SURVIVAL OF THE PEREGRINE FALCON: PROTECTION OR MANAGEMENT?

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The Peregrine Falcon has probably been affected by the DDT-thin eggshell syndrome over its entire range in North America. All recent samples of eggs from such diverse populations as those in Ungava, the Canadian Barrens, Northwest Territories, arctic Alaska, interior Alaska, Aleutian Islands, Queen Charlotte Islands, and Baja California show eggshell thinning that ranges from 7 to 21% below pre-DDT averages (Cade and Fyfe, 1970; Cade *et al.*, 1970). The larger percentage changes are in the range of those associated with the depleted population of Great Britain (Ratcliffe, 1970) and with the virtually extinct falcons of California and eastern United States (Hickey and Anderson, 1968).

Field surveys in 1969 and 1970 indicate that fewer than 20 producing pairs of *anatum* Peregrines remain south of the taiga, excluding Mexico. Local disappearances of pairs at long known aeries have occurred in the taiga and tundra in the last two or three years. There can no longer be any serious question that the Peregrine is an endangered species in North America.

What can be done about the plight of the Peregrine? Some people say we should give absolute protection to our last remaining wild Peregrines by preventing all human molestation and by prohibiting the taking of wild falcons for any purpose. This protectionist strategy can only work in ecosystems that are still capable of self-regenerating and self-regulating adjustments to perturbations, such as those caused by chemical pollution. Protectionists should ask themselves whether any such ecosystem still exists. I agree with Wayne Nelson (1970) that total protection of the Peregrine will only hasten its total extinction in North America.

The strategy of total protection is based on the assumption that once we stop the use of DDT and related compounds, organochlorine pollution will rapidly dissipate as a critical factor in the falcons' food-chain, and the remaining Peregrines will recoup their losses. In their recent paper on the decline of the Peregrine in California, Herman, Kirven,

and Risebrough (1970) give voice to this point of view: "The premise that pollution will inevitably doom the peregrine in California has prompted some would-be falconers to attempt to obtain birds before their final disappearance. We refuse to accept this premise, however, as long as the possibility exists that environmental contamination might be reduced. The partial recovery of the British peregrines following the sharp reductions in the use of dieldrin (N. W. Moore, pers. comm.) and the anticipated reductions of the inputs of DDT and perhaps also PCB into the environment in North America provide considerable support to the argument that it is essential to provide complete protection to any remaining birds that might constitute a nucleus of a future comeback."

This is a common and increasingly strident protectionist attitude, well exemplified in recent 1970-71 editorial comments in *The California Condor* published by the Society for the Preservation of Birds of Prey. Carried out as literally stated, "complete protection" would exclude the taking of Peregrines for experimental breeding or for other management practices; therefore, the probable outcome of protection needs to be carefully weighed against the advantages of taking falcons into captivity.

Despite the partial recovery that has taken place in Great Britain since 1963, from a population low equal to about 38% of the pre-war numbers to a level estimated in 1969 to be 55% of pre-WW II (D. A. Ratcliffe, *in litt.*), all evidence leads to the conclusion that a decline is still underway in North America (Cade and Fyfe, 1970). The British Peregrine population was never reduced as much as the population in continental United States; furthermore, it is a geographically restricted, insular population, one that was originally much denser than anything we have ever known in North America, about 650 pairs in only 88,135 square miles compared to California, for example, with a pre-DDT figure of about 100 pairs in 158,693 square miles. There were never fewer than 240 occupied aeries in Britain. Also, the British Peregrines are genetically more homogeneous than the North America populations are. Given some favorable change in the environment, recovery of such a population is more likely than is the recovery of a sparsely distributed, genetically heterogeneous, continental population, which has already been reduced to less than 5% of its original numbers south of the tiaga.

While the domestic use of DDT has been going down in the United States for several years, there is no evidence for a reduction in environmental levels of DDT (DDE) residues;

indeed, DDT residues are still increasing, in the phytoplankton of the sea for example (Cox, 1970). No breakdown products of DDE are known from nature, so that the quantities present now may simply recycle through ecosystems on an indefinite basis. There may be enough DDE already present in the global ecosystem to render the last wild Peregrine incapable of reproduction. Other pesticide residues, chemical pollutants, and heavy metals will surely loom as continuing hazards to birds of prey—not to mention the exponentially accelerating outright destruction of habitat and continued reduction in the number of prey animals for raptors.

There is always a chance that the protectionist point of view will prove to be correct. Just leave the falcons alone in the wild, and nature will take care of her own. But do we want to rely solely on such a tenuous hope? What if organochlorine residues continue to persist in nature? What if the remnant *anatum* populations have already passed below the "critical size" for recovery (Ziswiler, 1967)?

While the wild, **adult** Peregrines should be given absolute protection, a cogent case can be made for taking a prudent number of young falcons into captivity, including some of those produced in California. For those few aeries still surviving in the United States south of Canada, the states should immediately institute a system of falcon wardens to guard the aeries and to prevent unlawful human disturbance.

Beyond that simple expedient, a managed "harvest" of young falcons should be instituted for captive propagation and as a means for increasing the survival rate of first year birds. The immediate goal of propagation for *anatum, tundrius,* and *pealei* should be to develop self-perpetuating captive stocks on a scale sufficient for continued scientific studies that hopefully will lead to practical breeding for educational, recreational, and restocking purposes. In my opinion every producing pair of southern *anatum* Peregrines should be contributing some of their young to captive breeding programs. This is the only way to save some of these southern falcons, if indeed it is not already too late. While we do still have the time, sufficient numbers of *tundrius* and *pealei* falcons should be acquired, so that a genetically representative sample of adaptable individuals can be identified as captive breeders. Certainly several hundred Peregrines will have to be screened and should be made available to qualified breeders in the United States and Canada—both to professional, institutional programs and to qualified private individuals who have the demonstrated

expertise and facilities for attempting serious propagation.

The natural mortality of first year Peregrines is high. Band returns indicate that 70% of the fledglings die in their first year (Enderson, 1969); but the true natural mortality is probably lower, perhaps around 60%, or even lower according to Shor (1970). Band returns also suggest an adult mortality rate of 25%, but this figure is certainly too high for the pre-DDT period, when stable breeding numbers were maintained with an average production of about one fledged young per pair per year. My best estimate for adult mortality, when breeding numbers are stable, is about 15% or a mean adult longevity of slightly more than six years.

If 60% of the young die in their first year and 15% of the surviving cohort in their second year, then for every 100 young fledged 34 survive to breeding age. This is slightly more than enough to replace losses in the breeding population with the given mortality rates. Looked at in another way, for every 100 young fledged, 66 die before entering the breeding population.

Nearly 20 years ago I pointed out to falconers that these expendable young birds constitute the "harvestable surplus" for falconry (Cade, 1954). How many of these birds of the year can still be taken by human agency without affecting recruitment to the adult breeding populations? It could be argued that since the adult breeding populations are declining, there are no surplus young. The argument is somewhat academic, since the majority of young birds still die in their first year.

If falconers were allowed to continue taking immature, passage Peregrines with the proviso that the birds have to be released at the end of their second winter, in time for spring migration, the wild falcon populations could actually benefit from a bonus of adult birds added to them. Falconers can certainly keep a higher percentage of first year birds alive than obtains in the wild. From my experience I would estimate that for every 100 passagers taken in their first fall, at least 60 and perhaps as many as 75 would still be alive at the end of their second winter, roughly twice the number that can be expected to survive in the wild. Diseases that are often fatal to immature falcons in the wild are usually curable today in captivity. Moreover, falconers can feed their charges on foods with the least DDT contamination, so that their birds, when released to join the wild breeders, would have relatively low body burdens of pesticides. Thus two benefits could accrue by holding Peregrines for falconry during their first two years of life: (1) a greater number

would survive to breeding age and (2) the birds would re-enter the wild with the least likelihood that their eggs will be affected by DDT.

The use of falconry for increasing the survival rate of immature falcons is a management technique that should be given some serious thought, especially for migrant Peregrines from northern breeding grounds. In any case, protection, based on reason rather than hysteria, and propagation, based on scientific methods rather than trial and error, should go hand in hand as the two chief measures for promoting the survival of the Peregrine and other threatened birds of prey.

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