

# Florida Field Naturalist

PUBLISHED BY THE FLORIDA ORNITHOLOGICAL SOCIETY

VOL. 14, No. 2

MAY 1986

PAGES 29-52

## PRODUCTIVITY AND CHANGES IN NEST UTILIZATION IN FOUR CENTRAL FLORIDA BALD EAGLE NESTING TERRITORIES

NANCY WILLIAMS-WALLS<sup>1,2</sup>, SUE MCCUSKEY<sup>1</sup>

WAYNE MARION<sup>3</sup>, J. ROSS WILCOX<sup>4</sup>

<sup>1</sup>Applied Biology, Inc., 641 DeKalb Industrial Way, Decatur, Georgia 30033;

<sup>2</sup>School of Applied Biology, Georgia Institute of

Technology, 225 North Ave. N.W. Atlanta, Georgia 30332

<sup>3</sup>Department of Wildlife and Range Sciences, University of Florida,

118 Newins-Ziegler Hall, Gainesville, Florida 32611;

<sup>4</sup>Florida Power and Light Company, Environmental Affairs Department,

P. O. Box 14000, Juno Beach, Florida 33408. (Present address of

McCuskey: Dames & Moore, 55 East Paces Ferry Road, Atlanta, Georgia 30363.)

**Abstract.**—Four nesting territories of the Southern Bald Eagle (*Haliaeetus leucocephalus leucocephalus*) in central Florida were monitored to record productivity and changes in nest utilization. A total of 316 hours of observation was carried out during breeding seasons between 1978 and 1984. At the four nesting territories, annual productivity averaged 1.69 young per successful nest, a rate comparable to average productivity in Florida over the same years. More than one nest was present in each eagle territory and, at three of the four territories, a second nest was used when the tree supporting the first nest was destroyed by severe weather. Buffer zones may prevent disruption of eagle nesting and protection of alternate nest trees is desirable.

Nesting success of the Bald Eagle in Florida has been studied since the 1940's. A decline in eagle productivity in southwest Florida was documented by Broley (1958) when he found a 41 percent reduction in active eagle nests from 1946 to 1957. The Office of Endangered Species and International Activities (1973) assigned the Southern Bald Eagle to endangered species status in 1965 when the total nesting population throughout its range was estimated to be about 235 active pairs.

Since then, efforts have been made to halt the decline in eagle numbers, and annual surveys of the Florida population have been coordinated through the Florida Cooperative Bald Eagle Survey Committee organized in the fall of 1972 (Nesbitt et al. 1975). Survey results during 1978-1983 show an annual average of 351 active territories and 220 successful nests in Florida (Nesbitt pers. comm.). It is not known

Florida Field Naturalist 14: 29-37, 1986.

if eagle productivity has actually increased in recent years or if, with the increased efficiency of annual surveys, more active eagle territories have been discovered. However, the decline in hatching success formerly associated with pesticides that caused eggshell thinning now seems less of a problem. Probably survival and recovery of Florida Bald Eagle populations are primarily dependent upon availability of suitable nesting and feeding habitats.

In Florida, eagles begin nesting activities in the fall and females may begin egg laying by late October (Nesbitt et al. 1975); active nests with eggs may be found as late as early March (Nesbitt et al. 1975). Most young fledge the nest by April. Eagles commonly nest in tall pine or cypress trees within 3 km of water (McEwan and Hirth 1979). Because Bald Eagles often use alternate nests in different years, inactive nest trees receive the same protection as active nests (U. S. Fish and Wildlife Service 1982. Management guidelines for the Bald Eagle in the southeast region, Unpubl. Rpt., Jacksonville, Florida: U. S. Fish and Wildlife Service).

In this paper we document productivity and nest utilization in four Bald Eagle nesting territories in central Florida.

#### METHODS

Four nesting territories were studied in areas adjacent to electric generation or transmission facilities in central Florida (Fig. 1). Sites were located between 80°35' and 81°40' W longitude, 27°5' and 29°15' N latitude.

The Martin County territory included a 160 ha tract of cypress surrounded on three sides by a power plant cooling reservoir and on the fourth side by a canal and railroad. A pasture adjacent to the canal and across from the cypress stand is included in the site considered. The area is approximately 4 km from a power plant (Wilcox 1979, pp 451-464, Rocky Mountain Forest and Range Exp. St. Gen. Tech. Rpt. RM-65). This nesting territory was monitored during the breeding seasons of 1978 through 1984.

The Sanford territory located in Volusia County includes scattered clumps of pines adjacent to a 240 kV transmission corridor and about 1000 m from power plant stacks. This area is close to the plant's cooling reservoir, near an active railroad line, and within hearing distance of a state highway and air traffic from the Orlando Airport. The Sanford nesting territory has been observed from 1978 through 1984 excluding the 1982-1983 breeding season.

Located in Orange County, the Poinsett territory includes a wet flatwoods bordered on two sides by a state road and a 240 kV transmission corridor. It is about 500 m from a 500 kV substation (under construction 1981-1984) and approximately 3 to 4 km from the St. Johns River. Clearing activities at the substation site were timed to avoid disruption to the nesting period. This territory has been studied during breeding seasons from 1981 through 1984.

The Volusia County territory includes scattered pines located 90 to 100 m from the St. Johns River. Several campsites are within 150 m of the nest tree but no major roads are in the vicinity. The nest is approximately 280 m from a 500 kV transmission line corridor

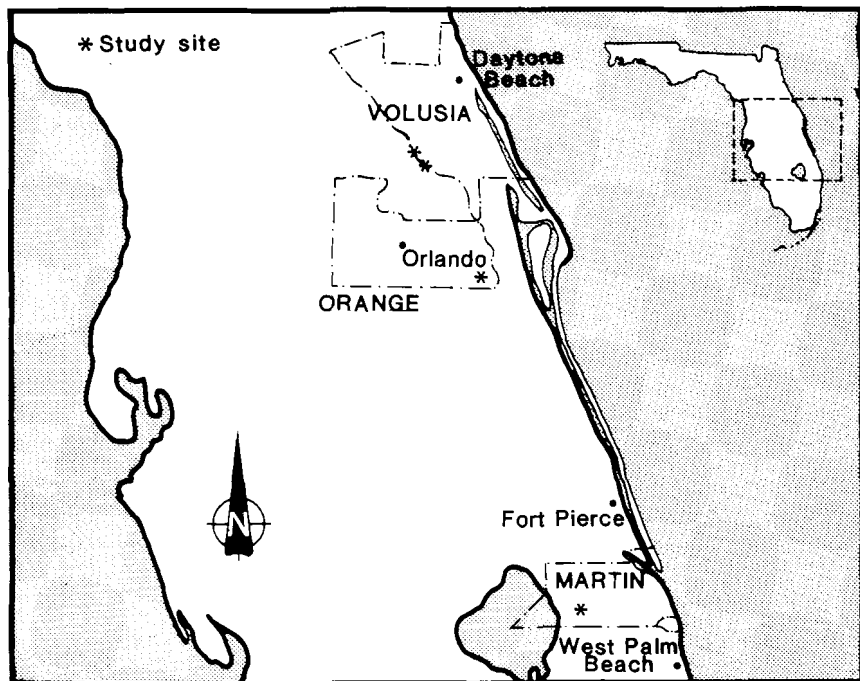


Figure 1. Bald Eagle nesting territory study sites.

(under construction 1983-1984). Clearing and construction activities in the corridor were timed to avoid disruption to the nesting period. This territory was studied only during the 1983-1984 nesting season.

Monthly observations were initiated at each site in October and continued until young were observed or it was determined that nesting had been unsuccessful. A successful nest was one which fledged one or more young. If young were present, observations generally were increased to once every two weeks until all were fledged. Observations were made from the ground with the aid of binoculars and a 60X spotting scope mounted on a tripod. The onset of incubation, probable hatch date and probable date of fledging were noted during regular observations. Because observations were made once every two to four weeks, dates are approximate.

A total of 137 visits (316 hours of observation) was made to the study sites. At Martin County, 29 observation visits (146 hours) were made over six years. At the Sanford nesting territory, 52 visits (78 hours) were made over five years. At the Poinsett sit, 38 visits (70 hours) were carried out over three years and at Volusia County, 18 visits (22 hours) were made primarily during one breeding season.

## RESULTS

**Productivity.**—At the study nesting territories, an annual average of 1.69 young Bald Eagles was produced per successful nest (Table 1). The annual average number of young fledged per successful nest ranged from 1.00 in 1981-1982 to 2.00 in 1978-1979, 1980-1981 and 1982-1983. Florida Bald Eagle survey results showed that the annual average number of young per successful nest ranged from 1.42 to 1.63 and averaged 1.51 during the years 1978 through 1984 in Florida (Nesbitt 1983, Nesbitt pers. comm.). Productivity at the study sites met or exceeded average productivity in Florida. Data for the study sites were compared to the statewide productivity data and showed no significant difference in productivity (Mann-Whitney  $p < .05$ ). It should be noted that the number of eagle pairs monitored in this study represented only 1.5 percent of the total monitored statewide.

At the Martin nesting territory (the southernmost site) incubation did not begin before early January and young fledged between early March and late June (Table 2). The nesting period spanning 10 weeks in 1980-1981 probably indicated failure of the first nesting attempt followed by a successful second attempt.

At the Sanford nesting territory, incubation was initiated between mid-December and late January. Fledging occurred between late April and late May. The nesting periods observed for 6 consecutive years at this site were more consistent from one year to the next than they were at any of the other study territories (Table 2).

Incubation began between mid-December and mid-February at the Poinsett nesting territory (Table 2). Fledging occurred between late March and early June. The latest onset of incubation took place in February 1984 when the former nest tree was destroyed by high winds in mid-January 1984.

The Volusia nesting territory was visited once in late March 1983 after the nest was reported to have been active earlier in 1983 (P. Simpson pers. comm.). No eagles were observed in March, but two major sections of an eggshell were found under the nest. The eggshell was relatively fresh with membranes attached to the shell. The annual Florida nesting survey recorded that this nest had been active, but no young were fledged (Nesbitt pers. comm.). Because no feces or food items were present under the tree, it appeared to us that the nest had been abandoned for several weeks prior to our observations in late March. When observations were resumed the following breeding season, nesting activity at Volusia spanned the period from mid-December 1983 through mid-June 1984 (Table 2). As occurred in 1980-1981 at the Martin site, this unusually long period indicates an early unsuccessful attempt.

**Table 1. Productivity at Four Florida Bald Eagle Nesting Territories Compared to Average Productivity During Study Years, 1978-1984.**

Year	Number of successful nests <sup>1</sup>	Number of young produced	Young per successful nest	Florida average young/successful nest <sup>2</sup>
1978-1979	2	4	2.00	1.45
1979-1980	3	5	1.67	1.63
1980-1981	3	6	2.00	1.57
1981-1982	2	2	1.00	1.48
1982-1983	2	4	2.00	1.52
1983-1984	4	6	1.50	1.42
Average annual productivity			1.69	1.51

<sup>1</sup>Includes data for the Poinsett site supplied by Nesbitt 1981, pers. comm.

<sup>2</sup>From Nesbitt 1983 and Nesbitt 1984, pers. comm.

**Nest utilization.**—In each of the four territories studied, the original nest was destroyed by storm or human activity, but an alternate nest was available or built. As an example, the large eagle nest (MC-1) located in a dense cypress stand at the Martin nesting territory was used from 1976 through 1978. Records show that the nest was successful during both of these breeding seasons (Wilcox 1979). During Hurricane David on 3 September 1979, this tall bald cypress (*Taxodium distichum*) nest tree was blown down and the nest material scattered over the ground. A second but smaller nest (MC-2) was discovered on 13 March 1980 in a cypress tree approximately 120 m west of a canal adjacent to the cypress stand. Because of its proximity to the former nest, the same feeding areas were available to the eagle pair. Nest MC-2 was used for three breeding seasons from spring 1980 through 1982. On 3 March 1983, two adults and two chicks were observed in a new nest (MC-3) located in a dead cypress adjacent to the former nest MC-1. Nest MC-3 was used successfully during 1983 and 1984. The tree containing canal nest MC-2 was cut down by the landowner in the spring of 1983.

At the Sanford nesting territory, the original nest (SF-1) was located in a longleaf pine (*Pinus palustris*). Eagles nested there successfully from 1978 through March 1982 (Table 2). On 8 April 1982, strong winds blew down pine trees adjacent to the nest tree and destroyed nest SF-1. One eagle chick approximately four to five weeks old was found dead on the ground near the remains of the former nest. A necropsy report stated that the bird died from exposure, possibly drowning, and trauma (National Wildlife Health Laboratory 1982, Unpubl. Necropsy Report on Bald Eagle accession number 29,703). Both adults were unharmed. Ob-

**Table 2. Summary of Breeding Behavior and Nest Utilization at Four Central Florida Nesting Territories, 1978-1984.**

Nesting Territory	Breeding Season	Incubation Beginning	Probable Hatch Date	Number Young	Number Fledged	Probable Date of Fledging
Martin	1978-1979	—	—	0	0	—
	1979-1980	—	1st week of March 1980	2	2	3rd week of April 1980
	1980-1981	Early Feb 1981	1st week of April 1981	2	2	Late June 1981
	1981-1982	Early Jan 1982	February 1982	—	1	Early March 1982
	1982-1983	—	Early Feb 1983	2	2	—(before late April 1983)
	1983-1984	—	Early April 1984	2	1	—
Sanford	1978-1979	—	Early March 1979	2	2	4th week of May 1979
	1979-1980	Mid-Jan 1980	1st week of March 1980	2	2	Mid-May 1980
	1980-1981	Early Jan 1981	1st week of March 1981	2	2	Mid-May 1981
	1981-1982	4th week Jan 1982	Early March 1982	1	0	—
	1982-1983	—	—	—	0	—
	1983-1984	Mid-Dec 1983	4th week in February 1984	1	1	4th week in April 1984
Poinsett	1978-1979				2 <sup>1</sup>	
	1979-1980				1	
	1980-1981				2	
	1981-1982	Early Jan 1982	Early March 1982	2	1	Late April 1982
	1982-1983	Mid-Dec 1982	Mid-January 1983	2	2	Late March 1983
	1983-1984	Mid-Feb 1984 or earlier	Early March 1984	2	2	Early June 1984
Volusia	1981-1982	—	—	—	0 <sup>1</sup>	—
	1982-1983	—	—	—	0	—
	1983-1984	Mid-Dec 1983	2nd week of March 1984	2	2	Mid-June 1984

<sup>1</sup>Nesting data supplied by Nesbitt 1984, pers. comm.

servations were resumed on 23 September 1983 when a relatively small nest (SF-2) was identified about 870 m north of the former nest. Nest SF-2 was located in a slash pine (*Pinus elliottii*) that was one of the tallest trees in the area. In late April 1984, one eagle successfully fledged this nest.

The Poinsett nest tree in use when observations were initiated in October 1981 was the tallest tree in the immediate area. The bald eagle nest (PO-1) was in a slash pine just southeast of a shallow seasonal pond. Nest PO-1 was used successfully for the first breeding season, 1981-1982. When observations were resumed in the fall of 1982, eagles were nesting in a slash pine tree (PO-2) located only 40 m west of the first nest. In the fall of 1983 the nest PO-2 support tree died, probably as a result of a lightning strike. High winds during two days in early January apparently broke off the top of the tree, destroying nest PO-2. Observations on 14 February 1984 noted an adult eagle in incubating posture on the original nest PO-1.

The Volusia nesting territory contained only one active nest that was used during 1983-1984. The nest (VO-1) was located in a longleaf pine about 90-100 m from the St. Johns River. The presence of an eagle eggshell found under the nest in late March 1983 showed that the nest was active during the 1982-1983 breeding season. A second smaller nest (VO-2) was identified on 18 January 1984 in a living pine tree located approximately 120 m northwest of the active nest. Adult eagles from nest VO-1 frequently perched on this nest, but no incubation occurred there.

## DISCUSSION

Eagle productivity (per successful nest) at the study nesting territories met or exceeded average productivity in Florida during the same years and was not statistically different from statewide productivity. Bald Eagle nesting was characterized by variability in the onset of nesting and duration of the breeding season and second nesting attempts when the first failed. Of the many factors affecting nesting success, three were documented: 1) impacts from storms; 2) importance of access to suitable nest trees; and 3) freedom from human disturbance.

Eagles select nest trees that generally are the tallest, oldest trees located in the open or on the edge of a stand of trees (McEwan and Hirth 1979). Trees and nests built in the upper branches of these trees are particularly susceptible to damage from hurricanes, lightning and high winds associated with severe weather. Of the nine nests observed, three were destroyed by storms, and in one instance, an eaglet was killed.

Because nest trees are vulnerable, trees meeting the conditions of height and location need to be available as alternates in the event that one nest tree is destroyed. An unoccupied nest may not represent an abandoned territory but may be an alternate nesting site within an active territory (Postupalsky 1974). In some cases, a pair of eagles has been observed to use nests as far as 3 km apart (Howell and Heinzman 1967). In our study, the maximum distance between alternate nests was approximately 1 km. The presence of suitable alternate nest trees insures that an eagle pair will have a site to rebuild the nest and retain access to the same feeding areas even if its original nest tree is destroyed.

The third factor important to nesting success is freedom from short-term and long-term human activities disruptive to eagle nesting behavior and especially alteration of habitat. Management guidelines for the protection of eagles in the southeast region have been issued by the U. S. Fish and Wildlife Service (1982). The guidelines recognize that all nests used by any pair of eagles are to receive the same protection even though a nest may not have been used for raising young for one or more years. Restrictions are recommended in Florida for a primary zone of a radius 0-227 m (0-750 ft) from the nest tree as well as for a secondary zone of 228-457 m (751-1500 ft) radius from the nest tree. In the primary zone, habitat alteration such as logging, industrial development and mining are discouraged. The recommendations for restriction do not have the force of law but are management guidelines. Restrictions of human activities also are recommended for each zone, and the particular vulnerability of eagles to disturbance during courtship, egg laying, incubation and brooding are recognized.

The eagles observed in this study successfully fledged young within 0.05-4 km of human activity and operation of equipment associated with the generation and transmission of electricity. At the Volusia site, land clearing for a transmission line located approximately 280 m from the nest tree was conducted before the breeding season. Setting foundations for transmission towers and stringing of lines were scheduled after the young had fledged. Clearing and filling operations for the Poinsett Substation fewer than 50 m outside of the secondary zone were conducted before the onset of the breeding season. Thus, in these two instances, management guidelines were adhered to and eagles continued to use these two nesting territories.

It has been our experience that eagles vary in the amount and kinds of human activities they will tolerate. The eagles observed in this study selected nest sites within sight and hearing of human activities; for these pairs it appears that the recommended buffer zones were sufficiently



large. From this study we cannot predict whether eagles presently nesting in isolated areas would tolerate human activity even at a distance of 457 m. Nevertheless, protection of alternate as well as occupied nest trees and restriction of disruptive activities during the breeding season are important factors that will increase the probability of nesting success for individual eagles.

#### ACKNOWLEDGMENTS

This research was funded by the Florida Power and Light Company.

#### LITERATURE CITED

- BROLEY, C. L. 1958. The plight of the American Bald Eagle. *Audubon* 60: 162-163.
- HOWELL, J. C. AND G. M. HEINZMAN. 1967. Comparison of nesting sites of Bald Eagles in central Florida from 1930-1965. *Auk* 84: 602-603.
- MCEWAN, L. C. AND D. H. HIRTH. 1979. Southern bald eagle productivity and nest site selection. *J. Wildlife Manage.* 43: 585-594.
- NESBITT, S. A., R. R. ROTH, AND W. B. ROBERTSON, JR. 1975. The status of the Bald Eagle in Florida 1972-1975. *Proc. Southeastern Assoc. of Game and Fish Commissioners* 29: 424-428.
- OFFICE OF ENDANGERED SPECIES AND INTERNATIONAL ACTIVITIES. 1973. Threatened wildlife of the United States. BSF & W Resource Publ. 114. Washington, D.C.: U. S. Govt. Printing Office.
- POSTUPALSKY, S. 1974. Raptor reproductive success: some problems with methods, criteria, and terminology. Pp. 21-31 *in* Management of raptors (F. N. Hamerstrom, Jr., B. O. Harrell, and R. R. Olendorff Eds.). *Raptors Res. Rept.* 2.

### FLORIDA ORNITHOLOGICAL SOCIETY SPECIAL PUBLICATIONS

**Species index to Florida bird records in Audubon Field Notes and American Birds volumes 1-30 1947-1976**, by Margaret C. Bowman. 1978. Florida Ornithological Society, Special Publication No. 1. Price \$4.00.

**The Carolina Parakeet in Florida**, by Daniel McKinley. 1985. Florida Ornithological Society, Special Publication No. 2. Price \$6.00.

Order prepaid from the Treasurer