SANDHILL LAKES MITIGATION BANK
(FITZHUGH CARTER TRACT)
OF
ECONFINA CREEK WILDLIFE MANAGEMENT AREA

ANNUAL REPORT 2015-2016

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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. Following nine years of successful partnership, in May 2014 this agreement was renewed for an additional five years through 2019. 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 July 1, 2015 - June 30, 2016.

HABITAT

Ecological and Land Cover Classification

The Carter Tract harbors several distinct ecological communities. A significant portion of 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 Table 1 displays the habitat management that occurred on Carter Tract FY 2015-16. Figure 1 shows the location of restoration/management activities, which transitioned land cover classifications closer to their targeted goals. Because wildlife and habitat are not mutually exclusive, the documentation of annual restoration/management activities is very important, and inclusion of this information in this report underscores the importance of habitat improvements to the enhancement of wildlife populations as evidenced by corresponding wildlife survey data.

Table 1. Habitat management and restoration activities implemented by NWFWMD from July 2015 - June 2016 on the Fitzhugh Cater Tract of Econfina Creek WMA, Washington County, Florida.

Management/Restoration Activity	Acreage	Planting Density	Month
Growing season prescribed burning	713	n/a	June 2016
Dormant season prescribed burning	52	n/a	January 2016
Bahiagrass (*Paspalum notatum* Flugge) and centipede grass (*Eremochloa ophiuroides*) herbicide	83	n/a	Winter 2016

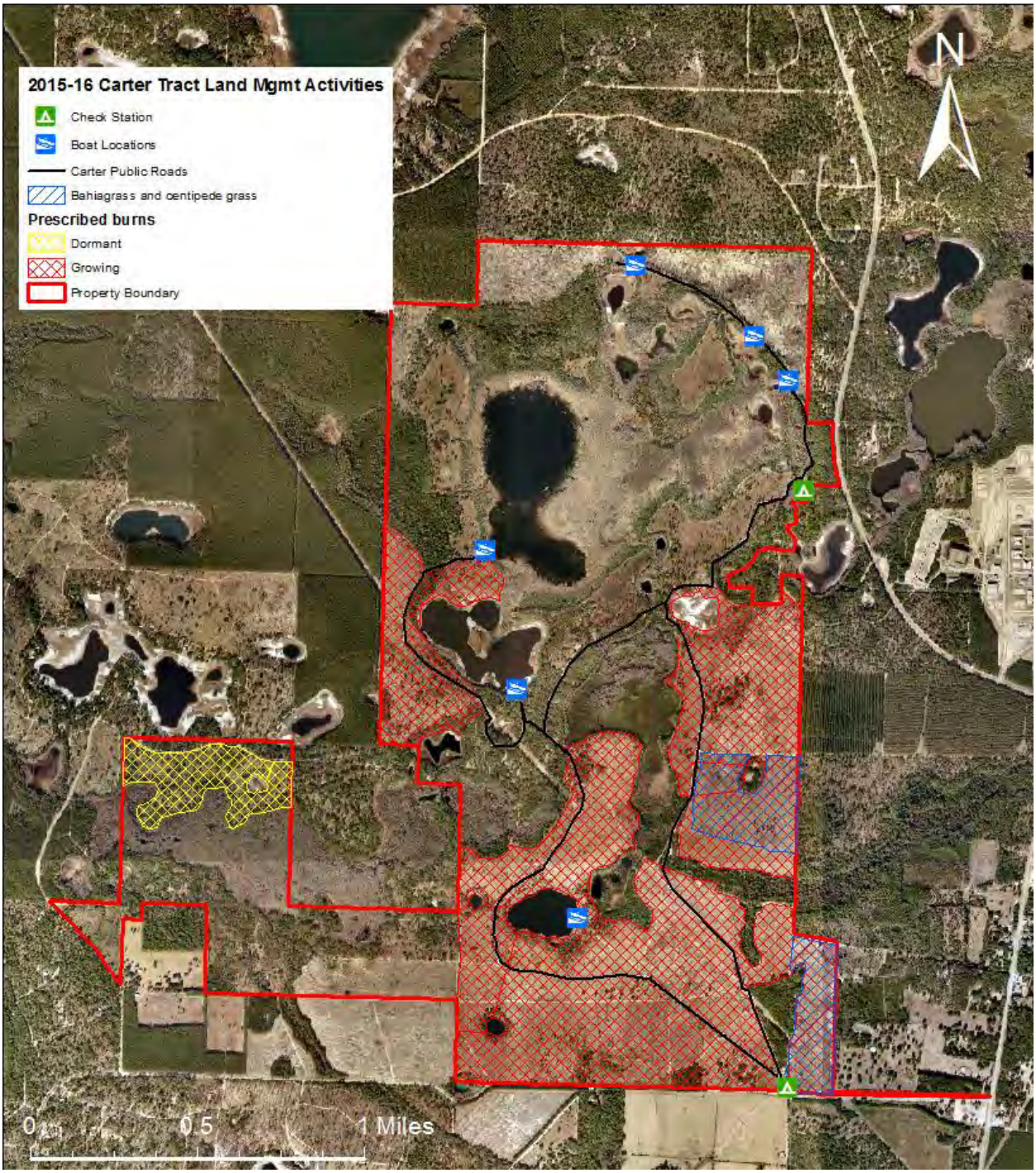


Figure 1. Habitat restoration and land management activities completed by NWFWMD and private contractors from July 2015 - June 2016 at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

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 are intricately tied to the water levels on Carter Tract ponds. For example, extremely low water levels forced the closing of Green Ponds to 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 with the typical season fluctuations and throughout FY 2015-16. Figure 2 graphically illustrates the change in water level of area water bodies over the last three years. The Area Map included within the Fitzhugh Carter Tract Hunting and Fishing Regulations Summary brochure (Appendix I) shows the location of primary water bodies.

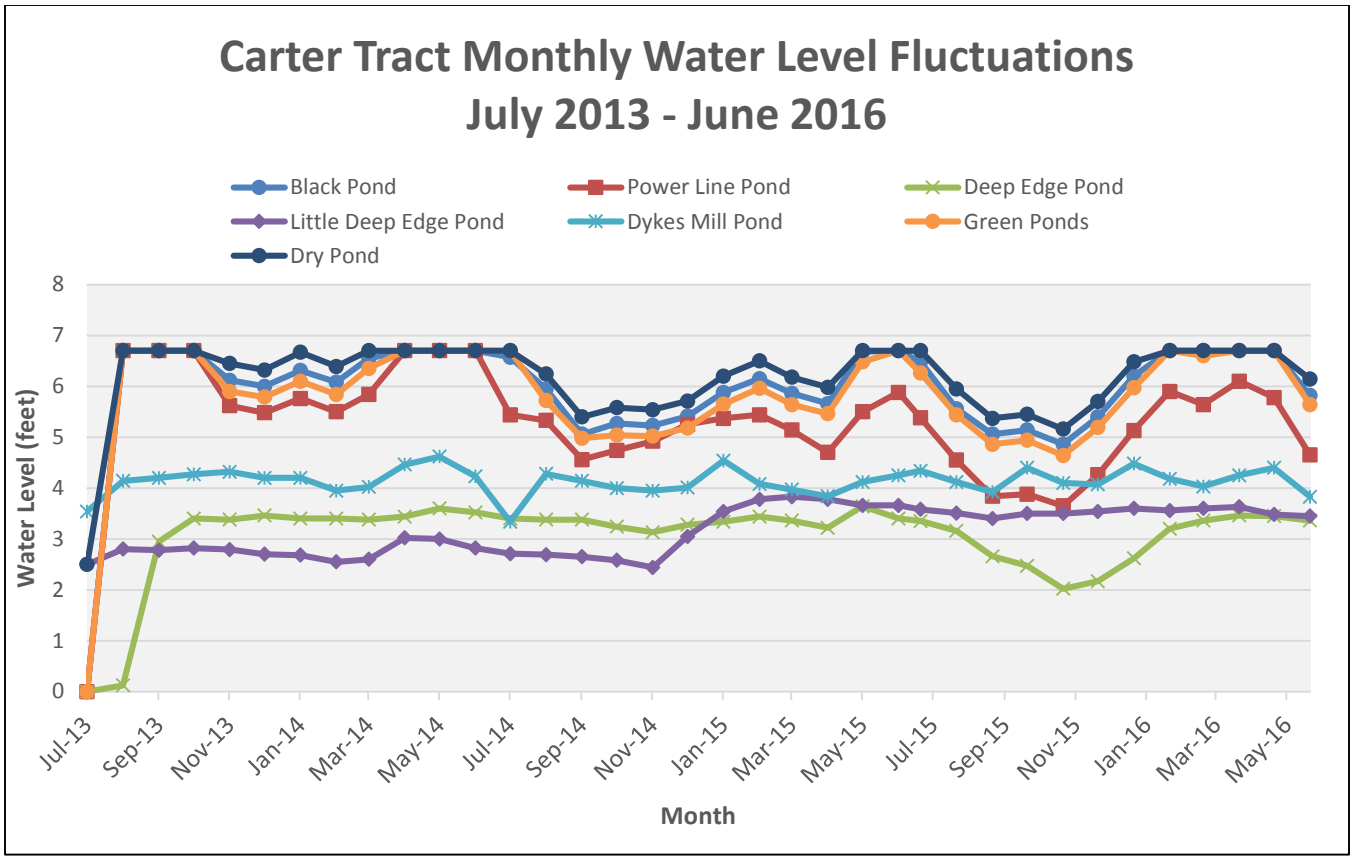


Figure 2. Monthly fluctuations in water levels from July 2013 - June 2016 on major water bodies within the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

Photo Plots

In an effort to visually document the progression of natural areas over time, annual photographs are taken at established locations (plots), facing predetermined azimuth bearings. In 2007, fifty-seven photo plots established on the Carter Tract have documented natural

community responses to restoration efforts such as prescribed burning and tree removal, as well as natural events (i.e. drought conditions). FWC staff added six plot locations in 2008 and 12 plot locations in 2013 to document change over time in what were perceived as under-represented areas of the WMA (Figure 3). We feel documenting this progression facilitates a better understanding of wildlife populations and their responses to such change over time. Infrastructure maintenance and improvements such as road-grading, bridge construction, and facility enhancements are also documented. Figure 4 illustrates how prescribed fire, hardwood eradication, and planting of wiregrass have begun the restoration process to a wet prairie community at this photo plot south of the Green Ponds on the Carter Tract. Photo plot photographs will continue to be taken annually, documenting all habitat types, water bodies, and infrastructure on the area.

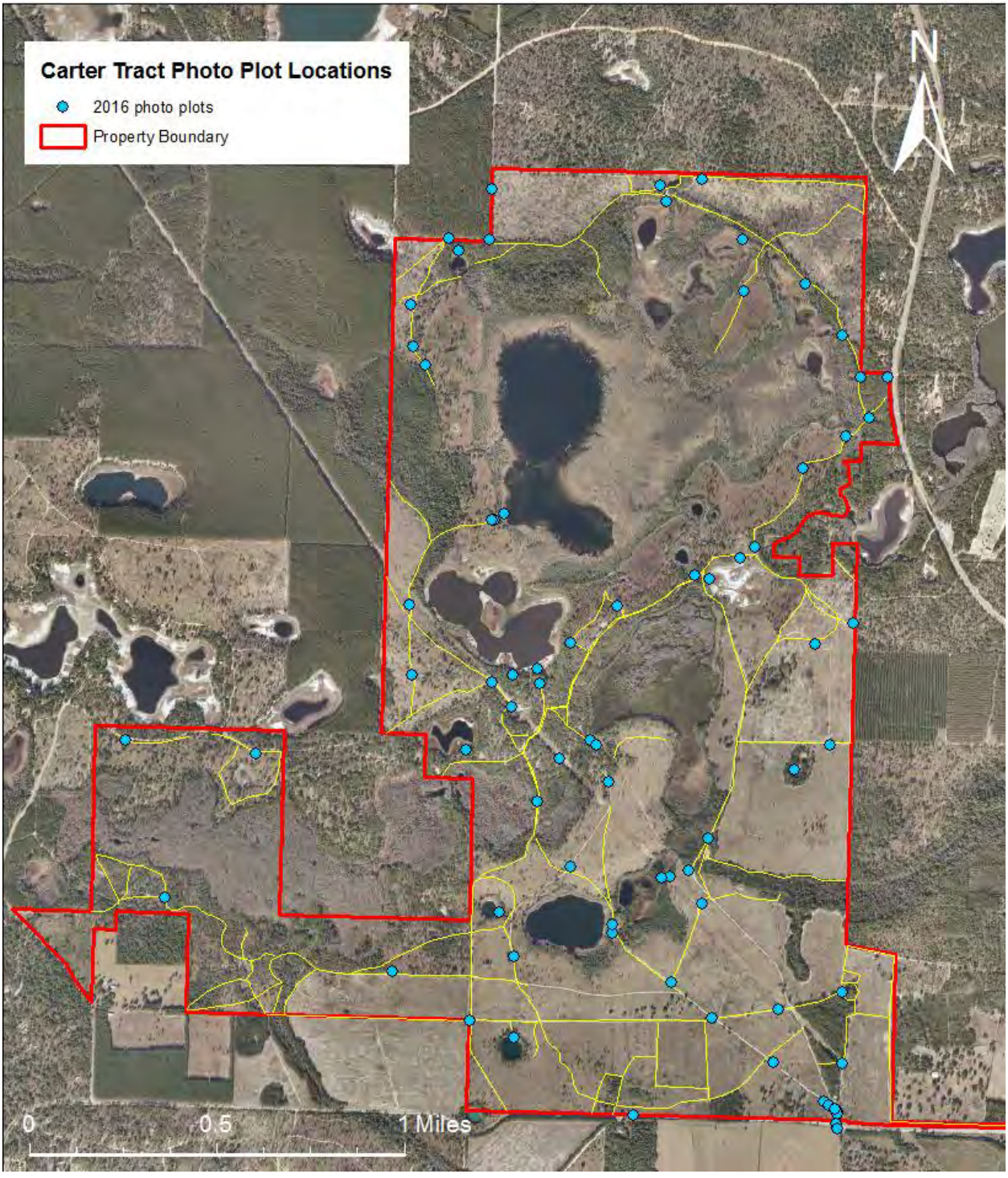


Figure 3. Historic and recently added photo plot locations used to document habitat change over time on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

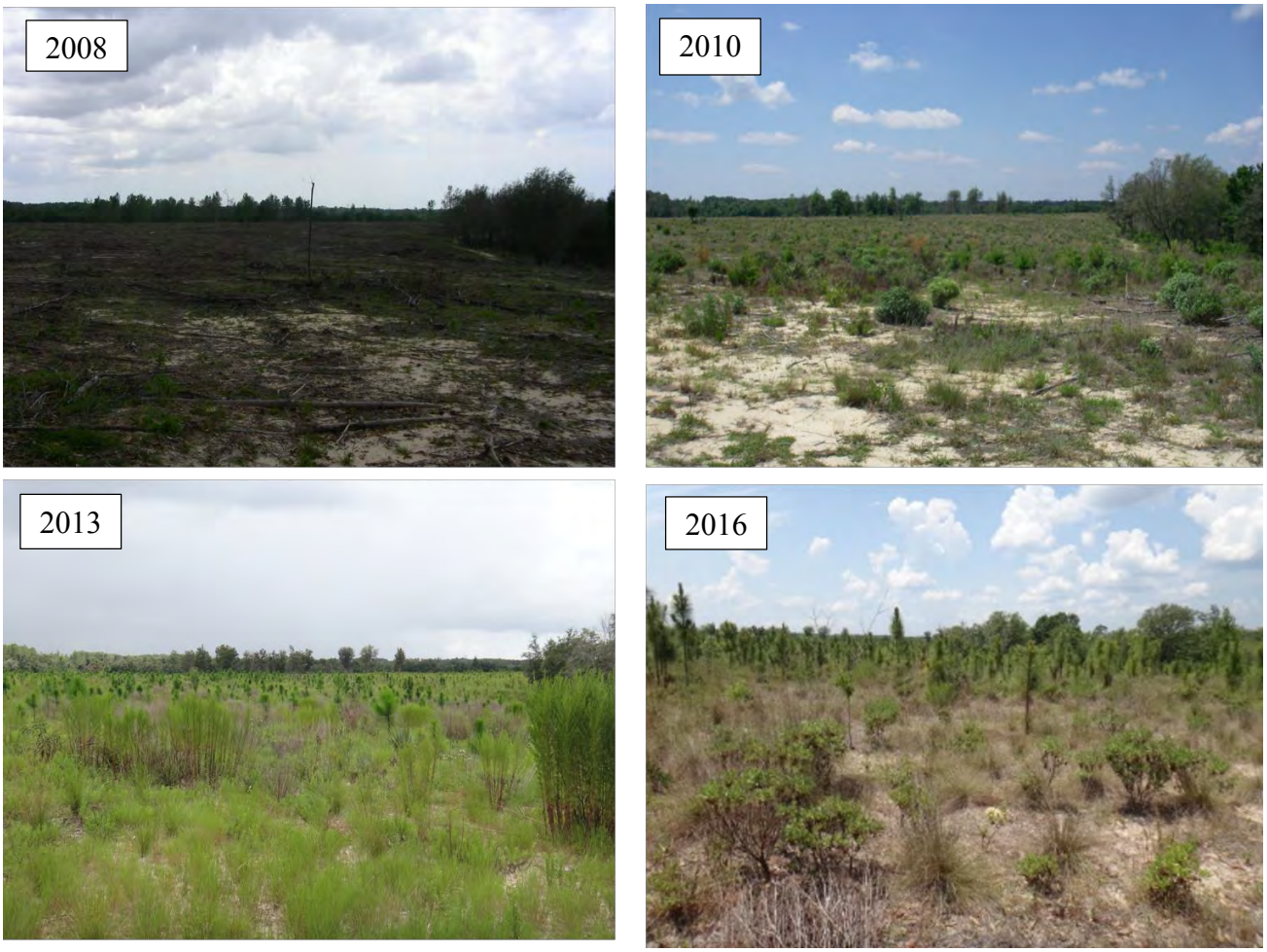


Figure 4. View from photo plot 61 illustrating how prescribed fire, hardwood eradication, and longleaf pine and wiregrass plantings, among other land management activities, have influenced habitat change at the Fitzhugh Carter Tract of Econfina Creek WMA,Washington County, Florida.

FISH AND WILDLIFE POPULATIONS

Working in cooperation with the NWFWMD, the responsibilities of FWC-Division of Habitat and Species Conservation on the Carter Tract are to conduct fish and wildlife population surveys/assessments, collect/analyze biological data, evaluate results, administer public fishing and hunting programs, provide recommendations for adjustments in harvest designed to optimize fish and wildlife populations, and oversee other fish- and wildlife-based recreational opportunities. The following are monitoring and management programs developed to address targeted species and public opportunities. Appendix I presents the 2015-16 Fitzhugh Carter Tract Hunting and Fishing Regulations Summary and Area Map. Appendix II presents the FWC Annual Work Plan and Accomplishment Report for July 1, 2015 – June 30, 2016.

Freshwater Fish

Fish Population Assessment

Given adequate water levels, fish population assessments are conducted twice a year during spring and fall. FWC staff have used a variety of methods, from Wegener rings, fyke nets, and electrofishing, to survey sportfish and baitfish populations at Carter Tract. However, dramatic fluctuations in water levels, as well as the tannic, low conductivity of the ponds have presented limitations with each of these survey methods. The low conductivity greatly reduces the efficiency of the electric current traveling through the water while electrofishing. Electrofishing continued during fall 2015 on Black, Dry, and the Green Ponds to assess sportfish and baitfish populations, measuring catch-per-unit-effort (CPUE). However, the low catch results, combined with the high water levels during the spring of 2016 kept FWC staff from conducting the spring survey. During high water the sportfish are able to move to deeper water as well as into the cypress trees where the electrofishing boat is unable to maneuver. Electrofishing will continue to be conducted biannually as water conditions permit. In an effort to continue to survey sportfish populations on Carter Tract, FWC staff analyzed the creel survey to examine trends in sportfish catch and catch length.

Electrofishing

In November 2015, electrofishing was performed using an 18-foot aluminum vessel with Smith-Root® generator-powered pulsator electrofisher and two six-foot shocking booms on Black, Dry, and the Green Ponds. Direct current power settings were 120 pulses per second and 680 volts; average amperage generated was between 1-2 amps. Staff using ½-inch mesh dipping nets captured, measured, and weighed all affected fish. Sportfish abundance for each pond was calculated as catch-per-unit-effort (CPUE), or the number of fish sampled per minute. A breakdown of the CPUE for each species captured per pond during fall 2015 is presented in Appendix III. Graphs illustrating sportfish abundance trends from 2005 – 2015 for each pond sampled are presented in Figures 5 through 7 (also illustrated are associated water depths during each sample season). Note that not all seasons were sampled for each pond every year due to water level restrictions.

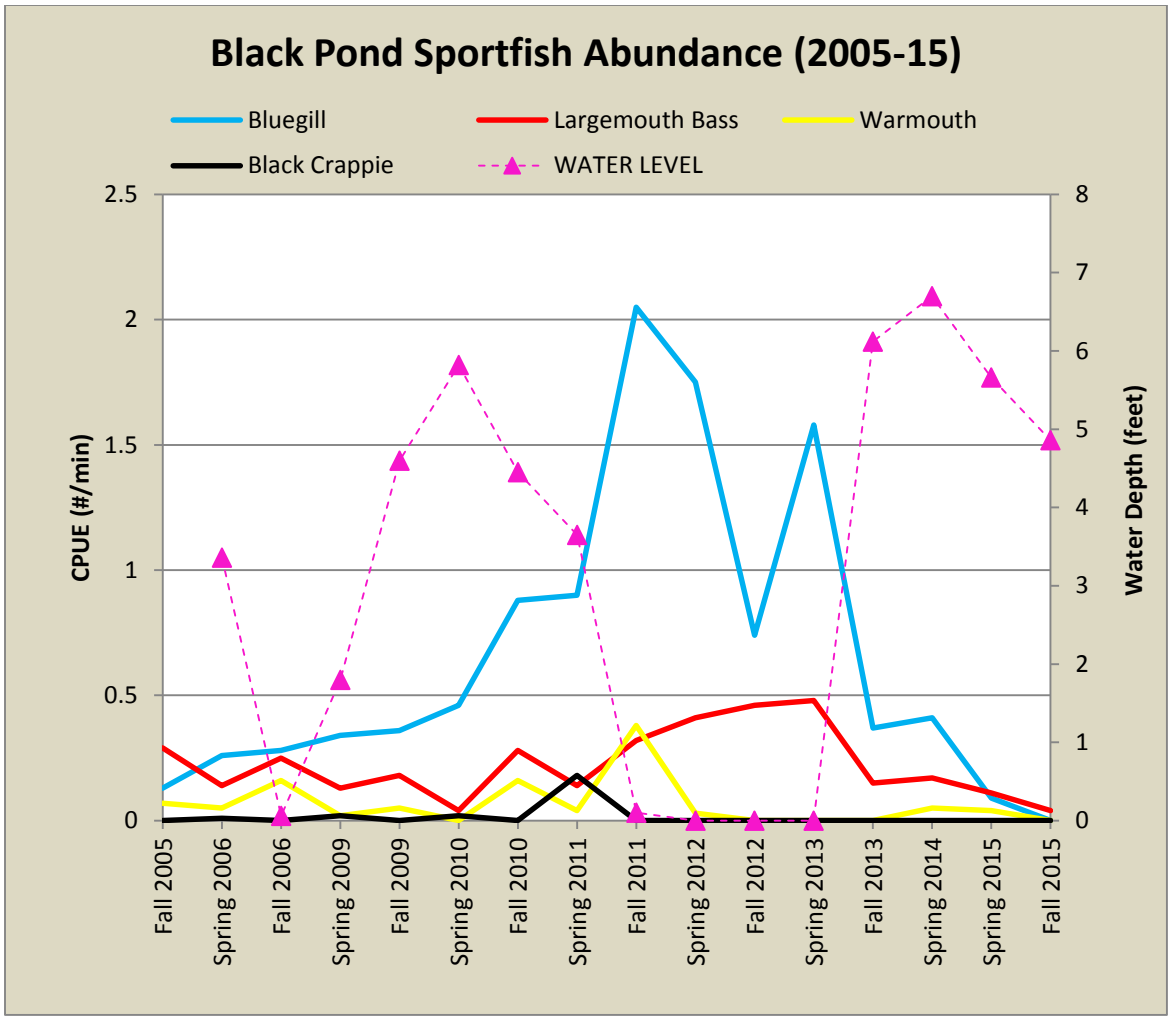


Figure 5. CPUE results from fall 2005 - fall 2015 sampling efforts on Black Pond of Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

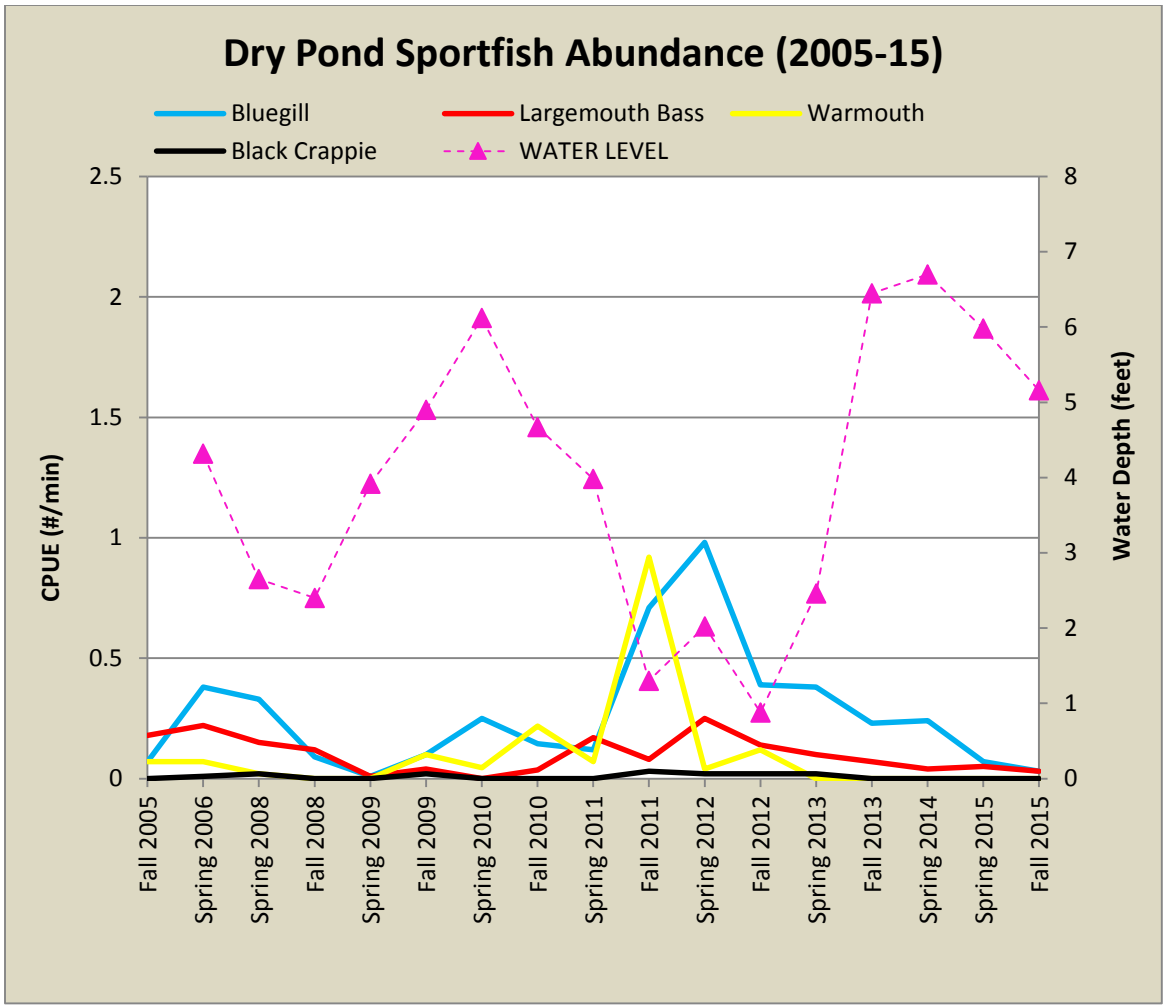


Figure 6. CPUE results from fall 2005 - fall 2015 sampling efforts on Dry Pond of Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida. Also shown are water depths during each sample season.

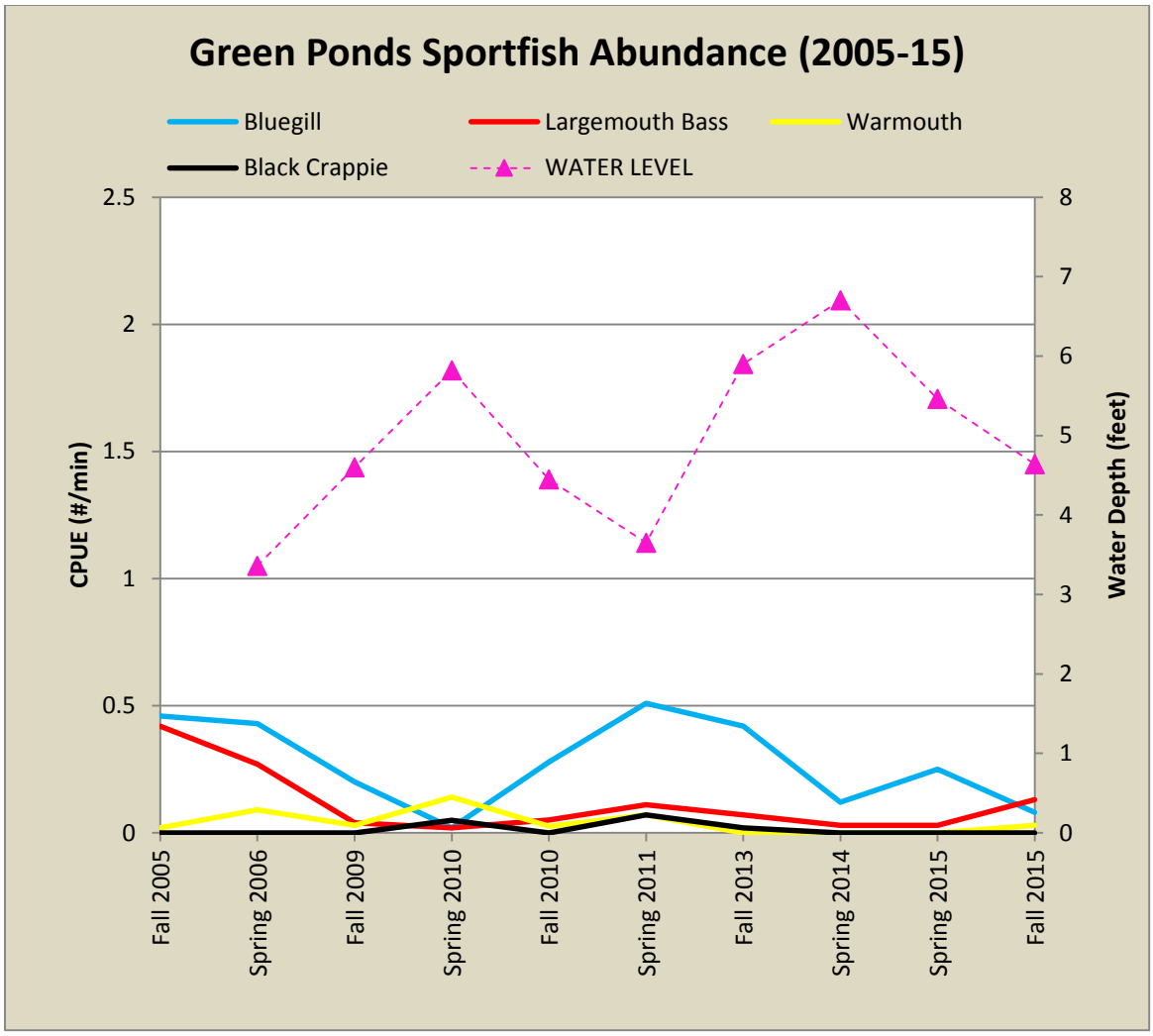


Figure 7. CPUE results from fall 2005 - fall 2015 sampling efforts on Green Ponds of Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida. Also shown are water depths during each sampling season.

Bluegill and largemouth bass were the two most abundant sportfish captured on all ponds during the fall 2015 sample (Figures 5-7). These figures support previous findings on Carter Tract ponds which suggest there is a negative correlation between water level and CPUE on both ponds, with a higher CPUE associated with low water conditions and a lower CPUE associated with high water conditions. When water levels recede, fish are forced to move out of flooded timber and become more concentrated in areas accessible via shocking boat, thus increasing the likelihood of counting them during electrofishing surveys. This can be seen when comparing the results from the fall 2012/spring 2013 (low water levels) with fall 2013/spring 2014 and spring 2015 (high water levels). Although CPUE was higher on Green Ponds compared to Dry Pond

and Black Pond during the fall sample season, all CPUE's were so low that comparisons amongst the ponds are impractical.

Another factor to consider in the assessment of electrofishing data collected from the Carter Tract is the conductivity level of area ponds. Electrofishing efforts on Black, Dry, and Green Ponds have revealed that these ponds have a very low conductivity (measurements in fall 2015 were between 23-25 microsiemens/cm). Conductivity is affected by the presence of dissolved solids (both anions and cations), water temperature, and the geology of the surrounding area through which water may inflow (via stream/river or ground water) to the water body to be sampled. Inflows from clay-rich areas yield water bodies with high conductivity while inflows from granite bedrock yield lower conductivity. The sandy nature of the soil making up the watershed that surrounds the Carter Tract likely explains the low conductivity of its ponds. This low conductivity results in a reduced effective shocking range of the electrofishing equipment available for sampling Carter Tract ponds. As a result, the density measures of sportfish within these ponds may be an underestimate of actual levels, especially for black crappie (*Pomoxis nigromaculatus*), which tend to stay in deeper water and may be out of the effective shocking range of the electrofishing equipment.

When considering the complexities in the sampling and analysis outlined above, and comparing Black, Dry and the Green Dry Pond CPUE measures over time, we feel that the Carter Tract is sustaining a healthy fishery and that current size/bag limits are appropriate. Electrofishing on Black, Dry, and Green Ponds will continue to take place biannually (spring and fall) given adequate water levels to continue our long-term assessment of the productivity of these ponds.

Public Fishing

The Public Fishing Program on the Carter Tract continues to provide anglers with the unique opportunity to fish smaller (farm pond style) bodies of water with comparatively low fishing pressure. Creel surveys from July 2015- June 2016 resulted in 1,015 anglers logging 4,020.75 fishing hours (Figure 8). This is an increase in both anglers and hours logged from the 2014-2015 fishing season. Water levels remained relatively stable at all the fishing ponds throughout the 2015-16 fiscal year, allowing anglers more opportunities to fish than in years past when drought conditions caused the closures of area ponds.

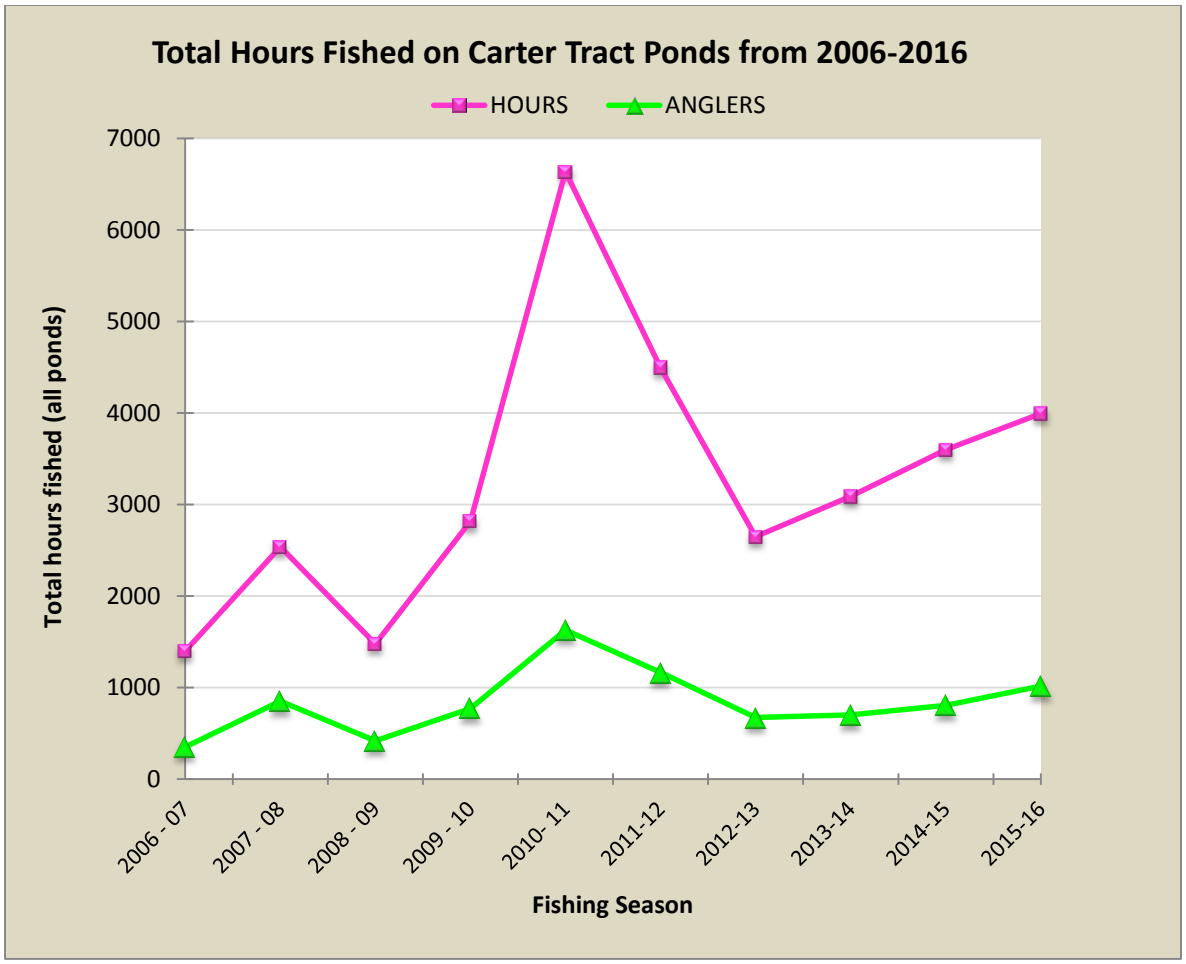


Figure 8. Total number of hours fished from 2006 - 2016 on all area ponds combined at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

Fishing pressure on the Carter Tract was calculated based on the total number of possible fishing hours from July 1, 2014 through June 30, 2015. As previously mentioned, anglers fished 4,020.75 hours, an increase of 11% from the previous fishing season. During 2015 -2016, Dry Pond was the most fished pond (1,848.75 hours) followed by Black Pond (1,096.25 hours), Green Pond 3 (497.75 hours), Green 1 (254.25 hours), Green 2 (239.75 hours), and Deep Edge Pond (84). Angler participation per month remains relatively consistent with past trends. There tends to be a lull in activity during the winter months due to cold weather and temporary closures for hunting seasons with peaks in spring and early summer (Figure 9).

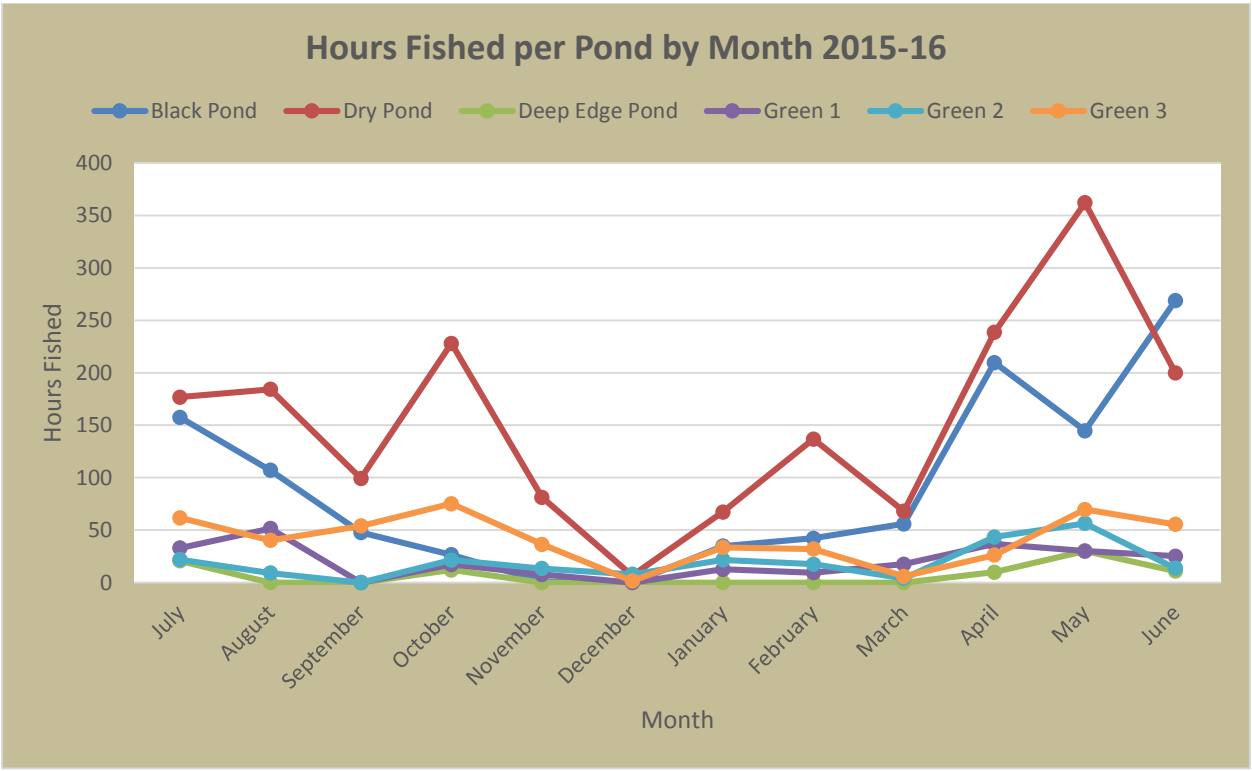


Figure 9. Hours fished per month on Dry, Black, Deep Edge, and Green Ponds in 2015-16 at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

A total of 4,063 fish representing ten species were caught on Carter Tract ponds during 2014-15. This is nearly the same as the 4,093 fish caught during 2014-15. Table 2 illustrates the number of fish caught per species for each pond. Bluegill comprised 66.5% of fish caught, followed by black crappie, largemouth bass, and bullhead catfish (*Ameirus nebulosus* and *Ameirus natalis*) with 17.3%, 12%, and 0.9%, respectively. The remaining 3.3% of fish caught were warmouth (*Lepomis gulosus*), chain pickerel (*Esox niger*), spotted gar (*Lepisosteus oculatus*), redbreast sunfish (*Lepomis auritus*), flier (*Centrarchus macropterus*), and redear sunfish (*Lepomis microlophus*).

Table 2. Number of fish caught by species per pond at the Carter Tract of Econfina Creek WMA, Washington County, Florida, July 2015 - June 2016.

Species	Dry Pond	Black Pond	Deep Edge Pond	Green 1	Green 2	Green 3
Bluegill	1763	567	18	108	53	192
Largemouth Bass	143	116	28	5	36	158
Black Crappie	388	224	0	17	5	70
Catfish	14	20	0	1	0	2
Other	49	35	0	9	9	33

Figure 10 illustrates angler creel trends from 2007-16 per water body. The fluctuations in bluegill catch over the years is likely due to drought conditions in 2008-09 and 2011-13 that forced the closure of the Green Ponds to fishing. The recharging of the aquifer in 2013 allowed all area ponds to be reopened to fishing, and relatively stable water levels since have allowed more bluegill, as well as largemouth bass and black crappie catches since 2013. The current size restrictions imply the bluegill population may have reached a more balanced population level. Future surveys will attempt to assess the population levels of largemouth bass and black crappie to determine if area ponds may be able to sustain a harvest of largemouth bass. Total number of fish caught and released per pond was calculated based on angler-reported creel data and a detailed table of these data is presented in Appendix IV.

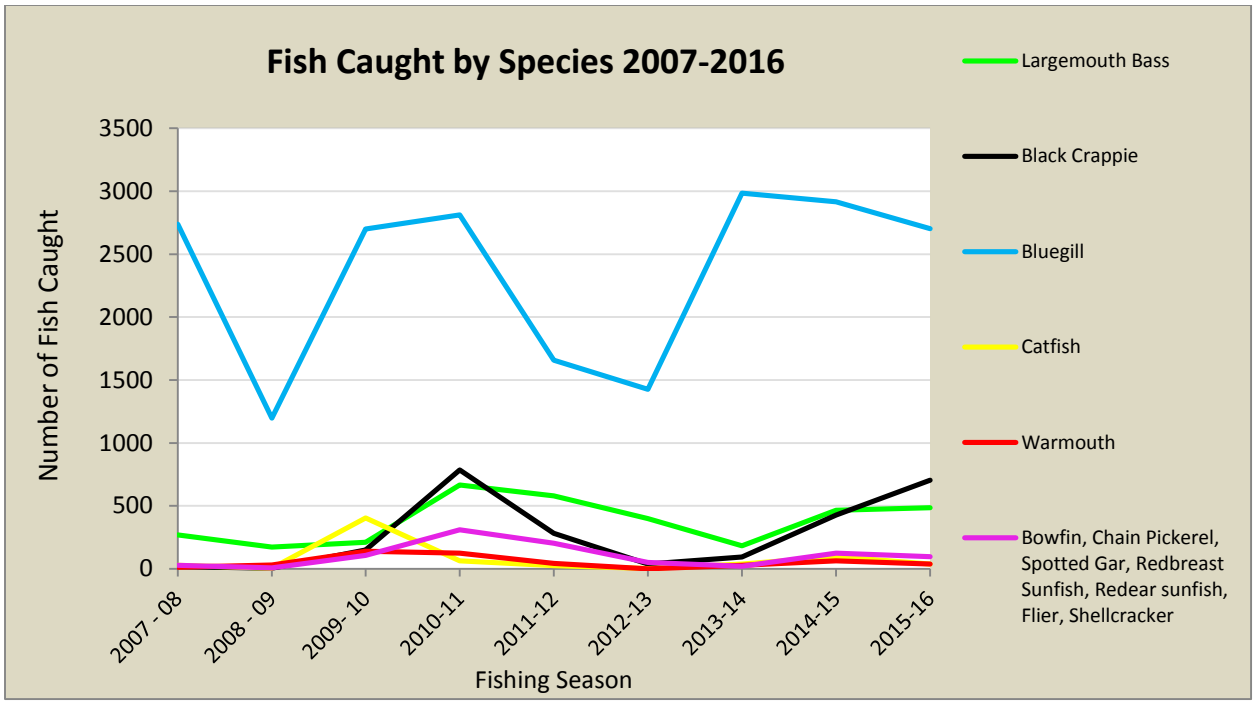


Figure 10. Angler creel trends from 2007 - 2016 on all area ponds of the Carter Tract of Econfina Creek WMA, Washington County, Florida.

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 2015-16 fishing season (Table 3). Dry Pond was the most productive water body, followed by Black, Green 3, and Green 1 Ponds. Figure 11 shows the trend in angler success rate for area ponds over the last five years. Anglers should use caution when making decisions about the 'quality' of a pond based on these data because the effect of variables such as water level and angler skill level can be hard to measure and may skew success rates. Further, low sample sizes (i.e. number of hours fished per pond) during some years for certain ponds may also result in a misrepresentation of the 'quality' of a pond based solely on the measured success rate during that particular year. These data will continue to be collected annually as an index of fishing success rates per pond.

Table 3. Fishing success rate (fish caught/hours of fishing effort) on area ponds at the Carter Tract of Econfina Creek WMA, Washington County, Florida, July 2015 - June 2016.

Pond	Angler success rate (fish/hour)
Dry	1.3
Black	0.9
Deep Edge	0.5
Green 1	0.6
Green 2	0.4
Green 3	0.8
All Ponds	1.0

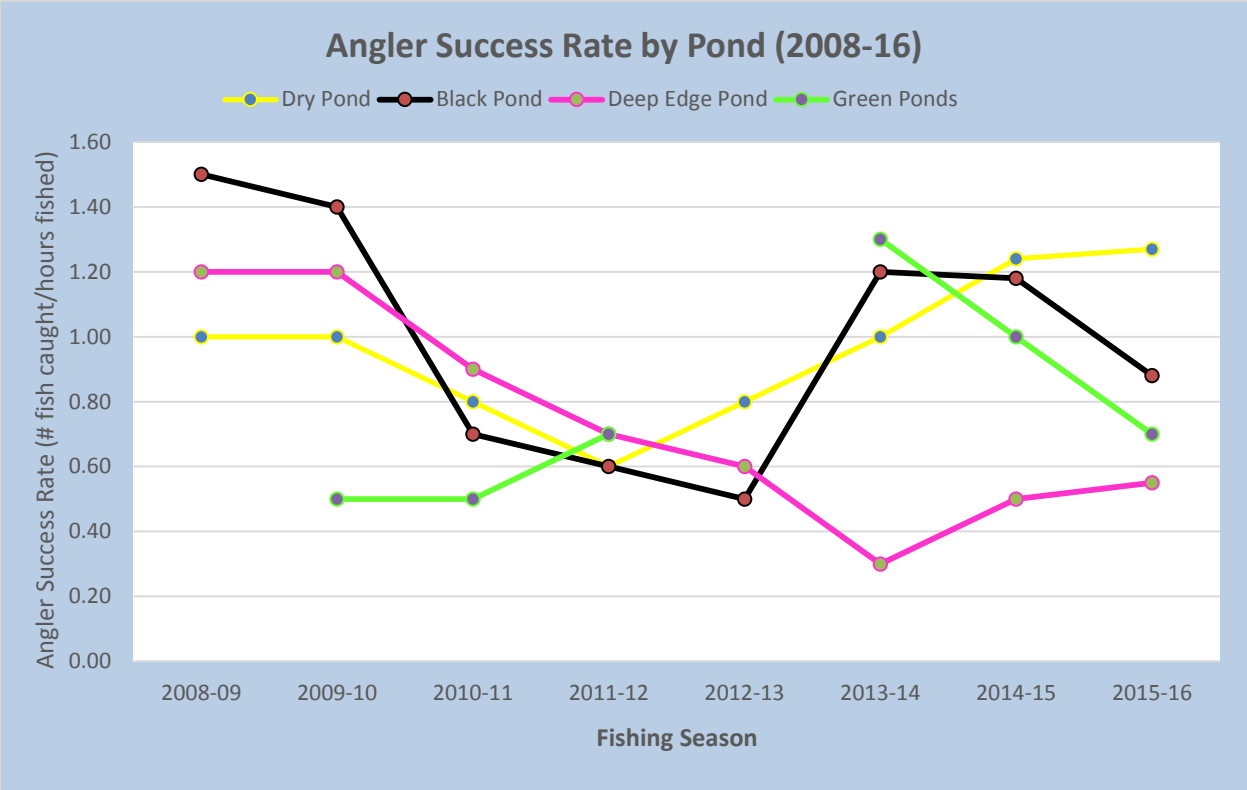


Figure 11. Angler success rate (# fish caught/hour of fishing effort) from 2008 - 2016 on area ponds of the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida. Green Ponds were closed to fishing during the 2008 - 09 and 2012 - 13 fishing seasons due to drought conditions.

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+ 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, as well as habitat.

Line-Transect Distance Sampling

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, one 4.6-km long and the other 4.7-km long, and were replicated six times in September 2015. 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 one-million candlepower Q-beam® spotlight. Routes were driven at a speed of roughly 5 mph. Deer were detected by eye shine and the following data were recorded: number of deer, distance to deer, direction/bearing from vehicle, age (adult versus fawn), and gender (if determinable). Distance and bearing data were calculated using a Leupold® RXB-IV digital rangefinder/binocular. Figure 12 depicts the line transect routes used on the Carter Tract, along with locations of deer observed during 2015 surveys.

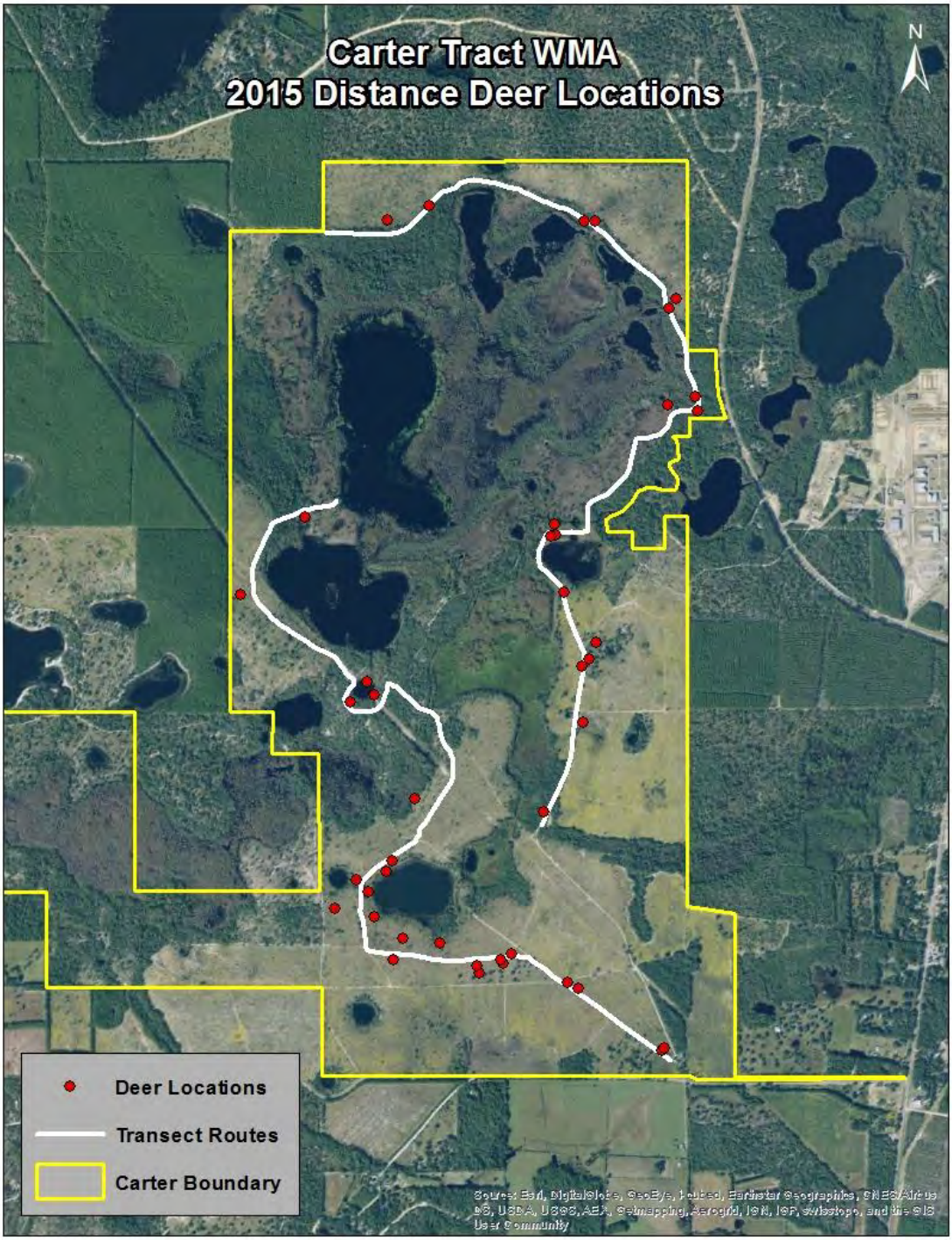


Figure 12. Survey routes and locations of deer observations during the September 2015 line-transect distance sampling conducted on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

Preseason deer density for 2015 was estimated at 20.8 deer/mi^2 (95% CI: 13.0, 50.8), using the software DISTANCE 5.0 Release 2 (Thomas et al. 2006). The Cramér-von-Mises goodness-

of-fit test performed on these data produced a *p*-value of .900, which along with the relatively small confidence range, suggests an excellent model fit. This index was greater than the 14.0 deer/mi^2 calculated in 2014, and is within the desired population goal for the Carter Tract (Figure 13). It is important to remember that a number of 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 in 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.

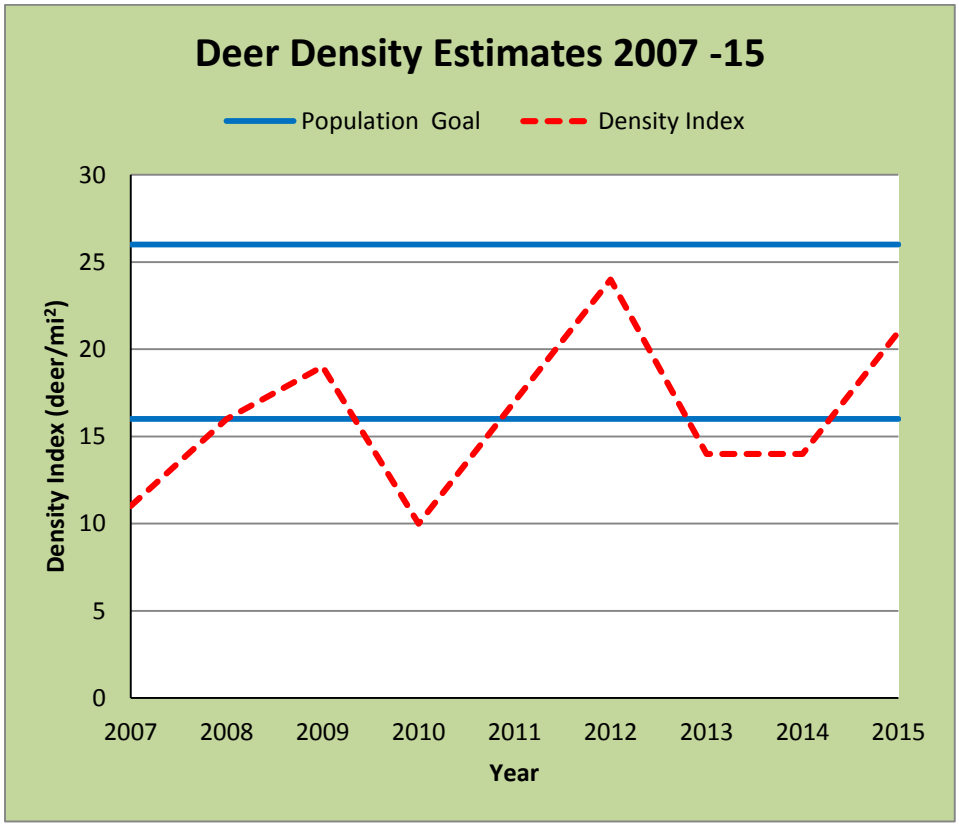


Figure 13. Trend in White-tailed deer density as estimated using line transect distance sampling at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida, 2007 - 2015.

White-tailed Deer Camera Survey

Camera surveys were initiated on Carter Tract during FY 2015-16 as a possible alternative to LTDS to determine the density of deer on Carter Tract. Cameras surveys are a recent survey method that is believed to provide a more robust monitoring tool than the standard LTDS survey (Jacobsen et al. 1997). The study was conducted between January 4 and 18, 2016, and followed protocols established by Jacobsen et al. (1997) and Quality Deer Management Association (QDMA 2012). Camera sites were determined by gridding Carter Tract into 100 acre cells (n=33) (Figure 14). Once the grid was established, 20 cells were randomly chosen as camera sites. A 200-yard buffer was placed on the center of the cell and the camera location was selected based on the best available habitat or where the most deer sign was present. The 20 selected cameras sites were cleared of any standing vegetation within 20 feet of the camera lens to prevent vegetation of obscuring the camera lens. On December 28, 2015, sites were pre-baited with 50 pounds of corn. Cameras were activated on January 4th, set to a five-minute delay between capturing photos, and rebaited with 50 pounds of corn (J. Kelly pers. comm.). Sites were visited on January 11th and rebaited as needed. On January 18th, all cameras were collected for processing and bait removed from the site.

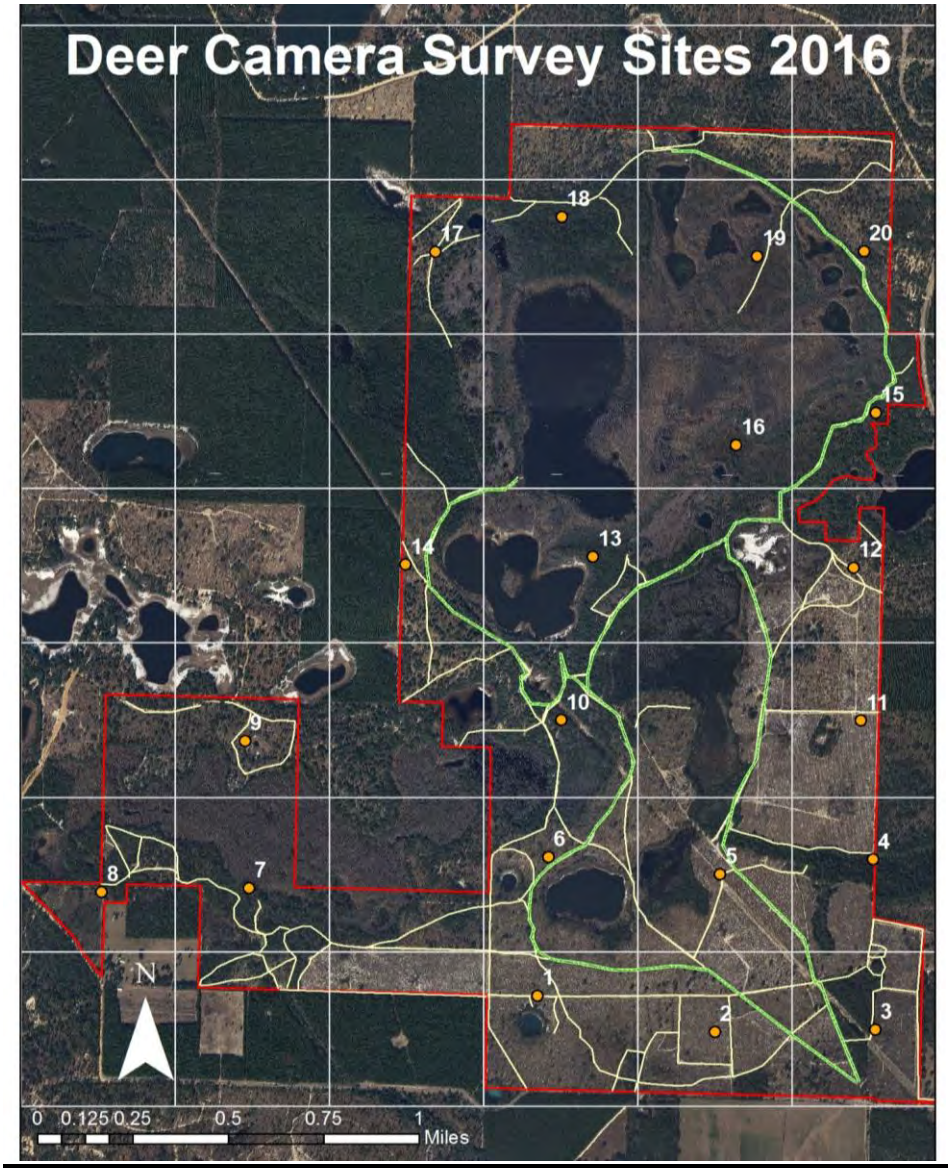


Figure 14. Camera locations within each grid cell on Fitzhugh Carter Tract WMA during the 2016 deer camera survey study, Washington County, Florida.

Photos were downloaded from camera memory cards and sorted based on site location. All photos were then sorted into four categories: branch-antlered bucks, spikes, does, fawns or other. Branch-antlered buck photos were then processed and unique bucks were identified based on antler or other body characteristics. Photos were then analyzed using two different models (Jacobsen et al. 1997 and QDMA 2012) to determine white-tailed deer density and population estimates.

Table 4 displays the deer density and population estimates for the two different models from the 2016 camera survey. Both models projected a much greater deer density than the LTDS

survey (Jacobsen = 56.64, QDMA = 39.35). Twenty-one bucks were uniquely identified from photos during the survey. The Jacobsen estimate yielded 30 total bucks, QDMA estimated 21 bucks. Overall, Jacobsen had higher population estimates than QDMA due to differences in how total bucks were calculated. QDMA did not include any spikes when calculating total bucks, whereas Jacobsen did include spikes to calculate total bucks. The main point to emphasize from the camera survey is it will provide another tool with which to measure the white-tailed deer population on Carter Tract and how this species responds to the management aimed at restoring Carter Tract habitat. Therefore, while the estimates from these models (like the deer/mi^2) may seem high, the trends in these population statistics collected over the years will provide the most useful tool in understanding population trends of the Carter Tract herd.

Table 4. Population and density estimates from photos captured during 2016 deer camera survey study at Fitzhugh Carter Tract WMA, Washington County, Florida.

	Jacobsen et al. 1997	QDMA
Bucks	30	21
Does	116	80
Fawns	31	22
Total	177	123
Doe:Buck Ratio	3.83	3.82
Acre/Deer	11.3	16.27
Deer per square mile	56.64	39.35

Harvest and Hunting Pressure

Deer hunters and their guests logged a total of 149 man-days of hunting during the 2015-16 season, compared to 174 man-days last year. The first phase of general gun yielded the highest participation with 38 hunters, followed by the first phase of archery with 37 hunters. Hunting man-days was down slightly in 2015-16, with the second phase of archery having the greatest decline (Figure 15). The weather that week was extremely hot (mid 80s ^{0}F, humid and wet), which likely led to the decreased participation.

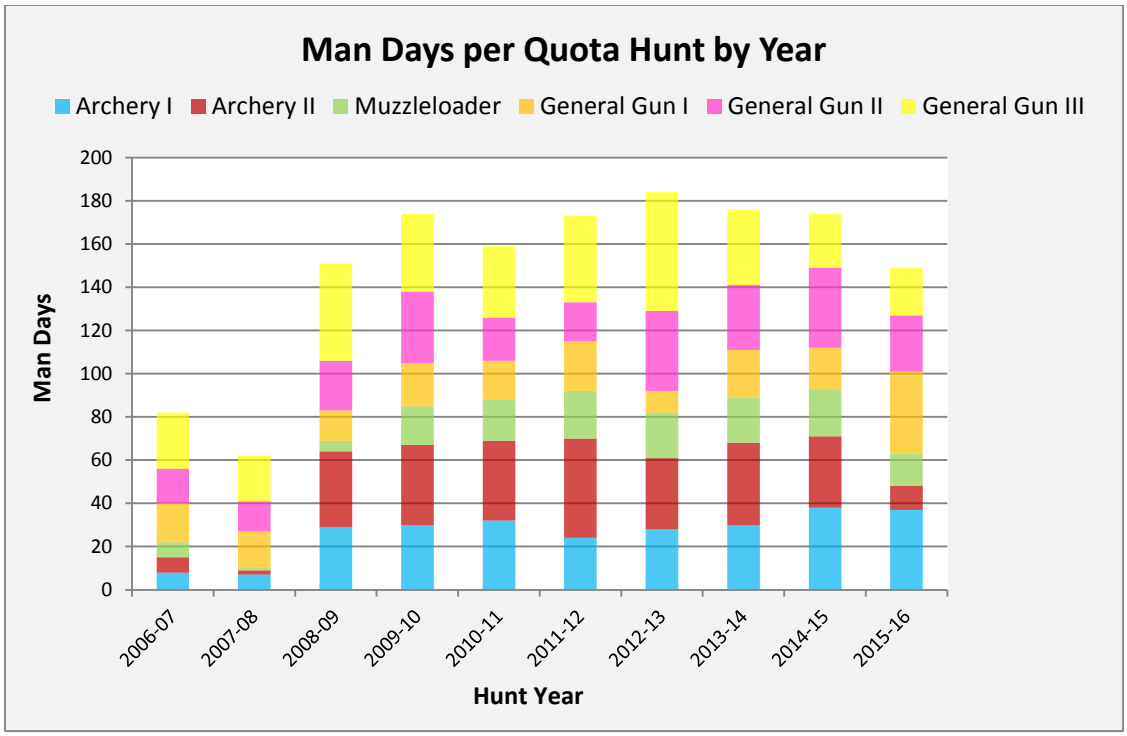


Figure 15. Comparison of hunter participation by quota hunt from 2006 - 2016 on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

All quota permit hunters were required to check-in/out at the Carter Tract check station in order to monitor hunter pressure and collect biological data from harvested deer. Two deer were harvested on the Carter Tract during 2015-16, yielding a hunter success rate of 1.3% (1 deer/74.5 man-days of hunting pressure); the lowest rate recorded on Carter Tract. Overall hunter success rate (calculated as the number of deer harvested per man-days hunted) is depicted in Figure 16, and is compared over the last ten deer seasons. The LTDS and camera surveys both point towards Carter Tract having a relatively healthy deer herd, however that did not translate into a successful season for hunters.

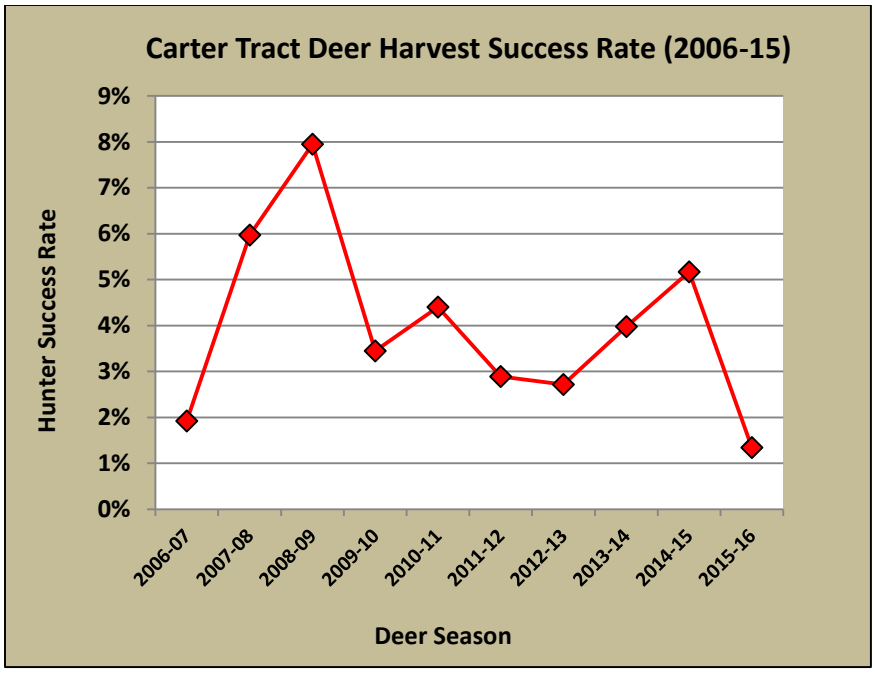


Figure 16. Overall hunter success rate from 2006 - 2016 at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

Mean physical parameters of all deer harvested per quota hunt season are presented in Table 5.

Table 5. Morphometric parameters of deer harvested during 2015-16 quota hunts on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

		Mean Physical Parameters 2015-16					
Quota Hunt	**Gender**	**Age (yrs)**	**Weight (lbs)**	**Antler points**	**Avg beam length (in)**	**Avg beam circum. (in)**	**Inside spread (in)**
Archery I	Doe	2.5	75	N/A	N/A	N/A	N/A
General Gun II	Buck	2.5	135	8	14 7/8	3 3/4	13 1/4

The buck harvested during General Gun II followed recent trends for buck harvest mainly occurring during General Gun II and III on Carter Tract. These two hunts occur annually during the last week and a half of January. This coincides with the primary rutting activity and mean conception dates for southern Washington County (Garrison et al. 2009).

We believe the full potential for deer hunting opportunities on the Carter Tract has yet to be realized, but is expected to continue to improve in conjunction with habitat quality. 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 affect improvements in hunter success. Further, physiologic and morphometric indices suggest the population can be maintained at still higher densities before eroding herd health.

FWC implemented new hunting regulations prior to the 2014-15 hunting season that may affect the deer herd structure at the Carter Tract. FWC divided Zone D into two Deer Management Units (DMUs), with Interstate 10 being the dividing line between the two DMUs. The Carter Tract lies in DMU-D1 and the new regulation requires that bucks have a minimum of two points (each point having to be a minimum of 1 inch long) on one side. These regulations are intended to protect most 1.5-year-old bucks from being shot, while allowing the harvest of most 2.5 year-old and older bucks. No 1.5 year-old bucks have been harvested from Carter Tract since the implementation of the hunting regulation (Figure 17). FWC will monitor whether the intended results of these new regulations (older bucks) will apply to Carter Tract through harvest data collected at the check station and incidental observations in the field.

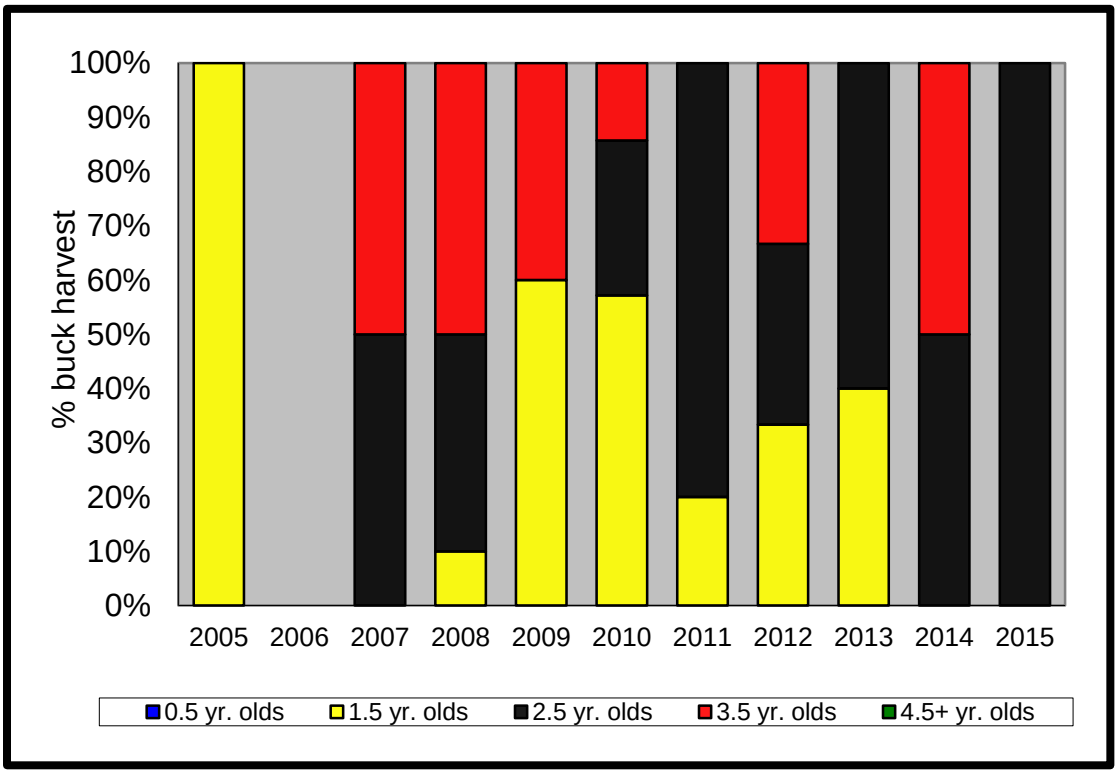


Figure 17. Age structure of bucks harvested over time at Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, FL.*Age was not recorded for the buck harvested in 2006.

Chronic Wasting Disease (CWD) is a contagious neurological disease that has been found in captive and wild mule deer (*Odocoileus hemionus*), white-tailed deer, moose (*Alces alces*), and Rocky Mountain elk (*Cervus elaphus*) within 22 states and two Canadian provinces 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 no 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. Even low numbers of CWD-positive deer would be cause for concern, so we plan to continue this disease surveillance for the foreseeable future.

In an effort to minimize the risk of the disease spreading, Florida has adopted regulations affecting the transportation of hunter-harvested deer, elk, and moose from CWD-infected areas. Moreover, in September 2013, the FWC enacted prohibition on the importation of live cervids (deer, elk, and moose) into Florida from out-of-state sources. Live cervids cannot be imported into Florida unless they come from a herd certified CWD-free by the Florida Department of Agriculture and Consumer Services.

Wild Turkey

Management Objectives

1. Encourage and maintain a population of wild turkey (*Meleagris gallopavo*), providing a high quality hunting experience to the public.
2. 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.

Harvest

Spring turkey season on the Carter Tract consists of three quota hunts, each three days in length, and a two-day youth quota hunt. Permit holders for all turkey quota hunts were afforded one day prior to each hunt for scouting. Twenty six hunters participated in the 2016 spring

turkey hunts, including two youth. Two turkeys were harvested during the first quota hunt, and one was harvested during the third quota hunt in 2016. The turkey harvest success rate (defined as the number of gobblers harvested/man-days of effort) for the Carter Tract from 2007 – 2016 is illustrated in Figure 18. The annual hunter success rate from 2007-16 quota turkey hunts is 1 gobbler/18.5 man-days of effort.

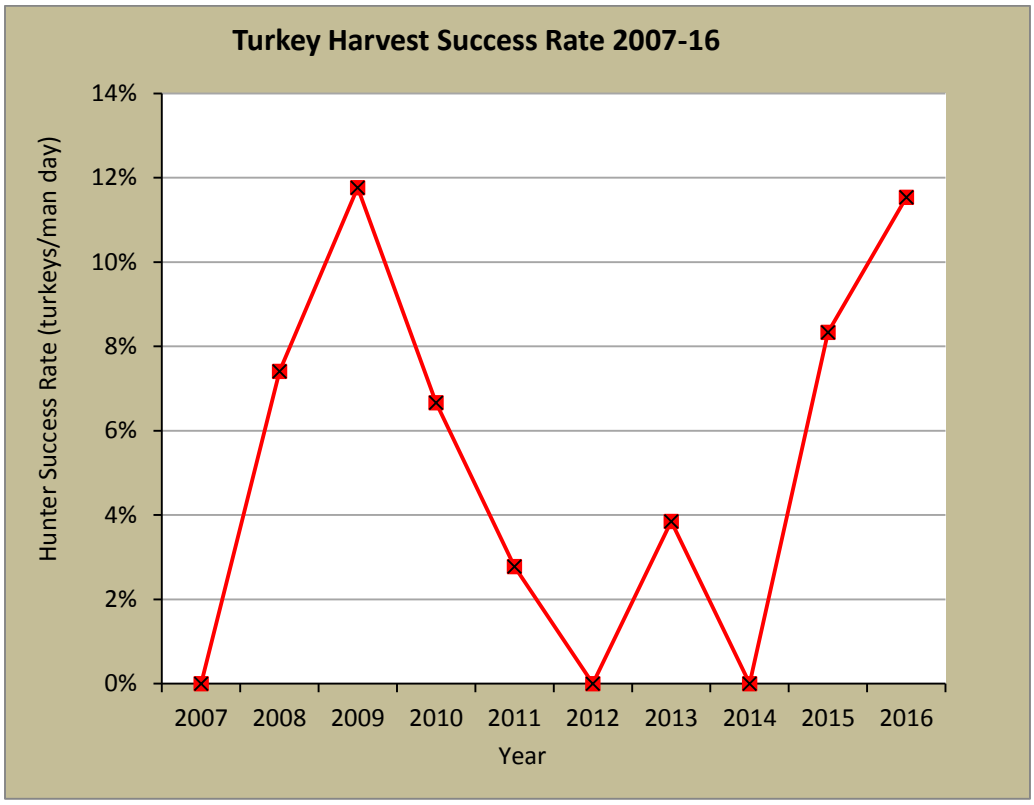


Figure 18. Turkey harvest success rate from 2007 - 2016 on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

Weather conditions, experience level of hunters, and hunting pressure on surrounding/adjacent properties can all affect harvest success rates. Turkey harvesting opportunities on the Carter Tract have and 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 bugging conditions 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.

Small Game

The Carter Tract is open annually to small game hunting during a 16-day non-quota season each December. Small game can also be hunted by permit holders during deer quota hunts, provided there is season overlap between the game being hunted and deer quota hunt dates. Hunters are encouraged not only to hunt popular small game such as gray squirrel (*Sciurus carolinensis*), rabbit (*Sylvilagus* spp.), and northern bobwhite (*Colinus virginiana*), but also for taking wild hogs (*Sus scrofa*), which are occasionally encountered on the property. Check station operators record how many hunters pursue each type of game for the duration of the small game season. Small game hunters devoted 34 days to squirrel hunting, 19 days to quail hunting, and 10 days to hog hunting during the 2015-16 small game season. Participation was down from 2014-15, however, it continued a recent positive trend in participation (Figure 19). Hunters harvested 20 gray squirrels, a decrease from the 34 squirrels harvested during 2014-15. Fourteen bobwhites were harvested, a decrease from the twenty harvested during the 2014-15 season. Finally, two female hogs (80 lb. and 30 lb.) were harvested during the 2015-16 season, the same number harvested in 2014-15.

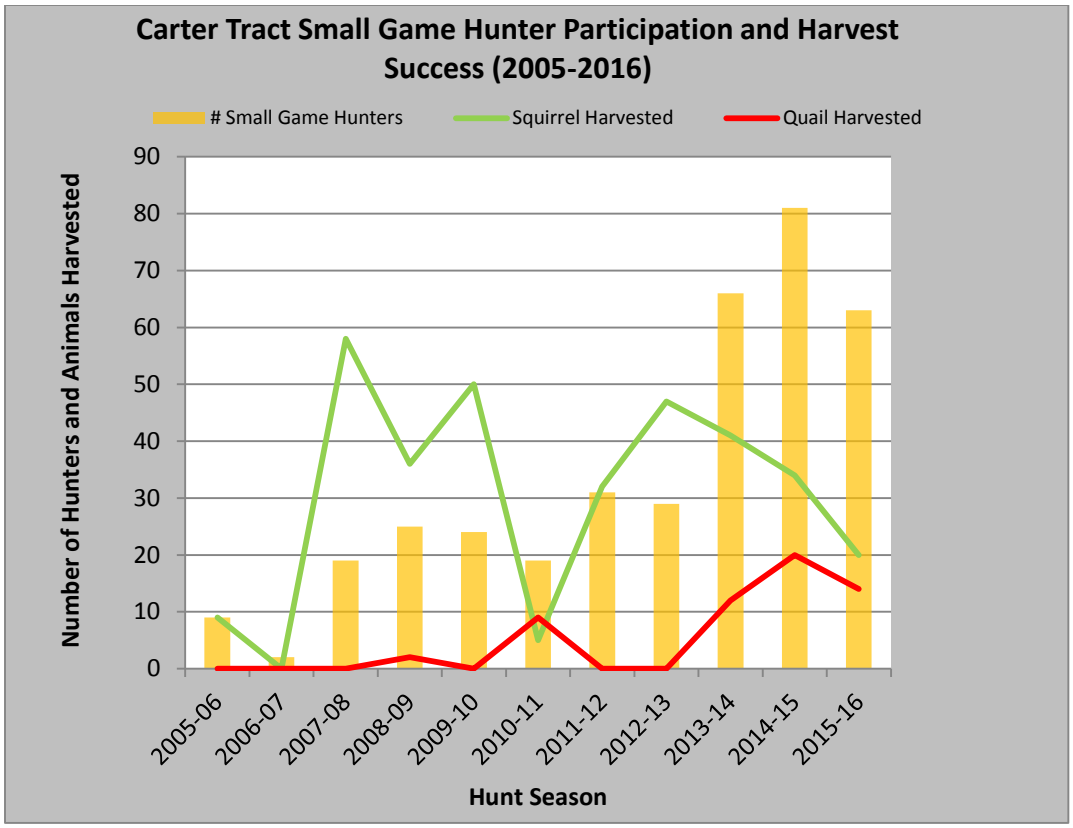


Figure 19. Small game hunter participation and harvest success on the Carter Tract of Econfina Creek WMA, Washington County, Florida, 2005 - 2016.

Waterfowl

Harvest

The Carter Tract provides duck hunting opportunities during a special five-day early duck season each September. 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) are also open to duck hunting. For the 2015-16 season duck hunters spent 150 man-days hunting and harvested a total of 68 ducks, representing three species. Twelve wood ducks (*Aix sponsa*) and four teal (*Anas spp.*) were harvested during the September early duck season. Forty-six wood ducks and six ring-necked ducks (*Aythya collaris*) were harvested during the general gun quota hunts and small game season. Duck hunter participation and harvest trends from 2006-16 on the Carter Tract are represented in Figure 20. Hunter participation was the highest ever recorded on Carter Tract. Figure 21 depicts harvest success (number of ducks harvested/man-days of hunting effort) on the Carter Tract from 2006-16. Duck hunters realized a harvest rate of 0.5 ducks/man-day during the 2015-16 hunting season, the lowest recorded on Carter Tract.

However, the mild temperatures across the southeastern U.S. observed fall/winter 2015-16 may have kept many of the migratory ducks from moving further south. Although hunters did not have as much success as in years past waterfowl hunting on Carter Tract, the high man-days and large number of wood ducks harvested is encouraging that Carter Tract is gaining popularity as a waterfowl area for both the hunter and the ducks.

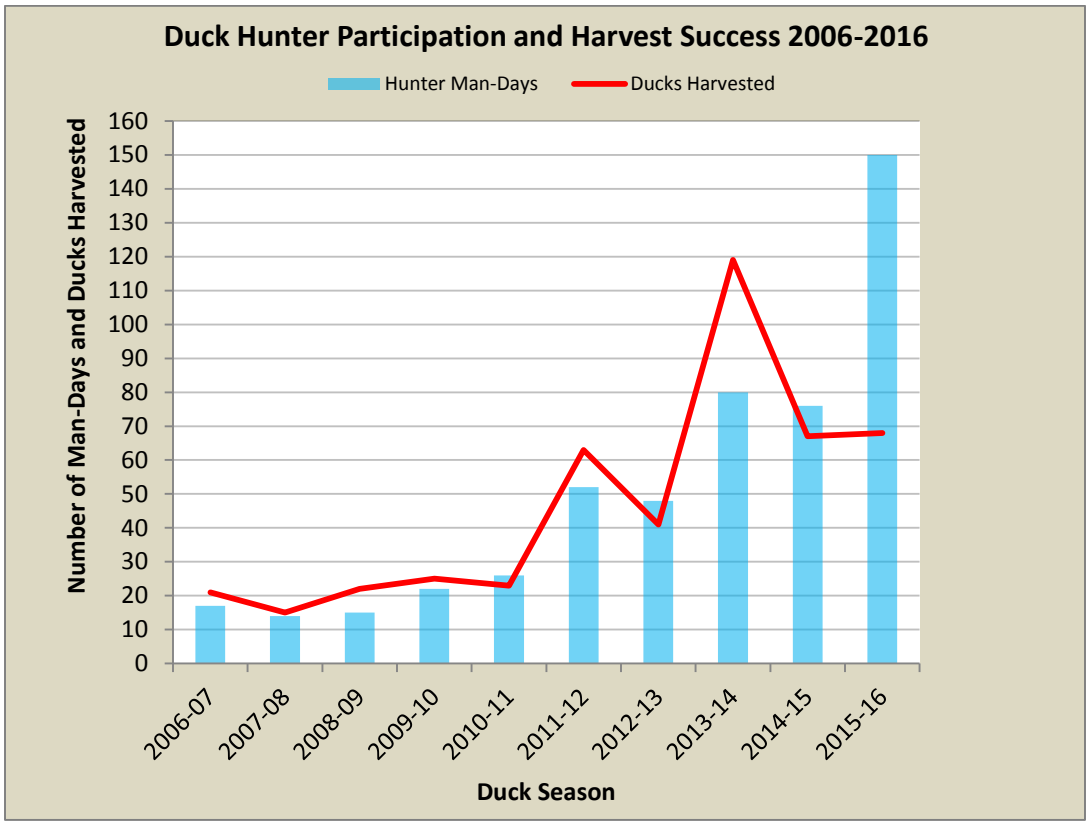


Figure 20. Duck hunter participation and harvest from 2006 - 2016 at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

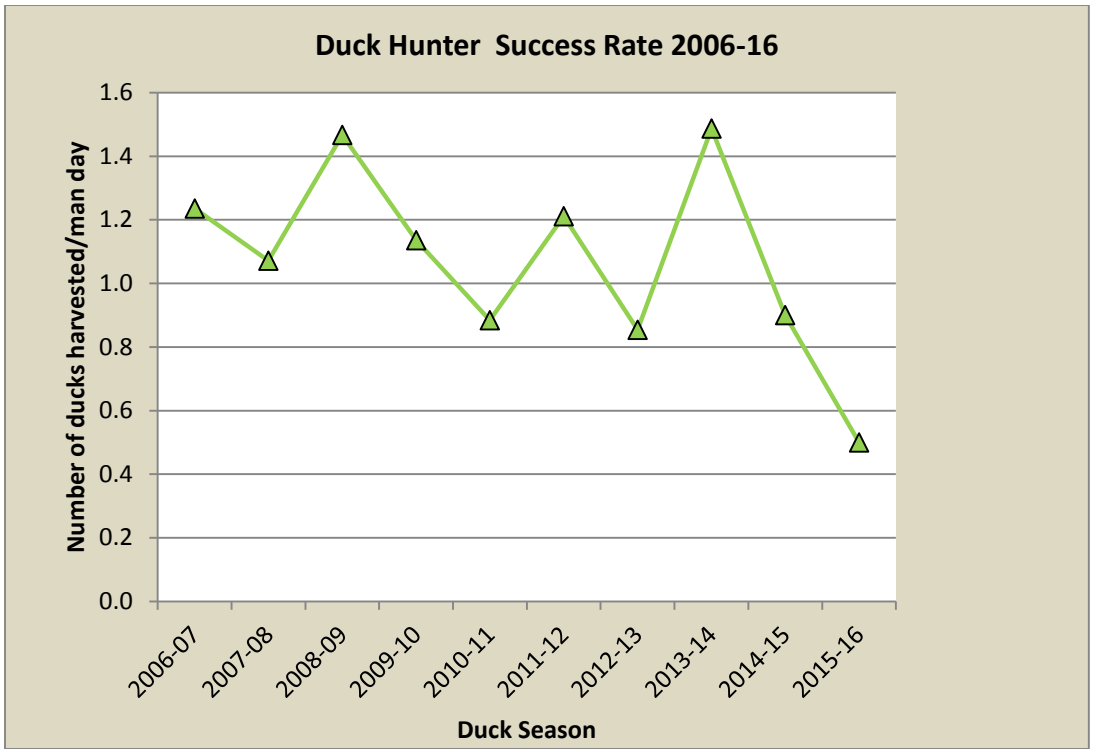


Figure 21. Duck hunter success rate (ducks harvested/man-day) on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida, 2006 - 2016.

Wood Duck Nest Boxes

Efforts to facilitate local breeding populations of wood ducks continued on the Carter Tract, with maintenance and monitoring efforts of 50 nest boxes that were erected in winter 2005. Boxes are checked twice during the breeding season (March – July) to determine occupancy and nest fate, and yearly winter checks allow boxes to be cleaned and repaired as needed. Figure 22 shows the current location of nest boxes on Carter Tract.

Figure 22. Current wood duck box locations across the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida. Three boxes (purple dots) were moved from Pine Log Creek to Dykes Mill Pond in January, 2015.

Twenty seven wood duck boxes produced clutches during the 2016 nesting season. Measures of reproductive success including average number eggs/clutch, total number of productive nests, overall nesting success, total ducklings, and estimated ducklings/clutch were calculated; Table 6 presents these data relative to previous years. The 2016 nesting season saw

78% nesting success, with 21 clutches producing an estimated 158 ducklings. Three nests were still active during the summer check and therefore were not included in Table 6. Wood ducks on Carter Tract continue to show improved nesting success as the consistent water levels of 2015 remained relatively steady through much of the 2016 breeding season. Hopefully, due to the philopatric nature of wood ducks (Hepp et al. 1987) box use will continue to increase on Carter Tract. Detailed data on number of nests, percent nest success, average clutch size, and estimated ducklings produced/clutch for each water body by year is available in Appendix V.

Table 6. Reproductive success measurements of wood ducks from 2008 - 2016 on Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

Measurement	2008	2009	2010	2011	2012	2013	2014	2015	2016
total number clutches	5	21	29	26	22	23	16	21	28
average number eggs/clutch	7.8	8.1	7.8	7.4	8.4	6.4	4.7	6.9	7.7
number productive nests	2	12	14	16	20	17	4	11	21
nesting success	40%	57%	48%	62%	91%	74%	25%	52%	78%
total estimated ducklings	25	64	79	88	109	85	14	60	158
estimated ducklings/clutch	4.2	2.7	2.7	3.4	5.0	3.7	0.9	2.9	5.6

*Nests considered productive if ≥ one membrane found following spring nesting season
†Nesting success measured as number of productive nests/total number of clutches

Avifauna

The Carter Tract supports a mosaic of unique habitat types that tend to harbor a diversity of bird species. As such, multiple survey types designed to document this diversity are conducted annually. For example, surveys of Little Deep Edge Pond and Dykes Mill Pond document use as wading bird colonies. Passerine point counts note species change over time in relation to habitat restoration and bluebird boxes provide an index of the success of secondary cavity-nesting songbirds. Kestrel boxes are used to determine possible residency status of the southeastern American kestrel (*Falco sparverius paulus*). The Bachman's sparrow (*Peucaea aestivalis*), identified as a species of greatest conservation need by FWC (FWC 2012), was first observed on Carter Tract in 2015 and is monitored through spring playback surveys. Gamebird populations are monitored using summer whistle counts for northern bobwhite and mourning doves (*Zenaida macroura*) are banded each summer as part of a national banding program.

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. Little Deep Edge Pond on the Carter Tract has supported a wading bird colony each summer since surveys began in 2007 and a new colony was found on Dykes Mill Pond in 2015. 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. Egrets and herons belong to the family Ardeidae, members of which are locally affected by wetland drainage resulting from urbanization and agricultural expansion. In Florida specifically, loss of suitable foraging and breeding habitat, native and exotic predators, and habitat are the key threats to Florida's wading birds (FWC 2013). Alteration of habitat remains the greatest threat to most Ardeids today, highlighting the importance of the conservation of unspoiled wetland habitat such as that found on the Carter Tract.

Wading bird surveys are conducted annually from April – July on the Carter Tract. Adult birds and nest contents are observed at a distance using binoculars and a spotting scope to avoid disturbing the nests. Nesting areas had been approached in previous years, but we feel that the potential risk of eggs or nestlings falling out of the nests outweighs counting every egg. Checks are completed every three weeks, during which time, nestlings get large enough to accurately be counted using two observers. Nest locations are drawn on a map to follow the same nest throughout the breeding season.

At the Little Deep Edge colony, 7 great egret nests produced 6 chicks. Thirteen little blue heron nests produced fifteen chicks. Fifty-one cattle egret nests produced one hundred and twelve chicks. One anhinga nest produced zero chicks. No tricolored heron nests were observed, however three juveniles were observed at the rookery during the last check. This is first time tri-colored herons have been documented at this rookery since 2011, although we cannot confirm nesting at this site. One snowy egret nest produced zero chicks. Figure 23 illustrates adult bird use and chick production of wading birds at Little Deep Edge Pond from 2008-16. Cattle egret and little blue heron both increased in nests and chicks produced, with cattle egrets producing more than double the number of chicks from 2015. A detailed summary

of species observed from 2008-2016 using the Little Deep Edge Pond wading bird colony can be found in Appendix VI.

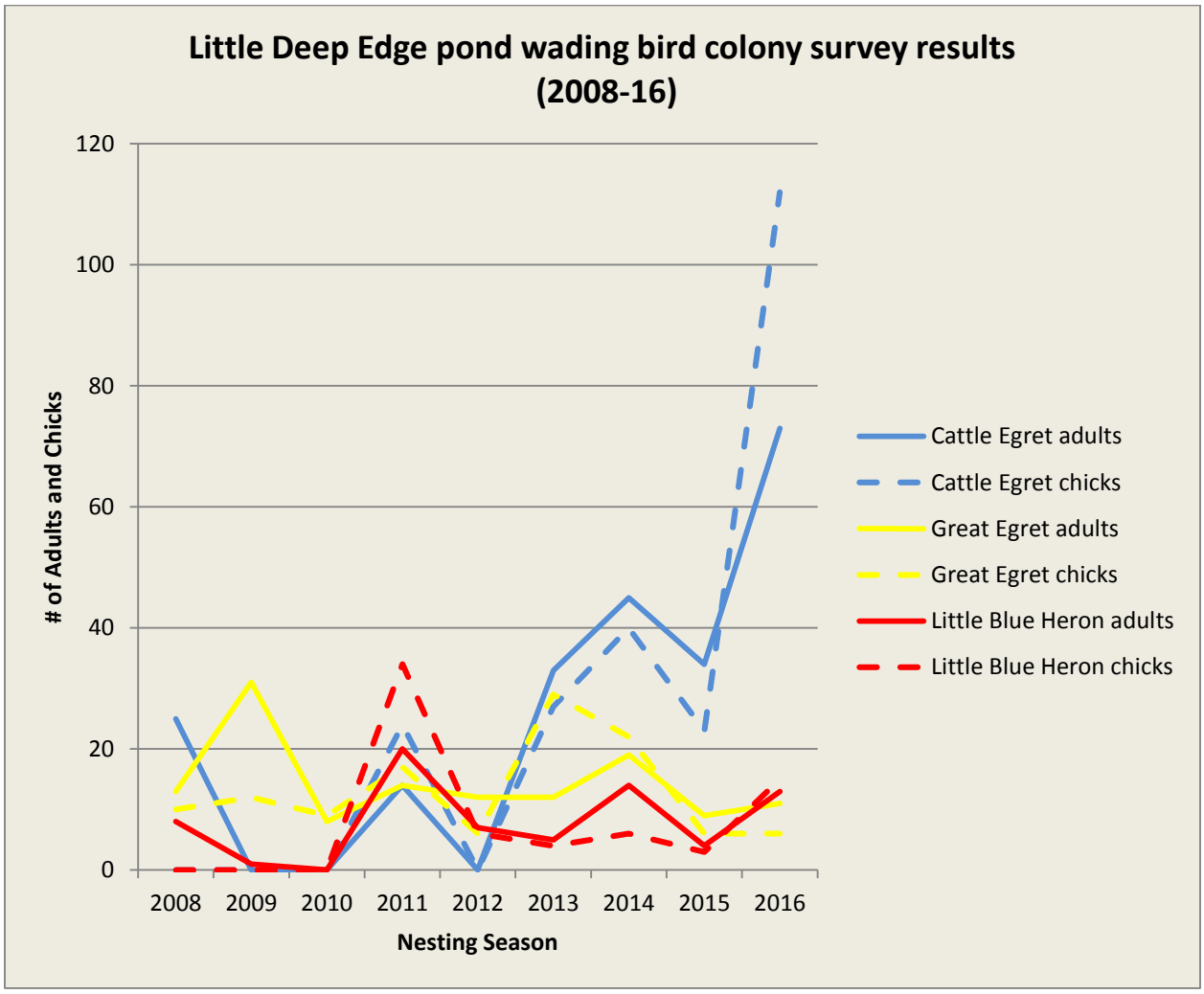


Figure 23. Adult wading birds and chicks observed on Little Deep Edge wading bird colony from 2008 - 2015, Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

The Dykes Mill pond colony was first documented in January 2015 while out scouting for potential wood duck box nest sites. During the 2016 breeding season, 13 great blue heron nests produced 13 chicks and 2 anhinga nests produced 6 chicks. This colony is on the southern edge of a cypress dome in the western portion of Dykes Mill Pond (Figure 24). FWC will continue to monitor this colony annually to track nesting success and species composition.

Figure 24. Wading bird colony along Dykes Mill Pond discovered in January of 2015. Red line denotes great blue heron and anhinga colony, Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

Passerines

Breeding bird point count surveys are conducted on the Carter Tract annually. Point counts document bird species presence and can be used to calculate relative abundance among habitat types (Bibby et al. 1992). Point count surveys are most effective during the breeding season when calling activity is at its peak (Hamel et al. 1996). Six points (points 9 – 14) were added before the 2015 survey season in an effort to survey more of the habitat on Carter Tract. Point count locations are distributed among the different habitat types as follows: sandhill habitat (Points 2, 6, 7 and 14), wetland/wading bird colony (Point 1 and 13), lake edge (Point 8 and 12), wet prairie (Point 4 and 11), mixed-hardwood forest (Point 3 and 10), and early successional grassland habitat (Point 5 and 9; Figure 25). Except for Points 3 and 10, all locations have undergone significant habitat enhancement and restoration efforts.

Figure 25. Location of point count surveys conducted May and June 2016 on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

Point counts were conducted in May and June, 2016. Protocol closely followed procedures outlined in Hamel et al. (1996). Instead of conducting four surveys in consecutive days as in years past, we conducted three surveys spread out every other week. This allowed us to account for changes in species' composition throughout the breeding season versus the snapshot approach of years past and have a more accurate representation of the avian population on Carter Tract. Surveys were conducted in the early morning, when bird activity is typically highest (Hostetler and Martin 2001). Counts began at dawn and ended by 0830. The order in which each point count location was surveyed was alternated among the three survey days. This was

done to ensure that counts were conducted in early-, mid-, and late-morning periods for each location, thus accounting for any bias from birds potentially calling more frequently at certain hours during the count period (Hostetler and Martin 2001). Following arrival at each count location, observers refrained from movement or sound for two minutes prior to the start of the count. Count duration was ten minutes, during which time all birds seen and/or heard within a 75-meter radius were recorded. Birds observed/heard outside of the 75-meter plot were also noted.

Point count results were similar to those documented in 2015 with wet prairie habitat having the greatest increase in species richness, and mixed hardwood having the greatest decrease (Table 7). Slight variations in richness will occur year to year depending on the weather conditions and other factors that affect the singing rate of passerines. Species found at each point where indicative of the habitat type. Northern bobwhite (*Colinus virginianus*), eastern bluebird (*Sialis sialis*), and red-headed woodpeckers (*Melanerpes erythrocephalus*) were found in the sandhill habitat type, herons, egrets, and red-winged blackbirds (*Agelaius phoeniceus*) were commonly found in the wetland rookery habitat. The lake edge habitat type harbored species such as wood ducks, great crested flycatchers (*Myiarchus crinitus*), and yellow-throated warblers (*Setophaga dominica*). Species found in the clearcut, mixed hardwood, and wet prairie were all indicative of that particular habitat type. Over the long term, this database will provide a platform for how the habitat management occurring on Carter Tract has shaped the avian diversity on the property.

Table 7. Species richness and most common species per habitat types at breeding bird point count stations in 2016 on Fitzhugh Carter Tract, Washington County, FL.

Habitat Type	# of Species within 75m	Most Common Species
Clearcut	13	Northern cardinal, eastern meadowlark, eastern towhee
Sandhill	27	Northern mockingbird, eastern towhee, eastern bluebird
Lake edge	25	Cedar waxwing, great crested flycatcher, yellow-throated warbler
Wetland rookery	24	Cattle egret, red-winged blackbird, little blue heron
Mixed hardwood	12	Northern parula, white-eyed vireo, Carolina chickadee
Wet prairie	25	Wood duck, great crested flycatcher, red-winged blackbird

Landscapes comprised of a mosaic of habitat types yield higher species diversity than landscapes dominated by a single habitat type. The Carter Tract is a unique combination of

freshwater ponds, marshland, uplands, and transitional hardwood hammocks. The inherent habitat diversity of the Carter Tract, combined with the intensive habitat restoration efforts of the NWFWMD, have resulted in a property representing multiple habitat types, each of which contribute to the overall high diversity of avian life which utilizes the property. As each habitat type continues to be maintained within the recommended fire return interval (the main source of habitat management needed going forward on Carter Tract), and the longleaf pine continue to mature, we expect this high diversity of avian species to remain at Carter Tract. To date, 128 species of bird have been documented as occurring on the Carter Tract (Appendix VII). Mississippi kite (*Ictinia mississippiensis*) was the newest species observed on the tract in 2016.

Point count data over the last nine years was used to calculate bird species diversity within the six habitat types represented during annual surveys. Simply counting the number of species observed during a given survey yields species richness. Species richness does not equate to species diversity because it does not take into account species evenness (how many individuals of each species are counted). The Shannon-Weiner Diversity Index is one of the most common methods of incorporating species evenness as well as richness into a comparable diversity measure (Zar 2010). The mathematical formula for calculating the Shannon-Weiner Diversity Index (*H'*) is below, where p_i is the proportion of individuals belonging to the *i*th species in the dataset of interest, and *k* is the number of species (Shannon 1948).

$$H = -\sum_{i=1}^{k} p_i \log p_i$$

Microsoft Excel® was used to calculate *H'* from 2008 – 2016 for the six habitat types sampled to determine which habitat types harbor the highest diversity and how they may have changed over the years in response to habitat restoration improvements. The results are graphically depicted in Figure 26. Of the six habitat types surveyed during the spring 2016 point counts, the lake edge, sandhill, and wet prairie point counts yielded the highest species diversity. The sandhill point counts have supported the highest diversity of bird species in seven of the nine years point count surveys have been completed. The six point counts that were added prior to the 2015 survey increased the point counts for each habitat type and provided a more complete survey of the habitat types on Carter Tract. All habitat types saw an increase in species diversity except for wetland rookery, mixed hardwood, and clearcut sites. The large flocks of nesting

wading birds (cattle and great egrets, great blue herons) led to an unevenness in the relation to the number of individuals of other species observed decreased the overall species diversity. We suspect that this will continue to be the case as long as wading bird rookeries remain near the wetland point counts.

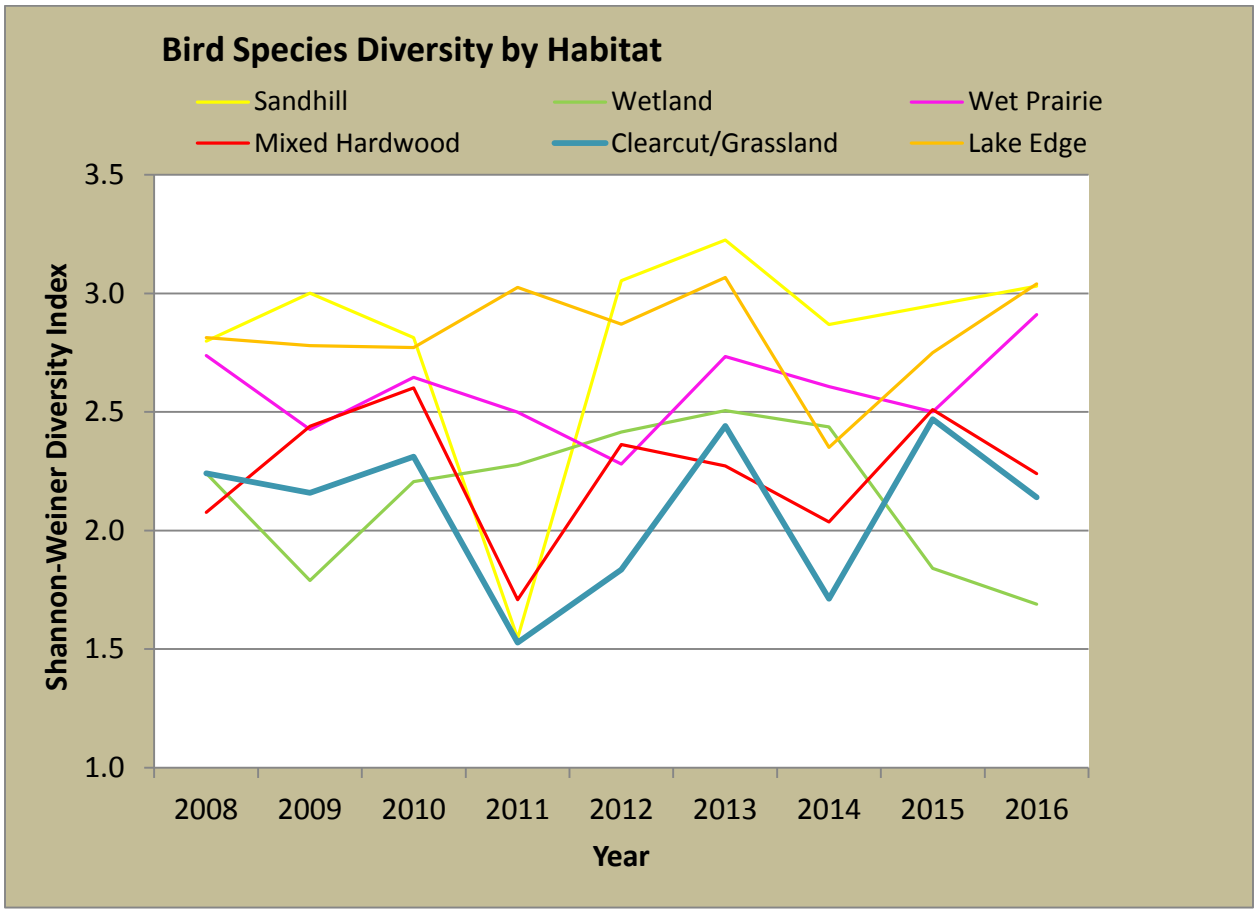


Figure 26. Shannon Wiener Diversity Index (*H'*) compared from 2008 - 2016 among habitat types at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

Bluebird Boxes

Worldwide bird species diversity continues to decline each year due to habitat fragmentation, development, and degradation. For secondary cavity nesters like the eastern bluebird, this regression has typically been attributed to a decline in available nesting cavities. Further, changing agricultural and silvicultural practices have led to snag removal and replacement of wood fence posts by treated wood or steel posts (Conner 1974). Since bluebirds are secondary cavity nesters, they rely on primary excavators (i.e. woodpeckers) and natural forces to create suitable cavities for nesting. Competition for cavities has also increased due to growing

populations of introduced species such as the European starling (*Sturnus vulgaris*) and house sparrow (*Passer domesticus*). When natural cavities become scarce, nest boxes become important supplementary nesting sites.

During January 2011, efforts were launched to monitor local breeding populations of eastern bluebirds on the Carter Tract. Eighteen nest boxes were fastened to existing fence or sign posts roughly 3 ½ – 5 feet off the ground and were oriented on a south/southeast bearing. Boxes were installed throughout the property in locations with open grassy habitat and were located a minimum of 100 yards from the next closest box. Several boxes have been moved due to high vulnerability for predation and lack of use. Bluebird nest boxes were checked every 7-10 days throughout the breeding season (April – July) to determine occupancy and nest fate. Box construction, installation, and monitoring followed protocol outlined by the U.S. Geologic Survey (USGS) online resources (2006).

Eastern bluebirds, tufted titmice, and great crested flycatchers utilized 13 out of 18 nest boxes during the 2016 spring nesting season. Bluebirds constructed 25 nests, laid an average of 4.1 eggs/clutch, and fledged 15 chicks (Table 8). Tufted titmice built three nests, laid ten eggs, and fledged zero chicks. Great crested flycatchers built one nest with two eggs that fledged zero chicks. Egg success rate (number of fledged chicks/total number of eggs produced) was 14.6%, 0%, and 0% for bluebirds, titmice, and great crested flycatchers, respectively. Bluebird production dramatically decreased during the 2015 nesting season, most of which were the result of depredation. Eighteen bluebird nests appeared to have been predated during the 2016 nesting season, an increase from the 10 nests predated in 2015. Although this number is within the 55 – 84% range documented in Radunzel et al. (1997), we feel that the boxes in their current locations leave the bluebirds too vulnerable.

Predator guards were not used so boxes could be installed directly on existing fence/sign posts, which is a common method of mounting/installation. Brawn (1985, 1987) found similar predation rates between unprotected western bluebird (*Sialia mexicana*) boxes and natural cavities. Moving boxes in the past has helped to lower predation rates, but seemed to only last for a year. Due to the high predation rate and the amount of natural nesting habitat (snags), we feel like we have three possible directions to go with the bluebird nest box monitoring program: (1) continue to move boxes around each year; (2) place boxes on poles with predator guards; or (3) abandon the bluebird nest box monitoring program.

Table 8. Bluebird box occupancy, egg success, and nest success during spring 2011 - 2016 on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

Year	Total nests	Total eggs	Avg. clutch size	Nests with young	Total chicks	Fledged chicks	Egg success (fledged chicks/# eggs)	Nest success (nests with young/total nests)
2011	18	78	4.3	8	22	15	19.2%	44.4%
2012	24	106	4.4	15	59	48	45.3%	62.5%
2013	24	100	4.2	17	59	51	51.0%	62.5%
2014	28	96	3.4	7	27	22	22.9%	25.0%
2015	25	101	4	18	69	58	57.4%	60.0%
2016	25	103	4.1	13	40	5	14.6%	20.0%

Bachman's sparrow playback survey

Bachman's sparrows 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 were 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 to areas with diverse, healthy ground cover conditions maintained by frequent prescribed fire. This survey will allow FWC to determine the presence and distribution of Bachman's sparrow on Carter Tract, and track it 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 27). Surveys were conducted in May 2016 and began at sunrise at ended by 0900. Surveys could only be conducted during acceptable weather conditions and three rounds of surveys were completed. 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 total of a three minute sampling period.

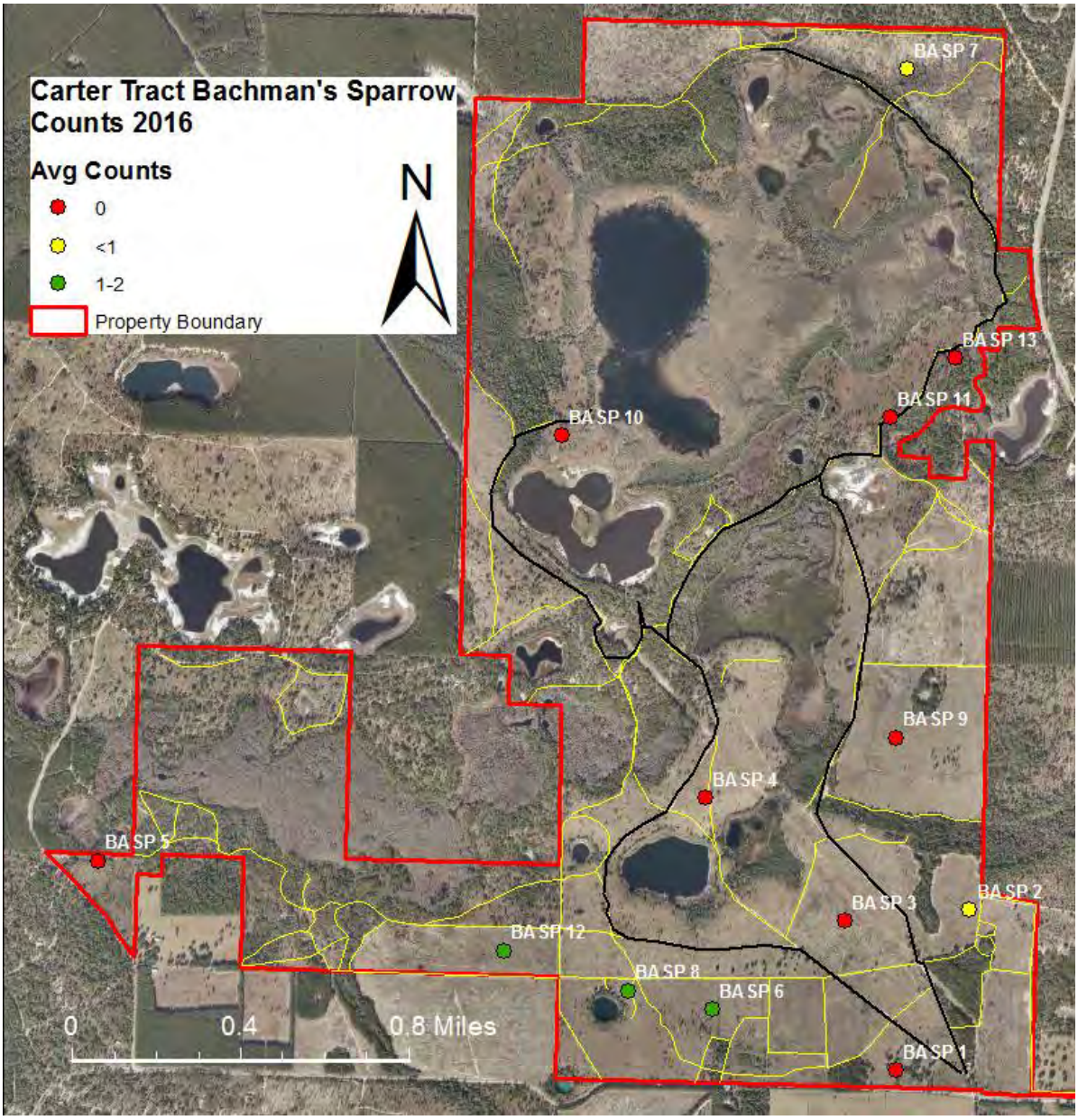


Figure 27. Bachman's sparrow survey sites on Fitzhugh Carter Tract WMA, Washington County, Florida.

Bachman's sparrows were documented at five of the thirteen survey sites (Figure 27). The majority of the birds counted were clustered near the southern portion of Carter Tract, with stations 6, 8, and 12 recording multiple Bachman's sparrow at each point. These stations are all characterized as sandhill habitat, with a dense wiregrass groundcover and longleaf saplings dominating the landscape. In 2015, only one Bachman's sparrow was anecdotally observed on Carter Tract, but the 2016 surveys revealed more sparrows using the upland habitat of Carter

Tract. 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.

Kestrel Boxes

The southeastern American kestrel (*Falco sparverius paulus*) is a subspecies of the American kestrel 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 is 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 (Hipes et al. 2001; U.S. Department of Agriculture 1999).

FWC staff consistently observes 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 (USDA) (1999). Figure 28 displays the current location of the eight kestrel nest boxes.

Figure 28. Location of kestrel nest boxes at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

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

predation. Nest box monitoring followed protocol outlined by FWC's Fish and Wildlife Research Institute.

No kestrel nests were recorded during spring 2016. Boxes 76-79 were used during the winter months by American kestrels (*Falco sparverius*), but were abandoned prior to the start of breeding season (Figure 28). Non-target species documented using kestrel boxes included great-crested flycatchers and possibly a red-headed woodpecker. A similar kestrel box project on Blackwater WMA documented breeding kestrels one year following box installation, and the 2014 nesting season resulted in southeastern kestrels nesting in seven out of 20 boxes (Barbara Almario, pers. comm.). Because Blackwater WMA is located just 75 miles west of the Carter Tract, we feel there is a good chance southeastern kestrels will utilize nest boxes in the future. Therefore, kestrel boxes will continue to be monitored again during the 2017 nesting season (February – June).

Summer Whistle Counts

Conducting summer whistle counts for the northern bobwhite is a common method of obtaining a population index for this popular game species. It has been shown that there is a strong positive relationship between the number of bobwhites whistling in the summer and the number of coveys established the following fall (Rosene 1984; Terhune et al. 2009). We therefore chose to conduct summer whistle counts for northern bobwhites in order to analyze this data and subsequent harvest success of bobwhites on the Carter Tract.

Whistle count surveys were conducted from June 7 - 22, 2016. Most surveys fell within the June 15-July 10 calling peak suggested by Rosene (1984) and 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.

The trend in mean number of bobwhites heard whistling per station on the Carter Tract for the past five years has tended to fluctuate (Figure 29). With a slight dip the past couple years. Still the utility of this index is population trends over time and our aim is to compare/contrast this with the frequented burn regime in the uplands.

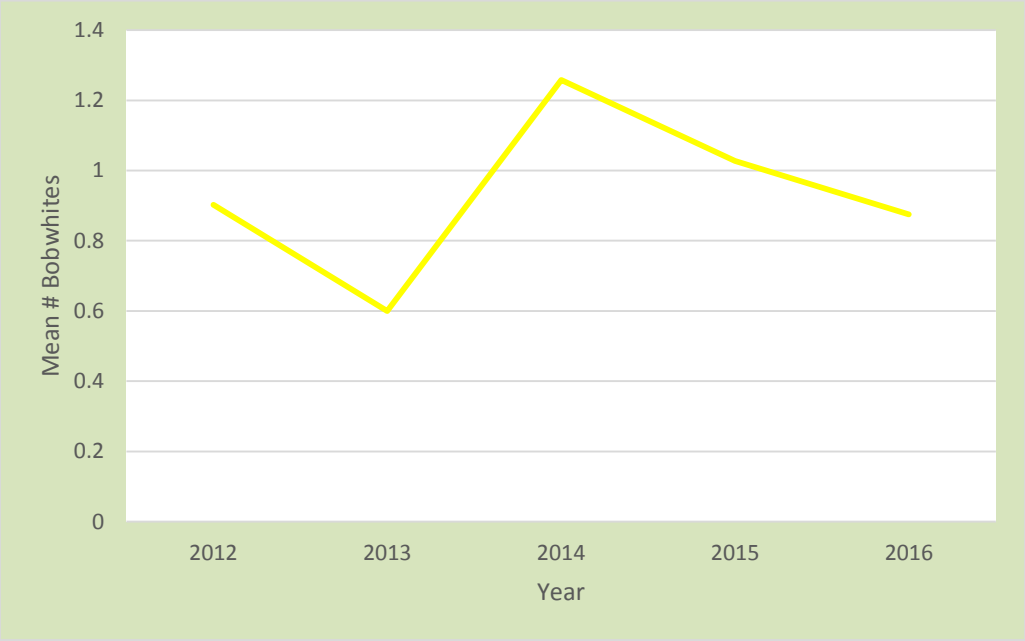


Figure 29. Trend in mean number of northern bobwhites heard whistling per station on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida, 2012-2016.

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 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 6 replicates on the Carter Tract should be adequate for now.

We are encouraged to see more widespread use of the entire Carter Tract property by northern bobwhites and feel that maintaining an aggressive burning regime is the most important management activity NWFWMD can do to continue to improve the northern bobwhite population on the Carter Tract. Simply put, to manage for northern bobwhite 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.

Mourning Dove Banding

As part of a national long-term mourning dove banding program, FWC's Small Game Management Program solicited WMAs throughout the state to participate in this banding work. 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 at 1-800-327-BAND, or online at www.pwrc.usgs.gov (select "Birds", then "Bird Banding Lab").

Two sites on the Carter Tract were prebaited with white millet seed in June 2015, prior to trapping. Trapping was conducted beginning July 1, 2015 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 (Figure 30). Fifteen mourning doves (9 HY; 6 AHY) were successfully banded during the 2015 capture/banding effort, and there were two recaptures of birds banded in previous years (Table 9).

Figure 30. Mourning doves were trapped (left), banded with U.S. Fish and Wildlife identification bands, and age, sex, and molt sequence (right) were recorded in July 2013 on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida (arrow denotes the emergence of new primary feather #06 following on a hatch year mounring dove).

Table 9. Dove banding results from 2007 - 2015 on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

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

Herpetofauna

FWC staff employ several methods for surveying and monitoring the herpetofauna population at the Carter Tract. Methods used include: box-style snake traps, pitfall traps, minnow traps, frog tubes, drift fences, 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 VIII). 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. 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 are beneficial to a host of commensalistic species that utilize them (both active and abandoned) for shelter and foraging (Jackson and Milstrey 1989). Specifically, the federally Threatened eastern indigo snake (*Drymarchon kolpobasileus*), in addition to the gopher frog (*Lithobates capito*) and Florida pine snake, both imperiled species, are known to use gopher tortoise burrows (Moler 1992; Ashton and Ashton 2008). As in previous years, a detailed report on the *Annual Survey and Monitoring of the Gopher Tortoise on the Carter Tract* will be submitted separate from this comprehensive annual report.

Snake Traps

Because of their size, large terrestrial snakes such as black racers, rat snakes, coachwhips, Florida pine snakes, and the gulf coast indigo snake (Federal Threatened) can be difficult to capture using traditional survey methods. Use of traps specifically designed to capture these large terrestrial species is the most effective method for documenting their numbers on the Carter Tract. Five spatially distinct upland sandhill habitats were chosen based on their vegetative composition and structure, as well as proximity to mesic habitats (Figure 31). Three snake traps were implemented in 2008-09, and two new traps were constructed during FY 2015-16. One north of Pine Log Creek in August 2015, and one north of the Green Ponds in February 2016. The 2015-16 surveys followed the methods outlined in McElhone (2014).

Figure 31. Location of upland snake traps used for sampling herpetofauna on the Fitzhugh Carter Tract of Econfina Creek WMA, Washinton County, Florida.

Across 380 trap nights, 266 individual animals representing 33 species were captured from September-November 2015 and March-April 2016 (Figure 32). Fifty-five percent of animals were captured in buckets while the remaining 45% were captured in box traps. Amphibians were the most captured taxa group with 106 captures, followed by lizards, snakes, small mammals,

and birds, with 64, 61, 32, and 3 captures, respectively. Southern black racer (*Coluber constrictor priapus*) was the most captured snake. An adult Florida pine snake (*Pituophis melanoleucas*) was captured in March at snake trap 2. This is the same trap were a juvenile and adult pine snake were captured in the spring of 2015. Also, two adult Florida pine snakes were observed on the road just north of the check station while FWC were conducting gopher tortoise surveys in May. Appendix IX details the number of individuals of each species captured in snake trap arrays.

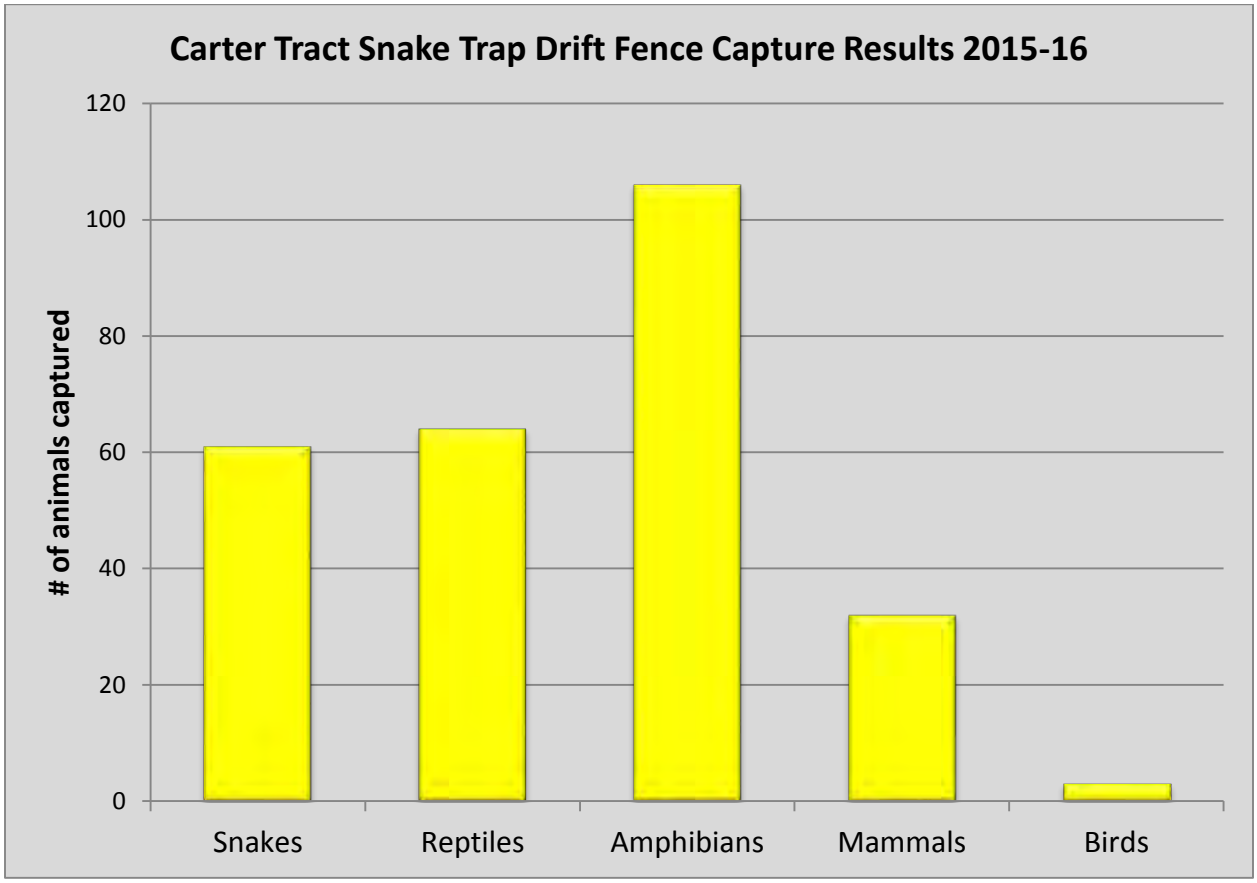


Figure 32. Snake trap capture results from September - November 2015 and March - April 2016 on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

Based on data collected to date and observed capture trends, opening traps in spring during March and April should maximize the capture of snakes emerging from winter hibernacula in search of mates. Fall trapping during September and October should capture the majority of snakes dispersing across the landscape (including YOY born during late summer) before cooler weather forces them underground for the winter. Staff will continue to deploy snake traps on

this schedule, adjusting trapping efforts as dictated by weather patterns (i.e. drought conditions, ambient temperature, etc.) and incidental snake activity observations.

ADDITIONAL ACTIVITIES

Wild Hog Management

At the request of NWFWMD, FWC staff began assisting with trapping wild hogs (*Sus scrofa*) on Carter Tract in the summer of 2014. Hogs have occasionally been documented on Carter Tract in the past (F. Robinette pers. comm.), but not until recently have they had much impact on the understory vegetation that is undergoing restoration management and impacting the mitigation bank of NWFWMD. Trapping efforts were concentrated from June through September. Public hunting opportunities run from September through April each year on Carter Tract (Appendix I). However, FWC staff utilized several breaks between hunts to attempt to trap hogs. Two corrals were built during the summer of 2015; one in the flatwoods southeast of Dry Pond, and the other in the flatwoods west of Dry Pond. NWFWMD purchased a Jager Pro™ style corral in early June, which replaced the corral west of Dry Pond. Efforts yielded a capture of 23 hogs, as well as 2 hogs harvested during hunting for a total of 25 hogs removed from Carter Tract in 2015-16.

The main point of access for hogs onto Carter Tract appears to be the wet flatwoods section west of Dry Pond where the vegetation inhibits adequate fence installation. Completing this section of fencing and repairing areas where the soil has eroded holes underneath the fence elsewhere could prove the most effective method to keep hogs from accessing the Carter Tract. Secondly, consideration for a hog-dog hunting season during the summer months may be prudent as well. Pressuring wild hogs during the growing season has the potential to keep hogs from frequenting wetlands if the hunting pressure is there, whether harvest occurs or not during that time. Trapping efforts will continue into our FY 2016-17, during breaks in the hunting season.

Bat Houses

In January 2016, FWC staff installed two bat houses, one near Garrett Pond and the other between Dry and Black Ponds (Figure 33). 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 site in two hollow cypress trees on Dry Pond no longer being used.

Figure 33. 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).

Further, because this species occurs in human habitations in Florida, they are particularly vulnerable to intentional eviction, roost destruction, vandalism, harassment, and large-scale colony destruction. Therefore attempts should be made to preserve known roost sites (Humphrey 1992).

Given the vulnerability of bat species to potential population declines through intentional eviction, roost destruction, vandalism, harassment, and large-scale colony destruction (Humphrey 1992), FWC will monitor these houses periodically throughout the year to assess their use. To date, no bats or bat sign has been documented at the houses, however, it is not uncommon for it to take up to a year for bats to find and begin using houses (F. Bibin pers. comm.).

LAW ENFORCEMENT ACTIVITIES

FWC Law Enforcement Activities
Lieutenant Warren Walsingham

Florida Fish and Wildlife Conservation Commission Officers patrol the Fitzhugh Carter Tract of the Econfina Wildlife Management Area providing policing to include wildlife, fisheries, and general law enforcement. This FY 2015-2016 officers provided approximately 125 hours of patrol directed to the Carter Tract. There were approximately 108 user contacts for the area with 4 citations and written warnings issued.

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 several complaints in reference to possession of alcohol, tree stands being abandoned after season, damage to exterior fencing, illegal entry, improper check in, fishing in an unpermitted area, and illegal use of ATV's.

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.

LITERATURE CITED

Ashton, P.S. and R.E. Ashton. 2008. The Natural History and Management of the Gopher Tortoise (*Gopherus polyphemus* Daudin). Krieger Publishing Company, Malabar, FL. 275 pp.

Bailey, M.A., J.N. Holmes, K.A. Buhlmann, and J.C. Mitchell. 2006. Habitat Management Guidelines for Amphibians and Reptiles of the Southeastern United States. Partners in Amphibian and Reptile Conservation Technical Publication HMG-2, Montgomery, AL. 88pp.

Bibby, C.J., N.D. Burgess, and D.A. Hill. 1992. Point Counts. Pp. 85-87 *In* Bird Census Techniques. Academic Press, London. 257 pp.

Brawn, J.D. 1985. Population biology, community structure, and habitat selection of birds in ponderosa pine forest habitat. Ph.D. dissertation, Flagstaff, Northern Arizona University.

Brawn, J.D. 1987. Density effects on reproduction of cavity nesters in northern Arizona. Auk 104: 783-787.

Conner, R.N. 1974. A note on eastern bluebird nesting in clearcuts. Journal of Wildlife Management 38: 934-935.

Cox, J. 2014. Standard monitoring protocol for Bachman's sparrow and brown-headed nuthatch. FWC Wildlife Habitat and Management Section, Wildlife Conservation, Prioritization and Recovery Program. Tallahassee, Florida.

Curtis, P. D., P. D. Doerr, R. M. Oates, and K. H. Pollock. 1989. Whistling-cock indices as a measure of northern bobwhite harvest in North Carolina. Proceedings of the 43rd Annual Conference Southeastern Association of Fish and Wildlife Agencies 43: 253-259.

Ellis, J. A., K P. Thomas, and P. Moore. 1972. Bobwhite whistling activity and population density on two public hunting areas in Illinois. Pp. 282-288 *In* J.A. Morrison and J.C. Lewis, eds. Proc. First Natl. Bobwhite Quail Symp,, Okla. St. Univ., Stillwater, OK. 390 pp.

Florida Fish and Wildlife Conservation Commission. 2012. Florida wildlife legacy initiative: Florida's state wildlife action plan. Tallahassee, Florida.

Florida Fish and Wildlife Conservation Commission. 2013. A species action plan for six imperiled wading birds: little blue heron, reddish egret, roseate spoonbill, snowy egret, tricolored heron, and white ibis. Tallahassee, Florida.

Garrison, E., R. Kiltie, L. Perrin, and G. Mohr. 2009. White-tailed Deer Breeding Chronology Project Preliminary Summary Report. Florida Fish and Wildlife Conservation Commission.

Hamel, P. B., W.P. Smith, D.J. Twedt, J. R. Woehr, E. Morris, R. B. Hamilton, and R. J. Cooper. 1996. A Land Manager's Guide to Point Counts of Birds of the Southeast. USDA Forest Service General Technical Report SO-I 20. 45 pp.

Hepp, G. R., R. T. Hoppe, and R. A. Kennamer. 1987. Population parameters and philopatry of breeding female Wood Ducks. J. Wildl. Manage. 51:401-404.

Hipes, D., D. R. Jackson, K. NeSmith, D. Printiss, and K. Brandt. 2001. Southeastern American Kestrel (*Falco sparverius paulus*) *In* Field Guide to the Rare Animals of Florida. Florida Natural Areas Inventory. 310 pp.

Hoffman, M. L. and M.W. Collopy. 1988. Historical status of the American Kestrel (*Falco sparverius paulus*) in Florida. Wilson Bulletin 100: 91-107.

Hostetler, M. E. and M. B. Main. 2001. Florida Monitoring Program: Point Count Method to Survey Birds. Document WEC144, Institute of Food and Agricultural Sciences, Florida Cooperative Extension Service, University of Florida. 9pp.

Humphrey, S. R. 1992. Rare and Endangered Biota of Florida, Volume I, Mammals. University Press Florida, Gainesville. 392 pp.

Hurst, G.A. 1992. Foods and Feeding. Pages 66-83 *in* The Wild Turkey: Biology and Management (Ed. J.G. Dickson). Stackpole Books, Mechanicsburg, PA. 463 pp.

Jackson, D. and E.G. Milstrey 1989. The fauna of gopher tortoise burrows. *In* J. Diemer, D. Jackson, L. Landers, J. Layne, and D. Wood (eds.), Proceedings of the Gopher Tortoise Relocation Symposium, pp. 86-98. Florida Game and Freshwater Fish Commission Nongame Wildlife Program, Technical Report No 5, Tallahassee. 109 pp.

Jacobsen, H.A., J.C. Kroll, R.W. Browning, B.H. Koerth, and M.H. Conway. 1997. Infrared-triggered cameras for censusing white-tailed deer. Wildlife Society Bulletin 25: 547-556.

McElhone, P. 2014. Sandhill Lakes Mitigation Bank (Fitzhugh Carter Tract) of Econfina Creek Wildlife Management Area Annual Report 2013-2014. 104 pp.

Moler, P.E. 1992. Rare and Endangered Biota of Florida, Volume III, Amphibians and Reptiles. University Press Florida, Gainesville. 291 pp.

Quality Deer Management Association [QDMA]. 2012. How to run a trail-camera survey. QDMA homepage. <http://www.qdma.com>. Accessed 1 Aug 2016.

Radunzel, L. A., D. M. Muschitz, W. M. Bauldry, and P. Arcese. 1997. A long-term study of the breeding success of eastern bluebirds by year and cavity type. Journal of Field Ornithology. 68: 7-18.

Robinette, C. F. 1991. The influence of hunting or mortality and movements of Northern bobwhite quail in the North Carolina Sandhills. M. S. Thesis, North Carolina State University, Raleigh, NC. 107 pp.

Rodgers, Jr., J.A., H.W. Kale II, and H.T. Smith. 1996. Rare and Endangered Biota of Florida, Volume V. Birds. University Press of Florida. 688 pp.

Rosene, W. 1984. The Bobwhite Quail: Its Life and Management. The Sun Press. Hartwell, Georgia. 418 pp.

Shannon, C. E. 1948. A mathematical theory of communication. The Bell System Technical Journal, Vol. 27: 379-423 and 623-656.

Snyder, W. D. 1978. The bobwhite in eastern Colorado. Colo. Div. of Wildl. Tech. Publ. 32. 88 pp.

Terhune, T. M., Hamrick R. G., Sisson D. C., Stribling H. L. 2009. Summer male call index relative to nesting chronology and autumn density of the northern bobwhite. Pages 54 - 64 in Cederbaum SB, Faircloth BC, Terhune TM, Thompson JJ, Carroll JP, eds. Gamebird 2006: Quail VI and Perdix XII. 31 May - 4 June 2006. Warnell School of Forestry and Natural Resources, Athens, GA, USA.

Thomas, L., Laake, J.L., Strindberg, S., Marques, F.F.C., Buckland, S.T., Borchers, D.L., Anderson, D.R., Burnham, K.P., Hedley, S.L., Pollard, J.H., Bishop, J.R.B. and Marques, T.A. 2006. Distance 5.0. Release 2. Research Unit for Wildlife Population Assessment, University of St. Andrews, UK.

U.S. Department of Agriculture. 1999. American Kestrel (*Falco sparverius*): Fish and Wildlife Habitat Management Leaflet Number 3. Natural Resources Conservation Service – Wildlife Habitat Management Institute. 12pp.

Williams, Jr., L. E. and D. H. Austin. 1988. Studies of the Wild Turkey in Florida. Technical Bulletin No. 10, Florida Game and Freshwater Fish Commission, Division of Wildlife. University of Florida Press. Gainesville, Florida. 232 pp.

Zar, J. H. 2010. Biostatistical Analysis (Fifth Ed.). Pearson Prentice Hall. Upper Saddle River, New Jersey. 944 pp.

Appendix I. Fitzhugh Carter Tract of Econfina Creek WMA Regulations Summary and Area Map, July 1, 2015 – June 30, 2016.

2015-2016 Hunting Season

Fitzhugh Carter Tract

Econfina Creek

Wildlife Management Area

Regulations Summary and Area Map
July 1, 2015 - June 30, 2016

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 from any Commission office, county tax collector and 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, at MyFWC.com/license or by telephone at 888-486-8356 (hunting) or 888-347-4356 (fishing). 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 the Commission's Recreational License Issuance Services (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 the Commission's 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 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. A non-hunting supervisor is allowed to accompany a youth or mentor license holder during any hunt.

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. Species legal to hunt are listed under each season.
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, without written authorization of 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 for the take of wild hog.
17. Littering is prohibited.
18. It is unlawful to set fire to any forest, grass or woodlands.
19. A Fish and Wildlife Conservation Commission 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 recreational 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 on any part of any wildlife management area that has been 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. Air guns may be used to hunt gray squirrel and rabbits during any season when these species are legal to hunt, except archery and muzzleloading gun.
5. Children under the age of 16 hunting with a firearm or air gun must be in the presence of a supervising adult.
6. No person shall discharge a firearm or have a loaded firearm in hand while under the influence of alcohol or drugs.
7. For hunting non-migratory game, only shotguns, rifles, pistols, bows, crossbows or falconry may be used.
8. 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.
9. 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.
10. 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. 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, quail and rabbit - Daily limit 12, possession limit 24 for each.
5. Raccoon, opossum, armadillo, beaver, coyote, skunk and nutria - No bag limits.
6. Migratory birds - See Migratory Bird Hunting Regulations pamphlet.

Archery Season:
October **24-30** and October **31** through November **8**.

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 when 1 or more species are legal to hunt (see Migratory Bird section and the current Migratory Bird Hunting Regulations pamphlet).

General Gun Season:
November **26-29**, January **23-26** and January **27-31**.

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 **5-7**.

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 when 1 or more species are legal to hunt (see Migratory Bird section and the current Migratory Bird Hunting Regulations pamphlet).

Small Game Season:
December **12-27**.

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 **12-13**.
Spring Turkey: March **19-21**, April **1-3** and **15-17**.
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 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 Migratory Bird Hunting Regulations pamphlet.
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 1 or more 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.

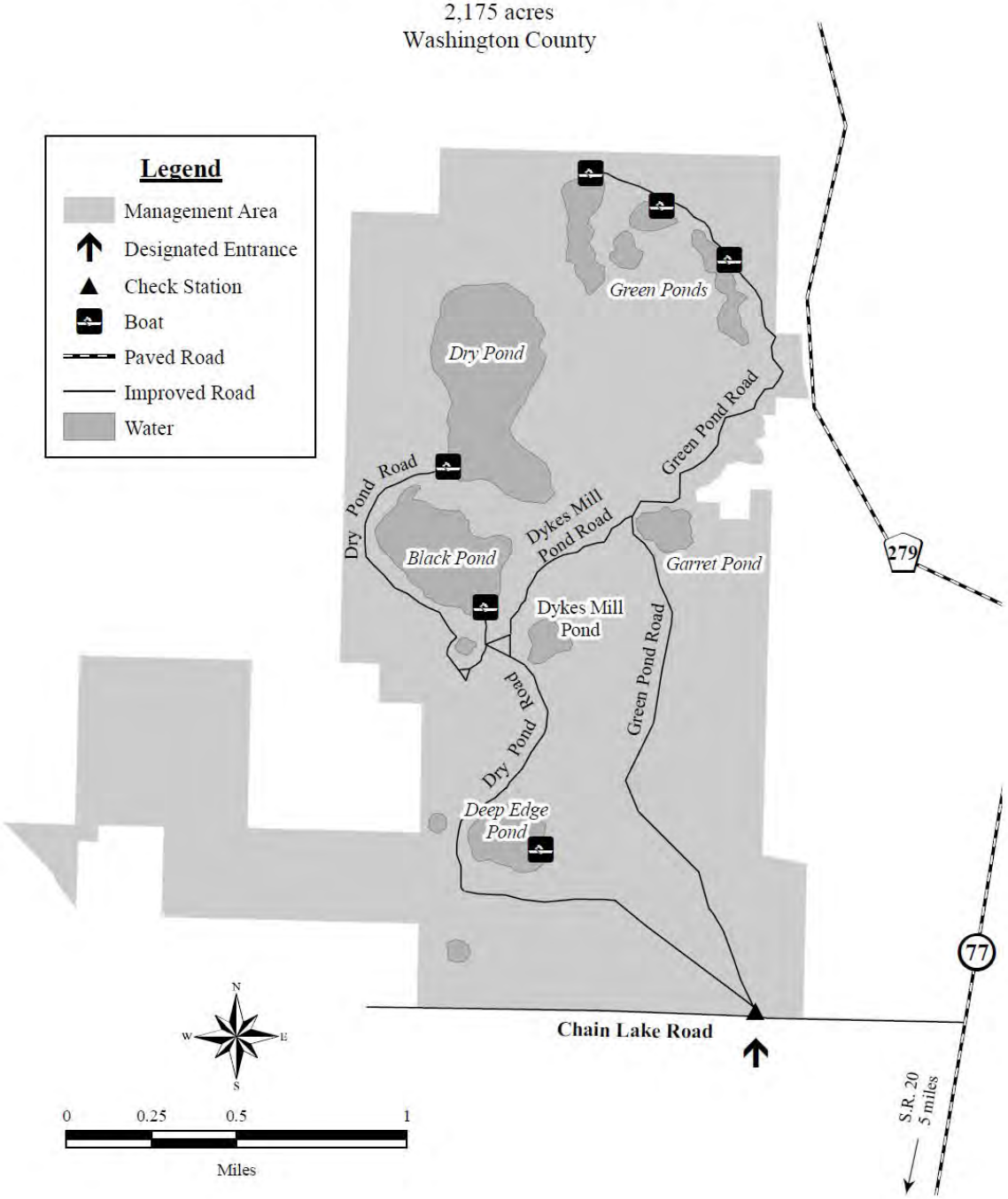
The U.S. Department of the Interior prohibits discrimination on the basis of race, color, national origin, age, sex or disability. If you believe that you have been discriminated against in any program, activity or facility as described above, or if you desire further information, please write to: The 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. 2015-2016 Annual Work Plan and Accomplishment Report for the Fitzhugh Carter Tract of Econfina Creek Wildlife Management Area.

FY 2015-16
Project 7281 - NW FLORIDA WATER MANAGEMENT DISTRICT LANDS

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
Species 9100 - All freshwater fish							
Activity - 221	Animal surveys						
	1.74	$392.75	$18.20	$79.80	$490.75	0	Conducted sampling of fish populations in area ponds via electroshocking. NFA*.
Activity - 250	Monitoring and assessments						
	9.46	$2,265.65	$69.17	$0.00	$2,334.82	0	Monitored area fish population and developed a comprehensive sportfish population assessment. NFA*.
Activity - 342	Public use administration (non-hunting)						
	4.44	$1,269.13	$1,983.36	$20,178.43	$23,430.92	0	Administered public fishing program via check station. Salary for OPS fishing check station operators included here. NFA*.
Species 9100 Total	15.64	$3,927.53	$2,070.73	$20,258.23	$26,256.49		
Species 9200 - All wildlife							
Activity - 100	Administration						
	0.00	$0.00	$0.00	$306.93	$306.93	0	General clerical and administrative support to Wildlife Management Area staff
Activity - 101	Project inspection						
	7.04	$2,260.76	$103.90	$987.39	$3,352.05	0	Inspected area projects and activities. Field orientation of land

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
							boundaries, features and habitats.
Activity - 103	Meetings						
	7.21	$1,768.59	$79.16	$499.91	$2,347.66	0	Attended landowner, cooperator, scientific and agency meetings. Attended training workshops and seminars.
Activity - 128	New Vehicle and Equipment Purchases						
	0.00	$0.00	$0.00	$8,077.60	$8,077.60	0	Purchased ATV and accessories for wildlife management activities.
Activity - 140	Report writing/editing/manuscript preparation						
	14.09	$3,343.54	$102.86	$451.39	$3,897.79	0	Prepared and reviewed annual wildlife reports and completed annual accomplishment report.
Activity - 150	Personnel management						
	6.80	$1,753.87	$64.56	$588.82	$2,407.25	0	Supervised volunteer activities. Recruited, hired, and supervised OPS personnel. Attended training workshops and seminars.
Activity - 182	Data management						
	20.51	$6,234.31	$178.54	$513.21	$6,926.06	0	Incorporated all data collected into GIS database. Analyzed and summarized WMA databases and pertinent information.
Activity - 200	Resource Management						
	12.23	$2,972.41	$89.60	$708.65	$3,770.66	0	Routine planning, paperwork, purchases and correspondences dealing with daily operations of the WMA.

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
Activity - 201	Cultural resource management						
	0.00	$0.00	$0.00	$26.59	$26.59	0	Coordinated projects related to cultural resource management.
Activity - 204	Resource planning						
	77.47	$21,186.57	$1,168.45	$18,814.21	$41,169.23	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	$188.39	$0.00	$0.00	$188.39	0	Assisted Northwest Florida Water Management District with prescribed burning.
Activity - 207	Prescribed burning - dormant season						
	0.00	$0.00	$0.00	$357.98	$357.98	0	Purchased supplies, materials, and safety equipment to assist Northwest Florida Water Management District with prescribed burning.
Activity - 221	Animal surveys						
	0.00	$0.00	$0.00	$489.62	$489.62	0	Purchased supplies to assist Northwest Florida Water Management District with wild hog control. NFA*.
Activity - 312	Informational signs						
	1.30	$497.64	$9.55	$234.53	$741.72	0	Developed and maintained information signs at kiosk and display boards.
Activity - 320	Outreach and education						
	3.54	$716.56	$87.80	$1,153.56	$1,957.92	0	Participated in wildlife management

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
							presentations to area school groups. Participated as a Steering Committee member and wildlife facilitator for the Emerald Coast Regional Envirothon. NFA*.
Activity - 350	Customer service support						
	0.12	$28.81	$0.91	$0.00	$29.72	0	Provided information to callers regarding fish and wildlife-based recreation opportunities and area regulations.
Activity - 920	FEM -- buildings/structures						
	9.44	$2,262.18	$80.06	$12,124.72	$14,466.96	0	Maintained and repaired area office and buildings as needed.
Activity - 923	FEM -- vehicles/equipment						
	1.78	$367.30	$18.63	$5,137.00	$5,522.93	0	Repaired and maintained vehicles, boats, ATVs and associated equipment, including services-parts and labor.
Activity - 926	FEM -- roads/bridges						
	7.45	$2,135.81	$54.58	$0.00	$2,190.39	0	Made minor repairs and maintained access roads and bridges as needed.
Activity - 928	FEM -- fences						
	0.00	$0.00	$2.73	$11,927.42	$11,930.15	0	Maintained and erected gates and fences as needed on access roads and boundaries. Purchased fence for WMA compound.
Species 9200 Total	168.98	$45,716.74	$2,041.33	$62,399.53	$110,157.60		

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
Species 9210 - Game wildlife							
Activity - 221	Animal surveys						
	0.00	$116.29	$0.00	$2,752.22	$2,868.51	0	Developed and purchased supplies for wildlife camera survey.
Activity - 285	Nest structures						
	1.00	$184.31	$7.28	$0.00	$191.59	0	Maintained and monitored wood duck nest boxes on area waterways.
Activity - 295	Biological data collection, analysis, and reporting						
	0.00	$0.00	$0.00	$476.66	$476.66	0	Collected biological data and samples from harvested game at check station. Purchased tools and supplies for data collection.
Activity - 341	Public use administration (hunting)						
	4.24	$1,529.49	$1,008.71	$8,893.57	$11,431.77	0	Administered and managed public hunts. Compiled weekly harvest and hunter pressure reports. Salary for OPS check station operators included here.
Species 9210 Total	5.24	$1,830.09	$1,015.99	$12,122.45	$14,968.53		
Species 9211 - White-tailed deer							
Activity - 182	Data management						
	0.37	$90.00	$32.31	$561.23	$683.54	0	Summarized and analyzed survey, biological, harvest and hunter pressure data.
Activity - 221	Animal surveys						
	7.78	$1,864.61	$181.11	$2,317.92	$4,363.64	0	Conducted spotlight surveys employing line transect distance

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
							sampling methodology.
Activity - 252	Biomedical monitoring						
	0.00	$0.00	$0.00	$399.99	$399.99	0	Purchased supplies to store biological specimens.
Species 9211 Total	8.15	$1,954.61	$213.42	$3,279.14	$5,447.17		
Species 9216 - Hogs							
Activity - 286	Population control						
	0.93	$191.50	$14.54	$177.49	$383.53	0	Assisted Northwest Florida Water Management District with wild hog population control. NFA*
Activity - 291							
	5.36	$1,455.88	$73.71	$861.61	$2,391.20	0	Provide technical information and assistance to cooperators or other state agencies regarding wildlife management and habitat. NFA*
Species 9216 Total	6.29	$1,647.38	$88.25	$1,039.10	$2,774.73		
Species 9218 - Quail							
Activity - 182	Data management						
	0.00	$121.61	$0.00	$0.00	$121.61	0	Summarized and analyzed survey, biological, harvest and hunter pressure data.
Activity - 221	Animal surveys						
	1.06	$577.90	$7.73	$0.00	$585.63	0	Conducted northern bobwhite calling surveys.
Species 9218 Total	1.06	$699.51	$7.73	$0.00	$707.24		

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
Species 9222 - Wood duck							
Activity - 182	Data management						
	0.81	$177.42	$8.86	$50.49	$236.77	0	Analyzed and summarized wood duck nest box monitoring data.
Activity - 285	Nest structures						
	4.67	$977.19	$64.16	$534.75	$1,576.10	50	Maintained and monitored 50 wood duck nest boxes on area waterways.
Species 9222 Total	5.48	$1,154.61	$73.02	$585.24	$1,812.87		
Species 9226 - Mourning and white-winged doves (migratory and non-migratory							
Activity - 221	Animal surveys						
	1.29	$466.38	$15.45	$91.80	$573.63	0	Trapped and banded area doves as part of a statewide project and nationwide effort.
Species 9226 Total	1.29	$466.38	$15.45	$91.80	$573.63		
Species 9240 - Nongame wildlife							
Activity - 221	Animal surveys						
	14.57	$3,354.11	$458.08	$9,600.63	$13,412.82	0	Conducted various herpetofauna surveys with emphasis on imperiled salamanders and anurans. NFA*.
Species 9240 Total	14.57	$3,354.11	$458.08	$9,600.63	$13,412.82		
Species 9251 - Songbirds (passerines)							
Activity - 285	Nest structures						
	1.11	$342.01	$8.18	$0.00	$350.19	18	Maintained and monitored eighteen Eastern bluebird nest boxes.

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
Species 9251 Total	1.11	$342.01	$8.18	$0.00	$350.19		
Species 9252 - Wading birds							
Activity - 182	Data management						
	0.00	$53.94	$0.00	$0.00	$53.94	0	Analyzed and summarized wading bird rookery data.
Activity - 221	Animal surveys						
	1.23	$392.88	$14.99	$109.69	$517.56	0	Monitored wading bird rookery.
Species 9252 Total	1.23	$446.82	$14.99	$109.69	$571.50		
Species 9254 - Breeding birds							
Activity - 182	Data management						
	1.18	$393.74	$8.63	$0.00	$402.37	0	Analyzed and summarized breeding bird point count data.
Activity - 221	Animal surveys						
	2.24	$506.93	$31.38	$295.02	$833.33	0	Conducted breeding bird point count surveys.
Species 9254 Total	3.42	$900.67	$40.01	$295.02	$1,235.70		
Species 9258 - Southeastern kestrel							
Activity - 285	Nest structures						
	0.92	$201.05	$10.00	$55.92	$266.97	8	Maintained and monitored eight kestrel nest boxes.
Species 9258 Total	0.92	$201.05	$10.00	$55.92	$266.97		
Species 9271 - Bats							
Activity - 221	Animal surveys						
	3.67	$936.29	$26.84	$0.00	$963.13	2	Maintained and monitored bat houses.
Species 9271 Total	3.67	$936.29	$26.84	$0.00	$963.13		

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
Species 9278 - Gopher tortoise							
Activity - 140	Report writing/editing/manuscript preparation						
	2.17	$504.75	$76.89	$899.05	$1,480.69	0	Prepared annual progress report on gopher tortoise surveying and monitoring efforts. NFA*.
Activity - 182	Data management						
	0.00	$0.00	$21.60	$365.94	$387.54	0	Analyzed and summarized gopher tortoise survey data. NFA*.
Activity - 221	Animal surveys						
	4.31	$958.73	$246.26	$4,461.47	$5,666.46	0	Coordinated and conducted gopher tortoise surveys. NFA*.
Species 9278 Total	6.48	$1,463.48	$344.75	$5,726.46	$7,534.69		
Project 7281 Total	243.53[1]	$65,041.28	$6,428.77	$115,563.21	$187,033.26		

[1]Man-days for OPS Fish & Wildlife Technician for a year (210 man-days) and OPS Hunting & Fishing Check Station Operators (~380 man-days) not included. However, salary for OPS is included in "Other" expenses category.

Appendix III. Catch-per-unit-effort (CPUE) results for sportfish sampled via electrofishing at Black and Dry Ponds in November 2015 on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

	Black Pond		Dry Pond		Green Pond	
November 2015	*n*[a]	CPUE[b]	*n*[a]	CPUE[b]	*n*[a]	CPUE[b]
Bluegill	0	0.00	2	0.03	3	0.08
Largemouth bass	2	0.04	2	0.03	5	0.13
Warmouth	0	0	0	0	1	0.03
Black Crappie	0	0	0	0	0	0
TOTALS	2	0.04	4	0.06	9	0.24

[a] **Number of fish sampled**
[b] **Catch per unit effort (CPUE) measured in number of fish/minute**

Appendix IV. Number of fish caught and released per pond from July 2015 - June 2016 on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

	Pond						
Species	Dry	Black	Deep Edge	Green 1	Green 2	Green 3	All Ponds
Bluegill (*Lepomis macrochirus*)							
Kept	1205	224	4	62	31	81	1607
Released	558	343	14	46	22	111	1094
Total caught	**1763**	**567**	**18**	**108**	**53**	**192**	**2701**
Black Crappie (*Pomoxis nigromaculatus*)							
Kept	275	133	0	2	2	32	444
Released	113	91	0	15	3	38	260
Total caught	**388**	**224**	**0**	**17**	**5**	**70**	**704**
Largemouth Bass† (*Micropterus salmoides*)							
Total caught	**143**	**116**	**28**	**5**	**36**	**158**	**486**
Warmouth (*Lepomis gulosus*)							
Kept	6	4	0	2	0	1	13
Released	17	3	0	0	0	5	25
Total caught	**23**	**7**	**0**	**2**	**0**	**6**	**38**
Catfish (*Ameirus nebulosus* and *Ameirus natalis*)							
Kept	12	5	0	0	0	0	17
Released	2	15	0	1	0	2	20
Total caught	**14**	**20**	**0**	**1**	**0**	**2**	**37**
Other (Chain pickerel, Spotted Gar, Bowfin, Redbreast Sunfish,, Redear Sunfish, Flier)							
Kept	8	3	1	1	0	0	12
Released	18	5	0	6	9	27	85
Total caught	**26**	**28**	**1**	**7**	**9**	**27**	**97**

†Largemouth Bass are catch-and-release only on Carter Tract ponds

Appendix V. Percent nest success, no. of nests, avg. clutch size, and estimated duckling survival/clutch of wood duck (*Aix sponsa*) nest boxes (2007 - 2016) by water body on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

Year	Water Body										
2007	Green 1&2	Green 3	Deep Edge	Black	LDE	Dry	Garrett	Warmouth	PLC	Dykes Mill	All Water Bodies
% nest success	33%	0%	0%	0%	50%	0%	0%	0%	0%	n/a	18%
# nests	3	2	2	1	2	1	0	0	0	n/a	8
average eggs/clutch	0.7	0.0	4.5	0.0	6.0	11.0	0.0	0.0	0.0	n/a	6.8
hatched ducklings/clutch	0.7	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	n/a	1.0
2008											
% nest success	0%	0%	0%	0%	0%	100%	0%	0%	0%	n/a	40%
# nests	1	1	0	0	0	3	0	0	0	n/a	4
average eggs/clutch	0.0	6.0	0.0	0.0	0.0	10.3	0.0	0.0	0.0	n/a	9.4
hatched ducklings/clutch	0.0	0.0	0.0	0.0	0.0	6.3	0.0	0.0	0.0	n/a	5.0
2009											
% nest success	25%	33%	0%	50%	0%	78%	0%	0%	0%	n/a	57%
# nests	4	3	1	5	1	7	0	0	0	n/a	17
average eggs/clutch	6.5	6.3	6.0	6.8	12.0	10.0	0.0	0.0	0.0	n/a	8.4
hatched ducklings/clutch	1.5	0.3	0.0	2.7	0.0	4.6	0.0	0.0	0.0	n/a	2.7
2010											
% nest success	33%	40%	100%	40%	0%	50%	100%	0%	50%	n/a	48%
# nests	6	5	1	5	0	8	2	0	2	n/a	23
average eggs/clutch	7.5	7.2	8.0	6.6	0.0	8.9	9.0	0.0	8.0	n/a	7.8
hatched ducklings/clutch	1.7	3.0	6.0	2.0	0.0	2.1	7.0	0.0	3.5	n/a	2.7
2011											
% nest success	60%	50%	100%	80%	50%	43%	100%	0%	0%	n/a	62%
# nests	5	4	3	5	2	7	1	0	0	n/a	22
average eggs/clutch	7.2	5.5	5.5	11	10	5.6	9	0	0	n/a	7.4
hatched ducklings/clutch	3.6	2.75	4	6.4	1.5	1.57	9.00	0.00	0.00	n/a	3.40
2012											
% nest success	100%	75%	100%	100%	100%	100%	0%	100%	50%	n/a	86%
# nests	4	4	2	3	3	3	0	1	2	n/a	22
average eggs/clutch	8.3	11	10	11	5	8.3	0.0	9	3	n/a	8.4
hatched ducklings/clutch	6.0	6.0	8.5	6.7	1.0	4.7	0.0	5.0	1.0	n/a	4.9
2013											
% nest success	100%	33%	50%	50%	100%	83%	100%	0%	0%	n/a	74%
# nests	4	3	2	4	3	6	1	0	0	n/a	23
average eggs/clutch	9	4	8.5	4.5	4.3	6.7	12	0.0	0.0	n/a	6.4
hatched ducklings/clutch	7.5	0.67	2.5	0.75	2	4.5	12	0.0	0.0	n/a	3.7

Year	Green 1&2	Green 3	Deep Edge	Black	LDE	Dry	Garrett	Warmouth	PLC	Dykes Mill	All Water Bodies
2014											
% nest success	50%	0%	0%	0%	100%	0%	100%	0%	0%	n/a	25%
# nests	2	4	2	1	2	3	1	1	0	n/a	16
average eggs/clutch	6.5	5.75	4.5	4	2.5	4.7	2	5	0	n/a	4.7
hatched ducklings/clutch	3.5	0	0	0	2.5	0	2	0	0	n/a	0.9
2015											
% nest success	50%	100%	0%	67%	50%	33%	100%	0%	50%	0%	52%
# nests	4	2	0	3	2	3	1	0	4	2	21
Average eggs/clutch	6.8	6	0	7.3	5	8.3	7	0	5.8	9	6.9
Hatched ducklings/clutch	2.8	5	0	4	3	2.3	2	0	3	0.5	2.9
2016											
% nest success	50%	67%	100%	0%	67%	100%	100%	0%	100%	100%	78%
# nests	4	3	1	3	3	4	4	0	3	3	28
Average eggs/clutch	6	10	7	5.3	7	4.5	10.8	0	9.7	9.3	7.7
Hatched ducklings/clutch	3.3	7.7	6	0	5.5	4.3	10	0	6.7	9.3	5.6

LDE = Little Deep Edge Pond, PLC = Pine Log Creek

Appendix VI. Wading bird survey results (2008 - 16) 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
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
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
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

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
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
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
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

Appendix VII. Bird species (n=128) documented on the Fitzhugh Carter Tract of Econfina Creek WMA, as of June 2016.

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*
- 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*

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*

FALCONIFORMES

Falconidae (Hawks and Allies)

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

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*

CHARADRIIFORMES (continued)

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*

PASSERIFORMES (continued)

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 VIII. Comprehensive list of herpetofaunal species (n=62) documented on the Fitzhugh Carter Tract of Econfina Creek WMA, 2005 -2015.

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*
- Eastern diamondback rattlesnake *Crotalus adamanteus*
- 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*

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*

Appendix IX. Snake trap array capture results from July 2015 – June 2016 on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

Reptiles	**Number captured**
Six-lined racerunner (*Cnemidophorus sexlineatus*)	11
Eastern fence lizard (*Sceloporus undulates*)	36
Southeastern five-lined skink (*Eumeces inexpectatus*)	7
Green anole (*Anolis carolinensis*)	1
Five-lined skink (*Eumeces fasciatus*)	2
Slender glass lizard (*Ophisaurus attentuatus*)	1
Northern mole skink (*Eumeces egregious similes*)	3
Chicken turtle (*Deirochelys reticularia*)	2
Florida cooter (*Pseudyms floridana*)	1
Eastern hognose snake (*Heterodon platyrhinos*)	5
Eastern coachwhip (*Masticophis flagellum*)	12
Dusky pygmy rattlesnake (*Sistrurus miliarius barbouri*)	11
Southern black racer (*Coluber constrictor priapus*)	24
Corn snake (*Elaphe guttata*)	3
Banded water snake (*Nerodia fasciata*)	1
Smooth earth snake (*Virginia valeriae*)	2
Florida pine snake (*Pituophis melanoleucas*)	1
Scarlet snake (*Cemophora coccinea*)	2
TOTAL REPTILES	104
NUMBER OF REPTILE SPECIES	18
Amphibians	**Number captured**
Southern toad (*Bufo terrestris*)	20
Eastern narrowmouth toad (*Gastrophryne carolinensis*)	6
Southern Leopard Frog (*Rana sphenocephala)*	3
Bullfrog (*Rana catesbiana*)	24
Bronze frog (*Rana clamitans clamitans*)	2
Pig frog (*Rana grylio*)	15
Florida cricket frog (*Acris gryllus dorsalis)*	4
Eastern spadefoot toad (*Scaphiopus holbrookii*)	11
Barking treefrog (*Hyla gratiosa*)	1
Mole salamander (*Ambystoma talipoideum*)	20
TOTAL AMPHIBIANS	106
NUMBER OF AMPHIBIAN SPECIES	10
Mammals	**Number captured**
Oldfield mouse (*Peromyscus polionotus*)	30
Southeastern pocket gopher (*Geomys pinetis*)	1
Least shrew (*Cryptotis parva)*	2
TOTAL MAMMALS	33
NUMBER OF MAMMAL SPECIES	3

Birds	**Number Captured**
Unknown species	2
House wren (*Troglodytes aedon*)	1
TOTAL BIRDS	3
NUMBER OF BIRD SPECIES	2