfall traps. Five public conservation areas in known Homosassa shrew range were selected for surveys: 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. Staff also obtained data 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. Biologists set up drift fence arrays, with traps, at two to four study sites on each area, in multiple habitat types expected to be used by Homosassa shrews. At each site, traps were opened for six to eight survey periods between April 3, 2014, and April 30, 2015. For each survey period, the traps were kept open for two weeks. Total trapping effort was 686,448 trap nights across all sites. Trapping produced 12 Homosassa shrews, captured across five conservation areas.

FWC staff completed a draft final report on the results of this project in June 2015. The data from prior surveys, museum collections, and surveys conducted for this project indicate the accepted range is a reasonable estimate of the extent of occurrence for the Homosassa shrew. The range of habitats where Homosassa shrews were recorded (which includes upland mixed woodland, upland pine forest, sandhill, scrub, hydric hammock, and bottomland hardwood forest) indicates a large area of occupancy within that extent of occurrence. Project results indicate an apparent low abundance for the Homosassa shrew across multiple habitats and sites within the accepted range. Results from other recently published studies seem to support that finding.

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 action plan for the Sherman's short-tailed shrew identified priority actions to develop reliable trapping techniques and develop a monitoring strategy for a thorough status assessment.

Biologists believe the Sherman's short-tailed shrew is restricted to a small area in southwest Florida from the vicinity of Royal Palm to just north of Fort Myers. The specimens used to differentiate Sherman's short-tailed shrew from other species of short-tailed shrew and delineate its range in Florida were collected in 1955. Additional attempts have been made to collect specimens to determine if the species is still present within its presumed range, but no individuals have been caught, suggesting that it is either very rare or has been extirpated from the area. Current data on the Sherman's short-tailed shrew is needed to evaluate its population status and determine if it is still present within its presumed range.

Between December 2014 and May 2015, FWC biologists surveyed for Sherman's short-tailed shrew on publicly managed lands in Charlotte and Lee counties. FWC biologists established 60 drift-fence arrays, each constructed using three 30-foot segments of silt fence in a "Y" formation with seven two-gallon buckets placed at the ends and center of each fence segment. The buckets were placed in the ground such that the top of the buckets were flush with the ground. Raised covers were constructed and placed over each bucket to provide protection for captured animals. Each array was open for a minimum of 30 days, with most arrays open for

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60 days. Staff checked each array two to three times a week, and identified all captured shrews by species. They also collected either tissue samples (e.g. tail tip) or whole carcasses for future genetic analysis.

In total, biologists captured 214 least shrews and one short-tailed shrew. The lone short-tailed shrew specimen was captured on the Corkscrew Regional Ecosystem Watershed Wildlife and Environmental Area (WEA) in Lee County. Genetic analysis is required to confirm that the specimen is a Sherman's short-tailed shrew; however, the capture location is within the presumed range of the Sherman's short-tailed shrew. 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. Survey methodology appears suitable to detect least shrews in southwest Florida; however, adjustments or alternative methods may be required in order to increase the detection rate of short-tailed shrews.

Sanibel Island Rice Rat (*Terry Doonan*)

The Sanibel Island rice rat was first 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 Island, where it exists mostly in freshwater, open marsh habitat across the island. 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. The Sanibel Island rice rat is currently a State-designated Species of Special Concern in Florida.

In 2010, FWC and external experts conducted a biological status review that determined the Sanibel Island rice rat met the criteria for listing as a State-designated Threatened species in Florida, but will remain a Species of Special Concern until the Imperiled Species Management Plan is approved by the FWC Commissioners.

Filling Data Gaps to Address the Status and Management of the Sanibel Island Rice Rat – During FY 2014-15, the University of Florida received a State Wildlife Grant to fund a three-year project, which begins in FY 2015-16, to address 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 the 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 a second project that will 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 two Lee County 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 begins in FY 2015-16.

Florida Bonneted Bat (*Jeff Gore and Jennifer Myers*)

The Florida bonneted bat was listed by the USFWS as a Federally-designated Endangered species in October 2013. The Florida bonneted bat is the largest and rarest bat

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species in Florida. Florida bonneted bats have been known to occur in the Miami area since the 1930's. There was only one known roost statewide (in a bat house at a private residence in Ft. Myers) until 2006, when bonneted bats were detected through acoustic surveys by the Florida Bat Conservancy on Babcock Webb Wildlife Management Area (WMA) in Charlotte County. In 2007, FWC installed eight roosts, each consisting of one or two single or triple-chambered bat houses, on the WMA. In December 2008, bonneted bats occupied two roosts, tripling the number of known roosts for this species. FWC confirmed the use of two additional bat houses by Florida bonneted bats in May 2010, bringing the total confirmed occupied bonneted bat roosts on the WMA to four, and a total of five statewide. During FY 2011-12, five more roosts were installed, each consisting of two single-chambered bat houses. To date, seven of the roosts on the WMA have been used by Florida bonneted bats at least once.

During FY 2014-15, FWC conducted seven nighttime simultaneous emergence counts on occupied bonneted bat roosts on the WMA, and monitored for Florida bonneted bat young during the breeding season. A simultaneous count indicates that bats were counted at each occupied roost on the same evening. Emergence counts determine the presence of targeted species. An average of 58 bonneted bats were counted during emergence counts during FY 2014-15.

During FY 2014-15, FWC monitored bat houses during the bat maternity season to determine how Florida bonneted bats use the bat houses for reproduction. FWC staff visited occupied bonneted bat houses approximately weekly from mid-May through the end of FY 2014-15, to monitor for the presence of bonneted bat young in the bat houses. Staff counted approximately 22 young among four roosts during this period. FWC will continue simultaneous emergence counts and monitoring for young in FY 2015-16.

In 2012, University of Florida researchers received a Federally-funded State Wildlife Grant to develop a survey protocol for the Florida bonneted bat and to identify habitats important for roosting and foraging. Grant activities began in FY 2013-14 and continued in FY 2014-15. A portion of the grant involves monitoring the bonneted bats occupying bat houses on Babcock Webb WMA. During FY 2014-15, FWC and the University of Florida conducted three capture events on occupied bonneted bat roosts on the WMA. Researchers collected biological data and inserted a Passive Integrated Transponder (PIT) tag into each bat. Each PIT tag is numbered, and will allow researchers to document recapture of the same individual in future trapping events. One hundred and eighteen bonneted bats (36 male and 82 female) have been captured since grant activities began in FY 2013-14. Grant activities will include one more capture in FY 2015-16, and FWC will continue the project in FY 2016-17, as well.

In FY 2013-14, FWC applied for and received a Conserve Wildlife Tag grant to purchase an automatic PIT tag reader to mount on a bat house. The automatic PIT tag reader scans bats as they enter/exit the bat house. In FY 2014-15, FWC purchased one automatic PIT tag reader using the Conserve Wildlife Tag grant, and installed in August 2014. Bat Conservation International donated a second automatic PIT tag reader to FWC, and FWC installed it in April 2015. FWC then purchased three additional automatic PIT tag readers in May 2015, and they will be installed on Babcock Webb WMA during FY 2015-16.

In FY 2014-15, University of Florida researchers received a grant from the Joint Fire Science Program to explore the effects of prescribed fire on Florida bonneted bats. 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 2014-15, University of Florida researchers deployed acoustic detectors on the WMA

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to monitor bat use in burned and unburned habitat, placed radio tags on three Florida bonneted bats, and placed Global Positioning Satellite (GPS) tags on three Florida bonneted bats. This project is ongoing and results will become available during FY 2015-16.

In FY 2012-13, FWC invited conservation partners to join the Agency's Florida Bonneted Bat Working Group. Twenty-two people representing 12 organizations met in September 2012 to discuss ongoing research and monitoring, conservation across the species' range, and to assist in conducting emergence counts on occupied roosts at Babcock Webb WMA. FWC and partners hosted a second meeting of the Working Group in November 2014 and the Working Group plans to meet again during FY 2015-16 to coordinate conservation activities among partners.

Gray Bat (*Jeff Gore*)

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

Gray bats occupy different caves in summer and winter based upon temperature, and historically some bats migrated out of Florida during winter. The size of the summer population of gray bats in Florida cannot be determined easily because the bats roost within large colonies of a similar bat species, the Southeastern myotis. Observations made within caves and during counts conducted in the evening as bats exit their roosts are not definitive because of the presence of multiple species. Nevertheless, no gray bats have been observed or captured at summer roosts in Florida since 1990.

Gray bats in Florida typically have roosted in winter in two Florida caves, and hibernating bats can be readily counted at both sites. In recent years, however, few gray bats have been observed during the annual census of the winter roosts conducted by FWC and Florida Department of Environmental Protection's (FDEP) Florida Park Service. During the most recent winter count on February 16, 2015, biologists found no gray bats in the primary wintering cave in Florida Caverns State Park in Jackson County. As is typical, several hundred bats of two other species (Southeastern myotis and tri-colored bat) were present in the cave. The only other cave in Florida where gray bats have roosted recently in winter is adjacent to the park. Biologists visited this smaller cave on the same date and found no gray bats. Although thousands of gray bats previously wintered in Florida's caves, biologists have found no more than nine gray bats hibernating in the State in any year since 2002. In addition to the historical cave roosts of gray bats, FWC researchers also visited more than 100 other Florida caves this past winter and found no gray bats. Gray bats formerly wintered in a cave in southern Alabama, and it is possible that the Florida population shifted to that site, but no gray bats recently have been reported there in winter either.

White Nose Syndrome is an emerging fungal disease that has killed millions of bats from several species, but it is not believed to be responsible for the decline of gray bats in Florida for three reasons. First, the fungus has primarily affected hibernating bats in North America and it has not yet been recorded in Florida. Second, although gray bats are susceptible to White Nose Syndrome, their range-wide populations have been little affected by the disease compared to

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other cave-roosting species. Finally, the decline in the gray bat population in Florida began before 2006, before the earliest documentation of White Nose Syndrome in the U.S. Nevertheless, as in previous years, FWC researchers in 2015 took swab samples from several Southeastern myotis bats and tri-colored bats that roosted in Old Indian Cave (Florida Caverns State Park in Jackson County) where the gray bats were formerly present. As expected, tests on those samples by the National Wildlife Health Laboratory found no evidence of the fungus that causes White Nose Syndrome.

Surveys that are more frequent or more intensive might provide evidence that gray bats are still present in Florida, 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.

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

The Sherman's fox squirrel is listed as 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 species 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.

In FY 2014-15, FWC and the University of Florida focused efforts on analyzing data collected from 2011-2014 on a multi-component study investigating the ecology and conservation of fox squirrels in Florida. Study objectives included assessing densities, habitat use, how management practices influence presence of fox squirrels, and genetic variation of the four subspecies found in Florida.

During 2011-2014, FWC surveyed fox squirrels throughout North and Central Florida using camera-traps. In a study conducted in Central Florida at Camp Blanding Wildlife Management Area (WMA) in Starke, and the Ordway-Swisher Biological Station in Melrose, the goal was to estimate fox squirrel densities, which has not been done in Florida since the species was first protected, almost 20 years ago. Staff identified individual fox squirrels from camera-trap photographs using variation in color features and patterns. The estimated densities ranged between 6-16 squirrels per square kilometer (0.02-0.06 squirrels per acre), which fall within the range of previous estimates from other southeastern populations.

In another study, staff assessed how land cover types, vegetation structure, and proximity to residential and urban areas influence presence of fox squirrels. FWC surveyed 40 landscapes; each landscape was 1,930 acres and comprised of public and private lands. Cameras were set in 3x3 grids with 330 foot spacing and were active for up to eight days. In total, staff surveyed 200 grids and 1,800 camera points. At all points, FWC measured habitat structure around the camera, including canopy density, basal area of pines and oaks, shrub cover, and ground cover. Fox squirrels were detected at seven of the 22 land cover types surveyed, at 26 landscapes (65%), 70 grids (35%), and 210 of the camera-trap points (12%). At the landscape scale, fox

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squirrel occurrence increased in areas with a reduced canopy cover. At fine scales, fox squirrel occurrence increased in areas with increased tree canopy, increased oak density, and decreased cover in the shrub and ground layers. Within landscapes where fox squirrels occurred, they were more likely to occur around areas of low intensity residential development.

Staff also investigated the response of fox squirrels to herbicide treatments and vegetation structure within the sandhill communities. Surveys were conducted at five locations, with cameras placed on 157 grids, totaling 1,413 camera-trapping points. Fox squirrel occurrence was positively correlated with turkey oak density, and therefore, restoration methods that kill oaks (i.e. herbicide) may damage fox squirrel populations.

Ongoing research with the joint FWC/University of Florida project will include finalizing the genetic analyses that are evaluating the genetic variation of the four subspecies in Florida, including defining their geographical boundaries.

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 and, more recently, habitat loss and fragmentation due to the growth of the human population reduced the size of the panther population and isolated it from other puma populations. When FWC began investigations into the status and distribution of panthers in the early 1970s, there were thought to be fewer than 30 panthers still living in South Florida. This small population size and its geographic isolation from other puma populations made the Florida panther very vulnerable to extinction due to inbreeding. Therefore, in 1995, FWC, with the approval of the USFWS, began a genetic restoration plan by temporarily bringing in eight female pumas from Texas to increasing the diversity of the population's genetic composition. These releases mimicked the natural exchange among panthers and other puma subspecies that last occurred in the 19th century. Biologists estimate that the Florida panther population is currently between 100-180 adults in South Florida due, in part, to these actions. While genetic restoration of the Florida panther was successful with regard to some of its initial objectives, panthers remain isolated and may therefore suffer from inbreeding and loss of genetic variation over time. If this happens, biologists will consider and evaluate the release of additional pumas in Florida to maintain an appropriate genetic health.

FWC and its partner, Big Cypress National Preserve (BCNP), continue to monitor the panther population and its genetic health. Biologists annually capture a sample of panthers between November and February and fit them with collars containing radio transmitters. Staff monitor these radio-collared panthers three times a week, recording their locations. Since 1981, 240 panthers have been radio-collared, providing essential data for the management and conservation of the population. Biologists collected radio telemetry data on 42 Florida panthers in FY 2014-15. 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. In FY 2014-15, FWC and BCNP biologists visited eight panther dens and documented 22 kittens (12 males, ten females). Since 1992, 447 kittens

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have been handled at dens.

In FY 2014-15, 37 wild Florida panthers were known to have died, including ten (five males, five females) radio-collared panthers and 27 (15 males, nine females, three unknown sex) uncollared panthers. Twenty-five of the 37 panthers died after being hit by vehicles, four were killed by other panthers, seven died from undetermined causes, and one was shot illegally. In addition to these mortalities, biologists removed a two-year-old male panther from the wild permanently after shotgun blast blinded him along a road in Collier County. This panther is now being cared for at the Naples Zoo. Additionally, an 11-week-old female kitten was found abandoned in East Naples and was removed to permanent captivity at the Miami Zoo.

Research continues to be an important part of Florida panther conservation. Research plans are vetted with FWC's partners to ensure that research and monitoring efforts are well-designed, coordinated, and meet priority needs. FWC is currently involved in several collaborative research projects focusing on issues related to Florida panther conservation, recovery, 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 DNA genome sequencing, evaluating the presence and significance of various parasites and environmental contaminants in panthers, determining mortality factors, assessing the efficacy of panther rehabilitation, a review of panther diet using scats and stomach contents, and describing fine-scale panther movement rates using GPS collar data.

In the fall of 2011, FWC organized a small, internal working group to discuss available techniques that could potentially provide statistically robust estimates of the panther population size, a task that is notoriously difficult for secretive, wide-ranging, and endangered large carnivores like the Florida panther. Subsequent collaborative efforts have identified two promising protocols. Staff initiated a methodology that relies on a combination of trail camera surveys and marked panthers 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 will be the focus of this project during FY 2015-16. The second technique that utilizes both 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. FWC and its collaborators published a manuscript on this method in the *Journal of Applied Ecology* in the summer of 2015. Lastly, FWC continues its protocol of disease monitoring and vaccination of all panthers handled as well as monitoring the genetic health of the population via DNA analyses contracted to the U.S. Forest Service Rocky Mountain Research Station.

FWC assisted with the completion of several collaborative research projects during FY 2014-15 including: assessing the presence of the *Trichinella* (a type of roundworm) parasite in Florida panthers, modeling of movement patterns in Florida panthers, and delineating a technique to assist with selecting appropriate home range estimators for GPS datasets. Agency staff served as lead or co-authors on four peer-reviewed publications and four published abstracts presented at professional conferences.

FWC investigates human-panther interactions in accordance with the Interagency Florida Panther Response Plan (http://www.floridapanther.net/images/field_notes/EA_for_the_Panther_Response_Plan_FINAL_PUBLISHED.pdf). FWC verified that panthers were responsible for preying upon domestic

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animals (called depredations) in 27 separate events during FY 2014-15. In some cases, multiple animals were killed or injured during a single event. These 27 verified panther depredation events all occurred in Collier, Hendry, and Lee counties, and the majority of depredations occurred in Golden Gate Estates east of Naples (Collier County). Golden Gate Estates is approximately 150 square miles in area and borders public lands located in the Florida Panther National Wildlife Refuge, Picayune Strand State Forest, and the Corkscrew Regional Ecosystem Watershed. Panthers occupy these public lands. Lot sizes in Golden Gate Estates typically range from one to five acres, and most lots still contain native habitat. It is permissible to keep livestock under local zoning codes. 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 produced a brochure that describes these steps, and this information is also available online at http://www.floridapanther.net/images/field_notes/LivingWithPanthers.pdf. 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. Encounters included someone witnessing a panther follow their dog back to the house, a hunter whose turkey calling attracted the attention of a panther, and a ranch hand who observed a juvenile panther as it stalked cattle egrets.

The public's perception of panthers and support for their conservation varies widely and can be greatly influenced by having experienced some type of interaction with a panther. Education and outreach are critical recovery actions, because conservation efforts will not be achieved without public support. To that end, FWC has contracted Dr. Elizabeth Pienaar at the University of Florida to begin exploring human dimension issues related to panther population expansion. The primary objective of this research is 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 will provide insights into which incentives (financial incentives, regulatory relief, and/or assistance) landowners prefer and the potential costs of implementing these incentives. A combination of interviews and surveys will be used to collect the information needed to determine the minimum incentives required to attain conservation of panther habitat on private, non-urban lands. Based on this information, insights on how to structure one or more trial incentive programs that may be implemented will be provided to the FWC and the USFWS. This project is on schedule to be completed with a detailed final report in December 2015.

FWC provided information and reviews of numerous road and development projects throughout southern Florida during FY 2014-15. 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 2014-15, people submitted over 2,400 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 677 records that included photographs, staff verified 42% as panthers and 29% as bobcats. Other purported sightings of panthers were determined to be other animals such as coyotes, dogs, foxes, house

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cats, otters, and a monkey (Rhesus macaque).

Three biologists of the panther research and management team, Marc Criffield, Mark Lotz, and Dave Onorato, were recognized as Conservationists of the Year by the Florida Wildlife Federation at their 77th Annual Conservation Awards Banquet on June 21st for their exceptional work as Florida panther biologists who helped reestablish the panther population.

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 <http://www.fws.gov/verobeach/ListedSpeciesMammals.html#fp>.

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 [Section 379.2431(2), F.S.], the Florida Manatee Management Plan approved by the FWC Commissioners in December 2007 (which may be accessed at http://www.myfwc.com/media/415297/Manatee_MgmtPlan.pdf), and the USFWS Florida Manatee Recovery Plan of 2001 (which may be accessed at 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 2014-15, the Manatee Forum met twice, once in October and once in May. During the October meeting, presentations were given on manatee aerial surveys conducted in Brevard County during Florida Power and Light's repowering of the Cape Canaveral power plant, a study of manatee carrying capacity at selected warm-water sites, and an update on the draft proposal for Manatee Protection Zones in western Pinellas County. The May meeting included information about the development of minimum flows and levels for springs and river systems, a boater compliance study in Sarasota County, and a new approach to statewide manatee abundance estimates. 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 annual report provided to the President of the Florida Senate and the Speaker of the Florida House of Representatives each year, available at: <http://www.myfwc.com/research/manatee/trust-fund/annual-reports/>. FWC's Florida Manatee Management Plan directs manatee management activities, and it focuses on five program areas (manatee outreach efforts are provided in the outreach portion of this report):

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Manatee Protection Plans (MPPs) – This work involves the development and implementation of comprehensive county-based MPPs, with FWC working closely with the counties. FWC’s Executive Director approves these MPPs with concurrence by the USFWS. During FY 2014-15, FWC, in collaboration with the City of Jacksonville and the USFWS, completed a revision of Duval County’s MPP. FWC continues to assist Charlotte County in developing their first MPP with the first draft expected in the fall of 2015. FWC has also completed a preliminary review of an MPP submitted by Flagler County and provided comments, in coordination with the USFWS. FWC 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 protective zone rules. During FY 2014-15, FWC continued work on manatee protection zones for western Pinellas County, meeting with County staff, the USFWS, local governments, and interested stakeholder groups and residents to discuss available data and potential protection needs. Following review of the report from the Local Rule Review Committee, FWC held a public workshop in Pinellas County in September 2014, before taking a draft proposed rule to the FWC Commissioners at their November 2014 meeting. FWC published a proposed rule in December 2014, and FWC held two public hearings in Pinellas County in January 2015. The FWC Commissioners approved a final rule at their June 2015 meeting.

Permit Reviews – FWC produced 280 final comment or assistance letters for proposed permitting projects reviewed during FY 2014-15. 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 the permit review 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 boat users.

Manatee Habitat – During FY 2014-15, 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. The agency worked to ensure the presence of a warm-water refuge at the Port Everglades power plant in Broward County during its conversion to natural gas. This required coordination with Florida Power and Light to confirm the implementation of all manatee-monitoring plans during the conversion.

The 2006 “Guidelines for Manatee Conservation during Comprehensive Everglades Restoration Plan Implementation” (<http://www.fws.gov/verobeach/MammalsPDFs/CERPManateeGuidelines120806.pdf?spcode=A007>) are being updated in an effort led by FWC in coordination with the USFWS, South Florida Water Management District, and U.S. Army Corps of Engineers. Staff are also working 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.

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

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Mortality and Rescue – FWC researchers and law enforcement officers respond to statewide reports of manatee carcasses and injured manatees. Staff is strategically located in five coastal field stations in order to maintain response capabilities on a statewide basis. During FY 2014-15, 401 manatee carcasses were documented in Florida. All but 25 of these carcasses were recovered and examined in order to determine causes of death. Collision with watercraft accounted for 81 of the 401 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/>.

During FY 2014-15, FWC and cooperators rescued 86 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 June 2015, 50 of these rescued manatees were released back into the wild, 14 died, and 22 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 synoptic survey [required annually, weather permitting, by section 379.2431(4)(a), F.S.] was conducted in winter 2015; 6,063 manatees were counted by a team of 20 observers from nine organizations. Results from the traditional synoptic 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 synoptic 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 synoptic 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. Reliable estimates can be used to track population changes over time and as part of population projection models to provide valuable feedback to conservation managers.

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Designing a new method for estimating manatees has been challenging, because manatees occur over large landscapes and are often in near-shore habitats that make it difficult to apply traditional, statistically sound survey methods. To meet this challenge, FWC designed, tested, and vetted an innovative approach with experts. This approach is based on a random sampling design and combines multiple sources of information. A combination of a double-observer protocol (i.e., two observers in each plane), repeated passes, and detailed diving behavior data were used to account for imperfect detection of animals. The newly published estimate uses data collected from February 28 to March 22, 2011, along Florida's west coast, and from March 5 to 13, 2012, along Florida's east coast. The estimate of abundance for this time period was 6,350 with 95% confidence (95% 5,310-7,390). The full, published article is accessible at <http://www.sciencedirect.com/science/article/pii/S0006320715000993>.

FWC, in cooperation with the U.S. Geological Survey's Sirenia Project and Mote Marine Laboratory in Sarasota, maintains an image-based, computerized database called the Manatee Individual Photo-Identification System, used for photo-identification of individual manatees. These data assist scientists in estimating important population vital rates as well as life history information. FWC met a long-term goal of processing a backlog of photo-identification information this year. FWC's southwest region currently has updated, processed information through the most recent field season.

Genetic testing offers an additional 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.

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 2014-15, FWC, along with the U.S. Geological Survey, Mote Marine Laboratory, and Florida Power and Light, formulated and implemented plans to monitor how manatees respond to a major change at a traditionally used Florida Power and Light power plant near Titusville in Brevard County. Part of the monitoring plan entailed using telemetry to describe fine-scaled movements and habitat use. The 2012-13 winter was the last year of a three-year construction period, during which Florida Power and Light provided a temporary warm-water refuge for manatees. In the last two years of the multi-year project, manatees were monitored at the original site. Twelve manatees were captured and tagged with GPS tracking devices in December 2014 as part of this study. Individuals were tracked over the winter period, and tags were recovered in March 2015. Analyses of tag information and environmental variables was conducted and available in annual reports to Florida Power and Light.

Florida Sea Grant awarded FWC funds to advance a quantitative framework to evaluate vessel collision risk for marine mammals, including manatees, in Florida. 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.

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

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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 2014-15 calving season, FWC conducted 51 aerial surveys and 17 vessel cruises. Through collaborative efforts with NOAA-Fisheries, the Georgia Department of Natural Resources, the Sea to Shore Alliance, and volunteer sighting networks, 47 unique North Atlantic right whales were documented (including 17 newborn calves), and 19 North Atlantic right whales were biopsy sampled (including 15 calves). Additionally, FWC 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.

FWC also participated in North Atlantic right whale satellite tagging with NOAA’s Southeast Fisheries Science Center. Five tagging cruises were conducted and tags were attached to three right whales.

BIRDS

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

The Audubon’s crested caracara is a Federally-designated Threatened species. FWC continued Audubon’s crested caracara nest surveys during FY 2014-15, from January to March, using FWC’s standard monitoring protocol. During the surveys, four crested caracara nests were located at Dinner Island Ranch Wildlife Management Area (WMA) in Hendry County, but none were located on Spirit of the Wild or Okaloacoochee Slough WMAs in Collier and Hendry counties. During FY 2014-15, five crested caracara nests were located on Fisheating Creek WMA in Glades County. FWC initiated Audubon’s crested caracara nest surveys on Rotenberger WMA in Palm Beach County during FY 2014-15, following the observance of a

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pair of caracaras on the levee, one carrying nesting material. Staff did not find any nests during the surveys, but did make multiple observations of caracaras flying into Rotenberger carrying food. FWC stopped the surveys when they observed a juvenile caracara on the levee. FWC plans to continue yearly surveys.

Everglade Snail Kite (*Tyler Beck*)

The Everglade 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 stormwater treatment areas in Palm Beach and Hendry counties have also seen significant levels of kite nesting.

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

The kite population crashed in the 2000's, going from over 3,000 birds at the end of the 1990's to approximately 600 by 2008. Since then, the population has been steadily increasing, and the most recent population estimate is roughly 1,700 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. For this reason, 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. Research from 2010 to 2012 provided information about how to reduce nest failures in lake habitats and what habitat characteristics were associated with higher feeding rates. 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 where large exotic snails have invaded, providing more stable platforms for young 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, 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 with relying on an exotic species to assist in achieving recovery goals, however. 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.

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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 (*Traci Castellón, 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. It is a subspecies of the grasshopper sparrow that is endemic to dry-prairie habitat in only a few Central Florida counties: Osceola, Okeechobee, Highlands, and DeSoto. 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 reclassify the grasshopper sparrow as a Federally-designated Threatened species when ten protected locations contain stable, self-sustaining populations of more than 50 breeding pairs each.

The Florida grasshopper sparrow exists at five or fewer 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 two parcels of privately owned land in Osceola County. FWC monitors Florida grasshopper sparrows on protected public lands with annual point count surveys, a standard method used to assess the relative abundance of bird populations. Kissimmee Prairie Preserve State Park and Avon Park Air Force Range populations are currently near extirpation. The population on Three Lakes WMA has also witnessed a decline over the last several years, but continues to function with active reproduction being observed. Population levels on private lands are currently unknown but are being assessed by FWC and the USFWS.

Monitoring on Three Lakes Wildlife Management Area in Osceola County – Staff has conducted point count surveys for Florida grasshopper sparrow on Three Lakes WMA since FY 1990-91. The surveys are conducted each spring (April-June) and consist of a grid of 190 stations spaced 0.25 miles apart. Of the 190 stations, 24 are located in unsuitable habitat and are not surveyed annually. Staff survey each station for five minutes, three times each spring and record all Florida grasshopper sparrows heard or observed. In FY 2014-15, surveys estimated there were at least 53 different male Florida grasshopper sparrows at the main site, which is a slight decrease from the 56 detected in FY 2013-14. The overall declining trend of detected males across the last several years is of great concern to FWC. Monitoring will continue on the Three Lakes WMA in FY 2015-16.

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.

Florida Grasshopper Sparrow Management on Private Ranch Lands – All known populations of the Florida grasshopper sparrow are in steep decline, and the subspecies may be

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extinct within the decade unless immediate action is taken to reverse the current trend. Only one potentially viable population remains on public land in Florida, and more than 75% of remaining habitat is privately owned. Thus, efforts to find any remaining populations on private lands and bring these populations and habitats under appropriate management are critically necessary to prevent imminent extinction.

With a grant from the Conserve Wildlife Tag Fund, FWC has partnered with the USFWS and owners of large private ranches within the Florida grasshopper sparrow historic range to search for existing populations and bring them under appropriate management to prevent further declines.

Management is vitally important because the Florida grasshopper sparrow is extremely habitat specific, depending on treeless, species-diverse grasslands for breeding and over-winter survival. To maintain suitable conditions, the grasslands require prescribed burning, carefully prescribed grazing (if grazing occurs), tree removal, and invasive species management. Although frequently burned (two to three year rotation), native dry prairie is optimal, Florida grasshopper sparrow populations have been observed on semi-improved pastures that support characteristics similar to native dry prairie. Nonetheless, because appropriate management of grazed lands to maintain habitat quality for the Florida grasshopper sparrow is poorly understood, careful monitoring is needed to document responses of vegetation and Florida grasshopper sparrow populations to management so that prescriptions can be adapted and improved. For this reason, FWC has contracted with an experienced range-scientist who is intensively monitoring the grassland habitats, both before and after management treatments, so that management prescriptions can be adapted as better information becomes available.

To date, FWC has secured access and management agreements with four large ranches. Funding from the Conserve Wildlife Tag grant has been used to provide financial incentives to owners for access and habitat management agreements, and to cover the cost of vegetation assessments, development of management plans, assistance, and follow-up vegetation monitoring. One extant Florida grasshopper sparrow population has been located on a ranch where USFWS has an access agreement with the owner, and this agreement has provided an opportunity for FWC biologists to monitor the population closely, where 28 adults and 11 chicks were captured and banded by mid-season 2015. Vegetation surveys and cattle enclosure experiments have been conducted on all four ranches, habitat management plans have been developed, and ranchers have been actively implementing recommended management practices. The vegetation is responding to treatments, and the management plans are being updated as appropriate to optimize results. This two-year grant will provide funding for access, monitoring, and management through the end of 2015.

Effects of Fire Management on Demographic Rates at Three Lakes Wildlife Management Area in Osceola County – The third season of FWC-conducted Florida grasshopper sparrow demographic research occurred during FY 2014-15. This project has been a cooperative effort involving FWC, USFWS, Tall Timbers Research Station, and the Florida Grasshopper Sparrow Working Group. Different fire treatments were assigned to management units within Three Lakes WMA to better understand the role of fire interval and seasonality on Florida grasshopper sparrow demographics. Units were burned in either the dormant or the growing seasons every two years starting in February 2013 and continuing in 2014 and 2015. By tracking the banded population's use of these units, FWC will assess territory preference, between- and within-season

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movement, nest timing and placement, and nest survival rates as they relate to the different burn regimes.

As part of FWC's continued effort to color-band the entire male population, 28 adult males, three juveniles, and 67 nestlings from successful broods were captured and color-banded in 2015. In addition to these new captures, 32 males and six females banded prior to 2015 were resighted in 2015. Together, the number of color-banded individuals known to exist at Three Lakes WMA in 2015 was 60 adult males and six adult females, as well as 70 fledglings of unknown sex. All known adult males were color-banded by the end of the 2015 breeding season, but most females and first-year birds remain unbanded because they are difficult to locate and capture. Given the difficulty of finding sparrow nests and the secretive nature of young fledglings, it is likely that site productivity is higher than indicated from detected nests alone.

Having 100% of the study population uniquely marked has allowed FWC to collect valuable data on dispersal. Staff detected one male, banded at Three Lakes WMA in April 2014, on a private ranch property 15 miles to the south in June 2015. This male has been observed on eight different days at the new location and appears territorial. Understanding that these birds are capable of moving between study areas emphasizes the need for the preservation of suitable habitat across the larger landscape, even on properties where no Florida grasshopper sparrows remain. In addition, biologists observed frequent movements of territorial males across management unit boundaries within the study area. Staff will use documentation of these movements to understand habitat management preferences (particularly after prescribed burning events).

So far in the 2015, FWC biologists have located and monitored 54 Florida grasshopper sparrow nests, which exceeds the previous record for a single site and year of any study for the subspecies. Of these nests, five remain active, 25 survived to fledge young, two flooded, and 22 were depredated. Staff obtained additional information on the predator community through a concurrent nest camera study of several grassland bird species (see below). Future analyses will estimate robust rates of nest survival across different management treatments. Low rates of nest survival remains one of the largest threats to population recovery for this subspecies.

Surveillance of Grassland Bird Nests Using Video Systems – Funding through the USFWS was provided to FWC to design and construct eight nest camera systems to identify specific nest predators. So far in 2015, these cameras have been placed at the entrances of 54 ground-nesting bird nests (40 Florida grasshopper sparrows, five Bachman's sparrows, five Eastern meadowlarks, and four common ground doves). Twenty-eight of these nests have successfully fledged young, five are still active, one was abandoned, two were flooded, and 19 were depredated. FWC could not identify the nest predator in five of the depredated nests because of equipment failure. The remaining 14 nests were depredated by corn snakes (five), spotted skunks (three), hispid cotton rat (one), Virginia opossum (one), nine-banded armadillo (one), black racer (one), Florida pine snake (one), and yellow rat snake (one). In two of the corn snake predation events, the snake killed and consumed the incubating Florida grasshopper sparrow female in addition to the nest contents. The data provided by these nest cameras has been invaluable to the understanding of the predator community and will be critical when planning future management strategies.

Effectiveness of Predator Deflection Fencing at Increasing Nest Survival of Ground-Nesting Birds – In 2015, FWC initiated a pilot study to design and test a predator deflection

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barrier to increase nest survival for the Florida grasshopper sparrow. To begin, staff tested several fence materials on potential nest predators using wet cat food as bait in areas away from known sparrow territories. The preferred design consisted of two-foot tall, open-topped fence circling the nest with a nine-foot radius. The fence material was constructed of either a stiff plastic hardware net with a ½-inch mesh, or a metal hardware cloth with a ¼-inch mesh. Steel reinforced garden stakes and zip-ties held the fence upright. Foam strips were secured to the bottom of the fence with landscaping staples to fill in gaps created by uneven ground. A team of four people practiced fence installation until installation time was consistently 15-20 minutes or less. Staff first tested the fences on active Bachman's sparrow (three) and Eastern meadowlark (two) nests. All females returned to their nests within 15 minutes of fence installation and all nests successfully fledged young.

After observing fence acceptance by the surrogate species, FWC installed fences on every other Florida grasshopper sparrow nest discovered. To date, 27 Florida grasshopper sparrow nests have been fenced and another 27 left unfenced. Preliminary results suggest that the fences may increase nest survival. The potential benefits of fence installation are greater if installed earlier in the nesting cycle. Nests with fences installed at the beginning of incubation are approximately 1.89 times more likely to fledge than an unfenced nest. Nests with fences installed on hatch day are approximately 1.31 times more likely to fledge than an unfenced nest. While this technique is labor-intensive and only protects the subset of nests located prior to predation, it may help boost local productivity and protect incubating females, providing more time to investigate long-term habitat management solutions.

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. Based on their range and available habitat, staff established 12 routes totaling roughly 640 miles through 16 counties and surveyed twice during the fall. In 2013, staff counted 371 adults, 37 young, and 11 birds of undetermined age. The 2014 recruitment survey documented 404 adults, 89 young, and 42 birds of undetermined age. High winter and spring rainfall likely helped productivity in 2014. In both survey years, Osceola and Okeechobee county routes were regional crane strongholds accounting for approximately half of all adult and young observations. Another round of surveys will continue in 2015.

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,

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however, are surrounded by unsuitable habitat consisting of a dense ring of palmetto. The dry prairie also consists of sparse to dense palmetto.

FWC collected baseline nesting and productivity data in FY 2012-13, 2013-14, and 2014-15 via aerial surveys. In 2014, there were 18 nest attempts: ten on the private ranch, and eight on Three Lakes dry prairie. No chicks survived to fledging age (approximately 60 days). In FY 2014-15, 413.5 acres of palmetto were roller-chopped on the Three Lakes study site: roughly one-quarter of the study site. During the FY 2014-15 breeding season, staff monitored 11 nest attempts 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 roller-chopped marsh areas used for nest attempts. FWC will chop and burn approximately 400 additional acres of palmetto in FY 2015-16, and then reassess nesting behavior and productivity of cranes.

Florida Scrub-Jay (*Nancy Dwyer, Craig Faulhaber, Norberto Fernandez, Allan Hallman, Karl Miller, Dwight Myers, Nicole Ranalli, Steve Shattler, Angela Tringali, David Turner, and Wade Ulrey*)

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. Three-quarters of remaining scrubby habitats are protected under public or private ownership that is dedicated for conservation. Despite this, scrub-jay numbers have continued to decline on conservation lands largely due to habitat degradation caused by decades of fire suppression followed by inadequate habitat management. Florida scrub-jays rely on fire to maintain low and open habitat. Typical habitat management efforts include controlled burning and mechanical 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 2014-15, the Florida Scrub-jay Conservation Coordination Project continued to work with partners to enhance range-wide conservation efforts. Project activities included providing assistance regarding priority conservation actions, organizing regional working groups, assisting partners in preparing grant proposals, and developing management plans and guidelines to enhance efforts to conserve scrub-jays.

FWC provided assistance for project planning, habitat management, restoration, monitoring, and translocations during FY 2014-15. Project staff visited ten tracts of land to discuss land management with managers and biologists from local, State, and Federal government agencies. FWC continued to advise USFWS on priority locations and management actions for scrub-jays and provided comments to internal and external stakeholders, including wildlife conservation, prioritization, and recovery strategies for Fisheating Creek (Glades County), Moody Branch (Manatee County), and Platt Branch (Highlands County) Wildlife and

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Environmental Areas (WEAs). FWC worked with the Brevard Zoo and other partners to relocate two families of scrub-jays from degraded land to a managed conservation area in Brevard County. FWC also provided assistance to other agencies regarding appropriate monitoring methods for scrub-jays. Activities in FY 2014-15 included continuation of a partnership with the U.S. Forest Service to conduct monitoring in Ocala National Forest, which contains the largest scrub-jay population. Project staff also served on the Advisory Group for Audubon of Florida's Jay Watch citizen science monitoring program.

Project staff continued to facilitate communication and information exchange among partners via regional working groups and workshops focused on conserving scrub-jays and their habitat. The working group and workshop attendees included representatives from all major public land management entities as well as non-governmental organizations, university staff, and private landowners. During FY 2014-15, project staff organized six working group meetings, including a land management field trip. These working groups provide an excellent opportunity for participants to network, share ideas and experiences, and learn about new developments.

FWC also assisted partners in identifying and applying for funding for habitat and species conservation. Project staff assisted the Brevard Zoo in preparing two proposals to fund additional Florida scrub-jay translocations in Brevard County, and is working with the Florida Department of Environmental Protection (FDEP) and the Florida Department of Transportation (FDOT) to prepare additional proposals for habitat management and translocation in Brevard, Indian River, Levy, and Sarasota counties.

FWC continued to develop management plans and guidelines to assist partners with scrub-jay conservation efforts during FY 2014-15. Project staff served on the Florida Scrub-Jay Recovery Team, which is improving and updating the Federal Recovery Plan for the species. The Federal Recovery Plan, which has not been updated since 1990, will provide an important "road map" for scrub-jay conservation. As part of this effort, project staff participated in Recovery Team meetings, and drafted and reviewed sections of the updated draft Federal Recovery Plan. Project staff also continued revising the Agency's Scrub Management Guidelines to help land managers determine the best ways to restore and manage scrub-jay habitat.

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 2014-15, FWC completed a final report covering four years of post-reproductive (June-July) monitoring data. Florida scrub-jay density (family groups per 100 acres) on stands two to ten years post-harvest ranged from 4.1 in 2012 to 5.0 in 2014, which is greater than typically observed in most populations. The Ocala National Forest's scrub-jays exist in relatively high densities on islands of habitat surrounded by a mostly inhospitable matrix of pine forest. No stand was too small to be occupied. Despite low annual productivity in all four years of the study (0.50 – 0.87 nutritionally independent hatch-year birds per family group), no evidence of population decline was observed.

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FWC detected relationships between stand age and Florida scrub-jay density, group size, and productivity, with the highest numbers of scrub-jays consistently observed in stands seven to nine years post-harvest. The data provide a quantitative basis for revising the definition of suitable habitat in Ocala National Forest to a somewhat more conservative two to ten years post-harvest. Vegetation regenerated quickly in clearcut stands, however, and within seven years was often taller than what would be considered optimal habitat for scrub-jays elsewhere in the species' range.

FWC made recommendations to the U.S. Forest Service for how to continue to cooperatively implement the monitoring program. FWC continues to study the demographics and dispersal of scrub-jays in this unique landscape.

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. FWC manages both tracts using prescribed fire and nearly half of these habitats are potentially suitable for Florida scrub-jays. The Florida Department of Agriculture and Consumer Services (FDACS) is the lead management agency on these areas and FWC is a cooperating agency.

Archbold Biological Station, under contract with FDACS from February 2003 to February 2006, conducted past scrub-jay monitoring and banding. FWC initiated scrub-jay monitoring in 2008 using a pilot survey by Jay Watch (<http://fl.audubon.org/jay-watch>), formerly The Nature Conservancy's citizen science program and now managed by Audubon of Florida. FWC continued monitoring scrub-jays on these areas through FY 2014-15.

During FY 2014-15, 11 scrub-jay groups were located on Arbuckle WMA. This is a decrease from 14 groups in FY 2013-14. The mean group size increased from 2.86 in FY 2013-14 to 2.91 in FY 2014-15. The number of juveniles per group was 1.45. The total number of scrub-jays decreased from 40 to 32. Although both the number of groups and total number of birds observed decreased, the average group size increased.

During FY 2014-15, six scrub-jay groups were located on Walk-in-the-Water WMA. This is an increase from five groups in FY 2013-14. The mean group size decreased from 3.4 in FY 2013-14 to 2.5 in FY 2014-15. The number of juveniles per group was 0.17. The total number of scrub-jays decreased from 17 to 15. Although the number of groups increased by one, the decrease in the total number of birds observed and number of juveniles per group may be an indication of a decreasing population. FWC will continue scrub-jay monitoring on these WMAs using the Jay Watch protocol in FY 2015-16.

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 gyrotrac) and herbicide. Grant activities began in FY 2014-15 and included chain sawing 34 acres and applying herbicide to the stumps. In addition, the perimeter and five interior lines were mowed in an attempt to help carry fire. The next step is to apply prescribed fire as soon as possible to the area already treated, and to initiate treatment on an additional 27 acres.

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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. Two surveys conducted in August and December 2014 yielded no observations of scrub-jays on Camp Blanding. 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 lead managing agency, FDEP in the monitoring and management of Florida scrub-jays on the Cedar Key Scrub WMA. There are typically five family groups of scrub-jays 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, along a route set up by Audubon of Florida's Jay Watch program, banding chicks-of-the-year, and sexing the adults through territorial and nesting behavior. During FY 2014-15 monitoring efforts, no birds were observed on the area, but there were reports of scrub-jays observed on adjacent private property.

Half Moon Wildlife Management Area in Sumter County – FWC continued to monitor Florida scrub-jays on the 9,500-acre Half Moon WMA during FY 2014-15. Volunteers from the Jay Watch Program have contributed to surveys each summer. Scrub-jays were color-banded to better track the population. Although unbanded scrub-jays continue to appear, banding has been discontinued due to the decline in scrub-jay numbers. No juveniles have been found for the past two years. FWC estimates the present population at six birds in three groups; a substantial drop from previous years when up to 30 birds used the area.

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 jay habitat, which consists of scrubby and moist flatwoods. This may be marginal habitat, as no true scrub exists in the area. During FY 2014-15, FWC burned approximately 75 acres of potential scrub-jay habitat. Habitat management will continue with palmetto reduction through rollerchopping, increasing open ground, and cutting overgrown oaks in and surrounding potential habitat.

Salt Lake Wildlife Management Area in Brevard County – FWC continued to monitor the Florida scrub-jay population on the Salt Lake WMA. During FY 2014-15, staff recorded seven individuals in three family groups. There was no documented recruitment in FY 2014-15. This is a decline from nine individuals in four groups in FY 2013-14. 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 2015-16.

During FY 2014-15, FWC identified approximately 11 acres of scrub and scrubby flatwoods in need of management and applied prescribed fire. Management activities slated for FY 2015-16 include the continued use of mosaic prescribed fire on approximately 70 acres of potential scrub-jay habitat.

Mitigation Parks – The goal of the mitigation park program 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

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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. The agency manages these parks primarily to enhance listed species populations, particularly those animals for which State and Federal entities require approvals prior to any impacts from new land development. FWC designates all mitigation parks as WEAs.

Annual monitoring of Florida scrub-jays during FY 2014-15 occurred at three mitigation parks. Moody Branch WEA in Manatee County was monitored using a private contractor. Five groups of scrub-jays comprising nine total scrub-jays were located during the surveys, which is a decrease of three individuals from FY 2013-14. Two unaffiliated wandering scrub-jays were observed at various times throughout the year. Moody Branch WEA had 173 acres of Florida scrub-jay habitat burned, 279 acres treated for 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 first time in FY 2014-15. Jay Watch revealed two groups of scrub-jays consisting of five individuals, with one juvenile being observed after the nesting season. Three additional birds were observed just off the site in a residential area. The population increased by three birds from FY 2013-14. Management actions include 25 acres of prescribed burning within oak scrub, 12 acres of mechanical treatments to reduce mature oaks, and 302 acres of uplands surveyed and treated for exotics.

FWC monitored the Platt Branch WEA in Highlands County, and the WEA has a scrub-jay population that consists of seven groups with 17 individuals, which is an increase of one group from FY 2013-14. Three juveniles were identified post-nesting season. Management efforts included burning 325 acres at Platt Branch WEA, much of this within areas used by scrub-jays.

Lake Wales Ridge Wildlife and Environmental Area in Highlands and Polk Counties – The Lake Wales Ridge WEA consists of 19 tracts, 12 of which contain known groups of Florida scrub-jays. FWC monitors scrub-jay populations on select tracts on the Lake Wales Ridge WEA in cooperation with Archbold Biological Station and Jay Watch program. During FY 2014-15, tracts surveyed by Archbold Biological Station included Lake Placid Scrub, McJunkin, Holmes Avenue, Royce/ Clements, Leisure Lakes, Highlands Park Estates, and Gould Road. Jay Watch volunteers and FWC staff surveyed at Royce Unit, Clements, Silver Lake, Sun 'n Lakes, and Holmes Avenue.

The number of scrub-jay groups increased at Lake Placid Scrub, McJunkin, Royce/ Clements, and Gould Road. Numbers of groups decreased at Holmes Avenue, Leisure Lakes, and Highlands Park Estates. Group size increased at Lake Placid Scrub and McJunkin, but decreased at Royce/ Clements, Gould Road, Holmes Avenue, Leisure Lakes, and Highlands Park Estates. Compared with previous surveys, the number of juvenile birds per group increased only at Lake Placid Scrub. Number of adult birds per group increased only at McJunkin and Royce/ Clements. Numbers remained unchanged at Holmes Avenue and Gould Road, while a decline in the number of adults per group was seen at Lake Placid Scrub, Leisure Lakes, and Highlands Park Estates.

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Additionally, Jay Watch volunteers and FWC staff surveyed Royce/ Clements, Holmes Avenue, and Silver Lake this year. Jay Watch surveyed Clements and the Royce Unit, and it showed a decrease in the number of groups (11 to 10), while Holmes Avenue had nine groups, and the Silver Lake/ Sun 'n Lakes properties had 15 groups.

Finally, FWC staff banded Florida scrub-jays at the Silver Lake and Sun 'n Lakes tracts in March and April of 2015 to help identify individuals and distinguish between groups in future surveys. Staff banded 15 birds, 13 at Silver Lake and two at Sun 'n Lake, all of which were adults. Three birds were females, and sex was undetermined in the remaining 12 birds. FWC used vocalizations to determine the sex of the individuals.

Controlled burns during FY 2014-15 included roughly 132 acres of occupied or potential scrub-jay habitat in eight separate management units at the Carter Creek and Silver Lake tracts. Additionally, 20 acres of sand pines were felled using chainsaws in currently occupied scrub-jay habitat at the Royce Unit and Carter Creek. FWC plans to use controlled burns and chainsaw work to reduce canopy heights during FY 2015-16 to improve habitat suitability for existing scrub-jays and to attract new individuals. Lastly, 17.4 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 2013, FWC staff 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. A total of 40 survey stations are located along ¼ mile of the river. At each survey station, observers listen for limpkins and scan all habitat for a two-minute period. Surveyors record the number of individual limpkins seen or heard, along with sex and age class if possible. After the two-minute period, staff play 30 seconds of recorded limpkin calls and record all new individual limpkins. Following playback of the recorded call, observers listen and scan for another two-minute period and record all new individual limpkins. FWC conducted three replicates in 2015 on March 1, April 3, and April 22. Due to equipment problems, staff only completed the first replicate on the first 20 stations. A total of seven to ten individual limpkins were observed, or an estimated four to five breeding pairs (three pairs were observed). Additionally, staff observed one male limpkin at the first station on March 4, 2015, but did not observe him there during any of the three survey replicates. Staff does not know if this same limpkin was observed at one of the other stations, thus this occurrence is not included in the total number of observed limpkins. This is an increase in observations from last year's survey when one individual limpkin was detected during each of three replicates, for a total of one to three individuals, though it is likely that all three observations were the same individual. During the initial survey in 2013, staff observed 11 to 13 limpkins, with four pairs observed.

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

John C. and Mariana Jones/Hungryland Wildlife and Environmental Area in Martin and Palm Beach Counties – FWC conducted marsh bird surveys on the John C. and Mariana Jones/Hungryland Wildlife and Environmental Area (WEA) during FY 2014-15. The Wildlife

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Conservation, Prioritization and Recovery Program's Species Management Plan for Hungryland calls for monitoring of limpkins, a State-designated Species of Special Concern, to establish a baseline and track relative abundance over time. Staff conducted surveys according to the Arizona Cooperative Fish and Wildlife Research Unit Standardized North American Marsh Bird Monitoring Protocols 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. Each transect consisted of 13 points and was located along roads and trails where wetlands were present. The black rail was the only focal species not detected during the surveys. The surveys also detected the non-focal, listed species Everglades snail kite (a Federally-designated Endangered species) and Florida sandhill crane (State-designated Threatened species).

John G. and Susan H. DuPuis, Jr. Wildlife and Environmental Area in Martin and Palm Beach Counties – The 2,500-acre marsh on the John G. and Susan H. DuPuis, Jr. WEA provides good habitat for many species of wading birds in Florida. Monthly roadside visual surveys have been conducted since 1996 to monitor wading bird presence. The most common wading birds observed have been great egrets, great blue herons, and little blue herons (a State-designated Species of Special Concern). Numerous other wading birds have been seen feeding on the area, including tricolored herons, snowy egrets, and white ibis (all State-designated Species of Special Concern), and wood storks (a Federally-designated Endangered species). The marsh and other wetland areas at DuPuis WEA will continue to be surveyed monthly to document wading bird activity.

Apalachicola River Wildlife and Environmental Area in Gulf and Frank Counties – Since the spring of 2012, FWC has conducted surveys for secretive marsh birds at the Apalachicola River WEA. Following the Standardized North American Marsh Bird Monitoring Protocol using the call-playback method, FWC established three routes and surveyed each route three times between April and May. For the Apalachicola River WEA, this survey focused on 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 2015, staff most commonly detected clapper rails, king rails, least bitterns, and American coots. FWC did not document limpkins during the 2015 survey or during surveys from previous years. 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). FWC detected at least one marsh wren at 14 out of 20 survey points (70%).

During FY 2014-15, 42 acres of salt marsh along part of one survey route were included in a 1,500-acre prescribed fire. Applying periodic prescribed fire to marshes improves habitat conditions for resident birds and other organisms.

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

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distribution makes them especially vulnerable to habitat loss and fragmentation. The two subspecies overlap in their habitat requirements and can therefore be surveyed together.

In FY 2014-15, FWC researchers continued point count surveys to assess the distribution, abundance, and habitat associations of these subspecies while also initiating nest surveys and monitoring to examine reproductive success and habitat selection in both subspecies. Surveys conducted in May to June 2015 showed that the distribution of both subspecies was limited to the salt marshes in Nassau County and the portion of Duval County north of the St. John's River, the same as the surveys in the year prior. These results are similar to surveys conducted by FWC in 2000-2001, suggesting that while a historical range contraction did occur, the distribution of these birds has remained stable over the last decade. While densities of both subspecies north of the St. John's River varied from point to point, birds were detected at 39 count points (62% of the northern points surveyed). Reproductive research is on-going as the breeding season does not end until August 2015. This is the final year of point count surveys. The reproductive research will continue until the end of the 2017 breeding season.

Osprey (*Tim Dellinger*)

Most North American ospreys breed throughout temperate areas and winter in the tropics. The subpopulation resident in southern Florida has unique characteristics that set it apart from the majority of the subspecies, however. Monroe County ospreys, as well as some individuals living in 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 began a study to determine if the southern coastal osprey 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. FWC accessed nests primarily by ladder, rope and mechanical ascenders, climbing tree stand, or via free climbing. Staff recorded coordinates of feather collection sites, as well as age of chick and nest initiation when possible. Osprey feathers were collected from 182 locations through July 2014. Collaborators at Virginia Commonwealth University will use mitochondrial and nuclear DNA analyses to determine the relatedness of osprey in these populations. FWC expects to receive the results from their analyses in October 2015. Once complete, FWC will convene the biological review group to review the results and conduct a biological status review.

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 October 2015.

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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 staff, continues to enroll landowners. By the end of FY 2014-15, 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.

At the close of the 2015 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 – Population monitoring for red-cockaded woodpeckers on Babcock Webb Wildlife Management Area (WMA), including the Yucca Pens Unit, began in 1999. FWC has conducted color-banding of all adults and nestlings since 2002. The annual tree cavity survey conducted in 2015 revealed 41 active red-cockaded woodpecker clusters. Annual roost checks confirmed 35 potential breeding pairs, which is an increase of seven groups from the previous year. There were six solitary bird clusters, which is a decrease of four. Thirty-two potential breeding pairs attempted nesting; nine nests failed with seven re-nesting, four successfully. Thirty-eight

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nestlings were banded (two were not banded) with 34 confirmed fledglings. One artificial cavity was installed and one intra-population translocation of a juvenile female was successfully conducted which resulted in a breeding pair. FWC completed controlled burns on 26,047 acres. Staff mowed around thirty-two clusters to reduce fuel-load (vegetation) levels within 200 feet of the cavity trees. FWC roller chopped and planted 170 acres of pines in three areas to improve future connectivity.

Camp Blanding Wildlife Management Area in Clay County – At Camp Blanding WMA, FWC assists with habitat improvement and restoration for the red-cockaded woodpecker population. Camp Blanding and FWC staff cooperatively burned one red-cockaded woodpecker cluster and surrounding foraging areas during FY 2014-15. One aerial burn, totaling 2,507 acres, was conducted. FWC did not install or replace any artificial cavity inserts during FY 2014-15.

Citrus Wildlife Management Area in Citrus County – During FY 2014-15, FWC, in cooperation with Florida Department of Agriculture and Consumer Services (FDACS), continued to manage and monitor red-cockaded woodpeckers on the 49,317-acre Citrus WMA tract of the Withlacoochee State Forest. Of the 80 active clusters in 2015, 66 nested and 60 were successful in fledging 101 young. Although the number of potential breeding groups on the area has leveled off, it was still a high of 72; six more than in 2014. Color-banding continued with 117 nestlings banded during the 2015 nesting season, which is the highest productivity to date.

Habitat management on Citrus WMA included prescribed burns on 23,884 acres (10,258 acres were growing season burns), hardwood control, protecting cavity trees from fire, and installing or replacing artificial cavity inserts. About 60% of the area surrounding clusters received fire in the past year. Encroaching hardwoods were cut and treated with herbicide in at least 26 clusters. Staff and volunteers protected, by mechanical means, over 450 cavity trees from fire in 55 clusters. Staff replaced ten inserts in clusters needing them and installed 16 new inserts in established or historic clusters. Another 22 inserts were cleaned and repaired.

Intensive monitoring and habitat management for this population has allowed it to serve as a donor to smaller populations. In October 2014, FWC translocated seven young-of-the-year from Citrus WMA, which is the farthest south of any donor population, to Triple N and Bull Creek WMAs. Up to six pairs will again be available from Citrus WMA this fall to augment smaller populations to the south.

J. W. Corbett Wildlife Management Area in Palm Beach County – FWC owns and manages J.W. Corbett WMA, and the agency conducts all monitoring and management of the red-cockaded woodpecker on the WMA. During FY 2014-15, FWC determined the number of active clusters, monitored active clusters for nests, color-banded nestlings and adults, and determined fledging success. Staff installed, replaced, and maintained artificial cavities in existing clusters and installed one new recruitment cluster in order to accommodate translocated birds in the fall.

Habitat management included burning 5,960 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 19,964 acres of exotic plant species. FWC installed 21 artificial red-cockaded woodpecker cavities including the creation of four new recruitment clusters.

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There were 21 active clusters and 17 potential breeding groups during the 2015 nesting season. Thirteen out of 17 potential breeding groups attempted nesting and 11 clusters successfully fledged 14 birds. Corbett WMA received four pair of birds from Osceola National Forest and a single female from Big Cypress National Preserve in the fall of 2014.

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 metapopulation as determined by the Florida Red-Cockaded Woodpecker Management Plan. FWC has been intensively monitoring the red-cockaded woodpecker population on Three Lakes WMA since 2001. The Three Lakes WMA supported 43 potential breeding groups during FY 2014-15 breeding season. This is down from 46 potential breeding groups in FY 2013-14. During the FY 2014-15 breeding season, FWC banded 67 red-cockaded woodpecker nestlings, 31 of the 49 nesting attempts were successful, and 48 chicks survived to fledge the nest. Staff installed five new cavity insert boxes and replaced 25 cavity insert boxes in order to augment existing nesting and roosting cavities. Twenty-three insert boxes were cleaned and maintained in FY 2014-15. Habitat management activities that enhance red-cockaded woodpecker habitat included prescribed fire on 11,406 acres, mechanical treatment (including rollerchopping and mowing) on 586 acres, and exotic plant treatment. FWC pre-burned around cavity trees in an effort to protect them during prescribed fires.

FWC has actively managed the Herky Huffman/Bull Creek and Triple N Ranch WMAs as a single, small, red-cockaded woodpecker population since FY 2002-03. These properties supported 14 potential breeding groups during the FY 2014-15 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 2014, FWC translocated seven individuals to Triple N Ranch and Herky Huffman/Bull Creek WMAs. Five of the translocated individuals remain in the area, two of which remained paired, and successfully produced one fledgling. During FY 2014-15, 11 of the 14 nesting attempts were successful and staff banded 19 nestlings. Sixteen of the 23 chicks survived to fledge the nest. Sixteen cavity insert boxes were installed, and 25 cavity insert boxes were replaced in order to augment existing nesting and roosting cavities. Thirty cavity insert boxes were cleaned and maintained in FY 2014-15. Habitat improvements by FWC included prescribed fire on 13,660 acres, rollerchopping and mowing on 1,720 acres, and invasive plant control on 1,527 acres. To protect red-cockaded woodpecker cavity trees during prescribed fires, FWC pre-burned around each tree.

Babcock Ranch Preserve in Charlotte County – Monitoring efforts by FWC at the Babcock Ranch Preserve began in 2012. Population monitoring of red-cockaded woodpeckers in FY 2014-15 was a cooperative effort between FWC, Babcock Ranch Management, and local volunteers. There were ten active clusters but the complete breeding and nesting activity were not monitored. Several new cavities were found this year and six artificial cavities were installed to supplement existing clusters. Brush was hand trimmed around all active trees prior to prescribed burning. Staff conducted burning on 17,000 acres of habitat during FY 2014-15.

Big Cypress National Preserve in South Florida – Big Cypress National Preserve (BCNP), in Collier County, supports the largest, southern-most population of red-cockaded

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woodpeckers. The National Park Service and FWC continue to cooperatively monitor and document this population.

Annual monitoring continued in the fall of 2014, with tree and cavity surveys conducted in order to determine cluster status and activity. FWC also completed the seventh and eighth red-cockaded woodpecker translocations from BCNP to Lostman's Pines sub-population in BCNP in Monroe County and Corbett WMA in Palm Beach County. Staff did not translocate any red-cockaded woodpeckers into the population due to the success of red-cockaded woodpeckers present on property. In 2015, 16 artificial cavities have been installed in four cavity-limited clusters and two recruitment clusters, and five artificial cavities were replaced in three cavity-limited clusters. So far, FWC has banded nine adult red-cockaded woodpeckers in 2015. Staff has discovered two new clusters and created two recruitment clusters during FY 2014-15, bringing the total number of known clusters in BCNP to 115.

For the eighth year, monitoring continued into the summer with nest checks, nestling banding, fledge checks, and roost checks. FWC monitored 42 of 115 potential clusters for productivity based on access and cluster activity. Out of 37 potential breeding groups, 31 groups attempted nesting with 27 of those successfully hatching chicks. Thirty-two chicks made it to banding age (seven to ten days old) and 14 of those fledged with 11 still unknown. Staff observed helper birds in 12 of the monitored clusters. FWC surveyed additional clusters for signs of activity during the breeding season and at least 93 were active.

FWC will continue to survey BCNP for new cluster locations and continue to augment cavity-limited clusters. FWC has fall 2015 translocation plans in place, and will work with cooperating agencies to continue translocations from BCNP. The agency also plans to augment additional cavity-limited clusters and continue to closely monitor clusters for the remainder of the 2015 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 2014-15, there were 62 active clusters, producing 66 chicks. The high number of chicks produced was due to several clusters re-nesting and producing two clutches. FWC observed this phenomenon in several populations around the State this year. The annual monitoring program includes roost checks, cavity and tree inventories, searching for new cavities, banding of chicks-of-the-year and any un-banded adults that are found, and sexing the chicks when fledged.

Other management actions included replacing eight inserts that were dilapidated or otherwise un-usable in existing clusters. Staff mowed approximately 193 acres of forest land around existing clusters to help change the fire regime from dormant season burns to growing season burns. FWC burned a total of 19,812 acres of forest lands during FY 2014-15 to enhance habitat for the red-cockaded woodpecker and other wildlife.

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

During FY 2014-15, FWC improved red-cockaded woodpecker habitat by mechanically clearing 72 acres of hardwood midstory, including 52 acres around six clusters and 20 acres

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around the site of a future recruitment cluster. FWC assisted FDACS on three prescribed burns that were included in the 56,820-acre burn plan. FDACS burned the area surrounding the perimeter of all 19 of the red-cockaded woodpecker clusters in the burn plan that were not included in timber sales, including 8,238 acres of forest compartments that contained red-cockaded woodpecker clusters and foraging habitat. Thirty artificial cavities were installed from December 2014 to January 2015. Ten cavity-limited clusters were augmented. No new recruitment clusters were installed this year.

From March through early July 2015, 60 clusters were monitored for red-cockaded woodpecker activity. FWC documented 49 active clusters. Active trees within each cluster were then surveyed for nests. These trees were “peeped” (using a special camera designed for use in red-cockaded woodpecker cavities) to confirm the nest and determine the number of eggs or chicks. Thirty-seven (75.5%) of the active clusters contained eggs, up from 32 nests in 2014. Four (10.8%) nest attempts failed. Thirty-two nests contained nestlings. FWC banded 68 of 77 nestlings in 29 clusters. Fledge checks were attempted in the 29 clusters with banded young and confirmed survival in 20 nests. Overall survival rate was 47.9%. In clusters where young were detected during fledge checks, the survival rate was 77%. These numbers should be taken cautiously as fledge checks in Tate’s Hell are challenging due to high midstory vegetation.

Apalachicola River Wildlife and Environmental Area in Franklin County – Apalachicola River Wildlife and Environmental Area (WEA) supports a relatively small, but stable population of red-cockaded woodpeckers. Prior to this year’s breeding season, Apalachicola River WEA staff mowed approximately 59 acres of vegetation around cavity trees in ten clusters, reducing hardwood/shrub competition to promote the grassy ground cover favored by this species. This mowing also assisted staff in protecting cavity trees in three clusters by reducing surrounding vegetation during a prescribed fire conducted in April. The fire burned approximately 2,300 acres, which improved foraging habitat.

During the 2015 breeding season, FWC monitored both natural and artificial cavities within these ten clusters to document reproductive success. Nine clusters were active with eight clusters having potential breeding groups. Each of these eight potential breeding groups laid at least one clutch of eggs. Seven of these clutches successfully hatched, but only six clusters had nestlings that successfully fledged. FWC banded 15 nestlings (five females, six males, four unknown) and believes that all 15 fledged. This represents an increase in the number of fledglings over the past two nesting seasons (ten fledged in 2014 and six fledged in 2013).

Although the number of clusters Apalachicola River WEA supports is small compared to the number of clusters on neighboring areas (i.e., Tate’s Hell WMA and Apalachicola National Forest), Apalachicola River WEA’s clusters not only contribute to overall regional population numbers, but also provide breeding opportunities for females dispersing from other areas. This year, a two-year old female that was originally banded nearly three miles north in the Apalachicola National Forest successfully fledged three nestlings at an Apalachicola River WEA cluster.

John G. and Susan H. DuPuis, Jr. Wildlife and Environmental Area in Martin and Palm Beach Counties – FWC, in conjunction with the South Florida Water Management District and the USFWS, developed a plan to reintroduce red-cockaded woodpeckers to the Dupuis WEA. Since 2006, 84 red-cockaded woodpeckers have been captured and translocated from public lands in Florida and Georgia to Dupuis WEA. Of the eight birds translocated from Osceola

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National Forest in the fall of 2013, four remained on the area. In 2014, ten potential breeding groups produced nine fledglings.

As part of the area's red-cockaded woodpecker management plan, an additional six to eight woodpeckers will be translocated in fall 2015. Old cavities have been replaced and new cavities have been installed to bring the total number of cluster locations to 28. During the next breeding season, clusters will continue to be monitored for nests, nestlings will be banded, and fledging success determined. In addition, habitat management activities to reduce midstory height and enhance red-cockaded woodpecker habitat will continue.

Restoration of the red-cockaded woodpecker at DuPuis WEA will provide an important additional population in southeastern Florida as part of the Federal Recovery Plan. The only other group of red-cockaded woodpeckers in southeastern Florida is at J.W. Corbett WMA in Palm Beach County.

Platt Branch Mitigation Park Wildlife and Environmental Area in Highlands County – FWC continued monitoring of red-cockaded woodpeckers within Platt Branch WEA and on adjacent private properties, portions of which are protected by conservation easements, since 2002. The population consisted of seven active clusters in FY 2014-15, which is an increase of two from FY 2013-14. Six red-cockaded woodpeckers were translocated in 2014 from Camp Blanding WEA, with 50% staying within the population and one new breeding pair forming. One new recruitment cluster was established at the WEA in 2014. There were five potential breeding groups and one solitary group during the 2015 breeding season, and one group adjacent to the WEA. Nesting success was monitored during the spring of 2015, with five pairs nesting successfully and seven nestlings banded. Five birds were confirmed to have fledged. The third year in a row of the initial translocations has been important in the stabilizing of the population. Controlled burns on 325 acres of suitable habitat and 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 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 the FWC Commissioners.

During FY 2014-15, FWC monitored reddish egrets closely in Hillsborough, Pinellas, and Manatee counties, but the current population size throughout the State is unknown. Multiple methods exist to estimate populations of wading birds, but none have been evaluated specifically for reddish egrets, whose dark plumage, preference for nesting below the canopy of colonies, and small population size make it an especially challenging species to count. In FY 2014-15, FWC, Audubon of Florida, and the Avian Research and Conservation Institute, initiated a study to evaluate various survey techniques for reddish egrets and performed preliminary surveys in Florida Bay and the lower Florida Keys in preparation for a statewide survey of the species FWC will lead in FY 2015-16.

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FWC and partners conducted repeated intensive surveys at 12 colonies to validate minimally disruptive counts performed from boats. In addition, staff surveyed nearly 70 keys that were potential sites in the lower Florida Keys with nesting reddish egrets confirmed on ten. FWC surveyed 51 additional keys in Florida Bay, with nesting confirmed on 12. Biologists also collected extensive nesting data that will document nesting success as well as breeding season phenology, 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 biologists 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. Staff did not place decoys and call broadcasting equipment at the Dry Tortugas after 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. Staff did not record any roseate tern nests at the Dry Tortugas National Park in 2015. FWC also surveyed four gravel roofs in 2015 that contained roseate terns nesting colonies. Two of those roofs did not contain roseate tern nests. FWC recorded 165 nests between two roofs. The agency estimates the total roseate tern population for Florida at 165 pairs based on peak nest numbers during the first wave of nests. In FY 2014-15, a minimum of 164 chicks hatched, of which FWC captured, banded, and released a sample of 144, at the roof colonies in the Florida Keys.

Shorebirds (*Naomi Avissar, Janell Brush, Bobbi Carpenter, 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. The status change for the black skimmer and American oystercatcher will occur when the Imperiled Species Management Plan is approved by the FWC Commissioners.

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 – Survival of Florida's vulnerable seabirds and shorebirds depends on community-based conservation. This type of conservation requires the skills, experience, and resources that only a broad spectrum of partners can provide. Realizing this, in

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2007, FWC initiated a conservation approach for shorebirds and seabirds through cultivation of partnerships with key agencies, organizations, and individuals involved with the management, monitoring, and stewardship of shorebirds and seabirds. These partnerships coalesced into the statewide partnership called the Florida Shorebird Alliance in 2009. This project was initially funded through Florida's Wildlife Legacy Initiative (Federal State Wildlife Grants program), and has expanded and continued with the support of the Statewide Beaches Habitat Conservation Plan, Natural Resource Damage Assessment Early Restoration, Conserve Wildlife Tag grant, and National Fish and Wildlife Foundation grants. FWC is seeking funding to continue the Alliance's important work into the future.

Twelve regional partnerships that work locally to ensure important shorebird and seabird sites are surveyed and monitored make up the Florida Shorebird Alliance. The Shorebird Partnership Coordinator (FWC position) facilitates information exchange between partners statewide, and improves coordination of monitoring and management of Florida's shorebirds and seabirds. The Shorebird Partnership Coordinator also publishes a monthly e-newsletter (the *Wrack Line*), maintains an email list-serve of over 13,900 contacts, coordinates training and data quality control for the statewide shorebird monitoring program, and manages the Alliance website (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, launched in spring 2011, was created to serve as the central repository for data collected on shorebirds and seabirds in Florida. The Database is an online data entry interface that allows users to submit and view survey data. FWC and partners developed the Database and accompanying protocols for monitoring breeding and non-breeding shorebirds and seabirds. To date, over 800 monitoring partners from throughout the State have registered accounts in the Database and many of these partners collect and report breeding data. Monitoring data are available online to anyone with an account, thereby allowing researchers, managers, conservationists, and permit reviewers to use information to help conserve shorebirds and seabirds.

A group of select partners is also participating in non-breeding shorebird and seabird surveys. In early 2014, FWC drafted an official non-breeding protocol for partners to use statewide. Members of the Alliance, in particular those from the Panhandle partnership, started using the protocol in 2014. The 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.

The Database and the Alliance monitoring program have received national praise, and were recognized by Governor Rick Scott in June 2014 for saving the State over \$500,000 in monitoring costs. The Database may be accessed at www.flshorebirddatabase.org.

American Oystercatcher – During FY 2014-15, FWC researchers monitored breeding success and movement patterns for American oystercatchers at the Cross Florida Barge Canal Spoil Islands and Cedar Key along the Nature Coast, and the Tolomato and Matanzas rivers in northeast Florida. In these areas, researchers documented and monitored about 45 nesting pairs. In the absence of early season storms and nest flooding, which often contribute to nest failures, nesting pairs on the Tolomato River had a very successful year. The nesting season is not yet complete, so FWC will report results in next year's annual report. So far this breeding season,

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FWC researchers and partners have banded over 50 adults and chicks statewide as part of a long-term study on movements and survival. There are over 125 Florida-banded American oystercatchers to date.

Southeastern American Kestrel (*Barbara Almario, Eric Dennis, Norberto Fernandez, Allan Hallman, Randy Havens, Nathan Lambert, Karl Miller, Anni Mitchell, Jennifer Myers, and Johnathan S. Roberts*)

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. In July 2008, FWC initiated a long-term effort to develop a regional Southeastern American kestrel conservation partnership within and across agencies by: 1) Identifying suitable but unoccupied kestrel habitat; 2) Establishing population targets for kestrels on FWC's Wildlife Management Areas (WMAs) and other public lands; 3) Building and installing new nest boxes and repairing old nest boxes; 4) Providing standardized data collection protocols to monitor kestrels and establishing a database to manage annual monitoring data on public lands; 5) Monitoring nest boxes during the breeding season; 6) Educating biologists, land managers, bird watchers, and others through talks, web sites, and printed media; and 7) Conducting additional research on kestrel breeding habitat requirements.

During FY 2014-15, FWC completed a final report covering five years of nest-box monitoring data. Staff provided six key recommendations for land managers and partners interested in installing or maintaining Southeastern American kestrel nest boxes:

1. Maintain a core group of nest boxes (a minimum of ten) in suitable habitat annually to promote kestrel occupancy and meaningful data collection.
2. Locate nest boxes on sites with pine canopy closure of less than 25% and a low ground cover (ten inches or less) dominated by grasses and avoid areas where palmetto is the dominant shrub.
3. Avoid placing nest boxes along busy roads and highways with narrow shoulders.
4. Follow recommended revised monitoring protocol to maximize value of the data collected.
5. Prepare new nest boxes annually with wood chips before each breeding season.
6. Re-evaluate each nest box program on a four to five-year basis to implement needed repairs or additions and to update maps and facilitate communication among partners.

FWC became a cooperator on a project to evaluate high-resolution genetic markers to reveal connectivity and migratory routes and wintering areas for Southeastern American kestrels throughout their range in North America. During May to June 2015, staff collected blood samples from 18 different broods of Southeastern American kestrels in Marion and Levy counties.

In FY 2014-15, FWC staff maintained and monitored 45 Southeastern American kestrel nest boxes on FWC-managed lands during the spring breeding system. In southwest Florida, these areas include: Chassahowitzka WMA, Perry Oldenburg Wildlife and Environmental Area (WEA), Janet Butterfield Brooks WEA, and Chinsegut WEA, which are 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 nine nest boxes.

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Chassahowitzka WMA had three active boxes. Perry Oldenburg WEA and Janet Butterfield Brooks WEA each had one active box. The Lake Wales Ridge WEA and Crooked Lake WEA each had two active boxes. Other species encountered included Eastern screech owls, Eastern bluebirds, red-bellied woodpeckers, wood duck, and great-crested flycatchers.

Bell Ridge Longleaf Wildlife and Environmental Area in Gilchrist County – In FY 2014-15, four kestrel nest boxes were maintained and monitored by FWC on Bell Ridge Longleaf WEA during the spring breeding season. Breeding kestrels used one nest box with undetermined nest success. Other species observed utilizing the boxes include the great-crested flycatcher and Eastern screech owl.

Big Bend Wildlife Management Area in Taylor County – Monitoring of 19 kestrel nest boxes was completed during the spring and early summer of 2015 on the Tide Swamp Unit of Big Bend WMA. None of the nineteen boxes was used for kestrel nesting. Great crested flycatchers, Eastern screech owls, or a Southern flying squirrel occupied all boxes.

Blackwater Wildlife Management Area in Okaloosa and Santa Rosa Counties – In March 2009, FWC installed and monitored ten 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. Occupancy by kestrels has increased over time with one box used in 2009, two boxes in 2010 and 2011, four boxes in 2012, and seven boxes in 2013 and 2014.

During FY 2014–15, two kestrel nest boxes were relocated and one nest box was added, increasing the total number of nest boxes monitored to 21. In January 2015, FWC recorded any evidence of use and removed remaining nesting materials from the previous year. Throughout the nesting season, six boxes had signs of kestrel use and staff observed 11 kestrel eggs. Monitoring and maintenance of kestrel boxes will continue in FY 2015-16.

Camp Blanding Wildlife Management Area in Clay County – Activities to enhance the survival of the kestrel on Camp Blanding WMA consisted of providing and maintaining nest boxes and conducting surveys. During February 2015, 50 nest boxes were cleaned and surveyed. All boxes were then checked from April to June for usage and maintained. Kestrels utilized 32% of the nest boxes. Sixteen nest boxes were verified as having been or currently being used by kestrels. Seventeen successful nests were monitored, 74 eggs were laid, 59 kestrel chicks were fledged, and 11 unhatched eggs remained. One late nest had four eggs that were laid on June 18, 2015. Hatch success rate for Camp Blanding WMA was 80%. Southern flying squirrels, gray squirrels, great crested flycatchers, Eastern screech owls, Eastern bluebirds, and honey bees also used the nest boxes. Local beekeepers removed two honey beehives.

Fort White Wildlife and Environmental Area in Gilchrist County – In FY 2014-15, 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 the Southern flying squirrel, great-crested flycatcher, and Eastern screech owl.

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Jennings State Forest Wildlife Management Area in Clay and Duval Counties – Activities to enhance the survival of the kestrel on Jennings State Forest WMA consisted of providing and maintaining nest boxes and conducting surveys. During February 2015, 26 existing nest boxes were cleaned and maintained. FWC conducted two visits during nesting (April-May) season. Staff did not note any kestrel activity. Other animals utilizing boxes were Southern flying squirrels, gray squirrels, great-crested flycatchers, Eastern screech owls, a wood duck, and Eastern bluebirds.

Twin Rivers State Forest Wildlife Management Area in Madison County – Activities to enhance the survival of the kestrel on Twin Rivers State Forest WMA consisted of providing and maintaining nest boxes and conducting surveys. During February 2015, ten nest boxes were examined and cleaned. All were checked for usage in March, April, May, and June 2015. Four kestrel nests were identified from two pairs of kestrels. All nests failed. Other animals utilizing boxes were Southern flying squirrels, great-crested flycatchers, and tufted titmice.

Watermelon Pond Wildlife and Environmental Area in Alachua County – Monitoring of seven kestrel nest boxes was completed during FY 2014-15 on Watermelon Pond WEA. Two of the seven boxes were used for kestrel nesting, with five eggs in each box. Both nests failed and no young were fledged.

Wading Birds (*Pamela Boody, Dawn Dodds, Matthew Goode, Jason Huckabee, Patrick McElhone, Paul Miles, Catherine Ricketts, 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 Wildlife Management Area (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. FWC flew aerial transects on May 1, 2015 and again on May 19, 2015. Staff surveyed the northern half of Aucilla WMA on May 1 and the southern half on May 19. Transects were flown ½-mile apart and flown at an altitude of 300-400 feet and an air speed of approximately 40-50 knots. Of six previously identified wading bird colonies, three were active. These were the same three colonies that were active in 2014. Of the six colonies, no more than five have ever been active at the same time. FWC did not find any new colonies during the aerial survey. The wading bird colonies are typically mixed with

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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 or at-risk. In particular, Little Deep Edge Pond rookery has been observed supporting nests for 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 and tricolored heron. The rookery is monitored 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 our data show little blue herons use this colony more frequently than tricolored herons. Multiple incidental observations of white ibis, another State-designated Species of Special Concern, are made annually on area water bodies. Wood storks, a Federally-designated Endangered species, are also occasionally observed 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 bird rookery 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.

During FY 2014-15, a new wading bird rookery was documented on Dykes Mill Pond. Ten great blue heron and six anhinga nests produced at least 27 great blue heron and seven anhinga juveniles. FWC will continue to monitor this new rookery annually to determine occupancy by listed or at-risk wading bird species.

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 in Washington County, FL.

| Year | Little Blue Heron | | | Tricolored Heron | | |
|------|-------------------|-------|--------|------------------|---------|--------|
| | Adults | Nests | Chicks | Adults | Nests | Chicks |
| 2008 | 8 | 3 | 0 | 2 | unknown | 0 |
| 2009 | 1 | 0 | 0 | 0 | 0 | 0 |
| 2010 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2011 | 20 | 14 | 34 | 1 | 1 | 1 |
| 2012 | 7 | 4 | 6 | 0 | 0 | 0 |
| 2013 | 5 | 3 | 4 | 0 | 0 | 0 |
| 2014 | 14 | 6 | 6 | 0 | 0 | 0 |
| 2015 | 7 | 4 | 3 | 0 | 0 | 0 |

Dinner Island Ranch, Okaloacoochee Slough, and Spirit-of-the-Wild Wildlife Management Areas in Hendry and Collier Counties – FWC flew aerial transects, spaced 0.8 nautical miles apart, over the three WMAs once a month for three months during the spring of 2015. Staff recorded seventeen foraging aggregations and nine roosting locations on the Okaloacoochee State Forest portion of Okaloacoochee Slough WMA and Dinner Island Ranch WMA. No observations of wading bird colonies were made on Spirit-of-the-Wild WMA or the

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FWC portion of Okaloacoochee Slough WMA. FWC did not find any nesting colonies.

J.W. Corbett Wildlife Management Area in Palm Beach County – Wading bird rookeries on J.W. Corbett WMA were surveyed for activity during FY 2014-15. Both previously known rookeries were confirmed to be active and nests of snowy egrets, white ibis, tricolored herons, little blue herons (all State-designated Species of Special Concern), great egrets, black-crowned night-heron, cattle egrets, and anhingas were observed. Additionally, marsh bird surveys have been conducted from March through April since 2013 following the Arizona Cooperative Fish and Wildlife Research Unit Standardized North American Marsh Bird Monitoring Protocols 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 (a State-designated Species of Special Concern). All focal species were detected this year except for the king rail.

Apalachicola River Wildlife and Environmental Area and Box-R Wildlife Management Area in Gulf and Franklin Counties – The wetland habitats of the Apalachicola River WEA, Box-R WMA, and Tate’s Hell State Forest provide nesting sites for multiple species of colonial wading birds including the great blue heron, tricolored heron, little blue heron, great egret, snowy egret, white ibis, and wood stork. In order to monitor the number and distribution of nests over time and identify areas in which to apply protective measures during land management activities, FWC conducts an aerial nesting colony survey within the lower Apalachicola River basin in the spring of each year. Wading bird surveys began on Apalachicola River WEA and Box-R WMA in 1988, and have been flown every year since 1993.

FWC completed aerial surveys within the lower Apalachicola River basin on April 21, and May 21, 2015. Staff detected seven nesting colonies – two more than the five detected in 2014 and one more than in 2013. FWC observed little blue herons at two sites (at least 14 nests total); great blue herons at five sites (approximately 34 nests total); great egrets at three sites (approximately 75 nests total); and wood storks at one site (approximately 50 nests).

John C. and Mariana Jones/Hungryland Wildlife and Environmental Area in Martin and Palm Beach Counties – Aerial nest colony surveys were conducted on Hungryland WEA during the breeding season. Transects were flown ½-mile apart at an altitude of 300-400 feet and an air speed of 40-50 knots. Seven nest colonies were located, supporting 67 great egret nests, five great blue heron nests, and five anhinga nests. In addition to the focal species, FWC detected seven Florida sandhill crane (a State-designated Threatened species) nests during the survey. American white pelican, white ibis (a State-designated Species of Special Concern), little blue heron (a State-designated Species of Special Concern), tricolored heron (a State-designated Species of Special Concern), snowy egret (a State-designated Species of Special Concern), roseate spoonbill (a State-designated Species of Special Concern), and wood stork (a Federally-designated Endangered species) were also observed on the area.

Impact of Hydrilla on Foraging in Central Florida – In FY 2014-15, FWC continued a study with the goal of determining how an infestation of hydrilla affects feeding behavior of limpkins, great egrets, and little blue herons in the shallow areas near the shore of Central Florida lakes. FWC identified survey points 3,281 feet apart in the area close to the shoreline of lakes Tohopekaliga, Kissimmee, Cypress, Jackson, and Lawne. Using airboats to access the survey points, FWC conducted ten minute surveys for the three species of wading birds. Due to the

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tendency of limpkins to flush out of sight because of airboat noise, a limpkin playback is used during the first minute of the survey. Hydrilla is quantified in the immediate area of the survey point the day of the survey. Data resulting from this study will provide lake managers with goals for managing hydrilla that also will provide suitable foraging habitat for limpkins and other wading birds. These goals will allow for efficient control of hydrilla, reduced use of herbicides, and reduced costs and staff time for lake management programs directed toward hydrilla.

White-crowned Pigeon (*Carol Rizkalla and Ricardo Zambrano*)

The white-crowned pigeon, a State-designated Threatened species, nests on mangrove islands and forages in deciduous forest. Tropical hardwood hammock and pine rockland forests have been severely reduced and fragmented and remain under threat. The majority of known nesting islands are protected within the Keys Refuge Complex and USFWS has historically monitored them using flight line counts. In 2013, FWC staff received training in this protocol. In 2014, FWC staff began monitoring two nesting islands in Biscayne National Park and provided training to park staff. Counts were performed monthly from June to August 2014. Based on highest counts, approximately 85 nests occurred within Biscayne National Park. In 2015, FWC continued to assist Park staff with counts when necessary.

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. FWC's intensive monitoring of the remaining birds ended in June 2012, and at that time, the population was estimated at 18 birds. FWC continues to monitor the remaining birds when there is an opportunity, however.

In 2014, a pair from the non-migratory population produced a chick that survived past the fledging age (approximately 90 days). FWC partnered with USFWS, Disney's Animal Kingdom, and the Louisiana Department of Wildlife and Fisheries in an attempt to translocate this individual to the growing Louisiana non-migratory population. The eight-month old juvenile was captured in December and held in quarantine at Disney's Animal Kingdom. While in quarantine, it developed unsurmountable health problems and unfortunately was euthanized in March 2015. During the 2015 breeding season, another chick fledged. Staff will decide about attempting a translocation for the fledgling during fall 2015.

Eastern Migratory Population – A separate reintroduction of migratory whooping cranes is taking place in the Eastern U.S. These birds breed in Wisconsin and migrate to Florida (and other southeastern states) in the winter. There are currently 92 birds in this population. Like the non-migratory flock, the migratory flock is encountering reproductive challenges and research is underway to identify the limiting factors. FWC's involvement with this project consists only of occasional field monitoring.

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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 – In 2008, FWC began aerial monitoring of two Central and South Florida stork colonies in the process of radio-tracking whooping cranes; FWC now surveys 28 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 from a fixed-wing aircraft, typically 600–1,000 feet above ground level. In recent years, FWC counted approximately 2,900 nests, an estimated 20% of the U.S. nesting population. In April 2015, FWC biologists counted approximately 2,250 nests within the colonies.

L. Kirk Edwards Wildlife and Environmental Area in Leon County – Lower Lake Lafayette located within the L. Kirk Edwards Wildlife and Environmental Area (WEA) in Leon County is home to the Chaires wood stork colony. In an effort to monitor whether the colony is active or inactive from year to year and determine the approximate number of nests, FWC conducts an annual aerial survey of the colony. Staff conducted the survey, first implemented in June 2009, on May 1, 2015, from a helicopter at an altitude of approximately 600 feet to avoid disturbing the nesting birds. The colony was inactive (zero nests) in 2012, as there was no water in Lake Lafayette or under the nest colony due to prolonged drought. Rainfall brought the lake to levels that are more normal for the 2013 nesting season. FWC documented approximately 200 wood stork nests in 2013 and 100 nests in 2014. This year, the Chaires colony was inactive (zero nests). The lake contained water, although levels were low.

Two additional wood stork colonies (Ochlockonee North and Ochlockonee South) that occur on private property in western Leon County were also monitored in May 2015. There were no nests observed at the location of the Ochlockonee North colony and approximately 290 nests were observed at the Ochlockonee South colony. This represents a marked increase from the 170-200 estimated nests observed in 2014.

Little Gator Creek Wildlife and Environmental Area in Pasco County – Little Gator Creek WEA in Pasco County has a ten-acre 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 six.

During FY 2011-12, a monitoring protocol was developed and implemented on the WEA to monitor water levels within the colony and assess wood stork nesting success. Using this protocol, FWC conducted weekly site visits during the breeding season (January to April) in FY 2014-15. Wood storks were actively nesting during the survey period, with approximately 25-50 nests observed.

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AMPHIBIANS

Flatwoods Salamanders (*Diane Alix, Barbara Almario, Justin Davis, Kevin Enge, Kelli Herrick, Pierson Hill, and Fred Robinette*)

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.

During FY 2014-15, 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. Heavy winter and spring rains created optimal conditions for surveys for the second year in a row. Biologists surveyed 229 ponds and found flatwoods salamander larvae in 24 ponds. Of the 68 known breeding ponds surveyed, staff found larvae in 15 (22%). Of the nine new breeding ponds found, five had been unsuccessfully surveyed previously and four had never been surveyed. These surveys are consistent with the trend of continuing decline of the species in the Apalachicola National Forest.

FWC biologists also surveyed for the reticulated flatwoods salamander on several public lands within its potential range that have recent or historical records. Surveys were unsuccessful at a known breeding site on Pine Log State Forest in Washington County, one site on Yellow River Wildlife Management Area (WMA) in Santa Rosa County, and one site on Garcon Point Water Management Area in Santa Rosa County. A single larva was dipnetted at a known breeding site in Yellow River Marsh Preserve State Park, the first observation there since 2006.

FWC biologists participated in a multi-agency working group to address conservation needs of flatwoods salamanders. FWC staff also gave presentations on flatwoods salamander natural history, conservation, and management at two meetings of the Florida Native Plant Society, including their statewide meeting. FWC staff summarized survey results and presented them to the USFWS and U.S. Geological Survey.

Hurlburt Field Habitat Restoration in Okaloosa County – 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 and Hurlburt Field in Okaloosa County, and Navy Outlying Landing Field Holley in Santa Rose County.

Ephemeral wetlands serve as breeding and larval habitat for flatwoods salamanders as well as a variety of other rare plant and wildlife species. However, these systems have degraded over time due to a shift away from natural fire regimes. Fire suppression during the growing season leads to an increase in woody vegetation, resulting in premature drying of breeding wetlands and a decline in herbaceous vegetation, which provides cover for larvae. To restore degraded wet flatwoods habitat, FWC removes woody vegetation from the site and treats cut stumps with herbicide to minimize re-sprouting. Ideally, staff then uses prescribed fire to prevent regeneration of woody vegetation, maintain an open canopy, and foster native herbaceous groundcover.

Wetland habitats on Eglin Air Force Base 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 breeding wetlands

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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 herbicide treatment. In 2011 and 2012, these areas were re-treated with herbicide to control woody vegetation resprouting. Habitat restoration activities planned for FY 2013-14 were postponed due to excessive rainfall. In FY 2014-15, FWC biologists proposed habitat restoration (woody vegetation removal and stump herbicide treatment) on 22.03 acres of reticulated flatwoods salamander breeding ponds on Hurlburt Field. Logistical constraints in fall 2014 pushed the timeline of this work into spring 2015, which was then further delayed due to unacceptably high water levels within the ponds. Following a drop in water levels, restoration work on the ponds began in mid-June 2015, with the contract being extended into FY 2015-16 to allow the contractor to complete the project. As of July 28, 2015, 5.98 acres of the 22.03 acres have received the restoration treatment. Barring unforeseen logistical or weather constraints, the remaining 16.05 acres will be completed prior to October 1, 2015. Pending funding, an identical project to restore an additional 22.31 acres of reticulated flatwood salamander breeding ponds on Hurlburt Field has been proposed for FY 2015-16 as well.

Pine Log and Point Washington Wildlife Management Areas in Bay, Washington, and Walton Counties – FWC sampled potential amphibian breeding ponds on Pine Log WMA, located in Bay and Washington counties, and Point Washington WMA, located in Walton County, from October 2014 to March 2015 to re-confirm two historic flatwoods salamander breeding ponds and locate any new breeding habitat.

Documented ponds continued to be updated categorically and ranked as “confirmed,” “highly likely,” “potential,” “unlikely,” or “unsuitable.” Staff based rankings on the pond’s ability to support developing amphibian larvae and the presence of herbaceous vegetation, namely wiregrass, at the pond edge. FWC gave ponds classified as “confirmed,” “highly likely,” or “potential” a priority ranking of one or two and gave ponds classified as “unlikely” or “unsuitable” a priority three ranking. Staff only visited ponds ranked one or two in FY 2014-15.

FWC biologists surveyed ponds in FY 2014-15 using drift fences set parallel to the pond edge and dip nets. They employed drift fences on five priority one or two ponds located on Pine Log WMA. Staff did not employ drift fences at Point Washington; however, staff expect to expand the project during FY 2015-16. Traps were set for 22 fence nights on Pine Log WMA.

Between February and April 2015, FWC dip netted 98 potential ponds, including 29 ponds on Pine Log WMA and 69 ponds on Point Washington WMA. Staff surveyed each pond in early spring and revisited later in the season to maximize species detection. FWC did not detect any flatwoods salamanders during FY 2014-15. However, incidental species detected included ornate chorus frog, mole salamander, pinewoods treefrog, and pig frog.

Blackwater and Yellow River Wildlife Management Areas in Okaloosa and Santa Rosa Counties – FWC has surveyed for reticulated flatwoods salamanders within Blackwater WMA since 2001. In 2007, the agency implemented a sampling protocol to survey and monitor 126 ponds throughout the WMA. Staff sample potential breeding ponds annually, and sample less suitable sites on a three-year cycle. As of June 2015, there were no confirmed flatwoods salamander breeding ponds on Blackwater WMA.

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The Yellow River Ravines Tract of Yellow River WMA was acquired in 2008 and contains a historic flatwoods salamander breeding site with three potential breeding ponds. FWC sample the ponds twice a year. Since 2010, FWC, Florida Department of Agriculture and Consumer Services (FDACS), and USFWS have collaborated in the restoration of the wetland complex. Management practices implemented in previous years to improve habitat for the species included removal of undesirable woody vegetation from two pond basins, herbicide application along pond margins to control resprouting vegetation, a third row thin of adjacent slash pine plantation, establishing fire lines in the surrounding uplands, and implementing prescribed burns within uplands and pond basins.

In September 2014, approximately 80% of midstory hardwoods were removed from the basin of the third pond to encourage herbaceous growth. Following thinning, herbicide was applied to stumps to prohibit regrowth. FDACS conducted a prescribed fire in April 2015 that burned adjacent uplands and part of the wetland complex, reducing debris piles left after thinning. Since monitoring by FWC began in 2009, staff have not found reticulated flatwoods salamanders on Yellow River WMA. FWC will continue to collaborate with FDACS to manage and improve habitat around all potential flatwoods salamander breeding ponds.

Tate's Hell State Forest in Franklin and Liberty Counties – Reticulated flatwoods salamanders were documented on Tate's Hell State Forest in 1984 and 1985 in the Womack Creek Unit, and in 1998 north of Dry Bridge Road. In 2000-01, Florida Natural Areas Inventory conducted surveys with drift-fence arrays in the Sumatra Tract but did not capture any flatwoods salamanders. Dipnet surveys were conducted in 2002 by Florida Natural Areas Inventory, 2003 by Florida Natural Areas Inventory and FWC, and 2004 by FWC, but did not capture any larvae. More recently, FWC surveyed for flatwoods salamanders and other amphibian larvae in the winters of 2014 and 2015, but did not detect flatwoods salamanders.

During FY 2014-15, three potential breeding ponds with significant hardwood encroachment were targeted for restoration. Ponds were located in the Sumatra Tract within a grassy wet savannah that is in growing season rotation for prescribed burning. Hardwoods less than five inches in diameter were cut and removed from the ponds. Herbicide was applied to the stumps shortly after cutting to prohibit regrowth. Ideally, prescribed fire will be applied within the next growing season to promote the growth of herbaceous groundcover.

Florida Bog Frog (*Barbara Almario and Justin Davis*)

The Florida bog frog is a State-designated Species of Special Concern in Florida. In 2009, FWC began nighttime call surveys for the Florida bog frog on the Yellow River Ravines and Escribano Point tracts of Yellow River Wildlife Management Area (WMA), located in Okaloosa and Santa Rosa counties. Call surveys have taken place annually since 2009 and continued during FY 2014-15. Nighttime call surveys follow a protocol similar to that used by the U.S. Geological Survey North American Amphibian Monitoring Program and are conducted once each month in May, June, and July. Ten survey points were initially established along three creeks (Garnier, Julian Mill, and Burnt Grocery) within Yellow River Ravine and six points within Escribano Point. In 2013, three survey points were removed from Yellow River Ravine due to unsuitable habitat and one point was added on the Julian Mill Creek power line right-of-way bringing the number of survey points to eight. Bog frogs have been documented at the Garnier Creek right-of-way every year since surveys began in 2009. In May and July 2014, a

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bog frog was heard calling from the right-of-way at Julian Mill Creek for the first time since the 1980s. Since surveys began in 2009, Florida bog frogs have not been detected on Escribano Point.

During the winter of FY 2012-13, FWC, in cooperation with the Florida Department of Agriculture and Consumer Services (FDACS), initiated restoration on one acre of habitat along Garnier Creek. Using an experimental approach, five 0.4-acre plots were established along Garnier Creek and divided in half into experimental and reference sections of equal size. Habitat management actions in the experimental sections included hand-cutting woody vegetation and immediately treating the stumps with herbicide. The reference sections did not receive habitat management. In April 2014 and May 2015, the experimental plots were re-treated with herbicide to inhibit regeneration of woody vegetation. FWC funded all restoration activities. Since 2013, nighttime call surveys have been conducted within the plots twice a month in May, June, and July to document bog frog response to habitat restoration efforts. Results from FY 2014-15 survey efforts are provided in **Table 5** below.

To compliment nighttime call surveys, acoustic recording units were deployed in June 2014 in each of the plots on Garnier Creek and at various locations along the length of Julian Mill Creek, including the power line right-of-way. Acoustic recording units on Julian Mill were relocated once a month in July and August in order to achieve as much coverage of the stream as possible. All acoustic recording units were removed in September 2014. Preliminary data analysis revealed the presence of bog frogs at three locations north of the right-of-way on Julian Mill Creek; however, data from the acoustic recording units are still being analyzed. Additional acoustic recording units will be deployed in the future to determine bog frog response to restoration on Garnier Creek, distribution within Julian Mill Creek, and to aid in identifying suitable locations for future restoration efforts.

Table 5. Florida bog frog survey results, Garnier Creek, Yellow River WMA, Santa Rosa County, FL, 2015. “Exp” refers to the half of the plot that received habitat management and “Ref” refers to the half of the plot that did not receive management.

| Survey Date | Plot 1 | | Plot 2 | | Plot 3 | | Plot 4 | | Plot 5 | |
|-------------|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|
| | Exp | Ref | Exp | Ref | Exp | Ref | Exp | Ref | Exp | Ref |
| 4-May-15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 28-May-15 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 17-Jun-15 | 2 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 1-Jul-15 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| 17-Jul-15 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 28-Jul-15 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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

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 the FWC Commissioners approve the Imperiled Species Management Plan and associated rules.

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The gopher frog is an “explosive breeder” (all or most of a population congregates to breed during a short period) that travels during heavy rainfall events from burrows in surrounding uplands (sometimes from more than a mile away) to temporary wetlands lacking predatory fish. Breeding often occurs from October through April, or after tropical storms, hurricanes, or winter cold fronts, but breeding may occur any month of the year. Tadpoles remain in ponds for three to seven months before transforming into frogs and leaving in search of burrows in which to live.

During FY 2014-15, FWC staff dipnetted 139 ponds on 27 public or conservation lands and two ponds on private lands for gopher frogs, finding tadpoles in 29 ponds on eight public lands (**Table 5**). Surveys in 2014 were on winter-breeding amphibian species, and staff completed the final report for this study in December. Notable survey findings were two new breeding ponds at Bull Creek WMA (Osceola County) and the first record from Flagler County of gopher frogs observed in tortoise burrows in the Pellicer Creek Conservation Area. Drift fences installed in Twin Rivers State Forest as part of an upland snake survey captured two gopher frogs, which represented the first records from Madison County. Surveys in 2015 were primarily to collect genetic samples for looking at the genetics of gopher frog populations throughout the State. FWC staff collected 121 genetic samples (primarily tadpole tail tips) from 18 ponds (**Table 6**) and a toe clip from an adult frog in Madison County. Dr. Stacey Lance at the Savannah River Ecology Laboratory genotyped 1,119 of 1,428 samples (many of which were collected earlier), and Dr. Tom Devitt has conducted preliminary genetic analyses of these samples.

Until recently, FWC policy allowed the translocation of the gopher frog and other commensal species with 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 on recipient populations led to an interim policy in 2012 that limited translocation to on-site movements until the effects of translocation on commensal species could be studied. FWC has initiated a pilot study to assess the effects of translocation on gopher frog survivorship and behavior using radio-telemetry to track movements and survival of both resident and translocated animals. This study will provide valuable information on how gopher frogs respond to translocation at a single study site and allow FWC to evaluate research methods and determine if a large-scale study is feasible. An initial pilot study at Jennings State Forest in FY 2013-14 failed to capture enough large individuals as test subjects. FWC will conduct a revised study in the Ocala National Forest, where FWC will attempt to capture large adult frogs at the mouths of tortoise burrows and as they exit breeding ponds. In preparation for the project, FWC identified four ponds in Ocala National Forest as study sites where gopher frogs bred last year, mapped gopher tortoise burrows surrounding these ponds where attempts will be made to capture frogs that inhabit burrows, and constructed approximately 200 funnel traps to use in association with drift fences at breeding ponds. Staff will begin Gopher frog trapping in the fall of 2015, when ponds begin to fill.

Table 6. Florida Amphibian Pond Surveys

| Area | No. Ponds | No. Gopher Frog Ponds | No. Gopher Samples |
|------------------------------|-----------|-----------------------|--------------------|
| <u>Northwest Region</u> | | | |
| Apalachicola National Forest | 15 | 9 | 19 |
| Calhoun Co. (private) | 1 | 0 | 0 |

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| | | | |
|--|-----|----|-----|
| Econfina Creek Water Management Area | 1 | 0 | 0 |
| Jackson Co. (private) | 1 | 0 | 0 |
| Pine Log State Forest | 3 | 0 | 0 |
| Point Washington State Forest | 1 | 0 | 0 |
| <u>North Central Region</u> | | | |
| Big Bend WMA, Spring Creek Unit | 9 | 0 | 0 |
| Camp Blanding Military Reservation | 10 | 0 | 0 |
| Goethe State Forest | 7 | 4 | 7 |
| Jennings State Forest | 18 | 0 | 0 |
| Lafayette Forest WEA | 3 | 0 | 0 |
| Longleaf Flatwoods Reserve | 3 | 0 | 0 |
| Phifer Flatwoods | 3 | 0 | 0 |
| Watermelon Pond – Gladman Tract | 1 | 0 | 0 |
| Watermelon Pond WEA | 3 | 0 | 0 |
| <u>Northeast Region</u> | | | |
| Dunn’s Creek State Park | 5 | 1 | 1 |
| Bull Creek WMA | 7 | 3 | 23 |
| Conner Preserve | 4 | 0 | 0 |
| Etoniah Creek State Forest | 4 | 0 | 0 |
| Faver-Dykes State Park | 4 | 0 | 0 |
| Half Moon WMA | 6 | 0 | 0 |
| Indian Lake State Forest | 2 | 0 | 0 |
| Merritt Island NWR | 3 | 3 | 19 |
| Ocala National Forest | 22 | 7 | 37 |
| Pellicer Creek Conservation Area | 2 | 0 | 0 |
| Triple N Ranch | 4 | 1 | 14 |
| <u>Southwest Region</u> | | | |
| Archbold Biological Station | 14 | 1 | 1 |
| Lake Wales Ridge WEA – Lake Placid Scrub | 1 | 0 | 0 |
| Mosaic Fertilizer’s Wellfield | 1 | 0 | 0 |
| Starkey Wilderness Preserve | 3 | 0 | 0 |
| Total | 161 | 29 | 121 |

Chassahowitzka Wildlife Management Area in Hernando County – During FY 2014-15, FWC conducted a gopher frog call survey on Chassahowitzka WMA in Hernando County in late December 2014. Staff surveyed ten ponds using FWC’s Standard Monitoring Protocol for Gopher Frog Call Surveys, and detected gopher frogs in significant numbers at three of the ten ponds surveyed. Per the Species Management Strategy for the WMA, FWC will repeat this survey at least once every three years, or annually if resources allow.

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Pine Barrens Treefrog (*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 the FWC Commissioners approve the Imperiled Species Management Plan and associated rule changes. 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 observers conducted surveys for calling frogs in June to July 2013 and again in mid-April to May 2014 at 31 historical and 39 potential breeding sites in Blackwater River State Forest in Okaloosa and Santa Rosa counties. During the Blackwater surveys, FWC found 27 new breeding sites. Surveys of historical sites will continue through FY 2015-16.

REPTILES

American Crocodile (*Lindsey Hord and Jason Waller*)

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 in Florida 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 2014-15, FWC received 123 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. FWC captured 13 crocodiles in FY 2014-15. Three crocodiles (two males, one unknown) died either due to capture myopathy (a muscle disease resulting in muscle fatigue) or of unknown causes while in possession. These animals ranged in size from 1.3 feet to 12.4 feet in length. Six crocodiles (two males, four females) were captured and translocated to a site deemed suitable by FWC. Animals ranged from 4.3 to 9.8 feet in length, for an average of 7.2 feet. Four crocodiles (two males, one female, and one unknown) were captured and removed from human-interaction situations and released near their capture site. Those animals ranged in size from 2.4 to 11.8 feet in length for an average of 5.6 feet.

FWC was involved in the recovery of seven American crocodile carcasses (two males, three females, and two unknown) during FY 2014-15. The animals ranged from 1.0 to 12.5 feet in length, for an average of 7.0 feet. The cause of death for most of the animals was attributed to wounds inflicted by automobile traffic.

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Alligator Snapping Turtle (*Matthew Goode, Jonathan Mays, Catherin Ricketts, and Travis Thomas*)

The alligator snapping turtle is the largest freshwater turtle in North America. FWC turtle regulations prohibit its harvest in Florida, and possession of an alligator snapping turtle requires an FWC permit. The alligator snapping turtle is currently listed in Florida as a State-designated Species of Special Concern. 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. FWC staff conducted a preliminary biological status review to determine whether the three species that are now recognized warrant listing as State-designated Threatened. FWC staff also prepared two manuscripts summarizing the results of population and home-range studies on the Suwannee alligator snapping turtle.

Status Survey of the Apalachicola Alligator Snapping Turtle – The USFWS was petitioned to list the alligator snapping turtle as Federally-Threatened and provided a grant to Georgia to determine its status. FWC did not request money because a study was already underway in the Suwannee River, and some trapping data were available from rivers in the Panhandle. However, when the Apalachicola alligator snapping turtle was described as a separate species, FWC decided a study was warranted in the three rivers (Ochlockonee, Apalachicola, and Choctawhatchee) that comprise its range in Florida. FWC staff trapped nine sites (three per river) twice and caught 36 turtles in 72 trap nights in the Ochlockonee River, 13 turtles in 71 trap nights in the Apalachicola River, and one turtle in 65 trap nights in the Choctawhatchee River. Staff did not capture any alligator snapping turtles in 36 trap nights in the Silver and Ocklawaha rivers (Marion County), where the species has reportedly been introduced. Including trapping data from FY 2013-14 (approximately 100 trap nights per river), the number of alligator snappers caught per trap night was 0.53 in the Ochlockonee, 0.35 in the Apalachicola, and 0.01 in the Choctawatchee (and one turtle observed basking).

Apalachicola River Wildlife and Environmental Area (Brothers River) in Gulf County – 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. During 2008-2010, Apalachicola River Wildlife and Environmental Area (WEA) staff captured and marked turtles. WEA staff began another mark-recapture study in 2014 to provide information to help determine the status of this species.

Thirteen turtles were captured between 2008 and 2010 at seven different locations. Five of the 13 turtles captured were male (38%) and eight were female (62%). During FY 2014-15, WEA staff captured 16 turtles, eight male (50%) and eight female (50%) from 13 different locations. One individual was recaptured 26 days later and approximately 164 feet from where it was originally captured. Trapping will continue into FY 2015-16 to ensure enough data are collected before deriving a population estimate. Since 2008, 29 turtles have been captured, 13 male (45%) and 16 female (55%).

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

The Barbour's map turtle is currently listed in Florida as a State-designated Species of Special Concern. A biological status review determined that the Barbour's map turtle 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 the FWC Commissioners approve the Imperiled Species Management Plan and associated rules changes. 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.

The Barbour's map turtle is typically found in limestone-bottomed streams and rivers with ample basking sites consisting of snags and fallen trees. Females have enlarged heads and attain a shell length of 6-12.6 inches, which is almost twice that of males. The species naturally occurs in the Panhandle in the Apalachicola and Choctawhatchee river drainages, but the origin of the population in the Ochlockonee River is unknown. There is a report of an introduced population in the Ocklawaha River in Marion County, and two sightings, both adult females, from the Wacissa River in Jefferson County.

FWC biologists from Apalachicola River WEA conducted four days of distribution surveys in October 2014 for Barbour's map turtles on the lower Apalachicola, Brothers, and Chipola rivers. They observed 711 Barbour's map turtles. The Chipola River section continues to have the most turtles counted with 507 seen in 2014. The total count for 2014 is lower than the 920 counted in 2013; however, environmental factors including the river's height and the difference between air and water temperature likely impact the number of turtles basking on logs and thus, staff's ability to detect them. For example, in 2014, water in the Chipola River was higher (around six feet) than in 2013 (around four feet), submerging more of the downed limbs and logs upon which turtles bask. Surveys resumed on the Apalachicola River in May 2015 and staff detected 874 Barbour's map turtles. During the entire study, 293 miles of Panhandle rivers were surveyed: 135 miles of the Apalachicola (including 38 miles of the Chipola River), 93 miles of the Choctawhatchee, and 65 miles of the Ochlockonee. The species' range was extended approximately six miles downstream on the Choctawhatchee to include the first vouchered record (via digital photo) for Walton County and about 12 miles upstream and 37 miles downstream on the Ochlockonee, which includes the first records for Wakulla County.

To better understand observed abundance recorded during the distributional surveys, three 3.1-mile sites on the Apalachicola River and five 3.1-mile sites on the Ochlockonee River were selected and surveyed five times each in short succession during late May and early June 2015. Observed map turtle totals for each of the five surveys (summed by river by date) were 852, 818, 790, 536, and 679 for the Apalachicola (9.3 miles surveyed); and 100, 99, 83, 118, and 149 for the Ochlockonee (15.5 miles surveyed). Both observed numbers and area of occupancy were greater than had been reported previously.

Gopher Tortoise (*Barbara Almario, Travis Blunden, Deborah Burr, Traci Castellón, Norberto Fernandez, Alan Hallman, Randy Havens, Kelli Herrick, Donna Jones, Nathan Lambert, Aubrey Pawlikowski, Diana Pepe, Jonathan S. Roberts, Fred Robinette, Eric Seckinger, Steve Shattler, Kathleen Smith, and Wade Ulrey*)

Management – The gopher tortoise is a State-designated Threatened species in Florida. Gopher tortoises are keystone species that support the structure and functions of an ecosystem, as

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their burrows are home to over 350 other species. In order to conserve the species and its habitat, FWC published its first Gopher Tortoise Management Plan in 2007 and revised it in 2012. The Gopher Tortoise Management Plan (<http://myfwc.com/media/2286685/GT-Management-Plan.pdf>) is intended to guide the continued conservation of the gopher tortoise in Florida through 2022. The plan places an emphasis on landowner incentives, habitat management, and maintaining the gopher tortoise as a keystone species through commensal species conservation. FWC continues to coordinate with the stakeholder Gopher Tortoise Technical Assistance Group on gopher tortoise conservation issues. The continued participation of stakeholders is vital to the long-term conservation of the species.

Increased efforts have been made to engage Florida residents in gopher tortoise conservation. The Gopher Tortoise Conservation Program offers three 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 gopher tortoise transportation, and silt fence installation. The mortality data collection program asks volunteers to notify FWC of any deceased or injured gopher tortoises they discover and to report the mortality data via the new online web form (<https://public.myfwc.com/HSC/GopherTortoise/GTMortality.aspx>). This data allows FWC biologists to determine potential “hotspots” of gopher tortoise mortality throughout the State. Student interns use Geographic Information Systems (GIS) to create a map that illustrates potential mortality “hotspots” throughout Florida. The waif tortoise transportation program, or “Tortoise Taxi,” assembles volunteers to transport waif, rehabilitated, sick, or injured gopher tortoises to the appropriate location, based on their status. The silt fence installation program recruits volunteers to install temporary fencing around waif recipient sites for the soft release of gopher tortoises. The program acts as an additional incentive to landowners who would like to establish waif recipient sites, as it reduces labor costs for silt fence installation. The volunteer program has also utilized student interns from Florida State University who have contributed approximately 368 hours during FY 2014-15 to help implement actions in the management plan.

FWC has continued to work with stakeholders to discuss and explore possible solutions to challenges encountered with gopher tortoise permitting and conservation issues. Constant discussion on implementing new improvements to the guidelines occurs with help from stakeholders. In February 2015, FWC Commissioners approved new revisions to permitting guidelines. These revisions include limiting the amount of improved pasture on future recipient sites permitted by FWC. The Commission added criteria to help establish thresholds to ensure habitat and cattle densities are compatible with gopher tortoise recipient sites. Staff, consulting with stakeholders, developed these criteria, based on recommendations from a University of South Florida research study. Additionally, new requirements address mortality on recipient sites, and document burrow size class on monitoring burrow surveys to document recruitment. All of these new guidelines help improve overall conservation on recipient sites and put in safeguards to help ensure long-term conservation success.

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), includes approximately 15,305 acres of gopher tortoise habitat that 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, 41 recipient

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sites with an available capacity of 39,251 tortoises are permitted. An additional three recipient site permit applications are currently under review with potential available capacity for an additional 1,301 tortoises on 916 acres of gopher tortoise habitat. During FY 2014-15, FWC-issued permits allowed the relocation of 3,029 tortoises.

During FY 2014-15, FWC continued with efforts to identify solutions for waif tortoises. Waif tortoises are gopher tortoises that have been removed from the wild (either unauthorized or due to injury) and for which their origin cannot be determined. One solution includes identifying willing landowners to care for waifs on their property, designating the land as a “waif tortoise recipient site.” One waif site in Lake County was established, and two tortoises (out of 13 possible) have found permanent homes at this site. FWC is currently in the process of developing several additional waif sites by working with public and private landowners to establish sites in Manatee, Duval, Miami-Dade, and Sarasota counties. FWC is working with wildlife rehabilitators to place waifs currently undergoing rehabilitation at designated waif recipient sites, or releasing them back to the wild if location information is known. Under a current Memorandum of Agreement with the South Carolina Department of Natural Resources, there is also an ongoing effort to restock depleted populations of gopher tortoises on public lands in South Carolina, through the FWC waif program. FWC staff are currently working with South Carolina Department of Natural Resources during FY 2014-15 to amend the Memorandum of Agreement to extend the time and to increase the number of gopher tortoises transferable to South Carolina by an additional 100 tortoises.

FWC continues to work closely with public and non-profit organizations, as well as private landowners, to identify and provide incentives for gopher tortoise conservation on private lands. Staff regularly participates in workshops that promote conservation opportunities and habitat management incentives for private landowners to benefit from having wildlife on their property.

The gopher tortoise program has utilized student interns from Florida State University since 2011. Interns completed many of the management plan actions, many of which may not have otherwise been completed with existing staff resources. The interns also benefit from gaining professional experience in wildlife conservation and working in a government agency. Examples of projects completed by interns during FY 2014-15 include: using Geographic Information Systems (GIS) to identify private lands containing priority gopher tortoise habitat in an attempt to establish long-term recipient sites on private landowners’ properties; researching agency records of previously-issued incidental take permits to promote humane relocation; creating the Florida Guide to Gopher Tortoise Friendly Plants (<http://myfwc.com/wildlifehabitats/managed/gopher-tortoise/help/plant-guide/>) that provides plants that tortoises use for forage; and creating a contingency plan to address large-scale mortality events should they occur on public or private lands in the future.

In order to better understand gopher tortoise population distribution and trends in Florida, a survey protocol adopted by range-wide partners including the Southeastern states, Line Transect Distance Sampling was implemented. Under a three-year contract (funded in part by a Federal grant) with The Joseph W. Jones Ecological Research Center, 25 select public conservation lands in Florida are being surveyed using this standardized technique, and 40 staff from the Florida Department of Environmental Protection (FDEP), Florida Department of Agriculture and Consumer Services (FDACS), and FWC have been trained. Population size and density estimates for 18 conservation lands have been completed between August 2014 and June 2015. Little Talbot Island State Park had the highest population density. Withlacoochee State

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Forest Citrus Tract had the largest population size of the sites surveyed thus far. Burrow occupancy ranged from 29% at Cayo Costa State Park to 69% at Little Talbot Island State Park. Burrow size class graphs indicate a predominance of adult burrows (more than 9.1 inches in width) in most populations. However, 45% of occupied burrows at Gold Head Branch State Park were less than or equal to 9.1 inches in width and small juvenile tortoises (less than 4.7 inches burrow width) were present at Bell Ridge Wildlife and Environmental Area (WEA), Cayo Costa State Park, Ft. White WEA, Gold Head Branch State Park, Guana River Wildlife Management Area (WMA), Ichetucknee Springs State Park, Little Talbot Island State Park, Moody Branch WEA, O'Leno-River Rise State Park, and Watermelon Pond WEA. Joe Budd WMA, Hilochee WMA, and Perry Oldenberg WEA appeared to have very low numbers of juvenile tortoises (0, 0 and 3.8% of occupied burrows, respectively, were less than or equal to 9.1 inches in width). FWC expects to complete surveys for all of the 25 identified lands in FY 2015-16. Gopher tortoise interns help input survey data into a GIS database in order to identify, monitor, and track potential viable and supporting populations throughout Florida.

During FY 2014-15, approximately \$63,700 in funding assistance was provided to assist gopher tortoise habitat management activities that benefited more than 676.7 acres under local government ownership. Some habitat management and improvement activities conducted include fire line preparation, prescribed burns, disking, roller chopping, selective tree removal, and chemical treatment of invasive species through herbicide applications.

FWC is collaborating with an Associate Professor, Nessi Goldberg, from Jacksonville University to survey the tortoise population in coastal sand dune habitat at Huguenot Memorial Park in Jacksonville. The project will provide a population estimate for the park and provide a hands-on learning opportunity for students assisting with surveys. The study is also designed to assess the quality of data collected by "citizen scientists" (i.e., students) compared with professional biologists, thereby helping to inform development of citizen science programs and training. Professional biologists conducted a complete survey of the coastal dune habitat using a double observer method in May to June 2015, followed by scoping of all burrows using a video-camera scope. A botanist from Jacksonville University conducted vegetation surveys. Students will conduct follow-up burrow surveys in Fall 2015.

Wildlife Management Area and Wildlife and Environmental Area Activities – FWC has annually surveyed, monitored, and assessed the status of the gopher tortoise on Pine Log WMA (Bay and Washington counties) since 2004 and Point Washington WMA (Walton County) since 1993. Staff divided the WMAs into clusters of primarily upland, sandhill habitat for management and logistical purposes. Pine Log WMA, sampled annually, contains 15 clusters (2,479 acres). Point Washington WMA, surveyed on a three-year rotation, contains 33 clusters (15,427 acres). Due to a vacancy in the biologist position, gopher tortoise surveys were not conducted in FY 2013-14. The 2014-15 Pine Log WMA surveys yielded 694 burrows, including 51 new burrows. Thirteen percent of these burrows were classified as either "active" or "possibly active." The percentage of "active" and "possible active" burrows has declined slightly since 2013 when 15.3% percent of burrows retained that classification. However, the number of new active burrows found in 2013 was less than the number of new active burrows found in 2015. The increase in new burrows suggests that gopher tortoise activity remains steady and recruitment is occurring at Pine Log WMA. As surveys have not been completed on Point Washington WMA, there is no data to report at this time. Habitat improvement and maintenance on Pine Log and Point Washington WMAs continues to be implemented in

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cooperation with the FDACS. Prescribed fire remains the preferred strategy for maintaining habitat; however, herbicide is effective in managing hardwoods when fire is impractical. Habitat management guidelines are intended to produce favorable habitat conditions in and around gopher tortoise clusters, improve recruitment, increase the population, and allow for expansion of clusters into adjacent habitat.

At Herky Huffman/Bull Creek WMA in Osceola County, in order to determine the effort needed for a complete gopher tortoise survey on the WMA, staff conducted a pilot survey during FY 2014-15. Nearly 27,887 feet of transects were surveyed with 25 tortoises detected. The overall encounter rate for the area was one tortoise every 1,109 feet. Using this data, an estimated 115,305 feet would need to be surveyed to provide a population estimate for the area.

During FY 2014-15, FWC continued a multi-year comprehensive burrow survey, designed to evaluate the entire 200,000 acres of Blackwater WMA, located in Okaloosa and Santa Rosa counties. The purpose of the survey is to provide the FDACS, the lead land manager on the area, with habitat improvement recommendations. Transects of suitable habitat are traversed by foot or all-terrain vehicle with each burrow encountered assigned a unique identification number. In addition, FWC recorded the location, status (“active,” “possibly active,” “inactive,” and “abandoned”), orientation, and width of burrows. During FY 2014-15, FWC surveyed approximately 3,305 acres of suitable gopher tortoise habitat and located 255 burrows. To date staff has surveyed over 86,000 acres of habitat with 3,592 burrows located. The agency has classified only 15% of gopher tortoise burrows as abandoned when staff did not observe any tortoise activity. 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.

In 2010, Apalachee Wildlife WMA (located in Jackson County) received funding from a State Wildlife Grant and from gopher tortoise mitigation funds to remove overgrown hardwoods, thin dense pine stands, and apply prescribed fire on 775 acres of degraded gopher tortoise habitat over a three-year period. Prior to habitat restoration and five years after initial treatments, WMA staff conducted surveys for gopher tortoises according to the protocol in FWC’s 2007 Gopher Tortoise Management Plan. In January 2010 and 2015, WMA staff surveyed 23 transects that were each one acre in area; the same transects were surveyed both years. Density for the survey area was 1.11 tortoises/acre in 2010 and 1.30 tortoises/acre in 2015. According to the protocol, more than one tortoise per acre is considered a high density; therefore, Apalachee WMA has a high density of tortoises. Future habitat management actions are expected to maintain or increase the density of tortoises on Apalachee WMA. These actions include maintaining a fire return interval of one to three years in tortoise habitat and additional hardwood control with mechanical or chemical treatments, if necessary.

Gopher tortoise surveys and monitoring continued in May 2015 on the Fitzhugh Carter Tract of Econfina Creek WMA (located in Washington County). The 2,155-acre tract contains approximately 1,200 acres of sandhill uplands. For logistical and accounting purposes, FWC groups gopher tortoise burrows on the area into six clusters and monitoring protocol follows that established for Point Washington WMA. The 2015 surveys yielded 631 total burrows; 79 more burrows than were documented in 2014 (**Table 7**). Staff classified 24 percent of burrows as “active” or “possibly active.” Compared to data from the 2014 survey, the number of active burrows increased by 14 and the number of possibly active burrows increased by ten. Gopher

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tortoise burrow surveys on the Carter Tract have revealed a continuous cycle of burrow creation and abandonment over time.

Actions to improve habitat, including the removal of sand pine and slash pine plantations, and planting longleaf pine and wiregrass, were implemented in 2007. 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. Annual surveys will continue on the area during 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 burrow count and status by year at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, FL.

| Burrow Status | Year | | | | | | | | | |
|---------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| | 2005/06 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
| Active | 53 | 12 | 26 | 17 | 73 | 76 | 92 | 85 | 102 | 116 |
| Poss. Active | 12 | 1 | 9 | 28 | 23 | 47 | 28 | 38 | 28 | 38 |
| Inactive | 95 | 64 | 40 | 49 | 64 | 99 | 83 | 85 | 40 | 37 |
| Abandoned | 34 | 131 | 193 | 161 | 184 | 206 | 269 | 304 | 382 | 440 |
| Total | 194 | 208 | 268 | 255 | 344 | 428 | 472 | 512 | 552 | 631 |

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 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. FWC designates all mitigation parks as WEAs.

During FY 2014-15, FWC conducted management actions for gopher tortoise habitat at all of the WEAs. In Central Florida, at Crooked Lake WEA in Polk County, staff burned 710 acres, treated 300 acres for exotic plants, and mowed 120 acres to control weedy species. Perry Oldenburg WEA in Hernando County received 128 acres of controlled burning, 270 acres of exotic plant control, and 73 acres of mechanical treatments. Gopher tortoise management at Janet Butterfield Brooks WEA in Hernando County included prescribed burning on 91 acres, exotic plant surveys and control on 210 acres, and mechanical treatment on 13 acres. Bullfrog Creek WEA in Hillsborough County had 353 acres burned, 130 acres treated for exotic plants, 80 acres mowed to control weedy species, and 26 acres mechanically treated to control hardwoods.

In south-central Florida, at Platt Branch WEA in Highlands County, FWC completed controlled burns on 325 acres. Moody Branch WEA in Manatee County had 173 acres of gopher tortoise habitat burned, 279 acres treated for exotic plants, 60 acres mowed to control weedy species, and 107 acres of forested habitat mechanically treated to control sand pine and

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hardwood encroachment. At Hickey Creek WEA in Lee County, FWC burned 21 acres, mechanically treated 12 acres, and treated an additional 302 acres of uplands for exotics.

During FY 2014-15 in north-central Florida, FWC conducted gopher tortoise management and monitoring on various WEAs in the region. On the Spring Creek and Tide Swamp Units of Big Bend WMA in Taylor County, which has been restored from off-site sand pine which was clearcut in 2006, 559.4 acres of historic sandhill were planted with containerized longleaf pine seedlings. FWC continued to monitor gopher tortoise habitat restoration projects on Belmore State Forest, Jennings State Forest, and Ralph E. Simmons State Forest Wildlife Management Areas in Clay, Duval, and Nassau Counties. Staff established photo points prior to initial herbicide treatments. Monitoring on each site is conducted at least once a year, preferably during the summer months.

Biologists used growing season prescribed fire to maintain and enhance 113 acres of gopher tortoise habitat on Branan Field WEA in Duval County and 358 acres of gopher tortoise habitat on Fort White WEA in Gilchrist County. A habitat restoration project to reduce the density of under-story hardwoods was completed in spring 2015 on Fort White WEA. This restoration covered an area of 185 acres. An herbicide application controlled re-sprouting hardwoods and prevented over-shading of native groundcover while promoting the growth of desirable species through reduced competition. Staff used dormant season prescribed fire to maintain and enhance 358 acres of gopher tortoise habitat on Lafayette Forest WEA in Lafayette County. A mid-story reduction project removed laurel oak on 303 acres of degraded gopher tortoise habitat at Lafayette Forest WEA. Dormant season prescribed fire maintained and enhanced 75 acres of gopher tortoise habitat. Growing season prescribed fire maintained and enhanced 70 acres of gopher tortoise habitat. Ongoing habitat restoration efforts include seeding 30 acres with wiregrass; 212 acres were treated to eradicate pasture grasses. The herbicide treatment is the first step in the reintroduction of native ground cover used by gopher tortoises.

Habitat Restoration Projects – The Lake Wales Ridge WEA in Highlands and Polk counties consists of nineteen tracts in. 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. Biologists established permanent photopoint locations 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 2014-15, FWC transplanted potted native plants into the restoration site. Control of exotic species through herbicide and hand-pulling, continued quarterly documentation of progress via photopoints, and a second round of acorn planting were all conducted in FY 2014-15. Volunteers also collected and planted acorns and other native plants in pots to grow in the WEA's greenhouse. An initial baseline survey for presence of gopher tortoises identified 85 burrows, with 67% either active or usable, including ten occupied during the survey.

In addition to the gopher tortoise habitat restoration site, habitat was improved or maintained across the WEA via prescribed burning of 1,637 acres. Further, a total of 20 acres of sand pines were felled using chainsaws at the Royce Unit and Carter Creek, and two acres of hardwoods were thinned using chainsaws and herbicide at the Royce Unit. Controlled burns and chainsaw treatments reduced canopy height and density, thereby allowing sunlight to penetrate to the ground level plants that gopher tortoises eat. Continued vegetation management is planned

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for FY 2015-16 to improve habitat suitability for gopher tortoises, and a second round of gopher tortoise surveys will be conducted in the 20-acre restoration area.

During FY 2014-15, 559.4 acres of historic sandhill habitat on Spring Creek and Tide Swamp Units of Big Bend WMA in Taylor County, restored from off-site sand pine that had been clearcut in 2006, were planted with containerized longleaf pine seedlings. The goal of these restoration activities is to reestablish native community species composition to increase habitat suitability for gopher tortoises and other sandhill endemic species.

During FY 2014-15, FWC continued to monitor gopher tortoise habitat restoration projects on Belmore State Forest, Jennings State Forest, and Ralph E. Simmons State Forest WMAs in Clay, Duval, and Nassau Counties. Photo points were established prior to initial herbicide treatments. FWC conducts monitoring on each site at least once a year, preferably during the summer months.

Habitat Mapping and Pilot Survey at Corkscrew Regional Ecosystem Watershed Wildlife and Environmental Area in Lee and Collier Counties – As a cooperator on the Corkscrew Regional Ecosystem Watershed WEA, it is FWC's responsibility to survey and monitor threatened and endangered species. FWC biologists designed a survey to determine the population of gopher tortoises on the WEA and using that information, provide land management recommendations to the South Florida Water Management District for improving tortoise habitat and increasing their population.

The protocol adopted by the FWC in 2012 uses the Line Transect Distance Sampling method to survey for gopher tortoises (<http://www.fws.gov/southeast/candidateconservation/PDF/GTSurveyHandbook.pdf>). This method uses a multi-faceted approach: define a sampling area using GIS, conduct a pilot survey, and then if the survey effort is reasonable for staff, conduct the full survey.

Staff designed a pilot survey in FY 2014-15 to determine the effort needed to conduct a full survey. Survey transect starting locations were chosen by placing 100 random points within the mapped sampling area of two units in the WEA: the Cypress Dome Trails and the Corkscrew Marsh. The survey protocol consisted of three observers walking each transect. The middle observer located burrows and navigated the transect using a Trimble, which is a handheld GPS unit. The other two observers searched for burrows on either side of the middle observer. When a burrow was located, FWC biologists scoped each burrow with an infrared camera on a flexible tube attached to a video monitor to identify tortoise-occupied burrows. If staff discovered a gopher tortoise, they used the Trimble to mark the location's. Only gopher tortoises (and not burrows) were counted in the results.

Staff discovered four gopher tortoises in the Cypress Dome Trails unit during the pilot survey, yielding a low 0.31 miles/tortoise encounter rate. No gopher tortoises were located in the Corkscrew Marsh unit. As a result of the low encounter rate, FWC biologists decided not to pursue the full survey at this time. Future considerations include reducing the sampling frame, conducting another pilot survey during a different time of year, or postponing the full survey until the appropriate land management activities, such as prescribed fire, have been conducted that would improve the potential for gopher tortoises on the WEA.

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Sea Turtles (*Beth Brost, Simona Ceriani, Allen Foley, Robert Hardy, Shigetomo Hiramama, 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: green, leatherback, hawksbill, and Kemp's ridley sea turtle (all Federally-designated Endangered) and the loggerhead (Federally designated Threatened). The Agency 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. Agency staff served on several scientific advisory committees, governing boards, working groups, and committees during FY 2014-15, including: the Archie Carr Sea 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 2014-15, 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 [Section 379.2431(1), Florida Statutes] and the USFWS' Recovery Plans for five species of sea turtle (also known as marine turtles) in Florida. FWC's efforts to ensure protection of Endangered and Threatened sea turtles, their nests, hatchlings, and habitats emphasize a cooperative approach with the diversity of stakeholders who depend on Florida's beaches, reefs, and coastal areas for their livelihood and recreation. Public education about sea turtle biology and important conservation issues continues to be the major focus of FWC's sea turtle management efforts as well as partnering with State, local, and Federal agencies, conservation groups, and industry.

In March 2015, FWC hosted the 19th Annual Marine Turtle Permit Holder Workshop in Melbourne Beach, Florida. Over 350 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 26 businesses (from Arizona, California, Florida, Hawaii, Louisiana, Michigan, New Jersey, New York, Tennessee, Texas, and Washington) to identify lighting options that are appropriate for use adjacent to Florida's sea turtle nesting beach. Agency staff assessed 54 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.

FWC collaborated with biologists and experts from Florida Power and Light to identify a streetlight option appropriate for use on roadways along sea turtle nesting beaches. Working

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together, the team identified a long wavelength LED that was full cutoff and with additional shielding options. The team then tested the impact of this light on hatchling sea turtle orientation behavior in the field. Hatchlings were able to orient correctly toward the water on the beach adjacent to the prototype streetlight fixture, making this an appropriate option along nesting beaches where streetlights are necessary for human safety.

During FY 2014-15, 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 Florida’s Panhandle conservation lands and assisting local governments in their efforts to reduce the impact of beachfront lighting on sea turtles, their nests, and nesting beaches. Staff completed the revision of the manual, “Understanding, Assessing, and Resolving Light-Pollution Problems on Sea Turtle Nesting Beaches.” Another project component focuses on developing effective methods to educate residents and visitors in Florida’s coastal Panhandle counties about sea turtles and how they can help protect nesting females, nests, hatchlings, and nesting habitat. Several local governments, including Franklin County, Gulf County, and the City of Destin, used funds to enhance compliance with their local lighting ordinances by hiring additional staff or providing information and appropriate bulbs and fixtures to beachfront properties.

FWC staff presented information on sea turtles and lights in several venues, including presentations for local government code enforcement and environmental staff at a Sea Grant workshop in Panama City Beach. Staff also presented the Sea Turtles and Lights Course to a total of 160 participants including staff at the Cape Canaveral Air Force Station, members of a local sea turtle conservation group in Marathon, local government staff in Broward County, and the Florida Association of Code Enforcement in Naples. Staff displayed the sea turtles and lights trailer at the Dark Sky Festival, West Palm Beach, and at Naples Florida Association of Code Enforcement meeting.

FWC reviewed 192 applications as requested by FDEP, water management districts, and the State ClearingHouse during FY 2014-15 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 ClearingHouse. FWC participated in meetings and conference calls on these projects and on other issues involving sea turtles with local governments, other State and Federal agencies, and diverse stakeholders. FWC also participated in the development of the Florida Statewide Beaches Habitat Conservation Plan (in cooperation with FDEP). Staff conducted over a hundred site inspections as part of FWC’s environmental commenting responsibilities, including lighting inspections conducted at the invitation of local governments and property owners.

During FY 2014-15, sea turtle permits became part of the FWC’s online portal. This allows applicants and permit holders to apply for permits or amendments, to renew their permits, and to submit reports and monitoring electronically. This has significantly streamlined the sea turtle permit process, allowing staff to review and take action on pending requests more quickly and efficiently. Permit renewal is also simplified, as the permit holder’s information is maintained in the system and automatically uploaded to the application each year. Permits are now sent directly to the applicant upon issuance, removing the need for staff to print, sign, scan, and email or mail the approved permit. Staff hosted five online webinars to introduce permit holders to the online permit program.

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FWC reviewed and approved approximately 282 applications and amendment requests for conservation activities with sea turtles, including nesting beach surveys, stranding and salvage work, research, public turtle walks, rehabilitation at captive facilities, and educational displays during FY 2014-15. FWC issued 25 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 28 permit requests for research involving Threatened and Endangered sea turtles, for a total of 121 distinct research projects. Forty 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 staff coordinated transfer and release of sea turtles undergoing rehabilitation and assisted with coordinating sea turtle releases; this included 220 sea turtles that stranded in New England in late 2014 as part of a record-breaking prolonged cold-stunning event. The turtles then were transferred to Florida for rehabilitation. Over 70% have been successfully rehabilitated and released as of June 30, 2015.

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. Documentation of stranded sea turtles provides information on mortality levels, and is an important component of monitoring the status of sea turtle populations. The Network also identifies and monitors mortality factors for sea turtles.

During FY 2014-15, a total of 2,379 dead or debilitated sea turtles were documented (1,116 green turtles, 949 loggerheads, 248 Kemp's ridleys, 21 hawksbills, 13 leatherbacks, and 32 sea turtles not identified by species). FWC responded to 1,889 reports regarding sea turtle concerns (primarily reports of dead, sick, or injured sea turtles), transported 93 sick or injured sea turtles to rehabilitation facilities, and conducted necropsies on 228 carcasses. Seventeen training workshops, involving 436 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/flstssn/>) for use by various entities such as NOAA-Fisheries, FWC law enforcement, and protected species management personnel. This website shows numbers by county, week, and species, and compares current values to the previous five-year and ten-year averages to quickly identify and characterize any unusual sea turtle mortality events.

The population-monitoring program involves collection of nesting and habitat information throughout the geographic range of sea turtles in Florida. Approximately 90% of the world's largest loggerhead nesting population occurs in Florida, and the green turtle and leatherback nesting populations are of regional significance. 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, assesses data collection error rates, analyzes data trends, and serves as a clearinghouse for information on sea turtle populations and habitats. During FY 2014-15, staff presented six

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workshops around the State to 1,088 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 2014, 213 survey areas were monitored, comprising 829 miles of beaches. Statewide, in 2014, the program documented 86,870 loggerhead nests, 5,895 green turtle nests, 1,604 leatherback nests, two hawksbill nest, and seven 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 since 1979.

The Index Nesting Beach Survey Program collects data that are more detailed 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 26 years at 478 index beach zones, surveyed daily during each 109-day season (May-August). These efforts currently provide more than six million records in the Index Nesting Beach Survey Program database. Annual survey or training, on-site verification, and consistency of the methods used during the 26 years of the program and among the 246 miles of index beaches, make the resulting database a representative assessment of sea turtle nesting. The program provides a reliable way to detect changes in the abundance of Florida sea turtles. In 2014, the program documented increasing trends in nesting for loggerheads, green turtle, and leatherbacks.

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

In June 2015, 83 loggerheads and two Kemp's ridley turtles 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 (45) of the loggerheads had been previously tagged, providing data on growth and residency in Florida Bay. Biologists released all turtles shortly after capture. This project has

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been conducted continuously since 1990. Some individual turtles have now been captured numerous times over periods as long as 19 years.

FWC studies the abundance, distribution, behavior, and diet of recent hatchlings and small juvenile sea turtles in open-ocean habitat off Florida's coasts. These sea turtles live in surface waters and occupy a pelagic stage (deep ocean water) in sea turtle development. This stage precedes the stage when they will live primarily along the bottom of more shallow, coastal areas. Study objectives measure relationships between open-ocean habitat and pelagic sea turtle abundance, and to measure threats unique to this habitat such as mortality and morbidity from plastics and tar ingestion. FWC records physical oceanographic measurements, sea turtle behavior, their relationships to floating objects and other organisms, sea turtle weights and measures, and evidence of ingested plastics and tar. During July and August 2014, FWC researchers sampled waters offshore of Pensacola, Florida, Venice, Louisiana, and Port Aransas, Texas. Researchers captured 59 juvenile sea turtles of four species including 43 green turtles, 12 Kemp's ridleys, two hawksbills, and two loggerheads. A miniature, solar-powered satellite transmitter was deployed on one Kemp's ridley turtle captured offshore of Venice, Louisiana. This individual's movements were monitored for 42 days, during which the turtle traveled approximately 9,134 miles out of the Gulf of Mexico and into the Atlantic Ocean off southeast Florida. During 2014, FWC researchers used satellite remote sensing to conduct a multi-year assessment of the Gulf of Mexico Sargassum seaweed habitats of recent hatchlings and small juvenile sea turtles. This research identified regions of the Gulf and time periods where habitat is concentrated. FWC also used satellite images of Sargassum seaweed habitats to understand the swimming behavior of satellite-tracked juvenile sea turtles. Some results from the current three-year project were presented at the Southeast Regional Sea Turtle Meeting during February 2015. This work was also instrumental in understanding the impacts of the Deepwater Horizon oil spill. FWC has completed a study of the behavior of 11 juvenile Kemp's ridley sea turtles that used satellite tracking and remote sensing techniques. FWC found that Kemp's ridley sea turtles exhibit both active (swimming) and passive (drifting) behaviors. Kemp's ridley sea turtles were in a drifting behavioral state in the presence of *Sargassum* or when ocean surface winds were sufficiently low for *Sargassum* to accumulate at the surface. The study has been expanded to on-water work in northern (Venice, LA) and western (Port Aransas, TX) Gulf of Mexico study areas. This expanded coverage will allow FWC to answer several questions regarding the density and life history of Kemp's ridley sea turtles across the northern Gulf. It is known that *Sargassum* is typically more abundant in the western Gulf but it is not known if the density of Kemp's ridley sea turtles increases as habitat increases. The western Gulf is also very close to the primary Kemp's ridley sea turtle nesting beaches. This allows FWC to study Kemp's ridley sea turtles across their entire juvenile range. Now, FWC is repeating this behavioral study with a focus on juvenile green turtles to determine if their behavior is similar.

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. FWC hosted a workshop at the recent International Symposium on Sea Turtle Biology and Conservation, which brought together marine conservation managers and researchers regarding sea turtle information needs. For more information on the Sea Turtle Research Program, please visit <http://myfwc.com/research/wildlife/sea-turtles/>

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At-Risk Snake Surveys (*Diane Alix, Barbara Almario, Kelli Herrick, Patrick McElhone, and Fred Robinette*)

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 Wildlife Management Area in Okaloosa and Santa Rosa Counties – In an effort to document presence of these listed species and determine the efficacy of the survey method, FWC installed a box-style snake trap on the WMA in suitable habitat. To maximize the catch of target species and minimize capture of non-target species, staff installed the trap on the edge of a wildlife opening which is maintained by FWC. The trap was installed in April 2015 and monitored through June 2015. Throughout the trapping period, biologists captured 105 individuals representing 15 different wildlife species. Of the target species, five individual Florida pine snakes (four adults and one juvenile) and one adult Eastern diamondback rattlesnake were captured. Additionally, 18 individuals of four non-target snake species were captured. Upland snake trapping will continue in FY 2015-16 at additional locations throughout the WMA.

Pine Log and Point Washington Wildlife Management Areas in Bay, Washington, and Walton Counties – In an effort to document presence of these species, four box-style snake traps were installed – three at Point Washington WMA and one at Pine Log WMA. Staff placed the traps in upland sandhill habitat adjacent to mesic habitats to maximize the number of reptile and amphibian species each trap could potentially intercept. The traps consisted of four 100-foot drift fence arms with two five-gallon buckets at the end of each arm and the box-style snake trap in the center. FWC opened the traps between September 2014 and March 2015. Snake traps on Pine Log WMA yielded captures of 22 individuals representing seven different wildlife species; while traps on Point Washington WMA captured 28 individuals representing 13 species. At Pine Log WMA, five snakes of three species were captured. This included the capture/release of a juvenile Florida pine snake. Snake traps on Point Washington captured nine snakes of four species.

Fitzhugh Carter Tract of Econfina Creek Wildlife Management Area in Washington County – In an effort to document presence of these species, three box-style snake traps were installed in spring 2010. Staff placed the traps in upland sandhill habitat adjacent to mesic habitats to maximize the number of reptile and amphibian species each trap could potentially intercept. The traps consisted of four 100-foot drift fence arms with two five-gallon buckets at the end of each arm and the box-style snake trap in the center. The traps were used between September and October 2014, and March and April 2015. Drift arrays captured 300 individuals of 26 wildlife species on Carter Tract, including 24 individuals of seven snake species. On

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consecutive days in April, FWC captured a juvenile and adult Florida pine snake in the same trap. There were also two Eastern diamondback rattlesnakes captured during FY 2014-15. Finally, staff documented two Florida pine snakes as incidental observations over 1.5 miles west of the snake trap captures while surveying for the State-designated Threatened gopher tortoise. This allows FWC to conclude that Florida pine snakes are likely inhabiting several areas and reproduction is occurring on or near the Carter Tract.

Tate's Hell State Forest in Franklin and Liberty Counties – In FY 2014-15, FWC constructed 15 drift fence arrays on Tate's Hell to update survey information on the reptile and amphibian communities of the forest. All arrays included pitfall and funnel traps, and in three drier sites, large box-style snake traps. Since November 2014, FWC has conducted surveys for two weeks of every month. On March 3, 2014, staff detected an Eastern diamondback rattlesnake basking near an array in a dry wetland. On March 10, 2014, an Apalachicola kingsnake was captured in a funnel trap in a wet prairie site. Staff have also encountered Apalachicola kingsnakes on three other occasions this year while conducting surveys for red-cockaded woodpeckers.

Eastern Indigo Snake (*Kevin Enge and Alan Hallman*)

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. FWC is collaborating with Mark Endries (USFWS) to publish a manuscript on potential habitat models for the indigo snake in Florida. FWC collaborated with The Orianna Society (a privately funded organization to conserve indigo snakes), Central Florida Zoo, Atlanta Zoo, Auburn University, The Nature Conservancy, Georgia Department of Natural Resources, and USFWS to discuss plans to reintroduce indigo snakes into a site in the Panhandle, where the last verified record was in 1999. In October 2014, FWC staff gave a presentation on the status of the Eastern indigo snake at the reintroduction meeting held in Georgia. In addition, the agency provided a potential habitat model to the USFWS and to an environmental consultant; this model is being used to determine whether surveys for indigo snakes are needed at proposed development sites.

Camp Blanding Wildlife Management Area in Clay County – During FY 2014-15, FWC and Camp Blanding staff monitored Camp Blanding Wildlife Management Area (WMA) for Eastern indigo snakes. While no formal search was conducted, any incidental sightings were to be recorded and reported to Camp Blanding staff. One indigo snake was found road-killed on October 30, 2014, near the ammo supply point in the cantonment area near Whitmore Lake Road. A tail clipping was obtained for DNA analysis.

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 once the FWC Commissioners approve the Imperiled Species Management Plan and associated rules. The short-tailed snake, which is only found in Florida, is currently listed as State-designated Threatened and will remain so after the FWC Commissioners approve the draft species action

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plan. The USFWS has been petitioned to list both species 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.

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 were compiled from museum, Florida Natural Areas Inventory, and FWC survey databases before beginning this project. These records were mapped to identify road survey routes in areas without sightings or with no sightings since 2000, particularly of the Southern hognose snake. FWC solicited sightings of these species 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>) and Diamondback Rattlesnake Registry (<https://public.myfwc.com/fwri/drs>). In FY 2014-15, FWC added 385 more records: 31 Southern hognose, 11 short-tailed, 65 Florida pine, and 278 Eastern diamondback rattlesnake. Photos received and dead specimens collected were vouchered in the Florida Museum of Natural History.

From September to November 2014, FWC checked traps along two drift-fence arrays in sandhill habitat at Camp Blanding Military Reservation in Clay County, the Ocala National Forest in Marion County, Suwannee Ridge Mitigation Park Wildlife Environmental Area (WEA) in Hamilton County, and St. Marks National Wildlife Refuge in Wakulla County. Staff installed these arrays in March 2014, and each array had four fences totaling 400 feet, one center box snake trap, eight funnel traps, and eight pitfall traps. FWC captured 1,225 amphibians and reptiles of 42 species, including one Eastern diamondback rattlesnake each at Suwannee Ridge WEA and St. Marks National Wildlife Refuge, and one Florida pine snake at the Ocala National Forest. One road-killed Southern hognose snake was found near the entrance to Suwannee Ridge; this represented the first record from Hamilton County. In March 2015, FWC installed eight new arrays in sandhill habitat at Camp Blanding Military Reservation and Jennings State Forest in Clay County, Twin Rivers State Forest in Madison County, and Apalachicola National Forest in Leon County. There are no records of Southern hognose snakes from the first two areas, but recent records exist from the latter two areas. From April-June, FWC captured 1,917 amphibians and reptiles of 45 species, including one Southern hognose snake at Apalachicola National Forest; one Eastern diamondback rattlesnake each at Camp Blanding, Jennings State Forest, and Apalachicola National Forest; and seven Florida pine snakes at Apalachicola National Forest (one recapture); three Florida pine snakes at Camp Blanding; four Florida pine snakes at Jennings State Forest (one recapture); and three Florida pine snakes at Twin Rivers State Forest.

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

A one-year pilot status survey will begin 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 once the FWC

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Commissioners approve the Imperiled Species Management Plan and associated rule changes. The survey will address various tasks identified in these plans, including determining current distribution, assessing effective survey methods, and collecting genetic samples for future taxonomic studies. FWC will obtain locality records from monthly surveys and from an FWC webpage soliciting sightings. FWC developed a reporting webpage (<https://public.myfwc.com/fwri/flkeysreptiles>), which went online in June and already has produced two Key ringneck snake records on Key West and numerous red rat snake records. FWC conducted a scouting trip in January 2015 to meet with land managers of conservation lands and to select possible survey sites. The USFWS and Florida Department of Environmental Protection obtained permits to survey National wildlife refuge and State park lands.

FISH

Atlantic, Gulf, and Shortnose Sturgeon (*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 2014-15. 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 these agencies. While conducting alligator gar research from the Escambia River, researchers incidentally collected 11 adult sturgeon during sampling in spring 2015. These fish were inspected for tags, measured, weighed, and released. Fish that were not previously tagged were implanted with new tags prior to release. FWC submitted all information collected, including capture location, to USFWS. FWC will continue to coordinate and collaborate with NOAA-Fisheries and USFWS during the upcoming year while conducting additional alligator gar sampling from the Yellow River in the Panhandle.

Shortnose Sturgeon Activities – The shortnose sturgeon is a Federally-designated Endangered species. No shortnose sturgeon were caught by FWC or reported in Florida during FY 2014-15. FWC will provide all future collections of the species and any associated information to NOAA-Fisheries, USGS, and USFWS in order to assist with population monitoring and management of this species.

Smalltooth Sawfish (*Gregg Poulakis, Rachel Scharer, and Philip Stevens*)

The smalltooth sawfish is a Federally-designated Endangered species that was once common in the coastal and estuarine waters of the southeastern U.S., but during the 20th century it became rare throughout its North American range. FWC attributes this decline to two main factors: 1) bycatch in commercial and recreational fisheries; and 2) life history parameters that

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include late maturity and production of small numbers of young. Smalltooth sawfish in Florida are currently primarily found only from Charlotte Harbor (Charlotte County) to the Florida Keys (Monroe County).

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

In November 2004, FWC initiated long-term monitoring specifically designed to collect data on the life history, biology, and ecology of the smalltooth sawfish. During FY 2014-15, staff performed sampling for smalltooth sawfish in the Charlotte Harbor estuarine system, which is located on the southwest Gulf Coast of Florida. Monthly sampling for smalltooth sawfish was conducted in the Caloosahatchee River (Lee County) and in upper Charlotte Harbor (Charlotte County) using a multi-gear approach.

During FY 2014-15, FWC staff captured and released 77 smalltooth sawfish, including 23 recaptures. A variety of data were taken on all captured sawfish (*e.g.*, lengths, rostral tooth counts), and each new animal was tagged and released. Total lengths ranged from approximately two and a half to six feet; all of these sawfish were immature. Captured sawfish were tagged with a colored tag embossed with FWC's tagging hotline phone number, a PIT (Passive Integrated Transponder) tag (similar to electronic tags used for dogs and cats), an acoustic tag, and were released at the site of capture. PIT tags remain with the sawfish for life, and researchers carry the PIT tag reader to detect recaptures. Researchers use the acoustic tags to track sawfish movements using hydrophones (underwater listening devices that determine short-term, fine-scale movements) and to listen for acoustic tags at moored stations. Biologists use the data obtained to define activity space, home range, and the abiotic (non-living chemical and physical factors in the environment) preferences of this species while it resides in the nurseries. This is part of a collaborative effort between FWC and other scientists.

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

FWC staff compile and archive information received via awareness efforts (*e.g.*, calls to the FWC sawfish hotline from poster and permanent sign distribution) and research, as part of the International Sawfish Encounter Database. The Smalltooth Sawfish Recovery and Implementation Teams and NOAA-Fisheries use this database in a variety of ways, including designation of juvenile critical habitat for the species. When citizens provide information on sawfish, FWC takes the opportunity to inform responders about the smalltooth sawfish and FWC's role in its protection. 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>.

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

Federal Wallop-Breaux Sport Fish Restoration Program – During FY 2014-15, FWC

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conducted research funded through the Federal Wallop-Breaux Sport Fish Restoration Program to monitor the status and trends of Florida's riverine sport fish populations and associated fish communities. Though staff did not specifically target listed fishes during sampling, several species were collected. All information gathered during monitoring efforts contributes valuable information for developing proper conservation and management strategies to protect listed fishes in Florida.

Alternative sampling methods and species-specific research are needed to more appropriately determine the status and trends of Florida's listed fishes. During FY 2013-14, FWC released species action plans to address species-specific conservation needs for six listed fishes in Florida. Species-directed sampling projects have been initiated for the harlequin darter, Southern tessellated darter, blackmouth shiner, and saltmarsh topminnow. The goal of these projects is to design and establish sampling techniques to determine current population status and trends of the species in Florida.

Blackmouth Shiner – The blackmouth shiner is currently listed in Florida as State-designated Threatened. A species action plan has been completed for this species. Preliminary visual surveys began during FY 2014-15, and 137 blackmouth shiners were collected from eight of 43 sites sampled from the Blackwater River watershed. FWC did not collect them from any of the 41 sites sampled in the Perdido, Escambia, and Yellow rivers, however, and they were not collected at historical collection locations in the Shoal River. Future research goals are to expand the sampling area and assess the genetic structure of known populations.

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 2014-15, a total of 24 bluenose shiners were collected – 15 from Nichols Creek and nine from Boiling Creek (both Yellow River watershed). Sampling techniques used for Florida's river monitoring project appear to be sufficient for collecting the species, but species-directed sampling is necessary to determine population status and trends for the species. 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 began in FY 2014-15 and 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 system near Century, Florida. Crystal darters were not collected during FY 2014-15. 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.

Harlequin Darter – The harlequin darter is currently listed in Florida as a State-designated Species of Special Concern. The harlequin darter only occurs in the Escambia River watershed. While restricted in range, the species is regularly collected from both tributaries and mainstream Escambia River when suitable habitats (submerged woody debris) are present. Fifty-one harlequin darters were collected from the mainstream Escambia River during FY 2014-15. Additionally, a mark-recapture study to estimate the population size of harlequin darters in the Escambia River watershed began in FY 2014-15 in Big Escambia Creek (an Escambia River

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tributary). FWC researchers captured and tagged 374 harlequin darters and recaptured 53 individuals (14%). This sampling to estimate population size is ongoing and will be expanded to other Escambia River tributaries.

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 northwest Florida rivers from the Perdido to the Yellow River. During FY 2014-15, FWC collected 1,134 saltmarsh topminnows from 34 of 60 sites sampled throughout the Perdido, Escambia, and Blackwater bays using passive trapping and seining techniques. The agency will expand future sampling to the Choctawhatchee and Apalachicola bays, and will investigate techniques for estimating saltmarsh topminnow densities.

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. During FY 2014-15, five Southern tessellated darters were collected from Orange Creek (tributary to the Ocklawaha River). Information on the population status and trends of Southern tessellated darters is still unknown, but species-directed sampling will provide information important in determining the status of the species. Genetic analyses suggests the Southern tessellated darters in the Ocklawaha watershed have low genetic diversity and a small population size due to a long (hundreds of generations) isolation from other populations.

Commenting – FWC provided comments on numerous developments of regional impact, environmental resource permits, joint coastal permit applications, deadhead logging, housing developments, highways and bridges, beach renourishment, power plants, dredge and fill activities, dam removal, and other projects impacting State-listed species. Many of the proposed activities had the potential to negatively affect State-listed fishes by increased sediment loading, water quality degradation, habitat alteration, and/or indirect lethal take. Species potentially impacted included: Atlantic sturgeon, bluenose shiner, blackmouth shiner, Gulf sturgeon, harlequin darter, Okaloosa darter, Southern tessellated darter, saltmarsh topminnow, and smalltooth sawfish.

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 once the FWC Commissioners approve the Imperiled Species Management Plan and associated rules. The Black Creek crayfish inhabits streams with cool, unpolluted water with a constant flow and high oxygen content. This species is endemic to northeast 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.

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In the fall of 2014, FWC, in collaboration with partners, conducted surveys for Black Creek crayfish at 38 locations that 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 ten new occurrence locations for this species. In fall of 2015, FWC will expand this study with the hope of determining the distributional limits of this species to facilitate better conservation and management of the Black Creek crayfish.

Panama City Crayfish (*David Cook, Justin Davis, and Tom Ostertag*)

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, Panama City crayfish thrived in wet pine flatwoods with an open, herbaceous 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 biologists worked during FY 2014-15 to update the State's draft Management Plan (http://myfwc.com/media/1355365/Revised_Draft_PCC_Plan.pdf), which includes the recommendation to reclassify the species to that of State-designated Threatened. Staff will present the Management Plan to the FWC Commissioners for final action in 2016.

During FY 2014-15, FWC biologists also addressed questions involving development, construction, and other land-use conversion and maintenance activities within the historic range of Panama City crayfish and made site visits to evaluate Panama City crayfish presence and potential habitat. FWC consulted with the Florida Department of Environmental Protection (FDEP), 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. A Panama City crayfish Impact Assessment and Mitigation Tool (http://portal2.fwc.state.fl.us/sites/HSC/SpeciesCP/Listing_Conservation_and_Permitting_Subsection/PCC_2015/PCC_Impact_Assessment_and_Mitigation_Tool_ST_4-17-15.pptx) was created to assist landowners and developers in determining appropriate mitigation measures when take is unavoidable, and an associated Panama City Crayfish Conservation Fund was established to receive mitigation fees. Mitigation funds deposited into this account will be used for Panama City crayfish habitat restoration and maintenance on existing Panama City crayfish management areas.

FWC conducted extensive Panama City crayfish surveys in FY 2011-12 and FY 2012-13 on Gulf Power right-of-ways, public road edges, St. Joe Company lands, and other areas to confirm historic Panama City crayfish occurrences and to search for previously undocumented sites throughout the species' historic range. In FY 2014-15, staff surveyed additional locations for Panama City crayfish, with the majority of surveys taking place on Panama City crayfish management areas/conservation easements to assess Panama City crayfish response to habitat restoration efforts and rebounding groundwater levels. Currently, four Panama City Crayfish Management Area exist: Talkington Preserve, Marjorie's Magical Marsh/Symone's Sanctimonious Swamp, City of Lynn Haven, and D&H/Deerpoint Elementary. The Bay County Conservancy owns the Talkington Preserve and Magical Marsh/Symone's Sanctimonious Swamp. Surveys at Talkington Preserve Conservation Easement revealed expansion of Panama City crayfish across the site, and surveys at D&H/Deerpoint Elementary Conservation Easement

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and City of Lynn Haven Conservation Easement confirmed for the first time the presence of Panama City crayfish on those properties.

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. To restore degraded wet flatwoods habitat, biologists remove woody vegetation from the site and treat cut stumps with herbicide to minimize re-sprouting. Ideally, staff then use prescribed fire to prevent regeneration of woody vegetation, maintain an open canopy, and foster native herbaceous groundcover. FWC planned four habitat restoration/maintenance projects for FY 2014-15 on existing Panama City crayfish conservation easements. They included: 1) mechanical removal/herbicide of midstory hardwoods on a 7.24-acre portion of the City of Lynn Haven Conservation Easement; 2) removal of existing timber debris and stumps on a 6.4-acre portion of Magical Marsh/Symone's Sanctimonious Swamp Conservation Easement; 3) prescribed burning on the 6.4-acre portion of Magical Marsh/Symone's Sanctimonious Swamp Conservation Easement, and 4) maintenance mowing of the Talkington Preserve Conservation Easement. Staff could not complete two of these projects (one and three) due to logistical constraints. Projects two and four were successfully completed, however. FWC funded the debris/stump removal project on Magical Marsh/Symone's Sanctimonious Swamp Conservation Easement while mowing of the Talkington Preserve Conservation Easement was done in-house by FWC biologists using equipment provided by FWC. Vegetation surveys have been conducted on Panama City crayfish Conservation Easement's in past years following initial restoration efforts to track vegetative response. During FY 2014-15, staff conducted a vegetation survey on the City of Lynn Haven Conservation Easement to document pre-restoration conditions. Future Panama City crayfish habitat restoration plans include maintaining the 43 acres of previously restored wetlands (i.e. mowing, prescribed burning, limited herbicide), restoring additional Panama City crayfish habitat as funding availability dictates, and securing additional conservation easement acreage for Panama City crayfish habitat restoration as properties are identified. 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

In FY 2014-15, FWC used funds to employ a Panama City crayfish project coordinator to facilitate and oversee restoration activities on the multiple Panama City Crayfish Management Areas/Conservation Easements. Tasks included conducting site inspections; developing scopes of work; researching the status of FDEP permits, property deeds, and conservation easements; writing draft agreements; coordinating with appropriate parties for access and permissions; overseeing contracted restoration work; and providing quarterly progress reports.

In November 2013, the St. Joe Company announced an agreement to sell the majority of its timberland holdings to the Utah-based affiliate of the Mormon Church, AgReserves, which stated it intends to continue to use the land for agricultural purposes. This land transaction is potentially significant to the conservation of the Panama City crayfish because the majority of the species' known localities occur on St. Joe lands, including many that were resurveyed in April to July 2013. During FY 2014-15, FWC staff met with AgReserves representatives and determined that AgReserves owns approximately 200 acres of land within the Panama City crayfish range. Initial discussions indicated that management of those 200 acres for cattle grazing would not be detrimental to Panama City crayfish or its habitat if best management practices for Florida cow/calf operations were followed. FWC staff also met with representatives from the St. Joe Company to discuss the possibility of establishing a conservation

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banking system on St. Joe lands that would promote the long-term conservation and management of Panama City crayfish populations throughout the species' historic range and provide a streamlined permitting framework while affording private landowners a financial incentive for their conservation efforts (i.e., perpetual easements and long-term habitat management). As such, FWC biologists acquired funding to contract with a third party during FY 2015-16 to develop a habitat valuation tool. The tool would be a crucial piece in the development and implementation of a habitat conservation bank process for the Panama City crayfish, helping reduce the need for protection under the Federal Endangered Species Act, and moving the species towards recovery goals proposed in the State's draft management plan.

Miami Blue Butterfly (*David Cook, Mary Truglio, and 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 on the Gulf Coast and from Merritt Island (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.

Over the last decade, FWC has partnered with several government agencies, non-governmental organizations, and the University of Florida to protect and conserve this species. During FY 2014-15, 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 nonnative green iguanas) and the captive population (due to inclement weather that affected their food supply also) 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. USFWS contracted a biologist from North Carolina State University through December 2013 to: 1) conduct regular surveys of the Key West National Wildlife Refuge Miami blue butterfly populations; 2) refine survey and monitoring techniques; and 3) develop a model to predict when observation of high adult numbers is likely. Peak population estimates were between 450 and 600 Miami blue butterflies, and were associated with the amount of precipitation, and resulting growth of the black bean host plant, over the preceding two months.

In FY 2015-16, surveys for Miami blue butterfly elsewhere in the historical range will continue with assistance from FWC. In August 2014, FWC was asked by USFWS to join the Miami Blue Butterfly Recovery Team to assist in developing a Federal recovery plan for the Miami blue butterfly. Through a series of meetings conducted in coordination with those planned for the Imperiled Butterflies of Florida Work Group, FWC provided data on the species' status, distribution, habitat, threats, and helped write and review the draft recovery plan. FWC hosted three meetings at its south regional office, during which subsequent drafts were reviewed and recommendations for revision discussed. The draft plan is currently under final review by the USFWS, although recovery team members are actively moving forward with several high priority actions from the draft plan. These include: 1) hiring a technician to monitor the Key West National Wildlife Refuge populations; 2) planning studies to evaluate host plant

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preferences; 3) planning to conduct field studies on natural history and reintroduction techniques; and 4) planning population viability studies.

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

Schaus Swallowtail Butterfly (*David Cook, Mary Truglio, and 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. By the end of the 2012 flight season, USFWS approved an emergency permit to allow the capture of up to three females to attempt captive propagation. However, no further Schaus were seen or captured in 2012.

During 2013 surveys, staff sighted 31 Schaus, all on Elliott Key. According to a protocol approved by USFWS the previous year, three female Schaus were captured and held in captivity until eggs were deposited ("first round of captive breeding"). This effort yielded 100 eggs, which were taken to the University of Florida for captive rearing in a "head start" program to augment the numbers flying in 2014. Seventy-two of the eggs hatched, and the captive larvae, augmented by five additional larvae collected in 2013 under USFWS authorization, yielded 70 pupae from seven founder lines. In the wild, Schaus typically remain as pupae until spring rains trigger their emergence to begin that year's flight season. In order to maximize the number of Schaus available for potential release in the spring, however, 22 of the pupae were treated with water sprinkling in March 2014 to artificially trigger early emergence. Researchers paired the resulting adults as mates, and the pairings resulted in 996 Schaus larvae ("second round of captive breeding"). FWC provided funds to help purchase the wild lime host plants needed to support these captive rearing efforts.

In February 2014, FWC led pre-planning meetings for the 2014 Schaus flight season through 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. In spring 2014, 308 larvae (from the second round) plus 46 adult Schaus (from the first round) were released on Elliott Key. Larvae were released along accessible trails and placed on new torchwood growth when available, and were subsequently monitored. Released adults were individually marked with a number and the letter "R" to designate them as releases. During the surveys conducted by the University of Florida and associates from May 9 until June 27, 2014, 413 adults were counted on Elliott Key, and of those 233 were captured and marked. Dr. Jaret Daniels, the University of Florida lead researcher for the project, proposed, "The numbers are likely up due to the increased rains last year and nearly 50 adults released this spring; it is also possible that the late rains this year (heavy rain starting in mid-June) could have triggered additional adult emergences even of some of the more than 300 larvae released that undoubtedly survived to pupation."

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Due to the intensive efforts on Elliott Key, the University of Florida did not conduct surveys on other islands in Biscayne National Park in 2014. Florida Department of Environmental Protection (FDEP) staff coordinated surveys on North Key Largo in 2014, where three Schaus sightings were reported.

In January 2015, FWC again planned and led the pre-planning meeting for the 2015 Schaus flight season through the Imperiled Butterflies of Florida Work Group. The University of Florida monitored the Elliott Key population while volunteers covered Key Largo. The University of Florida released 471 adult Schaus on Elliott Key and Key Largo during spring 2015. They also released 269 larvae on Key Largo and 50 larvae on Elliott Key, following them closely in the field. The vast majority of middle instars (medium-aged caterpillars) were predated by two species of predatory wasps. Building on this pilot project, Biscayne National Park staff have arranged to have volunteers monitor a subset of these larvae daily to record survival and potential predation. FWC staff assisted with adult Schaus releases and monitoring. Overall, an estimated 200 adults were observed on Elliott Key and 60 on Key Largo. This is a significant increase to the four verified sightings in 2012 on Elliott Key only.

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. The 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.

Strategies are particular to each WMA/WEA and outline the role of the area(s) in wildlife conservation. Each strategy contains measurable objectives for managing priority species and their habitat, a list of actions necessary to achieve these objectives, and provisions for monitoring to verify progress towards meeting the objectives. Implementing this program ensures FWC is efficiently meeting the needs of Florida's at-risk species on lands managed by the agency.

During FY 2014-15, FWC completed three workshops covering two WMAs and three WEAs. The areas covered by a workshop included: Fisheating Creek WMA (Glades County), Tosohatchee WMA (Orange County), Split Oak Forest Mitigation Park WEA (Orange/Osceola counties), Platt Branch Mitigation Park WEA (Highlands County), and Hickey Creek Mitigation Park WEA (Lee County). FWC initiated the drafting of strategies that are the output from these workshops. The agency anticipates the completion of a majority of these strategies during FY 2015-16.

During FY 2014-15, FWC finalized four strategies covering five areas. Properties covered by these completed strategies include: Fisheating Creek WMA (Glades County), Three Lakes WMA (Osceola County), Lafayette Forest Mitigation Park WEA (Lafayette County), Moody Branch Mitigation Park WEA (Manatee County), and Bullfrog Creek Mitigation Park WEA (Hillsborough County). The Program has initiated strategies for Split Oak Forest

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Mitigation Park WEA (Orange and Osceola counties), Tosohatchee WMA (Orange County), Platt Branch Mitigation Park WEA (Highlands County), Hickey Creek Mitigation Park WEA (Lee County), and Crooked Lake Mitigation Park WEA (Polk County), which will be completed in FY 2015-16.

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, Twanisha Presley, Kristin Rogers, and Paul Schueller)

Coordination – Listed species coordination during FY 2014-15 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 reports, preparing and executing Section 6 grants, and developing the renewal packets for the Cooperative Agreements.

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.

Project Support – FWC provided statistical and data management support for numerous projects focused on Endangered and Threatened species and Species of Special Concern during FY 2014-15. The Agency contributed population trend analysis, monitoring, or assessment of marsh birds, wading birds, American alligators, Florida panthers, bald eagles, Florida scrub jays, Southeastern American kestrels, green sea turtles, Kemp's ridley sea turtles, leatherback sea turtles, alligator snapping turtles, striped mud turtles, pine barrens treefrogs, short-tailed snakes, Florida pine snakes, winter breeding reptiles and amphibians, snook, and red drum, as well as analyzing loggerhead turtle nesting trends.

Reviews and Assistance for Transportation Projects – FWC performed a total of 163 reviews of highway projects during FY 2014-15, which included projects reviewed through the Florida Department of Transportation's Efficient Transportation Decision Making Process and assistance letters outside of the Process, including 72 written letters. Each review included a biological assessment of the direct and indirect effects of the transportation project on listed bird,

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mammal, amphibian, and reptile species, and their habitats. FWC provided recommendations 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 Florida panther wildlife underpasses; wildlife species occurrence information and field survey methodologies; wetland and upland habitat restoration strategies and techniques; and suitability evaluations of a moderate number of land parcels for mitigation through public land acquisition. This assistance was designed to reduce the adverse effects of specific highway projects on listed fish and wildlife species.

Land Use Planning Activities – FWC provided a review of 1,215 projects and provided written assistance letters on 484 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 2014-15. 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. Staff based the content of consultations 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.

Critical Wildlife Areas (Carol Rizkalla)

FWC establishes Critical Wildlife Areas (CWAs) under rule 68A-14.001 of the Florida Administrative Code, to protect concentrations of listed and other important wildlife species from human disturbance during critical periods of their life cycles, such as nesting or maternity seasons. For each CWA, the boundaries and periods of time when portions of the area may be posted as closed to entry by people are defined in the CWA establishment order. FWC's regional species conservation biologists and the CWA coordinator are responsible for evaluating needs for potential CWAs, producing or revising establishment orders, and coordinating necessary management and monitoring activities for the wildlife populations using those areas each year. FWC law enforcement personnel and multiple partners including other State and Federal agencies, local governments, and nongovernmental organizations participate in the management and monitoring activities.

Posts and signs clearly identify the boundaries in each CWA. They serve not only to identify the area, but also to increase public awareness and reduce disturbance to the fragile wildlife resources present there. During FY 2014-15, all active and potentially active CWAs that could be posted were posted with appropriate signage as necessary.

Active CWAs were monitored in FY 2014-15 by FWC biologists, technicians and management partners. Monitoring protocols varied among sites, depending on the species present, but usually involved either direct counts or estimates of adults, nests, or young. Protection and monitoring efforts for listed species of shorebirds and seabirds at some CWAs have been improved through the work of partnership networks, which are organized through efforts by FWC and the activities of other member groups. FWC provides species expertise,

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assistance, and available management and educational materials when partnering with other groups in these efforts.

Fourteen of the 19 established CWAs supported populations of listed and other important wildlife species during FY 2014-15 (**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 2014-15, Threatened Nongame Species Management funded two technicians, a Coastal Management Program grant funded one technician, and a National Fish & Wildlife Foundation grant funded an additional technician. The CWA Coordinator received a permit from the Florida Department of Environmental Protection (FDEP) to conduct vegetation management at Big Marco Pass CWA. A permit was issued by FWC to install posts in navigable waters. These posts protect a buffer around Bird Island CWA, which was established last year. Eight CWAs were re-established with minor changes and four were dis-established due to long inactivity.

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Table 8. Critical wildlife areas (CWAs) in Florida during FY 2014-15, with relevant information about each.

| FWC Region CWA name | County | Closure period | Primary taxa | Status ^a | Managed Area within Boundary |
|------------------------|--------------|--------------------|---|---|--------------------------------------|
| Southwest | | | | | |
| 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 | 20, 100, 35, 135, 5, 165, 12, 100, 30, 35, 11000, 100, 350, 190, 8, 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 | 17, 5, 0, 1 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 | 60, 35, 1, 1, 2, 1, 0 nests | 1 ac (0.4 ha) |
| North Central | | | | | |
| Amelia Island | Nassau | 1 April to 1 Sept. | Least tern, black skimmer, Wilson's plover, American oystercatcher, willet | 63, 0, 10, 2, 1 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 | Inactive | 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 | 2575, 3, 2, 1445, 0, 48, 2 nests | 10 ac (4 ha) |
| Northwest | | | | | |
| Tyndall | Bay | Year-round | Least tern, black skimmer, snowy plover, Wilson's plover, American oystercatcher, willet, piping plover ^c | 0, 0, 61, 16, 1, 4 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, 3, 2, 2 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 | 23, 111, 0, 400, 130, 5, 0, 289 nests | 32 ac (13 ha) |
| Gerome's Cave | Jackson | 1 March to 1 Sept. | Southeastern myotis bat | ~1000 individuals | 2 ac (0.8 ha) |
| South | | | | | |
| 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 | 30, 2, 10, 15, 100, 4, 10, 15 nests | 75 ac (30 ha) |
| Big Marco Pass | Collier | Year-round | Least tern, black skimmer, snowy plover, Wilson's plover, wintering shorebirds ^c | 0, 0, 0, 8 nests | 30 ac (12 ha) |
| Caxambas Pass | Collier | 1 April to 31 Aug. | Least tern, black skimmer, Wilson's plover, wintering shorebirds ^c | Inactive | 1 ac (0.4 ha) |
| Rookery Island | Collier | Year-round | Hérons, egrets, brown pelican | Inactive | 1 ac (0.4 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. | 48, 37, 2, 1, 10, 19 nests | 7.5 ac (3 ha) |
| Pelican Shoal | Monroe | 1 April to 1 Sept. | Roseate tern, bridled tern | Inactive | 1 ac (0.4 ha) |
| Northeast | | | | | |
| Matanzas Inlet | St. Johns | 1 April to 1 Sept. | Least tern, Wilson's plover, willet | Inactive | 28 ac (11 ha) |

^aCounts or estimates of peak numbers of individuals and/or nest attempts at each site during the closed period in FY 2014-15.

^bInactive means the site was either not used, or not available for use, by wildlife during FY 2014-15.

^cMonitoring to count or estimate numbers of wintering shorebirds was not conducted.

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

FWC has been administering the Landowner Assistance Program (LAP), in cooperation with USFWS, since October 2003. Florida's LAP promotes stewardship on private lands while also playing a fundamental role in the conservation of listed species. Florida's LAP is a voluntary program designed to provide wildlife-related assistance with land-use planning and habitat management to private landowners, as well as financial support to those interested in improving habitat conditions on their property for the benefit of listed species. The Program's emphasis is on priority habitats located primarily in focal areas, thus ensuring the targeting of Federal dollars in the most efficient and equitable manner to properties with the greatest potential benefits for listed species.

During FY 2014-15, FWC's LAP assisted more than 580 landowners, including providing evaluations of effects from proposed agricultural practices to listed species on 157 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 staff worked in cooperation with the U.S. Department of Agriculture's Natural Resources Conservation Service, USFWS, National Oceanic and Atmospheric Agency's National Marine Fisheries Service (NOAA-Fisheries), the University of Florida's Institute of Food and Agriculture Sciences, Florida Natural Areas Inventory, and various other conservation organizations, to assist Florida's private landowners. While private landowners represent the majority assisted by LAP staff during FY 2014-15, 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 Chuck Mincy*)

FWC's Division of Law Enforcement continued statewide enforcement activities to protect specific Endangered and Threatened species during FY 2014-15. These activities included:

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

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manatee vessel strikes and manatee harassment. Law enforcement devoted more than 99,850 water patrol hours to manatee enforcement, resulting in 2,095 citations and over 3,753 warnings.

The Division of Law Enforcement issued 23 additional citations and seven warnings separate from manatee citations, involving Endangered species, Threatened species, and Species of Special Concern.

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

Permitting and Assistance (*Angela T. Williams*)

During FY 2014-15, FWC provided Federal agencies, other State agencies, environmental consultants, and regional and local regulatory authorities with assistance and guidance regarding projects that impact protected and listed fish, bird, and land dwelling species on managed Federal, State, and 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 protected and listed species.

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

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

FWC made thousands of telephone calls, sent thousands of emails, and hundreds of formal letters in conjunction with these assistance efforts. An estimated 330 protected and listed species scientific collection, captive possession, translocation, wildlife relocation, nest removal, disturbance, incidental take permits, and permit amendments were issued during FY 2014-15.

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/>. Applications for scientific collecting, migratory bird nest relocation, and non-resident falconry permits, may be accessed via the online permitting system at <http://myfwc.com/license/wildlife/protected-wildlife/#howToApply>.

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Coastal Wildlife Conservation Initiative (*Heather Hillard*)

Many species of wildlife are dependent on coastal ecosystems, including 17 State or Federally-listed species and more than 100 at-risk species. Coastal habitats are among those identified in Florida's Wildlife Action Plan as having the highest relative threats statewide. Habitat loss and degradation due to development, commercial, and recreational activities have led to declining wildlife populations and natural coastal ecosystems. The Wildlife Action Plan is part of a nationwide framework for proactively conserving fish and wildlife, including their habitats. 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 Institute of Food and Agriculture Services] strategy that began in May 2007. The goal of the CWCI is to initiate a statewide, cooperative process to provide greater consistency and coordination in protecting coastal wildlife populations, conserving and managing coastal ecosystems, and achieving balance between these efforts and human use of coastal areas. The CWCI's comprehensive approach focuses on wildlife and their habitat needs as well as socio-economic issues. Through this interactive process, agencies can improve coordination on coastal issues, address emerging issues, and work towards greater consistency statewide in the conservation of wildlife. The people of Florida will benefit from this process through improved efficiency of State and local agencies in meeting missions for coastal management and conservation.

A full-time coordinator is responsible for creating and maintaining the partnership network, developing and implementing the framework for working groups, and coordinating actions between these groups and FWC in addressing coastal issues. Engaging potential partners and stakeholders at the local level is an important component in achieving a cohesive partnership. After initial regional outreach forums to introduce the CWCI, efforts were made to establish a partnership network in each of FWC's five regions to focus on wildlife, habitat, and human interests in coastal areas. CWCI-led working groups were formed where such venues for coastal wildlife collaboration were lacking. In other areas, the CWCI Coordinator participates in existing groups that share common goals to lend expertise and to strategize on how the CWCI and its partnership may assist with achieving goals focused on coastal conservation issues. Working groups and partners identify regional priority projects and collaborate on a variety of efforts for conservation of coastal wildlife. For example, the working groups have developed a training module for best practices for beach driving by municipal governments, "best practices" for recreational crabbers to reduce by-catch of diamondback terrapins and other species, and a "Beach Hero" outreach effort to promote wildlife-friendly behavior. The CWCI Coordinator and team are 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: a campaign on 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; a community-based social marketing approach to reduce impacts to shorebirds from mechanical beach cleaning at important nesting beaches; developing guidelines for beach cleaning and mangrove trimming practices that minimize impacts to coastal wildlife; management of beach vegetation at targeted sites to better suit nesting seabirds and shorebirds; and creating strategies to address the effects of dogs on coastal wildlife.

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CITIZEN AWARENESS PROGRAM

Compiled and edited by *Diane Hirth*

Contributors: *Bonnie Abellera, Naomi Avissar, Laura Barrett, Andi Blount, Claire Sunquist Blunden, Kelly Broderick, Deborah Burr, Alexi Deleon, Nancy Douglass, Craig Faulhaber, Judy Gillian, Donna Jones, Alex Kalfin, Mark Lotz, Ron Mezich, Ann Morrow, Gary Morse, Brendan O'Connor, Bill Parken, Allie Perryman, Twanisha Presley, Kelly Richmond, Jess Rodriguez, Sharon Tatem, David Telesco, Lisa Thompson, Robbin Trindell, Angela Tringali, Rae Waddell, 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, 2014, to June 30, 2015.

Highlights – FWC engaged in major efforts promoting citizen awareness of listed or at-risk species and their habitats in FY 2014-15. Examples include:

The draft Imperiled Species Management Plan, released in February 2015, resulted in more than 500 comments from members of the public, stakeholder groups, and partners responding to FWC's request for feedback on the plan. The plan will conserve 57 fish and wildlife species, including the Florida burrowing owl, roseate spoonbill, Big Cypress fox squirrel, Florida bog frog, and blackmouth shiner. The Imperiled species Management Plan is an innovative new



wildlife conservation model for Florida, combining actions targeted to conserve each of the 57 species with broader integrated strategies benefiting multiple species. The plan focuses on filling in species information gaps and emphasizing cooperative efforts with other agencies, private landowners, stakeholders, and the public. Staff presented an update of the draft plan to the FWC Commissioners in June 2015, with additional opportunities for public input anticipated before finalization of the plan. In addition to two news releases about the Imperiled Species

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Management Plan, FWC has an ongoing series of Facebook posts featuring fish and wildlife in the plan.

Paddle-sports recreation is the focus of a new Florida manatee awareness campaign.

As more people discover water-based ecotourism in Florida, impacts to manatees and other marine life increase. Kayak, canoe, and paddleboard commercial operators and enthusiasts are found throughout the State. In some areas, multiple operators use the same waterways. As a result of the growing numbers

of commercial and recreational paddlers and increasing encounters with manatees, FWC staff developed manatee awareness viewing guidelines for the paddle-sport community. The guidelines are included in a revision of “Guidelines for protecting native wildlife – Florida manatees,” targeted to boaters, divers, snorkelers, and now paddle-sport operators and individuals. The new information, online at <http://www.myfwc.com/Manatee>, is part of the overall educational message about recreating in manatee habitat:

<http://www.myfwc.com/wildlifehabitats/managed/manatee/for-operators/>. The same focus was applied to the design and message of the new manatee decal, available with a \$5 donation as of July 1, 2015. Tax collector offices distribute the decal, which raises funds for manatee conservation.



You are more likely to see a panther today in Florida than someone here 40 years ago.

When someone catches sight of a panther and reports it to FWC, the Agency’s biologists may use that sighting to help research and manage those species. Already the public’s willingness to report where they see panthers in Florida is having a positive impact on what is known about where these large mammals live and reproduce in the State. Based on two years of online public reporting of panther sightings, biologists know more about what areas of Florida provide viable habitat for this species. Data gathered so far include: 1,537 Florida panther sightings reported as of June 2015, of which 275 have been verified as panthers based on photos of the animal or its footprints. This



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includes the first verification of a panther sighted near the Green Swamp north of Interstate 4 in Central Florida. Primarily, the verified panther sightings are in southwest Florida. FWC continues collection of panther sightings at <http://www.myfwc.com/PantherSightings>. A news release on the sightings was issued in August 2014, <http://myfwc.com/news/news-releases/2014/august/25/panther-bear-sightings/>, and a Facebook post featuring citizens' photos of their panther sightings reached more than 85,000 people.

Shhhh! Don't disturb nesting sea turtles and shorebirds. People populating Florida's beaches during spring and summer get advice on how they can help conserve nesting sea turtles and shorebirds. The public was reminded in a March 3, 2015, news release, <http://myfwc.com/news/news-releases/2015/march/03/nesting-turtles/>, that it can be thrilling to watch a sea turtle crawl onto the beach at night and dig a nest in the sand, but to remember that "Do not disturb," is the best behavior to follow if they happen to see a nesting sea turtle on the beach. FWC asked people not to get too close, shine lights on, or take flash photos of nesting sea turtles. Another news release, <http://myfwc.com/news/news-releases/2015/march/24/shorebirds/>, asked beachgoers to watch out for and not disturb beach-nesting shorebirds, which build nests out of sand and shells and hatch chicks that are difficult to see. Shorebird nests, eggs, and chicks are well camouflaged and can be easily missed and even stepped on unless people know to look out for them. The snowy plover, least tern, black skimmer, and American oystercatcher are several of Florida's beach-nesting shorebird species that face conservation challenges. There were same-day Facebook posts accompanying both the releases.



Rescued, rehabbed panther "Uno" becomes ambassador for his species. On October 11, 2014, FWC biologists responded to a report of an injured male panther on the side of rural Collier County road. Initial reports indicated a vehicle may have hit the panther. Biologists quickly immobilized the panther, gathered information from witnesses, and learned the panther had not sustained injuries from a vehicle but was ambling slowly alongside of the road. Once biologists examined the panther, they discovered he was blind with one eye missing and the other cloudy. Additionally, the panther was severely underweight. Initial care was administered at the Animal Specialty Hospital of Naples where the cause of its blindness was revealed: bird shot from a shotgun that had hit its face and rear flank. The panther was transported to the Lowry Park Zoo in Tampa for rehabilitation. This panther, officially designated as UCFP221 (uncollared Florida panther #221) and the first patient admitted to the zoo's new veterinary

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hospital, was nicknamed “Uno” by a zoo donor. Because of Uno’s injuries, he cannot be released back into the wild. However, this panther’s recovery and demeanor made him an excellent candidate for captive management. He was moved to the Naples Zoo in December 2014 and placed on public exhibit in July 2015. FWC also has assisted Naples Zoo with its new panther signage that mentions the challenges for people living in panther country.



Another panther activity that attracted media, social media, and public attention:

- A male panther struck by a vehicle near the town of Ft. Meade in Polk County in April 2014 sustained a fracture to the left rear femur. The leg was surgically repaired at the University of Florida’s College of Veterinary Medicine, and the panther was transferred for convalescence to White Oak Conservation in north Florida, a long-term FWC partner in panther conservation. After nine months of rehabilitation, the panther, now identified as FP232, was equipped with a GPS radio collar and released on the Kissimmee Prairie State Preserve on January 7, 2015. This area, 40 miles from the accident, was chosen because of the relatively large acreage of the property and distance to major roads. Since his successful release FP232 has practically gone from coast to coast, crossing I-95 and the Turnpike as well as a myriad of other roadways throughout central Florida.

“A Florida Guide to Gopher Tortoise Friendly Plants,” online at www.MyFWC.com/GopherTortoise, provides gardeners with information on how to help the gopher tortoise. Gopher tortoises graze on broadleaf grasses, wiregrass, prickly pear grass, wild grape, blackberry, blueberry, and many other plants. If people share their property with a gopher tortoise and its burrow or are looking to attract a gopher tortoise to their yard, they can help this Threatened species by looking at the guide and adding the plants that gopher tortoises feed on.



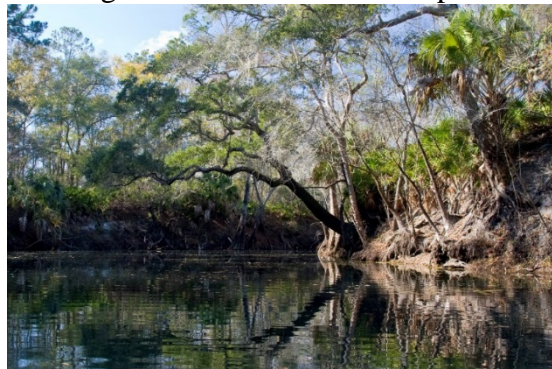
Gopher tortoises were released on ideal habitat at Ted Turner’s Avalon property in Jefferson County in September 2014. Media came to the event. The tortoises had been

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removed from a site in Clay County where development is planned. FWC, The Humane Society of the United States, and the Turner Endangered Species Fund supported the effort.

Help plan the future of FWC’s Wildlife Management Areas (WMA), which conserve critical habitat for Florida’s Endangered and Threatened species.

Staff presented a ten-year draft management plan for the Aucilla WMA at a May 2015 public hearing in Monticello. A news release invited the public to attend, ask questions and comment, and an FWC Flickr photo album showed off the beauty and diversity of the Aucilla WMA, home to listed species such as the limpkin, little blue heron, wood stork, and gopher tortoise. The Aucilla WMA includes the spring-fed clear waters of the Wacissa River and the Aucilla River with its dark tannic waters that tunnel underground in some areas. It spans portions of Jefferson and Taylor counties, and people come here for fishing, boating, paddling, hiking, hunting, wildlife viewing, photography, primitive camping, and biking. FWC staff regularly schedule and hold public hearings to receive input on WMA management plans. Other hearings in FY 2014-15 included ones on the T.M. Goodwin Waterfowl Management Area and the Florida Keys Wildlife and Environmental Area (WEA).



The FWC Facebook post: “Missing: ‘Stokes’ the manatee,” reached more than 391,000 people on May 23, 2015. You are not dreaming if you see a manatee wearing a colorful belt attached to a floating device. This is real and meant to be there – and you do not need to free the manatee from this apparatus! Biologists attach the manatee tracking gear, consisting of a belt around its peduncle (the narrow area above its tail), a tether, and a floating satellite-linked GPS radio tag, to monitor a manatee’s movements and condition. The tag is temporary and eventually falls off. Right now, a manatee, dubbed “Stokes” by the Sea to Shore Alliance tracking him, has lost his tag and tether and is swimming along with just the belt. If you see a manatee with just a belt, please report the location on our Wildlife Alert Hotline, 1-888-404-3922.



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

| | |
|---------------------|-------|
| Daily newspapers | 5,618 |
| Weekly newspapers | 5,106 |
| Magazines | 5,014 |
| Online publications | 5,149 |
| Radio | 4,910 |
| TV | 4,910 |

Numbers reflect individual reporters, editors, and producers receiving FWC news releases via email.

During FY 2014-15, FWC issued dozens of news releases on Endangered and Threatened species. FWC news releases are posted online at MyFWC.com/News. Examples include:

- Plan to conserve dozens of imperiled species updated, June 24, 2015
- FWC discusses strategic priorities for panther conservation, June 23, 2015
- Springtime brings close encounters of manatees, boaters, April 1, 2015
- Plan for conserving 60 Florida species ready for input, Feb. 24, 2015
- Slow down as manatees start their swim to warmer waters, Nov, 12, 2014
- Another good year for sea turtles nesting in Florida, October 8, 2014
- FWC recommends Collier County residents take steps to protect small livestock from panthers, Aug. 29, 2014
- Be a Hero! Help rescue manatees, sea turtles by getting FWC decals, July 31, 2014

FWC’s Division of Habitat and Species Conservation and the agency’s Fish and Wildlife Research Institute, as well as regional public information coordinators, communicate regularly with media on listed species.

- Biologists tally a record high manatee count, March 16, 2015, was a Fish and Wildlife Research Institute-generated news release that drew major media attention. Warm temperatures and clear, sunny days between some of the coldest weather of the year assisted FWC biologists and partners in counting an all-time high number of manatees during this year’s statewide aerial survey. FWC reported a preliminary count of 6,063 manatees.
- In the southwest region, the public information coordinator responded to media calls about listed and managed species, including manatees, panthers, gopher tortoises, nesting shorebirds, sandhill cranes, bald eagles, loggerhead sea turtles, burrowing owls, wood storks, and alligators.



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Social Media – The people who “Like” and thus regularly follow the MyFWC Facebook, <https://www.facebook.com/MyFWC>, reached nearly 90,000 followers as of June 30, 2015, a significant increase from 50,000 a year ago. The newer FWC Fish and Wildlife Research Institute Facebook site, <https://www.facebook.com/FWCResearch>, and FWC’s Great Florida Birding Trail Facebook, <https://www.facebook.com/floridabirdingtrail>, site now have more than 10,000 “Likes” each. Overall, FWC’s use of social media and its social media audiences grew significantly during FY 2014-15:

- Flickr photo views reached close to 8.5 million
- YouTube video views reached nearly 1.5 million
- Twitter followers grew to more than 22,000
- Instagram followers reached more than 13,000

(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 audience interested in stories about Florida wildlife. Among the social media tales told on Facebook during FY 2014-15, are:

- **A sea turtle’s incredible long journey home, June 4, 2015** – It is an incredible journey, starting with a sea turtle rescued in Florida, rehabilitated in Georgia, and then settled seemingly for good at the Pittsburgh Zoo and PPG Aquarium due to flipper injuries and lack of mobility. But this sub-adult green sea turtle came back home to Florida! The turtle known as “Sunburst” was released in the Atlantic Ocean waters off Fernandina Beach just after noon (June 4, 2015). Sunburst was able to make this return home because the turtle once judged “non-releasable” has made a comeback! Our shelled friend sufficiently recovered to rejoin its brethren in the briny sea.
- **Bigger than your average squirrel!** March 30, 2015 – Fox squirrels can be easier to spot than many of Florida’s imperiled species. Look for their fat, furry tails and bigger body size than the common gray squirrel. They also sport an amazing range of colors from tawny to silver to black. Some have black masks or are entirely black.
- **Can you identify any of these native reptiles?** June 18, 2015 – Comment on each photo with your answers, and we will reveal the species tomorrow! Starting July 1, researchers will conduct a one-year study to collect data on seven State-listed reptile populations in the lower Florida Keys. The public is encouraged to report sightings of these reptiles using our new online reporting tool:



<https://public.myfwc.com/fwri/flkeysreptiles/default.aspx>.

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- **Feel awe and pride as the eagle flies**, June 18, 2015 – Gaze upward to spot a bald eagle – look for its distinctive white-feathered head soaring across Florida’s sunny skies. This national symbol makes its home in coastal and freshwater areas of Florida, which has one of the largest bald eagle populations in the lower 48 states! Florida Governor Rick Scott has signed a proclamation declaring Saturday, June 20, as American Bald Eagle Day.

Other social media sites under the FWC umbrella:



Florida kids share their excitement about “Marvelous Manatees” in a fun new video posted on Vimeo: <https://vimeo.com/110496423>. This one-minute video was used as a Facebook post, where it reached more than 202,000 people.

The Great Florida Birding & Wildlife Trail Facebook page, <https://www.facebook.com/floridabirdingtrail>, is packed with photos and information on at-risk birds. A “Living with Florida Sandhill Cranes” post appeared on May 31, 2015.



Photos on Flickr accompany virtually all FWC news releases and supply the visual “oomph” for people learning about Florida’s at-risk wildlife through social media. More Flickr photos are added regularly, providing a library of images to the media and public. For instance, the FWC Panther Research Team, along with the National Park Service and Conservancy of Southwest Florida, began a study in 2014 to estimate the density of Florida panthers in a section of the Big Cypress National Preserve. Biologists are estimating panther population density using trail camera photos, and 88,534 photos were taken at 50 game camera sites during the study that ended in



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September 2014. Species documented on camera, including panthers, are on Flickr at: <https://www.flickr.com/photos/myfwc/sets/72157651504120157>

When FWC Twitter sent out information on the rescue operation to save many manatees stuck in a storm drain on February 24, 2015, the resulting Tweets and photos went viral! They reached about 6 million people in just nine minutes.



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

Over 1 million people regularly receive emails from FWC, including news and updates on Endangered and Threatened species. GovDelivery, which FWC began using in June 2013, lets the public sign up for emails or text updates on topics they choose. MyFWC.com visitors just click on the “red envelope” icon to get started. GovDelivery helps increase citizen awareness of Endangered and Threatened species. There were 1,156,100 FWC GovDelivery subscribers as of June 30, 2015.

The new “Living in Panther Country” resource on www.FloridaPantherNet.org begins with “The Florida panther, Florida's official State animal, has been listed as a Federally Endangered species since 1967, with an estimated 100-180 adults remaining in the southern part of the State. As the State grows, suitable habitat for panthers and other wildlife shrinks. Florida panthers normally live in remote, undeveloped areas. But as both the number of panthers and the number of people living and recreating in Florida grows, so does the chance of an encounter with a panther.” It then provides answers to “What do I do if I see a panther?” and other topics such as “Are there panthers in my area?” “How can I keep my pets and livestock safe?” and “What do I do if I experience a panther depredation or other interaction?”

People come to the Great Florida Birding and Wildlife Trail website to find out where they can see at-risk bird species throughout Florida. They also come here to learn more about Florida’s native bird species. The species page, <http://floridabirdingtrail.com>, received 58,000 visits in FY 2014-15. The Florida burrowing owl page was the most popular at-risk species, with 7,395 visits to its web page in FY 2014-15.



Thousands of people are involved in Florida’s network of shorebird and seabird conservation partners. The Florida Shorebird Alliance has grown to over 13,900 members and 12 local partnerships. The alliance’s website, www.flshorebirdalliance.org, features resources and opportunities for partners and volunteers, and the “Wrack Line” newsletter. Alliance

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partners conduct shorebird and seabird monitoring statewide, and promote citizen awareness of shorebirds by volunteering as Bird Stewards on the beach, participating in outreach and training, and contributing to print, TV, and social media articles.

New “Wildlife Spotlights” offer photos and information online at MyFWC.com about wildlife and their habitats when people search for information on FWC’s WMAs and WEAs on MyFWC.com.

Fairs, Festivals and Events - FWC staff show 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 10,000 visitors to the latest MarineQuest, the 20th anniversary of this popular event. The annual open house of the Fish and Wildlife Research Institute, held October 16-18, 2014, brought in more than 2,000 students from grades fourth through eighth and their teachers, as well as 8,500 additional members of the public. Students toured lab stations managed by FWC scientists. Hands-on displays and activities drew students into the world of marine science and the fascinating things that scientists discover. Displays spotlighted listed species such as the manatee, North Atlantic right whale, sea turtles, and corals. Researchers displayed a live, 100-pound alligator snapping turtle and visitors participated in the simulated rescue of a manatee.



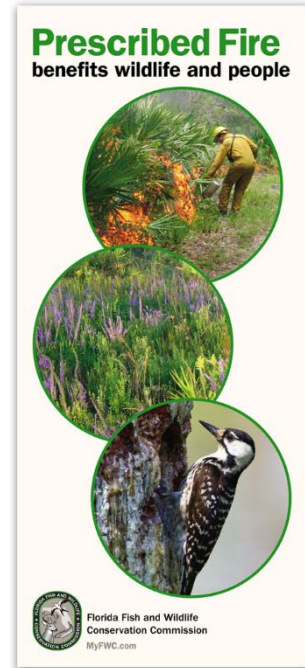
People flocked to the Great Florida Birding & Wildlife Trail’s first Chipola Feather Fest in northwest Florida. More than 150 people participated in field trips at the fest that took place on April 24-26, 2015. Birders spotted over 150 species during the festival weekend. They included listed bird species such as the little blue heron, red-cockaded woodpecker, snowy egret, white ibis and wood stork, and with a State-designated Threatened



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terrestrial species, the gopher tortoise, also coming into view.

More than 311,000 people visited FWC's exhibit at the Florida State Fair in Tampa from February 5-16. FWC's exhibit featured displays and information on American alligators, alligator snapping turtles, all five sea turtle species, black skimmers, American oystercatchers, least terns, and snowy plovers. Displays of live animals included a Florida panther and alligator snapping turtle. Also featured was a museum-style beach-nesting display, complete with sand and a hatching sea turtle nest with a message about the importance to hatchlings of turning out or shielding beach lighting. Black skimmer and least tern decoys also were used to simulate threats faced by beach-nesting shorebirds. Nineteen FWC volunteers participated in this 12-day event. Their responsibilities included monitoring the displays on panthers and facilitating the Wildlife Challenge Quiz.



More than 2,300 people attended the fourth annual Florida Panther Festival in Naples on November 15, 2014. FWC panther biologists talked about living with Florida panthers, and there was a "Living with Wildlife" pavilion where people learned how to peacefully coexist with Florida's wildlife through demonstrations and interactive displays. There were other displays and information from local parks, recreational areas, and environmental organizations, as well as opportunities to go on interactive field trips. Information about the festival may be accessed at <http://www.floridapantherfestival.com/>.

FWC helped organize the sixth annual Florida Scrub-Jay Festival on February 28, 2015 to celebrate and raise awareness about the Florida scrub-jay and its habitat:

<http://myfwc.com/news/news-releases/2015/february/23/scrub-jay-festival/>.

The festival at the Merritt Island National Wildlife Refuge included guided walks, presentations and a bus tour of Kennedy Space Center, as well as environmental exhibitors and a panel of experts answering visitor questions. About 500 people braved bad weather to attend. The festival was a cooperative effort led by Merritt Island National Wildlife Refuge staff and the Education and Outreach Committee of the Northeast Florida Scrub Working Group, which includes FWC, the FDEP, Around the Bend Nature Tours, and the Florida Scrub-Jay Consortium. Two FWC volunteers assisted.



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

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A new FWC brochure explains the benefits of using prescribed fire for managing wildlife habitats, as well as for helping prevent wildfires. It features photos of a gopher tortoise, Sherman's fox squirrel, and red-cockaded woodpecker. The brochure describes how prescribed fire helps conserve these species and others such as the Florida scrub-jay and Southeastern American kestrel.

“A guide to living with Bats,” a new brochure created in partnership with the University of Florida, gives people basic information about conserving bats. It explains why they cannot be disturbed or removed from buildings during maternity season and their value in controlling insect pests. Tips are included on how to help Florida bats survive. The brochure is available online at: <http://myfwc.com/media/3031963/LivingWithBats.pdf>. New signs also are up at Florida Caverns State Park, which worked with FWC to get out the word to its visitors on the danger of white-nose syndrome, which has killed millions of bats in other states, and how they can help prevent it from spreading to Florida.

A display about Florida's manatees and sea turtles was showcased at the annual Southeastern Association of Fish and Wildlife Agencies (SEAFWA) conference in Destin, October 17-20, 2014.

New signs at the Everglades and Francis S. Taylor WMA in South Florida offer information about Endangered and Threatened species living there, including the Florida panther, little blue heron, roseate spoonbill, snowy egret and wood stork. Additionally, a new sign is posted at the Watermelon Pond WEA in Alachua and Levy counties. It talks about restoration of sandhill habitat there and its importance as habitat for gopher tortoises and Sherman's fox squirrels.

Visitors to FWC WMAs use guides to help them identify and learn about listed wildlife species. Updated recreation guides showcase the red-cockaded woodpecker at the Babcock-Webb WMA; the Florida scrub-jay and crested caracara at Fisheating Creek WMA; and the snail kite, red-cockaded woodpecker, roseate spoonbill, and Florida sandhill crane at J.W. Corbett WMA.

A new fact sheet addressing gopher tortoises in urban areas is primarily focused on how to minimize domestic dog/gopher tortoise conflicts. It was added to the extensive educational materials available. Collectively, the gopher tortoise management program distributed more than 6,400 brochures and fact sheets. All the publications are online at www.MyFWC.com/GopherTortoise.

Volunteer Opportunities and Training – Volunteers contribute greatly to the success of the State's conservation efforts. Examples in FY 2014-15 include:

Shorebird/seabird surveys and stewarding begins even before nesting. Prior to nesting season, FWC hosted bird steward trainings with the Volusia County Shorebird Partnership and St. Johns/Flagler Shorebird Partnership. FWC volunteers modified the rooftop of a business in Indian River County to make it chick-proof for nesting seabirds. Hardware cloth

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fencing was installed along the perimeter of the rooftop, and drain holes were covered to prevent chicks from falling off the rooftop. During nesting season, FWC volunteers surveyed beaches and rooftops for shorebird and seabird activity in St. Johns and Brevard counties. Volunteers also acted as beach stewards to protect least tern colonies from disturbance in St. Johns County, and protected nesting Wilson's plovers from disturbance in Volusia County. Additionally, a least tern colony in Pinellas Park (Pinellas County) was monitored through a partnership between FWC and Saint Petersburg Audubon Chapter.

Volunteers assist FWC and partners with Florida scrub-jay surveys on public and private lands for Jay Watch, an Audubon of Florida program. Volunteers surveyed six properties in Marion, Sumter, and Lake counties to determine the number of family groups, family group sizes, and habitat use, while also identifying banded scrub-jays. Prior to the Jay Watch season, FWC hosted a workshop to train and recruit volunteers to conduct scrub-jay surveys. Twenty-one volunteers participated in scrub-jay surveys in FWC's northeast region at sites such as Halpata Tastanaki Preserve, Cross Florida Greenways "Triangle" Property, the Ross Prairie State Forest, Ocala State Forest, and Half Moon WMA.

FWC volunteers monitored a subset of the red-cockaded woodpecker population in the Ocala National Forest. The Forest's red-cockaded woodpecker population is located in two isolated regions of the forest. The northern population is at or near carrying capacity. The southern population has steadily grown over the years but would benefit from translocating young red-cockaded woodpeckers from the north into its population. Three volunteers monitored red-cockaded woodpecker nests in the northern population. As a result, biologists with the U.S. Forest Service banded juveniles for intra-population translocation, which involved moving red-cockaded woodpeckers from the northern population into the southern population to bolster the southern population.



Community volunteers get hands-on experience with monarch butterflies. Every fall, the iconic orange and black monarch butterfly is in migration from the northern U.S. and Canada to overwintering sites in central Mexico. A portion of the migration brings monarchs - perhaps the world's most well-known butterfly - through North Florida and the St. Marks National Wildlife Refuge on the Gulf Coast, south of Tallahassee. For years, FWC staff have helped coordinate volunteers in a project to count and tag monarchs at St. Marks. Volunteers of all ages meet before dawn on Saturdays to count monarchs, capture them by hand or with nets, then tag, and release them. Unlike most butterflies, whose colorful scales come off easily when touched, monarchs evolved to withstand a 2,000-mile or longer migration, and their scales remain in place when carefully handled. It is a treat for the public to interact so intimately with beautiful wildlife and be a part of citizen science. Monarchs tagged at St. Marks that are recovered elsewhere provide information on where they go and how they are getting there.

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Overall monarch population numbers have declined in recent years, and the USFWS has been petitioned to list the species.

The Federally Threatened Southeastern American kestrel benefits from FWC’s nest box program that augments kestrel populations and provides nesting opportunities. In the Agency’s northeast and north central regions, eight volunteers monitored 13 nest boxes on five properties in Marion, Sumter, and Citrus counties and, recorded the number of eggs/nestlings. A kestrel pair actively used one of the 13 boxes and its juveniles successfully fledged. Three volunteers also monitored approximately 150 nest boxes located in Marion and Levy counties, contributing data towards a long-term study in addition to the nest box monitoring project. Additionally, six volunteers monitored next boxes in Hernando and Polk counties.



Project Acorn, a multi-year project by FWC Ridge Rangers that engages and educates citizens to help restore oak scrub habitat on the Lake Wales Ridge in Central Florida, worked with about 1,000 volunteers in FY 2014-15. In July and August 2014, Ridge Rangers planted 2,425 scrub oak sprouts and civic organizations in the Royce Unit scrub restoration area, completing the first year’s cycle. In the fall of 2014, Ridge Rangers again gathered scrub oak acorns from FWC conservation areas, and staffed outreach booths at community festivals provided the oak acorns for attendees to pot in trays. A youth organization planted the first 350 of the potted oaks in the Royce area on June 25, 2015, with more planting dates underway for summer 2015. Scrub habitat is home to species like the gopher tortoise.



Volunteers are recruited and celebrated. A Facebook post in October 2014, “Be a Hero: Volunteer,” shared opportunities for volunteers to accomplish something great for wildlife: <https://www.facebook.com/MyFWC/posts/10152722331658349>. Another Facebook post in April 2015 during National Volunteer Week praised the great work that FWC volunteers are doing on several projects: <https://www.facebook.com/MyFWC/posts/10153198368253349>.

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.

Over 350 people participated in the Marine Turtle Permit Holders meeting in Melbourne Beach from March 6-8, 2015, where attendees got updates on data, trends, and challenges related to sea turtle nesting in Florida. Additionally in FY 2014-15, sea turtle management program staff also held workshops



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regarding sea-turtle friendly lighting measures. They reached local governments, conservation groups, property owners, and code enforcement professionals as part of several meetings and conferences.

To increase capacity to deal with human-panther issues, FWC panther biologists continue doing Florida Panther Road Show presentations throughout the State. The training given to staff within FWC and from other agencies includes information on panther biology, life history, how to identify panther signs, how to investigate possible panther depredations, and FWC's responsibilities under the Florida Panther Response Plan. Dogs are frequently involved in attacks on domestic pets and hobby farm animals such as goats and chickens. As a result, people often notify Domestic Animal Services in Collier County for assistance. Florida's wildlife may be the culprit on occasion as well. An FWC panther biologist conducted a training seminar for Collier County Domestic Animal Services employees in September on identifying the sign of Florida predators including panther, bobcat, and coyote. Different species attack and kill their prey in unique ways and having the ability to differentiate which predator was involved enables Domestic Animal Services' employees to notify FWC when necessary. FWC and Domestic Animal Services occasionally assist each other in cases when someone's pet or hobby animal has been killed or attacked.

School-based Programs and Presentations – FWC regularly reaches out to school-aged children to energize and excite them about the wildlife in their State, and what they can do to help conserve native species.

In FY 2014-15, Project WILD staff and their 65 volunteer facilitators provided activity guides, resources, and extensive training to over 1,500 educators from 48 Florida counties. Project WILD utilizes environmental education programming to foster stewardship and responsibility for fish and wildlife conservation in Florida. Project WILD environmental education activity guides are provided to educators of students K-12, free of charge, through attendance at a workshop. Many educators incorporate Project WILD activities into lesson plans year after year. A June 2015 email poll of Project Wild-trained educators generated a response from 127 teachers indicating they worked with 14,593 students using Project WILD materials. Other awareness efforts involving students and teachers:

- Many schoolkids attended an FWC exhibit at the Florida Capitol on April 22, 2015, where they learn about manatees, sea turtles, and panthers.
- The all-day May 2, 2015 event at FWC's Beau Turner Youth Conservation Center attracted about 150 people, including children and their families.
- FWC provided a lecture on Florida scrub-jays to a University of Florida class.
- A presentation on panthers and bats was made by an FWC panther biologist at the Pasco County science teachers' annual weekend retreat.
- Twelve educators at the League of Environmental Educators in Florida spring 2015 conference attended a "manatee treasure box" presentation, and a treasure box was awarded to the winning ticket holder. Also on display was a Florida panther pelt.

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APPENDIX A. LISTED WILDLIFE SPECIES IN FLORIDA AS OF JUNE 30, 2015

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 |
| Bluetail mole skink | <i>Eumeces egregius lividus</i> | FT |
| Eastern indigo snake | <i>Drymarchon corais couperi</i> | FT |

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| Common Name | Scientific Name | Status |
|-------------------------------------|---------------------------------------|--------|
| Florida brownsnake ¹ | <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 ¹ | <i>Thamnophis sauritus sackenii</i> | ST |
| Red rat snake ¹ | <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 ¹ | <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 |
| Ivory-billed woodpecker | <i>Campephilus principalis</i> | FE |
| Kirtland's wood warbler (Kirtland's warbler) | <i>Dendroica kirtlandii</i> (<i>Setophaga kirtlandii</i>) | FE |

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| Common Name | Scientific Name | Status |
|-------------------------------|---|--------|
| 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 ² | <i>Pandion haliaetus</i> | SSC |
| Piping plover | <i>Charadrius melodus</i> | FT |
| Red-cockaded woodpecker | <i>Picooides 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

| Common Name | Scientific Name | Status |
|--------------------------------|--|--------|
| 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 |
| Florida bonneted (mastiff) bat | <i>Eumops [=glaucinus] floridanus</i> | FE |
| Florida mouse | <i>Podomys floridanus</i> | SSC |
| Florida panther | <i>Puma [=Felis] concolor coryi</i> | FE |

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| Common Name | Scientific Name | Status |
|---------------------------------------|--|-----------------|
| 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 ¹ |
| 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 |
| Pillar coral | <i>Dendrogyra cylindricus</i> | FT |
| Rough cactus coral | <i>Mycetophyllia ferox</i> | FT |
| Staghorn coral | <i>Acropora cervicornis</i> | FT |

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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 erythropus</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) |
| Miami blue butterfly | <i>Cyclargus thomasi bethunebakeri</i> | FE |
| Nickerbean blue butterfly | <i>Cyclargus ammon</i> | FT(S/A) |
| Schaus' swallowtail butterfly | <i>Heraclides 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 |
| 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 |

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| Common Name | Scientific Name | Status |
|-------------------------|---|---------------|
| 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

- ¹ Lower Keys population only.
- ² Monroe County population only.

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APPENDIX B. LIST OF ACRONYMS USED IN THIS REPORT

| Term | Acronym |
|--|----------------|
| 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 |

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APPENDIX C. FWC'S FISH AND WILDLIFE RESEARCH INSTITUTE'S PUBLICATIONS
DURING FY 2014-15.

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/>.

Brost, B., Witherington, B., Meylan, A., Leone, E., Ehrhart, L., and Bagley, D. 2015. Sea turtle hatchling production from Florida (USA) beaches, 2002-2012, with recommendations for analyzing hatching success. *Endangered Species Research* 27:53-68.

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Delany, M. F., Kiltie., R.A., Glass, S.L., and Hannon, C.L. 2014. Spatial occupancy and abundance trends of endangered Florida Grasshopper Sparrows at Tree Lakes Wildlife Management Area. *Southeastern Naturalist*. 13(4):691-704.

Enge, K.M., Farmer, A.L., Mays, J.D., Castellón, T.D., Hill, E.P., and Moler, P.E. 2014. Survey of winter-breeding amphibian species. Final report, Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute, Lovett E. Williams, Jr. Wildlife Research Laboratory, Gainesville, Florida, USA. 136pp.

Enge, K.M., Farmer, A.L., and Emanuel, B.W. 2015. Geographic distribution: *Lithobates capito* (gopher frog). *Herpetological Review* 46:213.

Enge, K.M., Mays, J.D., and Godwin, C.D. 2015. Geographic distribution: *Pituophis melanoleucus mugitus* (Florida pinesnake). *Herpetological Review* 46:221.

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APPENDIX C. Continued

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APPENDIX C. Continued

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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

INVERTEBRATES

Apple snail
Honey bee

Pomacea insularum
Apis mellifera

FISH

Alligator gar
Common snook
Fat snook
Smallscale tarpon snook
Swordspine snook

Atractosteus spatula
Centropomus undecimalis
Centropomus parallelus
Centropomus pectinatus
Centropomus ensiferus

AMPHIBIANS

Ornate chorus frog
Mole salamander
Peninsula newt
Pig frog
Pinewoods treefrog
Striped newt

Pseudacris ornata
Ambystoma talpoides
Notophthalmus viridescens piaropicola
Lithobates grylio
Hyla femoralis
Notophthalmus perstriatus

REPTILES

Apalachicola kingsnake
Black racer
Corn snake
Eastern diamondback rattlesnake
Southern hognose Snake
Yellow rat snake

Lampropeltis getula meansi
Coluber constrictor
Elaphe guttata
Crotalus adamanteus
Heterodon simus
Pantherophis alleghaniensis

BIRDS

American avocet
American coot
American white pelican
Anhinga
Black-crowned night-heron
Black rail
Caspian tern
Cattle egret

Recurvirostra americana
Fulica americana
Pelecanus erythrorhynchos
Anhinga anhinga
Nycticorax nycticorax
Laterallus jamaicensis
Hydroprogne caspia
Bubulcus ibis

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APPENDIX D. Continued

| | |
|----------------------------|------------------------------------|
| 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> |
| Gull-billed tern | <i>Geochelidon nilotica</i> |
| King rail | <i>Rallus elegans</i> |
| Least bittern | <i>Ixobrychus exilis</i> |
| Magnificent frigatebird | <i>Fregata magnificens</i> |
| Marbled godwit | <i>Limosa fedoa</i> |
| Purple gallinule | <i>Porphyryula 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> |
| 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> |

MAMMALS

| | |
|----------------------------|-----------------------------------|
| Atlantic salt marsh mink | <i>Mustela vison lutensis</i> |
| Cotton rat | <i>Sigmodon hispidus</i> |
| Eastern gray squirrel | <i>Sciurus carolinensis</i> |
| Eastern spotted skunk | <i>Spilogale putorius</i> |
| Gulf salt marsh mink | <i>Mustela vison halilimnetes</i> |
| Least shrew | <i>Cryptotis parva</i> |
| Nine-banded armadillo | <i>Dasyopus 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> |
| Southern flying squirrel | <i>Glaucomys volans</i> |

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APPENDIX D. Continued

| | |
|-------------------------|------------------------------|
| 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> |

PLANTS

| | |
|-----------------|---------------------------|
| Cabbage palm | <i>Sabal palmetto</i> |
| Laurel oak | <i>Quercus laurifolia</i> |
| Longleaf pine | <i>Pinus palustris</i> |
| Oak trees | <i>Quercus</i> spp. |
| Sand pine | <i>Pinus clausa</i> |
| Saw palmetto | <i>Serenoa repens</i> |
| Seagrass | Order: <u>Alismatales</u> |
| Scrub oak | <i>Quercus</i> spp. |
| Slash pine | <i>Pinus ellioti</i> |
| Toothache grass | <i>Ctenium aromaticum</i> |
| Turkey oak | <i>Quercus laevis</i> |
| Wiregrass | <i>Aristida stricta</i> |

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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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APPENDIX E. Continued

Federally-designated Threatened Species – Species of fish or wild animal life, subspecies or isolated populations of species or subspecies, whether vertebrate or invertebrate, that are native to Florida and are classified as Threatened under 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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APPENDIX E. Continued

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 the FWC Commissioners, a species, subspecies, or isolated population of a species or subspecies which is facing a moderate risk of extinction, or extirpation from Florida, in the future.

State-designated Threatened Species – As designated by the 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 declining 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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APPENDIX E. Continued

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

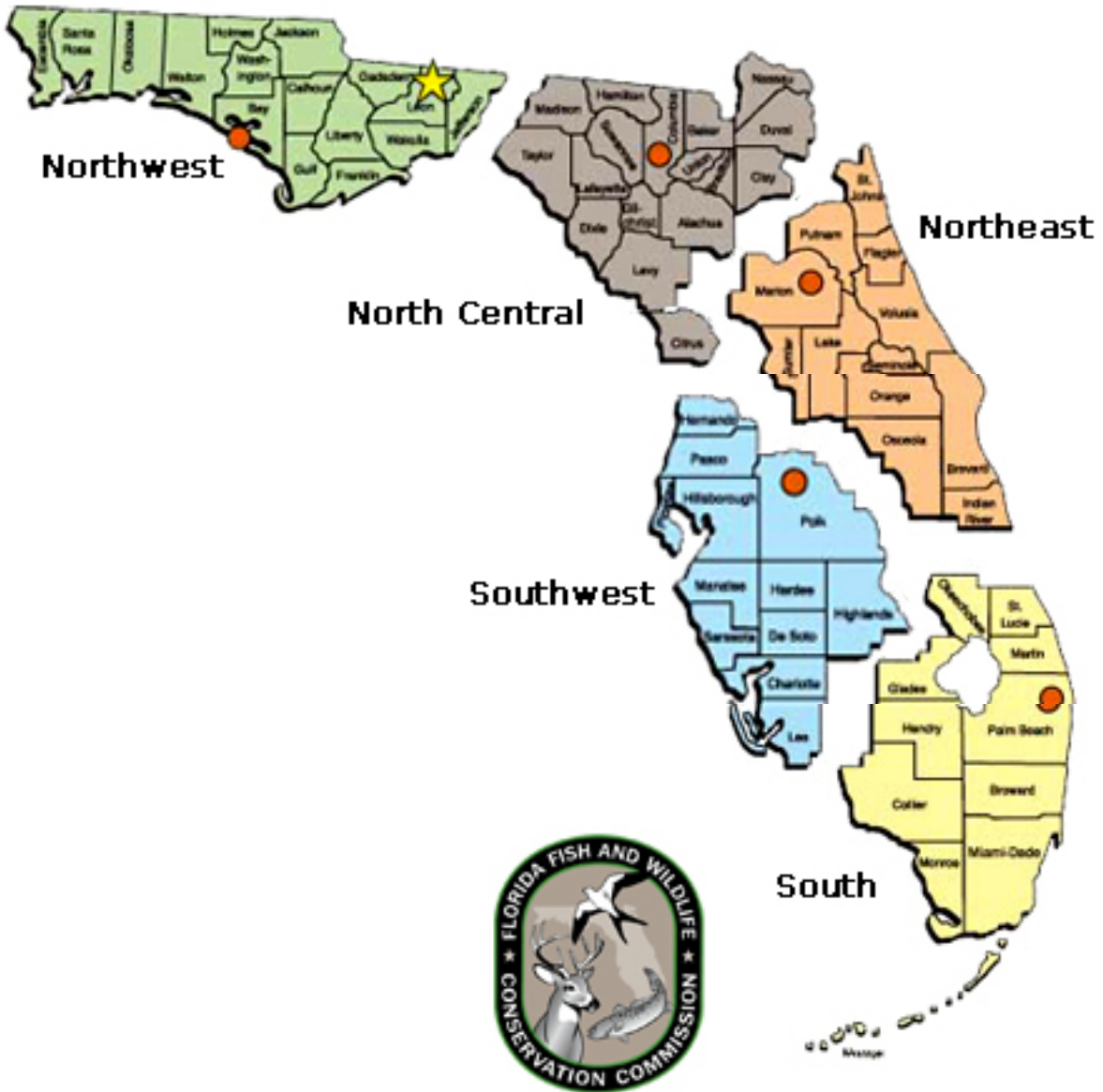
Translocation – Capture, transport, and release or introduction or reintroduction of wildlife.

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.

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APPENDIX F. MAP OF FWC'S REGIONS



- ★ Headquarters
- Regional Offices

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APPENDIX G. MAP OF FWC'S MANAGED AREAS

