

Recent Status of Florida's Bald Eagle Population and Its Role in Eagle Reestablishment Efforts in the Southeastern United States

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Abstract: We monitored bald eagle (*Haliaeetus leucocephalus*) nesting effort and success in Florida annually before, during, and after years when eggs were removed from selected pairs. Complete clutches were taken to promote renesting. Clutches were collected after ≥ 2 weeks of natural incubation. Incubation of collected eggs was continued artificially and resultant young were reared in captivity in Oklahoma. At 11–12 weeks, young were released at established hack sites in Oklahoma, Mississippi, Alabama, and North Carolina. The goal of the project was to increase the nesting population in the southeast without adversely impacting annual production in Florida. From 1985–1992, 275 eagles were released. In 1991, the first nest resulting from the hacking effort was documented in Mississippi. Increases in nesting eagles in the other states have occurred and were perhaps, in part, a consequence of these releases. In Oklahoma (the only donor state where intensive monitoring has been conducted), 23 nests were active in 1997. Statewide nest effort and success in Florida bald eagles has remained stable during and following the period of egg removal.

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Florida Fish and Wildlife Conservation Commission (FWC) personnel have coordinated and participated in annual bald eagle nesting surveys in Florida since 1973. All nesting territories known to exist were surveyed annually, and results have been published periodically (Nesbitt et al. 1975, 1990; Wood 1982, 1991). Otherwise, annual results have been documented in unpublished progress reports in FWC files.

Nesting efforts, documented from these surveys, have steadily increased from 1973 to 1997. However, until the mid-1980s, we believe that the increases in annual nesting efforts were primarily reflecting the discoveries of previously unknown nests. By the mid-1980s few previously known nesting territories were being reported to us. Additionally, several new nesting territories were discovered in areas previously surveyed with no nesting eagles found.

One by-product of the increasing Florida population was a coordinated multi-state bald eagle restoration effort in the Southeast, taking eggs from Florida eagle nests, then distributing the resulting young among strategically situated release sites (Cabbage 1985, Wood 1986, Sherrod et al. 1987, Simons et al. 1988, Porteous 1992). To increase the potential for successfully establishing a self-sustaining, expanded regional population, we wanted to use birds which originated in the Southeast and annually release 1 large group of birds (≥ 40) in 1 of the participating states.

A prerequisite to that effort, however, was a high degree of confidence that the annual production of eagles in Florida would not be measurably reduced. Accordingly, eggs were experimentally removed for 3 years to evaluate the rate at which Florida eagles would produce a second clutch (information from captive eagles suggested eagles in the wild would likely renest if eggs were removed early enough in the nesting season). Second clutches of eggs were laid in 78% of the 58 nests from which first clutches had been removed in that experimental phase (Wood and Collopy 1993). The subsequent operational phase of the effort was thereby predicated on the confidence that eggs removed from bald eagle nests in Florida would indeed be replaced through renesting.

The focus of the project was to increase the number of breeding bald eagles in those states where populations had not reached the goals established in the Southeastern States Bald Eagle Recovery Plan (U.S. Fish and Wildl. Serv. 1989). Sufficient time has passed to now assess the results of this reestablishment effort, as well as evaluate possible impacts of egg removal on Florida nesting bald eagles. In this paper, we also report the results of the surveys from 1983 through 1997 for Florida nesting bald eagles.

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Methods

Nesting

Bald eagle nesting effort and success were recorded from fixed-wing or rotary aircraft (Nesbitt et al. 1990) statewide in Florida from the 1984–85 nesting season through the 1996–97 season. Territories were checked at least twice per season, once early in the nesting season (late December through January) to document territory occupancy (whether or not at least 1 adult was on-territory), and once late in the breeding period (late March through April) to document production (*N* young fledged). Various ancillary data were collected opportunistically, and included observed incubation, number of eggs or nestlings present, and any unusual or otherwise significant observations (e.g., any recent land use changes near nests, nest tree dead or dying, etc.). At most occupied nests, incubation had been initiated before the early-season check. Additional checks were made at nests when scheduled visits did not yield completed nest history.

Territories were designated “currently active” unless they had not been attended by adult eagles for 5 consecutive breeding seasons, then classified as “abandoned” and deleted from the active data base (U.S. Fish and Wildl. Serv. 1987).

The nesting data were possibly biased by several factors. First, some territories recorded as inactive during the early check may have actually been occupied earlier (bald eagles begin arriving on nesting territories in Florida as early as mid-September, although most arrive late October through November), but were vacated for some reason before that early check. Second, fledging/dispersal of young might have occurred at some nests by the time of the late check, or, conversely, some pre-fledglings recorded at that later time might not have survived to fledging age. Third, territories might be occupied then abandoned between annual survey flights. Biases such as these could lower the counts of the number of occupied territories and alter estimates of young fledged per year, but are not great enough to cause an effect on the overall trend. Also, some percentage of the population expansion reflected in the data continues to be the result of discoveries of existing but previously unknown nests.

While there is no way to quantify that percentage, it is thought to be relatively small since the mid 1980s.

Reestablishment

Productivity data, collected in some territories annually since 1973, were used to select nests from which eggs might be collected. Territories with below average nesting success or those established for ≤ 2 years were not used for egg donation. Selection of potential donor territories also depended on nest accessibility. Most selected nests were on public lands. Those on private lands necessitated our acquiring permission in order to gain access.

Natural incubation by selected eagle pairs in Florida was allowed to proceed for a minimum of 2 weeks before clutches were collected, which improved the hatch rate of collected eggs. Professional arborists were engaged to collect complete clutches of eggs.

Collected eggs were placed in portable, artificial incubators (Sherrod et al. 1987) until collecting was completed. The eggs were then transported by motorhome or private jet to the Sutton Avian Research Center's facility in Oklahoma where incubation was completed by Bantam hens (*Gallus* sp.) or artificial incubators. Following hatching, the eagle chicks were raised behind one-way mirrors and fed with bald eagle puppets until being placed in enclosed hacking towers at the age of 8 weeks, ensuring wildness and avoiding imprinting on humans. At 11–12 weeks of age the birds were released from the enclosed hacking towers (Simons et al. 1988) at reintroduction sites in Oklahoma, Mississippi, Georgia, Alabama, and North Carolina.

A total of 275 eagles were successfully released in 5 southeastern states from 1985–1992 (Table 1). Searches for nesting activity by released eagles were conducted in Oklahoma and Alabama. Systematic surveys in Oklahoma were conducted on a frequency interval similar to the Florida nesting survey to collect information on effort and success. Casually collected information on nesting effort by reintroduced eagles also was received from Georgia, Kansas, Mississippi, South Carolina, and Texas. In states where systematic survey effort to verify nesting by reintroduced eagles were not possible, results must be considered minimal.

Table 1. Historic nest numbers and number of bald eagles released by the Sutton Avian Research Center in the Southeastern United States.

| | Occupied nests 1982 ^a | <i>N</i> Released | | | | | | | | Total |
|----------------|--|-------------------|------|------|------|------|------|------|------|-------|
| | | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | |
| Oklahoma | 0 | 5 | 11 | 4 | 11 | 0 | 59 | 0 | 0 | 90 |
| Georgia | 3 | 3 | 6 | 5 | 0 | 0 | 0 | 0 | 0 | 14 |
| Alabama | 0 | 4 | 7 | 5 | 0 | 0 | 0 | 53 | 0 | 69 |
| Mississippi | 0 | 0 | 4 | 4 | 0 | 41 | 0 | 3 | 46 | 98 |
| North Carolina | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 4 |
| Total | 3 | 12 | 28 | 18 | 11 | 41 | 59 | 60 | 46 | 275 |

a. Number provided by the U.S. Fish and Wildlife Service (1989).

Results

Nesting

The nesting bald eagle population in Florida has continued to expand, both during the years of egg removal and after (Table 2). Average annual percent of increase in the number of occupied territories between 1984 and 1997 was 7.8%, and the number of young per occupied territory and successful nests during that period averaged 1.14 (± 0.11 , SD) and 1.59 (± 0.6 , SD), respectively. Least-squares linear regression of time on the number of occupied territories statewide for all surveyed years (1973–1997) showed a strong positive trend ($r^2 = 0.876$, $P < 0.001$). In the years following egg removal (1992–1997), the trend continued ($r^2 = 0.962$, $P < 0.001$). In Osceola County where a majority of the eggs were taken, similar results were seen. In the year of active egg removal, the trend was again positive ($r^2 = 0.826$, $P < 0.002$), in the years following egg removal the positive trend continued ($r^2 = 0.824$, $P < 0.02$).

Reestablishment

The first known successful nesting of eagles resulting from the reintroduction efforts was on Horn Island, Mississippi, in 1991 and later the same year a pair of hacked eagles was found nesting in Oklahoma (Jenkins and Sherrod 1993). One and 2 young were reared in the Mississippi and Oklahoma (hacked) bald eagle nests, respectively. Two additional nests in Oklahoma also produced young that year, but the origin of the adults at these nests was not known because nests were reported after fledging occurred. Annual surveys from 1991–1997 revealed increasing numbers of nesting bald eagles in Oklahoma (Table 3).

Of other states where Florida bald eagles were released, only Alabama was closely monitored. Results there reflect an increase in the nesting population similar to that experienced in Oklahoma (K. Hudson, pers. commun.). Eagles released in Oklahoma have been documented nesting in Texas (M. Mitchell, pers. commun.) and Kansas (Mulhern et al. 1994) and an eagle released in Alabama has nested on the

Table 2. Number of occupied territories, successful nest and young produced recorded observed during bald eagle nesting surveys in Florida, 1984–1997.

| Nesting season | Occupied territories | Successful nests | % Nest successful | Young produced |
|----------------|----------------------|------------------|-------------------|----------------|
| 1984–85 | 387 | 280 | 72 | 435 |
| 1985–86 | 329 | 247 | 75 | 429 |
| 1986–87 | 391 | 251 | 64 | 400 |
| 1987–88 | 399 | 276 | 69 | 448 |
| 1988–89 | 439 | 310 | 71 | 474 |
| 1989–90 | 535 | 366 | 68 | 585 |
| 1990–91 | 601 | 385 | 64 | 591 |
| 1991–92 | 652 | 468 | 72 | 729 |
| 1992–93 | 667 | 447 | 67 | 679 |
| 1993–94 | 779 | 591 | 76 | 951 |
| 1994–95 | 831 | 621 | 75 | 982 |
| 1995–96 | 876 | 725 | 83 | 1,113 |
| 1996–97 | 912 | 748 | 82 | 1,216 |

Table 3. Oklahoma bald eagle nesting results.^a

| | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|----------------------|------|------|------|------|------|------|------|
| Occupied territories | 6 | 8 | 9 | 14 | 21 | 22 | 23 |
| Active nests | 3 | 2 | 5 | 10 | 15 | 15 | 22 |
| Successful nests | 3 | 2 | 3 | 7 | 11 | 11 | |
| Young produced | 6 | 4 | 5 | 12 | 16 | 10 | |

a. Occupied territories were those tended by a pair of eagles, active nests were those in which eggs were laid, successful nests refers to the number of nests which fledged young.

South Carolina side of the Savannah River, >500 km east of the hack site (T. Murphy pers. commun.). Increases in nest numbers for both Georgia and Mississippi are thought to include Florida-Sutton eagles but were not confirmed with observation.

Discussion

Florida Nesting

The number of occupied bald eagle nesting territories in Florida has increased from 387 in 1985 to 912 in 1997 (Table 2). In recent years (1991–1997) the population has increased at an annual rate of 0.08. At this rate the number of occupied nesting territories will exceed 1,100 by the year 2000. Given this trend a statewide management goal of maintaining $\geq 1,000$ occupied territories annually would seem to be reasonable. This level (1,000 pairs) is consistent with Florida's estimated historic bald eagle nesting population (U.S. Fish and Wildl. Serv. 1989).

The foundation for this objective was based on estimated historic population levels, population trends since the nesting surveys were initiated, and assumptions of Florida's bald eagle historic nesting population (1,000 pairs, U.S. Fish and Wildl. Serv. 1989). Whether the increase will continue beyond the 1996–1997 breeding season, and where it will level off, is unknown.

Reestablishment

The bald eagle was reclassified from endangered to threatened status in the southeastern United States in August 1995 (U.S. Fed. Register Vol. 60, No. 133, pp. 36,000–36,010). Reclassification was justified because the nesting population in the Southeast had recovered to target levels identified in the recovery plan. Recovery in the Southeast might have occurred with naturally-produced progeny from Florida, Louisiana, or South Carolina (the 3 areas in the Southeast with the largest number of nesting bald eagles), but such "natural" recruitment of nesting bald eagles into other areas of the region might have taken many more years without these reintroduction efforts. We believe recovery was probably accelerated by these release efforts, and the establishment of new nesting territories was enhanced by selecting release sites in suitable, unoccupied habitat where newly fledged young eagles had easy access to resources with minimal competition from older, established (territorial) conspecifics. The removal of up to 30 clutches annually over a limited number of years had little or no adverse effect on the Florida donor population (Wood and Collopy 1993).

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