

ANNUAL REPORT

Avian Research Subsection Wildlife Research Section Fish and Wildlife Research Institute

Project: **9291-250-2596 -Annual Bald Eagle Surveys in Florida**

Contract: Bald Eagle Population Monitoring #06150

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Abstract: An annual statewide survey of a subsample of bald eagle nesting territories in Florida was conducted between November and March. 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 population trend. The number of estimated bald eagle nesting territories in 2010 was 1,362 (+/-29). The number of young produced this year was estimated at 1,796, this was the same as the 2009 estimate and an increase of 301 from 2008. The productivity rates for 2010 (based on 119 nests for which results were determined) were 1.31 per active territory and 1.59 per successful nest. The continuation of this survey is critical for the conservation and management of the bald eagle in Florida. This will enable us to monitor the population of this recently delisted species.



Bald Eagle in Flight

INTRODUCTION

Florida supports one of the largest populations of breeding bald eagles (*Haliaeetus leucocephalus*) in the 48 continental United States. About 70% of the occupied nesting territories in the Southeast U.S. are in Florida. As development of Florida's coastal and freshwater environments increases, the direct and indirect effects of pollution, habitat disturbance, and habitat loss on nesting eagles will accelerate. Bald eagles will be among the first species to respond to these impacts because of the avoidance by many eagles of human-developed areas as nesting sites. There is an ongoing need for knowing the locations of eagle nests for site and developmental planning by both the private sector and governmental agencies.

In 2006, 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 the management and conservation of the bald eagle in Florida. Specifically, this MOU provides funding for the FWC's aerial survey program to locate new and existing nests, manage and disseminate data for public use, and present the resulting data within the year the data were collected on the eagle website.

FWC staff and others have monitored bald eagle nesting territories in Florida since 1972. A nesting territory is defined as the area associated with one breeding pair of bald eagles which contains one or more nests (FWC 2008). Information gathered during the past 35 years includes the locations of over a thousand eagle nesting territories, breeding productivity, core nesting areas, reproductive success, and population estimates.

The USFWS Post-Delisting Monitoring Plan (USFWS 2007) recommends that bald eagle

nests be monitored every 5 years for three eagle generations (24 years) on a nationwide basis. Monitoring eagle nests and nesting territories in Florida at a five-year interval may not provide adequate information to verify that the Florida population is being maintained. Additionally, annual surveys provide information about the status of all known active and alternate eagle nests in the state, and provide a basis for declaring nests to be lost or abandoned. To ensure that the conservation objectives of this management plan are being maintained, the FWC recommends that annual surveying continue until 2032 (FWC 2008). In addition to acquiring current information about the status of eagle nests, biologists characterize the habitat and land-use changes within each nesting territory in Florida. This information may help to identify the factors that affect population changes, movement patterns, habitat changes, and other trends.

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 reproductive suppression. The state approved the Bald Eagle Management Plan (BEMP) and removed the eagle from the state imperiled species list in April 2008. An implementation team was formed to work together to carry out the plan according to specific goals and objectives.

BEMP MONITORING

The continuation of FWC surveys of all known eagle nests and nesting territories is dependent on securing funding and resources. If funding or resources are limited, then the FWC may choose to survey only a sample of the eagle nests and nesting territories statewide annually, and to develop methods to estimate the overall population and productivity. This season we tested a sub-sampling approach that will reduce the workload on the pilot and individuals conducting the survey as well as survey costs. Although we are capable of monitoring every nest in the state, we would be sacrificing some productivity data for information about nest status. The type of flying that is required to complete this survey is dangerous and flying multiple days in a row creates a situation that is not advisable. As the number of nests in the state increases, the harder it becomes to do a statewide annual survey. This sub-sample approach allows for a reduced survey while continuing to monitor the status of bald eagle nesting territories and productivity statewide on an annual basis.

BEMP CONSERVATION GOALS AND OBJECTIVES

The goal of the 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 the conservation

goal. The following conservation objectives have been met or exceeded in Florida, and maintaining these objectives will help to ensure that the conservation goal is sustained. Annual nest surveys conducted by FWC biologists since 1972 provide the data used to establish the following objectives. Determining annual reproductive success will provide the information needed to monitor the population and to measure the success of the objectives. The FWC listing process has five criteria—three based on population size or trend, one on geographic range, and one on quantitative analysis of the probability of extinction (see Sullivan *et al.* 2006). 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 will ensure a healthy bald eagle population in Florida, and will prevent the need to relist eagles under FWC’s imperiled-species regulations. The following conservation objectives will be calculated annually from five-year running averages, beginning with data collected during the period 2002–2006. We use five-year averages to avoid the possibility that one or two years of poor reproductive success might trigger a relisting effort. These numbers are subject to revision based on changes in monitoring data and/or methods.

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 ≥ 1 nestling per year.
3. Maintain an average reproductive success of ≥ 1.5 fledglings per active nest over five years.
4. Maintain the current area of occupancy (>770 mi²) and extent of occurrence (52,979 mi²) of bald eagles statewide.

SURVEY OBJECTIVES

1. Complete an annual sub-sampling survey of newly reported, previously known, and potential 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 (1 and 2) of the Bald Eagle Management Plan (BEMP).

METHODS

A statewide survey of eagles was conducted during the 2009/10 nesting season 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).

The 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 was recorded by the biologists 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),
6. species of nest tree,
7. condition of nest tree (alive, dead, damaged, etc.), and
8. observations (presence of adults, incubation, etc.).

This year was the second year of a new survey protocol based on a stratified sampling method with coverage of 1/3 of the known nests each year (Figure 1). Subsets of the known active nests were revisited to get a statewide production estimate. Using these data, an extrapolated population estimate was derived with the use of an algorithm based on data collected during the preceding 35 years of activity and production surveys (see Appendix 1). Any reported new nests were checked and we continued to locate previously unknown nesting territories by surveying areas in suitable habitat that was not covered or inadequately covered in previous surveys. All nesting and productivity data collected during this study will be compiled annually and analyzed to interpret population trends.

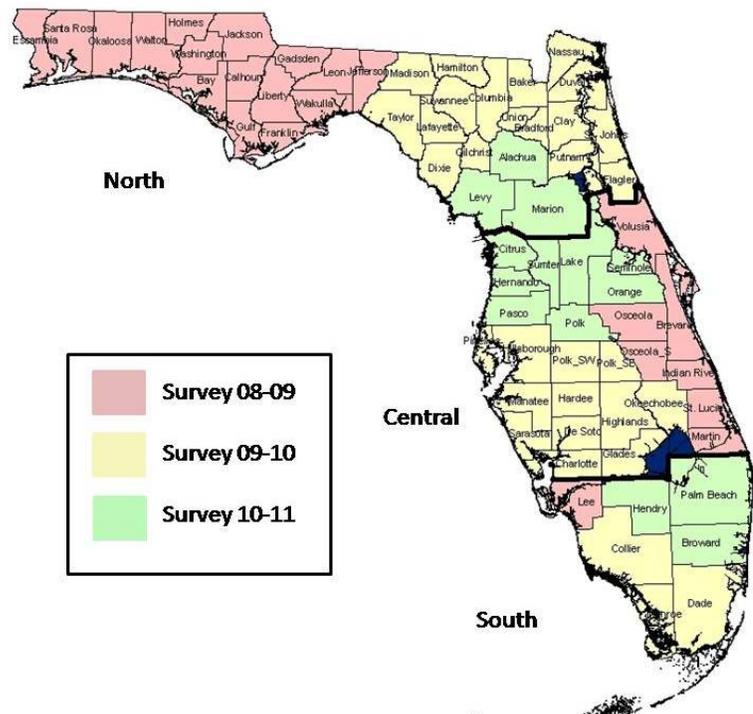


Figure 1. Schedule of areas to be surveyed over the next three nesting seasons.

RESULTS

The estimated number of active bald eagle nesting territories in Florida during the 2009/2010 statewide survey (excluding ENP) was 1,362 (Table 1). The number of young produced this year was estimated at 1,796, this was the same estimate as 2009 and an increase of 301 over the number estimated for 2008. The productivity rates for 2010 (based on 119 nests for which results were determined) were 1.31 young per active territory and 1.59 per successful nest. The numbers of young per active territory and per successful nest were above both the preceding 10 year and 5 year means (Table 1). Polk and Osceola Counties have the greatest number of active eagle nesting territories (Table 2). Pine trees are the most common nesting substrate for eagles in Florida (Table 3).

DISCUSSION

This was the first year that we surveyed a subset of the known bald eagle nesting territories. Because of this, geographic distribution and substrate use would be best assessed only every third year, after the entire state has been completely surveyed. The results of the survey indicate that the sub-sampling approach is adequate to address the management conservation objectives outlined in the Florida bald eagle management plan. We have met the first two BEMP conservation objectives this year.

The number of nesting pairs of bald eagles in Florida and their reproductive performance continues to exceed the minimum needed to meet regional population recovery goals. We should continue using the current sampling approach to monitor the population and thoroughly evaluate the suitability of this approach after the third year (2010/2011). In an effort to locate new nesting territories we should continue to identify and inventory suitable habitats that have been inadequately surveyed in the past.

TABLES AND FIGURES

Table 1. Productivity results for bald eagles nesting in 2000-2009 and 2010.

Year	# Active	# Young Produced	Y / Active	Y / Successful
2000	1,069	1,165	1.09	1.62
2001	1,102	1,311	1.19	1.60
2002	1,133	1,280	1.13	1.52
2003	1,133	1,280	1.14	1.54
2004	1,092	1,318	1.14	1.54
2005	1,133	1,473	1.30	1.59
2006	1,166	1,527	1.31	1.52
2007	1,218	1,303	1.07	1.46
2008	1,278	1,495	1.17	1.60
2009*	1,340	1,796	1.34	1.62
Mean preceding	1,166	1,395	1.19	1.56
10 years (SD)	(86.7)	(181.1)	(0.09)	(0.05)
Mean preceding	1,227	1,519	1.24	1.56
5 years (SD)	(83.7)	(177.5)	(0.1)	(0.07)
2010*	1,362	1,796	1.31**	1.59

* Numbers for 2008/2009 and 2009/2010 were estimated based on statistical analysis.

** Based on sampling protocol which assumes simple random sampling of all active nesting territories

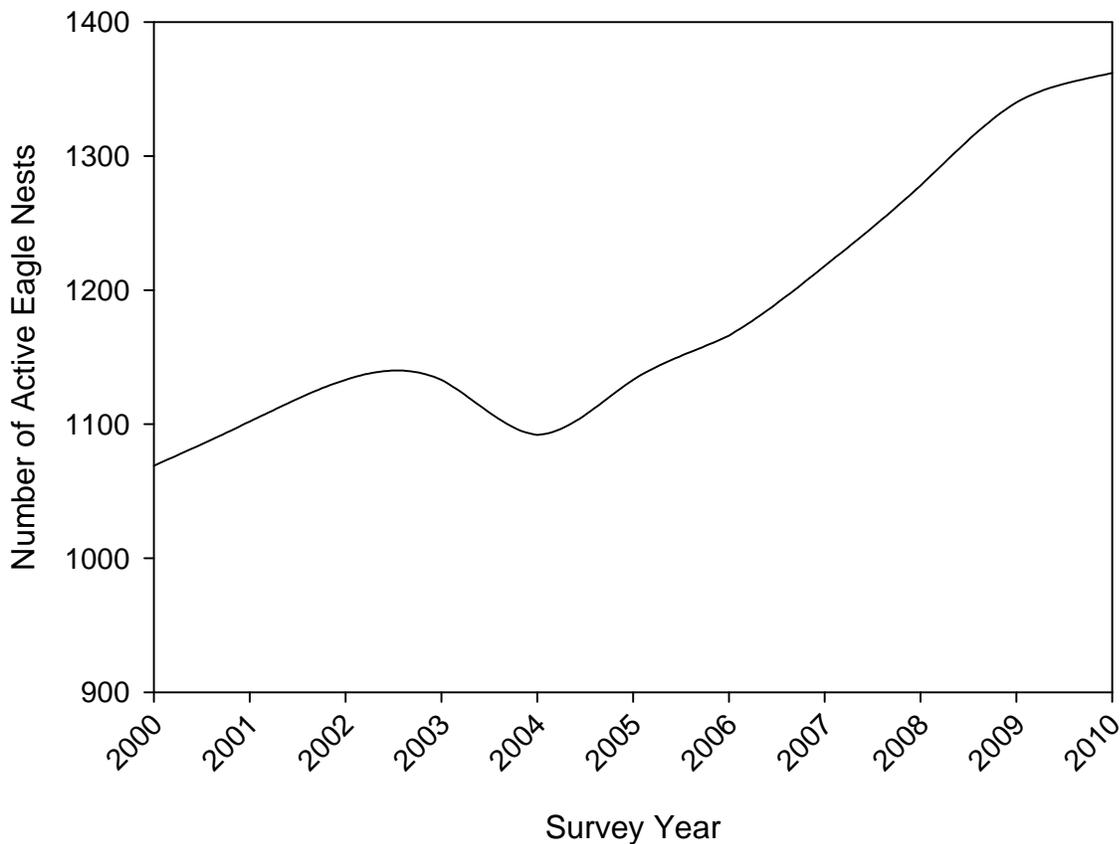
Table 2. Number of active bald eagle nests by select counties in Florida 2004–2010. *Numbers for 2009 and 2010 were estimated based on statistical analysis.

COUNTY	YEAR							
	2010*	2009*	2008	2007	2006	2005	2004	Average
Polk	115	116	119	113	121	122	118	118
Osceola	129	125	116	112	107	118	116	118
Lake	64	66	70	69	75	65	68	68
Volusia	73	70	73	60	66	70	67	68
Putnam	70	77	67	50	41	57	46	58
Seminole	48	49	49	51	52	47	46	49
Lee	48	47	51	50	47	42	43	47
Marion	65	58	51	46	38	36	34	47
Alachua	57	53	51	42	43	40	33	46
Brevard	26	30	39	42	43	42	41	38
Sarasota	43	45	41	37	33	34	31	38
Orange	42	40	38	35	34	29	30	35
Highlands	37	35	37	32	37	30	25	33
Charlotte	40	43	38	29	26	26	25	32
Franklin	37	33	28	40	25	34	20	31

Table 3. Nesting substrate used by bald eagle nesting in Florida 2004–2008.

Year	Australian Pine		Other		Oak		Sand Pine		Cypress		Pine		Artificial
	<i>Live</i>	<i>Dead</i>	<i>Live</i>	<i>Dead</i>	<i>Live</i>	<i>Dead</i>	<i>Live</i>	<i>Dead</i>	<i>Live</i>	<i>Dead</i>	<i>Live</i>	<i>Dead</i>	
2004	11	1	6	3	13	2	8	0	84	13	807	100	23
2005	12	0	5	2	12	2	6	1	86	8	918	80	20
2006	14	5	6	1	12	7	10	0	89	13	865	117	21
2007	17	6	7	3	14	1	8	1	84	12	862	165	27
2008	19	7	8	3	16	3	4	2	90	12	914	167	28
2009	The substrate samples will be tallied after the third year (2011) of surveys under the new sampling												
2010	protocol												

Figure 2. Number of active bald eagle nesting pairs in Florida 2000-2010. 2009 and 2010 numbers were estimated based on statistical analysis.



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REFERENCES

- Broley, C.L. 1947. Migration and nesting of Florida bald eagles. *Wilson Bulletin* 59:3–20.
- 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.
- McEwan, L.C., and D.H. Hirth. 1980. Food habits of the bald eagle in north-central Florida. *Condor* 82: 229–231.
- 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.
- Mojica, E.K. 2006. Migration, home range, and important use areas of Florida sub-adult bald eagles. Master's thesis, University of Georgia. Athens, GA.
- 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.
- Nesbitt, S.A., M.J. Folk, and D.A. Wood. 1993. Effectiveness of bald eagle habitat protection guidelines in Florida. *Proceedings of the Annual Conference of Southeastern Associated Fish and Wildlife Agencies* 333–338.
- 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. 2007. National bald eagle management guidelines. Washington, D.C.
- Wood, P.B., T.C. Edwards, and M.W. Collopy. 1989. Characteristics of bald eagle nesting habitat in Florida. *Journal of Wildlife Management* 53: 441–449.
- Wood, P.B. 1992. Habitat use, movements, migration patterns, and survival rates of sub-adult bald eagles in north Florida. Ph.D. dissertation, University of Florida. Gainesville, FL.

Wood, P.B., M.W. Collopy, and C.M. Sekerak. 1998. Postfledging nest dependence period for bald eagles in Florida. *Journal of Wildlife Management* 62: 333–339.