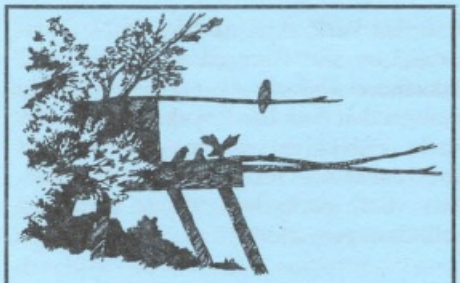


"Peregrine Falcon Re-establishment Efforts" is the second in a series of Pictured Rocks Resource Reports. The Reports are intended to communicate the results of specific investigations and to educate the reader on the values of the natural, cultural, and human resources of Pictured Rocks National Lakeshore. Management alternatives and implications are offered based on the scientific studies. Readers comments on the results and recommendations of the Reports are invited.

Grant A. Petersen, Superintendent
Pictured Rocks National Lakeshore

Pictured Rocks RESOURCE Report

PIR092-1

PEREGRINE FALCON RE-ESTABLISHMENT EFFORTS

by Brian C. Kenner

INTRODUCTION AND BACKGROUND

The peregrine falcon *(Falco peregrinus)* is a bird of prey with a nearly global historical distribution that made it one of the most widely dispersed bird species in the world. "Built" for high-speed flight, it generally takes prey (usually smaller birds) in mid-air by diving from above in a "stoop" and striking or grabbing the target with its powerful talons. Stoops have been estimated at speeds of up to 360 km/hr (260 mph) (Welty, 1975). These two characteristics of wide distribution and spectacular flight capabilities have made the peregrine the favored species of falconers around the world since ancient times.

There are 20 races or subspecies described throughout the world (U.S. Fish and Wildlife Service, 1979). Of these, three subspecies were historically present in North America. *Falco peregrinus* (anatum) occupied the largest range, nesting from central Alaska across north-central Canada, and down through central Mexico (U.S. Fish and Wildlife Service, 1991), although it was probably never abundant in its range.

Peregrine nests, or "eyries," are usually found on small ledges on nearly vertical cliffs overlooking plains or bodies of water (Welty, 1975). Strong attachment to specific nest sites is common; some known eyries in Europe have been occupied nearly continuously for a century or more (Isaacs, 1976). The habitat requirements for these nest sites seem to be: protection from enemies, open views for hunting, and abundant prey species. Historic nests on cathedrals in Europe (Isaacs, 1976) and more recent successful nesting on the ledges of tall buildings in U.S. cities suggest that those requirements are met by seemingly diverse habitats.

HISTORY OF PEREGRINE DECLINE

In the 1930's and 1940's, surveys led to an estimate of approximately 350 pairs in the eastern U.S. (Isaacs, 1976). In the following years sharp declines were noted in the use of known eyries all across North America. By 1964 researchers could find no active nest sites in the eastern U.S. and were convinced that the peregrine was no longer a breeding species there, even though most of the original suitable habitat remained intact.

Several causes for the decline were examined, including predation, theft by egg collectors and falconers, loss of potential prey species such as the passenger pigeon *(Ectopistes migratorius)*, and disease (Isaacs 1976, U.S. Fish and Wildlife Service, 1979). None of these possibilities could completely explain it. Not until researchers observed increasing incidence of egg breakage during incubation -- and noted this same phenomenon in European populations -- was the cause discovered (U.S. Fish and Wildlife Service, 1979). An international conference of peregrine researchers, convened in 1965, concluded that the primary cause of the worldwide decline in peregrine populations was poisoning from organochlorine pesticides (Cade, 1987), particularly DDT.

EFFECTS OF DDT

Research has shown that DDT and its metabolite, DDE, cause significant reduction in brood size and eggshell thickness in raptors, including several species of falcons (Wiemeyer, 1991); eggshell thinning was found to the extent that an adult could crush eggs during incubation.

DDT was used extensively in the U.S. after World War II and, even though its use was banned by the early 1970's (U.S. Fish and Wildlife Service, 1979), its effects are long-lasting. It is stored in fat cells, and thus as it moves up the food chain it is biomagnified -- in peregrines, 10 to 100 times the levels found in prey species (Isaacs, 1976). Peregrines, for reasons not clearly understood, are particularly susceptible to the effects of DDT. Reproductive failure occurs when levels of DDE in eggs reach 20 parts per million (ppm), whereas ducks and gulls experience reproductive loss at 100 ppm, and pheasants and chickens fail at several hundred ppm (Zimmerman, 1975).

DDT has persisted in the environment long after the ban. It continues to be manufactured in the U.S. and is still used

extensively in Latin America. Bowerman (1991) found continued high levels in bald eagle *(Haliaeetus leucocephalus)* hatchlings in nests located near the Great Lakes. Steidl, et al. (1991), found evidence of decreasing eggshell thickness in re-established falcon pairs in New Jersey. Thus, peregrines and their prey species may still be subject to organochlorine contamination.

EFFORTS TO RE-ESTABLISH PEREGRINE POPULATIONS

Because peregrine populations had virtually disappeared from much of the U.S. by the time the cause of the decline was identified, efforts to save the peregrine focused on re-establishment rather than just preserving remaining pairs. Captive propagation was greatly assisted by falconers, whose knowledge and skill contributed to rapid development of stocks and methods for release (Zimmerman, 1975). By 1973 there were enough captive-bred birds to provide stock for re-establishment efforts (U.S. Fish and Wildlife Service, 1987).

The first experimental releases in 1974 and 1975 proved that "hacking" had great potential as a release method. In hacking, captive-bred birds are placed in an artificial nest box in falcon habitat and cared for by human attendants until they are old enough to be released. The attendants provide food, usually commercially-raised quail (*Coturnix* spp.), at the box until the young have developed their flight skills and are capable of hunting on their own.

The U.S. Fish and Wildlife Service, as required by the Endangered Species Act of 1973 (16 U.S.C. §1531 et seq.), established an Eastern Peregrine Falcon Recovery Team which developed a recovery plan in 1979 (updated and revised in 1987). The goal of the plan is to re-establish a minimum of 175-200 sustained nesting pairs (approximately 50 percent of the population estimates of the 1940's) and establishment of a minimum of 20-25 nesting pairs in each of five regions designated for the eastern states (U.S. Fish and Wildlife Service, 1987). Once these numbers are reached the eastern peregrine population will be considered for removal from the endangered species list.

MIDWEST RECOVERY EFFORTS

The Midwest Peregrine Falcon Restoration Project began releases in 1981 (Redig and Tordoff, 1990) after studies were conducted to identify historic and suitable nest sites. The effort is coordinated by the University of Minnesota's Raptor Center, which obtains chicks from breeders, helps establish individual release programs, and provides technical support and advice (Hess, 1990). The goal of this effort is to establish 40 territorial pairs in a nine-state area (Minn., Wisc., Mich., Nebr., Iowa, Ill., Ind., Ohio, and Mo.). Several release projects have been established in these states, involving not only releases in wildland settings, but urban releases in several cities as well.

THE UPPER PENINSULA RELEASE PROGRAM

National Park Service Involvement

In 1974 the National Park Service funded a study of the history, current status, and reintroduction potential for the peregrine in three Lake Superior units: Isle Royale National Park, Apostle Islands National Lakeshore and Pictured Rocks National Lakeshore (Isaacs, 1976). The study showed that both Isle Royale and Pictured Rocks (PRNL) had historic eyries and held potential as sites for peregrine reintroduction. Both parks had remote cliffs and abundant prey bases.

U.P. Releases

Releases began in Michigan's Upper Peninsula in 1987, with five birds at Isle Royale. LaValley (1987) conducted preliminary evaluations for other potential U.P. release sites. He examined several criteria such as presence of great horned owls (*Bubo virginianus* – a potential predator of young peregrines), distribution of open areas for hunting, prey base, and contaminant levels in prey species. From these criteria he developed overall Habitat Suitability Indices for each site. The next year five more falcons were hacked at Isle Royale and eight were hacked at one of the studied sites, on the Ottawa National Forest.

The effort grew considerably in 1989 when a major, three-year release program began in the Upper Peninsula involving the Raptor Center, the National Park Service, the U.S. Forest Service, the Michigan Department of Natural Resources and The Nature Conservancy. Three release sites were involved: Isle Royale, Ottawa National Forest, and Pictured Rocks.

The first year ten birds were released at each site. In 1990, because of the presence of a nesting pair at the Ottawa site and the belief that a pair was nesting at Pictured Rocks (later found to be incorrect), falcons were released only at Isle Royale – a total of 18 birds (Redig and Tordoff, 1991). In 1991 a nesting pair was again present at the Ottawa site, but none were found at Pictured Rocks. Isle Royale and Pictured Rocks each released 12 birds that year.

A portion of Pictured Rocks cliffs near the hack box.

THE PICTURED ROCKS RELEASE PROGRAM

LaValley's report rated a site on the Pictured Rocks cliffs (Grand Portal Point) and nearby Grand Island fairly high as release sites. No great horned owls were located, abundant prey and open hunting areas were nearby, and contaminant levels in most prey species were low enough that peregrine reproduction was not likely to be impacted. Isaacs (1976) had identi-

fied historic eyries on Grand Portal Point. Due to access problems at Grand Island and high public use around Grand Portal Point, LaValley recommended choosing a cliff site located between the two.

An NPS maintenance crew built a platform and hack box atop the 70 meter-high cliff, overlooking Lake Superior. The structure was a double-compartment box, capable of handling two groups of birds at once. It was placed on top of a two meter-high platform as a precaution against predation by raccoons, foxes and coyotes. The front of the box is open with bars to allow the birds to see their habitat and to test their wings on the wind before being released.

The Raptor Center obtained the birds from independent breeders around the country, checked their health, and then shipped them by air carrier to the nearest airport to the park.

Two site attendants cared for the birds each year. They provided food and water, observed behavior throughout each day, and kept detailed notes of behavioral development until the birds dispersed. The birds were banded with breeder's and U.S. Fish and Wildlife Service bands, and were marked with paint on their wings and back to allow for identification once they began flying.

The 1989 Release

According to Berkelman and Smith (1989), the ten birds arrived at the park on June 7. Although they were all within three days of each other in age (32 to 35 days old), they were divided by sex and placed in the two boxes. The five males were released on June 14, three days prior to the females because male peregrines tend to develop faster. At release the males were 39 to 42 days old and the females were 43 to 44 days old.

All ten birds developed flight and hunting skills normally as described by Sherrod (1983) and Sherrod, et al. (1987), beginning with short, unsure flights and crash landings, and soon progressing to pursuing each other and attempting to catch small prey such as dragonflies and butterflies (Berkelman and Smith, 1989). Within several days they were aggressively pursuing any avian species that passed near the box and often stooped on each other and other species. Within a month of release the birds were hunting on their own and spending little time around the hack box. They dispersed from the hack site after a heavy storm on July 27 – at ages ranging from 82 to 85 days. The last bird seen at the site was on August 14, at 100 days of age. One of the males was injured on July 28 in a collision with an automobile near Escanaba, Michigan, approximately 50 miles southwest of the release site. The bird was taken to the Raptor Center, where it died from its injuries. Several months later, a female from the release was injured by an automobile in Minneapolis, over 350 miles southwest of the release site. It also died from its injuries. No sightings of the other birds have been reported.

The 1991 Release

After the 1990 PRNL release was shifted to Isle Royale, falcons were again released at Pictured Rocks -- once it was established that there was no nesting pair on the cliffs. According to Kenner, et al. (1991), 12 birds were scheduled for two successive releases. The first group of five birds consisted of four males and a female. The birds were relatively old upon arrival on July 11, ranging in age from 42 to 47 days, with one male 58 days old. This group was released three days later.

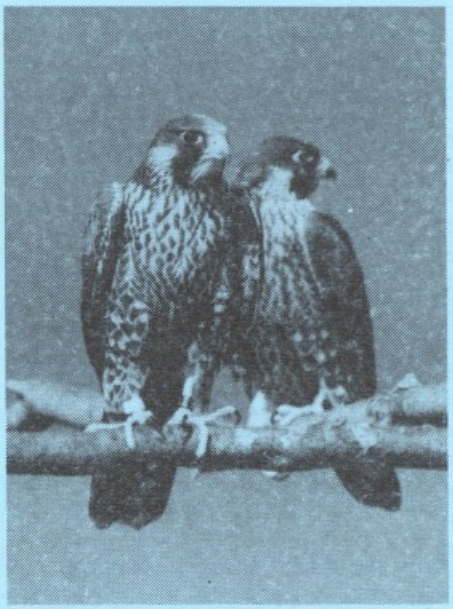
Two birds intended for the second group died at the breeder's facility, so five birds were sent to the park on July 22. There were once again four males and one female, ranging in age from 38 to 41 days of age. The birds were released on July 29 at ages ranging from 44-47 days old.

A male and a female were sent to the park on July 31 as replacements for the two that died. The Raptor Center had held them at the facility for a week in order to increase their weight. Their hatch dates were within the range of the previous five birds, so they were significantly older upon arrival (49 and 50 days). They were released on August 2.

One male from the second group disappeared only two weeks after release, at 58 days of age. Although he had shown normal flight skill development and dispersal at that age is possible, it seems likely to have succumbed from an unknown cause.

The male from the last release flew from the platform and was last seen only two days after release. It is presumed to have been lost to a predator. The female fledged successfully and joined the older birds in flights.

The other ten falcons developed flight and hunting skills normally and successfully dispersed at ages ranging from 84 to 120 days of age. No falcons were seen after September 19, when a northern weather front passed through the area. No confirmed sightings of any of these individuals have been reported since then.



Two of the birds released in 1991.

Summary

The results of the PRNL releases were much like other releases in the Midwest effort. In the three year period (1989-1991) for the entire Midwest program, 65 of 72 hacked falcons (90 percent) survived to independence (Redig and Tordoff, 1992). Twenty of 22 (90 percent) released at Pictured Rocks are known to have reached independence.

The range of ages at successful dispersal for PRNL (82 to 120 days) is within the range cited by Sherrod (1983) for hacked falcons. He found that most dispersed between 70 and 90 days of age, and concluded that most choose to leave once they are proficient at taking prey. Others may remain longer, until food is no longer provided at the hack box.

In 1991 the birds from the first release were frequently around the hack box when the second group was released. The hack site attendants felt that the second group developed their flight skills faster than the first group (Kenner, et al., 1991), perhaps due to repeated mild harassment from the older birds that forced them to develop aerial skills more quickly. This phenomenon has been reported at other hacking projects that utilized successive releases. The older birds seem to take the place of parents in encouraging the younger birds to develop flight skills.

RESULTS OF THE UPPER PENINSULA RELEASES

Success of the release program is difficult to measure because once the birds disperse little is known of their movements. No radio telemetry equipment was placed on them, and therefore the only way to gain post-release information is by leg band identification, which is very difficult for free-ranging birds. Information usually comes from observations of unidentified birds.

In the Upper Peninsula, the first successful peregrine nesting since 1957 occurred in 1991 at the Ottawa National Forest site (Redig and Tordoff, 1992). A nest had been attempted there in 1990, but had been unsuccessful. In 1992 falcons were again reported to be nesting.

At Porcupine Mountains State Wilderness Park in the western U.P., unsuccessful nesting attempts were made in 1990 and 1991. Another attempt was reported in 1992.

As of 1992, neither Isle Royale nor Pictured Rocks could report any territorial pairs or nesting attempts. The only release in the U.P. in 1992 was on the Hiawatha National Forest, at Grand Island National Recreation Area near Pictured Rocks. Eight birds were released. No further releases are planned at this time.

RESULTS OF THE MIDWEST RELEASE PROGRAM

According to Redig and Tordoff (1992), by the end of 1991, 563 falcons had been released in the entire Midwest release program. Thirty territorial pairs had been established, with 22 of those being nesting pairs. Of those nesting, 17 successfully fledged young. The nests were located in a variety of habitats: 8 were on cliffs, 12 were on urban buildings, 1 was on a bridge, and 1 was on a highway overpass.

THE FUTURE FOR THE PEREGRINE

The Raptor Center predicts that the goal of 40 territorial pairs in the Midwest project area will be achieved by 1993 or 1994 (Redig and Tordoff, 1992). The major release efforts should be over after 1991, and efforts will then be shifted to thorough annual surveys, monitoring, and careful population management through nest site enhancement, double-clutching, and fostering of additional young into secure nests (Redig and Tordoff, 1991a). Protection of habitat and eyries will be of utmost importance. An important aspect of the monitoring program for re-established nests will be determination of the amount of organochlorine toxins found in wild-born offspring.

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