

# **A Review of the Natural History of a Reestablished Population of Breeding Bald Eagles in New York**

*Peter E. Nye*

New York State Department of Environmental Conservation, Delmar, NY

Despite the bounty resulting in the removal of more than 100,000 Bald Eagles from the Alaskan population during the first half of the twentieth century, Bald Eagles can be considered secure and even at saturation levels in Alaska. This is undoubtedly due to the maintenance of undisturbed, suitable habitat and an abundant food supply. Similarly, much of Canada boasts abundant Bald Eagle populations.

Within the entire contiguous United States, however, the Bald Eagle is classified as either endangered or threatened. Human pressures, particularly expressed as habitat loss, disturbance, killing and more recently, persistent chemical poisoning, have been responsible for the steady and dramatic decline of our national symbol in the lower 48 states. Bald Eagle populations hit their nadir here in the early 1970s, at the same time that the reproductive contaminant DDT was banned nationally (1972) and the groundbreaking Endangered Species Act was passed (1973). Breeding populations were reduced by as much as 80% from historic norms in many areas, while in others, such as within New York, the species was completely extirpated.

By the mid-1970s, attention began to focus on the restoration of Bald Eagles and other raptorial species hard hit by DDT, into remaining vacant but suitable habitats. Efforts to bolster and actually restore dwindling or extirpated populations of breeding Bald Eagles in the United States began in Maine in 1974 with the transplant of two eggs from wild nests in Minnesota in exchange for two eggs in nests in Maine.

Three restoration techniques have been employed in the recent Bald Eagle recovery effort including egg transplants, fostering and hacking. Bald Eagle hacking, pioneered in New York State in 1976, has been the most widespread and successful technique. Following years of trial and refinement, hacking has become a popular and relatively straightforward method of releasing nestling age Bald Eagles into a given environment in hopes of reestablishing nesting pairs in the area.

The objective in hacking is to act as surrogate, yet inconspicuous, parents during the in-cage pre-fledging period and to conduct the hack in such a manner that the birds fledge

with the highest degree of "natural" fears, instincts and abilities possible. We want hacked eaglets to have as good a chance, or better, at growth, development and independence as wild nestlings. Years of learning have revealed that techniques used in the hacking process, more than any other variable, can and do influence the quality of the hack. Bear in mind that "quality" can be measured in a variety of ways, including time to fledging and dispersal and ultimately in survival (and/or mortality).



This hacking tower, located in New York, allows a commanding view by the eaglet(s) and security from predators. The adjacent scaffolding houses the feeding platform and blind. Photo by Peter Nye.

Selection of hacking sites is of extreme importance and should include the following considerations:

- 1) a clean, abundant fish food supply, usually a source very accessible to inexperienced eagles,
- 2) an area of limited or no human use or disturbance,
- 3) an area with documented historic eagle use and
- 4) an area suitable for nesting, should hacked eagles survive and decide to nest.

The hacking process involves the acquisition of young eagles, preferably six to eight weeks of age and their placement into artificial nests on man-made towers in suitable habitat, somewhat simulating natural nesting conditions. Eaglets are housed in 2.4 m square cages, usually two birds per cage. Hacking towers are constructed in a variety of ways with several important considerations including:

- 1) sufficient space for confined eagles to exercise and develop normally,
- 2) availability of a choice between protection from and exposure to the elements,
- 3) easy flight access both to and from the tower, including several potential perching locations,
- 4) sufficient isolation of the tower from any human activity to encourage use of the structure by fledged eagles and
- 5) placement of the tower in a suitable habitat location (site selection) and orienting birds properly to the chosen location (view).

Once in residence, young eagles require a continuous (preferably fresh) supply of food and minimal human contact until fledging time. Fresh water is also desirable, yet not essential, for caged eaglets. Since fledging generally occurs between 11-13 weeks of age, hacked eagles are confined within their tower cage for approximately 4-6 weeks. Close attention must be kept on potentially overly aggressive interactions with nest mates during this time and to ensure that all birds are feeding regularly. Detailed observations are greatly aided by use of remote video surveillance systems. These systems allow continuous daylight observation of caged eaglets without human contact or disturbance.

Prior to fledging, each eaglet is given a patagial (wing) marker and tail-mounted radio transmitter. Upon complete development of the flight feathers, cage doors are opened and eagles are allowed to fledge. An extensive network of perches outside of each cage ensures plenty of opportunity for young eagles to hop around and test their wings prior to fledging. Some individuals exhibit an immediate fledging response, while others may take up to a week before attempting their first flight. Special precautions are taken to ensure the release, usually conducted during early morning darkness, is as quiet and un-stressful as possible for the eagles.

Some eagles upon fledging leave the hacking area almost immediately, never returning, while others show a marked dependence on the hack tower in excess of seven weeks after fledging. The duration of stay, or weaning from the hacking towers, is believed to be linked to the fitness and survival of these eagles. After the release, fresh food continues to be provided on the hack tower and the lack of human contact becomes even more important for those eagles remaining in the immediate area. Aided by the use of short-term radio transmitters, post-fledging observations are made to ensure the welfare of each hacked eagle during the critical first few weeks of its independence. Additional remote feeding areas are also established as birds range from the hacking tower.

Historically, many parts of New York, especially the Adirondacks and the Great Lakes shorelines, provided suitable Bald Eagle nesting habitat. Large wetlands, such as those surrounding Oneida Lake, were favored locations. At least 75 locations have been confirmed to have had nesting Bald Eagles since 1800. The size of the New York breeding population at any one time is unknown, although it would seem reasonable that at least between 50-100 pairs occurred here during the most suitable times. By about 1960, only a dozen pairs were estimated to still exist and by 1974, only a single, non-productive pair remained in the entire state at a location in Livingston County in western New York. Although barren, this last pair proved to be suitable foster parents and successfully accepted and fledged eight foster eagles over a five-year period. Due to the lack of sufficient nesting birds to act as foster parents, however, hacking, or the hand-rearing to independence of nestling eagles in the absence of parent birds, was the primary option available for the attempted reestablishment of the species in New York.

Bald Eagle hacking began in 1976 in New York under the guidance of Tom Cade and was modeled after similar techniques just developed for Peregrine Falcons. Since that time, 15 additional states and the province of Ontario have initiated eagle hacking projects of varying sizes at approximately 30 locations, mostly within the eastern United States. By 1990, over 1,000 eagles had been released by these hacking projects. The vast majority (over 80%) of eagles for hacking have been collected directly from wild nests, with Alaska, by far, supplying the greatest number of birds. The remainder have come mostly from wild eggs collected in Florida and hatched in captivity at the Sutton Avian Research Center in Oklahoma. A small percent of the birds has come from totally captive sources such as Patuxent and selected zoos. The overall successful fledging rate for hacked eagles is extremely high, exceeding 95% for all projects and all years.

Between 1976 and 1980, 23 eagles were hacked at a single New York location in an experimental effort to determine if hacking was feasible for Bald Eagles. All results, including the successful establishment of a nesting pair of hacked eagles in 1980, indicated that the technique worked. Eaglets for these experimental years were obtained from captive sources at Patuxent and from wild nests in the Great Lakes. Based on these results, a plan was prepared to launch a large-scale management effort to hack 175 additional eaglets at additional sites in New York. Alaska was chosen as the donor state for these eagles, due to their abundance. The eagles simply could not be supplied from the lower 48 states.

Between 1981 and 1988, 175 additional nestling eagles were reared and released by hacking at four sites within New York. As noted, all of these birds were collected from wild nests in Alaska. A study area in Southeast Alaska, consisting of a control and a removal zone, was established for the eight-year collection program. Techniques and effects of collection have been discussed elsewhere in these proceedings by Jacobson. Once collected, eaglets were returned to New York State as quickly as possible, usually by private jet.



Eaglets aboard the M/V Surfbird in crates for shipment to New York. Photo by Jack Hodges, USFWS.

Following release, movements of hacked eaglets were carefully monitored and recorded. Similar to movement studies of wild fledglings, no clear preference as to direction or distance was observed. Movements of the eaglets can be generally characterized as random wandering for at least the first few years of their life.

Overall known mortality of New York hacked eagles is 16% (32 of 198 birds), undoubtedly a minimum. The majority of all known deaths (79%) occurred within three months of fledging, corresponding to the time of early independence when all young raptors are known to be most vulnerable. The primary cause of death of New York hacked eagles has been shooting, accounting for 50% of all mortalities.

Emaciation/starvation or young eagles simply not learning to make it on their own, was the next leading cause of death, but only accounting for 25% of the cases. This is not

surprising and indeed was expected, since fledgling Bald Eagles typically spend from 3-12 weeks within the nesting territory honing their flight and prey-capturing abilities while watching their parents. Other causes of mortality in order of magnitude included disease, suffocation, electrocution and vehicle collision. On the brighter side, survival at least appears to be equaling mortality.

Sexual maturity in Bald Eagles generally occurs at five years of age, although can occur at four years, particularly in unstressed (e.g., un-crowded) conditions. Of 150 potentially sexually mature New York hacked eagles (5 years of age through 1990), 16% (24) are definitely known to have survived to adulthood. Again, this number must be considered a minimum, since there are undoubtedly birds we are not aware of or that may have lost their wing tags and, therefore, are not countable. This represents a minimum survival to sexual maturity for approximately one of every six hacked eagles. Such data is extremely useful to others interested in establishing nesting Bald Eagles by hacking and in particular, it tells how many eagles may need to be released in any given location. Adult survival seems to be skewed slightly to females (13 females versus 8 males, 3 sex unknown), for unknown reasons. During the hacking process, male eaglets are typically the most annoyed and stressed. Males are also known to fledge sooner and leave the hack site earlier than do females, which may decrease their survival chances.

The first New York hacked eagles began breeding in 1980, at age four, 146 km (91 mi) from their release site. By 1990, 14 breeding pairs of Bald Eagles were confirmed within New York, all a direct result of hacking projects. In addition, New York hacked eagles are currently nesting in at least two other locations outside of the state, in Pennsylvania and in New Hampshire. Nearly 90% of all nesting New York hacked birds made their first nesting attempt at either four or five years of age. Fifty percent of all first time breeding attempts were successful. Of 55 total breeding attempts by New York hacked eagles since 1980, 65% have been successful, resulting in the fledging of 51 young, or 0.93 young per nesting attempt. These figures are comparable to other wild eagle populations under study. The national recovery goal for the Bald Eagle is 1.00 young per breeding attempt. As our New York nesting birds gain in breeding experience (and provided they receive sufficient protection from human disturbance) we fully expect to exceed this level. For example for 1990, 12 breeding pairs of eagles produced 15 young for a value of 1.25 young per nesting attempt.

Known turnover of our adult breeders currently stands at only 5% over a 13 year period, much less than in other raptorial species such as Peregrine Falcons. Wing tags have allowed this close, long-term monitoring of our New York hacked eagles. They have also provided us with significant insight into initial nest territory establishment by these hacked birds.

Seventeen New York hacked eagles (12 females, 5 males) have been positively identified as to release origin and subsequent nesting site. Although no favored direction could be detected of nest sites from release sites, a sexual bias based upon distance is clearly expressed. Males exhibited a definite tendency to establish nesting territories closer to their release site than did females. Males moved an average of only 58 km (36 mi, range

0-146 km, 0-91 mi) while females moved an average nearly 3 times greater, of 161 km (100 mi, range 14-386 km, 9-240 mi). The important lesson here is, if you want nesting eagles close to your release site, favor males. No hacked eagle has been found to be nesting further than 386 km (240 mi) from its release site.

The breeding chronology of recently reestablished New York nesting eagles has been found to be within the date-range consistent with our region, as opposed to dates expected from the locale of origin of these birds. In other words, transplanted Alaskan eagles adopt to the breeding chronology of their "new" surroundings. Recent egg dates have ranged from 8 March to 23 April. Hatchlings have been observed between 16 April and 30 May. Fledged young have been confirmed from 15 July to as late as 31 August. Current New York nesting eagles are showing a clear preference for dominant, live, white pine trees. Forty seven percent of all nest trees selected have been white pines (7 of 15 trees) while other tree species have been chosen on only single occasions. Other species used include red oak, red maple, silver maple, red pine, hemlock and an elm snag. Height to the nests have ranged from 7.6 m (25') to 33.5 m (110'), with an average height of 22.4 m (73').

Two current New York nesting situations bear special mention, both involving three adults. At one location, in an apparent display of polygamy, one male has been taking care of two females at separate nests spaced approximately .5 km (1/3 mile) from each other. For two consecutive years, the male has shared incubation duties with both females at both nests and provided food to young at both nests in 1989 when two young successfully fledged from each nest. One of these two nests has failed in 1990, due to an apparent infertile egg. The other nest hatched and fledged a single young. The second situation involves polyandry at a single nest site. Here, two males and a single female have been nesting, apparently quite harmoniously for four consecutive years. The trio have successfully fledged five young during this time and are still together. The reasons for these unusual behaviors is unknown, although the lack of a sufficient reservoir of breeding adults in the overall population may be a plausible explanation.

Although production of young is important within the context of an expanding Bald Eagle population, it is actually the survival of young and adult birds that is the critical determinant in population direction. Using a stochastic model for population growth developed by Grier, population parameters for hacked Bald Eagles in the eastern United States were input and three random situations covering a 20-year period were run to determine the direction of this nascent population. Two primary sets of survival conditions were applied to determine their affect on population growth. The first assumed a 60% first-year mortality and 15% per year thereafter. The second assumed a 50% first-year mortality and only 10% thereafter.

Under condition 1, with a higher mortality, the population shows early growth while young eagles are still being hacked, but then levels off and begins to actually decline following the cessation of releases. Under condition 2, with more favorable survival conditions, the overall population continues to grow even once hacking has ceased. Survival data accumulated for New York eagles thus far, indicates that we are squarely

within the survival range depicted under the growth scenario of condition 2. The New York breeding Bald Eagle population is currently expanding at an annual rate of between 25-75% per year. Should this rate of growth continue, we will easily reach and surpass our recovery goal of 40-50 nesting pairs by the mid-1990's.

Despite some initial concern and hesitation by both biologists and the public, Alaskan Bald Eagles are indeed "making it" in New York and making it successfully. They have adapted to local conditions and now form the basis of a strong and expanding regional population. The citizens of the state of Alaska should take great pride in providing the opportunity for the squanderers to the south, to reestablish our national symbol. Hopefully, we will all learn a valuable lesson from these experiences of the past and make it unnecessary for future generations to take these costly and Herculean steps.

*Editor Note: New York's Bald Eagle breeding population has continued to increase steadily. By 1998 there were 40 nesting pairs of Bald Eagles in the state.*





Jack Hodges inspects a Bald Eagle nest in Sitkoh Bay. Photo courtesy of USFWS.