

**SANDHILL LAKES MITIGATION BANK
(FITZHUGH CARTER TRACT)
OF
ECONFINA CREEK WILDLIFE MANAGEMENT AREA
ANNUAL REPORT 2013-2014**



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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 (NFWFMD) 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 NFWFMD in August 2005 to manage the property. Management objectives identified by the NFWFMD 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 NFWFMD 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, 2013-June 30, 2014.

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).

The historic natural communities on the Carter Tract were degraded by timber operations and suppression of natural fire regimes. Restoration efforts by NFWFMD, including mechanical

reduction/herbicide of hardwoods and sand pine (*Pinus clausa*), native groundcover plantings, slash pine (*Pinus elliotii*) plantation thinning, and prescribed burning continued during FY 2013-14 (Table 1). 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 NFWMD from July 2013 - June 2014 on the Fitzhugh Cater Tract of Econfina Creek WMA, Washington County, Florida.

Management/Restoration Activity	Acreage	Planting Density	Month
Growing season prescribed burning	719	n/a	June-July 2014
Dormant season prescribed burning	122	n/a	November 2013-March 2014
Upland wiregrass (<i>Aristida stricta</i>) planting	20	1,210 plugs/acre	January 2014
Hardwood (<i>Quercus</i> spp., <i>Liquidambar styraciflua</i> , and <i>Diospyros virginiana</i>) and sand pine (<i>Pinus clausa</i>) mechanical reduction/herbicide	100	n/a	January 2014
Yaupon (<i>Ilex vomitoria</i>) and Bahiagrass (<i>Paspalum notatum</i> Flugge) mechanical reduction/herbicide	37	n/a	March 2014

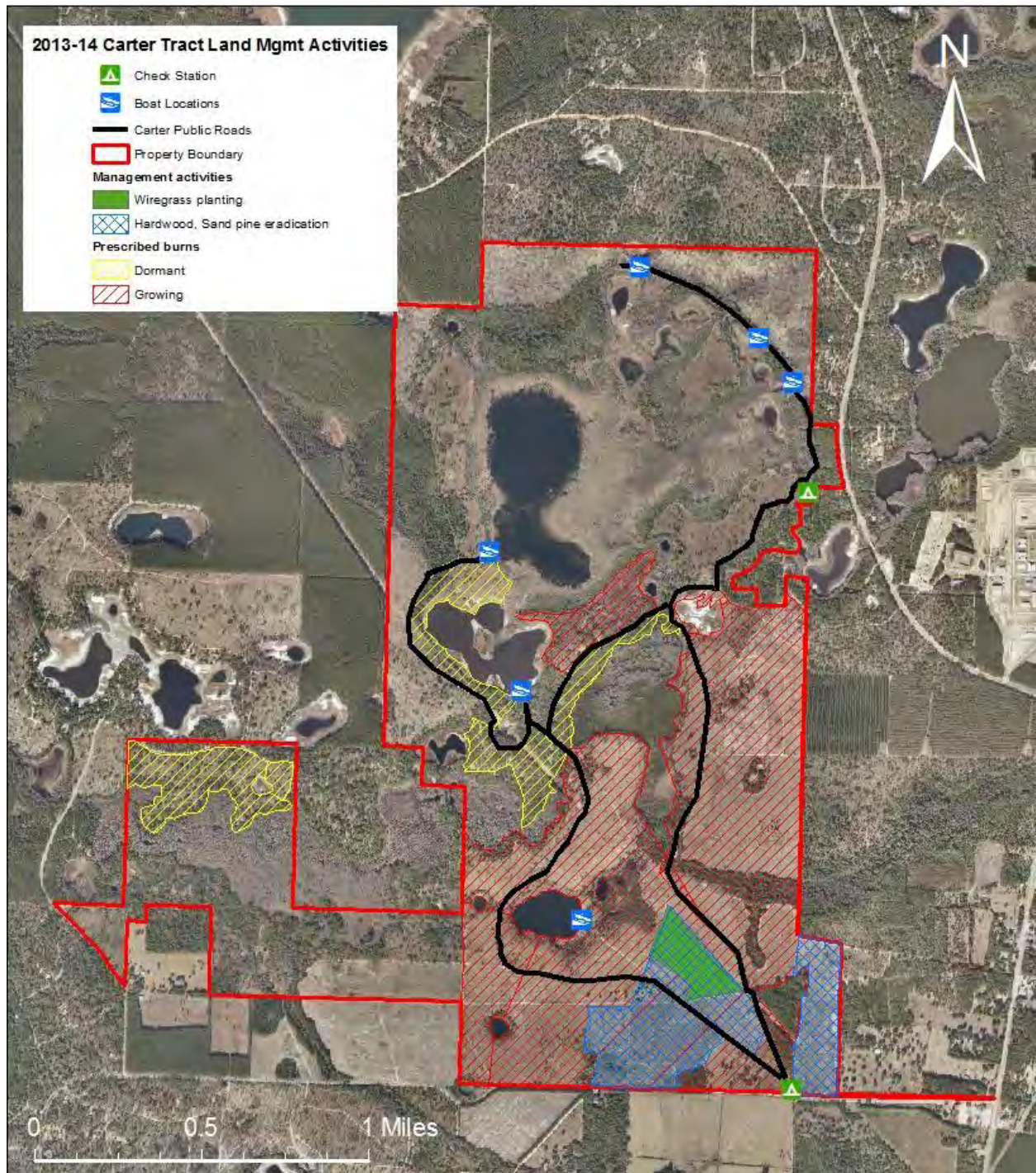


Figure 1. Habitat restoration and land management activities completed by NFWMD and private contractors from July 2013 - June 2014 at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

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 NFWMD in 2005, and readings have been recorded monthly by FWC field staff since January 2006. Following large rain events that filled up once-dry area ponds during spring 2009, water levels on all area ponds remained constant or increased until drought conditions returned in mid-April 2011. 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. As a result, pond levels have remained relatively stable FY 2013-14. 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.

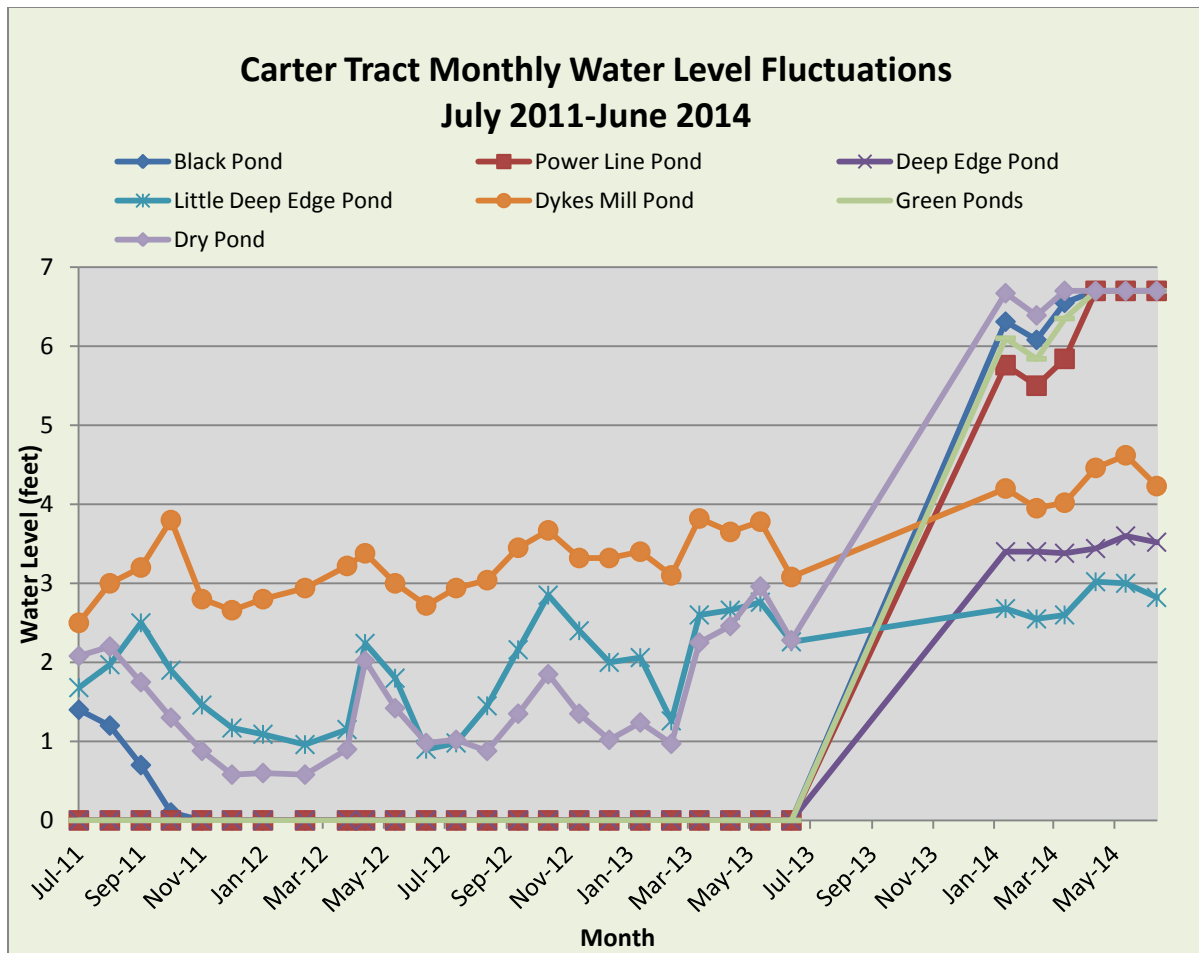


Figure 2. Monthly fluctuations in water levels from July 2011 - July 2014 on major water bodies within the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

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, 57 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 longleaf pine and wiregrass have begun the restoration process to a

natural sandhill community at this photo plot near Deep Edge pond on the Carter Tract. Photo plot photographs will continue to be taken annually, documenting all habitat types, water bodies, and infrastructure on the area.

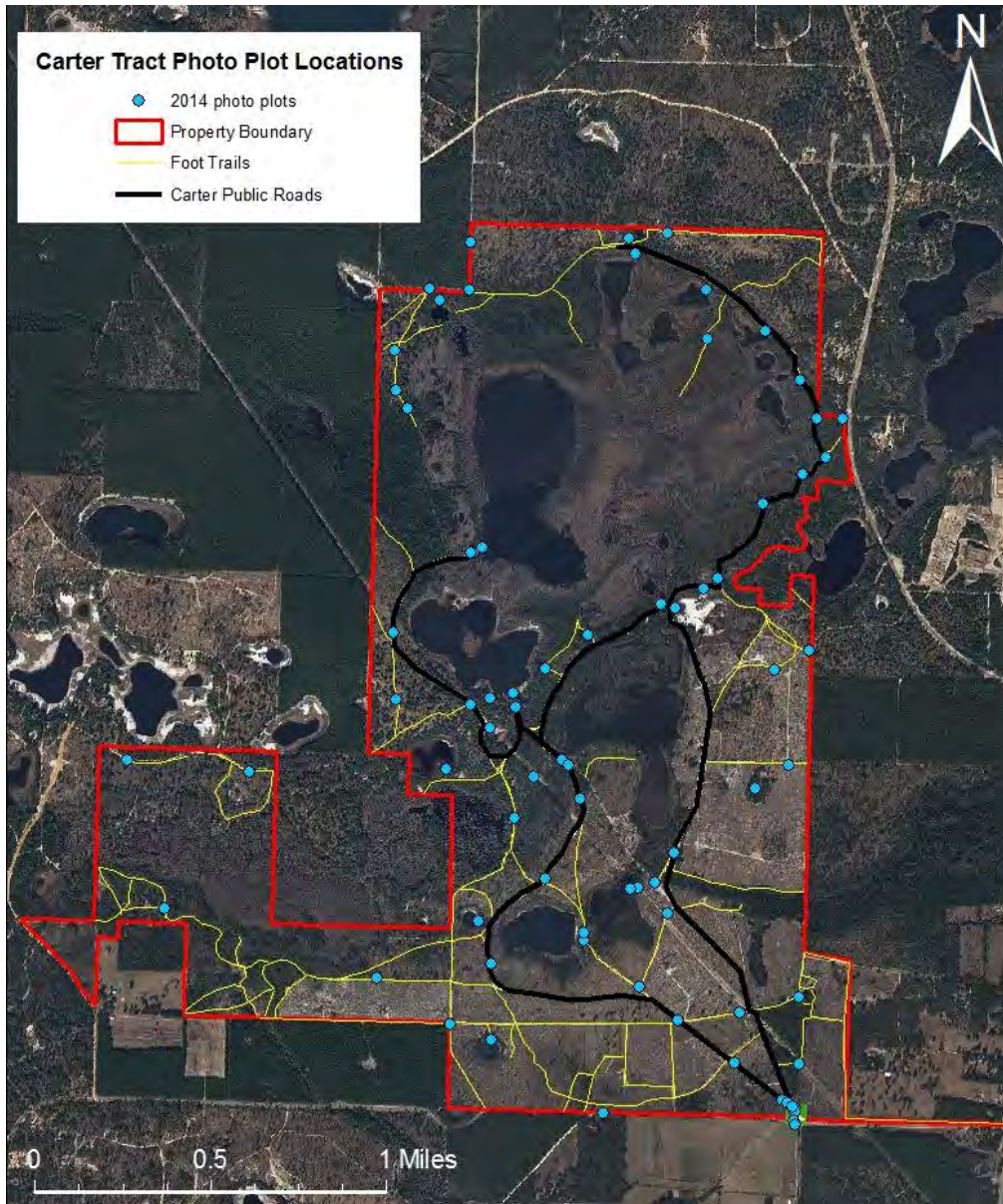


Figure 3. Historic and recently added photo plot locations used to document habitat change over time on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

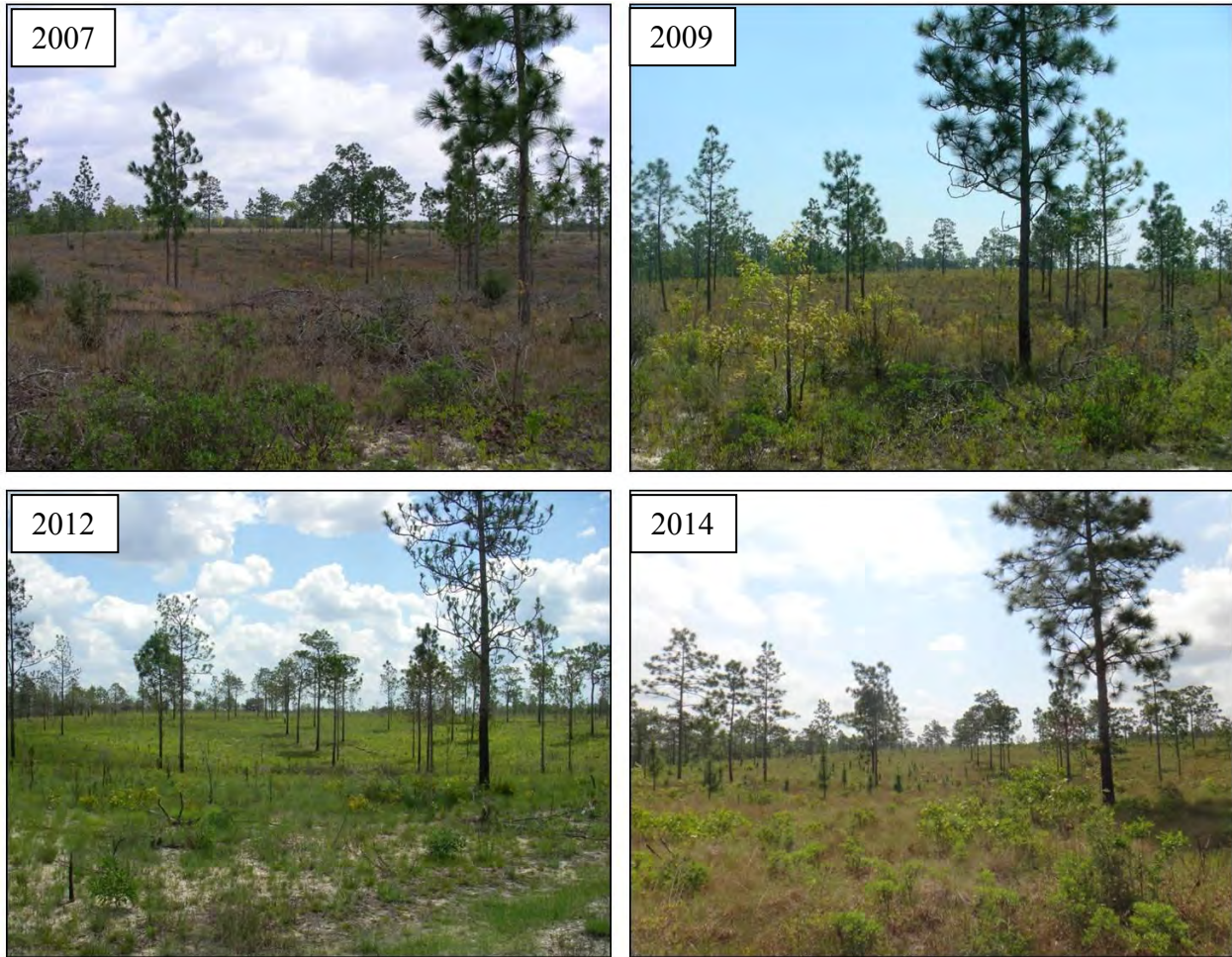


Figure 4. View from photo plot 37 illustrating how prescribed fire, hardwood eradication, and longleaf pine and wiregrass plantings, among other land management activities, have influenced habitat change at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

FISH AND WILDLIFE POPULATIONS

Working in cooperation with the NFWFMD, 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 2013-14 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, 2013 – June 30, 2014.

Freshwater Fish

Fish Population Assessment

Given adequate water levels, fish population assessments are conducted twice a year during spring and fall. From fall 2005 – fall 2009 Wegener rings were used to conduct baitfish surveys for gauging recruitment and prey base status (Wegener et al., 1974). However, fyke nets (Hubert, 1996) were implemented in 2010 as the preferred method for surveying baitfish populations and young-of-year (YOY) sportfish recruitment after proving to be a more efficient and productive method of capturing target fish species. Fyke nets were again used during fall 2012 and spring 2013. Electrofishing also continued during fall 2012 and spring 2013 on Black and Dry Ponds to assess mature sportfish populations, measuring catch-per-unit-effort (CPUE). The low water levels that prevented surveying the Green Ponds during fall 2012 and spring 2013 returned to levels that allowed surveying in 2013-14. Baitfish and sportfish surveys will continue to be conducted biannually on water bodies with adequate water levels.

Fyke Nets

Fyke nets were deployed in November 2013 to measure baitfish abundance and YOY sportfish recruitment (Figure 5). Fyke nets were 24-inches square, made of 1/8-inch mesh with two-inch wide throat plates and a two-inch diameter funnel ring. The lead line was 15-ft in length, with lead weights and floats spaced every three- and 12-inches on the bottom and top, respectively. Three locations were sampled in each pond per season and efforts were made to sample points which provide good spatial coverage across ponds. Low water conditions often require adjustment of net locations. Due to these continued wide fluctuations in water levels leading to inefficiencies in standardization, fyke net surveys are to be discontinued on the Carter Tract. Electroshocking sampling and harvest rates will continue to allow us to successfully assess fish populations on the Carter Tract. New potential surveys will be considered as needed.

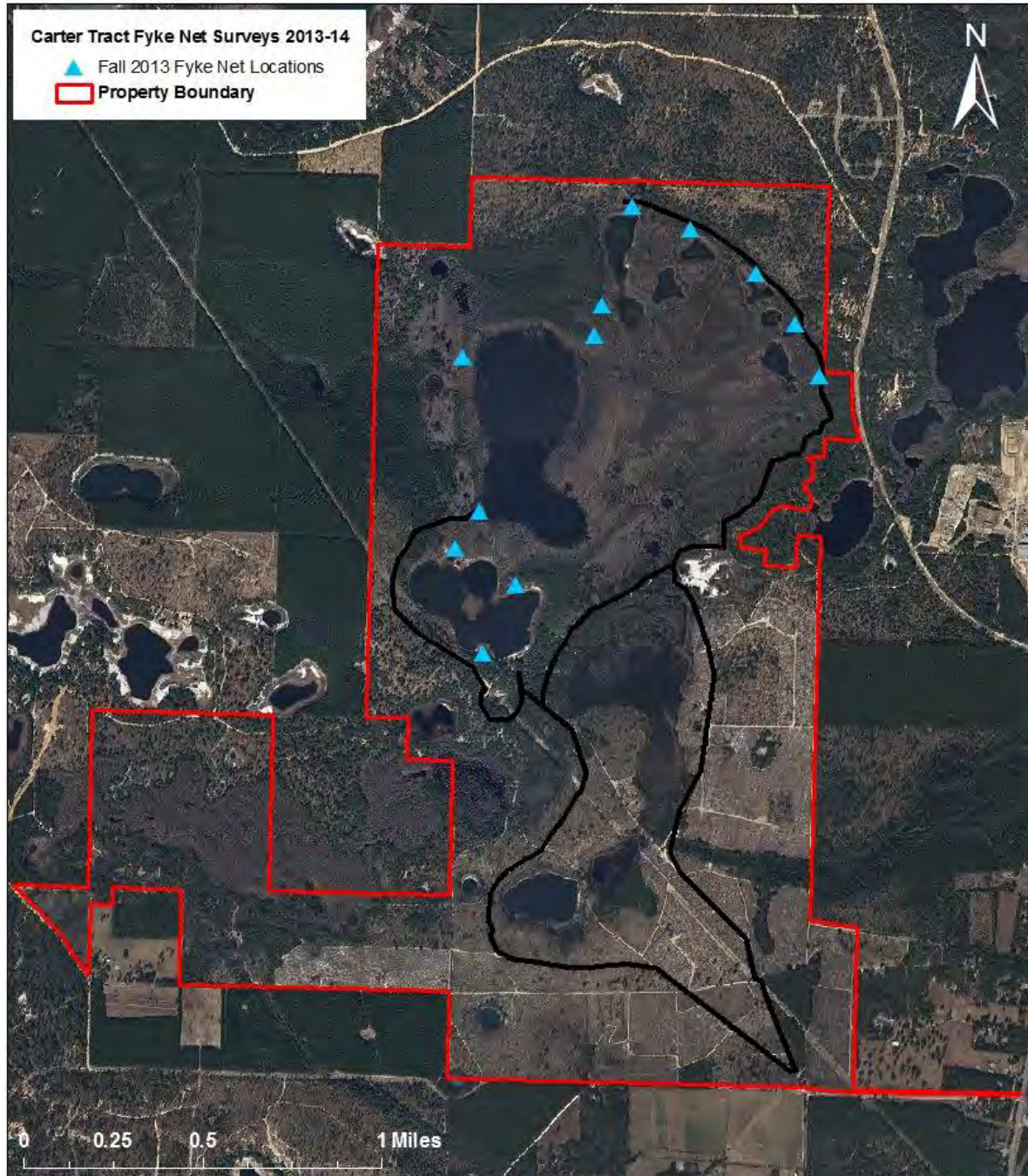


Figure 5. Fyke net locations used during November 2013 on Black, Dry, and the Green Ponds at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

Average percent occurrence of each species was calculated for Black, Dry, Green North, and Green South ponds per season; these data are illustrated graphically in Figure 6 and a table with specific values can be found in Appendix III. Eastern mosquitofish (*Gambusia holbrooki*) was the most abundant baitfish at all four ponds, consisting of > 60% of the occurrence at each pond.

Eastern starhead topminnow (*Fundulus escambiae*) was the second most abundant, comprising approximately 25% of the occurrence at Black and Dry ponds. Bluegill (*Lepomis macrochirus*) was the most abundant YOY sportfish on Black, Dry, and Green North ponds. Warmouth was the most abundant YOY sportfish on Green South pond.

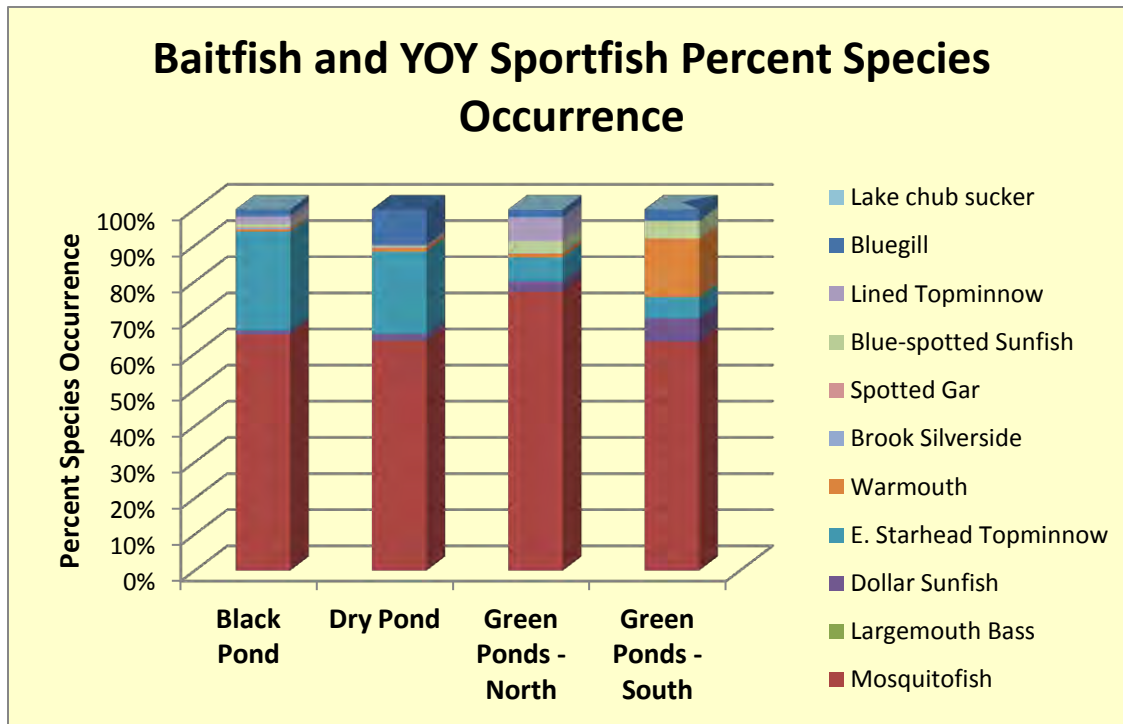


Figure 6. Percent species occurrence measured during November 2013 using fyke nets on Black, Dry, Green North, and Green South Ponds at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

Our data suggests that all ponds supported a similar diversity of baitfish. Green Ponds-North had the highest diversity (10), followed by Black and Dry Ponds (9 each), and Green Ponds-South (7). This is likely due to the high water levels experienced during the sample period on all ponds on the Carter Tract. Most baitfish inhabit water systems with some type of aquatic vegetation (Hoyer and Canfield, 1994) as it provides a source of forage and cover from predators. The high water levels allowed baitfish to use shallow areas near the shoreline where aquatic vegetation, such as pickerelweed (*Pontederia cordata*), fragrant water lily (*Nymphaea odorata*), and water shield (*Brasenia schreberi*) is most prevalent.

Just two YOY largemouth bass (*Micropterus salmoides*) were captured via fyke net during the fall 2013 sample, both from Dry pond. This is the same result that occurred during the 2012-

2013 sampling effort. The spring spawning season for largemouth bass was likely affected by the low water levels during the spring of 2013. The low water levels may have contributed to poor bass recruitment by limiting ideal bedding areas or providing insufficient structure and aquatic vegetation for YOY bass to forage and hide from predators.

Electrofishing

Sportfish abundance on Black, Dry, and the Green Ponds was measured during November 2013 and April 2014. Electrofishing was performed using an 18-foot aluminum vessel with Smith-Root[®] generator-powered pulsator electrofisher and two six-foot shocking booms (Figure 7). Direct current power settings were 120 pulses per second and 680 volts; average amperage generated was between 1-2 amps. Two dippers 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 2012 and spring 2013 is presented in Appendix IV. Graphs illustrating sportfish abundance trends from 2005 – 2014 for each pond sampled are presented in Figures 8 and 9 (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 7. Electroshocking is conducted in the spring and fall annually to assess sportfish abundances on Black, Dry, and Green Ponds of the Fitzhugh Carter Tract of Econfinia Creek WMA, WashingtonCounty, Florida.

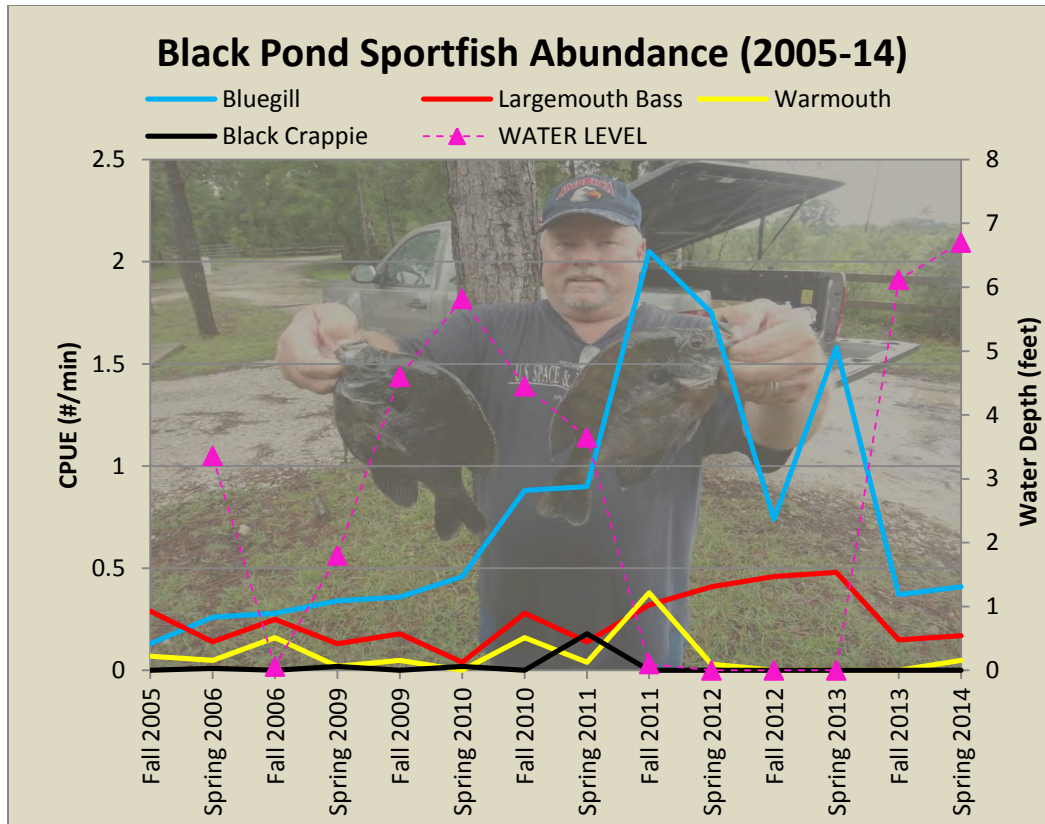


Figure 8. CPUE results from fall 2005 - spring 2014 sampling efforts on Black Pond of Fitzhugh Carter Tract of Econfinia Creek WMA, Washington County, Florida.

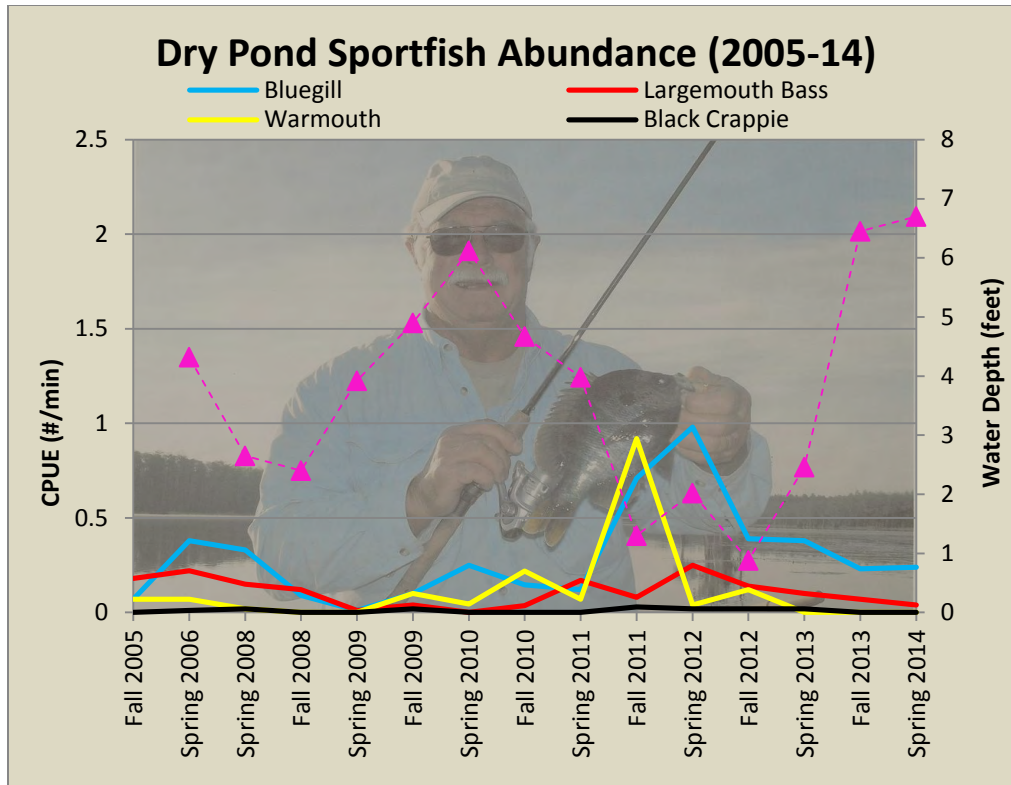


Figure 9. CPUE results from fall 2005 - spring 2014 sampling efforts on Dry Pond of Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida. Also shown are water depths during each sample season.

Bluegill and largemouth bass were the two most abundant sportfish captured on both Black and Dry Ponds during the fall 2013 and spring 2014 samples (Figures 8 and 9). These figures 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. We believe that 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 (high water levels). CPUE was higher on Black Pond compared to Dry Pond during both sample seasons. This might suggest that sportfish densities in Black Pond are higher than those in Dry Pond. Another plausible explanation has to do with differences in the physical structure of the two ponds. Black Pond, even at maximum water level has a defined shoreline and relatively little area in shallow flooded timber. Because of this, when the water level recedes, fish are concentrated further but the majority of the pond remains deep enough to allow shocking boat

access. Conversely, most of the shoreline of Dry Pond is not well-defined, but rather a gradual transition from shallow flooded timber to deeper water. Therefore, even when water levels drop significantly, the majority of the shoreline remains in flooded timber and can still be difficult to access using the available shocking vessel.

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 to date have been between 23-36 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.

While factors such as conductivity, physical pond structure, and extreme drought events can confound the electrofishing data analysis for Carter Tract ponds, comparison of this data with that of other local ponds can give an idea of the relative productivity of the water bodies. Table 2 compares CPUE measurements from Dry and Black Ponds with those of other nearby panhandle fisheries (Florida Fish and Wildlife Conservation Commission, 2002; FWC, unpublished data).

Table 2. Comparison of electroshocking results for Dry and Black Ponds to similar Florida panhandle water bodies.

Water body and sample season	Largemouth Bass		Bluegill		Distance from Carter Tract (miles)	Size of water body (acres)	County
	CPUE	n	CPUE	n			
Dead Lake					38.74	6700	Gulf
Fall 2012	0.36	91	0.43	108			
Deer Point Lake					15.92	5000	Bay
Fall 2012	0.70	175	1.84	459			
Pate Pond					12.86	379	Washington
Spring 2014	0.31	37	-	-			
Gap Pond					7.17	500	Washington
Spring 2014	0.10	3	0.03	1			
Daniel's Lake					1.43	60	Washington
Spring 2014	0.15	4	0.07	2			
Dry Pond					-	101	Washington
Fall 2013	0.07	5	0.23	19			
Spring 2014	0.04	2	0.24	13			
Black Pond					-	55	Washington
Fall 2013	0.15	8	0.37	19			
Spring 2014	0.17	7	0.41	17			

^aCatch per unit effort (CPUE) measured as number of fish per minute

^bNumber of fish sampled

Neither Black nor Dry Pond CPUE measures appear to differ drastically from similar local water bodies. In fact, in spring 2014 Black Pond had the third highest CPUE for bluegill among all ponds. Comparatively, Dry Pond was on the lower end of CPUE for both largemouth bass and bluegill. Again, we believe the shallow shoreline structure of Dry Pond (coupled with low conductivity) inhibits the efficacy of the available electrofishing equipment.

When considering the complexities in the sampling and analysis outlined above, and comparing Black and Dry Pond CPUE measures with those of similar local water bodies, 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 2013- June 2014 resulted in 700 anglers logging 3,088 fishing hours (Figure 10). This is an increase in both anglers and hours logged from the 2012-2013 fishing season. This increase coincides with the recharging of the aquifer and refilling of all area ponds that occurred from heavy rains in July 2013. Water levels continued to rise on all ponds until they stabilized by January 2014. All six area ponds were open to public fishing in August 2013 and remained open throughout the fiscal year. This gave anglers more opportunities to fish the ponds on the Carter Tract.

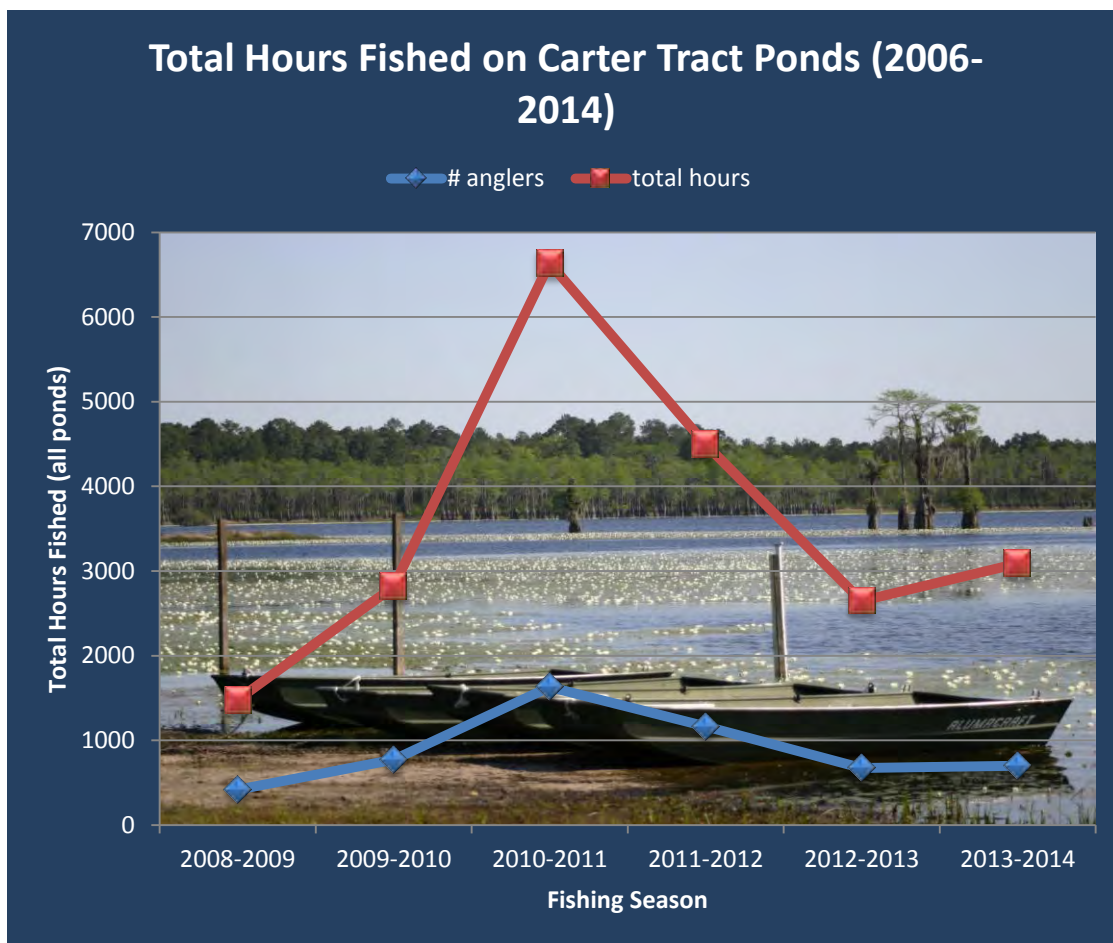


Figure 10. Total number of hours fished from 2006 - 2014 on all area ponds combined at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

Fishing pressure on the Carter Tract was calculated based on the total number of possible fishing hours from July 1, 2013 through June 30, 2014. Anglers fished 3,088 hours, an increase of 16.6% from the previous fishing season. This increase is likely due to the opening of the Green Ponds and the recharging of the aquifer that increased water levels on all the ponds. During 2013 -2014, Black Pond was the most fished pond (1,584.5 hours) followed by Dry Pond (910.25 hours) the Green Ponds combined (384.5 hours), and Deep Edge Pond (204.25). 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 11).

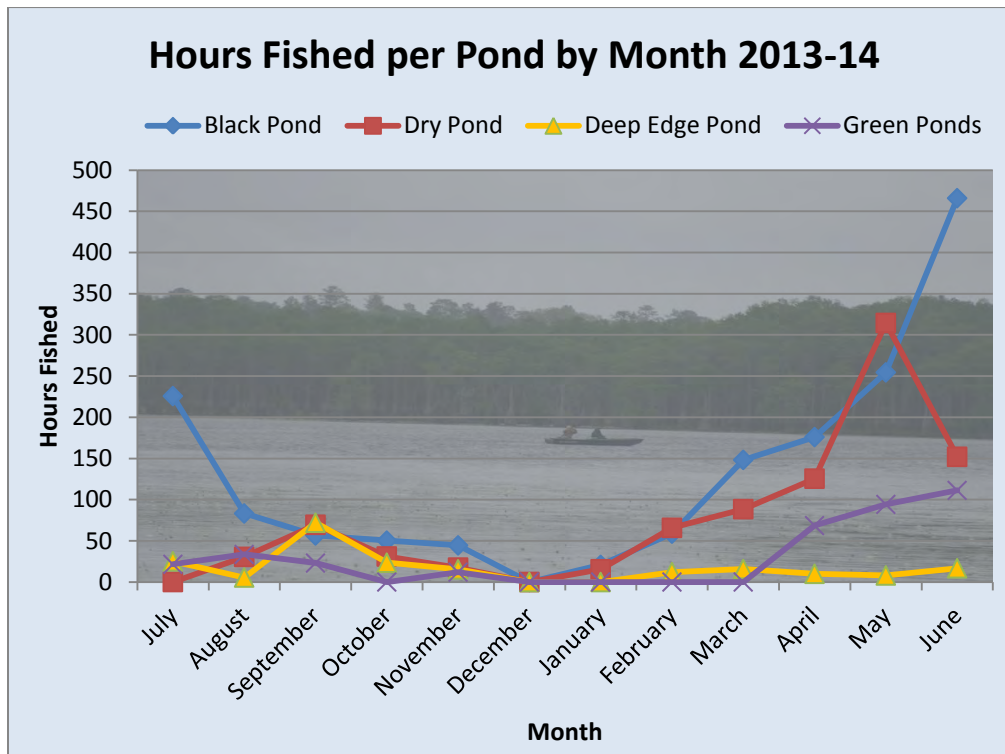


Figure 11. Hours fished per month on Dry, Black, Deep Edge, and Green Ponds at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

A total of 3,347 fish representing nine species were caught on Carter Tract ponds during 2013-14. This is a 74.7% increase compared to 1,916 fish caught during 2012-13. Table 3 illustrates the number of fish caught per species for each pond. Bluegill comprised 89.2% of fish caught, followed by largemouth bass, black crappie, and bullhead catfish (*Ameirus nebulosus* and *Ameirus natalis*) with 5.5%, 2.8%, and 1.2%, respectively. The remaining 1.3% of fish

caught were chain pickerel (*Esox niger*), spotted gar (*Lepisosteus oculatus*), redear sunfish (*Lepomis microlophus*), flier (*Centrarchus macropterus*), and shellcracker (*Lepomis microlophus*).

Table 3. Number of fish caught by species per pond at the Carter Tract of Econfina Creek WMA, Washington County, Florida, July 2013 - June 2014.

Species	Dry Pond	Black Pond	Deep Edge Pond	Green Ponds
Bluegill	900	1591	20	474
Largemouth Bass	23	119	29	12
Black Crappie	14	76	0	4
Catfish	4	32	3	0
Other	2	14	1	2

Figure 12 illustrates angler creel trends from 2007-14 per water body. The dramatic dip in bluegill catch during 2008-09 was likely due to the drought that closed all Green Ponds to fishing until heavy rains in May 2009 returned ponds to fishable water levels. Similarly, the drop in bluegill and black crappie during 2011-13 could be attributed to drought conditions which again forced the closure of Green Ponds to fishing. Alternatively, it is possible that the recent drop in bluegill catch is a sign that bluegill populations are beginning to reach a more balanced number following strict size restrictions. Future surveys will allow FWC staff to confirm or refute this assessment. Total number of fish caught and released per pond was calculated based on angler-reported creel data and a detailed table presenting these data is presented in Appendix V.

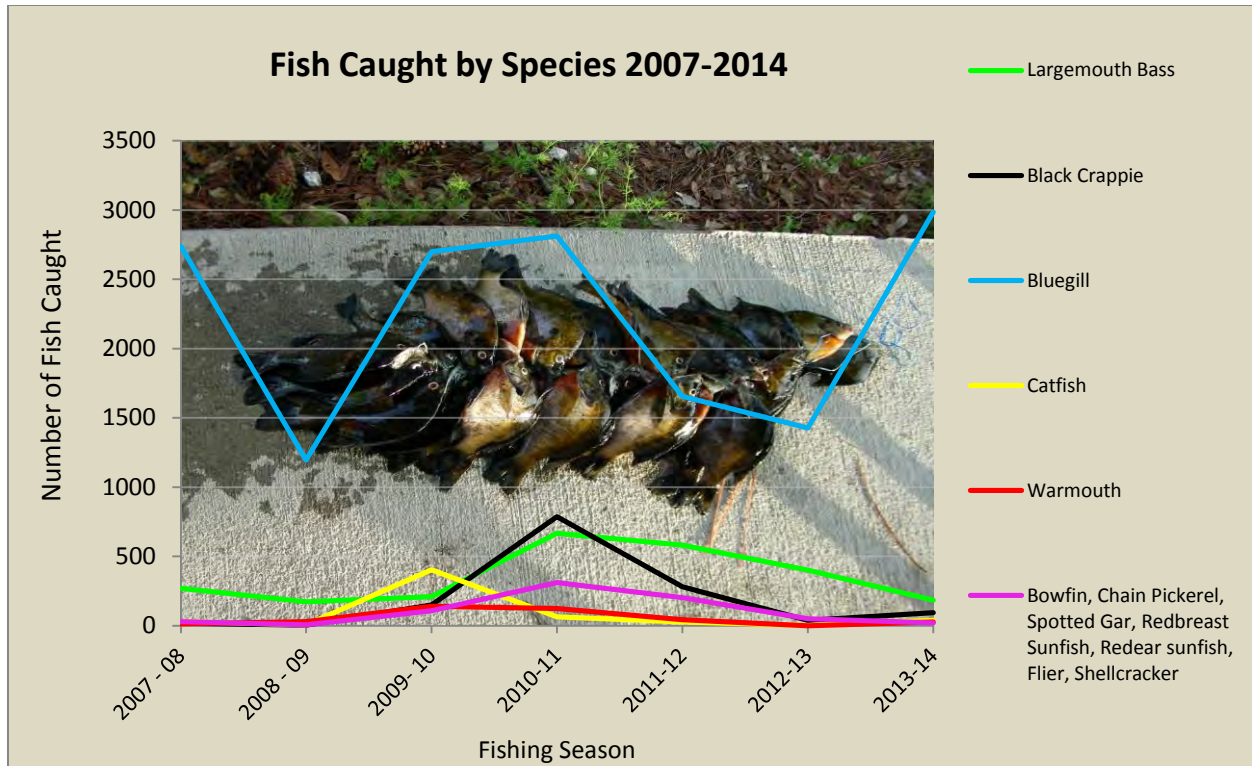


Figure 12. Angler creel trends from 2007 - 2014 on all area ponds of the Carter Tract of Econfina Creek WMA, Washington County, Florida.

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 2013-14 fishing season (Table 4). Green Pond was the most productive water body, followed by Black, Dry, and Deep Edge Ponds. Figure 13 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 4. Fishing success rate (fish caught/hours of fishing effort) on area ponds at the Carter Tract of Econfina Creek WMA, Washington County, Florida, July 2013 - June 2014.

Pond	Angler success rate (fish/hour)
Dry	1.0
Black	1.2
Deep Edge	0.3
Green Ponds	1.3
All Ponds	1.08

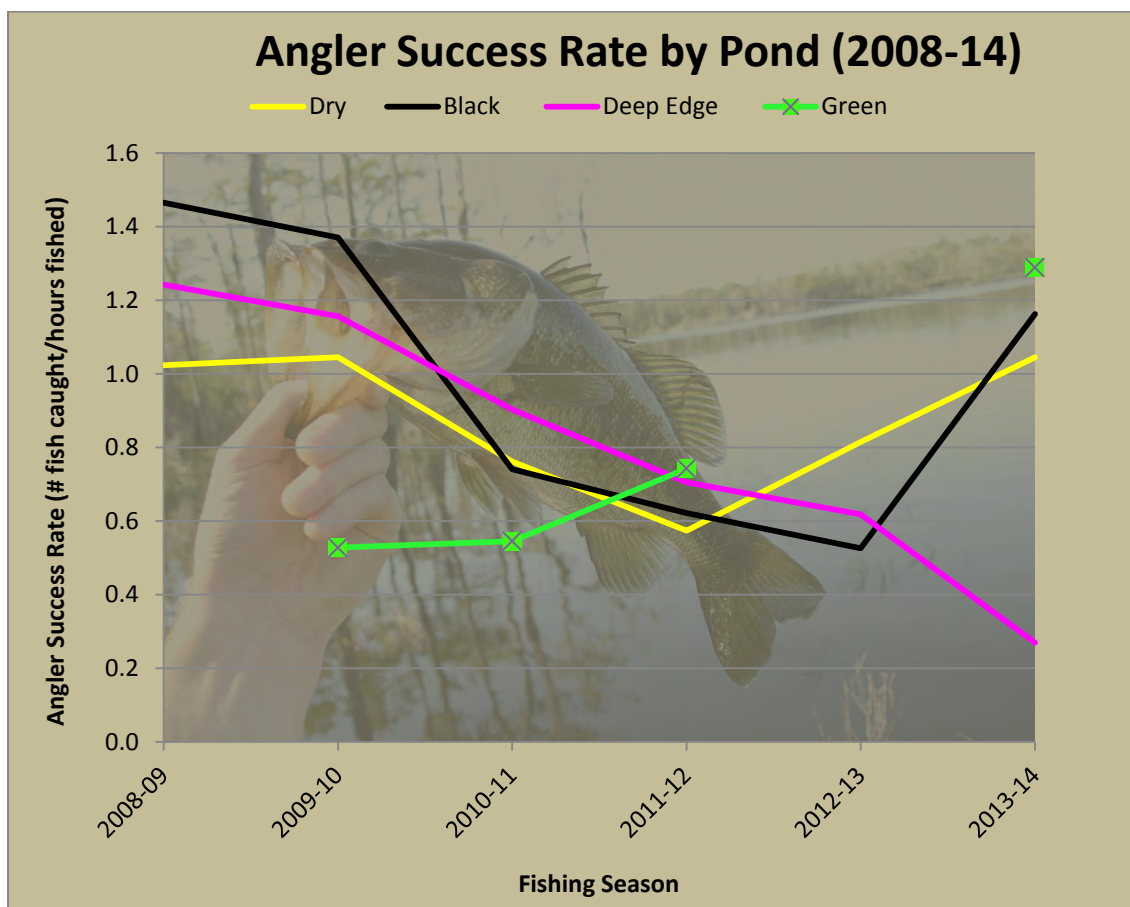


Figure 13. Angler success rate (# fish caught/hour of fishing effort) from 2008 - 2014 on area ponds of the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida. Green Ponds were closed to fishing during the 2008-09 and 2012-13 fishing seasons due to drought conditions.

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/mi² (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.

Population Trends

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 2013. 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 5-7 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 14 depicts the line transect routes used on the Carter Tract, along with locations of deer observed during 2013 surveys.

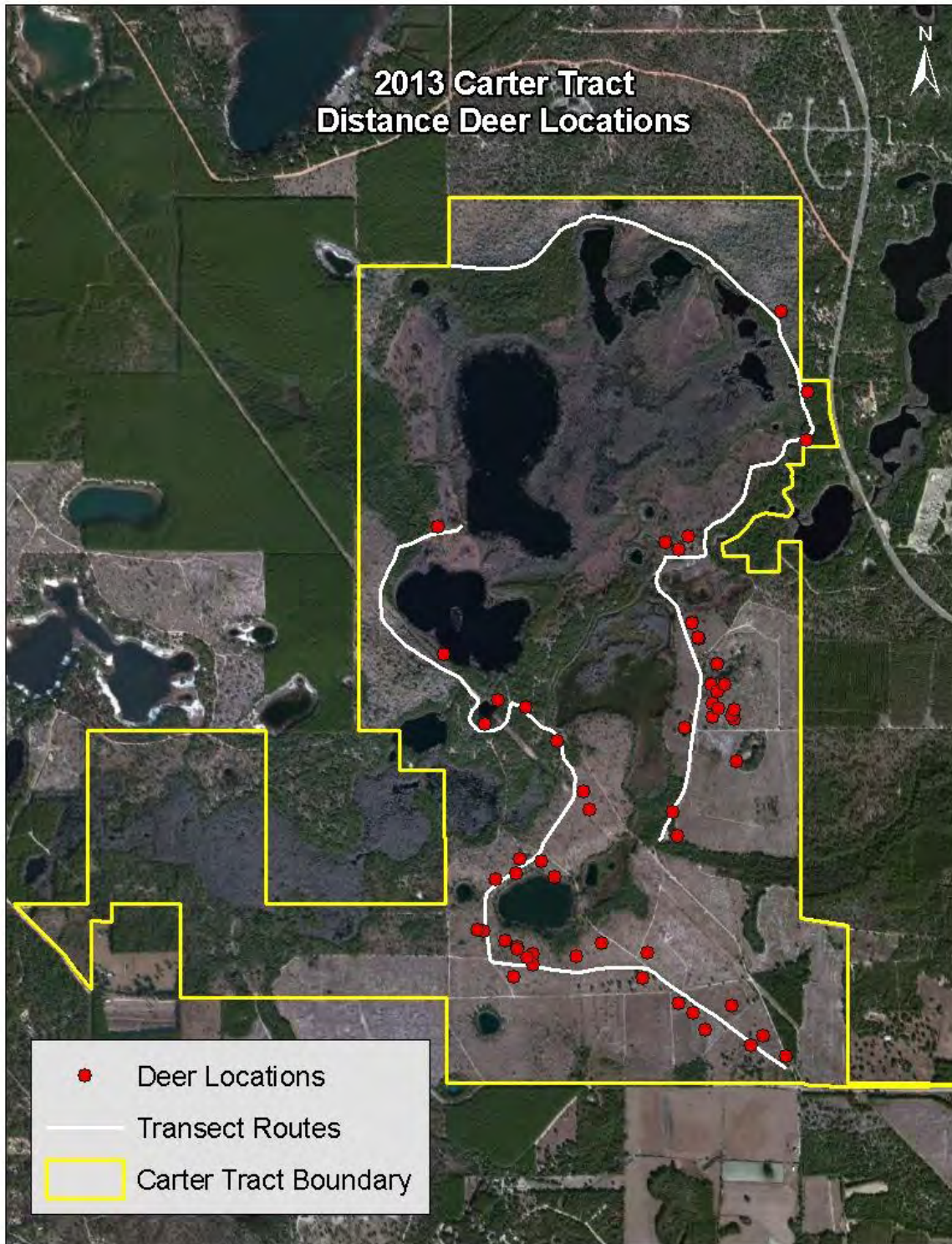


Figure 14. Survey routes and locations of deer observations during the September 2013 line-transect distance sampling conducted on the Fitzhugh Carter Tract of Econfinia Creek WMA, Washington County, Florida.

Preseason deer density for 2013 was estimated at 14 deer/mi² (95% CI: 8.7, 18.8), 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 .500, which along with the relatively small confidence range, suggests a good model fit. This index was a decrease from the 24 deer/mi² estimated during 2012, and drops below the desired population goal for the Carter Tract (Figure 15). 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.

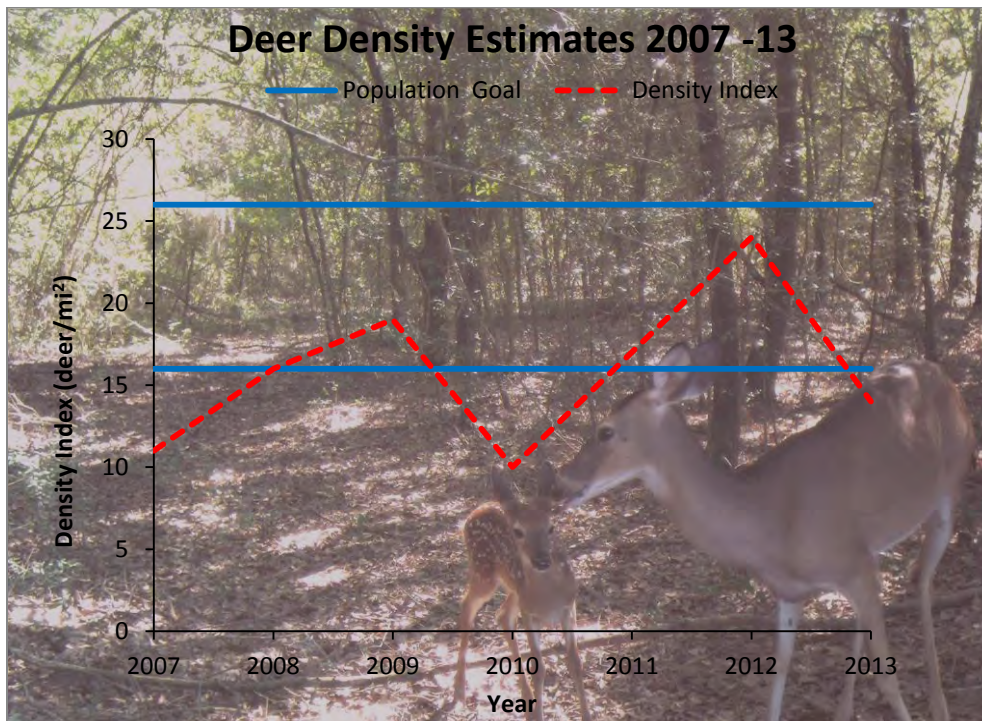


Figure 15. Trend in White-tailed deer density as estimated using line transect distance sampling at the Fitzhugh Carter Tract of Econfinia Creek WMA, Washington County, Florida, 2007 - 2013.

Harvest and Hunting Pressure

Deer hunters and their guests logged a total of 176 man-days of hunting during the 2013-14 season, compared to 184 man-days last year. The second phase of archery yielded the highest participation with 38 hunters, followed by the third phase general gun hunt with 35 hunters. Man-days of hunting pressure seems to be relatively consistent the past several years (Figure 16).

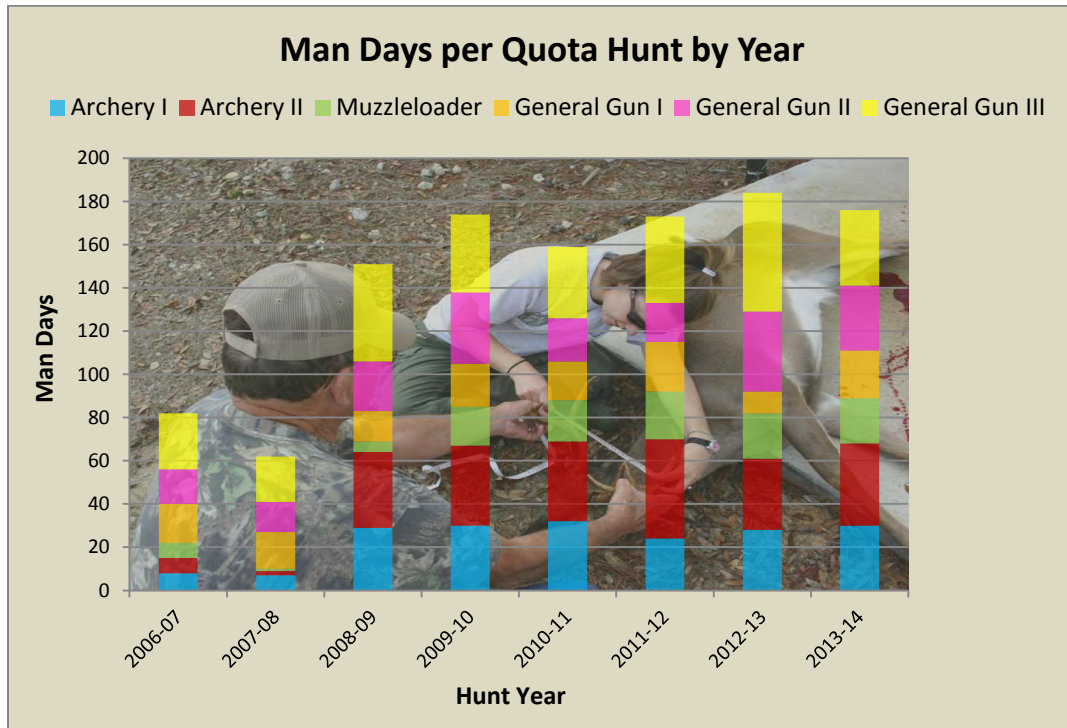


Figure 16. Comparison of hunter participation by quote hunt from 2006 - 2014 on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

All quote 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. Seven deer were harvested on the Carter Tract during 2013-14, yielding a hunter success rate of 4% (1 deer/24 man-days of hunting pressure); a slight increase from the past two years. Overall hunter success rate (calculated as the number of deer harvested per man-days hunted) is depicted in Figure 17, and is compared over the last eight deer seasons

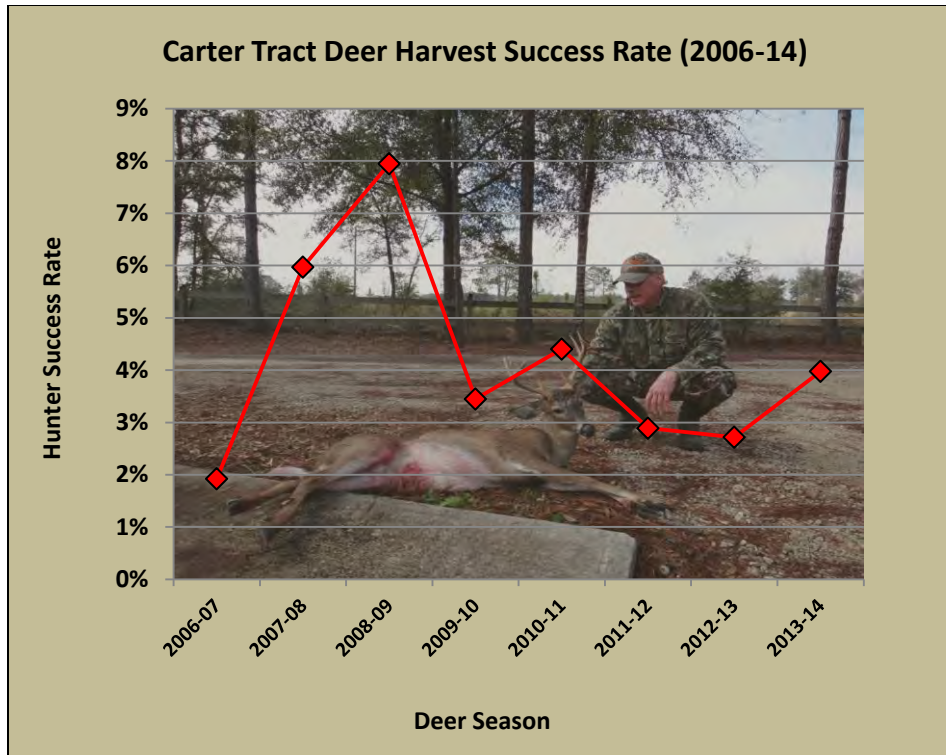


Figure 17. Overall hunter success rate from 2006 - 2014 at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

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

Table 5. Morphometric parameters of deer harvested during 2013-14 quote hunts on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

Mean Physical Parameters 2013-14							
Quota Hunt	Gender	Age (yrs)	Weight (lbs)	Antler points	Avg beam length (in)	Avg beam circum. (in)	Inside spread (in)
Archery I	Doe	1.5	60	N/A	N/A	N/A	N/A
Archery I	Buck	1.5	103	5	9 3/8	2 5/16	7 3/4
Archery II	Doe	5.5	83	N/A	N/A	N/A	N/A
General Gun I	Buck	2.5	112	6	12 4/9	2 1/2	10 1/2
General Gun I	Buck	1.5	88	6	12	3	10
General Gun II	Buck	2.5	120	7	13 1/4	2 5/8	11 1/4
General Gun III	Buck	2.5	110	8	15 3/4	3 1/8	11 1/2

Two larger racked bucks were harvested during the late January – early February (January 25 – February 2) General Gun hunts. Deer breeding chronology work by FWC’s Fish and Wildlife

Research Institute (FWRI) revealed calculated mean conception dates for the southern Washington County area to be approximately January 26th (Garrison et al., 2009). It is not surprising that the larger, more mature deer would be harvested during quota hunts which coincided later in the winter during primary rutting activity.

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. However, this may not always be the case; there was a 1.5 year-old buck killed during Archery I on Carter Tract from last year that would still be legal to kill during the 2014-15 hunts (Table 5). FWC will monitor whether the intended results of these new regulations (more older bucks) will apply to Carter Tract through harvest data collected at the check station and incidental observations in the field.

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. Eighteen other states, including Georgia and Alabama, also prohibit the importation of live cervids.

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. Thirty hunters participated in the 2014 spring turkey hunts, including six youth. No turkeys were harvested during the spring quota hunt in 2014. The turkey harvest success rate (defined as the number of gobblers harvested/man-days of effort) for the Carter Tract from 2007 – 2014 is illustrated in Figure 18. The annual hunter success rate from 2007-14 quota turkey hunts is 1 gobbler/23 man-days of effort.

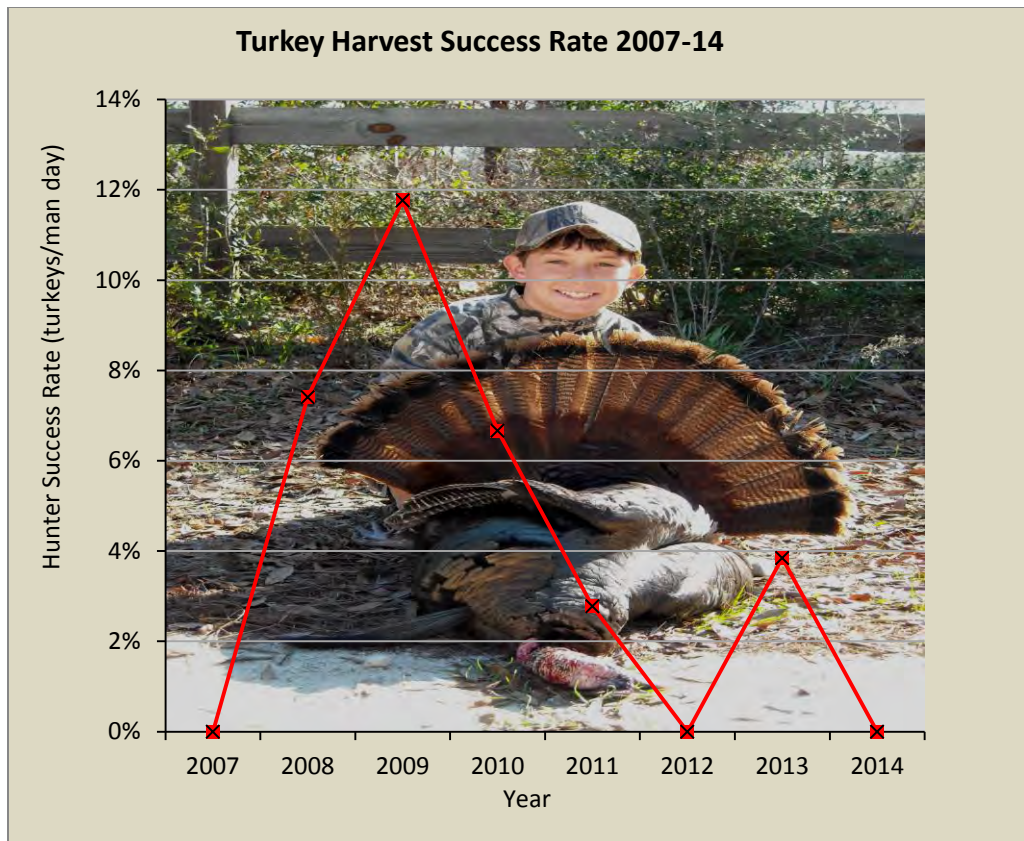


Figure 18. Turkey harvest success rate from 2007 - 2014 on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

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 should continue to improve as a more frequent burn regime is maintained for controlling scrub oaks and producing open grassy/herbaceous areas for nesting. 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 53 days to squirrel hunting and 13 days to quail hunting during the 2012-13 small game season. This is by far the highest participation since small game hunting initiated on the property in 2005 (Figure 19). Hunters harvested 41 gray squirrels, a decrease from the 47 squirrels harvested during 2012-13. Twelve bobwhites were harvested, an increase from the zero harvested during the 2012-13 season.

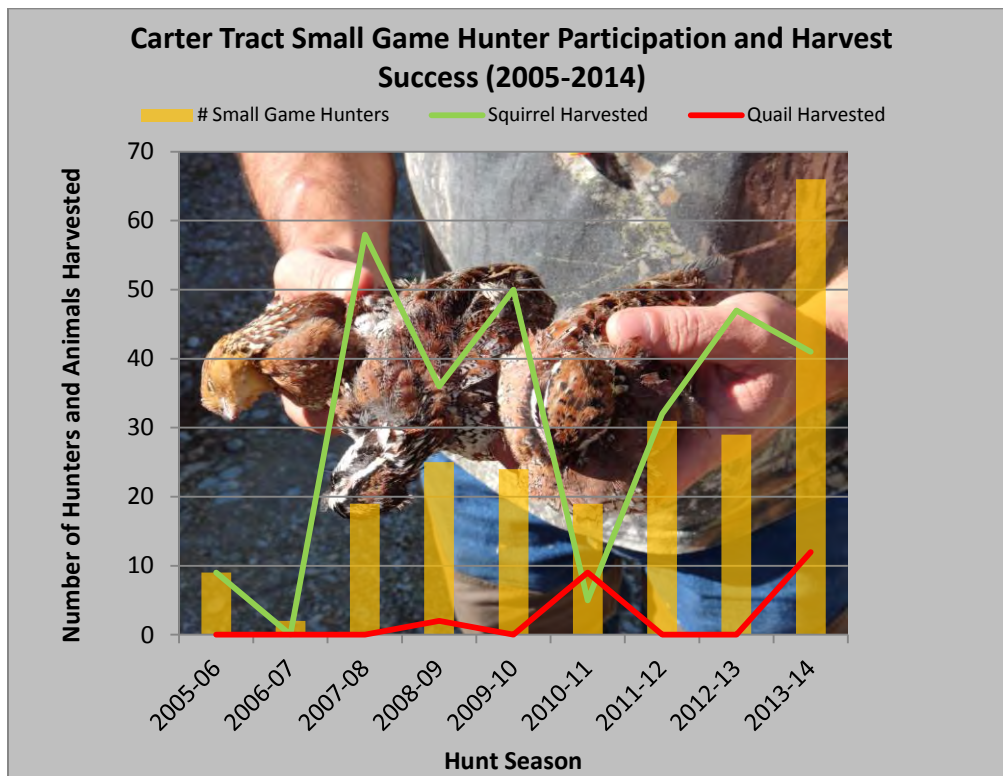


Figure 19. Small game hunter participation and harvest success on the Carter Tract of Econfina Creek WMA, Washington County, Florida, 2005 - 2014.

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 2013-14 season duck hunters spent 80 man-days hunting and harvested a total of 119 ducks, representing five species. Six wood ducks (*Aix sponsa*) and one teal (*Anas spp.*) were harvested during the September early duck season. Seventy two wood ducks, thirty seven ring-necked ducks (*Aythya collaris*), one teal (*Anas spp.*), one canvasback (*Aythya valisineria*), and one bufflehead (*Bucephala albeola*) were harvested during the general gun quota hunts and small game season. Duck hunter participation and harvest trends from 2006-13 on the Carter Tract are represented in Figure 20. Hunter participation was the greatest since the initiation of the Carter Tract hunting program. Figure 21 depicts harvest success (number of ducks harvested/man-days of hunting effort) on the Carter Tract from 2006-13. Duck hunters realized a harvest rate of 1.5 ducks/man-day during the 2013-14 hunting season. This is the highest rate since the 2008-09 season. Also, the number of species harvested remained high, with five species harvested. The opportunity to harvest multiple species of duck during a single hunting season on the same property is an opportunity that devoted duck hunters favor.

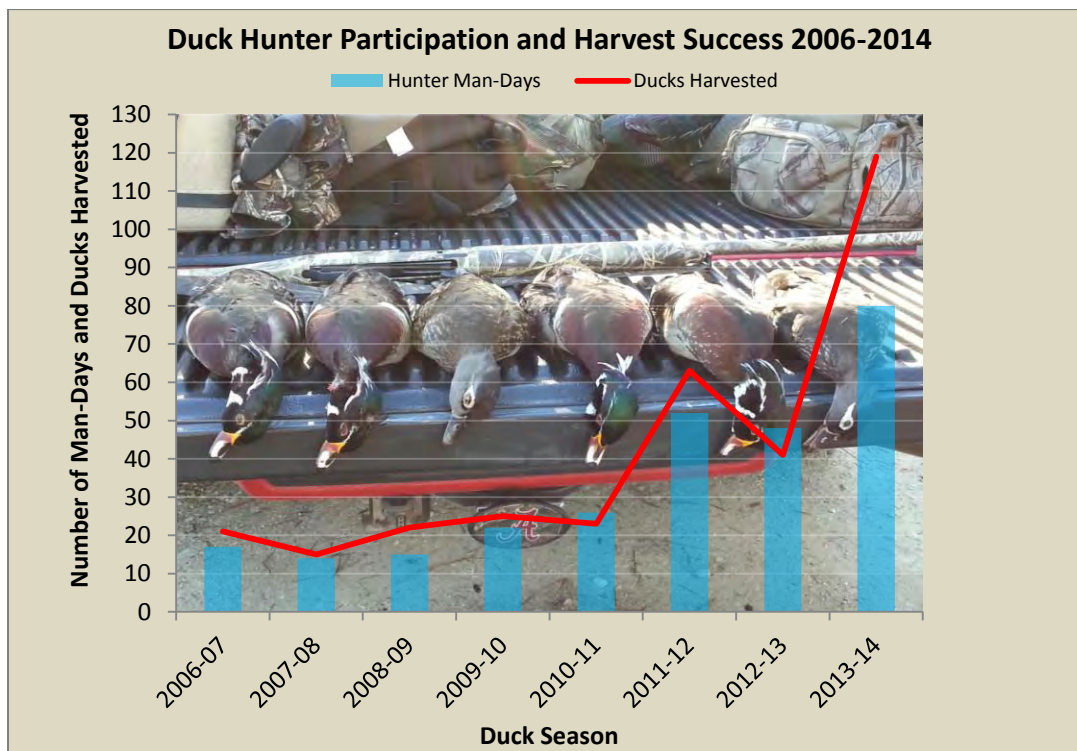


Figure 20. Duck hunter participation and harvest from 2006 - 2014 at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

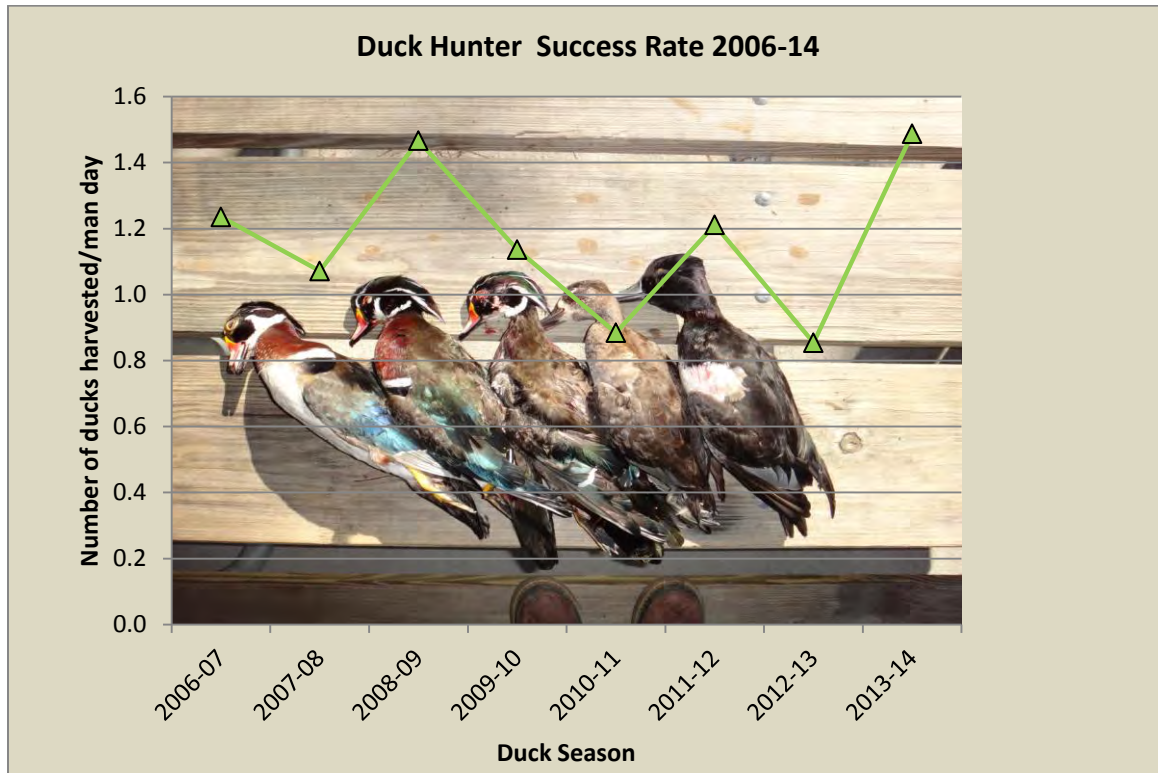


Figure 21. Duck hunter success rate (ducks harvested/man-day) on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida, 2006 - 2014.

Wood Duck Nest Boxes

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

Following initial implementation, it takes several years for a wood duck nest box project to develop (Table 6). Female wood ducks are philopatric, meaning that they typically return to the same areas from which they were hatched, and once they breed, often return to the same nesting site year after year (Hepp et al., 1987). In theory, box use each nesting season should continue to improve as ducklings reared on the Carter Tract mature and produce clutches of their own.

Figure 22 shows the location of nest boxes and associated use by year from 2006-14.

Table 6. Wood duck occupancy and percentage of boxes reused per year (2006 - 2014) on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

Year	Total boxes used	New boxes used	Previously used boxes	% boxes reused
2006	6	6	-	-
2007	11	8	3	27%
2008	5	4	1	20%
2009	21	13	8	38%
2010	29	7	22	76%
2011	24	3	21	88%
2012	21	4	17	81%
2013	23	0	23	100%
2014	21	1	20	95%

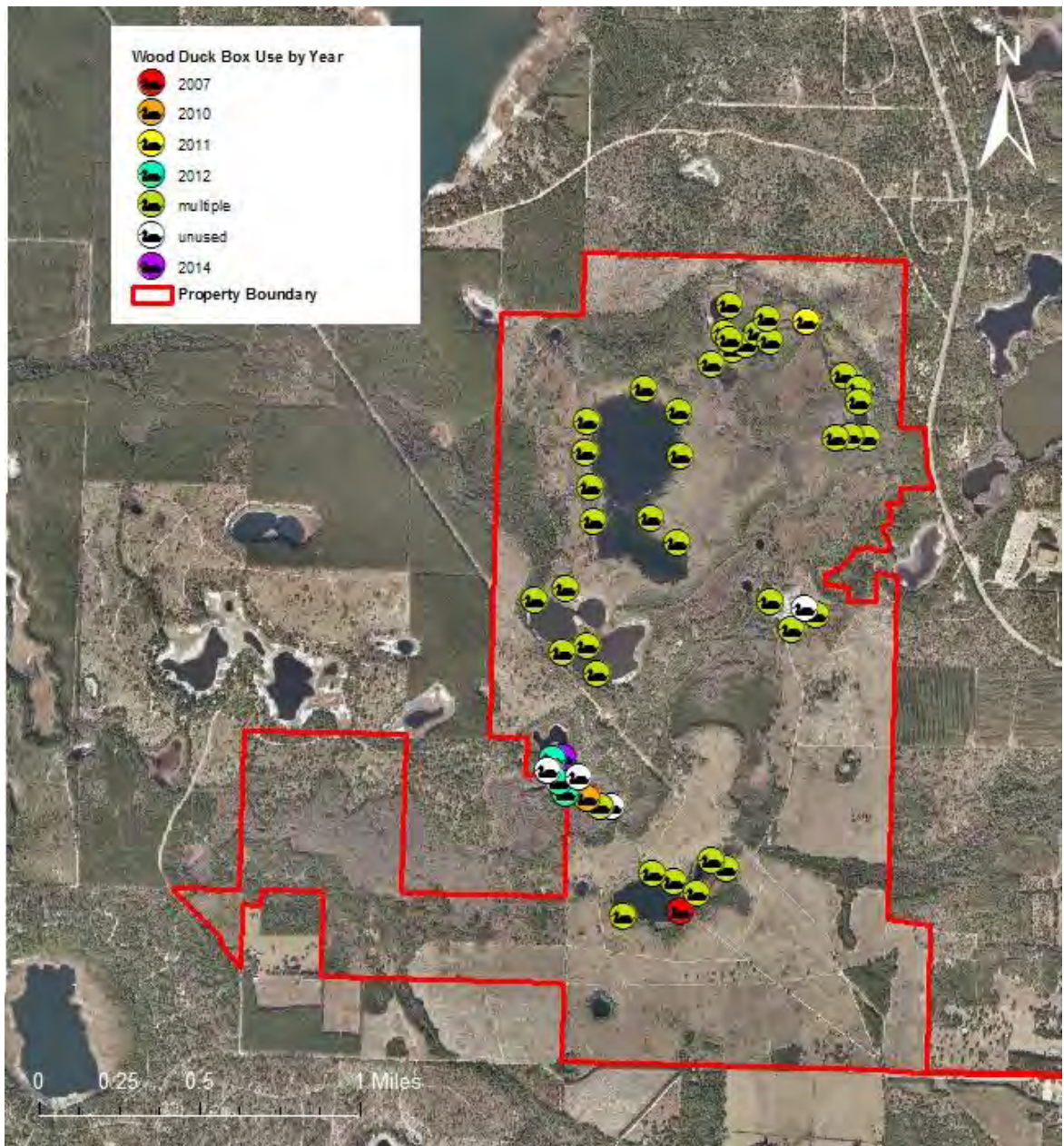


Figure 22. Use of wood duck nest boxes across the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

Sixteen wood duck boxes produced clutches during the 2014 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 7 presents these data relative to previous years. The 2014 nesting season saw 25% nesting success, with 16 clutches producing an estimated 14 ducklings. Much of the decline in nesting success is likely attributable to the water levels on the ponds at Carter Tract. Some of the boxes had water

in them during the nesting season. We believe this caused hens to abandon nests or forego nesting in the boxes during the 2014 breeding season. More 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 VI. Wood duck boxes vulnerable to flooding will be addressed in the future and either adjusted or removed.

Table 7. Reproductive success measurements of wood ducks from 2006 - 2014 on Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

Measurement	2006	2007	2008	2009	2010	2011	2012	2013	2014
total number clutches	6	11	5	21	29	26	22	23	16
average number eggs/clutch	8.2	3.1	7.8	8.1	7.8	7.4	8.4	6.4	4.7
number productive nests	2	2	2	12	14	16	20	17	4
nesting success	33%	18%	40%	57%	48%	62%	91%	74%	25%
total estimated ducklings	6	5	25	64	79	88	109	85	14
estimated ducklings/clutch	1.0	0.5	4.2	2.7	2.7	3.4	5.0	3.7	0.9

*Nests considered productive if \geq one membrane found following spring nesting season

†Nesting success measured as number of productive nests/total number of clutches

Evidence of nest box use by a variety of non-target wildlife species has also been documented over the years. Great-crested flycatchers (*Myiarchus crinitus*) are a cavity-dwelling species known for incorporating shed snake skins into nest construction (Harrison, 1975). The presence of this type of nest in several wood duck boxes on the Carter Tract suggests this species takes advantage of vacant boxes annually. Other avian species that have been documented in nest boxes on the Carter Tract include chimney swifts (*Chaetura pelagic*), eastern bluebirds (*Sialia sialis*), Carolina wrens (*Thryothorus ludovicianus*), and eastern screech owls (*Megascops asio*). Two species of mammal have also been documented inside wood duck boxes on the Carter Tract: the southern flying squirrel (*Glaucomys volans*) and southeastern myotis (*Myotis austroriparius*). We again documented use of wood duck nest boxes by southeastern myotis, eastern bluebirds, Carolina wrens, and great-crested flycatchers during the 2013 nesting season.

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 the various bird groups are conducted annually at the Carter Tract. For example, wading bird colony surveys document use of the Little Deep Edge Pond wading bird colony. 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*). Gamebird populations are monitored using fall covey call counts and 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 tends to support a viable wading bird colony that has been documented with up to 117 individuals representing six species. Great egrets (*Ardea alba*), cattle egrets (*Bubulcus ibis*), and little blue herons (*Egretta caerulea*; SSC) have historically been the most common species documented, with tricolored herons (*Egretta tricolor*; SSC), snowy egrets (*Egretta thula*), and anhinga (*Anhinga anhinga*) occasionally 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, changing water regimes have led to the relocation or decline of several species, including the little blue heron (Sibley et al., 2001). 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 done annually from April – July on the Carter Tract. Adult birds are observed first at a distance using binoculars and a spotting scope to get an accurate adult count. A 10-foot jonboat is then used to approach nesting areas in order to count nests, number of eggs, and number of chicks. Nesting areas are disturbed as little as possible while performing nest, egg, and chick counts. When possible, we calculated nesting success as: the number of chicks produced/number of eggs laid. Nests of some species are often situated in locations that are too difficult to get accurate egg counts. In these instances we did not calculate nesting success.

Over the 2014 nesting season, 14 great egret nests produced 22 chicks. Six little blue heron nests produced six chicks. Four anhinga nests produced nine chicks, and 46 cattle egret nests produced 40 chicks. No tricolored herons or snowy egrets have been observed at the wading bird colony since the 2011 nesting season. Figure 23 illustrates adult bird use and chick production of wading birds at Little Deep Edge Pond from 2008-14. Cattle egret produced the

most chicks in 2014 since wading bird colony surveys began in 2008. Little blue heron production increased slightly, while great egrets have fewer chicks in 2014 compared to 2013. A detailed summary of species observed from 2008-2014 using the Little Deep Edge Pond wading bird colony can be found in Appendix VII.

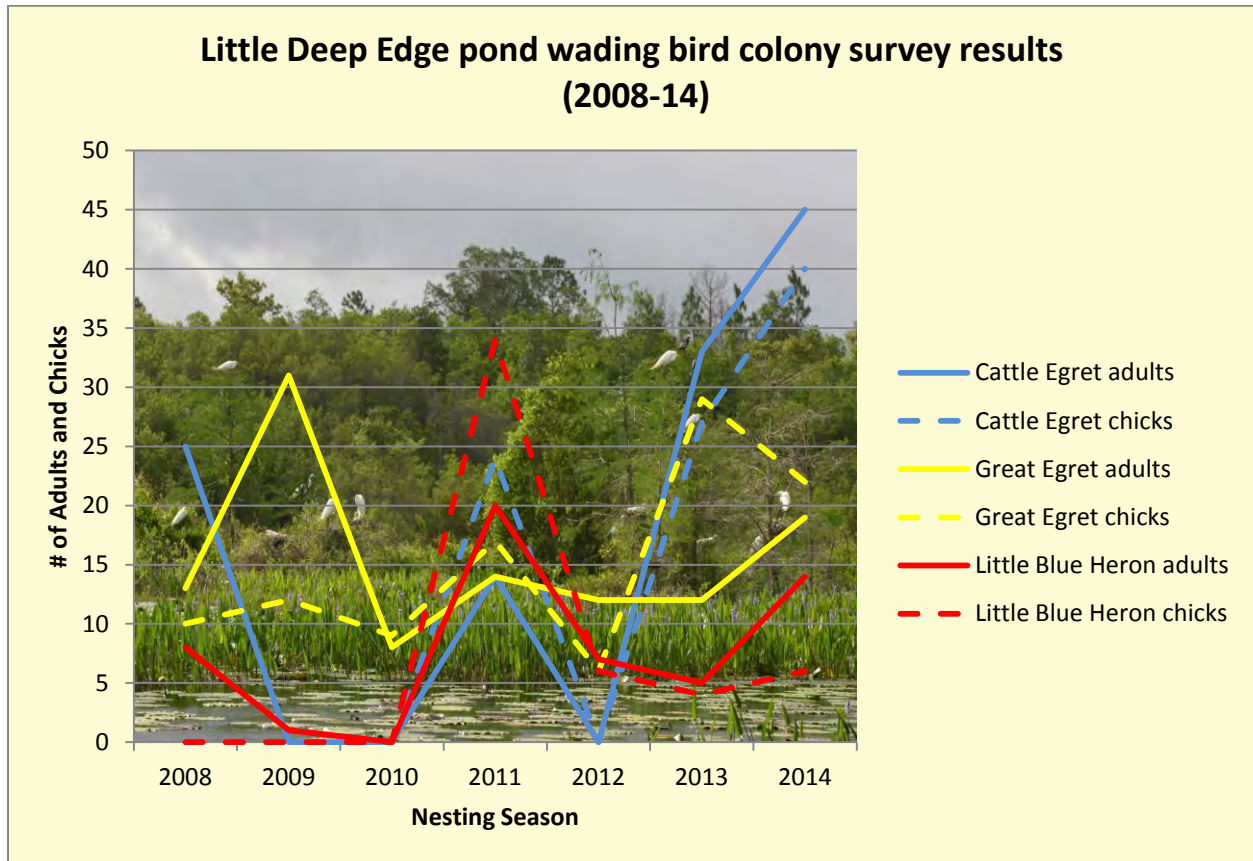


Figure 23. Adult wading birds and chicks observed on Little Deep Edge wading bird colony from 2008 - 2014, Fitzhugh Carter Tract of Econfinia Creek WMA, Washington County, Florida.

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). Point count locations are distributed among the different habitat types as follows: sandhill habitat (Points 2, 6 and 7), wetland/wading bird colony (Point 1), lake edge (Point 8), wet prairie (Point 4), mixed-hardwood forest (Point 3), and early successional grassland habitat (Point 5) that was clearcut in 2007 (Figure 24).

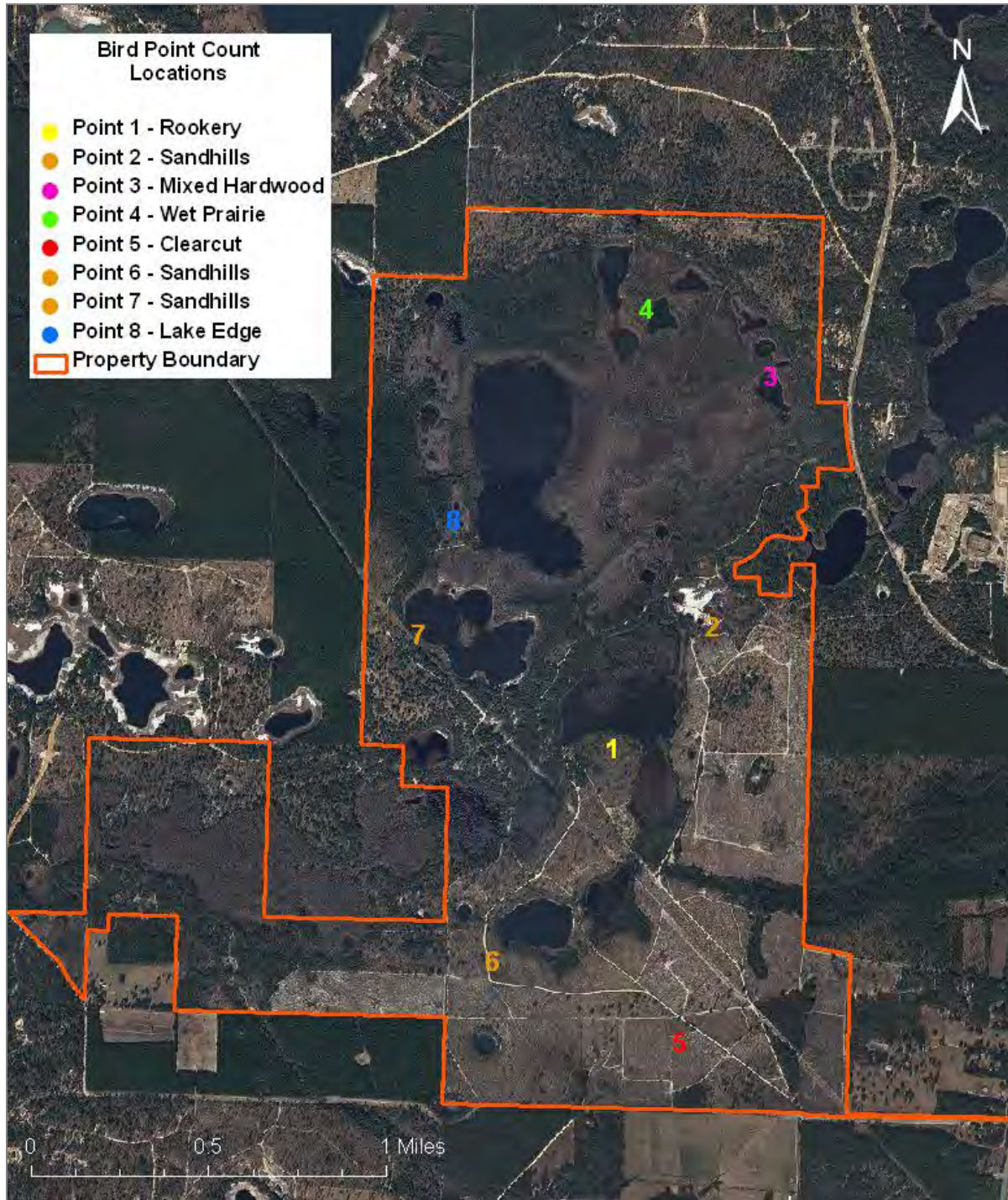


Figure 24. Location of point count surveys conducted during May 2014 on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.Figure 26.

Except for Point 3, all locations have undergone significant habitat enhancement and restoration efforts. Point counts were conducted from May 7-14, 2014. Protocol followed was consistent with that used in previous years, and closely follow procedures outlined in Hamel et

al. (1996). 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 four 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. Only birds positively identified were listed by species; other birds seen and/or heard were marked as “unknown”, with distinct plumage characteristics or call patterns noted for later identification. All birds were positively identified during the 2014 surveys.

The three sandhill point count locations chosen were spatially distinct to represent the entire area of the Carter Tract and were similar in vegetative composition (tree stem density and plant species). Twenty-eight bird species were documented within the 75-meter radius in sandhill habitats. The most common species identified were the cedar waxwing (*Bombycilla cedrorum*), northern mockingbird (*Mimus polyglottos*), eastern bluebird (*Sialia sialis*), and eastern towhee (*Pipilo erythrophthalmus*; Figure 25). Species relative use of this habitat type was similar to that seen in previous years. Brown-headed nuthatches (*Sitta pusilla*) and downy woodpeckers (*Picoides pubescens*) were documented in mature pines while eastern meadowlarks (*Sturnella magna*) and blue grosbeaks (*Passerina caerulea*) commonly used young longleaf pines to perch and sing. Species count trends within sandhill habitats suggest that management activities designed to control hardwoods, promote herbaceous groundcover (i.e. herbicide and prescribed burning), and encourage longleaf pine growth have created a vegetative structure and composition that attract a diverse assemblage of bird species.

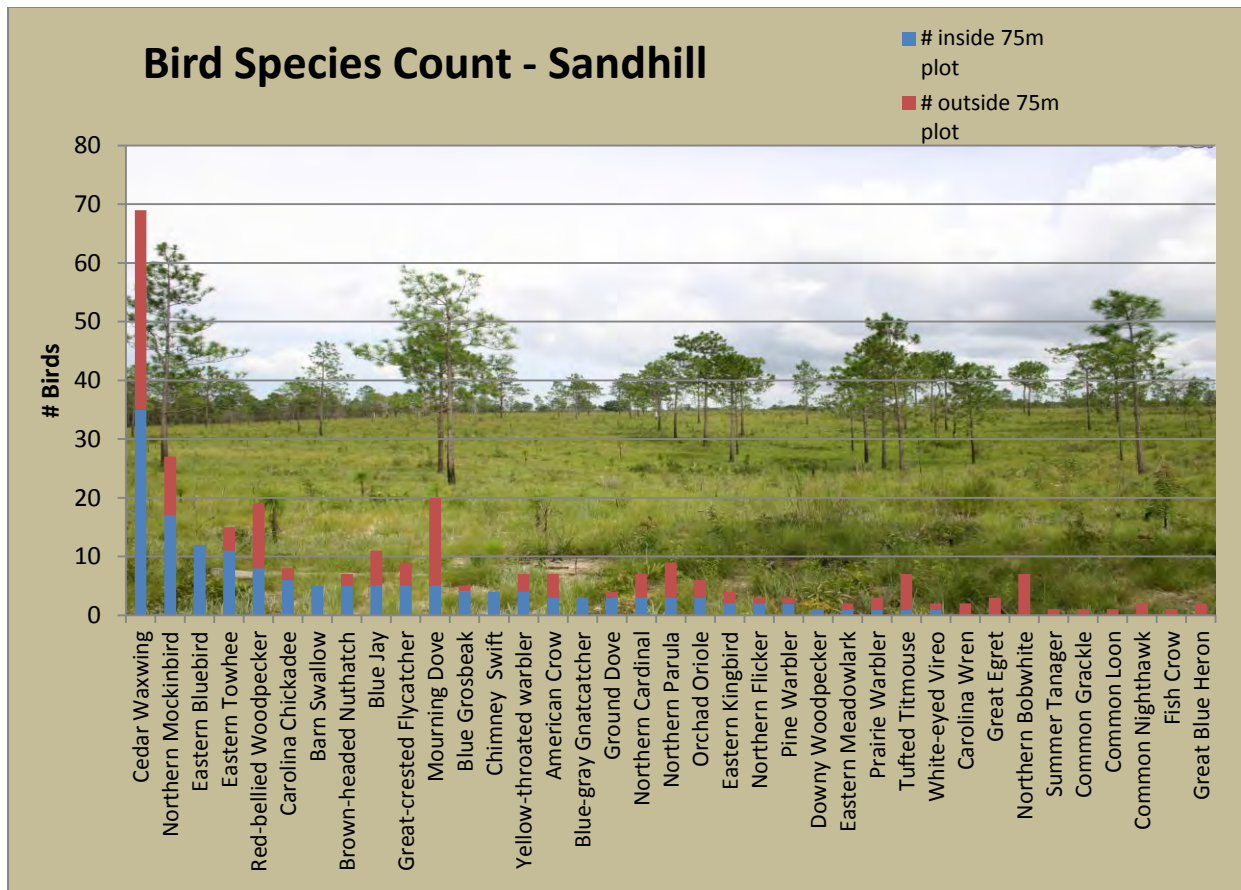


Figure 25. Bird species abundance in sandhill habitats during May 2014 point counts on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

The wetland point count location contains a mixture of open water and freshwater marsh, with a transition zone of emergent aquatic vegetation and shrubs merging with a steep-sloped hardwood hammock adjacent to sandhill uplands. The wading bird colony on Little Deep Edge Pond is just outside this point count. Twenty-one species were documented utilizing this habitat type. Cattle egret was the most common species documented at this plot using the rookery located nearby (Figure 26). Common grackles (*Quiscalus quiscula*) and red-winged blackbirds (*Agelaius phoeniceus*) were the most common species documented in the marsh. Northern parulas (*Parula americana*), blue-gray gnatcatchers, white-eyed vireos (*Vireo griseus*), yellow-billed cuckoos (*Coccyzus americanus*), Carolina wrens, and eastern bluebirds were identified utilizing the hardwood hammock transition zone.

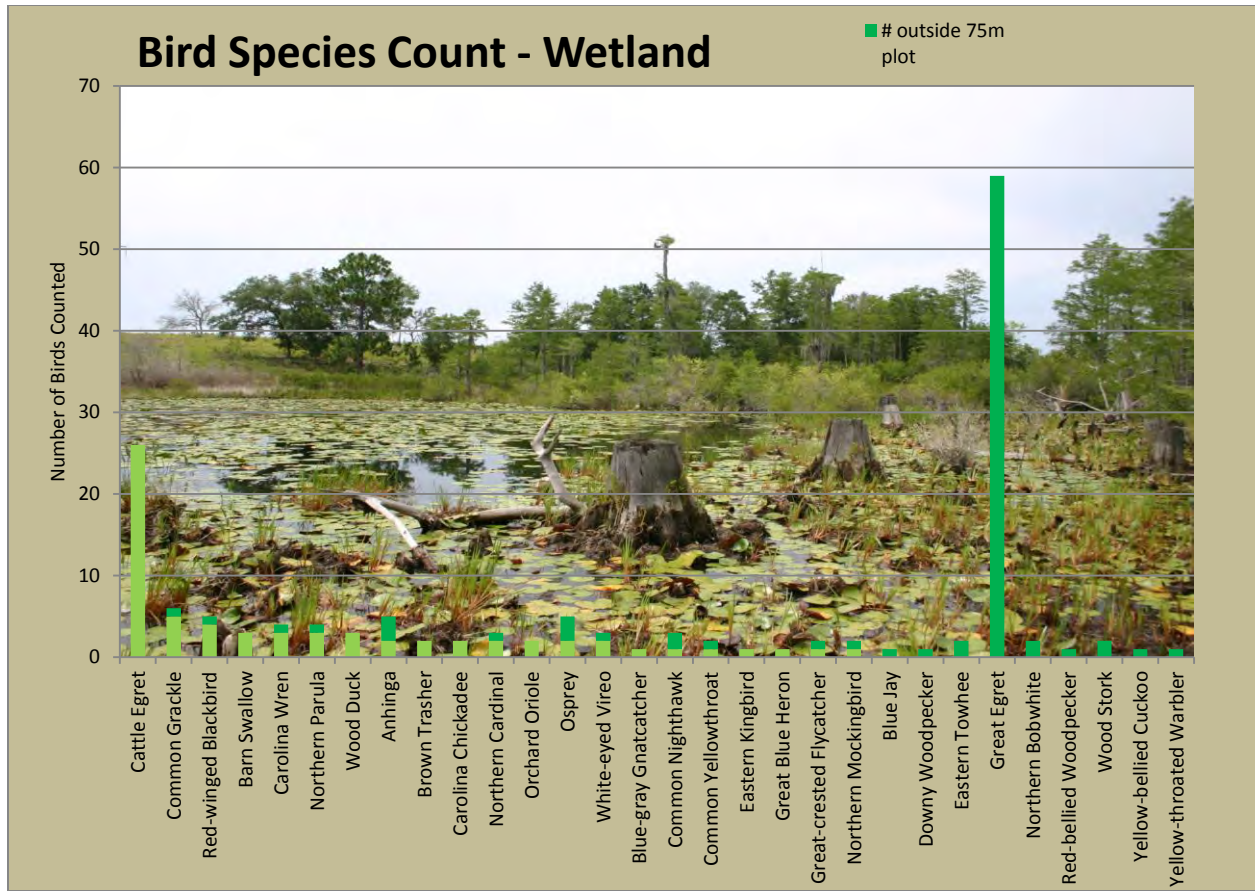


Figure 26. Bird species abundance in wetland habitat during May 2014 point counts on the Fithugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

The lake edge point count location is made up of a large body of open water (Dry Pond), and shrubby transition zone leading to hydric pine on one side and mixed wetland hardwoods on the other. This count therefore yields species found in both aquatic and pine flatwoods habitat types. Twenty species were documented at this point count location. The most common species identified in mature pine trees were the brown-headed nuthatch, yellow-throated warbler (*Dendroica dominica*), pine warbler, northern parula, and great-crested flycatcher (Figure 27). Eastern kingbirds (*Tyrannus tyrannus*), eastern towhees (*Pipilo erythrophthalmus*), and Carolina wrens were common in the shrubby transition between lake edge and pine flatwoods. Several standing dead pine trees within this point count make this location a hot-spot for primary and secondary cavity nesters. Primary cavity nesters documented included the red-bellied woodpecker (*Melanerpes carolinus*) and pileated (*Dryocopus pileatus*) woodpeckers, and the brown-headed nuthatch. Because of its restricted range, dependence on mature pine-savannah habitats, and declining population trend in Florida since 1966 (Sauer et. al., 2008), the brown-

headed nuthatch is a species of high conservation importance (U.S. Fish and Wildlife Service, 2008). Secondary cavity nesters observed included the eastern bluebird.

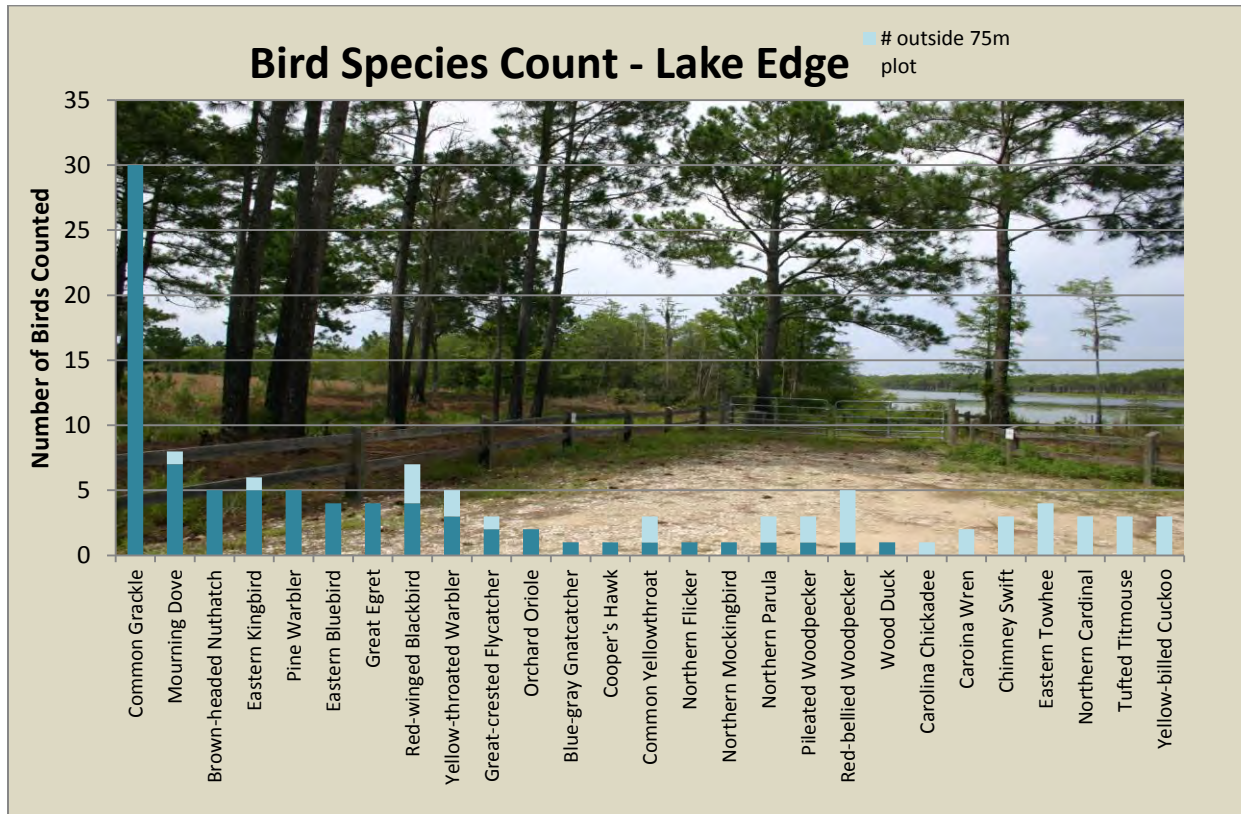


Figure 27. Bird species abundance in lake edge habitat during May 2014 point counts on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

The wet prairie point count location is adjacent to the cypress swamp connecting Dry and Green Ponds. Half of this location is comprised of semi-flooded shrub swamp with pond cypress (*Taxodium ascendens*) overstory, while the other half is mesic grassland prairie with mature pine making up the overstory. Sixteen species were documented at this point count. The most common species identified were the red-winged blackbird, great-crested flycatcher, blue-gray gnatcatcher, and eastern kingbird (Figure 28). Species composition was similar to that documented in previous years.

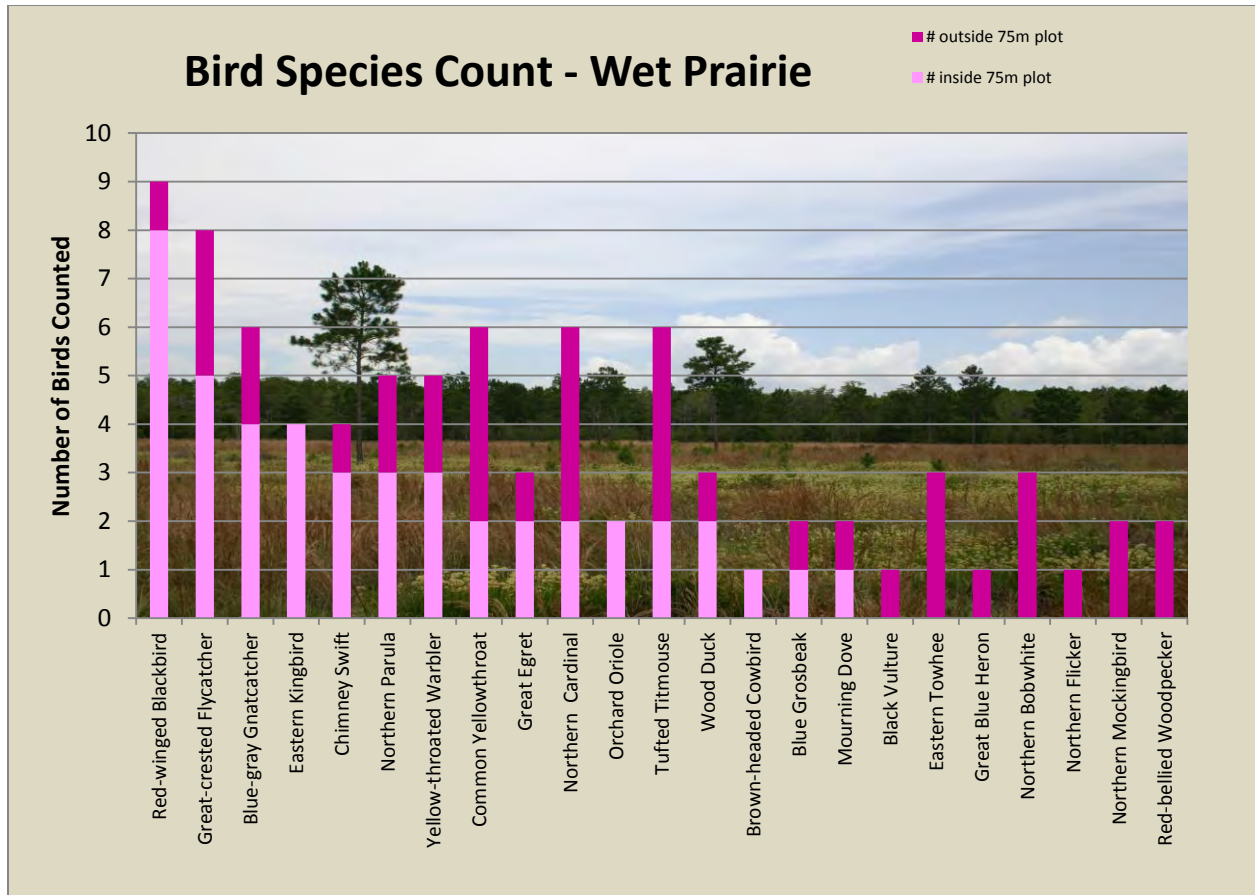


Figure 28. Bird species abundance in wet prairie habitat during May 2014 point counts on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

The mixed hardwood point count location is dominated by live oaks, bays, and holly trees that provide a closed canopy. Nine species were documented at this location. Northern parula, blue-gray gnatcatcher, red-eyed vireo (*Vireo olivaceus*), and Carolina wren were the most common species documented (Figure 29). These species have consistently made up the majority of observations within this habitat type over the last few years. This is likely because the habitat has not been altered in the way that the other point count locations throughout the property have.

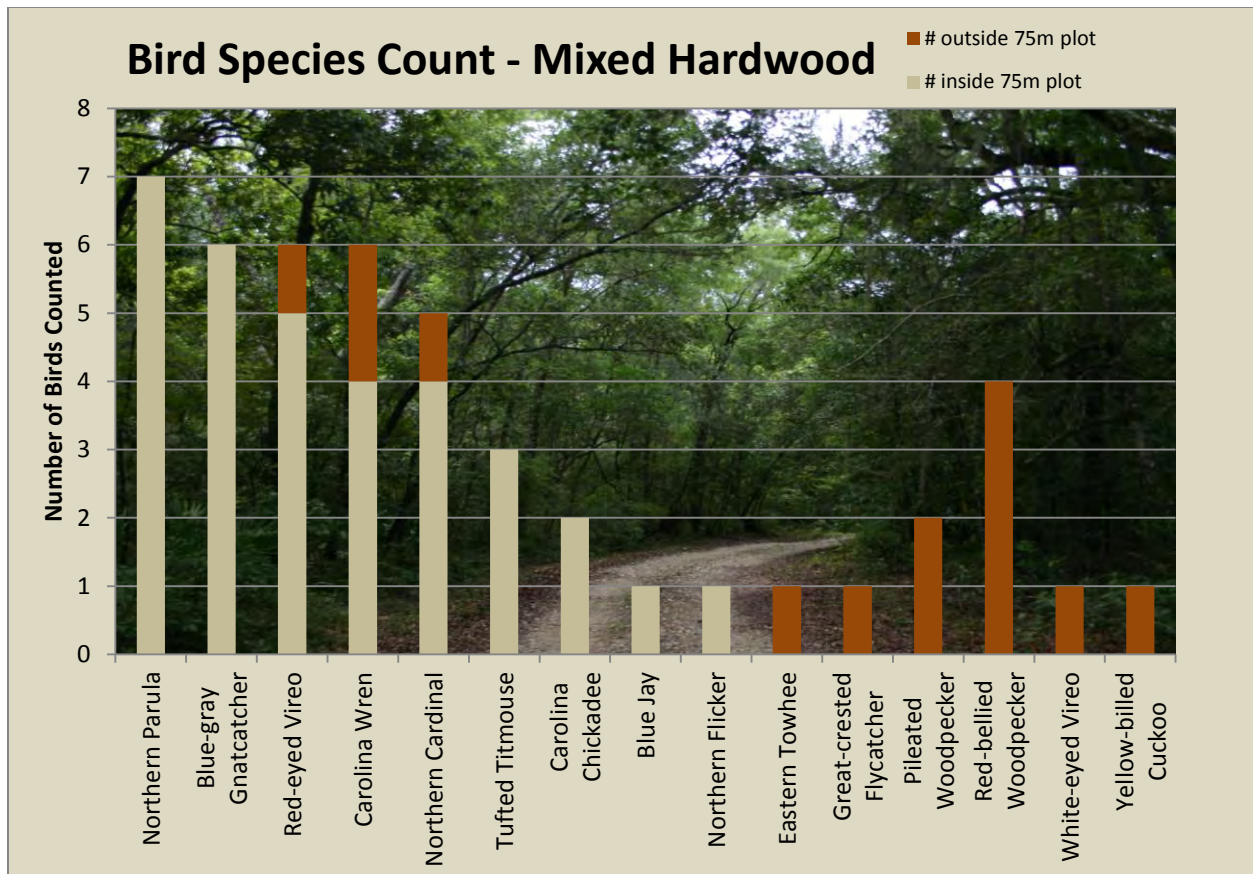


Figure 29. Bird species abundance in mixed hardwood forest habitat during May 2014 point counts on the Fitzhugh Carter Tract of Econfina Creek WAM, Washington County, Florida.

The grassland point count location is a former pine plantation that was clearcut in 2007. Current vegetative composition in this area is typical of early successional habitat types, consisting primarily of *Hypericum* sp., foxglove beardtongue (*Penstemon digitalis*), *Lespedeza* sp., wiregrass, broomsedge (*Andropogon virginicus*), and persimmon (*Diospyros virginiana*). Significant sand pine regeneration had also occurred within this point count location at the time surveys were conducted. Seven species were documented in this habitat type; the barn swallow (*Hirundo rustica*) and northern mockingbird being the most abundant within the plot (Figure 30). Eastern bluebirds, mourning doves, and tufted titmice (*Baeolophus bicolor*) were also documented but less abundant. It is likely that the bird community at this grassland site will continue to evolve in subsequent years as native groundcover becomes established with frequent prescribed fire and longleaf pine seedlings emerge from the grass stage and begin to mature. Control of sand pine regeneration via mechanical reduction/herbicide in combination with prescribed fire will aid and hasten the groundcover restoration process at this location.

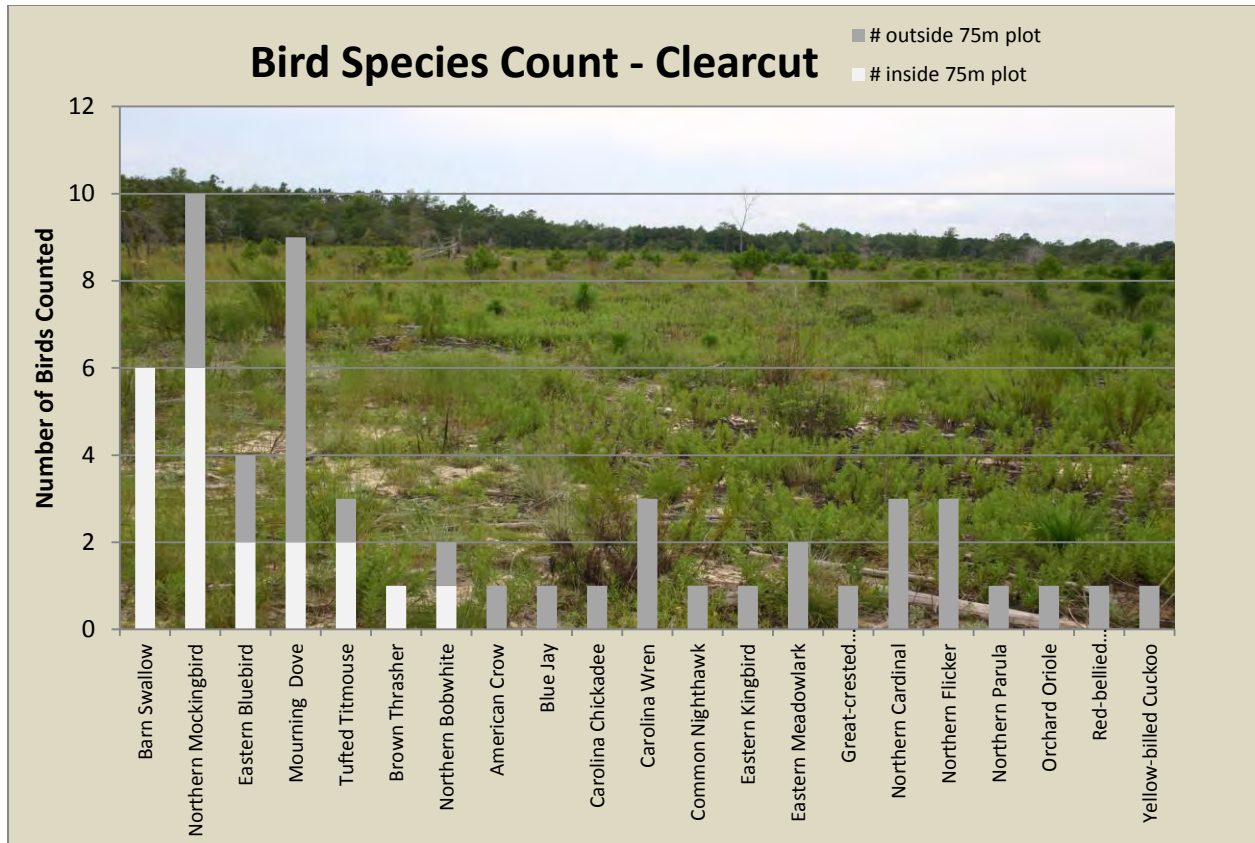


Figure 30. Bird species abundance in clearcut/grassland habitat during May 2014 point counts on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

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 NFWFMD, have resulted in a piece of property representing multiple habitat types, each of which contribute to the overall high diversity of avian life which utilizes the property. To date, 124 species of bird have been documented as occurring on the Carter Tract (Appendix VIII).

Point count data over the last seven 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 – 2014 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 31. Of the six habitat types surveyed during the spring 2014 point counts, the sandhills, wet prairie, and wetland point counts yielded the highest species diversity. These locations have consistently maintained some of the highest bird diversity levels annually on the Carter Tract. The decrease in the lake edge diversity may be attributable to the high water levels seen during the point counts that altered the amount of edge habitat available within the 75-meter radius buffer. We suspect the dramatic dip in H' for the sandhills point count during 2011 was due to a large flock ($n=221$) of cedar waxwings observed during the survey. The unevenness of that observation in relation to the number of individuals of the other species observed decreased the overall species diversity significantly.

It is not surprising that the mixed hardwood and clearcut/grassland habitat types tend to yield lower H' . The mixed hardwood point count is a closed canopy hardwood hammock with a thick, shaded understory and little herbaceous groundcover. This habitat type yields fewer generalist species, but harbors habitat specialists like the red-eyed vireo, blue-gray gnatcatcher, and northern parula that forage and nest within the shaded canopy. The clearcut/grassland point count is located within the sandhill uplands, but has been slow to establish the wiregrass/longleaf pine and herbaceous groundcover community that much of the rest of the sandhill habitat has. A lack of compositional vegetative structure and diversity for foraging and nesting within this point count likely explains the lower diversity of birds observed annually.

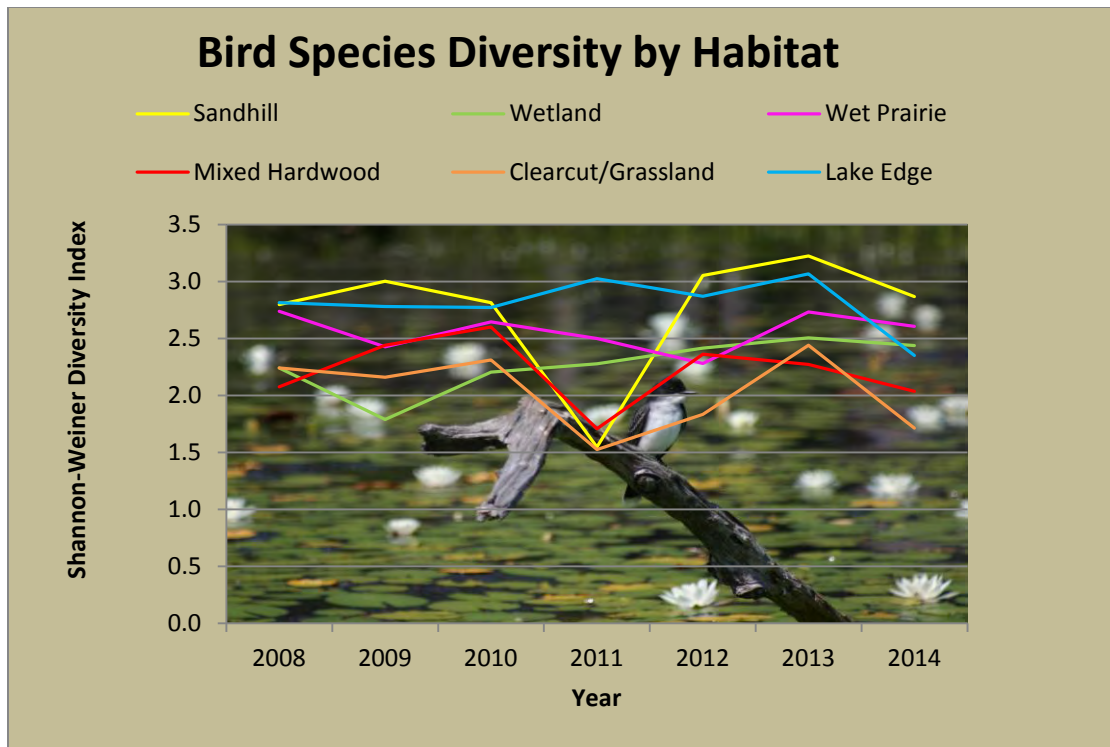


Figure 31. Shannon Wiener Diversity Index (H') compared from 2008 - 2014 among habitat types at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

The diversity of bird life seen across the Carter Tract is a testament to the success of habitat restoration efforts on the property to date. In addition to formal annual spring point counts, incidental observations are also made throughout the year to document bird species utilizing the Carter Tract. Immature and mature bald eagles (*Haliaeetus leucocephalus*), the federally threatened wood stork (*Mycteria americana*), merlins (*Falco columbarius*) and American kestrels (*Falco sparverius*) have all been documented using the Carter Tract. Bird species count should further increase as the various habitat types on the area continue to be enhanced by restoration efforts and subsequent prescriptions.

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 3.5 – 5 ft 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 (Figure 32). 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, Carolina chickadees (*Poecile carolinensis*), tufted titmice, and great crested flycatchers (*Myiarchus crinitus*) utilized 17 out of 18 nest boxes during the 2014 spring nesting season. Bluebirds constructed 28 nests, laid an average of 3.4 eggs/clutch, and fledged 22 chicks (Table 8). Tufted titmice built two nests, laid an average of 3.5 eggs/clutch, and fledged zero chicks. Carolina chickadees built four nests, laid an average of 1.5 eggs/clutch, and fledged zero chicks. Finally, great crested flycatchers built one nest with five eggs that fledged zero chicks. Egg success rate (number of fledged chicks/total number of eggs produced) was 22.9%, 08%, 0%, and 0% for bluebirds, titmice, chickadees, and great crested flycatchers, respectively. Bluebird and tufted titmice production decreased, while chickadee production remained zero during the 2014 nesting season. This year was the first season great crested flycatchers attempted nesting in bluebird boxes. Nineteen nests appeared to have been predated during the 2014 nesting season, an increase from the 10 nests predated in 2013.

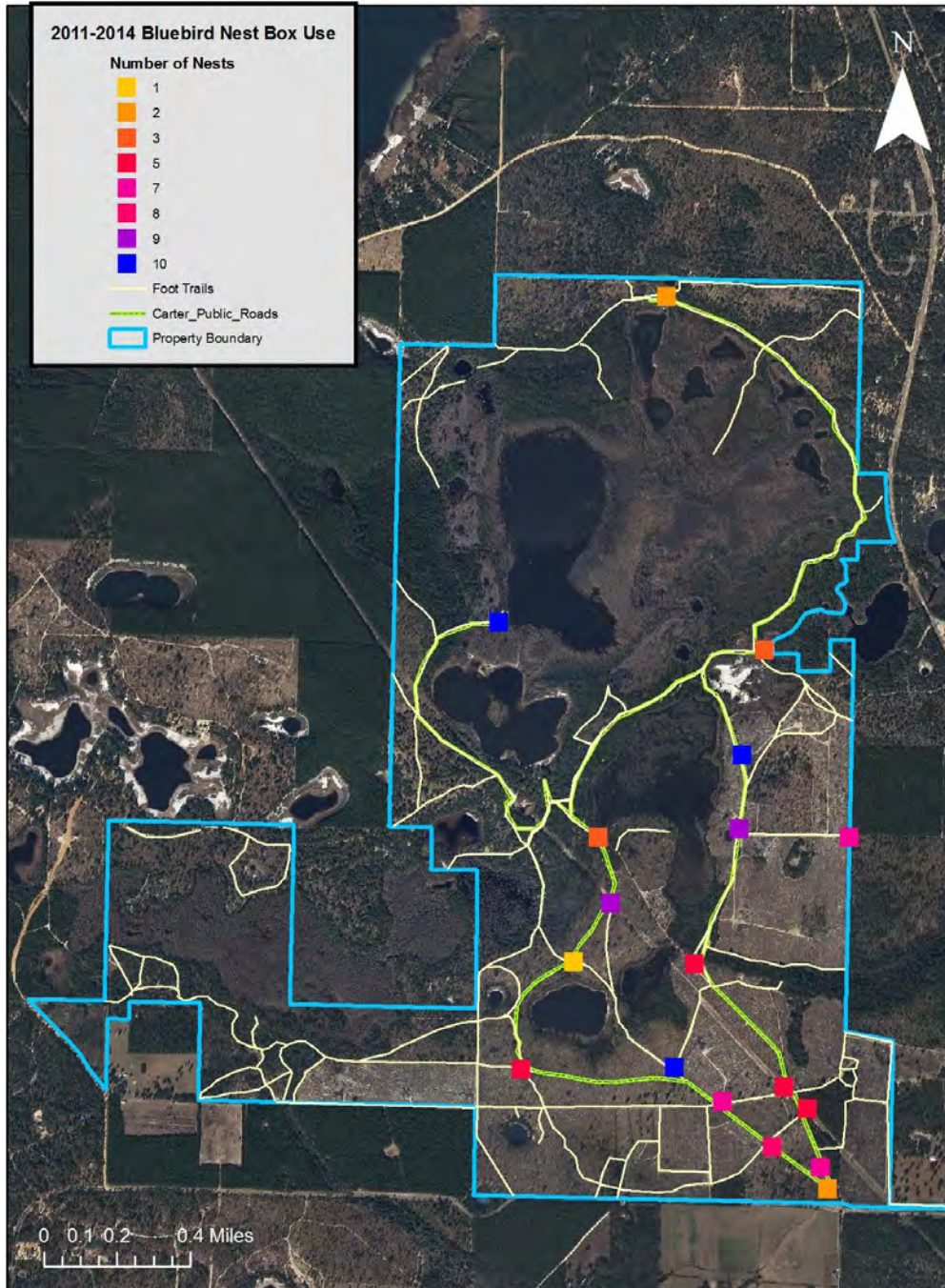


Figure 32. Location and use of bluebird nest boxes from 2011 - 2014 on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

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. The 68% predation rate warrants the installation of predator guards at the nest box sites.

We will explore options to secure predator guards to the bluebird nest box fence posts prior to the 2015 nesting season.

Table 8. Bluebird box occupancy, egg success, and nest success during spring 2011 - 2014 on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

Year	Species	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	Carolina chickadee	5	21	4.2	3	12	6	28.6%	60.0%
	Eastern bluebird	18	78	4.3	8	22	15	19.2%	44.4%
2012	Carolina chickadee	4	19	4.8	1	5	5	26.3%	25.0%
	Eastern bluebird	24	106	4.4	15	59	48	45.3%	62.5%
2013	Carolina chickadee	1	2	2.0	0	0	0	0.0%	0.0%
	Eastern bluebird	24	100	4.2	17	59	51	51.0%	62.5%
	Tufted titmouse	2	11	5.5	2	9	9	81.8%	100.0%
2014	Carolina chickadee	4	6	1.5	0	0	0	0.0%	0.0%
	Eastern bluebird	28	96	3.4	7	27	22	22.9%	25.0%
	Great crested flycatcher	1	5	5.0	1	4	0	0.0%	0.0%
	Tufted titmouse	2	7	3.5	0	0	0	0.0%	0.0%

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 at the Carter Tract during winter and early spring annually. 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). In 2013, one kestrel box was removed because of continued use by southern flying squirrels; the map depicted in Figure 33 shows the location of the remaining seven boxes.

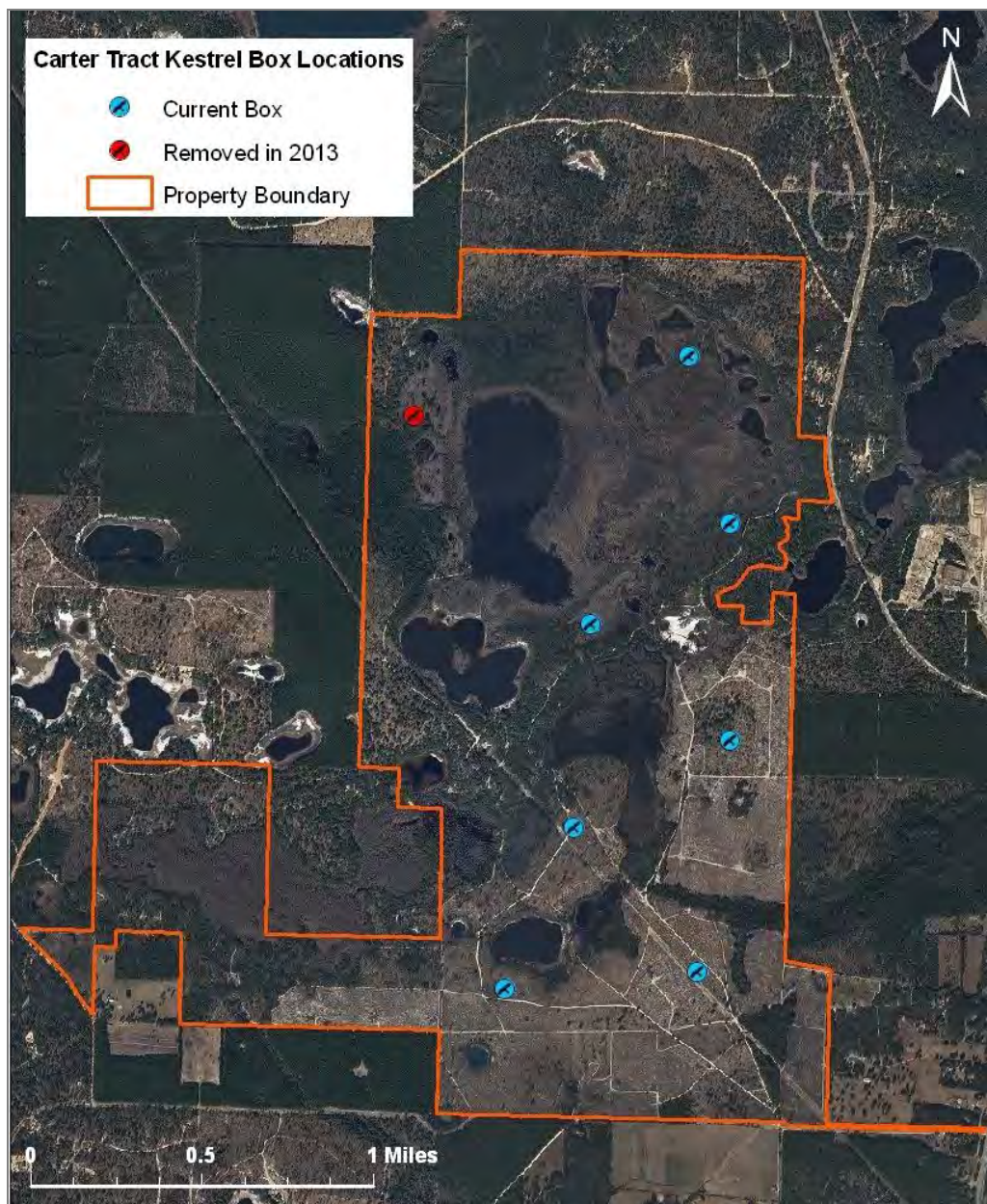


Figure 33. Location of kestrel nest boxes at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

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 2014. Non-target species documented using kestrel boxes included eastern bluebirds, great-crowned flycatchers, and flying squirrels. Breeding kestrels do not always utilize nest boxes immediately following installation. 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 2015 nesting season (February – June).

Quail Covey Call Counts

Determining autumn density of northern bobwhite populations can be important for estimating population response to land management activities. Upland habitat restoration activities on the Carter Tract (i.e. establishment of an herbaceous understory, hardwood control, establishment of a 2-3 year prescribed burn rotation) benefit bobwhite populations by providing the right combination of bare ground (for foraging) and herbaceous cover (for nesting and brooding). On areas with extremely low autumn densities (<1 bobwhite/25 acres or 1 covey/300 acres) early morning covey call counts may be the only realistic survey technique. Because a calling covey in the early morning will stimulate other coveys to call, a good technique when surveying low density areas is to stimulate calling by broadcasting taped recordings of covey calls (Wellendorf et al. 2004).

Covey call counts were performed at the Carter Tract from November 12 – 22, 2013. Nine call count stations were established throughout the property, with survey locations chosen based on habitat, incidental observations of bobwhite activity on the property, and adherence to a 500-meter buffer zone between count stations (Figure 34). Surveys began approximately 30 minutes prior to official sunrise and generally lasted one hour. A pre-recorded calling sequence was downloaded to an mp3 player and projected through portable speakers. The call was played for ten second loops with one minute breaks in between loops to listen for response calls. This iteration process was repeated until official sunrise, and the speaker was rotated 360 degrees to project the call in all directions. The relative locations of coveys within the 500-meter survey station (Appendix IX) were noted during the survey and attempts were made at the end of the

survey to flush each covey to count the number of birds. Surveys were performed on mornings with the following weather conditions: wind speed less than eight miles/hour, cloud cover less than 75%, barometric pressure had not dropped >0.05 inches/Hg in the six hours prior to the survey, and no rain.

Covey call counts during November 2013 resulted in response of two coveys to call stimulation recordings. Figure 34 illustrates the location of coveys heard during surveys. The primary purpose of covey call counts on the Carter Tract is to monitor bobwhite population trends as restoration activities continue to improve habitat quality across the property. The small number of coveys heard, along with the emergence of the summer whistle count survey, led us to drop the bobwhite fall covey count from future surveying efforts. Detectability issues confound fall covey call surveys, as Wellendorf et al. (2004) found over 40% of coveys did not call prior to leaving the roost. We will rely on the summer whistle counts to monitor quail population trends in gauging restoration management activities as they relate to this species. Northern bobwhites have been identified by FWC as a WCPR (Wildlife Conservation Prioritization and Recovery) focal species because they are highly responsive to active management activities such as prescribed fire. As a result, the continued use of management practices like prescribed fire should increase their populations at the Carter Tract, as well as other open canopy forest and grassland species.

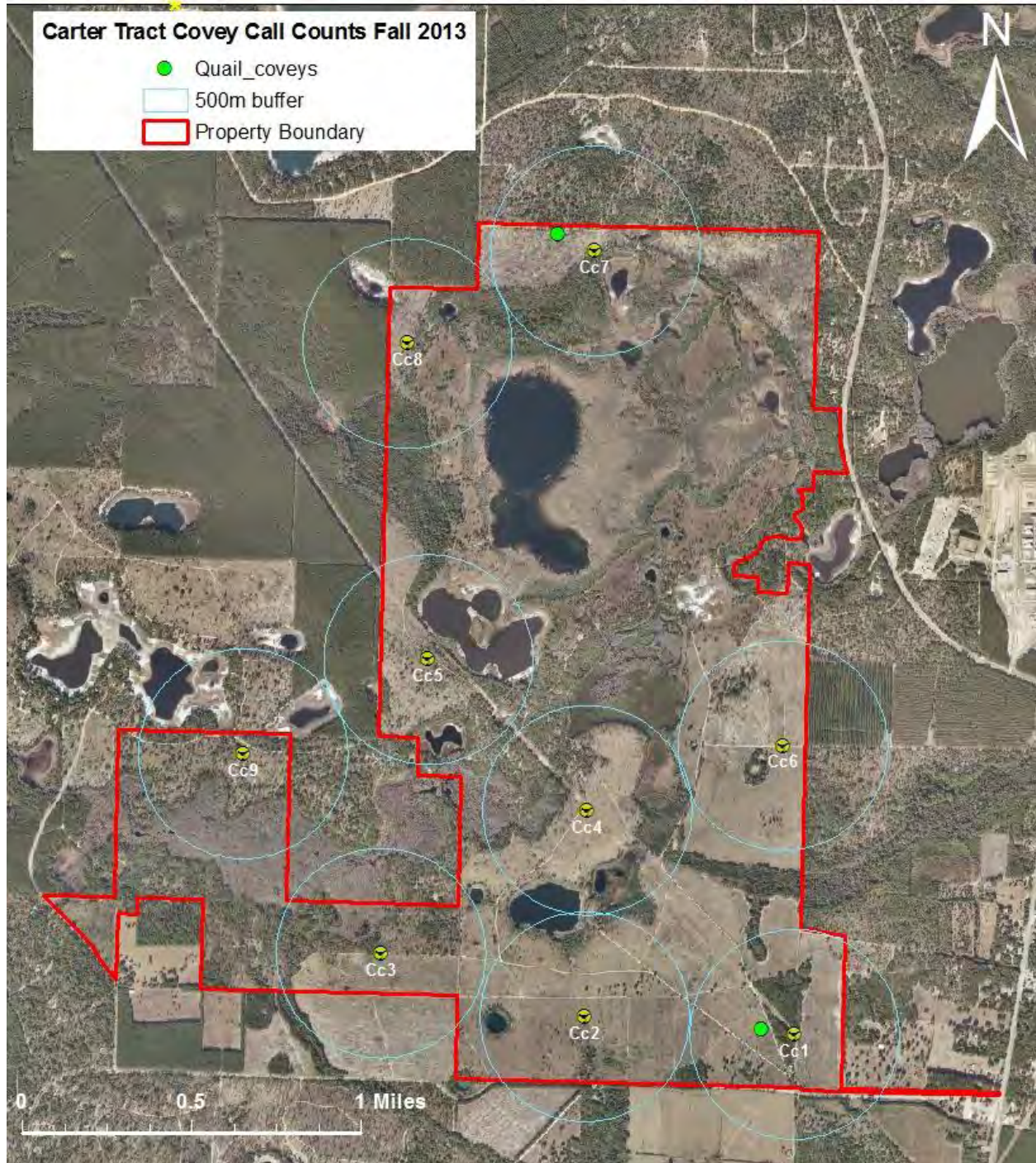


Figure 34. Northern bobwhite covey call count stations (with 500-m buffers) conducted November 2013 at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida; also shown are approximate covey locations.

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., 2006). We therefore chose to conduct summer whistle counts for northern bobwhites in order to analyze this data in concert with results from covey call counts and subsequent harvest success of bobwhites on the Carter Tract.

Whistle count surveys were conducted from June 9 - 30, 2014. 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. (2006). 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., 2006), and thus should be a more robust indicator of overall population estimates. Rosene (1984) and Terhune et al. (2006) 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 (Figure 35). One-half mile buffers were maintained between stations to decrease the possibility of double-counting birds. Surveys were not conducted when cloud cover was >50%, wind speed exceeded 12 mph, or under rainy conditions.

Figure 36 illustrates the mean number of bobwhites detected for each listening station. Bobwhites were detected at 10 listening stations during 2014 surveys. Our 2014 survey results differed from 2013 in that whistles were detected at listening stations 1-3, 11, 12. The habitat surrounding these listening stations has received the most management (prescribed fire, sand pine/hardwood removal, wiregrass/longleaf pine planting) and the higher bobwhite whistle count is a testament to these management activities.

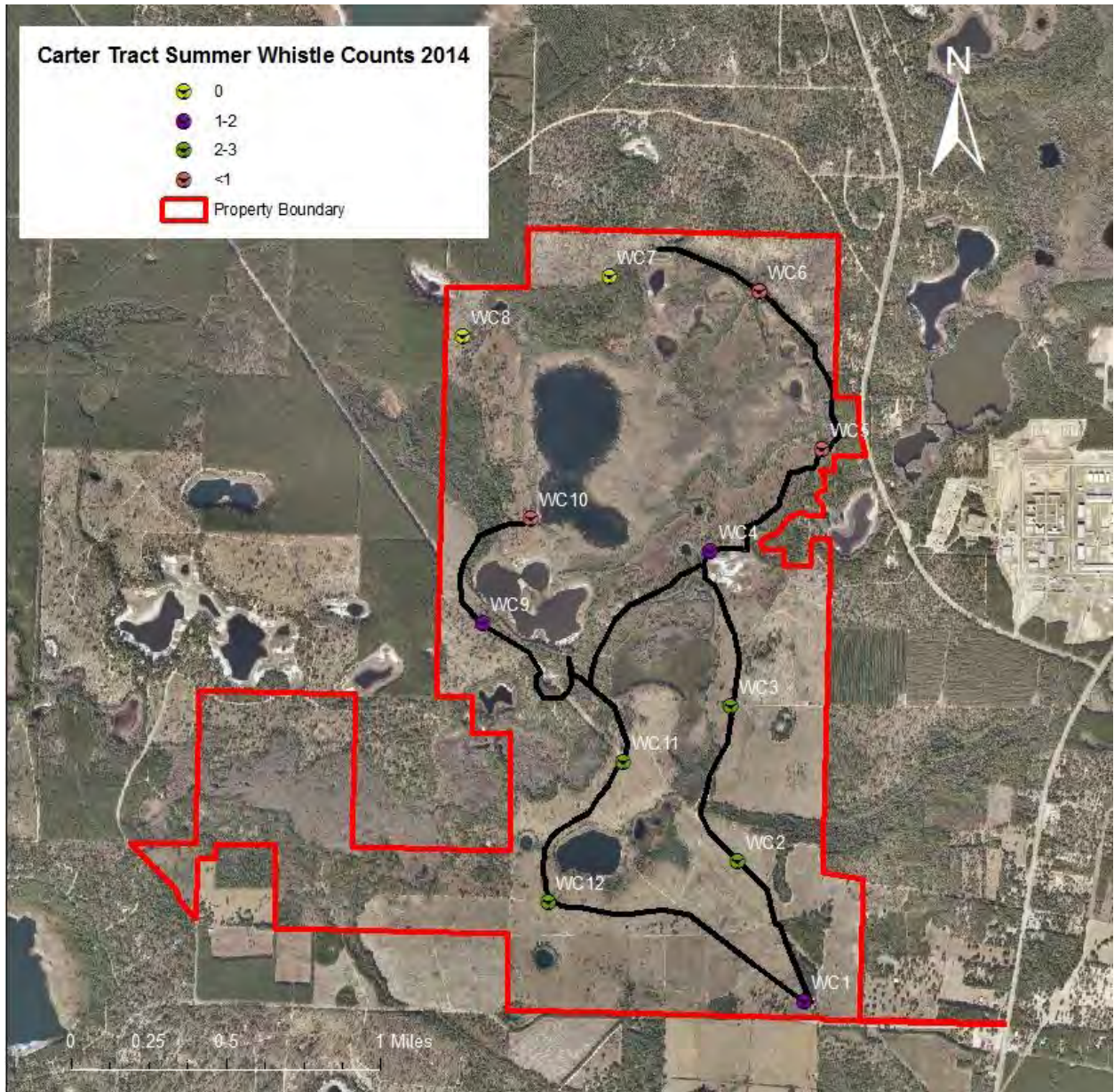


Figure 35. Mean number of northern bobwhites counted at each summer whistle count survey station in June 2014 on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

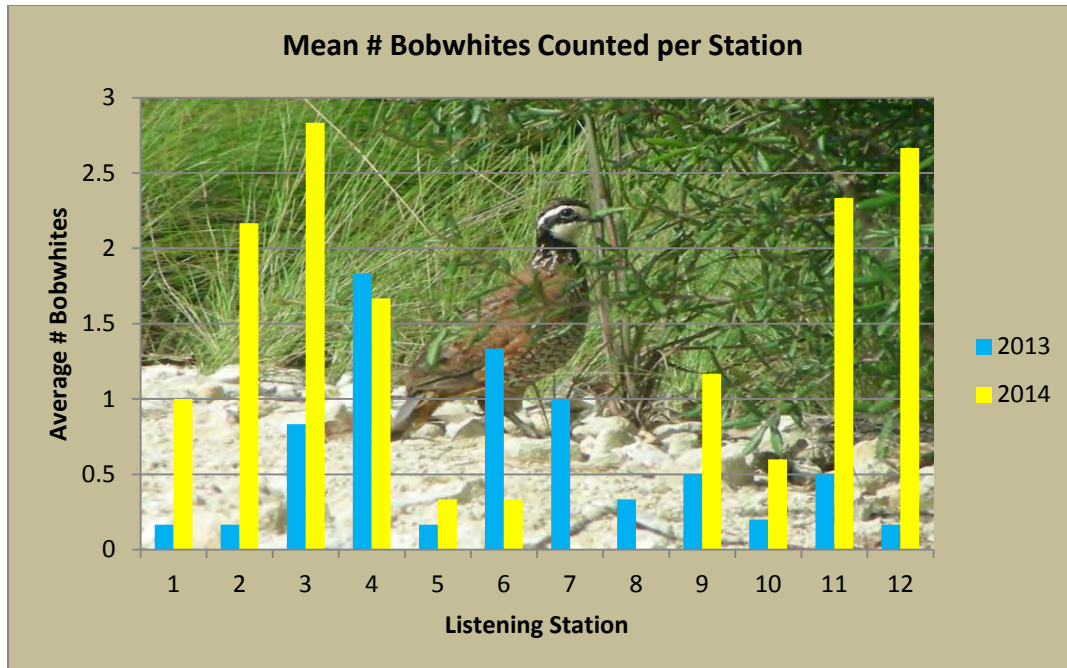


Figure 36. Comparison of average whistles heard per listening station during 2013 and 2014 surveys on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

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 replicated 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 replicated on the Carter Tract should be adequate for now.

Accordingly, we can use whistle count surveys as a tool to make informative habitat management decisions that improve bobwhite habitat across the Carter Tract by comparing relative abundance trends between habitats. As an example, based on results from 2012 surveys,

we suggested that the upland habitat north of Green and Dry Ponds (stations 5, 6, 7, and 8) be burned more frequently. The NFWWMD completed both dormant and growing season burns during September, October, and January in these areas. Whistles were detected at all stations in 2013, suggesting (at least preliminarily) that this improved the habitat enough to attract bobwhites from other areas of the property. However, in order to maintain bobwhite use of these areas, prescribed burns should continue to take place no less than every other year to further reduce the residual scrub hardwood component. As a result of the 2013 and 2014 whistle count surveys, we again recommend the uplands north and west of Green and Dry Ponds be burned to reduce hardwood encroachment and promote groundcover expansion.

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 NFWWMD 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 USFWS and BBL (Figure 37). 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"). Interestingly, according to 2013 mourning dove band returns (n=26), 92% of doves harvested in Florida originated in Florida (Rio Throm, FWC, pers. comm.).

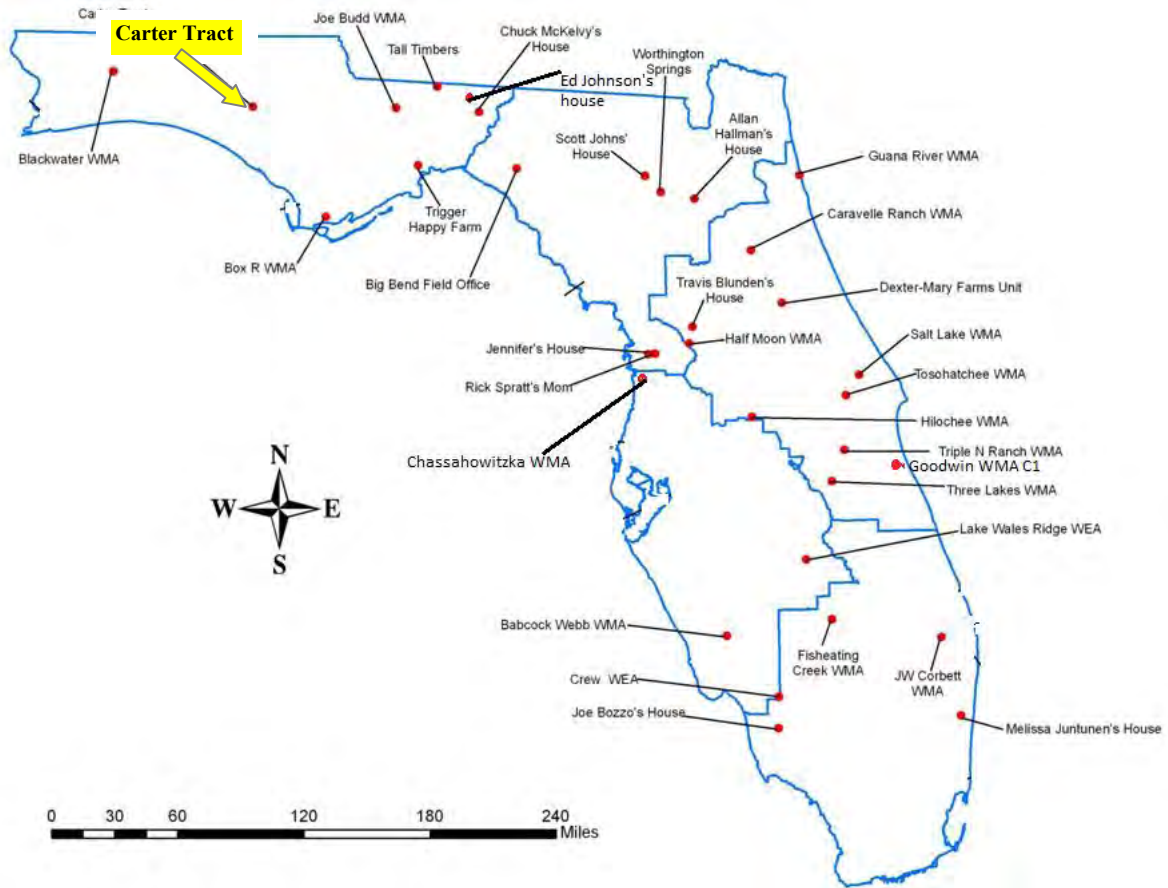


Figure 37. In conjunction with national long-term banding efforts, the Fitzhugh Carter Tract of Econfinia Creek WMA in Washington County, Florida is one of the sites participating in Florida's statewide dove banding program.

Two sites on the Carter Tract were prebaited with white millet seed in June 2013, prior to trapping. Trapping was conducted beginning July 1, 2013 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 38). Twenty-five mourning doves (14 HY; 11 AHY) were successfully banded during the 2013 capture/banding effort, and there were no recaptures of birds banded in previous years (Table 9).



Figure 38. 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 mourning dove).

Table 9. Dove banding results from 2007 - 2014 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

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, and incidental observations. A comprehensive list of all herpetofauna species (n=61) identified on the Carter Tract from 2005 to present has been compiled (Appendix X). A new herpetofauna species was identified as occurring on the Carter Tract from July 2013-June 2014, the bronze frog (*Rana clamitans clamitans*) was found in a pitfalls trap in September 2013, which brings the current species count to 38 reptiles and 22 amphibians. Several surveys were abandoned during the 2013-2014 survey period: drift fences, minnow traps, frog tubes, and turtle hoop traps. Fluctuations in water levels at the ponds made surveying too inconsistent and unreliable to report results on the herpetofauna populations sampled. New surveying and monitoring techniques

such as breeding anuran calling surveys, coverboard survey for salamanders and snakes, and revitalizing the passive frog tube surveys will be considered for the 2014-2015 year. 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 coureus couperi*), in addition to the gopher frog (*Rana capito*) and Florida pine snake, both SSC, 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 racers, rat snakes, coachwhips, Florida pine snakes (SSC), and the eastern indigo snake (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. We therefore constructed three box-style snake traps (Appendix XI) and installed them in conjunction with four 100-foot drift fence arms during spring 2010 (Figure 39). Drift fence arms were made of 36-inch silt fencing secured to wooden stakes and/or PVC poles. The bottom edge of silt fences was buried approximately six inches below the soil surface and fencing was replaced as needed. Two 5-gal buckets were installed on each side of the four arms of drift fence leading to the box trap (eight total buckets per array) to aid in capturing small-bodied terrestrial snakes, lizards, small mammals, and amphibians. Buckets were maintained with 1-2 inches of soil and a 3 x 5-inch sponge saturated with water to help prevent desiccation. The bottoms of buckets were perforated to allow excess rainwater to drain and to prevent drowning of captured

animals. Box traps were maintained with a 1.5-gal water tray, and were checked daily beginning in the early morning to prevent desiccation and undue stress on captured animals. Traps contained a 22-ounce tin can filled with dried grass to act as refugia for any small mammals captured. All traps were built with a side access door capable of being propped open when traps were not in use. Traps were maintained and repaired as necessary throughout the year. Three spatially distinct upland sandhill habitats were chosen based on their vegetative composition and structure, as well as proximity to mesic habitats (Figure 40).



Figure 39. Upland snake traps used for surveying herpetofauna on the Fitzhugh Carter Tract of Econfinia Creek, WMA, Washington County, Florida.

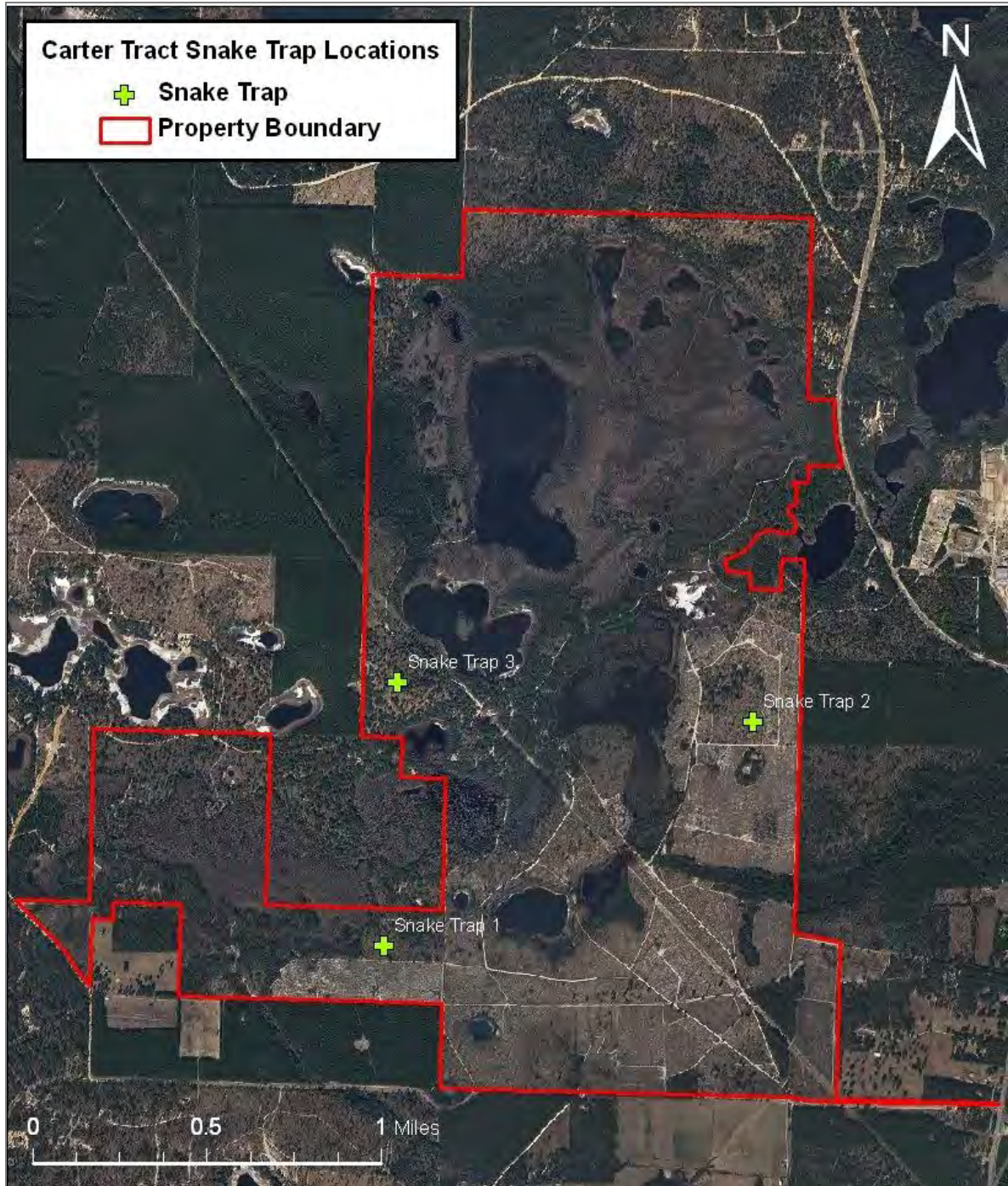


Figure 40. Location of upland snake traps used for sampling herpetofauna on the Fitzhugh Carter Tract of Econfina Creek WMA, Washinton County, Florida.

Traps were set four days a week (Monday – Thursday) from September-October 2013 and March-May 2014. Over 189 trap nights, 831 individual animals representing 31 species were captured (Figure 41). Eighty three percent of animals were captured in buckets while the remaining 17% were captured in box traps. Amphibians were the most captured taxa group with

676 captures, followed by small mammals, snakes, and lizards, with 61, 42, and 40 captures, respectively. A mass emergence of eastern narrowmouth toads (*Gastrophryne carolinensis*) in early September 2013 accounted for 49% of the captured. Oldfield mice (*Peromyscus polionotus*) dominated small mammal captures (84%), Southern black racer (*Coluber constrictor priapus*) was the most captured snake (34%), while fence lizards (*Sceloporus undulatus*) made up 55% of lizard captures. Staff were surprised to find a spotted skunk (*Spilogale putorius*) squeezed into a tin can during a September check (Figure 42). Appendix XII details the number of individuals of each species captured in snake trap arrays. All non-venomous adult snakes captured were marked by clipping belly scutes in a unique numerical pattern following procedures outlined by Enge (1997). Juvenile snakes that were too small were not marked via belly scute clipping. Lizards, frogs, and small mammals also were not marked prior to release.

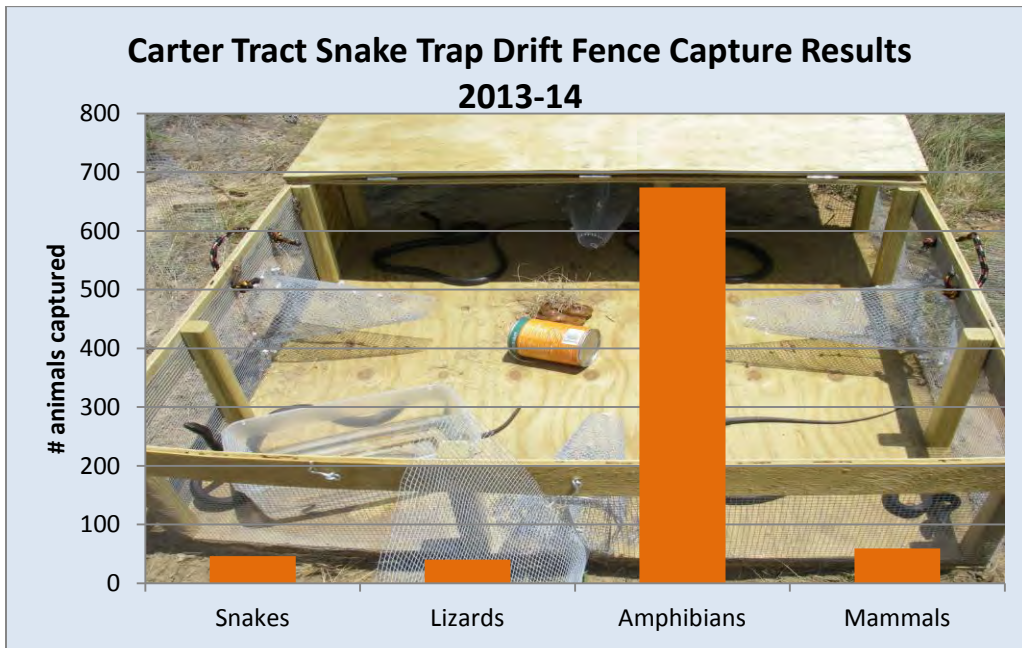


Figure 41. Snake trap capture results from September - October 2013 and April - May 2014 on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.



Figure 42. Spotted skunk (*Spilogale putorius*) captured in a snake trap in September 2013 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 April and May 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

Dry Pond Bat Roosts

In April 2012 FWC staff identified two hollow cypress trees on Dry Pond that were being utilized by two bat species (Figure 43). A large number of Brazilian free-tailed bats (*Tadarida brasiliensis cynocephala*) and southeastern myotis were observed roosting together in each tree.

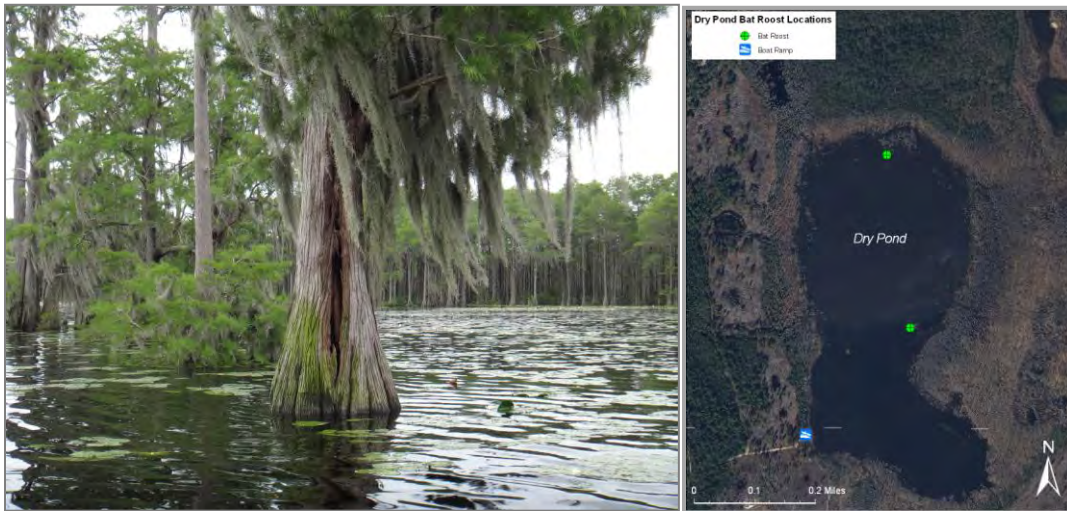


Figure 43. One of two roost trees on Dry Pond used by a maternity colony of southeastern myotis (*Myotis austroriparius*) during 2013 (left). The location of both roost trees on Dry Pond is shown at right.

Brazilian free-tailed bats have not been studied extensively in Florida, therefore overall population trends within the state are unknown. These bats almost exclusively roost in buildings in Florida, and their abundance appears to be limited by availability of roost sites (Humphrey, 1992). This species is occasionally found roosting in trees, but this behavior is considered uncommon (Jeff Gore and Melissa Tucker, FWC, pers. comm.). Brazilian free-tailed bats rely solely on insects for food, and are thus susceptible to pesticide poisoning. 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).

Southeastern myotis primarily roost in caves in Florida (Humphrey, 1992), so finding many individuals roosting in a single tree is uncommon (Jeff Gore and Melissa Tucker, FWC, pers. comm.). This species prefers to forage over water, feeding on small beetles, moths, mosquitoes, and other aquatic insects. Concentration of large numbers of these bats at just a handful of caves

throughout the panhandle make this species vulnerable to natural disturbances (i.e. flooding), as well as land-use conversion and recreation (i.e. spelunking, etc.; Humphrey, 1992).

Given the vulnerability of these two bat species to potential population declines in the panhandle, FWC monitored these roost sites periodically during 2012-13 to assess their use. Jeff Gore, a terrestrial mammal researcher with FWC, confirmed that the large group of bats was a maternity colony of an estimated 1,000+ southeastern myotis (Figure 44). Both adult and recently weaned pups were observed roosting in the trees. Confirmation of the trees as productive maternity roosts for such a large number of bats underscores the importance of this habitat feature within the Carter Tract to local bat populations. A large colony of southeastern myotis were documented using the roosts in summer 2013, however, no Brazilian free-tailed bats were found. The bat roosts will continue to be monitored annually to assess use, and temperature data loggers may be installed within the trees to determine how daily and seasonal temperature changes may affect their use.



Figure 44. A maternity colony of southeastern myotis (*Myotis austroriparius*) was again documented during summer 2013 using two roost trees on Dry Pond at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

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 2013-2014 officers provided approximately 66 hours of patrol directed to the Carter Tract. There were approximately 36 user contacts for the area with no arrests or 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 placed on boundary lines, damage to exterior fencing, and illegal hunting. All though none of these reports resulted in a violator being encountered, they were investigated and will continue to be followed up on.

This year officers checked several successful sportsmen with ducks, deer, turkey and fish. The management efforts, law enforcement patrols, and plentiful water levels are making direct benefits to the Carter Tract.

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Appendix I. Fitzhugh Carter Tract of Econfina Creek WMA Regulations Summary and Area Map, July 1, 2013 – June 30, 2014.



Fitzhugh Carter Tract Econfina Creek Wildlife Management Area

Regulations Summary and Area Map
July 1, 2013 - June 30, 2014



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, available where hunting licenses are sold, at most post offices or at www.duckstamp.com.

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. Hunting during the spring turkey season with firearms other than shotguns or using a shot size larger than #2 is prohibited.
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 or silencer-equipped 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 26 through November 1 and November 2-10.

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 - Any deer (except 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 - 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 28 through December 1, January 25-28 and January 29 through February 2.

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

Muzzleloading Gun Season:

December 7-9.

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 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 - 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 14-29.

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 8-9.

Spring Turkey: March 15-17, 28-30 and April 11-13.

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. Hunting with firearms other than shotguns or using a shot size larger than #2 is prohibited.
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 seasons established by the Commission for these species that coincide with the archery, muzzleloading gun, general gun or small game seasons. Ducks may also be hunted during special September duck season.

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 flotation 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, spears, gigs, snatch hooks, crossbow, bow and arrow or bush hooks 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:

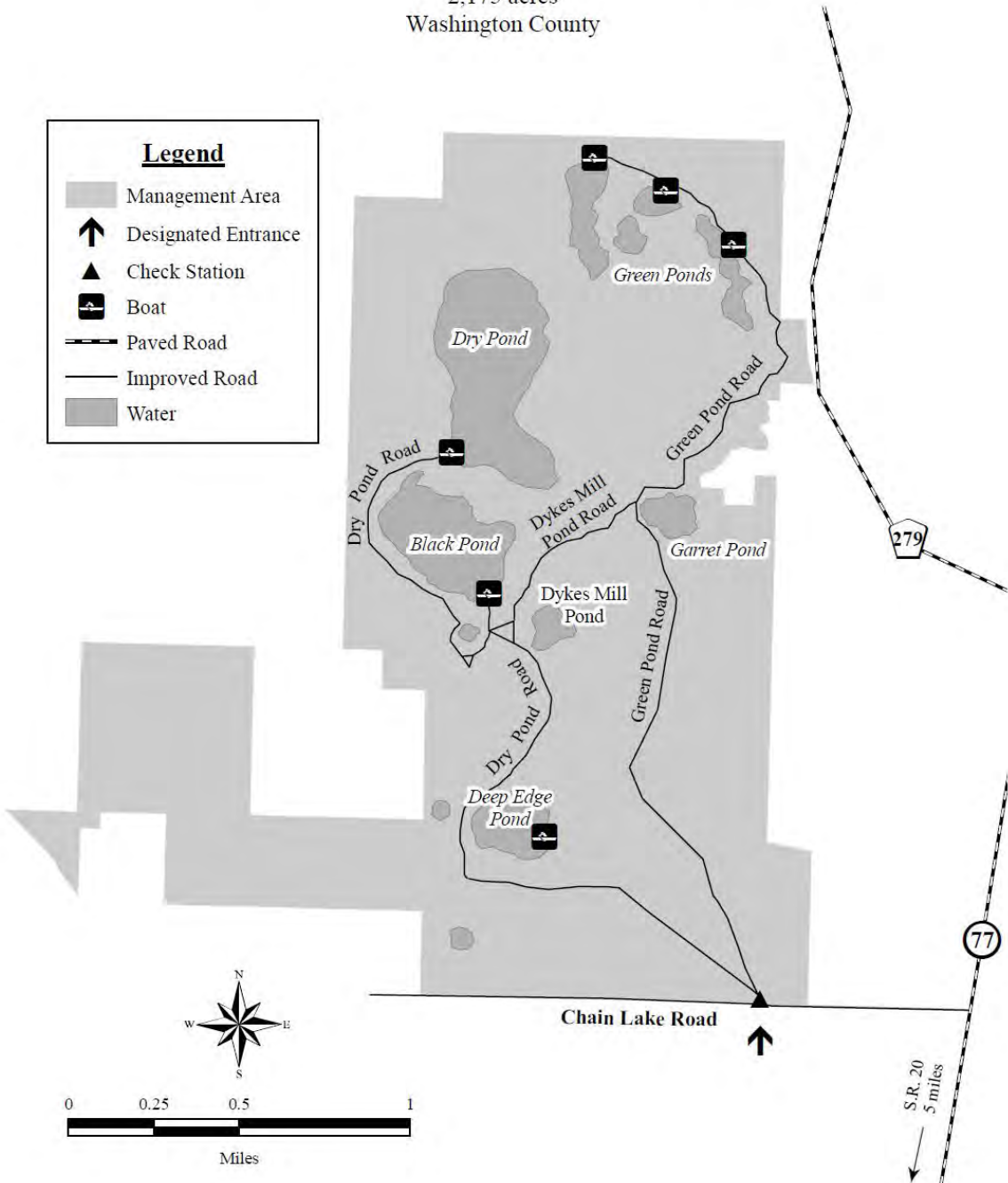
If you see law violators or suspicious activities, contact your nearest Commission regional office or call 888-404-FWCC. You may qualify for a cash reward from the Wildlife Alert Reward Association.

The U.S. Department of the Interior prohibits discrimination on the basis of race, color, national origin, age, sex or handicap. 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



Legend

- Management Area
- Designated Entrance
- Check Station
- B Boat
- Paved Road
- Improved Road
- Water

Appendix II. 2013-2014 Annual Work Plan and Accomplishment Report for the Fitzhugh Carter Tract of Econfina Creek Wildlife Management Area.

FY 2013-14

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					
	5.16	\$972.51	\$131.31	\$1,000.53	\$2,104.35	0 Conducted sampling of fish populations in area ponds via electroshocking and fyke nets. NFA.
Activity - 250	Monitoring and assessments					
	4.59	\$908.56	\$151.35	\$505.82	\$1,565.73	0 Monitored area fish population and developed a comprehensive sportfish population assessment through otolith analysis and biological data collected from samples. NFA.
Activity - 342	Public use administration (non-hunting)					
	3.18	\$723.09	\$2,420.53	\$19,268.38	\$22,412.00	0 Administered public fishing program. Distributed daily quotas and boats. Collected area use data from fishermen. Salary for OPS fishing check station operators included here. NFA.
<hr/>						
Species 9100 Total	12.93	\$2,604.16	\$2,703.19	\$20,774.73	\$26,082.08	
<hr/>						
Species 9200 - All wildlife						
Activity - 101	Project inspection					
	6.82	\$1,470.13	\$297.95	\$2,423.44	\$4,191.52	0 Inspected area projects and activities. Field orientation of land boundaries, features and habitats.

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
Activity - 103	Meetings 11.31	\$2,528.91	\$390.24	\$3,055.45	\$5,974.60	0	Attended landowner, cooperators, scientific and agency meetings. Attended training workshops and seminars.
Activity - 140	Report writing/editing/manuscript preparation 8.15	\$1,825.37	\$180.88	\$532.49	\$2,538.74	0	Prepared and reviewed annual wildlife reports and completed annual accomplishment report.
Activity - 150	Personnel management 24.10	\$5,957.66	\$332.23	\$401.34	\$6,691.23	0	Supervised volunteer activities. Recruited, hired, and supervised OPS personnel. Attended training workshops and seminars.
Activity - 182	Data management 18.48	\$4,397.04	\$534.21	\$3,281.40	\$8,212.65	0	Digitized habitat features for use in GIS database. Incorporated all data collected into GIS database. Analyzed and summarized WMA databases and pertinent information. Purchased office supplies.
Activity - 200	Resource Management 45.67	\$9,838.68	\$986.72	\$4,554.65	\$15,380.05	0	Routine planning, paperwork, purchases and correspondences dealing with daily operations of the WMA. Purchased fuel for area vehicles and equipment.
Activity - 204	Resource planning						

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
	30.86	\$7,346.70	\$519.44	\$7,335.58	\$15,201.72	0	Coordinated work projects related to management activities. Prepared written work plans and management proposals. Purchased supplies, materials and equipment for performing routine WMA operations.
Activity - 207	Prescribed burning - dormant season						
	1.11	\$252.81	\$28.48	\$226.50	\$507.79	0	Assisted Northwest Florida Water Management District with dormant season prescribed burning to improve wildlife habitat.
Activity - 221	Animal surveys						
	0.00	\$0.00	\$0.00	\$39.44	\$39.44	0	Purchased supplies for wildlife camera surveys.
Activity - 312	Informational signs						
	0.98	\$218.40	\$44.30	\$437.32	\$700.02	0	Developed and maintained information signs at kiosk and display boards.
Activity - 320	Outreach and education						
	6.09	\$1,330.76	\$329.59	\$4,209.66	\$5,870.01	0	Participated in wildlife management presentations to area school groups. Purchased supplies and materials to facilitate presentations. Participated as a Steering Committee member and wildlife facilitator for the Emerald Coast Regional Envirothon.
Activity - 350	Customer service support						

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
	1.48	\$327.11	\$25.84	\$0.00	\$352.95	0	Provided verbal and written information to the public regarding wildlife and wildlife management techniques.
Activity - 920	FEM -- buildings/structures						
	2.95	\$666.18	\$54.84	\$1,333.49	\$2,054.51	0	Maintained and repaired area office and buildings as needed, including electrical and phone service.
Activity - 923	FEM -- vehicles/equipment						
	0.42	\$87.66	\$3.69	\$3,018.12	\$3,109.47	0	Repaired and maintained vehicles, boats, ATVs and associated equipment, including services-parts and labor.
Activity - 926	FEM -- roads/bridges						
	2.71	\$602.91	\$61.17	\$0.00	\$664.08	0	Made minor repairs and maintained access roads and bridges as needed.
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Species 9200 Total	161.13	\$36,850.32	\$3,789.59	\$30,848.88	\$71,488.79		
<hr/>							
Species 9210 - Game wildlife							
Activity - 221	Animal surveys						
	0.87	\$239.75	\$7.38	\$0.00	\$247.13	0	Conducted deer spotlight surveys employing distance sampling methodology.
Activity - 341	Public use administration (hunting)						
	4.46	\$1,045.74	\$1,159.11	\$9,141.01	\$11,345.86	0	Administered and managed public hunts. Collected hunter harvest data/information. Compiled weekly harvest and hunter

	Man Days	Salary	FuelCost	Other	Total	Units Accomplishments pressure reports.	
Species 9210 Total	5.33	\$1,285.49	\$1,166.50	\$9,141.01	\$11,593.00		
Species 9211 - White-tailed deer							
Activity - 182	Data management	0.00	\$0.00	\$22.68	\$377.29	\$399.97	0 Summarized and analyzed survey, biological, harvest and hunter pressure data.
Activity - 221	Animal surveys	5.50	\$1,279.14	\$103.36	\$254.70	\$1,637.20	0 Conducted deer spotlight surveys employing distance sampling methodology.
Species 9211 Total	5.50	\$1,279.14	\$126.04	\$631.99	\$2,037.17		
Species 9218 - Quail							
Activity - 182	Data management	0.25	\$53.82	\$9.49	\$90.25	\$153.56	0 Summarized and analyzed survey, biological, harvest and hunter pressure data.
Activity - 221	Animal surveys	3.99	\$866.86	\$54.84	\$304.16	\$1,225.86	0 Conducted northern bobwhite calling surveys.
Species 9218 Total	4.24	\$920.68	\$64.34	\$394.41	\$1,379.43		
Species 9222 - Wood duck							
Activity - 182	Data management	0.36	\$80.73	\$14.77	\$118.80	\$214.30	0 Analyzed and summarized wood duck nest box monitoring data.
Activity - 285	Nest structures	4.77	\$1,040.88	\$131.31	\$790.79	\$1,962.98	50 Maintained and monitored 50 wood duck nest boxes on

	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments area waterways.
Species 9222 Total	5.13	\$1,121.61	\$146.08	\$909.59	\$2,177.28		
<hr/>							
Species 9226 - Mourning and white-winged doves (migratory and non-migratory)							
Activity - 221	Animal surveys						
	0.75	\$178.37	\$10.55	\$56.22	\$245.14	0	Trapped and banded area doves as part of a statewide project and nationwide effort.
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Species 9226 Total	0.75	\$178.37	\$10.55	\$56.22	\$245.14		
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Species 9240 - Nongame wildlife							
Activity - 182	Data management						
	0.00	\$0.00	\$5.27	\$134.98	\$140.25	0	Summarized and analyzed herpetofauna survey data. NFA.
Activity - 221	Animal surveys						
	9.12	\$2,056.49	\$405.27	\$3,437.37	\$5,899.13	0	Conducted herpetofaunal surveys (dipnets, drift fences, frog tubes, snake traps) with emphasis on imperiled salamanders and anurans. NFA.
<hr/>							
Species 9240 Total	9.12	\$2,056.49	\$410.54	\$3,572.35	\$6,039.38		
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Species 9251 - Songbirds (passerines)							
Activity - 182	Data management						
	0.18	\$40.30	\$12.13	\$144.04	\$196.47	0	Analyzed and summarized Eastern bluebird nest box monitoring data.
Activity - 285	Nest structures						
	0.60	\$136.38	\$6.33	\$14.33	\$157.04	18	Maintained and monitored eighteen Eastern bluebird nest boxes.
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	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
Species 9251 Total	0.78	\$176.68	\$18.46	\$158.37	\$353.51		

Species 9252 - Wading birds

Activity - 182	Data management	1.25	\$273.00	\$33.75	\$28.66	\$335.41	0 Analyzed and summarized breeding bird point count data.
Activity - 221	Animal surveys	0.60	\$137.09	\$12.13	\$90.49	\$239.71	0 Monitored wading bird rookery.

Species 9252 Total	1.85	\$410.09	\$45.88	\$119.15	\$575.12		
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Species 9254 - Breeding birds

Activity - 182	Data management	1.75	\$443.18	\$35.86	\$0.00	\$479.04	0 Analyzed and summarized breeding bird point count data.
Activity - 221	Animal surveys	2.18	\$416.32	\$29.53	\$140.81	\$586.66	0 Conducted breeding bird point count surveys.

Species 9254 Total	3.93	\$859.50	\$65.39	\$140.81	\$1,065.70		
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Species 9258 - Southeastern kestrel

Activity - 182	Data management	0.06	\$13.39	\$0.53	\$19.50	\$33.42	0 Analyzed and summarized southeastern kestrel monitoring data.
Activity - 285	Nest structures	0.18	\$41.63	\$7.91	\$128.66	\$178.20	0 Maintained and monitored eight kestrel nest boxes.

Species 9258 Total	0.24	\$55.02	\$8.44	\$148.16	\$211.62		
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Species 9278 - Gopher tortoise

Activity - 140	Report writing/editing/manuscript preparation	2.48	\$525.05	\$171.92	\$1,648.46	\$2,345.43	0 Prepared annual progress report on
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	Man Days	Salary	FuelCost	Other	Total	Units	Accomplishments
							gopher tortoise surveying and monitoring efforts. NFA.
Activity - 182	Data management						
	0.00	\$0.00	\$49.57	\$663.08	\$712.65	0	Analyzed and summarized gopher tortoise survey data. NFA.
Activity - 221	Animal surveys						
	1.62	\$348.09	\$142.12	\$1,648.76	\$2,138.97	0	Coordinated and conducted gopher tortoise surveys. NFA.
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Species 9278 Total	4.10	\$873.14	\$363.61	\$3,960.30	\$5,197.05		
<hr/>							
Species 9280 - All threatened and endangered wildlife							
Activity - 140	Report writing/editing/manuscript preparation						
	0.37	\$101.28	\$3.16	\$0.00	\$104.44	0	Prepared and reviewed reports on threatened and endangered herpetofauna. NFA.
<hr/>							
Species 9280 Total	0.37	\$101.28	\$3.16	\$0.00	\$104.44		
<hr/>							
Project 7281 Total	215.40 ¹	\$48,771.97	\$8,921.75	\$70,855.97	\$128,549.69		

¹Man-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 such is included in "Other" expenses category.

Appendix III. Average percent occurrence of fish species sampled via fyke nets November 2013 on Black, Dry, Green North, and Green South Ponds at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

Species	Pond			
	Black	Dry	Green North	Green South
Bluegill (<i>Lepomis macrochirus</i>)	1.96	9.91	2.07	3.26
Mosquitofish (<i>Gambusia holbrooki</i>)	65.33	63.54	75.50	63.01
Largemouth Bass (<i>Micropterus salmoides</i>)	0.00	0.04	0.00	0.00
Dollar Sunfish (<i>Lepomis marginatus</i>)	1.04	1.86	2.88	6.40
E. Starhead Topminnow (<i>Fundulus escambiae</i>)	27.46	22.85	6.46	5.91
Warmouth (<i>Lepomis gulosus</i>)	0.67	1.04	1.06	16.03
Brook Silverside (<i>Labidesthes sicculus</i>)	0.36	0.23	0.15	0.00
Spotted Gar (<i>Lepisosteus oculatus</i>)	0.22	0.00	0.00	0.00
Swampdarter (<i>Etheostoma fusiforme</i>)	0.00	0.00	2.09	0.48
Blue-spotted Sunfish (<i>Enneacanthus gloriosus</i>)	0.83	0.26	3.11	4.92
Lined Topminnow (<i>Fundulus lineolatus</i>)	2.13	0.27	6.58	0.00
Lake chubsucker (<i>Erimyzon sucetta</i>)	0.00	0.00	0.10	0.00

Appendix IV. Catch-per-unit-effort (CPUE) results for sportfish sampled via electrofishing at Black and Dry Ponds in November 2013 and April 2014 on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

	Black Pond		Dry Pond		Green Ponds	
	<i>n</i> ^a	CPUE ^b	<i>n</i> ^a	CPUE ^b	<i>n</i> ^a	CPUE ^b
Fall 2013						
Bluegill	19	0.37	16	0.23	19	0.42
Largemouth bass	8	0.15	5	0.07	3	0.07
Warmouth	0	0	0	0	0	0
Black Crappie	0	0	0	0	1	0.02
TOTALS	27	0.52	21	0.31	23	0.51

^a Number of fish sampled

^b Catch per unit effort (CPUE) measured in number of fish/minute

	Black Pond		Dry Pond		Green Pond	
	<i>n</i> ^a	CPUE ^b	<i>n</i> ^a	CPUE ^b	<i>n</i> ^a	CPUE ^b
Spring 2014						
Bluegill	17	0.41	13	0.24	4	0.12
Largemouth bass	7	0.17	2	0.04	2	0.03
Warmouth	2	0.05	0	0	0	0
Black Crappie	0	0	0	0	0	0
TOTALS	26	0.62	15	0.27	6	0.18

^a Number of fish sampled

^b Catch per unit effort (CPUE) measured in number of fish/minute

Appendix V. Number of fish caught and released per pond from July 2013- June 2014 on the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

Species	Pond				
	Dry	Black	Deep Edge	Green Ponds	All Ponds
Bluegill (<i>Lepomis macrochirus</i>)					
Kept	327	507	12	121	967
Released	573	1084	8	353	2018
Total caught	900	1591	20	474	2985
Black Crappie (<i>Pomoxis nigromaculatus</i>)					
Kept	8	50	0	1	59
Released	6	26	0	3	35
Total caught	14	76	0	4	94
Largemouth Bass[†] (<i>Micropterus salmoides</i>)					
Total caught	23	119	29	12	183
Warmouth (<i>Lepomis gulosus</i>)					
Kept	2	5	0	1	8
Released	7	6	2	4	19
Total caught	9	11	2	5	27
Catfish (<i>Ameirus nebulosus</i> and <i>Ameirus natalis</i>)					
Kept	0	11	3	0	14
Released	4	21	0	0	25
Total caught	4	32	3	0	39
Other (Chain pickerel, Spotted Gar, Bowfin, Shellcracker, Redear Sunfish, Flier)					
Kept	0	2	0	1	3
Released	2	12	1	1	16
Total caught	2	14	1	2	19
TOTAL					

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

Appendix VI. Percent nest success, no. of nests, avg. clutch size, and estimated duckling survival/clutch of wood duck (*Aix sponsa*) nest boxes (2007-2014) by water body on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

Year	Water Body										
	Green 1&2	Green 3	Deep Edge	Black	LDE	Dry	Garrett	Warmouth	PLC	All Water Bodies	
2007	% nest success	33%	0%	0%	0%	50%	0%	0%	0%	0%	18%
	# nests	3	2	2	1	2	1	0	0	0	8
	average eggs/clutch	0.7	0.0	4.5	0.0	6.0	11.0	0.0	0.0	0.0	6.8
	hatched ducklings/clutch	0.7	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	1.0
2008	% nest success	0%	0%	0%	0%	0%	100%	0%	0%	0%	40%
	# nests	1	1	0	0	0	3	0	0	0	4
	average eggs/clutch	0.0	6.0	0.0	0.0	0.0	10.3	0.0	0.0	0.0	9.4
	hatched ducklings/clutch	0.0	0.0	0.0	0.0	0.0	6.3	0.0	0.0	0.0	5.0
2009	% nest success	25%	33%	0%	50%	0%	78%	0%	0%	0%	57%
	# nests	4	3	1	5	1	7	0	0	0	17
	average eggs/clutch	6.5	6.3	6.0	6.8	12.0	10.0	0.0	0.0	0.0	8.4
	hatched ducklings/clutch	1.5	0.3	0.0	2.7	0.0	4.6	0.0	0.0	0.0	2.7
2010	% nest success	33%	40%	100%	40%	0%	50%	100%	0%	50%	48%
	# nests	6	5	1	5	0	8	2	0	2	23
	average eggs/clutch	7.5	7.2	8.0	6.6	0.0	8.9	9.0	0.0	8.0	7.8
	hatched ducklings/clutch	1.7	3.0	6.0	2.0	0.0	2.1	7.0	0.0	3.5	2.7
2011	% nest success	60%	50%	100%	80%	50%	43%	100%	0%	0%	62%
	# nests	5	4	3	5	2	7	1	0	0	22
	average eggs/clutch	7.2	5.5	5.5	11	10	5.6	9	0	0	7.4
	hatched ducklings/clutch	3.6	2.75	4	6.4	1.5	1.57	9.00	0.00	0.00	3.40
2012	% nest success	100%	75%	100%	100%	100%	100%	0%	100%	50%	86%
	# nests	4	4	2	3	3	3	0	1	2	22
	average eggs/clutch	8.3	11	10	11	5	8.3	0.0	9	3	8.4
	hatched ducklings/clutch	6.0	6.0	8.5	6.7	1.0	4.7	0.0	5.0	1.0	4.9
2013	% nest success	100%	33%	50%	50%	100%	83%	100%	0%	0%	74%
	# nests	4	3	2	4	3	6	1	0	0	23
	average eggs/clutch	9	4	8.5	4.5	4.3	6.7	12	0.0	0.0	6.4
	hatched ducklings/clutch	7.5	0.67	2.5	0.75	2	4.5	12	0.0	0.0	3.7
2014	% nest success	50%	0%	0%	0%	100%	0%	100%	0%	0%	25%
	# nests	2	4	2	1	2	3	1	1	0	16
	average eggs/clutch	6.5	5.75	4.5	4	2.5	4.7	2	5	0	4.7
	hatched ducklings/clutch	3.5	0	0	0	2.5	0	2	0	0	0.9

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

Appendix VII. Wading bird survey results (2008-14) from Little Deep Edge Pond at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, Florida.

Species	Number of Birds Observed			
	Year	Adults	Active Nests	Chicks
<i>Anhinga (Anhinga anhinga)</i>	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
	<i>Cattle Egret (Bubulcus ibis)</i>	2008	25	18
2009		0	0	0
2010		0	0	0
2011		14	12	24
2012		0	0	0
2013		33	20	27
2014		45	46	40
<i>Great Egret (Ardea alba)</i>		2008	13	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
	<i>Little Blue Heron (Egretta caerulea)</i>	2008	8	3
2009		1	0	0
2010		0	0	0
2011		20	14	34
2012		7	4	6
2013		5	3	4
2014		14	6	6
<i>Tricolored Heron (Egretta tricolor)</i>		2008	2	unknown
	2009	0	0	0
	2010	0	0	0
	2011	1	1	1
	2012	0	0	0
	2013	0	0	0
	2014	0	0	0

Snowy Egret (<i>Egretta thula</i>)	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
Green Heron (<i>Butorides virescens</i>)	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
Great Blue Heron (<i>Ardea herodias</i>)	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

Appendix VIII. Bird species (n=124) documented on the Fitzhugh Carter Tract of Econfina Creek WMA, as of June 2014.

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 *Bubulcus ibis*
- Green Heron *Butorides virescens*

Threskiornithidae (Ibises and Spoonbills)

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

Ciconiidae (Storks)

- Wood Stork *Mycteria americana*

Cathartidae (New World Vultures)

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

ANSERIFORMES

Anatidae (Ducks, Geese, and Swans)

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

FALCONIFORMES

Accipitridae (Hawks and Allies)

- Osprey *Pandion haliaetus*
- 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*

Falconidae (Falcons and Caracaras)

- 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)

- Common Moorhen *Gallinula chloropus*
- American Coot *Fulica Americana*

Gruidae (Cranes)

- Sandhill Crane *Grus Canadensis*

CHARADRIIFORMES

Charadriidae (Plovers and Lapwings)

- Killdeer *Charadrius vociferous*

Scolopacidae (Sandpipers, Phalaropes, and Allies)

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

Laridae (Gulls, Terns, and Allies)

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

COLUMBIFORMES

Columbidae (Pigeons and Doves)

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

CUCULIFORMES

Cuculidae (Cuckoos, Roadrunners, and Anis)

- Yellow-billed Cuckoo *Coccyzus americanus*

STRIGIFORMES

Strigidae (Typical Owls)

- Eastern Screech Owl *Megascops asio*
- Great Horned Owl *Bubo virginianus*
- 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*

Appendix VIII (continued)

PASSERIFORMES (continued)

Hyrrundinidae (Swallows and Martins)

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

Paridae (Chickadees and Titmice)

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

Sittidae (Nuthatches)

- Brown-headed Nuthatch *Sitta pusilla*

Troglodytidae (Wrens)

- Carolina Wren *Thryothorus ludovicianus*
- Marsh Wren *Cistothorus palustris*

Regulidae (Kinglets)

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

Sylviidae (Old World Warblers and Gnatcatchers)

- Blue-gray Gnatcatcher *Poliophtila 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*

Parulidae (Wood-Warblers)

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

Thraupidae (Tanagers)

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

Emberizidae (New World Sparrows)

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

Cardinalidae (Cardinals and Allies)

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

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*

TOTAL NUMBER OF BIRD SPECIES = 124

Appendix IX. Field data sheet used for conducting early morning autumn call counts for quail coveys on the Fitzhugh Carter Tract of Econfinia Creek WMA, Washington County, Florida.

Early Morning Covey Call Point Count Field Sheet						
State	Study Area	Point #	Date	Observer	% Cloud	Wind (km/hr)
Total Covey Count	50 m count	100 m count	250 m count	500 m count	>500 m Count	

North

Comments: _____

UTM Easting (Lon) : _____ UTM Northing (Lat): _____ Zone: _____

Appendix X. Comprehensive list of herpetofaunal species (n=62) documented on the Fitzhugh Carter Tract of Econfina Creek WMA, 2005 -2014.

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*

SQUAMATA (Lizards and Snakes)

Lacertilia (Lizards)

Polychridae (Anoles)

- Green Anole *Anolis carolinensis*

Phrynosomatidae (Earless, spiny, side-blotched, and horned lizards)

- Southern Fence Lizard *Sceloporus undulatus undulatus*

Teiidae (Whiptails)

- Six-lined Racerunner *Cnemidophorus sexlineatus sexlineatus*

Scincidae (Skinks)

- Ground Skink *Scincella lateralis*
- Five-lined Skink *Eumeces fasciatus*
- Broadhead Skink *Eumeces laticeps*
- Southeastern Five-lined skink *Eumeces inexpectatus*
- Northern Mole Skink *Eumeces egregius similis*

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 *Heterodon platirhinos*
- Mud Snake *Farancia abacura*
- Southern Black Racer *Coluber constrictor priapus*
- Eastern Coachwhip *Masticophis flagellum*
- Rough Green Snake *Opheodrys aestivus*

Appendix X (continued)

- 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*

Elapidae (Coral Snakes)

- Eastern Coral Snake *Micrurus fulvius*

Viperidae (Vipers)

Crotalinae (Pit Vipers)

- Florida Cottonmouth *Agkistrodon piscivorous conanti*
- Dusky Pigmy Rattlesnake *Sistrurus miliarius barbouri*
- Eastern Diamondback Rattlesnake *Crotalus adamanteus*

CAUDATA (Salamanders)

Amphiumidae (Amphiumas)

- Two-toed Amphiuma *Amphiuma means*

Sirenidae (Sirens)

- Greater Siren *Siren lacertina*
- Eastern Lesser Siren *Siren intermedia intermedia*
- Slender Dwarf salamander *Eurycea quadridigitata*

Ambystomadidae (Mole Salamanders)

- Mole Salamander *Ambystoma talpoideum*

Salamandridae (Newts)

- Central Newt *Notophthalmus viridescens louisianensis*

Plethodontidae (Lungless Salamanders)

- Southeastern Slimy Salamander *Plethodon grobmani*

ANURA (Frogs and Toads)

Pelobatidae (Spadefoots)

- Eastern Spadefoot Toad *Scaphiopus holbrooki*

Bufonidae (Toads)

- Southern Toad *Bufo terrestris*
- Oak Toad *Bufo quercicus*

Hylidae (Treefrogs and Their 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 ornata*

Microhylidae (Narrowmouth Toads)

- Eastern narrowmouth Toad *Gastrophryne carolinensis*

Ranidae (True Frogs)

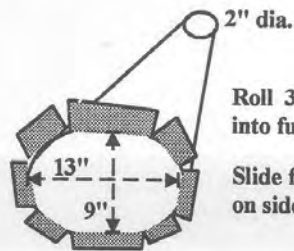
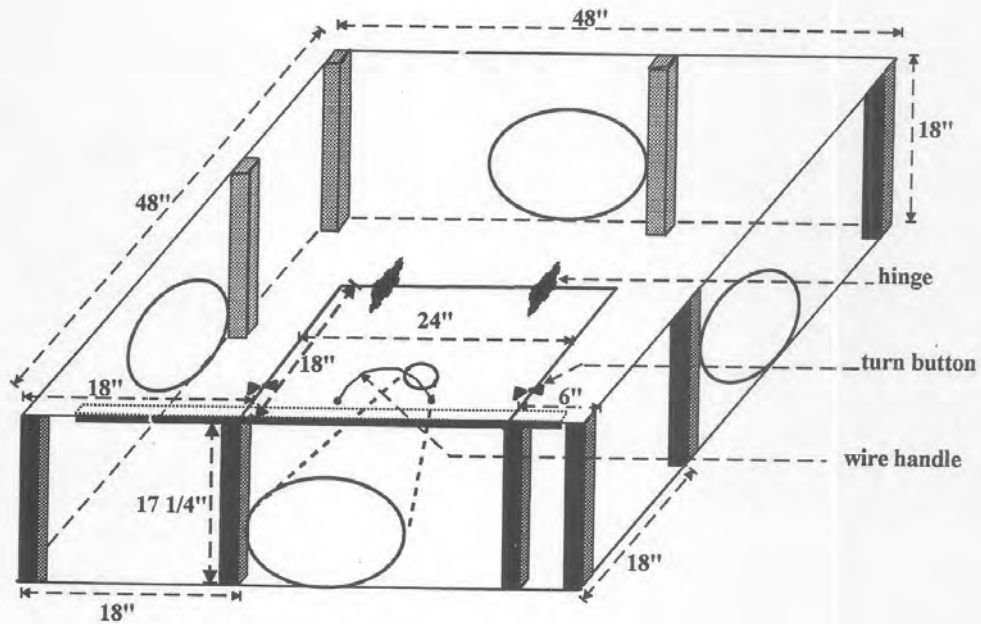
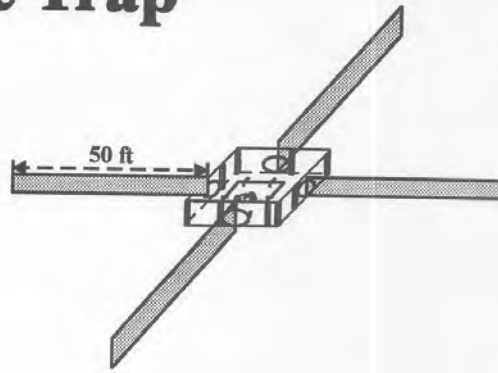
- Bullfrog *Rana catesbeiana*
- River Frog *Lithobates heckscheri*
- Pig Frog *Rana grylio*
- Southern Leopard Frog *Rana sphenoccephala*
- Bronze Frog *Rana clamitansclamitans*

Appendix XI. General design and dimensions of upland snake traps used annually at the Carter Tract during spring and fall (NOTE: Actual trap and array dimensions differ slightly from those described below).

Snake Trap

Materials

- 1/2" sheet of treated plywood (1)
- 2"x2"x8' treated lumber (2)
- 1"x2"x4' treated lumber (1)
- 1/4"x1/4" hardware cloth 24" high
 - 100 ft roll (2)
 - 28 ft peice (1)
- 3" strap hinge (2)
- turn button (2)
- 20ga galvanized wire 50ft (1)
- nails
- heavy duty staple gun and staples



Roll 30" x 18" piece of hardware cloth into funnel and trim excess.

Slide funnel through hole in hardware cloth on side of trap and wire into place securely.

Appendix XII. Snake trap array capture results from July 2013 – June 2014 on the Carter Tract of Econfina Creek WMA, Washington County, Florida.

Reptiles	Number captured
Six-line racerunner (<i>Cnemidophorus sexlineatus</i>)	8
Southern black racer (<i>Coluber constrictor priapus</i>)	14
Northern mole skink (<i>Eumeces egregius similis</i>)	4
Southeastern five-lined skink (<i>Eumeces inexpectatus</i>)	5
Eastern hognose snake (<i>Heterodon platyrhinos</i>)	2
Eastern coachwhip (<i>Masticophis flagellum</i>)	11
Dusky pigmy rattlesnake (<i>Sistrurus miliarius barbouri</i>)	9
Slender Glass Lizard (<i>Ophisaurus attenuatus</i>)	1
Eastern diamondback rattlesnake (<i>Crotalus adamanteus</i>)	1
Corn Snake (<i>Elaphe guttata</i>)	1
Cottonmouth (<i>Agkistrodon piscivorous</i>)	1
Pine Snake (<i>Pituophis melanoleucus</i>)	1
Smooth Earth Snake (<i>Virginia valeriae</i>)	1
Florida Cooter (<i>Pseudmys floridana</i>)	12
Common Garter Snake (<i>Thamnophis sirtalis</i>)	1
Eastern fence lizard (<i>Sceloporus undulatus</i>)	22
TOTAL REPTILES	94
NUMBER OF REPTILE SPECIES	16
Amphibians	Number captured
Southern toad (<i>Bufo terrestris</i>)	113
Eastern narrowmouth toad (<i>Gastrophryne carolinensis</i>)	409
Northern Cricket Frog (<i>Acris crepitans</i>)	2
Bronze frog (<i>Rana clamitans clamitans</i>)	2
Southern Leopard Frog (<i>Rana sphenocephala</i>)	12
Eastern spadefoot toad (<i>Scaphiopus holbrookii</i>)	138
TOTAL AMPHIBIANS	676
NUMBER OF AMPHIBIAN SPECIES	6
Mammals	Number captured
Southern short-tailed shrew (<i>Blarina carolinensis</i>)	1
Cotton rat (<i>Sigmodon hispidus</i>)	4
Oldfield mouse (<i>Peromyscus polionotus</i>)	46
Cotton mouse (<i>Peromyscus gossypinus</i>)	3
Eastern cottontail (<i>Sylvilagus floridanus</i>)	1
Golden mouse (<i>Ochrotomys nuttalli</i>)	1
Eastern woodrat (<i>Neotoma floridana</i>)	1
Spotted Skunk (<i>Spilogale putorius</i>)	2
<i>Southeastern shrew (Sorex longirostris)</i>	2
TOTAL MAMMALS	61
NUMBER OF MAMMAL SPECIES	9

