SANDHILL LAKES MITIGATION BANK

(FITZHUGH CARTER TRACT)

ECONFINA CREEK WILDLIFE MANAGEMENT AREA

ANNUAL REPORT 2018-2019

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Division of Habitat and Species Conservation

Wildlife Habitat and Management Section

Table of Contents

List of Figures

List of Tables

List of Appendices

INTRODUCTION

The Sand Hill Lakes Mitigation Bank property (referred to hereafter as the Carter Tract) is a 2,175-acre parcel located in south-central Washington County, approximately five miles north of State Road 20 and one mile west of State Road 77. The Carter Tract was purchased by the Northwest Florida Water Management District (NWFWMD) in October 2003 and established by the Florida Fish and Wildlife Conservation Commission (FWC) as a tract of the Econfina Creek Wildlife Management Area (WMA). A mitigation bank permit from the Florida Department of Environmental Protection (DEP) was issued to the NWFWMD in August 2005 to manage the property. Management objectives identified by the NWFWMD include wetlands restoration, preservation, and management; aquatic habitat preservation; erosion control; and uplands restoration and management. In June 2005, FWC entered into a cost-share agreement with the NWFWMD to develop and implement a comprehensive fisheries and wildlife management program for the Carter Tract.

The responsibilities of FWC – Division of Habitat and Species Conservation on the Carter Tract are to conduct fish and wildlife population assessments (collect and analyze biological data), administer public fishing and hunting programs (provide recommendations, based on scientifically accepted practices, for adjustments to harvests to optimize fish and wildlife populations), and oversee other fish and wildlife-based recreational opportunities. Following fourteen years of successful partnership, in June 2019 this agreement was renewed for an additional five years through 2024. In support of this cost-share agreement, this annual report is a comprehensive summary of the biological surveys, management activities, public use, and law enforcement monitoring conducted from 1 July 2018 – 30 June 2019. The updated 2018-19 Fitzhugh Carter Tract Hunting and Fishing Regulations Summary and Area Map is included in Appendix I. The FWC Annual Work Plan and Accomplishment Report for this reporting period is included in Appendix II.

HABITAT

Ecological and Land Cover Classification

The Carter Tract harbors several distinct ecological communities. The largest single community on the property is upland sandhill habitat (approx. 1,150 acres), which was historically logged for longleaf pine (*Pinus palustris*) and re-planted in pine plantation or left to regenerate with pine (*Pinus* spp.), live oak (*Quercus virginiana*), and scrub oaks (*Quercus* spp.). Interspersed within the uplands are approximately 875 acres of mesic and hydric habitats comprised of Swamp Lakes, Basin Swamps and Marshes, Seepage Streams, isolated Depression Marshes, Mesic Flatwoods, Baygalls, Wet Prairie, and

Seepage Slopes. The remaining 150 acres are natural Sinkholes and Sinkhole lakes (isolated, steep-sided karst ponds and shallow, gently-sloping lakes).

NWFWMD has led restoration efforts of the natural communities on Carter Tract that were degraded by timber operations and suppression of natural fire regimes. Restoration management has included mechanical reduction/herbicide of hardwoods and sand pine (*Pinus clausa*), native groundcover plantings, slash pine (*Pinus elliotii*) plantation thinning, and prescribed burning. There are many benefits of prescribed fire and selective herbicide application, including control of exotic invasive plants, increased plant community diversity, and restoration and/or maintenance of plant communities in an early successional state. The results are beneficial for both game and nongame wildlife species.

Water Levels

Water levels on Carter Tract ponds and creeks have historically fluctuated in cycles lasting several years. Water gauges were installed on the Carter Tract by NWFWMD in 2005, and readings have been recorded monthly by FWC field staff since January 2006. Public fishing opportunities require adequate water levels on the area ponds. For example, extremely low water levels forced the closing of Green Ponds to public fishing from June 2011 until mid-July 2013 when heavy rains recharged the aquifer and refilled all area ponds. Water levels on Carter Tract have remained relatively stable since the last recharging event – notwithstanding the typical seasonal fluctuations. However, inaccessibility along with high water levels following Hurricane Michael in October 2018 prevented water gauges being read on Black, Dry, and Green Ponds for several months (Figure 1). Primary water bodies are depicted on the Area Map included within the Fitzhugh Carter Tract Hunting and Fishing Regulations Summary brochure (Appendix I).

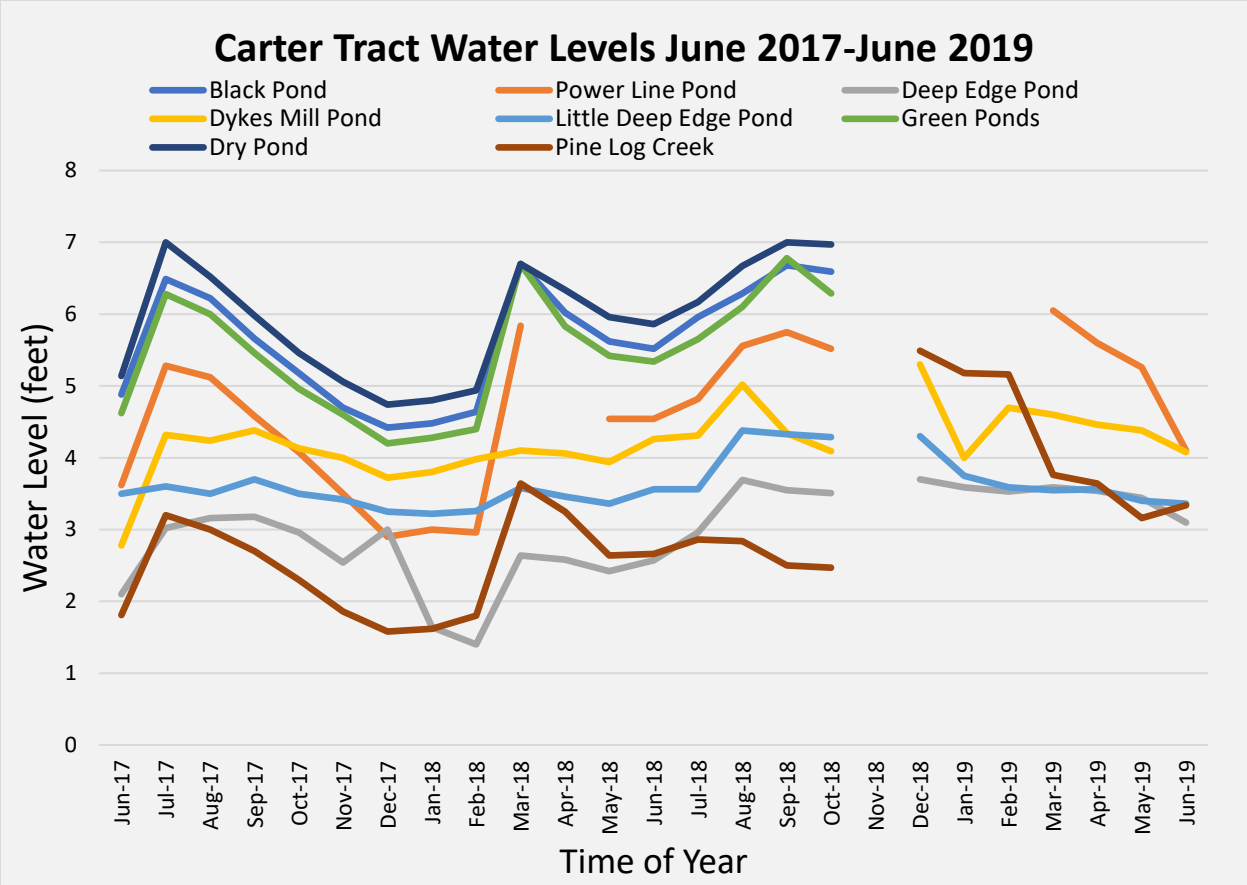

Figure 1. Water levels in feet for selected water bodies on Fitzhugh Carter Tract for the past two years. Inaccessibility and high water levels following Hurricane Michael in October 2018 resulted in water gauges being submerged and/or unable to be read.

FRESHWATER FISH POPULATIONS

Population Assessment

Fish population assessments have historically been conducted twice per year, during spring and fall. FWC staff have used a variety of methods, including electrofishing, to survey sportfish and baitfish populations on Carter Tract. However, sampling conditions at Carter Tract have proven electrofishing difficult and thus less effective. Conductivity between 100-500 microsiements/cm is ideal however, samplings on Black, Dry, and Green Ponds have yielded conductivity measurements between 23-25 microsiements/cm. The low conductivity yields less current to shock the fish, making them less susceptible to detection. Furthermore, high water events can disperse fish into surrounding vegetation rendering the larger boats used for electrofishing inefficient. FWC fisheries biologists recommend that the information gathered from angler creel surveys continue in its present form as it will be more reliable for following sportfish composition and size trends, and for fisheries management decisions on Carter Tract (Katie Woodside, FWC Division of Freshwater Fisheries (DFF), pers. comm.) On occasion, per

recommendations from DDF, electroshocking may be deployed as needed for updates rather than at regularly scheduled intervals.

Public Fishing

The Special Opportunity public fishing program on the Carter Tract continues to provide anglers the unique opportunity to fish smaller bodies of water with low fishing pressure. Creel surveys from July 2018 – June 2019 yielded 808 anglers logging 3,008.5 fishing hours (Figure 2). Water levels for public fishing remained relatively stable throughout the 2018 – 2019 reporting year, with the exception following Hurricane Michael in October (See: Water Levels).

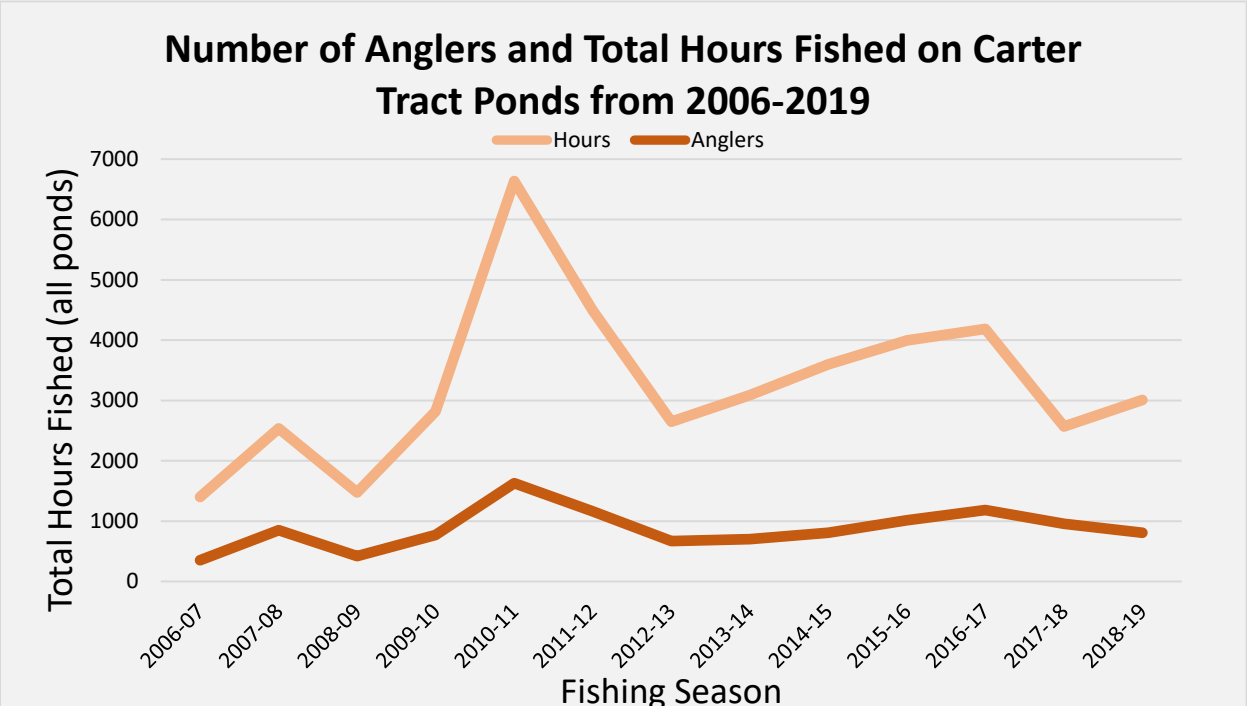

Figure 2. Total number of hours fished, and number of anglers, from 2006-2019 on all area ponds at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington Co., FL.

For 2018-19, Dry Pond continued to be the most fished with 1,340.5 hours. Black Pond was the second most fished pond with 994 hours, followed by Green Pond 3 (233.25 hours), Green Pond 1 (190.5 hours), Green Pond 2 (118.5 hours), and Deep Edge Pond (113.75 hours). May was the most popular month for fishing on the area with 155 anglers logging 566 hours of fishing. November showed the least participation, with 5 anglers logging 10.5 hours of fishing, due to the number of days the area is closed to fishing for public hunts (Figure 3).

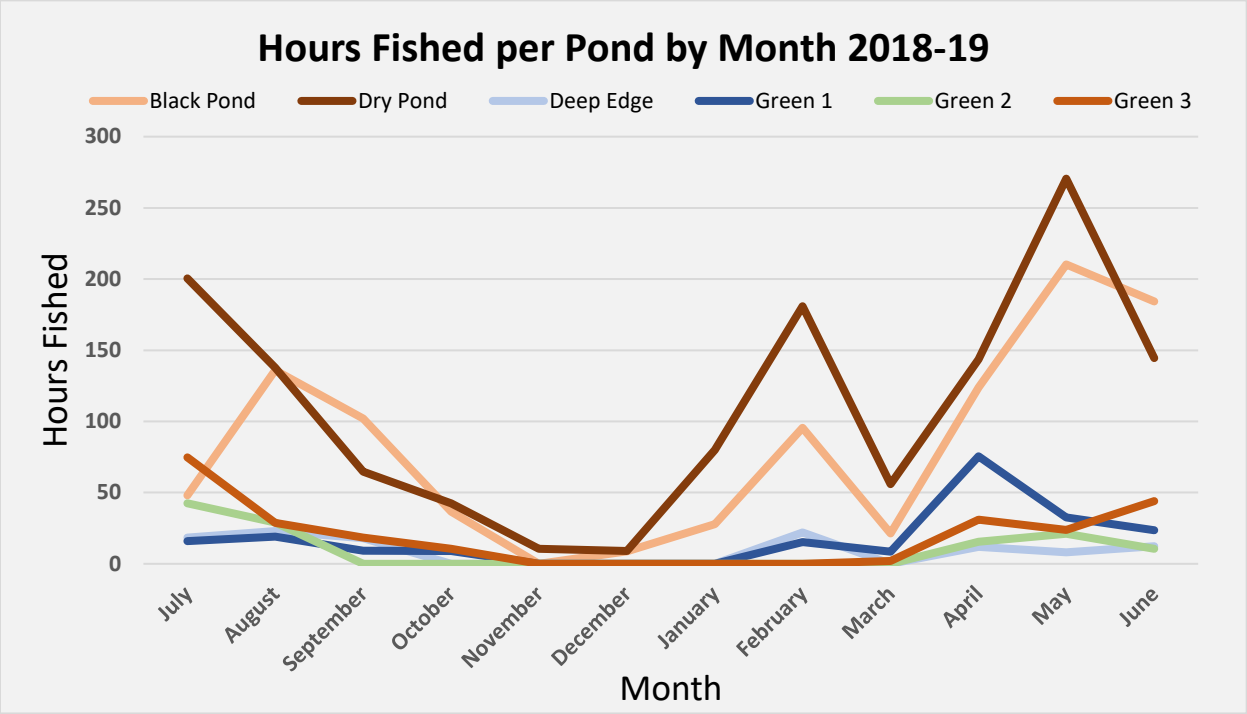

Figure 3. Hours fished per month on Dry, Black, Deep Edge, and Green Ponds during 2018-19 public fishing opportunities at Fitzhugh Carter Tract of Econfina Creek WMA, Washington Co., FL.

A total of 1,435 fish representing eight species were caught on Carter Tract ponds during 2018-19 (Table 1, Figure 4). Bluegill (*Lepomis macrochirus*) comprised 62.8% of fish caught, followed by largemouth bass (*Micropterus salmoides*), black crappie (*Pomoxis nigromaculatus*), and warmouth (*Lepomis gulosus*) with 18.7%, 14.6%, and 1.18%, respectively. The remaining 2.7% of fish caught were catfish (*Ameirus nebulosus* and *Ameirus natalis*), chain pickerel (*Esox niger*), bowfin (*Amia calva*), spotted gar (*Lepisosteus oculatus*), and other species not recorded by anglers. Additionally, three unspecified freshwater turtles were reported caught and released by anglers. A detailed table of all fish caught and released per pond is presented in Appendix III.

Table 1. Number of fish caught by species per pond at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington Co., FL from July 2018 to June 2019.

Species	Dry Pond	Black Pond	Deep Edge	Green 1	Green 2	Green 3
Bluegill	386	391	46	10	14	48
Largemouth Bass	103	95	16	19	13	19
Black Crappie	152	56	0		0	1
Other	15	37	0	2	0	3

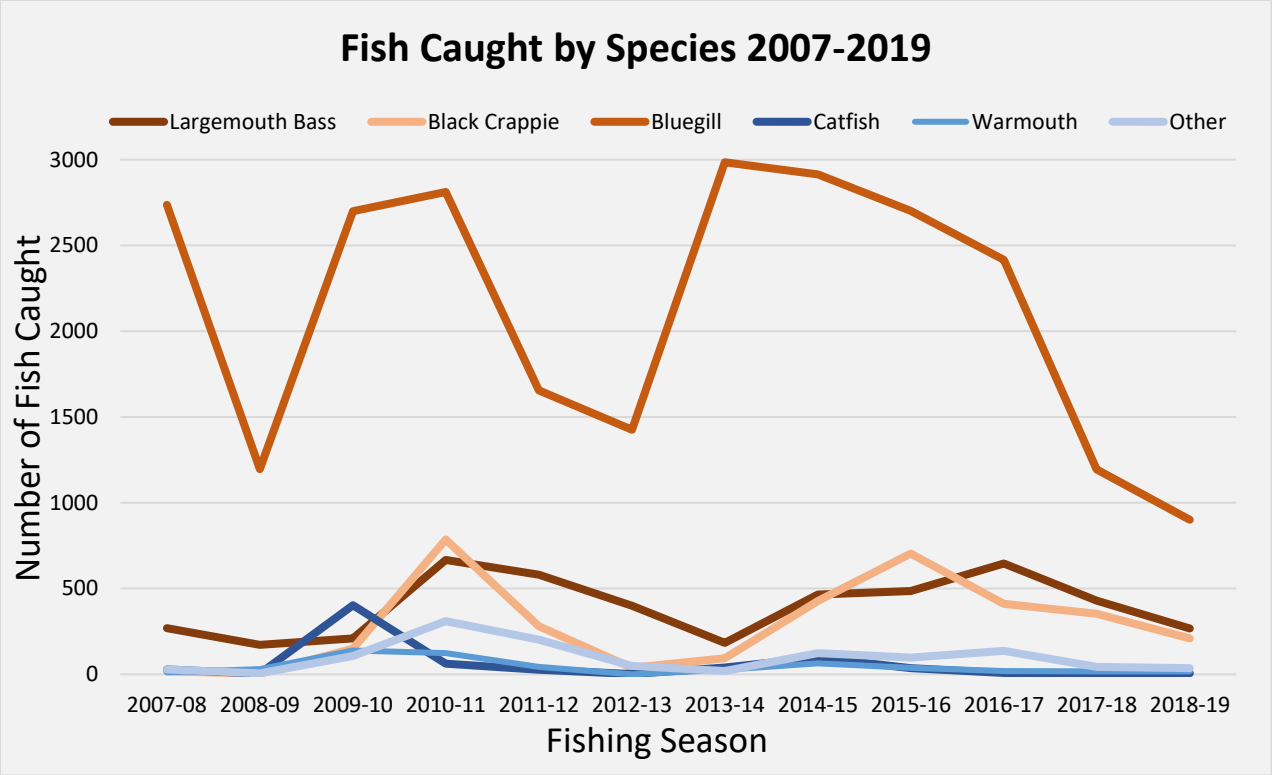

Figure 4. Angler creel trends from 2007-2019 on all area ponds of the Fitzhugh Carter Tract of Econfina Creek WMA, Washington Co., FL. Other species include bowfin, chain pickerel and spotted gar.

Angler success rate, defined as the number of fish caught per hour of fishing effort, was calculated for each pond and all water bodies combined for the 2018-19 fishing season (Table 2, Figure 5). Black Pond was the most productive water body, followed by Deep Edge Pond, Dry Pond, Green Pond 3, and Green Pond 2. Green Pond 1 had the lowest success rate of Carter Tract ponds.

Table 2. Fishing success rates (fish caught/hours of fishing effort) on all area ponds at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington Co., FL, July 2018-June 2019.

Pond	Success Rate (Fish/Hour)
Dry	0.49
Black	0.58
Deep Edge	0.55
Green 1	0.16
Green 2	0.23
Green 3	0.30
All Ponds	0.48

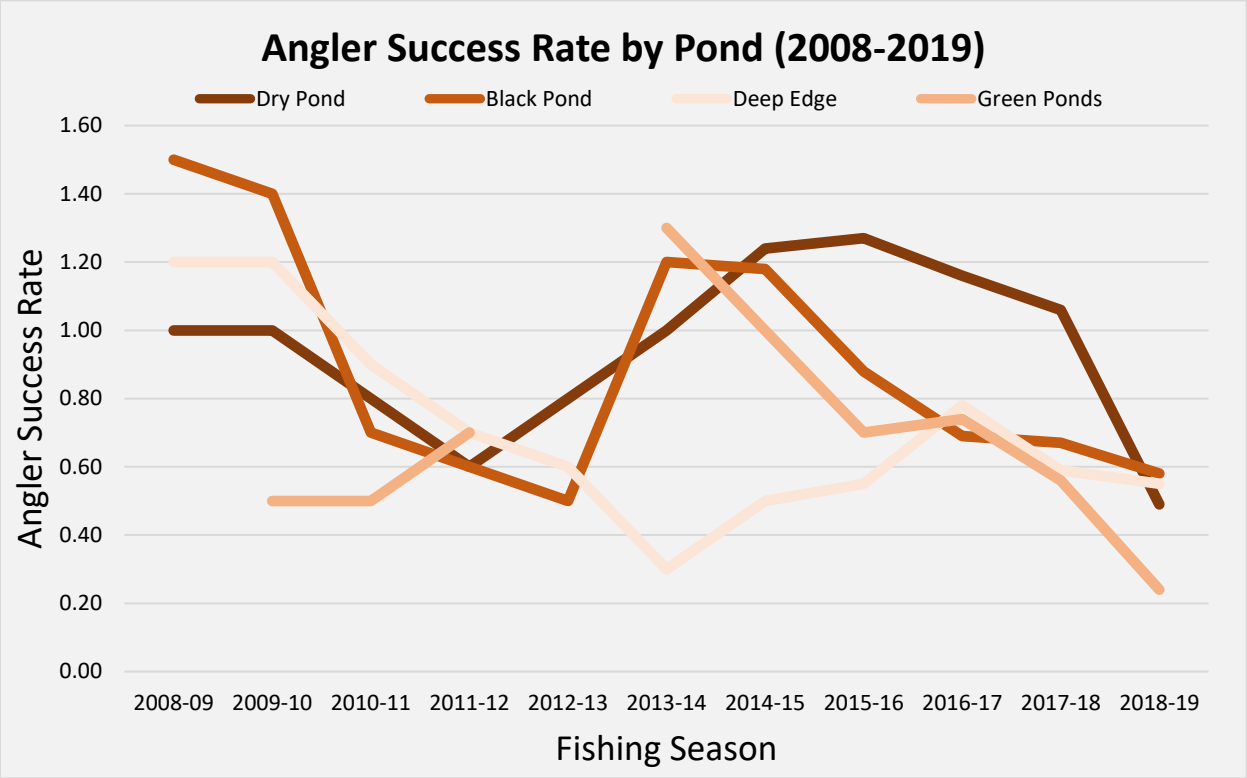

Figure 5. Angler success rate (number of fish caught/hour of fishing effort) from July 2008 to June 2019 on area ponds of the Fitzhugh Carter Tract of Econfina Creek WMA, Washington Co., FL. Green Ponds were closed to fishing during the 2008-2009 and 2012-2013 fishing seasons due to drought conditions.

WILDLIFE POPULATIONS

White-tailed Deer

Management Objectives

The primary white-tailed deer (*Odocoileus virginianus*) management objective for the Carter Tract is to provide quality hunting opportunities while managing optimal herd health. Specific objectives are to attain a herd density of 16-26 deer/mi^2 (25-40 acres/deer). With limited hunting dates and a conservative hunt format, our goal is to attain a harvest consisting of antlered deer predominantly in the 3.5+ year old age classes. In addition to offering a quality buck harvest, we plan to bolster and maintain a high degree of hunter participation with the implementation of limited antlerless deer harvest, dependent upon herd expansion. Achieving these objectives requires active monitoring and management of the population.

Population Assessment

Reliable annual indices of population size are fundamental to successful deer herd management. Indices provide an estimate of relative abundance, rather than true population size. However, because the specific relationship between the index and population density is not known, the real value of population surveys is to evaluate trends over time. Deer density on the Carter Tract is estimated using data collected from line-transect distance sampling (LTDS) surveys, which utilizes modeling to account for deer detectability. Precision seems to be higher using the LTDS method compared to standard spotlight surveys.

LTDS on the Carter Tract was conducted along two routes, both 2.9 miles long and replicated five times in September 2018 (Figure 7). Surveys began approximately one hour following official sunset and were driven along the pre-selected routes via pickup truck with two observers in the back, each equipped with a Q-beam® spotlight. Routes were driven at a speed of roughly 3-5 mph. Deer were detected by eye shine and the number of deer, distance to deer, direction/bearing from vehicle, age (adult versus fawn), and gender (if determinable) were recorded. Distance and bearing data were calculated using a Leupold® RXB-IV digital rangefinder/binocular. Figure 6 depicts the line transect routes used on the Carter Tract along with locations of deer observed during 2018 surveys.

The preseason deer density for 2018 was estimated at 14.4 deer/mi^2 (95% CI: 6.8-28.4), or 44 acres/deer, using the software DISTANCE 5.0 Release 2 (Thomas et al. 2006 Appendix IV). The Cramér-von-Mises goodness-of-fit test performed on these data produced a *p*-value of 0.6. The 14.4 deer/mi^2 indicates a 92% increase in population density from 2017 (7.5 deer/mi^2). While there appears to be an increase in population density on Carter Tract, the 2018 index is still below the desired 16 deer/mi^2. However, this index has fallen below desired density before and appears part of a normal cyclical

fluctuation in the deer density estimate exhibited on the area over the last 10 years (Figure 6). It is important to remember that many factors can influence deer detectability during spotlight transect surveys and may create what appear to be contradictory or confusing population estimates. Typically, variance estimate in DISTANCE has three components: variance due to observers' ability to detect animals along a transect (detection probability); variability between transect lines (encounter rate); and variance due to group size (cluster size). Further, vegetation composition and height, weather variables, recent burning activity, hunting pressure, etc. can all influence deer activity. Although the density estimate varies annually, continued habitat management (prescribed burning, native groundcover restoration, exotics removal) should improve habitat quality for deer on Carter Tract. Several subsequent years of surveys should produce a clearer relative abundance, from which stronger inferences of trends in population size can be drawn.

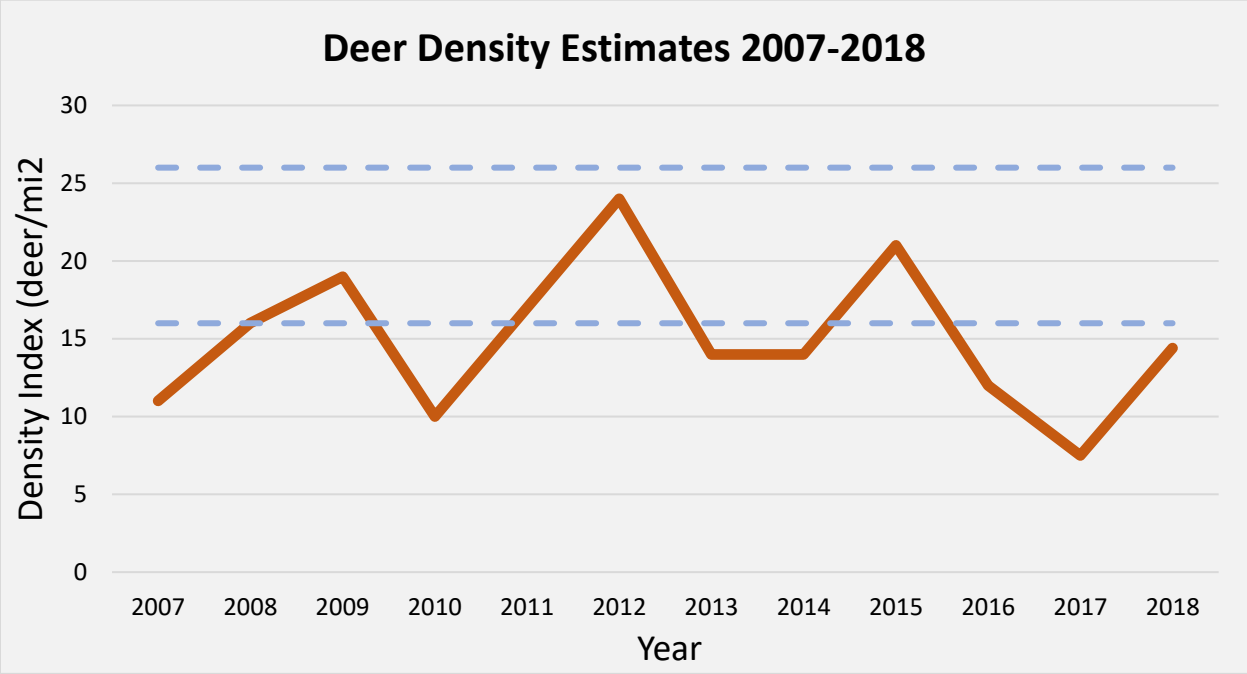

Figure 6. Trend in white-tailed deer density (orange line) as estimated using line-transect distance sampling at the Carter Tract of Econfina Creek WMA, Washington Co., FL from 2007-2018. Dashed blue lines represent the upper and lower limits of the target population density for the site.

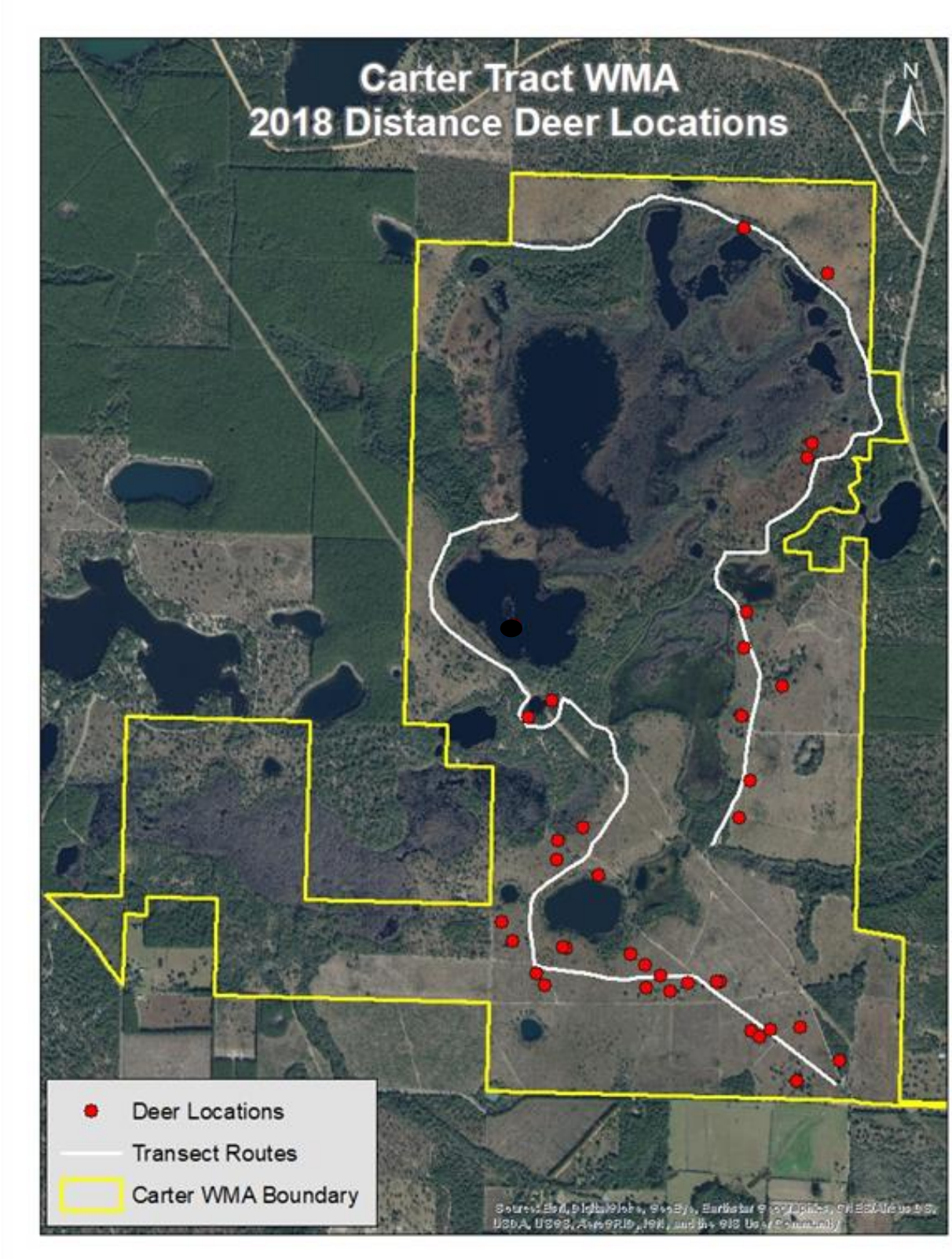

Figure 7. Survey routes and locations of observed deer during the September 2018 line-transect distance sampling conducted on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington Co., FL.

Hunting Pressure and Harvest

There is a sixteen-day archery season (divided into two consecutive hunts), a three-day muzzleloading gun season, and a thirteen-day general gun season divided into three quota hunts, one in November and two in January. For the 2018-19 season, Carter Tract was closed by administrative action for all but two days of the archery season due to Hurricane Michael. A non-transferable quota permit is required for each of these hunts, and numbers are capped at 15 hunters allowed on the area on any given hunt day. All quota permit hunters were required to check-in/out at the Carter Tract check station to monitor hunter pressure and collect biological data from harvested deer. Deer hunters and their guests logged a total of 74 man-days during the 2018-19 season, compared to 160 man-days for the 2017-18 season. The most popular hunts for this past year were the general gun hunts in January (49 man-days). While archery season historically has been the second most popular hunt on Carter Tract, the closure due to Hurricane Michael resulted in the general gun hunt in November being the second most popular hunt (25 man-days) (Figure 8).

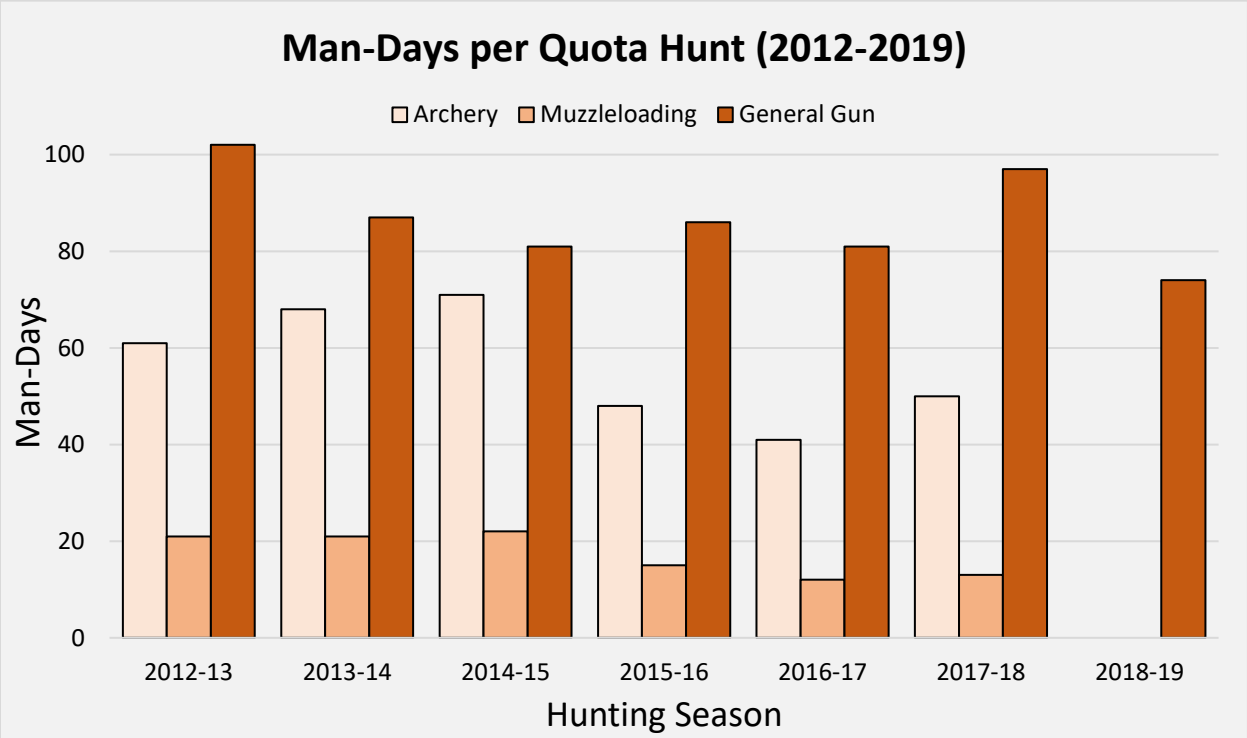

Figure 8. Hunter participation in each of three quota hunt types (archery, muzzleloading, general gun) from 2012-2019 on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington Co., FL. Note for the 2018-19 season, Carter Tract was closed for all but two days of archery season due to Hurricane Michael. There were three man-days of effort during muzzleloading season not depicted here as the hunters were not targeting white-tailed deer.

Four deer were harvested on the Carter Tract during the 2018-19 hunt season. One buck was taken during the November general gun hunt, and three more bucks were taken during the final general gun hunt in January. Despite a decrease in hunter participation due to Hurricane Michael closures, hunter success rate remained almost the same, 5.4% (1 deer/18.5 man-days), as it was for the 2017-18 season (5.6%, Figure 9).

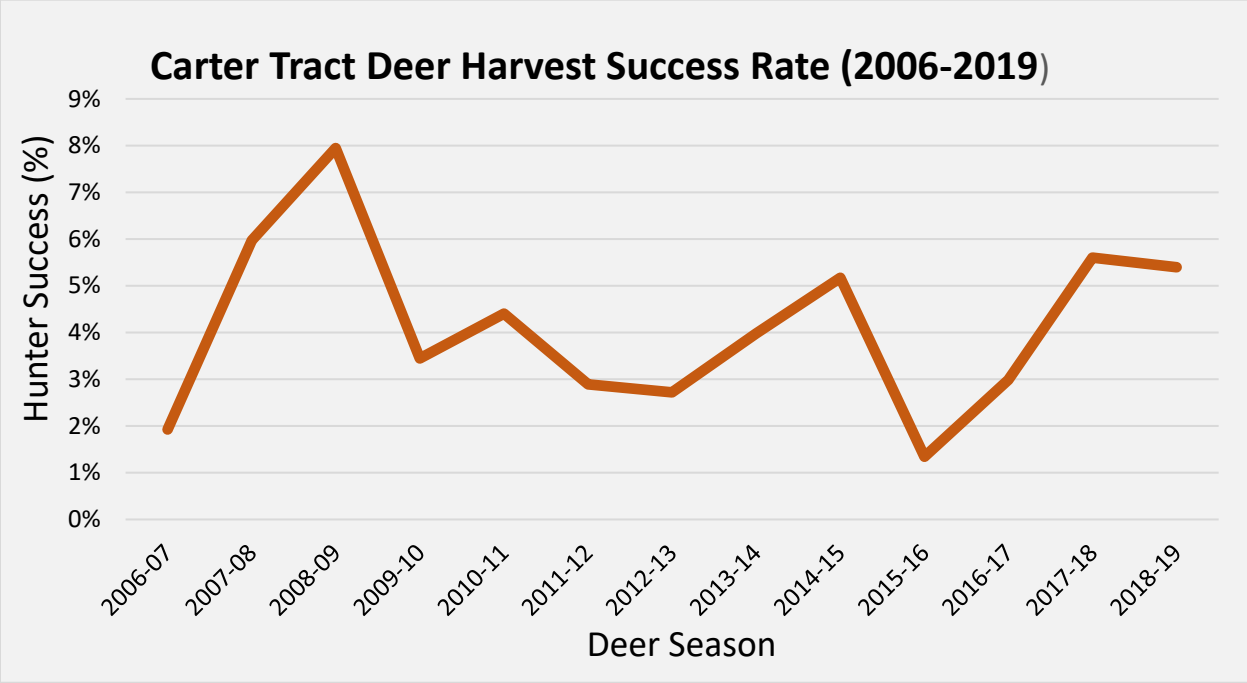

Figure 9. Overall hunter success rate for white-tailed deer from 2006-2018 at Carter Tract of Econfina Creek WMA, Washington Co., FL.

The recent trend is for area bucks to be harvested primarily during the General Gun II & III hunts. These two hunts occur annually during the last week and a half of January which coincides with the primary rutting activity and mean conception dates for white-tailed deer in southern Washington County (Garrison et al. 2009). The mean age of the four bucks harvested this year was 3.0-years-old, with two 3.5-year-old bucks and two 2.5-year-old bucks recorded (Figure 10). The largest deer was an 8-point, 3.5-year-old buck weighing 150 pounds (Table 3).

Table 3. Age and morphometric measurements of four individual deer harvested during the 2018-2019 quota hunts, and overall means, on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington Co., FL.

Quota Hunt	Sex	Age (yrs.)	Weight (lbs.)	Antler Points	MBL (in.)	MBC (in.)	Inside Spread (in.)
General Gun	Male	3.5	149	8	14.5	4.000	10.0
General Gun	Male	3.5	150	8	13.25	3.875	12.5
General Gun	Male	2.5	125	6	12	2.500	12.5
General Gun	Male	2.5	135	7	12	4.000	13.0
Mean	**N/A**	**3.0**	**139.75**	**7.25**	**12.94**	**3.594**	**12.0**

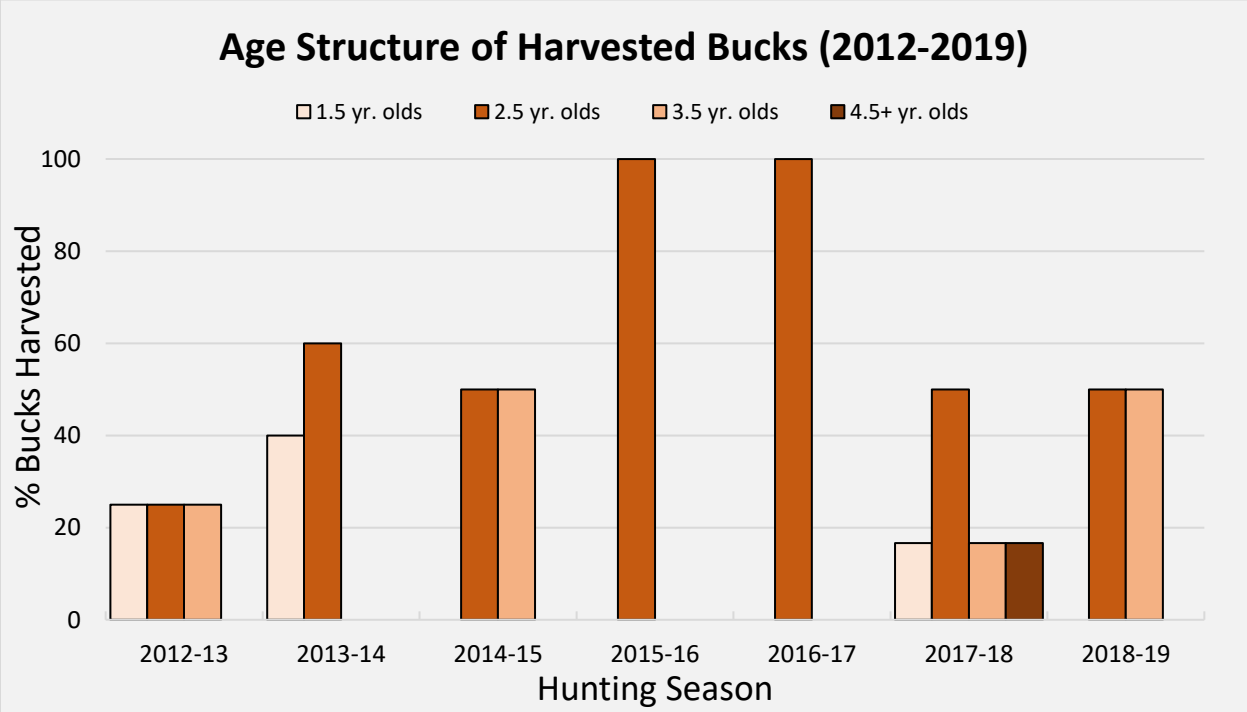

Figure 10. Age structure of all bucks harvested from the 2012-2013 to the 2018-2019 hunting season on Fitzhugh Carter Tract of Econfina Creek WMA, Washington Co., FL.

We believe the full potential for deer hunting opportunities on the Carter Tract has yet to be realized, but we do expect continued improvement in conjunction with active habitat management. Considering herd management objectives, additional antlerless harvests are not presently needed to control population levels as a higher density is desirable to meet our population goal and improve hunter success rates. The continued protection of does (outside archery season) is necessary to further bolster recruitment and expedite achievement of herd objectives. Limiting the harvest of does will facilitate increases in herd size and improvements in overall age structure, which should in turn positively affect hunter success.

Chronic Wasting Disease

Chronic Wasting Disease (CWD) is a contagious neurological disease that has been found in captive and wild white-tailed deer, mule deer (*Odocoileus hemionus*), moose (*Alces alces*), and Rocky Mountain elk (*Cervus elaphus*) within 26 states and three Canadian provinces in North America. CWD also has been detected in Finland, Norway, Sweden, and South Korea. The disease causes degeneration of the brains of infected animals, resulting in emaciation, abnormal behavior, loss of bodily functions, and death.

Currently the only practical method for diagnosing CWD is through analysis of brain stem tissue or lymph nodes from dead animals. There is not a practical live-animal test. In 2002, the FWC initiated a comprehensive surveillance and monitoring program for CWD. Staff continues to collect and test tissue samples from hunter killed deer from the Carter Tract and surrounding counties as part of this statewide monitoring program. The presence of any CWD-positive deer would be cause for concern, so we plan to continue CWD surveillance for the foreseeable future.

Wild Hog

Management

Since 2014, at the request of NWFWMD, FWC staff have assisted with trapping wild hogs (*Sus scrofa*) on Carter Tract. Historically, hogs seem to have always been present. However, ongoing understory vegetative restoration efforts have been recently impacted. As this report covers the FWC Fiscal Year (FY) 2018-2019, only efforts from 1 July 2018 – 30 June 2019 are included. While we do not cease hog management activities on 30 June, but continue unabated into the next FY, those activities will be covered in future reports. Trapping efforts were concentrated from July – mid September 2018, prior to public hunting opportunities, and again from mid-April – 30 June 2019 following the end of public hunting (Appendix I). FWC staff utilized the breaks between public hunting dates for trapping attempts as well. Last fall, Hurricane Michael had a consuming effect on all Carter Tract projects and activities beginning in October 2018; and wild hog management and control was just as impacted.

Frequent and routine scouting for presence of hogs on Carter (i.e. tracks, camera traps, and/or damage to vegetation) was maintained from FY 17-18 beginning in July 2018. Game cameras were deployed in an attempt to pattern the timing and locations of any wild hogs on property in conjunction with the M.I.N.E.™ cameras already deployed. Two corral traps remained in place: one west of Dry Pond, and one along the Garrett Pond/Diamond Head Canal interface (Figure 11).

Vegetation damage from a single, large boar was detected in late July 2018 along the north side of Dry Pond, an area of approximately 1-2 acres. The boar's presence was erratic, with ingress/egress along the fenceless Warmouth Pond/Pine Log Creek interface (Figure 11), making plotting the boar's movements challenging. Apparently, this boar had found a good exit strategy for leaving the Carter Tract; this was made evident on 29 July when it was captured on game camera at 12:30am south of Black Pond, heading towards Pine Log Creek, and subsequently left the property. By mid-August this one boar, which was detected sparingly on camera, abruptly moved out of the core area of Carter Tract.

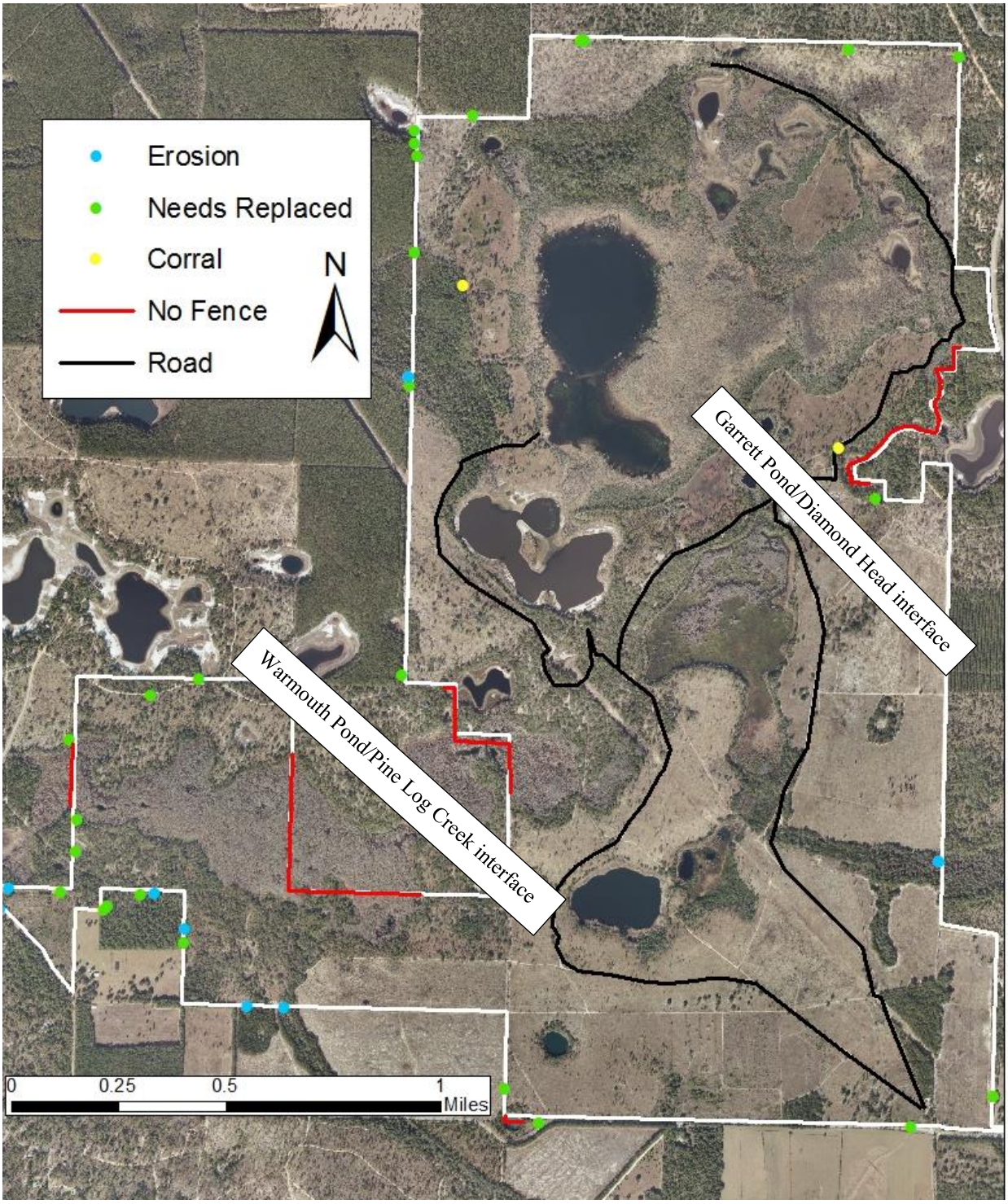

Figure 11. The more prominent boundary fence compromises on the Fitzhugh Carter Tract of Econfina Creek WMA as of June 2019. Location of corral traps used for hog management during the year are highlighted in yellow.

Hurricane Michael disrupted some of the public hunting opportunities on Carter Tract, mainly by forcing the closure of the property during the majority of the archery season in the fall of 2018. However, in January 2019, during general gun season, a 150 lbs. boar was harvested (Figure 12)

Following the conclusion of the 2019 spring turkey season, FWC staff reinitiated the intense spring/summer surveying, monitoring, and trapping period. Despite technical issues and delays with the M.I.N.E.™ camera systems continued monitoring efforts detected minimal presence of hogs on Carter Tract by the end of June – except in the extreme westernmost "arm" of the property.

Figure 12. Harvested 150-lbs. boar taken during the 2018-19 general gun season on Fitzhugh Carter Tract of Econfina Creek WMA, Washington Co., FL.

Boundary Fence Breach Management

Monitoring, and attempts to repair boundary fence breaches, continued despite the impact Hurricane Michael had on the overall integrity of the entire boundary fence. Extensive work will be needed to repair and/or replace the damage to the fence if it is expected to control the future ingress and egress of wild hogs. Obviously, wild hogs on the Carter Tract now have more entry and exit strategies available with new fenceless portions present in addition to the traditional Warmouth Pond/Pine Log Creek interface and the Garrett Pond/Diamond Head Canal interface.

Figure 13 is a Pre-Hurricane Michael snapshot of the Google Earth Boundary Breach Catalog (KMZ file) that has been created for tracking the condition of the entire boundary fence on the Carter Tract. Breaches in the fence were visually verified, GPS tagged, and then photographed. The resulting data was converted into a KML file which precisely locates the breach point with an interactive marker on a satellite image of the area. Clicking on the marker accesses the photo of the breach for reference purposes. This file continued to provide a real time spatial snapshot of the condition of the fence, with both new breaches and recent repairs being mapped and catalogued. This large database is updated during the hunting season, when the necessary man-power needed can be directed away from active surveying, monitoring, and trapping of hogs. Unfortunately, our present Google Earth Boundary Breach Catalog (KMZ file) needs to be rebuilt and revised once all major storm-related damages and issues can be resolved. Nonetheless, FWC personnel will continue to patrol the boundary fence in the present state, identifying and repairing breaches with rebar, wire, fence panels and any other means necessary.

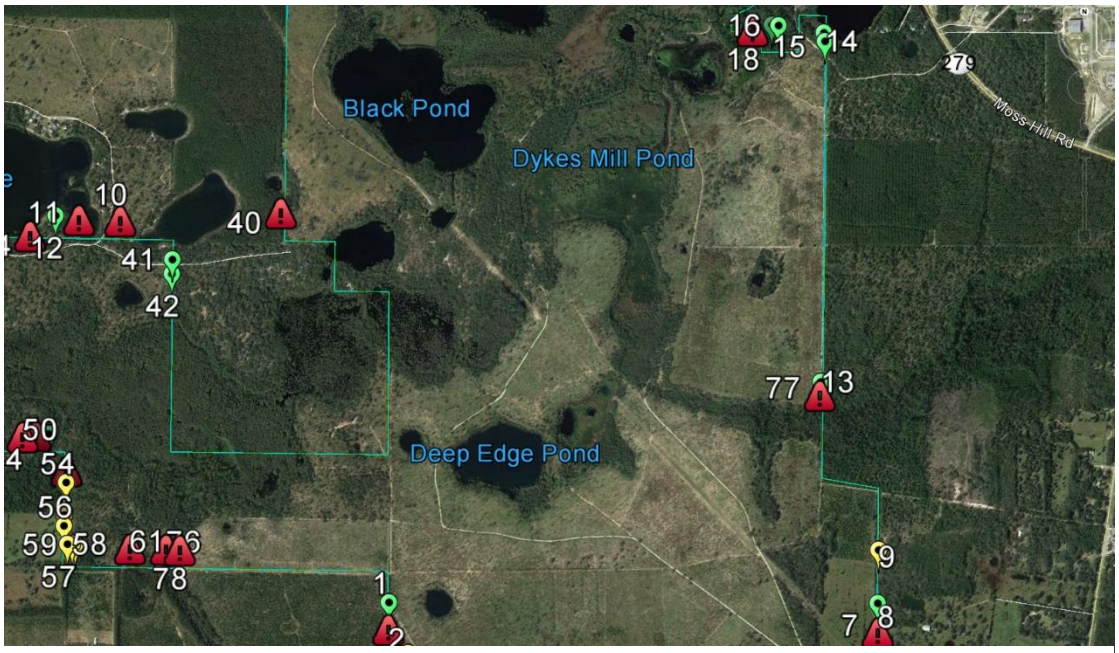

Figure 13. Pre-Hurricane Michael snapshot of the Boundary Breach Catalog used for surveying and monitoring of the boundary fence for hog control on Fitzhugh Carter Tract of Econfina Creek WMA, Washington Co., FL.

Recommendations

We recommend continued hog trapping and harvest, concomitant with addressing boundary fence breach issues, as part of an integrated hog management approach as either activity alone will likely produce less than desired results. Even a few hogs can cause vegetation damage, but once a sounder locates the fenceless areas and follow the same route, large-scale vegetation damage is inevitable. Our detection rate will be immediate given the level of man-power we are exerting right now in monitoring, however the damage will have been done.

Consideration for a hog-dog hunting season during the summer months could be another effective tool for the management of hogs on Carter Tract. Whether or not such a hunt results in successful harvest of hogs, the presence of dogs and the pressure exerted on the hogs has the potential to limit the impact of hog grazing on native vegetation during the critical summer growing season. This in turn supports the management objectives of this mitigation bank property. Given the cooperative efforts by FWC and NWFWMD in addressing the boundary fence breach issues, intensive surveying, monitoring, and trapping, and an abbreviated still-hunting season, it seems intuitive that the addition of a hog-dog hunting season could likely prove an integral part of the wild hog management program on the Carter Tract. Hunters will continue to be encouraged to harvest hogs at every available opportunity.

Prior to Hurricane Michael, and through our most recent and extensive removal efforts and fence maintenance, the hog population on the area had been subdued. One thing is quickly apparent if we are to return to pre-Hurricane Michael hog population conditions – it is imperative we remain diligent in our "three-legged stool" approach to controlling wild hogs on the Carter Tract (Figure 14). Our past successes have proven this to be true.

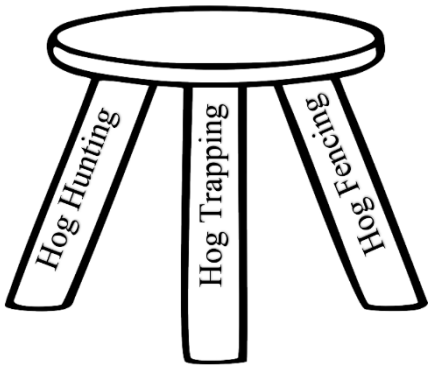

Figure 14. Control of the wild hog population on the Carter Tract has proven to be effective via the "three-legged stool" strategy as depicted above

Wild Turkey

Management Objectives

FWC personnel desire to encourage and maintain a strong population of wild turkey (*Meleagris gallopavo*) on the Carter Tract in order to provide a high-quality hunting experience for the public. We will continue to provide and enhance high quality habitat for wild turkeys by maintaining an open understory and encouraging herbaceous groundcover via habitat improvement activities such as prescribed burning.

Hunting Pressure and Harvest

Spring turkey season on the Carter Tract consists of a two-day youth quota hunt and three quota hunts, each lasting three days. Permit holders for all turkey quota hunts were afforded one day prior to each hunt for scouting. Fourteen total hunters participated in the 2019 spring turkey hunts, two during the youth hunt and another 12 during the remaining quota hunts. No turkeys were harvested during the spring turkey season. The turkey harvest success rate (calculated as the number of turkeys harvested/man-days of effort) for the Carter Tract for 2019 was 0%, as it was in 2018. Turkey harvest rates on the Carter Tract appear to be cyclic (Figure 15) and such trends can be attributed to weather conditions, experience level of hunters, and hunting pressure on surrounding properties affecting harvest success rates. Habitat should continue to improve as a more frequent burn regime is maintained for controlling scrub oaks and producing open grassy/herbaceous areas for nesting and feeding. Further, more frequent mowing of powerline right-of-ways at strategic times of the year (just post nest-hatching) can provide better insect habitat for poults. Turkey poults have a high protein demand during the first four weeks of life (Hurst 1992), and are incapable of flight until approximately ten days old (Williams, Jr. and Austin 1988). During this flightless period poults are extremely vulnerable to predation. Increasing the amount of protein available (in the form of insect abundance) should help achieve maximum poult growth and improve survival.

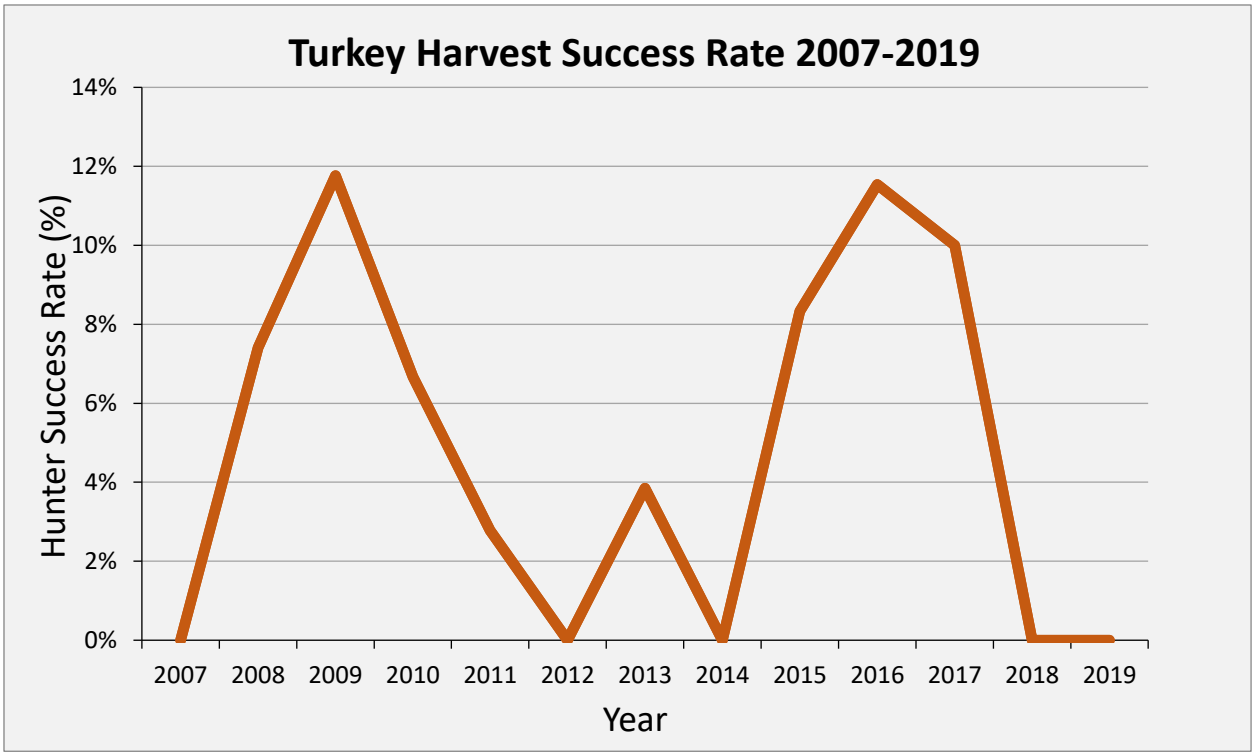

Figure 15. Turkey harvest success rate, calculated as the number of turkeys harvested per man-day of effort, for the years 2007-2019 on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington Co., FL.

Waterfowl

Hunting Pressure and Harvest

The Carter Tract provides duck hunting opportunities during a special early duck season each September and portions of the general gun and small game seasons coinciding with the phase I and II waterfowl seasons as determined by the U.S. Fish & Wildlife Service (USFWS). Duck hunters harvested 22 ducks, representing three species, during the 2018 season (Table 4). Five wood ducks *(Aix sponsa)* and ten blue-winged teal (*Anas discors*) were harvested during the September early duck season. Three wood ducks were harvested during the small game season. One wood duck and three ring-necked ducks *(Aythya collaris)* were harvested during the second general gun hunt.

Hunters devoted 50 man-days to duck hunting this season, a 58.6% decrease from the 2017-2018 season (Figure 16). While this is a sharp decrease, we believe the lack of duck hunters on Carter Tract for the 2018-2019 season is most likely due to lasting effects of Hurricane Michael's landfall in October and not because hunters are abandoning hunting opportunities on Carter Tract. Likewise, the decrease in hunter success (ducks harvested/man-days) is not alarming due to the decrease in hunter effort this season (Figure 17).

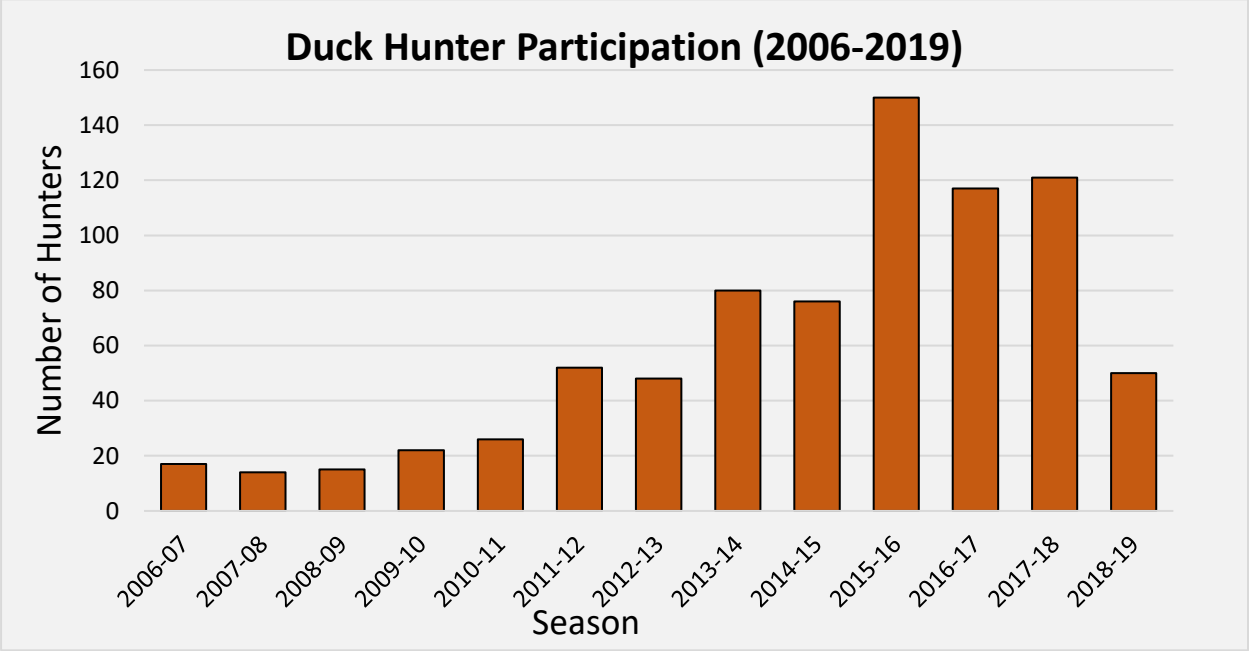

Figure 16. The number of hunters participating in duck season each year from the 2006-07 season to the 2018-19 season on Carter Tract of Econfina WMA, Washington Co., FL. Hunter participation was down 58.6% this year, likely due to lingering effects of Hurricane Michael and not hunter abandonment of Carter Tract.

Table 4. Species of waterfowl harvested during all public hunting opportunities on the Carter Tract of Econfina Creek WMA (Washington Co., FL) during the 2018-2019 duck season.

Species	Early Duck (Sept.)	Small Game Hunt	General Gun Hunts	Totals
Wood Duck	5	3	1	9
Blue-winged Teal	10	0	0	10
Ring-necked Duck	0	0	3	3

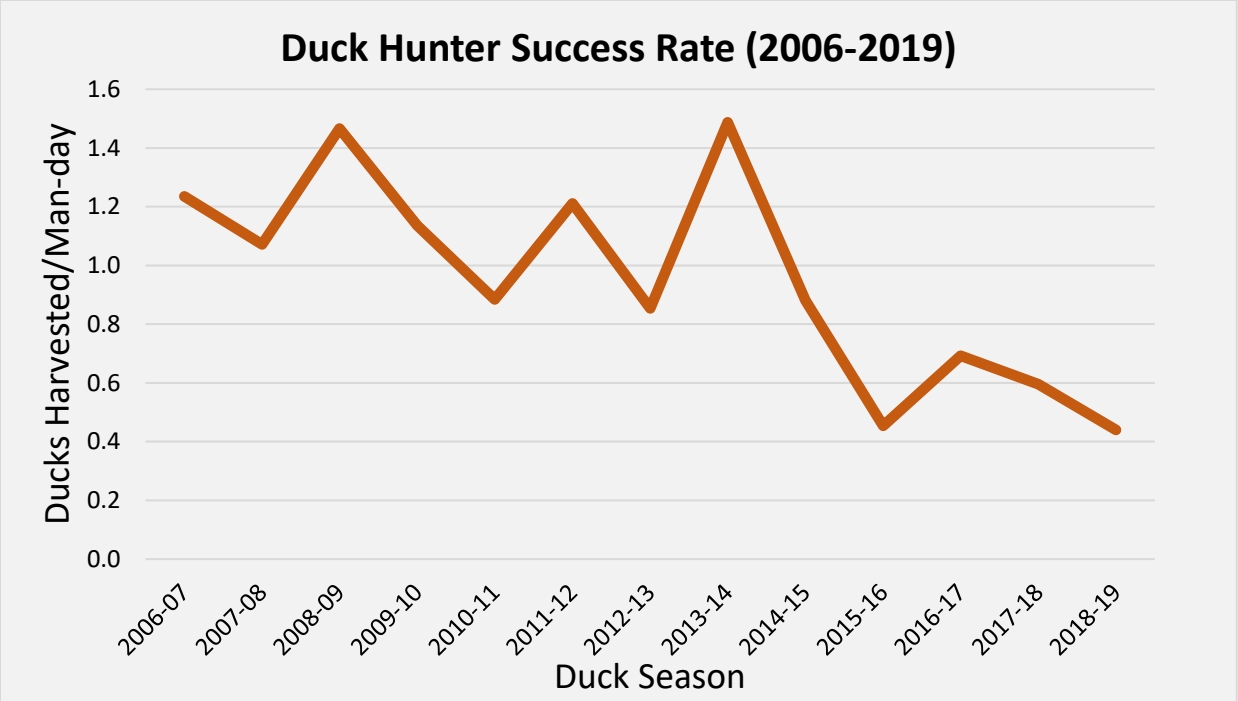

Figure 17. Success rate of duck hunters per year from the 2006-07 season to the 2018-19 season on Carter Tract of Econfina Creek WMA, Washington Co., FL.

Wood Duck Nest Boxes

Efforts to facilitate local breeding populations of wood ducks continues with the maintenance and monitoring of 48 wood duck nest boxes located throughout the Carter Tract (Figure 18). Boxes are visited each winter to repair or replace nest boxes and predator guards, and to replenish boxes with fresh wood shavings for the upcoming nesting season. During the nesting season, boxes are checked twice – once in March to record nests and clutch sizes, and once May-June to record late-nesting ducks and nest fate. The nest boxes at Carter Tract have averaged approximately 19 clutches per nesting season since the first nest checks in 2006.

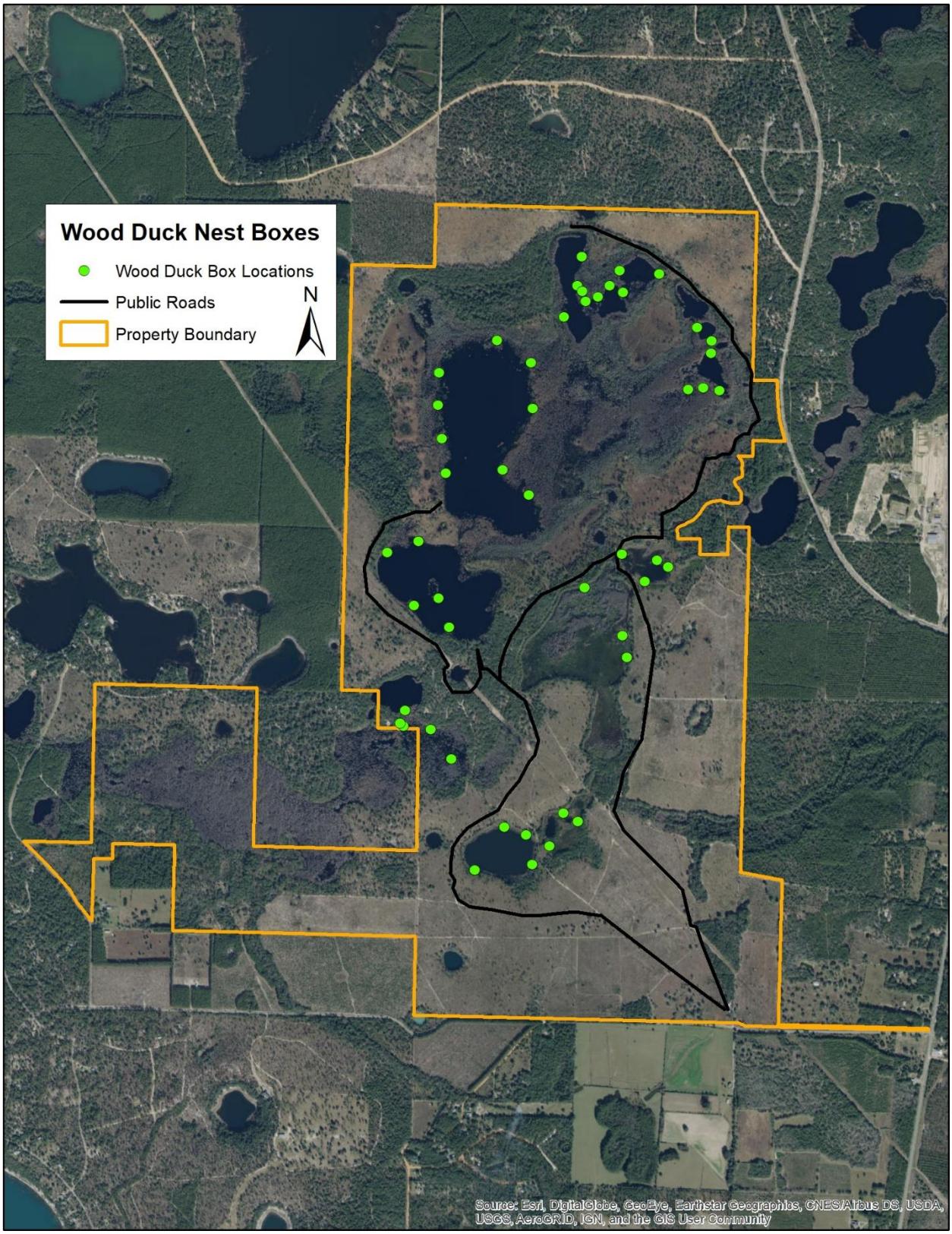

Figure 18. Current wood ducks nest box locations on Fitzhugh Carter Tract of Econfina Creek WMA, Washington Co., FL.

Small Game

Hunting Pressure and Harvest

The Carter Tract is open annually to small game hunting during a 16-day non-quota season each December. The area is open first-come first-served to a maximum of 15 hunters on the area at any given time. Gray squirrel (*Sciurus carolinensis*), northern bobwhite (*Colinus virginiana*), wild hogs (*Sus scrofa*), and various waterfowl species are the primary species hunted. Check station operators record how many hunters pursue each type of game for the duration of the small game season. Small game hunters devoted 31 man-days during the small game season harvesting 5 quail and 5 squirrels (Table 5). It is important to note that hunters pursuing waterfowl are not included in this count but constituted approximately half of the hunters participating in the small game season (see: Waterfowl Harvest). Small game hunter participation increased from 2017 (24 man-days, Figure 19), and thus we remain encouraged that the small game season is popular among the hunting public.

Table 5. The number of man-days devoted, number harvested, and hunter success rate for each of three species targeted during the 2018 small game season at the Carter Tract of Econfina Creek WMA, Washington Co., FL. Table does not include those hunters targeting waterfowl (see: Waterfowl Harvest).

Species	Number of Hunters	Number Harvested	Success Rate/Species
Quail	14	5	36%
Squirrel	8	5	63%
Hog	9	0	0%

In addition to the designated season, small game can be hunted by permit holders during deer quota hunts provided there is a season overlap between the game being hunted and quota hunt dates. Eleven squirrels were taken during the muzzleloader quota hunt and one male hog was harvested during general gun quota hunts. In total, 16 squirrels, 5 quail, and 1 hog (See: Wild Hog) were harvested during the 2018-2019 hunting seasons.

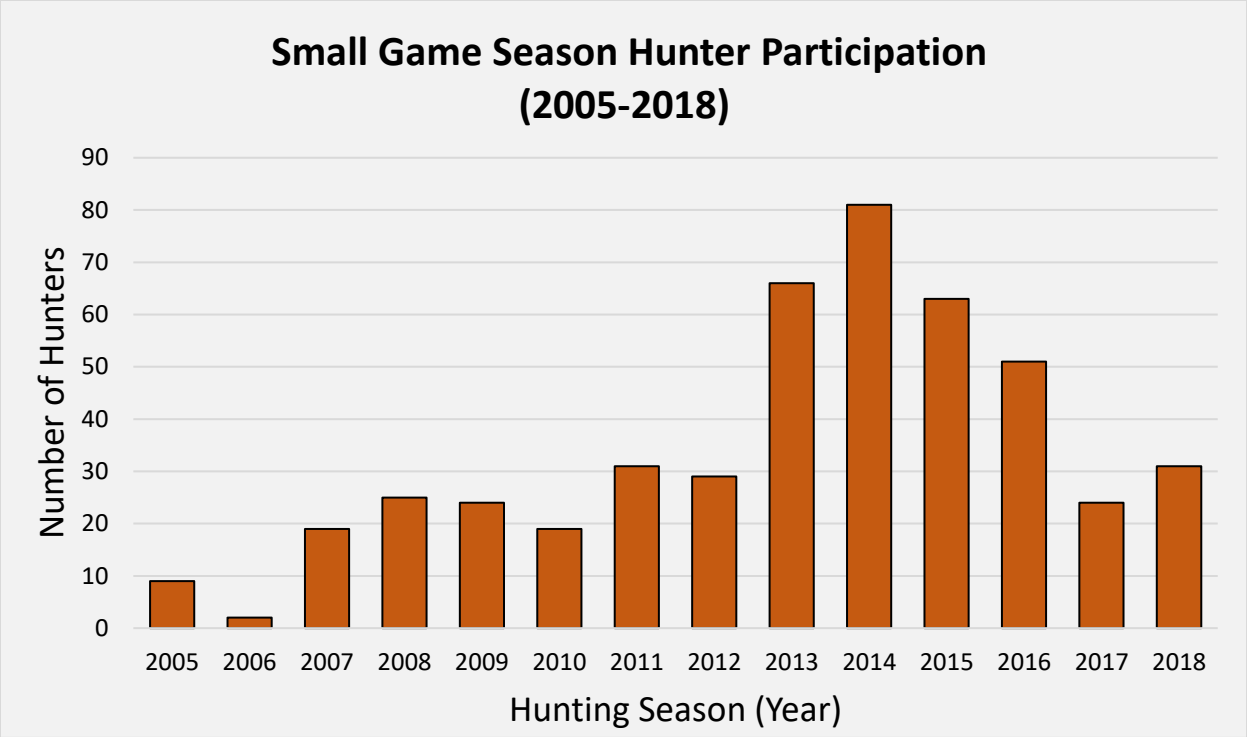

Figure 19. Small game season hunter participation from 2005-2018 on the Carter Tract of Econfina Creek WMA, Washington Co., FL.

Bobwhite Quail

Summer whistle counts for bobwhite quail (*Colinus virginianus*) are used to obtain a population index for this popular gamebird. It has been shown that there is a strong positive relationship between the number of quail whistling in the summer and the number of coveys established the following fall (Rosene 1984; Terhune et al. 2009). Since 2012, we have conducted annual summer whistle counts for quail in order to obtain a population index of this species and follow subsequent harvest success on the Carter Tract.

Whistle count surveys were conducted from June 4 - 18, 2019. Surveys fell within the mid-June to late-July peak suggested by Terhune et al. (2009). It was important to conduct surveys during peak whistling dates as intensity of whistling is thought to correspond closely with nesting and hatching activity (Terhune et al., 2009), and thus should be a more robust indicator of overall population estimates. Rosene (1984) and Terhune et al. (2009) also suggested that the best time to conduct whistle counts is during the 'calling optimum' that takes place during the two hours following sunrise. We followed this protocol, beginning surveys promptly at sunrise and completing all surveys within the two hours following official sunrise. Surveys lasted for five minutes per station and 12 total stations were chosen that maintained adequate spatial coverage of the upland habitats of the Carter Tract. One-half mile buffers were maintained between stations to decrease the possibility of double-counting birds. Surveys were not conducted when cloud cover was >50%, wind speed exceeded 12 mph, or under rainy conditions.

Figure 20 illustrates the trend in the mean number of quail heard per station annually during summer whistle count surveys for the past eight years at Carter Tract. Mean number of quail heard per station in 2019 was 1.27. This was likely aided by the 700+ acres of upland habitat burned in June 2016. However, the overall low number of male quail leaves the health of the population on Carter Tract vulnerable to declines due to weather events like hurricanes or disease. Continuing to keep the upland habitat on a two-year or less burn interval will reduce hardwood encroachment, keep wiregrass from becoming too thick, and provide open areas for quail to feed.

Because of the relationship to the number of calling birds, total calls per station were also recorded. By recording calls, an attempt is made to avoid observer errors in distinguishing the number of individual calling birds as this number increased. Ellis et al. (1972) and Snyder (1978) both noted that the relationship between the numbers of calls and number of calling quail deteriorated rapidly when more than 7 birds per station were heard. It was more difficult for observers to distinguish between individual quail at higher densities. Curtis et al. (1989) and Robinette (1991) observed increased variability in calling when the mean exceeded 4 birds per station. On the Carter Tract, the mean number of different quail heard per station didn't exceed four birds regularly. When this level is surpassed more frequently, it

may be appropriate to use mean number of calls rather than the number of whistling bobwhites as the count index. Moreover, Snyder (1978) also noted 3 replicates were needed to project within 20% of the actual mean 80% of the time, when the call rate averaged 1 quail per station. When the index rate averaged 4 quail per station, 7 replicates were needed. It appears that the 5-6 replicates on the Carter Tract should be adequate for sufficient sampling of the bobwhite population.

We are encouraged to see more widespread use of the entire Carter Tract property by bobwhite quail and feel that maintaining an aggressive burning regime is the most important management activity NWFWMD can do to continue to improve the population on the Carter Tract. Simply put, to manage for bobwhite quail populations, one is essentially managing for the integrity of the forest system that supports this bird; specifically, the sandhills longleaf-turkey oak-wiregrass association with its dendritic pattern of watersheds and frequent fire.

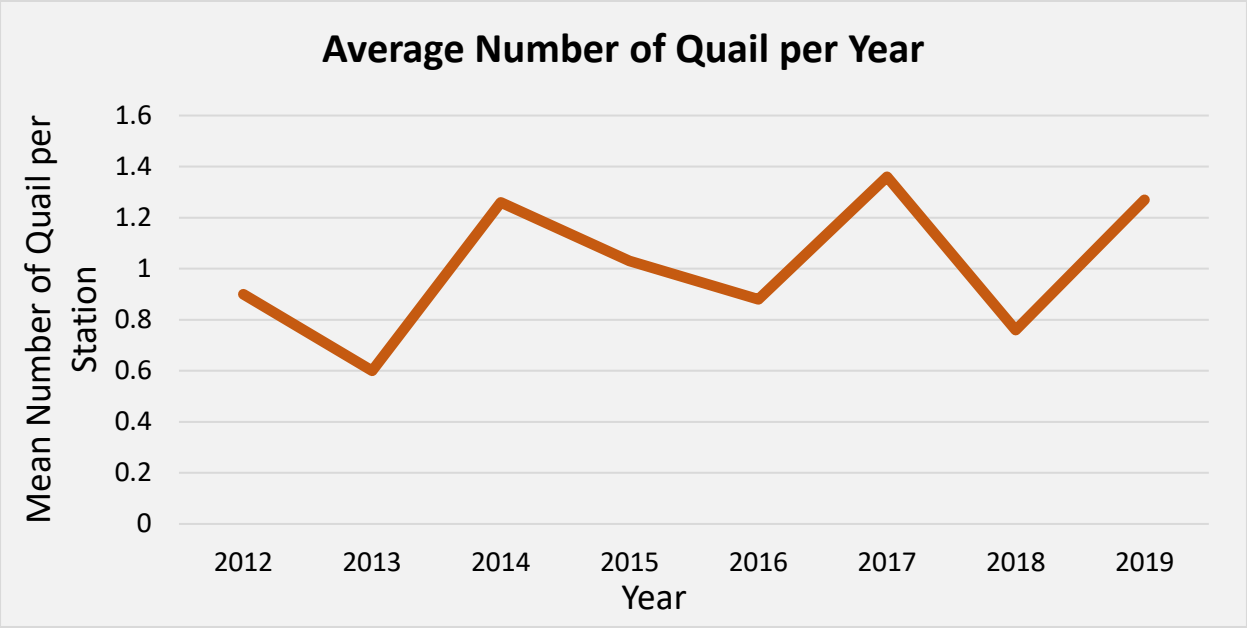

Figure 20. Trend in the average number of quail counted per station during surveys on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington Co., FL from 2012-2019.

Wading Birds

Most wading birds nest semi-colonially along the edges of lakes or creeks, or in trees and shrubs growing out of water bodies. Many species of wading birds are locally affected by wetland drainage associated with urbanization and agricultural expansion. The resulting loss of suitable foraging and breeding habitat in conjunction with increased predation are key threats to Florida's wading birds (FWC 2013). These issues highlight the importance of conservation of unspoiled wetland habitat such as that found on the Carter Tract. The Carter Tract supports two wading bird colony's that are monitored every spring, Little Deep Edge Pond (LDE), which has been surveyed since 2008, and Dykes Mill Pond since 2015.

LDE wading bird surveys are conducted annually from March – July. Great Egrets (*Ardea alba*), Cattle Egrets (*Bubulcus ibis*), and Little Blue Herons (*Egretta caerulea*) have historically been the most common species documented, with Tricolored Herons (*Egretta tricolor,* Snowy Egrets (*Egretta thula*), Great Blue Herons (*Ardea herodias*) and Anhinga (*Anhinga anhinga*) also observed. Adult birds and nest contents are observed at a distance using binoculars and a spotting scope to avoid disturbing the nests. Checks are completed on LDE every 2 - 3 weeks, during which time, nestlings get large enough to accurately count. For each visit, pictures of nesting locations are taken from multiple observation points. Nests are identified and given a nest ID so FWC staff can follow the same nest throughout the nesting season.

At the LDE colony, eight Great Egret nests produced 13 chicks and one Anhinga nest produced two chicks. There were no nests or chicks for Little Blue Herons, Tricolored Herons, and Snowy Egrets. Figure 21 illustrates active nests and chick production of wading birds at LDE from 2008-2019. A detailed summary of species observed from 2008-2019 using the Little Deep Edge Pond wading bird colony can be found in Appendix V, while a comprehensive list of all bird species documented on the Carter Tract can be found in Appendix VI.

Great Blue Heron and Anhinga have been documented using the Dykes Mill Pond cypress strand, regularly since 2005. During the 2019 nesting season, 12 Great Blue Heron nests produced 17 chicks and one Anhinga nest produced three chicks. FWC will continue to monitor this colony annually to track nesting success and species composition. Given the colony's distance from shore and overall size of the habitat which encompasses said colony, staff conduct two surveys of the Dykes Mill Pond rookery, one in late March-early April to document Great Blue Heron nests and chicks, and returning in early May to document Anhinga nests and chicks. This timing gives us the optimal window to document chicks and gauge to some extent the productivity of this colony.

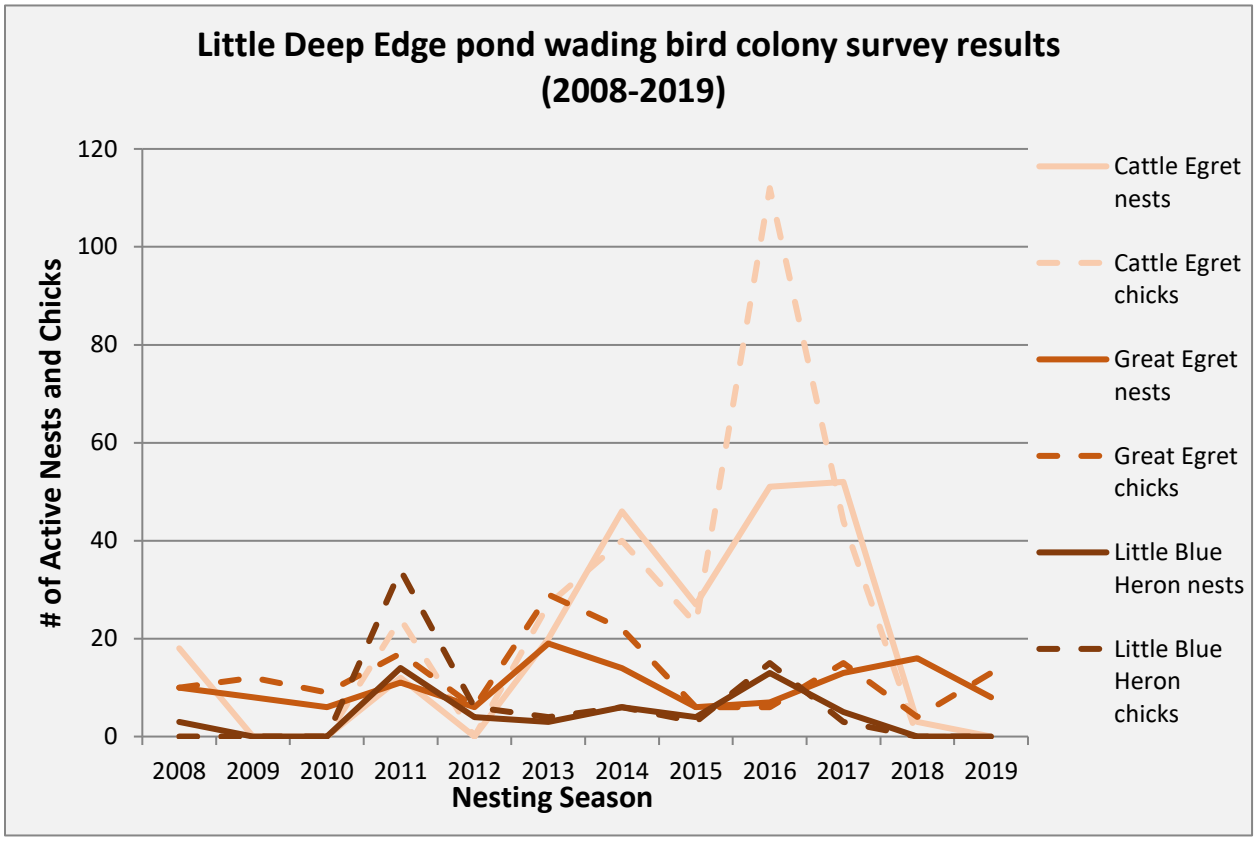

Figure 21. Active nests and chicks observed on Little Deep Edge wading bird colony from 2008 - 2019, Fitzhugh Carter Tract of Econfina Creek WMA, Washington Co., FL.

Bachman's Sparrow

Bachman's Sparrows (*Peucaea aestivalis*) were first documented on Carter Tract during the spring of 2015. This species has been identified as a species of greatest conservation need by FWC. Bachman's Sparrow was once a common species in the southeastern longleaf pine forests but has undergone dramatic population declines in recent decades (Cox 2014). An indicator of southern pine forests, Bachman's Sparrows nest and forage on the ground and are closely associated with areas with diverse, healthy ground cover conditions maintained by frequent prescribed fire. Playback surveys will allow FWC to determine the presence and distribution of Bachman's Sparrow on Carter Tract over time. Survey sites selection and protocols closely follow those established by Cox (2014). Sites needed to be at least 250m apart and cover potential breeding habitat (sandhills, flatwoods, scrubby flatwoods, and prairie) to be included. From these criteria, thirteen sites were randomly selected using ArcMap 10.3® GIS (Geographic Information Systems) software (Figure 22). Surveys were conducted from 24 April to 15 May 2019 under favorable weather conditions and began at sunrise and ended by 1200 hours. At each station, the observer played a sequence of Bachman's Sparrow vocalizations (45 sec) and silence (15sec) that was repeated three times for a three-minute sampling period. Three replicates of the survey were completed.

Bachman's Sparrows were documented at three of the thirteen survey sites. Presence was recorded in the extreme southern portion of Carter Tract at stations 6, 8 and 12 (Figure 22). These three stations are characterized as sandhill habitat, with a dense wiregrass groundcover and longleaf saplings dominating the landscape. With the continued two-year fire return interval, we expect Bachman's sparrows to continue to use Carter Tract and expand into northern portions of the property.

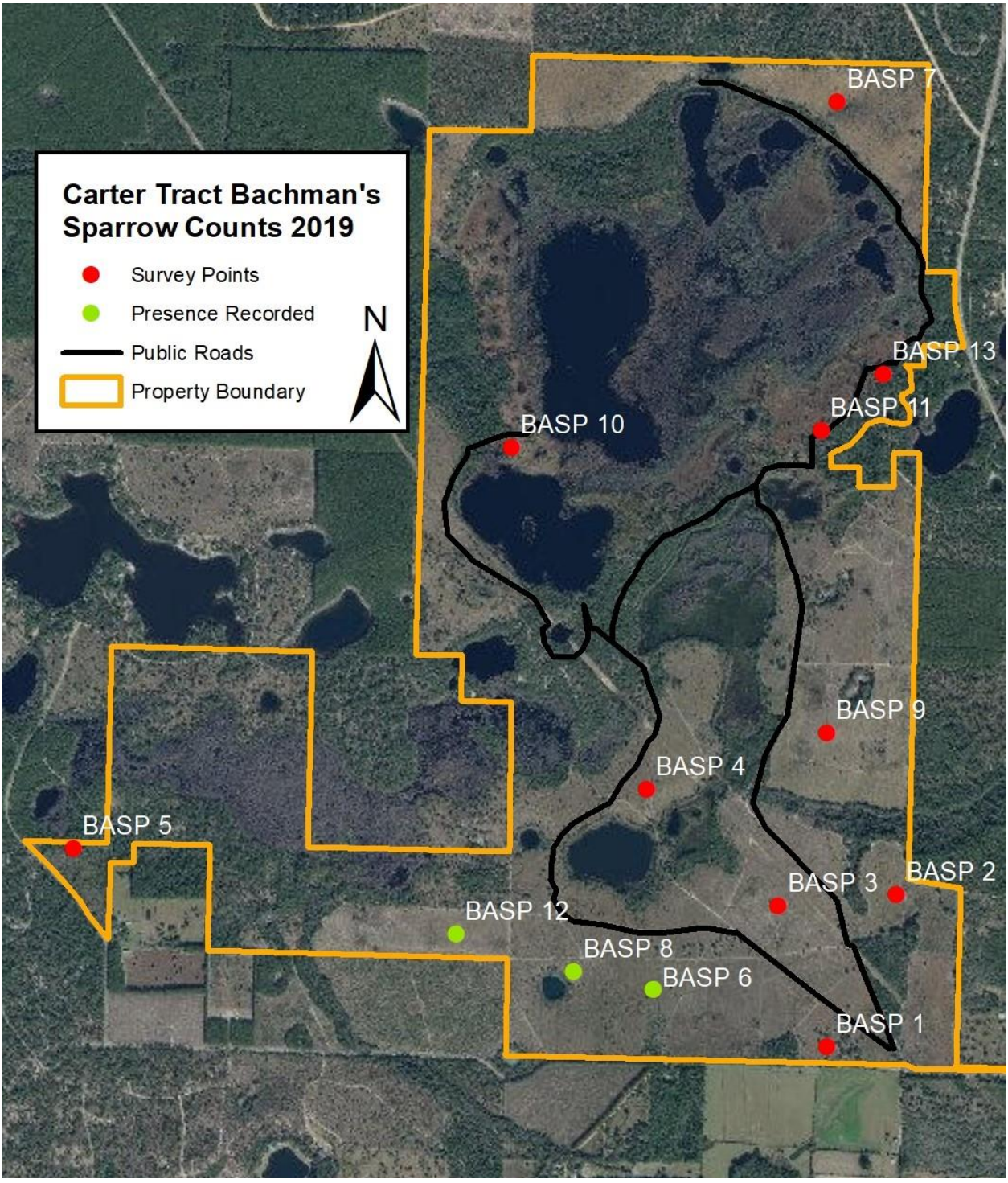

Figure 22. Recorded locations for Bachman's Sparrow (green) and survey stations (red) for 2019 surveys on Fitzhugh Carter Tract of Econfina Creek WMA, Washington Co., FL.

Southeastern American Kestrel

The Southeastern American Kestrel (*Falco sparverius Paulus)* is a subspecies of the American Kestrel (*Falco sparverius*) found in open pine habitats, woodland edges, prairies, and pastures, with a preference for sandhill habitats. The smallest falcon in the U.S., and a threatened species in the state of Florida, the southeastern American kestrel relies on suitable cavity trees as a key habitat feature necessary for breeding (Rodgers, Jr. et al., 1996). However, because kestrels are secondary cavity nesters, suitable nest sites are thought to be the most limiting factor and a major contributor to declining populations in Florida (Hoffman and Collopy 1988). The decline of natural nesting and foraging habitats in recent years has prompted the use of nest-box programs to help augment populations. Kestrel boxes can also provide important winter cover for other avian species, such as the Eastern Screech Owl (*Megascops asio*) (Hipes et al. 2001; U.S. Department of Agriculture 1999).

FWC staff observe kestrels annually at the Carter Tract during winter and early spring. However, it is unknown whether the birds are migratory/wintering American Kestrels or resident Southeastern American Kestrels. Although Southeastern American Kestrels are slightly smaller than American Kestrels, the two species cannot be reliably distinguished in the field. Because the Southeastern American Kestrel is the only subspecies of kestrel that breeds in Florida, erecting nest boxes is one method of determining which species is present on the Carter Tract. Therefore, in February 2011 eight nest boxes were installed throughout the Carter Tract following protocol outlined by the U.S. Department of Agriculture (1999). Currently, six of the eight original nest boxes are still on the area, and an additional nest box was added in the Spring of 2018 (Figure 23).

Nest boxes were installed on mature longleaf pine trees, approximately 15 ft from the ground facing a southeast orientation. Trees chosen were those in open areas, far enough away from surrounding trees to discourage squirrels from accessing nest boxes. Boxes were located at least 0.5 miles from the next nearest nest box. Boxes were filled with cedar shavings as nesting material. Aluminum flashing was wrapped around the base of trees to discourage rat snake (*Elaphe* sp.) predation. Nest box monitoring followed protocol outlined by FWC's Fish and Wildlife Research Institute.

Although there has not been documented nesting by Southeastern American Kestrels on Carter Tract yet, a similar kestrel box project on Blackwater WMA has documented breeding kestrels one year following box installation. Kestrels continue to nest at Blackwater WMA every year since (Barbara Almario, Biologist III, Blackwater WMA, pers. comm.). With Blackwater WMA located just 75 miles west of the Carter Tract, we feel there is a good chance Southeastern American Kestrels will utilize nest boxes in the future here.

Figure 23. Location of seven Southeastern American Kestrel nest boxes on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington Co., FL.

Mourning Dove

FWC's Small Game Management Program solicited WMA participation throughout the state as part of a national long-term mourning dove (*Zenaida macroura*) banding program. Since 2007, Carter Tract staff have participated and contributed to Florida's statewide dove-banding project in cooperation with the U.S. Fish and Wildlife Services and Bird Banding Lab. These efforts are integral components in the development and implementation of a long-term national harvest management strategy for mourning doves. Hunters play an important role in the success of the program and are encouraged to report leg bands either via telephone or internet.

Trapping was conducted early-mid July 2019, with traps set in the early morning. Traps were checked after 1-2 hours depending on weather conditions. Doves were banded using USFWS metal identification bands, and age (HY = hatch year; AHY= after hatch year), sex, and molt sequence data were collected for each bird. Our trapping efforts yielded 25 mourning doves (16 HY; 9 AHY) successfully banded (Table 6).

Table 6. Number of mourning doves banded, by age class, from 2007 - 2019 on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington Co., FL.

Year	# HY (hatch year) birds banded	# AHY (after hatch year) birds banded	# unknown age birds banded	Total # birds banded
2007	29	7	2	38
2008	40	9	1	50
2009	10	9	1	20
2010	11	13	1	25
2011	11	9	0	20
2012	12	14	0	26
2013	14	11	0	25
2014	34	12	0	46
2015	9	6	0	15
2016	8	7	0	15
2017	21	10	4	35
2018	28	7	0	35
2019	16	9	0	25
Totals:	243	123	9	375

Herpetofauna

FWC staff have employed various methods for surveying and monitoring the herpetofauna population at the Carter Tract over the years. Methods used include box-funnel snake traps, pitfall traps, and incidental observations. A comprehensive list of all herpetofauna species (n=62) identified on the Carter Tract from 2005 to present has been compiled (Appendix VII). Sandhill and scrub habitats, as well as seasonal isolated wetlands and small ponds, are among the most important and imperiled habitats for southeastern herpetofauna. Most amphibians that rely on seasonal wetlands or ponds for reproduction also require upland habitats (Bailey et al. 2006). The Carter Tract is an example of a good mix of both permanent (e.g. Dry Pond) and intermediate (e.g. Pine Log Creek and Garrett Pond) aquatic habitats interspersed with adjacent upland sandhills.

Gopher Tortoise

The presence of the gopher tortoise (*Gopherus polyphemus*) in the sandhill habitat of the property is significant not only because it is a state Threatened species, but also because their burrows (both active and abandoned) are used by a host of commensal species for shelter and foraging (Jackson and Milstrey 1989). Specifically, the federally Threatened eastern indigo snake (*Drymarchon couperi*), as well as the imperiled gopher frog (*Rana capito*) and Florida pine snake (*Pituophis melanoleucus mugitus*), are known to use gopher tortoise burrows (Moler 1992; Ashton and Ashton 2008). In previous years, a detailed report on the Annual Survey and Monitoring of the Gopher Tortoise on the Carter Tract was submitted by FWC staff separate from this comprehensive annual report. However, in March 2017 the annual gopher tortoise monitoring was contracted with the Florida Natural Areas Inventory (FNAI). After a pilot survey to determine sampling intensity needed to adequately survey for the species on the Carter Tract, three surveys were conducted in March, April, and May of 2017. Twenty-five burrows with seventeen tortoises were encountered. Line-transect distance sampling (LTDS) estimated the population to be approximately 86 tortoises. Over half of the tortoises sampled were subadult or younger, indicating high recruitment to the local population. Future plans to monitor the local gopher tortoise population are to contract periodic LTDS surveys as necessary.

Bat Houses

Since 2016, commercial bat houses have been erected near Garrett Pond and between Dry and Black Ponds (Figure 24). Each site contains two houses installed on opposite sides of the supporting pole and can hold up to 200 roosting bats, or 400 at each site. FWC staff installed the houses in response to the previously occupied roosting sites (two hollow cypress trees on Dry Pond) no longer being used. Because many bat species occur in human habitations in Florida, they are particularly vulnerable to intentional eviction, roost destruction, vandalism, harassment, and large-scale colony destruction, thus efforts should be made to preserve known roost sites (Humphrey 1992).

Figure 24. Two bat houses were installed on Carter Tract in January 2016. One house was installed between Dry Pond and Black Pond (left) and the other was installed at Garrett Pond (right).

Bat boxes were checked once in July and once in August during daylight hours. July observations yielded 5 bats of unknown species at the Garrett Pond array, and an estimated 50 at the Dry Pond site. August checks estimated 400 bats, or full capacity, at the Dry Pond site. However, following Hurricane Michael there has not been any sign of bats occupying either of the two bat house arrays.

LAW ENFORCEMENT ACTIVITIES

Lieutenant Warren Walsingham

Florida Fish and Wildlife Conservation Commission Law Enforcement Officers patrol the Fitzhugh Carter Tract of the Econfina Creek Wildlife Management Area providing policing to include wildlife, fisheries, and general law enforcement. This FY 2018-2019 officers provided approximately 85 hours of patrol directed to the Carter Tract. There were approximately 75 user contacts for the area with minimal enforcement action taken.

Officers conducted foot patrol and all-terrain vehicle patrols of the interior roads and perimeter of the Carter Tract throughout the year. Officers targeted illegal hunting, trespassing, baiting violations, and night hunting during the hunting season. They focused on possession of alcohol, licensing, bag limit and size limit violations during the allowed fishing season.

Officers responded to and worked complaints about possession of alcohol, taking game during closed season, illegal entry, improper check in, overdue hunters and fishing in an unpermitted area. With relationships being built between biologists, check station staff, and officers most illegal activity was stopped prematurely through education, as the popularity and activity increases in the area.

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Appendix I. 2018-2019 Fitzhugh Carter Tract of Econfina Creek Wildlife Management Area Hunting and Fishing Regulations Summary and Area Map.

2018-2019 Hunting Season

Fitzhugh Carter Tract
Econfina Creek
Wildlife Management Area

Regulations Summary and Area Map
July 1, 2018 - June 30, 2019

A cooperative public wildlife and recreational area

Northwest Florida Water Management District

Florida Fish and Wildlife Conservation Commission

MyFWC.com

This brochure is designed to provide the public with information and a summary of regulations pertaining to hunting, fishing and other recreational use on the Fitzhugh Carter Tract of Econfina Creek Wildlife Management Area. **Regulations that are new or differ substantially from last year are shown in bold print**. Area users should familiarize themselves with all regulations. For exact wording of the wildlife laws and regulations, see the Florida Fish and Wildlife Conservation Commission's wildlife code, on file with the Secretary of State and state libraries. This brochure, the Florida Hunting Regulations handbook, and quota permit worksheets should provide the information necessary for you to plan your hunting and fishing activities. These publications are available at MyFWC.com.

Persons using wildlife management areas are required to have appropriate licenses, permits and stamps. The following persons are exempt from all license and permit requirements (except for quota permits when listed as "no exemptions," recreational use permits, antlerless deer permits and the Migratory Bird Hunting and Conservation Stamp [federal duck stamp]): Florida residents who are 65 years of age or older; residents who possess a Florida Resident Disabled Person Hunting and Fishing Certificate; residents in the U.S. Armed Forces, not stationed in Florida, while home on leave for 30 days or less, upon submission of orders; and children under 16 years of age. Children under 16 years of age are exempt from the duck stamp. Anyone born on or after June 1, 1975 and 16 years of age or older must have passed a Commission-approved hunter-safety course prior to being issued a hunting license, except the Hunter Safety Mentoring exemption allows anyone to purchase a hunting license and hunt under the supervision of a licensed hunter, 21 years of age or older.

Licenses and permits may be purchased from county tax collectors, license agents, by telephone at 888-486-8356 (hunting) or 888-347-4356 (fishing) or through the Commission's Recreational License Issuance Services (RLIS). A no-cost Migratory Bird Permit is available when purchasing a hunting license. Any waterfowl hunter 16 years of age or older must possess a federal duck stamp.

Quota Permit Information:
Archery - 15, no-cost, quota permits (no exemptions) for each of 2 hunts.
General Gun - 15, no-cost, quota permits (no exemptions) for each of 3 hunts.
Muzzleloading Gun - 15, no-cost, quota permits (no exemptions).
Youth Turkey - 3, no-cost, quota permits (no exemptions).
Spring Turkey - 5, no-cost, quota permits (no exemptions) for each of 3 hunts.

Daily Fishing Permits: 20 anglers are allowed on the area per day. 10 daily permits are available first-come, first-serve at the check station; 10 daily permits can be reserved in advance by calling 850-773-2631. If reserved permits are not filled by 11 a.m., they will become available at the check station first-come, first-serve. Permits are issued with specific lake designations, and anglers are allowed to fish only at the lake for which the permit is issued and must have the permit in their possession at all times.

Permit applications: Hunters must submit electronic applications for quota and special-opportunity permits through RLIS. Worksheets listing hunts, application periods, deadlines and instructions are available at county tax collector's offices, FWC offices or MyFWC.com. Quota application periods occur throughout the year beginning April 1; please refer to the hunting handbook or MyFWC.com for specific dates. Worksheets will be available about 2 weeks prior to each application period.

Guest hunters: For each non-transferable archery, muzzleloading gun, general gun, wild hog, spring turkey and mobility-impaired quota permit issued through RLIS, a quota permit holder (host) may take a guest hunter by obtaining a guest permit. Guest hunters are not allowed during youth turkey hunts. A guest hunter must possess a completed guest permit while hunting except the following persons may be a guest hunter without a guest permit: a youth under 16 years of age, a youth supervisor, a mentor license holder or a mentor license supervisor. A host may only bring 1 guest hunter at a time and may only use 1 guest permit per day. The following persons are not considered to be guest hunters: other quota permit holders, non-hunters and exempt hunters (on areas and during seasons that allow exemptions). The host must share the bag limit with the guest hunter and the host is responsible for violations that exceed the bag limit. The guest hunter and host must enter and exit the area together and must share a street-legal vehicle while hunting on the area. The guest hunter may hunt only while the host is on the area. Refer to the quota hunt worksheets for additional information.

Youth and mentor license holders: A supervisor is required to accompany a youth or mentor license holder during any hunt. A youth hunter (less than 16 years of age) must be supervised by a person at least 18 years of age. A mentor license holder must be supervised by a licensed hunter at least 21 years of age. Unless exempt, only those supervisors with proper licenses and permits may hunt. If the supervisor is hunting during any hunt for which quota permits are issued, at least 1 person in the party must be in possession of a quota permit.

Transfer of permits: Quota and guest permits are not transferable. A positive form of identification is required when using a non-transferable permit, except for youth under 16 years of age. The sale or purchase of any quota permit or guest permit is prohibited.

General Area Regulations:
All general laws and regulations relating to wildlife and fish shall apply unless specifically exempted for this area. Hunting or the taking of wildlife or fish on this area shall be allowed only during the open seasons and in accordance with the following regulations:

1. Any person hunting deer or accompanying another person hunting deer shall wear at least 500 square inches of daylight fluorescent-orange material as an outer garment, above the waistline. These provisions are not required when hunting with a bow and arrow during archery season.
2. Taking of spotted fawn, swimming deer or roosted turkey is prohibited.
3. It is illegal to hunt over bait or place any bait or other food for wildlife on this area.
4. Driving a metal object into any tree, or hunting from a tree into which a metal object has been driven, is prohibited.
5. No person shall cut, damage or remove any natural, man-made or cultural resource without written authorization of the landowner or primary land manager.
6. Taking or attempting to take any game with the aid of live decoys, recorded game calls or sounds, set guns, artificial light, net, trap, snare, drug or poison is prohibited. Recorded calls and sounds can be used to hunt furbearers, wild hog and crows.
7. The wanton and willful waste of wildlife is prohibited.
8. Hunting, fishing or trapping is prohibited on any portion of the area posted as closed to those activities.
9. People, dogs, vehicles and other recreational equipment are prohibited in areas posted as "Closed to Public Access" by FWC administrative action.
10. Taking or herding wildlife from any motorized vehicle, aircraft or boat, which is under power is prohibited until power, and movement from that power, has ceased.
11. Most game may be hunted from ½ hour before sunrise until ½ hour after sunset (see exceptions for each season).
12. The release of any animal is prohibited, except by permit from FWC or written authorization from the landowner or primary land manager.
13. The head and evidence of sex may not be removed from the carcass of any deer or turkey on the area.
14. The planting or introduction of any non-native plant is prohibited, without written authorization of the landowner or primary land manager.
15. Wild hog may not be transported alive.
16. A hunting license is not required to hunt wild hog.
17. Littering is prohibited.
18. It is unlawful to set fire to any forest, grass or woodlands.
19. An FWC Law Enforcement Officer may search any camp, vehicle or boat in accordance with law.
20. Falconers may hunt during the statewide falconry season anytime a management area is open for public access. Falconers are not exempt from quota permits during hunts requiring them.
21. The possession or consumption of intoxicating beverages is prohibited.

Public Access and Vehicles:

1. Open to public access year round. During periods when the area is closed to hunting and fishing, public access other than by foot is prohibited.
2. All persons shall enter and exit at the designated entrance (see map).
3. Parked vehicles may not obstruct a road, gate or firelane.
4. No motor vehicle shall be operated in areas designated as closed to vehicular traffic.
5. Vehicles may be operated only on named or numbered roads.
6. Horses and the use of all-terrain vehicles and bicycles are prohibited.

Hunters and Check Stations:

1. Hunters must check in at the check station when entering and check out when leaving the area and check all game harvested.
2. Hunting equipment may not be taken onto the WMA until after 8 a.m. the day before the opening of a season and shall be removed by 6 p.m. 1 day after the end of the season.
3. On hunt days, the check station hours are 4:30 a.m. to 6 p.m. Refer to the Fishing and Frogging section for check station hours on days open to fishing.

Guns:

1. Hunting at night with a gun is prohibited.
2. Muzzleloading guns used for taking deer must be .40 caliber or larger if firing a single bullet, or be 20 gauge or larger if firing 2 or more balls.
3. Hunting deer with rimfire or non-expanding, full metal jacket (military ball) ammunition is prohibited.
4. Hunting wildlife (other than migratory birds) with air guns is allowed. **See Florida Hunting Regulations handbook for details on hunting with air guns.**
5. **Hunting deer with air guns is prohibited, except pre-charged pneumatic (PCP) air guns propelling a bolt, arrow or bullet .30 caliber or larger are allowed.**
6. **Hunting turkey with air guns is prohibited, except PCP air guns propelling a bolt or arrow are allowed.**
7. Children under the age of 16 hunting with a firearm or air gun must be in the presence of a supervising adult.
8. No person shall discharge a firearm or have a loaded firearm in hand while under the influence of alcohol or drugs.
9. For hunting non-migratory game, only shotguns, rifles, pistols, air guns, bows, crossbows or falconry may be used.
10. For hunting migratory game, only shotguns, bows, crossbows or falconry may be used. Shotguns shall not be larger than 10 gauge and shall be incapable of holding more than 3 shells in the magazine and chamber combined.
11. Hunting with full automatic firearms, centerfire semi-automatic rifles having a magazine capable of holding more than 5 rounds, explosive or drug-injecting devices and set guns is prohibited.
12. The discharge of a firearm outside of periods open to hunting or in areas closed to hunting is prohibited per s. 790.15 FS.

Dogs:

1. Hunting with dogs, other than bird dogs or retrievers, is prohibited.
2. No person shall allow any dog to pursue or molest any wildlife during any period in which the taking of wildlife by the use of dogs is prohibited.
3. Dogs on leashes may be used for trailing wounded game.
4. For purposes other than hunting, dogs are allowed, but must be kept under physical restraint at all times.

Camping: Prohibited.

Bag and Possession Limits: A guest hunter must share the host's bag limit, except bag limits specified as per person. No person shall exceed statewide bag limits.

1. Deer - Daily limit 2, possession limit 4 (see legal to take for each season).
2. Wild hog - No size or bag limit.
3. Turkey - Daily limit 1, except the youth turkey limit is 1 per quota permit; season limit 2, possession limit 2.
4. Gray squirrel and rabbit - Daily limit 12 per person, possession limit 24 for each.
5. Quail - Daily limit 12, possession limit 24.
6. Raccoon, opossum, armadillo, beaver, coyote, skunk and nutria - No bag limits.
7. Migratory birds - See Florida Hunting Regulations handbook.

Archery Season:

October **20-26** and October **27** through November **4**.

Permit, Stamp and License Requirements - Quota permit, hunting license, management area permit, archery permit, deer permit (if hunting deer), wild turkey permit (if hunting wild turkey) and migratory bird permit (if hunting migratory birds).

Legal to Hunt - Deer with at least 1 antler having 2 or more points (each point 1-inch or more in length) and having at least 1 antler 5-inches or more in length, antlerless deer (which includes does and bucks with antlers less than 5 inches in length, but not spotted fawn), wild hog, turkey of either sex, gray squirrel, quail, rabbit, raccoon, opossum, armadillo, beaver, coyote, skunk, nutria and migratory birds in season.

Regulations Unique to Archery Season -

1. Youth less than 16 years of age may harvest antlered deer with at least 1 antler 5 inches or more in length.
2. Hunting with guns or crossbows (except by disabled crossbow permit) is prohibited, except that centerfire shotguns are allowed for hunting migratory birds.

General Gun Season:

November **22-25**, January **19-22** and **23-27**.

Permit, Stamp and License Requirements - Quota permit, hunting license, management area permit, deer permit (if hunting deer), migratory bird permit (if hunting migratory birds), and state waterfowl permit and federal duck stamp (if hunting waterfowl).

Legal to Hunt - Deer with at least 1 antler having 2 or more points (each point 1-inch or more in length) and having at least 1 antler 5-inches or more in

length, wild hog, gray squirrel, quail, rabbit, raccoon, opossum, armadillo, beaver, coyote, skunk, nutria and migratory birds in season.

Regulations Unique to General Gun Season - Youth less than 16 years of age may harvest antlered deer with at least 1 antler 5 inches or more in length.

Muzzleloading Gun Season:

December **1-3**.

Permit, Stamp and License Requirements - Quota permit, hunting license, management area permit, muzzleloading gun permit, deer permit (if hunting deer), migratory bird permit (if hunting migratory birds), and state waterfowl permit and federal duck stamp (if hunting waterfowl).

Legal to Hunt - Deer with at least 1 antler having 2 or more points (each point 1-inch or more in length) and having at least 1 antler 5-inches or more in length, wild hog, gray squirrel, quail, rabbit, raccoon, opossum, armadillo, beaver, coyote, skunk, nutria and migratory birds in season.

Regulations Unique to Muzzleloading Gun Season -

1. Youth less than 16 years of age may harvest antlered deer with at least 1 antler 5 inches or more in length.
2. Hunting with archery equipment or guns, other than muzzleloading guns, is prohibited, except that centerfire shotguns are allowed for hunting migratory birds.

Small Game Season:

December **8-23**.

Permit, Stamp and License Requirements - Hunting license, management area permit, migratory bird permit (if hunting migratory birds) and state waterfowl permit and federal duck stamp (if hunting waterfowl).

Legal to Hunt - Wild hog, gray squirrel, quail, rabbit, raccoon, opossum, armadillo, beaver, coyote, skunk, nutria and migratory birds in season.

Regulations Unique to Small Game Season - Hunting with centerfire rifles is prohibited.

Spring Turkey Season:

Youth Turkey: March **9-10**.

Spring Turkey: March **16-18**, **29-31**, and April **12-14**.

Permit, Stamp and License Requirements - Quota permit, hunting license, management area permit and wild turkey permit.

Legal to Hunt - Bearded turkey or gobbler.

Regulations Unique to Spring Turkey Season -

1. Legal shooting hours are ½ hour before sunrise until 1 p.m.
2. Hunting other animals is prohibited.
3. Only bows, crossbows, **PCP air guns propelling a bolt or arrow** and shotguns using a #2 or smaller shot size may be used for hunting.
4. During the youth turkey hunt, only youth under 16 years of age may hunt and must be under the supervision and in the presence of an adult not younger than 18 years of age. Adults with required licenses and permits for taking wild turkeys may participate when in the presence of a youth, but may not harvest a wild turkey.

Trapping: Prohibited.

Migratory Bird Seasons:

Rails, common moorhen, mourning dove, white-winged dove, snipe, ducks, geese, coot, woodcock and crows may be hunted during statewide migratory bird seasons that coincide with the seasons where migratory birds are listed as legal to hunt in this brochure. Migratory birds may also be hunted during the September duck seasons.

Permit, Stamp and License Requirements - Quota permit (if hunting during any quota period), hunting license, management area permit, migratory bird permit and state waterfowl permit and federal duck stamp (if hunting waterfowl).

Legal to Hunt - See Florida Hunting Regulations handbook.

Regulations Unique to Migratory Bird Seasons - All Migratory Bird Regulations shall apply.

1. Hunting ducks, geese and coot with lead shot is prohibited.
2. Centerfire shotguns are allowed for hunting during established area seasons when migratory birds are legal to take.

Fishing and Frogging:

Allowed Friday through Monday (except during periods open to hunting) by permit only.

Permit, Stamp and License Requirements - Daily fishing permit and fishing license (not required when frogging).

Legal to Take - All legal fish (except as provided below) and frogs. See Florida Freshwater Fishing Regulations Summary.

Regulations Unique to Fishing and Frogging - All General Freshwater Fishing Regulations shall apply.

1. Anglers shall check in and out at the check station when entering and exiting the area and shall check all fish taken.
2. Fishing is allowed starting at 6 a.m. Entrance gates close at 8 p.m. during the summer period (March – October) and at 5 p.m. during the winter period (November – February).
3. Fishing is allowed in designated lakes and water bodies only. All other lakes, water bodies and restricted areas are closed to public fishing.
4. Boats are provided for use on each lake; these boats must be kept at the lake on which they are placed. No outside boats are allowed into the area. All state boating regulations, including the use of personal floatation devices (PFDs), apply.
5. Fish may be taken only by hook and line or rod and reel. The use or possession of nets, seines, fish traps, trotlines, set lines or bush hooks, spears, gigs, snatch hooks, crossbow, or bow and arrow is prohibited. Landing nets may be used for fish legally caught from a boat.
6. No person shall take more than 20 panfish in the aggregate per day. Any bluegill or redear sunfish less than 8 inches in total length must be released immediately. No person shall take more than 10 black crappie per day. Any black crappie less than 10 inches in total length must be released immediately. All largemouth bass are catch and release only.
7. Fish may not be filleted, nor the head or tail fin removed, until the angler has checked out at the check station.
8. Anglers will be given a creel kit and are expected to accurately complete the information sheet and return it to the check station upon check out.
9. Shooting frogs is allowed only during the listed open hunting seasons and only with the legal methods of take during each particular season.

General Information:

1. Other recreational uses, including canoeing, kayaking, hiking and bird watching, are allowed on the area and are subject to all area rules and regulations.
2. Information for persons with disabilities can be found at MyFWC.com/ADA.
3. If you have any questions about this material, please call the Fish and Wildlife Conservation Commission at 850-265-3676 (TDD 800-955-8771).
4. The FWC is not responsible for protection of personal property and will not be liable for theft of or damage to personal property.
5. Please report the location of any sick or extremely skinny deer to the Chronic Wasting Disease hotline, toll free at 866-293-9282.

Northwest Florida WMD Rules and Information:

1. This land was acquired by the Northwest Florida Water Management District (District) to protect public water resources. The purpose of the District's land acquisition and management program is to conserve and protect unique and irreplaceable land and water resources, restore areas to their original condition as much as possible and allow controlled multiple recreational and educational uses consistent with this purpose.
2. The District's land management activities for this area may include prescribed burning and timber harvesting during most months of the year. For personal safety reasons, area users should be aware of activities in the area and contact the District's Land Management office at 850-539-5999 with any questions. The District has no responsibility or obligation to identify and/or protect personal property while undertaking its land management activities.

Cooperation Requested:

If you see law violators or suspicious activities, contact your nearest Commission regional office or call 888-404-FWCC. You may qualify for a cash reward from the Wildlife Alert Reward Association.

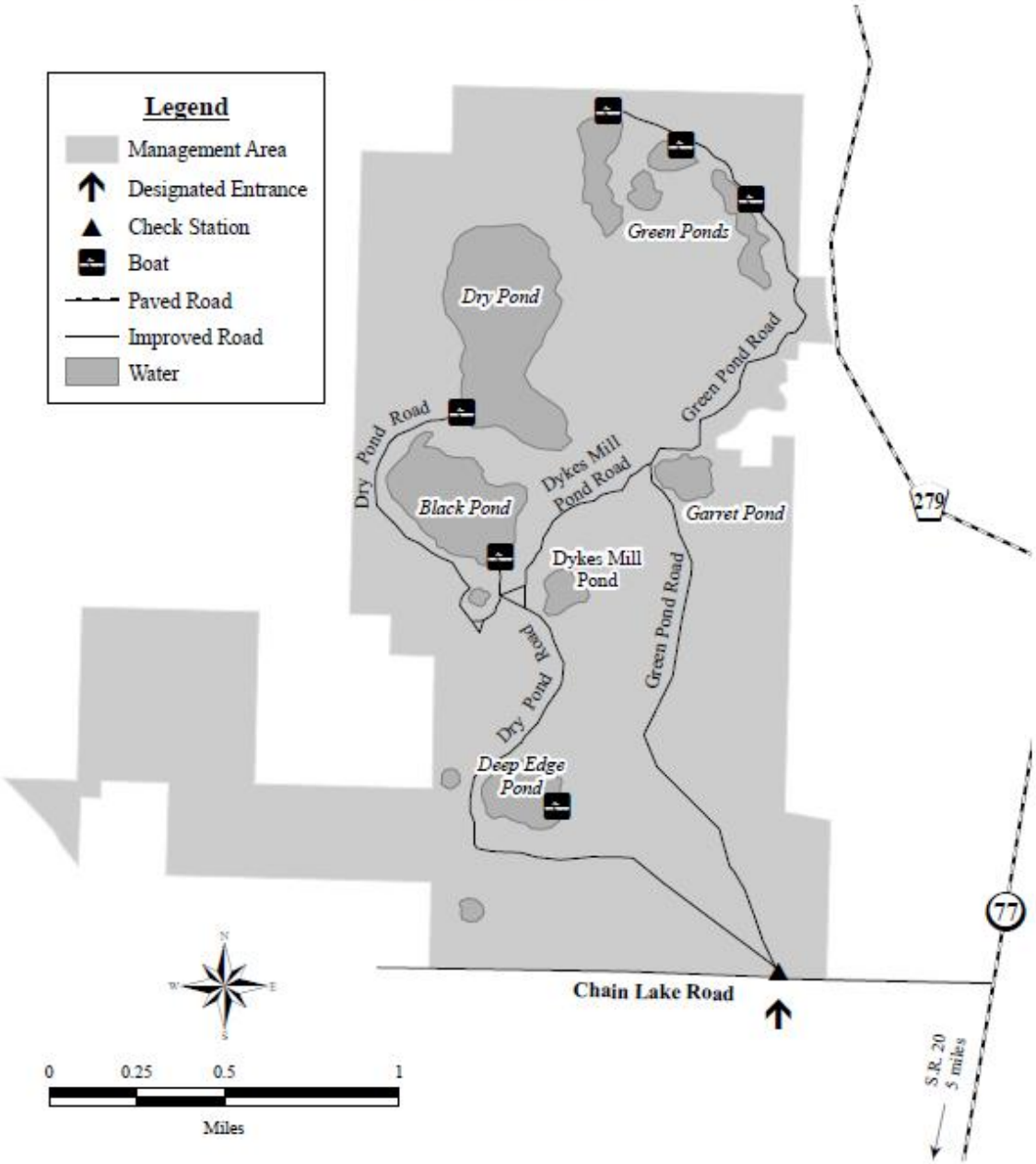
The U.S. Department of the Interior prohibits discrimination on the basis of race, color, national origin, age, sex or disability. If you believe that you have been discriminated against in any program, activity or facility as described above, or if you desire further information, please write to: The Office for Human Resources, U.S. Fish and Wildlife Service, Department of the Interior, Washington, D.C. 20240. The project described in this publication is part of a program funded by federal dollars under the Wildlife Restoration Act. Federal funds pay 20 percent of the cost of the program.

FITZHUGH CARTER TRACT

ECONFINA CREEK WILDLIFE MANAGEMENT AREA

2,175 acres

Washington County



Appendix II. 2018-2019 Annual Work Plan and Accomplishment Report for the Fitzhugh Carter Tract of Econfina Creek Wildlife Management Area.

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
Species 9100 - All freshwater fish							
Activity - 342	Public use administration (non-hunting)						
	0.00	$0.00	$1,323.00	$15,860.64	$17,183.64	0	Administered public fishing program via check station. Salary for OPS fishing check station operators included here. NFA*
Species 9100 Total	0.00	$0.00	$1,323.00	$15,860.64	$17,183.64		
Species 9200 - All wildlife							
Activity - 101	Project inspection						
	1.00	$487.93	$114.00	$217.65	$819.58	0	Inspected area projects and activities. Field orientation of land boundaries, features, and habitats.
Activity - 103	Meetings						
	0.16	$48.14	$1.00	$66.32	$115.46	0	Attended landowner, cooperator, scientific, and agency meetings. Attended training workshops and seminars.
Activity - 140	Report writing/editing/manuscript preparation						
	6.00	$2,512.34	$102.00	$142.61	$2,756.95	0	Prepared and reviewed annual wildlife reports and completed annual

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
							accomplishment report.
Activity - 150	Personnel management						
	26.00	$10,072.34	$311.00	$1,267.29	$11,650.63	0	Supervised volunteer activities. Recruited, hired, and supervised OPS personnel. Attended training workshops and seminars.
Activity - 182	Data management						
	6.00	$2,746.99	$40.00	$799.22	$3,586.21	0	Incorporated all data collected into GIS database. Analyzed and summarized WMA databases and pertinent information.
Activity - 200	Resource Management						
	0.00	$0.00	$980.00	$4,845.23	$5,825.23	0	Routine planning, paperwork, purchases and correspondences dealing with daily operations of the WMA.
Activity - 204	Resource planning						
	24.00	$8,108.64	$789.00	$12,450.60	$21,348.24	0	Coordinated work projects related to management activities. Purchased supplies, materials, and equipment for performing routine WMA operations.
Activity - 206	Prescribed burning - growing season						
	0.00	$0.00	$18.00	$0.00	$18.00	0	Assisted Northwest Florida Water Management District

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
							with prescribed burning.
Activity - 207	Prescribed burning - dormant season						
	0.00	$0.00	$0.00	$1,487.37	$1,487.37	0	Assisted Northwest Florida Water Management District with prescribed burning.
Activity - 211	Exotic plant control (mechanical)						
	0.00	$0.00	$7.00	$0.00	$7.00	0	Assisted Northwest Florida Water Management District with locating and treating cogon grass and other invasive exotic plant species on the area.
Activity - 294	Program coordination and implementation						
	0.00	$0.00	$2.00	$0.00	$2.00	0	Assisted Northwest Florida Water Management District with area activities.
Activity - 320	Outreach and education						
	0.00	$0.00	$10.00	$130.51	$140.51	0	Assisted local schools and the general public in wildlife-oriented training, presentations, and development. Participated as a steering committee member and wildlife facilitator for the Emerald Coast Regional Envirothon. NFA*
Activity - 920	FEM -- buildings/structures						
	0.00	$0.00	$12.00	$1,782.28	$1,794.28	0	Maintained and repaired area office,

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
							storage shed, and equipment workshop with storage bays as needed.
Activity - 923	FEM -- vehicles/equipment						
	1.00	$466.26	$44.00	$2,615.86	$3,126.12	0	Repaired and maintained vehicles, boats, ATVs and associated equipment, including services-parts and labor.
Activity - 926	FEM -- roads/bridges						
	0.00	$0.00	$18.00	$265.94	$283.94	0	Made minor repairs to access roads and bridges as needed.
Activity - 928	FEM -- fences						
	0.15	$44.61	$5.00	$81.65	$131.26	0	Maintained and erected gates and fences as needed on area.
Species 9200 Total	64.31	$24,487.25	$2,453.00	$26,152.53	$53,092.78		
Species 9210 - Game wildlife							
Activity - 182	Data management						
	0.00	$0.00	$2.00	$0.00	$2.00	0	Summarized and analyzed survey, biological, harvest and hunter pressure data.
Activity - 221	Animal surveys						
	1.14	$338.84	$31.00	$547.70	$917.54	0	Conducted deer surveys and other game surveys as needed.

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
Activity - 341	Public use administration (hunting)						
	6.00	$2,432.67	$566.00	$7,157.30	$10,155.97	0	Administered and managed public hunts. Reviewed area hunt maps and brochures. Compiled weekly harvest and hunting pressure reports. Salary for OPS check station operators included here.
Activity - 342	Public use administration (non-hunting)						
	0.00	$0.00	$0.00	$949.00	$949.00	0	Administered public fishing program via check station.
Species 9210 Total	7.14	$2,771.51	$599.00	$8,654.00	$12,024.51		
Species 9211 - White-tailed deer							
Activity - 221	Animal surveys						
	1.00	$497.93	$53.00	$0.00	$550.93	0	Conducted spotlight surveys employing line transect distance sampling methodology.
Species 9211 Total	1.00	$497.93	$53.00	$0.00	$550.93		
Species 9216 - Hogs							
Activity - 291							
	0.00	$0.00	$360.00	$1,534.39	$1,894.39	0	Assisted Northwest Florida Water Management District with controlling wild

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
							hogs on the area. NFA*
Species 9216 Total	0.00	$0.00	$360.00	$1,534.39	$1,894.39		
Species 9240 - Nongame wildlife							
Activity - 221	Animal surveys						
	0.00	$0.00	$66.00	$798.04	$864.04	0	Conducted herpetofauna surveys and monitoring. Installed and monitored drift fence arrays. NFA*
Species 9240 Total	0.00	$0.00	$66.00	$798.04	$864.04		
Species 9252 - Wading birds							
Activity - 221	Animal surveys						
	0.00	$0.00	$16.00	$574.35	$590.35	0	Conducted wading bird surveys and monitoring. NFA*
Species 9252 Total	0.00	$0.00	$16.00	$574.35	$590.35		
Species 9258 - Southeastern kestrel							
Activity - 182	Data management						
	0.00	$0.00	$15.00	$0.00	$15.00	0	Analyzed and summarized kestrel box surveying and monitoring data
Activity - 285	Nest structures						

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
	0.00	$0.00	$1.00	$46.41	$47.41	0	Maintained and monitored seven kestrel nest boxes.
Species 9258 Total	0.00	$0.00	$16.00	$46.41	$62.41		
Species 9280 - All threatened and endangered wildlife							
Activity - 221	Animal surveys						
	0.00	$0.00	$16.00	$0.03	$16.03	0	Conducted herpetofauna surveying and monitoring. NFA*
Species 9280 Total	0.00	$0.00	$16.00	$0.03	$16.03		
Project 7281 Total	72.45[1]	$27,756.69	$4,902.00	$53,620.39	$86,279.08		

[1]Man-days for OPS+ Biological Scientist III, OPS+ Fish & Wildlife Technician, and OPS Hunting & Fishing Check Station Operators not included here. However, salary for such is included in "Other" expenses category. The 72.45 man-days are additional FWC FTE staff time spent contributing to the Carter Tract cost-share.

Appendix III. Number of fish caught and released per pond from July 2018- June 2019 on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington Co., FL.

	Ponds						
Species	Dry	Black	Deep Edge	Green 1	Green 2	Green 3	All Ponds
Bluegill (*Lepomis macrochirus*)							
Kept	232	221	5	7	0	5	470
Released	154	170	41	3	14	43	425
Total Caught	**386**	**391**	**46**	**10**	**14**	**48**	**895**
Black Crappie (*Pomoxis nigromaculatus*)							
Kept	124	50	0	0	0	0	174
Released	28	6	0	0	0	1	35
Total Caught	**152**	**56**	**0**	**0**	**0**	**1**	**209**
Warmouth (*Lepomis gulosus*)							
Kept	1	11	0	0	0	0	12
Released	2	2	0	0	0	1	5
Total Caught	**3**	**13**	**0**	**0**	**0**	**1**	**17**
Largemouth Bass (*Micropterus salmoides*)							
Total Caught*	**103**	**95**	**16**	**19**	**13**	**19**	**265**
Catfish (*Ameirus nebulosus, A. natalis*)							
Kept	3	1	0	1	0	0	5
Released	0	1	0	0	0	0	1
Total Caught	**3**	**2**	**0**	**1**	**0**	**0**	**6**
Other**							
Kept	1	1	0	0	0	0	2
Released	8	20	0	1	1	2	32
Total Caught	**9**	**21**	**0**	**1**	**1**	**2**	**34**

*Largemouth bass are catch-and-release only on Carter Tract ponds.
**Other species include: Chain Pickerel (*Esox niger*), Spotted Gar (*Lepisosteus oculatus*), and Bowfin (*Amia calva*)

Appendix IV. 2018 Line-Transect Distance Survey results for pre-season white-tailed deer density on the Fitzhugh Carter Tract of Econfina Creek WMA.

Prepared by: Tracy Peters

December 5, 2018

Number of Transect	2
Number of Repetitions	5
Number of Observations	37
Number of Deer	67
Total Effort (km)	48

Truncation (T)	**Density Deer/Mi2**	**95% CI Lower**	**Upper**	**ESW (m)**	**CV%**	***p***
Right T 5%	14.4	6.8	28.4	123	35.8	0.600

Survey Type = please see appendix for explanation on right and left truncation
ESW = estimated strip width, half width of the transect. Area of visibility = Length of the transect * 2ESW
CV% = coefficient of variation of density
p= Cramér-von-Mises with cosine weighing goodness-of-fit test.

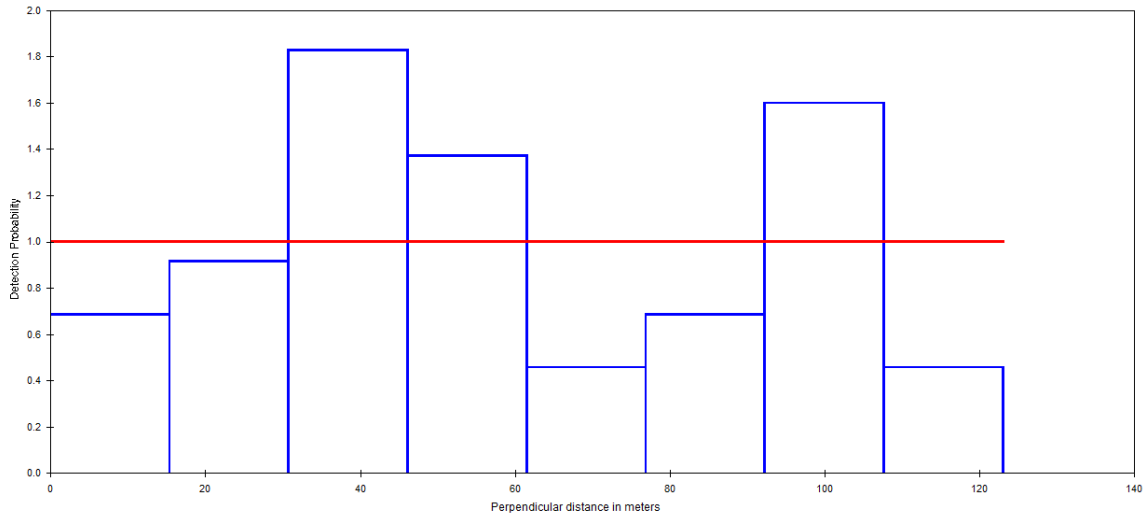
Summary of Results

The sample size of 37 observations was sufficient to run the analysis, however 60-80 observations are preferred and allowed for 5% right truncation. There was no evidence of either evasive movement off of the transect or avoidance of the transect therefore no left truncation was needed (histogram 1). The density estimate of 14.4 deer/mi^2 with right truncation only increased from last year's estimate of 7.5 deer/mi^2. The *P*-value corresponding to the χ^2 goodness-of-fit was 0.600, indicating a good model fit. The coefficient of variation percentage was 35.8 and increased from last year's percentage of 16.5. The CV% was based on the bootstrapped estimates and therefore are very conservative.

Comments

Effort decreased this year due to only five repetitions being run instead of six on account of the hurricane. Number of deer seen however increased even with less repetitions and nearly the same number of observations as last year.

Histogram 1. Histogram of white-tailed deer observations with 5% right truncation, Econfina Creek WMA Carter Tract, 2018.



Data Analysis Methods

All survey data for line transect analysis was compiled in an excel database and deer locations were calculated using the range (distance to deer), bearing, and location at the point of observation (Pierce 2000) within the database. We checked the data for any outliers and other problems and excluded any locations that were determined as data entry or recording errors by overlaying deer and truck locations to area map layers (WMA boundary, roads, etc) in ArcMap. We used the Multiple Minimum Distance v9 tool to determine the closest perpendicular distance from each deer location to the transect.

Line transect density, variance and interval estimation

Line transect density estimates and confidence intervals were computed with the software DISTANCE 5.0. Release 2 (Thomas et al. 2006) where density of clusters is calculated as $D = n/(2 \times ESW \times L)$ where n is the total number of observations, ESW is the effective strip (half-) width, and L is the total length of the transects. Density of deer is calculated as the average cluster size x cluster density. ESW is the distance from the line at which as many animals are detected beyond ESW as are missed within ESW. ESW is calculated from the probability density function of the estimated detection function at zero distance. To address the non-independence of repeated surveys within one transect, all the data from a given transect were pooled over the survey nights prior to analysis (Buckland et al. 2001). The total length of a transect, or the effort, was therefore entered as the pooled effort (e.g. 10 km transect, surveyed 6 times, was entered as 60 km).

Each area was analyzed separately and data analysis included an exploratory phase, including visual examination of histograms and goodness-of-fit test to determine if any assumptions are violated.

For goodness-of-fit we used the Cramér-von-Mises test with cosine weighting function. Cramér-von-Mises cosine weighing function puts more emphasis on the observation closer to zero and is believed to have more power due to its ability to detect departures from the fitted function (Thomas et al. 2006). Unless sample sizes were very small or 5% truncation was inappropriate for the particular data set, we truncated 5% of the observation furthest from the line (Buckland et al. 1993). Theoretically, number of animals sighted should decrease as the distance from the line increases. However, this may not always be the case if the animals flush prior to observation or if they avoid the area close to the transect. If the model fit was poor due to low number of observations close to the transect, we chose an appropriate left truncation point.

We used the following as a priori models: uniform (adjusted with cosine series and polynomial series), half-normal (adjusted with hermite polynomials) and hazard-rate (adjusted with cosine series). We used the corrected Akaike's Information Criterion (AICc) to select the detection function model that best fit the data.

Typically, variance estimate in DISTANCE has 3 components: variance due to observers ability to detect animals along the transect (detection probability); variability between transect lines (encounter rate); and variance due to group size (cluster size). However, if the data comes from a single transect, it is not possible to estimate the encounter rate variance using the default empirical between-transect variation (Thomas et al. 2006). Rather, the DISTANCE will assume the encounter rate is zero and the estimated variance is only appropriate for the density of the area that is actually sampled (area around the transect). To keep the method of estimating variance equivalent among the WMAs, we assumed the distribution was Poisson with overdispersion factor of zero in the areas with more than one transect (Thomas et al. 2006). We also estimated the variance using non-parametric bootstrap resampling. We set the number of bootstrap samples as 999 and selected observation as the sampling unit.

As recommend, we report the confidence intervals and coefficient of variation based on bootstrap results, but the report the density estimate based on the original data set (Buckland et al. 2001, Thomas et al. 2006). Confidence intervals are calculated using the percentile method (Thomas et al. 2006).

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Comparison of white-tailed deer density estimates on Carter Tract Unit of Econfina Creek WMA, 2007-2018.

Year	Effort (km)	Survey type[a]	Density Deer/Mi²	95% Confidence intervals Lower	Upper	No. of Observations	ESW[b] Visibility (m)	RT[d] (m)	LT[e] (m)	*p*	*CV%*
2007		Line, RT5%	8.1	4.8	103	34	134		0	0.200	20.8
		Line, RT, LT	11.0	5.9	18.4	33	96		25	1.000	25.8
		Spotlight	15.4	9.5	21.3	34	68				39.8
2008		Line, RT5%	16.0	10.4	20.7	51	90	131	0	0.700	18.5
		Line, RT, LT	18.1	11.1	25.3	49	75	131	15	1.000	21.5
		Spotlight	13.6	9.9	21.3	54	74				
2009	57 km	Line, RT5%	14.7	2.2	29.5	46	90	130	0	0.300	58.7
		Line, RT, LT	18.7	2.5	37.5	43	68	130	15	0.800	67.0
2010	80 km	Line, RT5%	10.1	6.8	14.1	50	92	143	0	0.600	24.7
		RT@largest	10.3	6.4	14.5	53	96	240	0	0.600	27.2
2010 NEW TRANSECT	74 km	Line, RT5%	10.8	6.6	16.1	50	92	143	0	0.700	34.6
2011	57 km	Line, RT5%	17.0	11.6	27.9	52	106	196	0	0.500	22.1
2012	55 km	Line, RT5%	19.1	7.0	30.6	43	68	107	0	0.500	39.2
		Line, RT, LT	24.1	8.5	59.0	42	50	107	10	0.900	51.8
2013	57 km	Line, RT5%	13.6	8.7	18.8	53	96	163	0	0.500	18.3
2014	57 km	Line, RT5%	13.5	9.2	19.9	43	103	180	0	0.800	19.8
2015	57 km	Line, RT5%	20.8	13.0	50.8	41	50	75	0	0.900	41.8
2016	57 km	Line, RT5%	11.8	7.6	17.5	31	74	105	0	0.500	21.0
2017	57 km	Line, RT5%	7.5	3.4	150.8	36	123	141	0	0.700	16.5
2018	48 km**	Line, RT5%	14.4	6.8	28.4	35	123	123	0	0.600	35.8

Effort = total number of kilometers surveyed. ****only 5 reps ran on account of hurricane.**

[a]Survey type = Line transect (line) with right truncation (RT) and left truncation (LT). Spotlight = traditional spotlight count.

[b] ESW (Effective strip width) and visibility refer to the half width of the transect. Area of visibility = Length of the transect * 2ESW. For spotlight surveys, visibility based on habitat visibility estimates.

[d]RT = right truncation in meters, set at 5% unless otherwise noted

[e]LT = left truncation in meters

P refers to the Cramér-von-Mises goodness-of-fit test

CV% refers to the deer density

Appendix V. Wading bird survey results (2008 - 2019) from Little Deep Edge Pond at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

Species	Number of Birds Observed			
Anhinga (*Anhinga anhinga*)	Year	Adults	Active Nests	Chicks
	2008	6	3	0
	2009	3	unknown	3
	2010	2	0	0
	2011	2	0	0
	2012	0	0	0
	2013	11	2	3
	2014	14	4	9
	2015	3	0	0
	2016	2	1	0
	2017	0	0	0
	2018	0	0	0
	2019	1	1	2
Cattle Egret (*Bubulcus ibis*)	2008	25	18	0
	2009	0	0	0
	2010	0	0	0
	2011	14	12	24
	2012	0	0	0
	2013	33	20	27
	2014	45	46	40
	2015	34	27	23
	2016	73	51	112
	2017	56	52	44
	2018	3	3	0
	2019	0	0	0
Great Egret (*Ardea alba*)	2008	13	10	10
	2009	31	8	12
	2010	8	6	9
	2011	14	11	17
	2012	12	6	6
	2013	12	19	29
	2014	19	14	22
	2015	9	6	6
	2016	11	7	6
	2017	11	13	15
	2018	7	7	4
	2019	9	8	13

Little Blue Heron (*Egretta caerulea*)	2008	8	3	0
	2009	1	0	0
	2010	0	0	0
	2011	20	14	34
	2012	7	4	6
	2013	5	3	4
	2014	14	6	6
	2015	4	4	3
	2016	13	13	15
	2017	10	5	3
	2018	0	0	0
	2019	0	0	0
Tricolored Heron (*Egretta tricolor*)	2008	2	unknown	0
	2009	0	0	0
	2010	0	0	0
	2011	1	1	1
	2012	0	0	0
	2013	0	0	0
	2014	0	0	0
	2015	0	0	0
	2016	0	0	3
	2017	1	1	0
	2018	1	1	0
	2019	0	0	0
Snowy Egret (*Egretta thula*)	2008	0	0	0
	2009	3	0	0
	2010	0	0	0
	2011	2	2	5
	2012	0	0	0
	2013	0	0	0
	2014	0	0	0
	2015	0	0	0
	2016	3	1	0
	2017	3	1	0
	2018	3	1	0
	2019	0	0	0
Green Heron (*Butorides virescens*)	2008	1	0	1
	2009	2	unknown	1
	2010	1	0	0
	2011	0	0	0
	2012	0	0	0

	2013	0	0	0
	2014	0	0	0
	2015	0	0	0
	2016	0	0	0
	2017	0	0	0
	2018	0	0	0
	2019	0	0	0
Great Blue Heron (*Ardea herodias*)	2008	0	0	0
	2009	0	0	0
	2010	1	0	0
	2011	0	0	0
	2012	0	0	0
	2013	0	0	0
	2014	0	0	0
	2015	0	0	0
	2016	0	0	0
	2017	0	0	0
	2018	0	0	0
	2019	0	0	0

Appendix VI. Avifauna (n=130) documented on the Fitzhugh Carter Tract of Econfina Creek WMA as of June 2019.

PODICIPEDIFORMES

Podicipedidae (Grebes)

- Pied-billed Grebe *Podilymbus podiceps*

PELICANIFORMES

Phalacrocoracidae (Cormorants)

- Double-crested Cormorant *Phalacrocorax auritus*

Anhingidae (Darters/Anhinga)

- Anhinga *Anhinga anhinga*

CICONIIFORMES

Ardeidae (Herons, Egrets, and Bitterns)

- Great Blue Heron *Ardea herodias*
- Great Egret *Ardea alba*
- Snowy Egret *Egretta thula*
- Little Blue Heron *Egretta caerulea*
- Tricolored Heron *Egretta tricolor*
- Cattle Egret *Bublucus ibis*
- Green Heron *Butorides virescens*

Threskiornithidae (Ibises and Spoonbills)

- White Ibis *Eudocimus albus*
- Roseate Spoonbill *Platalea ajaja*

Ciconiidae (Storks)

- Wood Stork *Mycteria Americana*

ANSERIFORMES

Anatidae (Ducks, Geese, and Swans)

- Snow Goose *Chen caerulescens*
- Wood Duck *Aix sponsa*
- Mallard *Anas platyrhynchos*
- Blue-winged Teal *Anas discors*
- Green-winged Teal *Anas crecca*
- Canvasback *Aythya valisineria*
- Redhead *Aythya americana*
- Ring-necked Duck *Aythya collaris*
- Bufflehead *Bucephala albeola*
- Hooded Merganser *Lophodytes cucullatus*
- Ruddy Duck *Oxyura jamaicensis*

FALCONIFORMES

Falconidae (Hawks and Allies)

- American Kestrel *Falco sparverius*
- Merlin *Falco columbarius*

ACCIPITRIFORMES

Accipitridae (Hawks and Allies)

- Osprey *Pandion haliatus*
- Mississippi Kite *Ictinia mississippiensis*
- Swallow-tailed Kite *Elanoides forficatus*
- Bald Eagle *Haliaeetus leucocephalus*
- Northern Harrier *Circus cyaneus*
- Sharp-shinned Hawk *Accipiter striatus*
- Cooper's Hawk *Accipiter cooperii*
- Red-shouldered Hawk *Buteo lineatus*
- Red-tailed Hawk *Buteo jamaicensis*

Cathartidae (New World Vultures)

- Black Vulture *Coragyps atratus*
- Turkey Vulture *Cathartes aura*

GALLIFORMES

Phasianidae (Grouse, Turkeys, and Allies)

- Wild Turkey *Meleagris gallopavo*

Odontophoridae (New World Quail)

- Northern Bobwhite *Colinus virginianus*

GRUIFORMES

Rallidae (Rails, Gallinules, and Coots)

- Purple Gallinule *Porphyrio martinicus*
- Common Moorhen *Gallinula chloropus*
- American Coot *Fulica americana*

Gruidae (Cranes)

- Sandhill Crane *Grus canadensis*

CHARADRIIFORMES

Charadriidae (Plovers and Lapwings)

- Killdeer *Charadrius vociferous*

Scolopacidae (Sandpipers, Phalaropes, and Allies)

- Greater Yellowlegs *Tringa melanoleuca*
- Lesser Yellowlegs *Tringa flavipes*
- Solitary Sandpiper *Tringa solitaria*
- Least Sandpiper *Calidris minutilla*
- Common Snipe *Gallinago gallinago*
- American Woodcock *Scolopax minor*

Laridae (Gulls, Terns, and Allies)

- Least Tern *Sterna antillarum*
- Forster's Tern *Sterna forsteri*

COLUMBIFORMES

Columbidae (Pigeons and Doves)

- Mourning Dove *Zenaida macroura*
- Common Ground Dove *Columbina passerina*

CUCULIFORMES

Cuculidae (Cuckoos, Roadrunners, and Anis)

- Yellow-billed Cuckoo *Coccyzus americanus*

STRIGIFORMES

Strigidae (Typical Owls)

- Eastern Screech Owl *Megascops asio*
- Great Horned Owl *Bubo virginanus*
- Barred Owl *Strix varia*

CAPRIMULGIFORMES

Caprimulgidae (Nighthawks and Nightjars)

- Common Nighthawk *Chordeiles minor*
- Chuck-will's Widow *Caprimulgus carolinensis*

APODIFORMES

Apodidae (Swifts)

- Chimney Swift *Chaetura pelagica*

Trochilidae (Hummingbirds)

- Ruby-throated Hummingbird *Archilochus colubris*

CORACIIFORMES

Alcedinidae (Kingfishers)

- Belted Kingfisher *Ceryle alcyon*

PICIFORMES

Picidae (Woodpeckers and Allies)

- Red-headed Woodpecker *Melanerpes erythrocephalus*
- Red-bellied Woodpecker *Melanerpes carolinus*
- Yellow-bellied Sapsucker *Sphyrapicus varius*
- Downy Woodpecker *Picoides pubescens*
- Hairy Woodpecker *Picoides villosus*
- Northern Flicker *Colaptes auratus*
- Pileated Woodpecker *Dryocopus pileatus*

PASSERIFORMES

Tyrannidae (Tyrant Flycatchers)

- Eastern Phoebe *Sayornis phoebe*
- Vermilion Flycatcher *Pyrocephalus rubinus*
- Great Crested Flycatcher *Myiarchus crinitus*
- Eastern Kingbird *Tyrannus tyrannus*

Laniidae (Shrikes)

- Loggerhead Shrike *Lanius ludovicianus*

Vireonidae (Vireos)

- White-eyed Vireo *Vireo griseus*
- Red-eyed Vireo *Vireo olivaceus*

Corvidae (Crows and Jays)

- Blue Jay *Cyanocitta cristata*
- American Crow *Corvus brachyrhynchos*
- Fish Crow *Corvus ossifragus*

Paridae (Chickadees and Titmice)

- Carolina Chickadee *Poecile carolinensis*
- Tufted Titmouse *Baeolophus bicolor*

Sittidae (Nuthatches)

- Brown-headed Nuthatch *Sitta pusilla*

Troglodytidae (Wrens)

- Carolina Wren *Thryothorus ludovicianus*
- House Wren *Troglodytes aedon*
- Marsh Wren *Cistothorus palustris*

Hirundinidae (Swallows and Martins)

- Purple Martin *Progne subis*
- Tree Swallow *Tachycineta bicolor*
- Northern Rough-winged Swallow *Stelgidopteryx serripennis*
- Barn Swallow *Hirundo rustica*

Regulidae (Kinglets)

- Golden-crowned Kinglet *Regulus satrapa*
- Ruby-crowned Kinglet *Regulus calendula*

Sylviidae (Old World Warblers and Gnatcatchers)

- Blue-gray Gnatcatcher *Polioptila caerulea*

Turdidae (Thrushes)

- Eastern Bluebird *Sialia sialis*
- Hermit Thrush *Catharus guttatus*
- Wood Thrush *Hylocichla mustelina*
- American Robin *Turdus migratorius*

Mimidae (Mockingbirds and Thrashers)

- Gray Catbird *Dumetella carolinensis*
- Northern Mockingbird *Mimus polyglottos*
- Brown Thrasher *Toxostoma rufum*

Bombycillidae (Waxwings)

- Cedar Waxwing *Bombycilla cedrorum*

Cardinalidae (Cardinals and Allies)

- Northern Cardinal *Cardinalis cardinalis*
- Rose-breasted Grosbeak *Pheucticus ludovicianus*
- Blue Grosbeak *Passerina caerulea*
- Indigo Bunting *Passerina cyanea*

Thraupidae (Tanagers)

- Summer Tanager *Piranga rubra*
- Scarlet Tanager *Piranga olivacea*

Parulidae (Wood-Warblers)

- Orange-crowned Warbler *Vermivora celata*
- Northern Parula *Parula americana*
- Yellow-rumped Warbler *Dendroica coronata*
- Palm Warbler *Dendroica palmarum*
- Black-and-white Warbler *Mniotilta varia*
- Prothonotary Warbler *Protonotaria citrea*
- Common Yellowthroat *Geothlypis trichas*
- Hooded Warbler *Wilsonia citrine*
- Yellow-throated Warbler *Dendroica dominica*
- Pine Warbler *Dendroica pinus*
- Prairie Warbler *Dendroica discolor*

Emberizidae (New World Sparrows)

- Eastern Towhee *Pipilo erythrophthalmus*
- Bachmann's Sparrow *Peucaea aestivalis*
- Chipping Sparrow *Spizella passerine*
- Field Sparrow *Spizella pusilla*
- White-throated Sparrow *Zonotrichia albicollis*
- White-crowned Sparrow *Zonotrichia leucophrys*
- Dark-eyed Junco *Junco hyemalis*

Icteridae (Blackbirds, Orioles, and Allies)

- Red-winged Blackbird *Agelaius phoeniceus*
- Eastern Meadowlark *Sturnella magna*
- Common Grackle *Quiscalus quiscula*
- Brown-headed Cowbird *Molothrus ater*
- Orchard Oriole *Icterus spurious*

Appendix VII. List of herpetofauna (n=64) documented on the Fitzhugh Carter Tract of Econfina Creek WMA as of June 2019.

CROCODILIA (Crocodilians)

Alligatoridae (Alligator and caiman)

- American alligator *Alligator mississippiensis*

TESTUDINES (Turtles)

Kinosternidae (Musk and mud turtles)

- Common musk turtle *Sternotherus odoratus*
- Eastern mud turtle *Kinosternon subrubrum*

Emydidae (Box and Water turtles)

- Florida box turtle *Terrapene carolina bauri*
- Gulf coast box turtle *Terrapene carolina major*
- Three-toed box turtle *Terrapene carolina triunguis*
- Yellow-bellied slider *Trachemys scripta*
- Florida cooter *Pseudemys floridana floridana*
- Eastern chicken turtle *Deirochelys reticularia reticularia*

Testudinidae (Gopher tortoises)

- Gopher tortoise *Gopherus polyphemus*

Trionychidae (Softshell turtles)

- Florida softshell *Apalone ferox*

LACERTILIA (Lizards)

Anguidae (Legless lizards)

- Slender glass lizard *Ophisaurus attenuatus*

Polychridae (Anoles)

- Green anole *Anolis carolinensis*

Phrynosomatidae (Earless, spiny, and horned lizards)

- Southern fence lizard *Sceloporus undulatus undulatus*

Scinidae (Skinks)

- Ground skink *Scincella lateralis*
- Five-lined skink *Eumeces fasciatus*
- Broadhead skink *Eumeces laticeps*
- Southeastern five-lined skink *Eumeces inexpectatus*
- Northern mole skink *Eumeces egregious similis*

Teiidae (Whiptails)

- Six-lined racerunner *Cnemidophorus sexlineatus sexlineatus*

SERPENTES (Snakes)

Colubridae (Colubrid snakes)

- Florida green water snake *Nerodia floridana*
- Banded water snake *Nerodia fasciata fasciata*
- Eastern garter snake *Thamnophis sirtalis sirtalis*
- Eastern ribbon snake *Thamnophis sauritus sauritus*
- Smooth earth snake *Virginia valeriae*
- Eastern hognose snake *Heterdon platyrhinos*
- Mud Snake *Farancia abacura*
- Southern black racer *Coluber contrictor priapus*
- Eastern coachwhip *Masticophis flagellum*
- Rough green snake *Opheodrys aestivus*
- Corn snake *Elaphe guttata guttata*
- Gray rat snake *Elaphe obsoleta spiloides*
- Florida pine snake *Pituophis melanoleucus*
- Scarlet snake *Cemophora coccinea*
- Black swamp snake *Seminatrix pygaea*
- Brown water snake *Nerodia taxispilota*

Elapidae (Coral snakes)

- Eastern coral snake *Micrurus fulvius*

Viperidae (Vipers)

- Florida cottonmouth *Agkistrodon piscivorus conanti*
- Dusky pigmy rattlesnake *Sistrurus miliarius barbouri*
- Eastern diamondback rattlesnake *Crotalus adamanteus*

CAUDATA (Salamanders)

Amphiumidae (Amphiumas)

- Two-toed amphiuma *Amphiuma means*

Sirenidae (Sirens)

- Greater siren *Sirenn lacertina*
- Eastern lesser siren *Siren intermedia intermedia*
- Slender dwarf salamander *Eurycea quadridigitata*

Ambystomatidae (Mole salamanders)

- Mole salamander *Ambystoma talpoideum*

Salamandridae (Newts)

- Central newt *Notophthalmus viridescens lousianensis*

Plethodontidae (Lungless salamander)

- Southeastern slimy salamander *Plethodon grobmani*

ANURA (Frogs and toads)

Pelobatidae (Spadefoots)

- Eastern spadefoot toad *Scaphiopus holbrookii*

Bufonidae (Toads)

- Southern toad *Bufo terrestris*
- Oak toad *Bufo quercicus*

Hylidae (Treefrogs and allies)

- Florida cricket frog *Acris gryllus dorsalis*
- Green treefrog *Hyla cinerea*
- Barking treefrog *Hyla gratiosa*
- Pine woods treefrog *Hyla femoralis*
- Squirrel treefrog *Hyla squirella*
- Bird-voiced treefrog *Hyla avivoca*
- Southern chorus frog *Pseudacris nigrita nigrita*
- Ornate chorus frog *Pseudacris ornate*

Microhylidae (Narrowmouth toads)

- Eastern narrowmouth toad *Gastrophryne carolinensis*

Ranidae (True frogs)

- Bullfrog *Rana catesbeiana*
- River frog *Lithobates heckscheri*
- Pig frog *Rana grylio*
- Southern leopard frog *Rana sphenocephala*
- Bronze frog *Rana clamitans clamitans*