

## ANNUAL REPORT

### Avian Research Subsection Wildlife Research Section Fish and Wildlife Research Institute

---

Project: **9291-204-6364 -Annual Bald Eagle Surveys in Florida**

Contract: Bald Eagle Population Monitoring

FWC\FWRI CODE: F6364-06-A1

Fiscal Year Covered: FY 2015-2016

Principal Investigator: Janell M. Brush, Avian Research Scientist, Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission, 1105 SW Williston Road, Gainesville, FL 32601

Contractors: Stephen A. Nesbitt, Biological Administrator, FWC, Fish and Wildlife Research Institute, (retired), 5407 SW 86<sup>th</sup> Drive, Gainesville, FL 32608

John H. White, Biological Scientist III, Florida Fish and Wildlife Conservation Commission, (retired), P.O. Box 1903, Eustis, FL 32727

Prepared By: Janell Brush, Kristin Rogers, Erin Leone, Jared Zimmerman

Date Prepared: June 23, 2017

---

**Abstract:** An annual statewide survey of a subset of bald eagle nesting territories in Florida was conducted between December 2015 and May 2016. Surveys were flown using fixed-winged aircraft. All nesting and productivity data were compiled and analyzed to generate annual population estimates that are used to determine the Florida eagle breeding population trend. The estimated number of active bald eagle nesting territories in Florida was 1,568 (+/-26). This number is similar to the most recent surveys: 1,499 (+/-21) in 2014 and 1,487 (+/-20) in 2013. The productivity rates for 2016 were 0.96 young per active territory (n = 89) and 1.47 young per successful nest (n = 58). The number of young produced in 2016 was estimated at 1,502 (+/- 188). Live pine trees are the most common nesting substrate for eagle nests in Florida. These data indicate that the number of nesting pairs of bald eagles in the state has been stable over the last 5 years and continues to exceed the minimum needed to meet the population goal outlined in Florida's 2008 Bald Eagle Management Plan (FWC 2008).



## INTRODUCTION

Florida supports one of the largest populations of breeding bald eagles (*Haliaeetus leucocephalus*) in the 48 continental United States (USFWS 2016). Bald eagles often adapt to land-use change (Millsap et al. 2004, Guinn 2013), but the scale and speed with which anthropogenic change has occurred in Florida has necessitated annual monitoring to facilitate conservation efforts and inform site and developmental planning.

In 2008, a Memorandum of Understanding was signed by the Florida Fish and Wildlife Conservation Commission (FWC), the Wildlife Foundation of Florida, and the U.S. Fish and Wildlife Service to establish a conservation fund for a variety of management and conservation actions for the bald eagle in Florida. The purpose of one of these actions, FWC's aerial survey program, is to locate new and documented nests, manage and disseminate data for public use, and present the resulting data on FWC's bald eagle website.

FWC staff and others have monitored bald eagle nesting territories in Florida since 1972. A nesting territory is the area associated with one breeding pair of bald eagles which contains one or more nests (FWC 2008). Information gathered over 40 years includes the locations of greater than a thousand eagle nesting territories, breeding productivity, core nesting areas, reproductive success, and population estimates.

The primary objective of this project is to gather data on the location, activity status, and productivity of bald eagle nests in Florida as part of the FWC Bald Eagle Population Monitoring. These data can be used for the management and conservation of the eagle in Florida and to determine if the eagle population in Florida is experiencing a loss of nesting sites or reduced productivity.

## **2008 BEMP MONITORING**

The survey protocol used during 1973 – 2008 entailed visiting all known eagle nests annually via aerial surveys. In 2009, FWC implemented a new survey protocol based on a stratified sampling method to reduce survey costs, produce more robust productivity estimates, and reduce risks to staff involved in aerial surveys (Zimmerman et al. 2017). Under the new protocol, a subset of nest territories were surveyed each year to determine number of active nests, and a subset of those active nests were revisited to determine productivity. The areas surveyed changed each year to ensure coverage of documented nests over a series of nesting seasons (e.g., from 2009-2014 all previously documented nests in the state were surveyed twice). The new approach incorporates data from past years with the current year and produces a statistically robust statewide population estimate.

## **2008 BEMP CONSERVATION GOALS AND OBJECTIVES**

The goal of the 2008 BEMP is to establish conservation actions that will maintain a stable or increasing population of bald eagles in Florida in perpetuity. To achieve this goal, a decline of 10% of the number of eagle nesting territories in Florida over a period of 24 years (three eagle generations) must be prevented through science-based management, regulations, public education, and law enforcement. The FWC anticipates that without continued protection of eagle nesting habitats, the number of nesting territories in Florida could decline by 10% or more over the next 24 years, which could trigger a relisting effort. The FWC has therefore set a conservation goal for bald eagles that is higher than the minimum threshold to avoid a need for relisting.

Conservation objectives are benchmarks used to measure progress toward a conservation goal. The objectives here align with metrics used in the Biological Status Review for the bald eagle (Sullivan et al. 2006) and are based on listing criteria including population size and trend, geographic range, and quantitative analyses of the probability of extinction. Annual nest surveys conducted by FWC biologists since 1972 provided the data used to establish the objectives. The first three conservation objectives below provide a means by which changes in population size or trend can be detected, while the fourth objective is intended to ensure that the bald eagle maintains its current geographic distribution. Maintaining a stable or increasing population of eagles throughout their current distribution ensures a healthy bald eagle population in Florida, and prevents the need to relist eagles under FWC's imperiled-species regulations. The conservation objectives have all been met to date, and maintaining these objectives helps to ensure that the conservation goal is sustained.

### **2008 BEMP Conservation Objectives:**

1. Maintain a minimum of 1020 active territories per year over the next 24 years
2. Maintain an average of 68% of the active territories producing  $\geq 1$  nestling per year.
3. Maintain an average reproductive success of  $\geq 1.5$  fledglings per successful nest over five years.
4. Maintain the current area of occupancy ( $>770$  mi<sup>2</sup>) and extent of occurrence (52,979 mi<sup>2</sup>) of bald eagles statewide.

## **SURVEY OBJECTIVES**

1. Complete an annual sub-sampling survey of newly reported and previously known locations of bald eagle nests in Florida.
2. Electronically enter and verify data on the locality and nest status in a format compatible with the FWC's Bald Eagle Nest Locator database.
3. Determine if we are meeting the objectives of the 2008 Bald Eagle Management Plan.

## **METHODS**

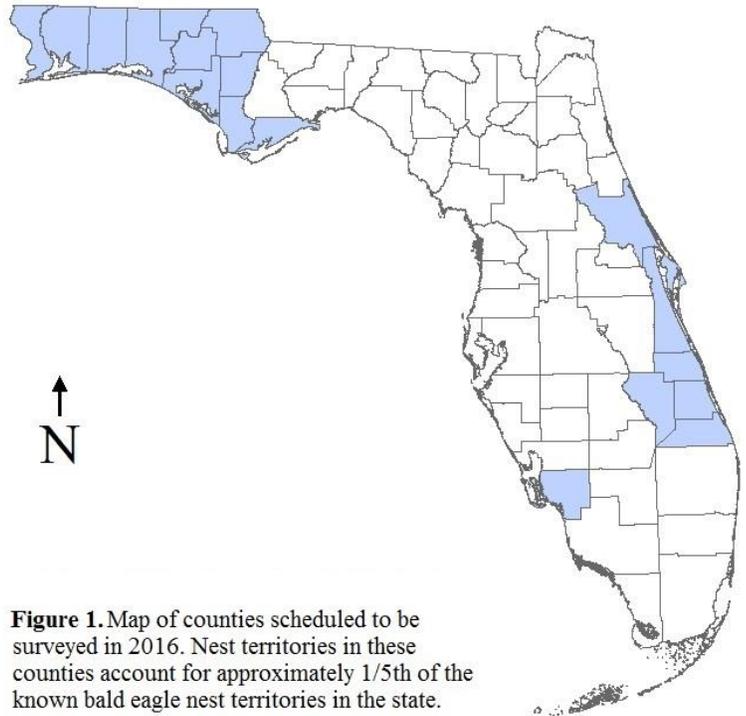
In this report, we refer to bald eagle breeding seasons based on the year in which the breeding season ends (i.e. the breeding season from October of 2015 to May of 2016 is the 2016 breeding season). In the 2016 breeding season, a subset of eagle nest territories in the state was surveyed using fixed-winged aircraft. The survey protocol followed Nesbitt et al. (1990) and included the following specifications: airspeed 60-80 knots (111-120 kph), altitude 300-500 feet (90-150 m), distance >1000 feet (>300 m) from the nest to avoid disturbance, and no flights during inclement weather or winds >20 knots (37 kph).

Biologists verified nest locations with the use of a WAAS-enabled Global Positioning System (WGPS) unit. Locations were recorded in longitude and latitude to hundredths of a minute and stored and displayed in NAD83 datum. A system called "X Marks the Spot," developed by Dr. Paul Kubilis of the FWC, was employed to record the location of new nest sites. This method consists of flying over the nest from two separate directions at an angle >60 degrees and marking a waypoint over the nest with each pass. This technique provides three separate points (two waypoints and the crossing point of the two over-flights). This method necessitates that the WGPS be capable of recording a flight log, and each flight must be downloaded before the next flight.

The following 8 categories of survey data were recorded for each nest:

1. date,
2. observer,
3. nest number,
4. latitude and longitude,
5. status of nest (active, inactive, destroyed, etc.),
6. productivity (number of eggs, nestlings, fledglings),
7. species and condition (alive, dead, damaged, etc.) of nest tree and
8. other observations (presence of adults, incubation, etc.).

We used a rotating panel survey of Florida counties to survey all known nest territories over a 5 year period; approximately 20% of the known nest territories in the state were surveyed in 2016 (Figure 1.) An annual statewide population estimate was modeled using the most recent observations for each county, while accounting for the historical trend in that county. A subset of the active nests were revisited to estimate a statewide productivity rate. Any reported new nests were surveyed and new nests that were encountered opportunistically during the survey were documented. Everglades National Park is not included in FWC's bald eagle nest surveys. There are approximately 25-30 existing bald eagle nest territories in Everglades National Park according to previous National Park Service surveys, but these nests are not included in FWC statewide population analyses.



**Figure 1.** Map of counties scheduled to be surveyed in 2016. Nest territories in these counties account for approximately 1/5th of the known bald eagle nest territories in the state.

## RESULTS

The estimated number of active bald eagle nesting territories in Florida during the 2016 statewide survey (excluding Everglades National Park) was 1,568 (+/-26) (Table 1, Figure 1). This number is similar to the most recent surveys: 1,499 (+/-21) in 2014 and 1,487 (+/-20) in 2013. The productivity rates for 2016 were 0.96 (+/- 0.12) per active territory (n = 89) and 1.47 (+/- 0.08) per successful nest (n = 58). The number of young produced in 2016 was estimated at 1,502 (+/- 188). The numbers of young per active territory and per successful nest and the number of young produced were below the preceding 10 year and 5 year means, but number of active territories was above the preceding means (Table 1). There was no statistically significant difference between the active nest counts observed in 2016 and the active nest counts from the 2008 survey, the last statewide survey that was conducted prior to the survey redesign ( $R^2 = 0.99$ ; Figure 2).

## DISCUSSION

This was the seventh year that we surveyed a subset of the known bald eagle nesting territories. The results of the first 6 years of this approach (2009-2014) are summarized in Zimmerman et al. 2017. The results of the 2016 survey indicate that the sub-sampling approach was adequate to address the objectives outlined in the FWC Bald Eagle Management Plan. We have met the 2008 BEMP conservation objectives this year.

## TABLES AND FIGURES

**Table 1.** Number of active bald eagle nest territories and productivity estimates for 2005-2014 and 2016.

Year	# Active	# Young (Y) Produced	Y/ Active	Y/ Successful
2005	1133	1473	1.30	1.59
2006	1166	1527	1.31	1.52
2007	1218	1303	1.07	1.46
2008	1278	1495	1.17	1.60
2009*	1340	1796	1.34	1.62
2010*	1362	1796	1.31	1.59
2011*	1457	1355	0.93	1.47
2012*	1511	1756	1.16	1.46
2013*	1487	1340	0.90	1.57
2014*	1499	1388	0.92	1.40
Mean preceding	1345	1523	1.14	1.53
10 years (SD)	(134.87)	(183.03)	(0.17)	(0.07)
Mean preceding	1463	1527	1.04	1.50
5 years (SD)	(53.69)	(204.29)	(0.16)	(0.07)
2016*	1568	1502	0.96	1.47

\*Nest counts for 2009 - 2014 and 2016 were estimated based on model-based statistical analysis. Productivity estimates assume that the nests monitored represent a random sample of all active nesting territories.

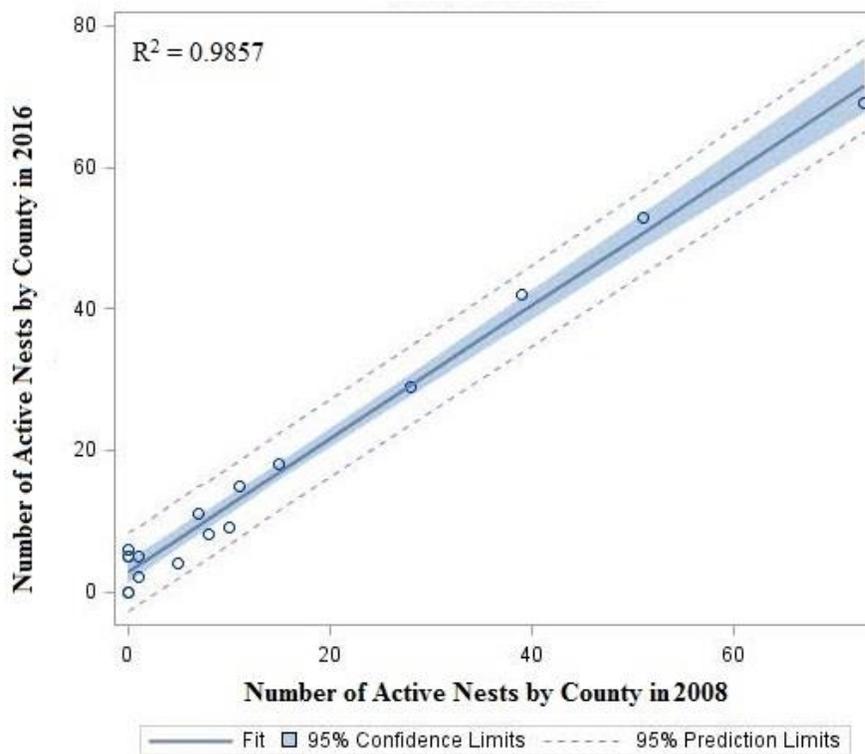


Figure 2. Comparison of slope of the number active nests per county surveyed in 2016 compared with the same counties from 2008. The number of active nests in 2016 do not statistically differ from 2008. The confidence interval for the estimated slope is shown in light blue.

## ACKNOWLEDGMENTS

We wish to thank the following partners: The Wildlife Foundation of Florida, United States Fish and Wildlife Service, Audubon EagleWatch and Ocala Aviation Services. Funding was provided through the Bald Eagle Conservation Fund. Thank you to the many individuals who continue to contribute to the success of this project, in particular thanks to: Robin Boughton, Becky Bolt, Will Bradford, Shawnlei Breeding, Resee Collins, Andrew Cox, Michelle Crowley, Craig Faulhaber, Jake Gipson, Ginger Gornto, Brad Gruver, Justin Heller, Tina Hannon, Ulgonda Kirkpatrick, Alice Mason, Ryan Mauch, Steve Nesbitt, Tyler Pittman, Cathy Ricketts, Matt Smith, Valerie Sparling, Becky Sweigert, Ron Towater, Kevin David, Melissa Tucker, Michelle van Deventer, and John White.

## REFERENCES

Buehler, D.A. 2000. Bald eagle (*Haliaeetus leucocephalus*). Number 506 in *The Birds of North America* (A. Poole, P. Stettenheim, and F. Gill, editors). The Academy of Natural Sciences, Philadelphia, PA, and the American Ornithologists' Union, Washington, D.C.

- Florida Fish and Wildlife Conservation Commission [FWC]. 2008. Bald eagle management plan. Tallahassee, FL.
- Guinn, J.E. 2013. Generational habituation and current bald eagle populations *Human–Wildlife Interactions* 7(1):69–76
- Millsap, B., T. Breen, E. McConnell, T. Steffer, L. Phillips, N. Douglass, and S. Taylor. 2004. Comparative fecundity and survival of bald eagles fledged from suburban and rural natal areas in Florida. *Journal of Wildlife Management* 68: 1018–1031.
- Nesbitt, S.A., G.L. Holder, D.A. Mager, and S.T. Schwikert. 1990. Use of aerial surveys to evaluate bald eagle nesting in Florida. Pages 207–210 in *Proceedings of the Southeast Management Symposium and Workshop*. National Wildlife Federation. Washington, D.C.
- Sullivan, D., T.H. Logan, C.M. Martino, S.[A.] Nesbitt, and T. Steffer. 2006. Biological Status Report for the Bald Eagle. Florida Fish and Wildlife Conservation Commission. Tallahassee, FL.USFWS. 2016.  
<https://www.fws.gov/migratorybirds/pdf/management/EagleRuleRevisions-StatusReport.pdf>
- Zimmerman, J., Brush, J., Pittman, T., Leone E., Cox, A., and Van Deventer, M. 2017. Status of the bald eagle (*Haliaeetus leucocephalus*) breeding population in Florida, 2009-2014. Florida Fish and Wildlife Conservation Commission, Tallahassee, FL. <  
<http://f50006a.eos-intl.net/F50006A/OPAC/Details/Record.aspx?BibCode=MF50006A|1464306|1|365357>>. Accessed 9 Mar 2017.