

the vanishing



peregrine?



by Melvin A. Traylor

"Yet, when I say that man has wiped out 10,000 species of insects and snails in the past 200 years, at most there are raised eyebrows." Alan Solem, *Bulletin* Field Museum, April 1970.

When Dr. Solem penned the above words, he was forcefully illustrating the anthropocentrism of man, that characteristic that causes him to place the most value on those forms of life that are "highest," i.e. nearest to man, in the animal kingdom. While man may bemoan and write books about the passing of the Passenger Pigeon or the Carolina Parakeet, the disappearance of bugs and slugs excites no interest. But despite all, man's anthropocentrism has some redeeming features; when an animal with which man can identify is endangered, all available resources are marshalled to save it.

The Peregrine Falcon is certainly one of our most magnificent birds, graceful, swift and bold, the perfect hunter. It has

been associated with man since the earliest records of falconry, which date back to 2000 B.C. in the Orient. Falconry, the art of hunting with the diurnal birds of prey, was and still is a sport of the aristocracy of the Middle East, and was introduced on a large scale in Europe with the return of the Crusaders. By the 12th century it flourished in all countries of Europe and in all ranks of society.

The Peregrine feeds on other birds, and hunts by circling above its quarry, and then dropping down on it in a fierce dive or swoop. If it misses, it uses its momentum to again climb above its prey, so that it may stoop again and again until it seizes the victim. Pairs of Peregrines often hunt together; one waits while the other chases the prey into a vulnerable position. This spectacular mode of hunting made the Peregrine the favorite of falconers, and its use was restricted to royalty and the higher nobility. Although popular interest in Peregrines declined as firearms relegated falconry to an esoteric sport, it has been revived in many cities by the falcon's willingness to accept modern skyscrapers as substitutes for the natural cliffs on which it normally nests. Some pairs have successfully raised their young in this situation, feeding them on the abundant city pigeons; the

most successful and best publicized individual was a female that raised 21 young in 16 years on the Sun Life Assurance Building in Montreal.

The female Peregrines are much larger than the males. Female dominance is an important factor in successful pairing, for the size difference enables the pair to take advantage of a greater range of prey. Peregrines go through a complicated courtship ritual. Food may be offered or dropped to the female on the ledge, or transferred to her in the air. The pair may indulge in billing at the nest; they may nibble toes, and mutually preen feathers. They also may chase each other and stage mock attacks.

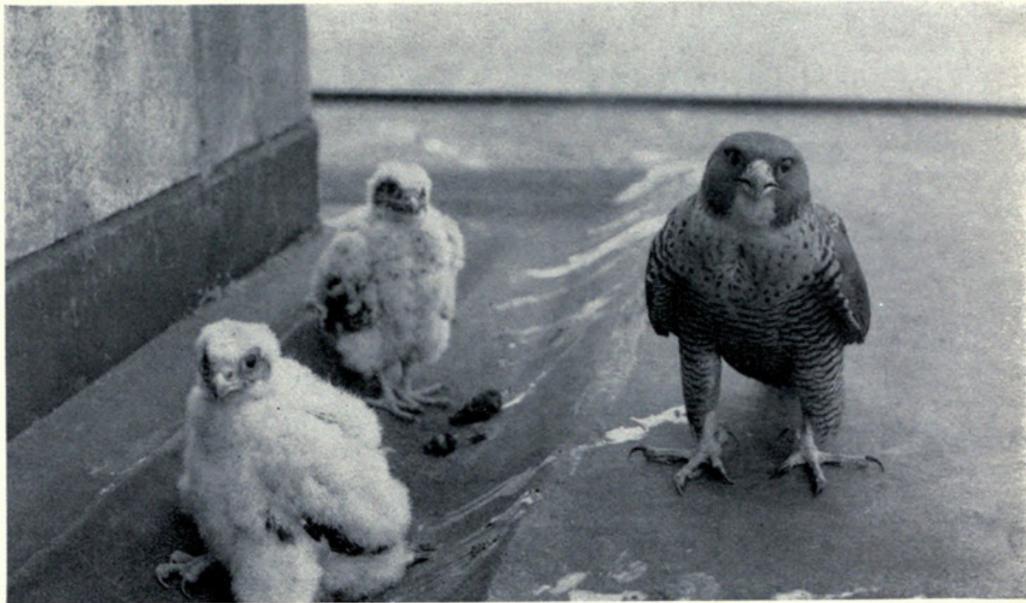
The female Peregrine usually lays three to five eggs, and incubation takes about 30 days. In the early stages, the male supplies all the food. The length of time required for development depends partially on how often and how much the young Peregrines are fed. The young remain with their parents in the general

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vicinity of their nest for two weeks to a month. In some species, hunting groups of juveniles are organized; eventually these are broken up by either fall migration or the invasion of aggressive territory-seeking adults.

When it became evident in the late fifties that the number of Peregrines was suffering a catastrophic decline, a concerted effort was made in many nations to find the causes and to remedy them. Through the cooperation of students around the world, the main reasons for the decline are now known. The remedy will require the cooperation of the political world as well as the scientific; hopefully we will someday be able to show how the Peregrine was saved rather than how it became extinct.

Prior to World War II, the Peregrine was a highly successful species, occurring as a breeding bird throughout the world, from the subarctic regions to Australia and southern South America. Even in the heavily populated areas of Europe and America it held its own, despite the attention of egg collectors and falconers who often took young birds from the nest. One reason for its success was its habit of nesting almost invariably on vertical cliff faces in remote areas, where it was comparatively free of molestation. Some of the best known nesting sites in the United States were the Palisades along the Hudson River. The Peregrine fed almost entirely on other birds, usually shorebirds and waterfowl. In more urban areas, however, its favorite prey was pigeons, particularly the homing pigeon which was trained to fly in a straight and undeviating path, and was



This female Peregrine raised 21 young in 16 years atop the Sun Life Assurance Building in Montreal. They lived on the abundant city pigeons.

thus more vulnerable to attack. The population of Peregrines in the eastern United States before the war was probably 350-400 breeding pairs.

The serious decline of the Peregrine began in the late forties in the eastern United States and Germany, and by the mid-fifties was general throughout the United States and northern Europe. However, the impact of this change was slight at first. Most observers were regularly watching only a small number of eyries, or nesting sites, and when these began to be abandoned, or the pairs failed to raise young, each observer thought he was dealing with a purely local problem. One of the first to publish on the problem of declining productivity was C. Demandt, an ornithologist in North Rhine-Westphalia. He noticed that beginning in 1946, pairs were raising fewer and fewer young, and in 1950 he suggested that this might be caused by superannuation, that is, the remain-

ing birds were too old to lay viable eggs. In the United States, Herbert and Skelton reported at the 1953 meeting of the American Ornithologists' Union that the Peregrines of the Hudson River series had failed to raise even a single young that year.

By 1958, continuing reports of declining numbers caused the Finnish League for the Protection of Nature to begin a full scale investigation. A questionnaire to the nation's ornithologists and an extensive field investigation revealed that only 35 of 151 known eyries were occupied that year. The date of the beginning of this drop in numbers could not be determined, but it must have been in the early fifties. This same year, 1958, saw the first recognition of the problem in Great Britain when Derek Ratcliffe of the Nature Conservancy reported ex-



tensive egg eating among breeding birds, a sign of decreasing productivity. Ironically, the subsequent investigation made in 1961-62 by the British Trust for Ornithology was in response to complaints by pigeon fanciers that Peregrines were increasing their depredations on homing pigeons. This was quickly disproved when it was shown that the species was virtually extinct as a breeding bird in England and Wales.

The first cooperative study in the United States took place in 1964. In 1939-40, Joseph Hickey, now of the Department of Ecology, University of Wisconsin, had made a survey of all known active eyries east of the Mississippi, then numbering about 200. In 1964 he organized a re-run of his earlier study, and during that summer 133 eyries were visited, distributed geographically from Kentucky to Maine. In all this area, not a single occupied site was found; the species was extirpated east of the Mississippi.

Jolted by this catastrophic decline and by similar situations among other birds of prey that had been reported at a recent Working Conference on Birds of Prey and Owls that had been organized by the International Council for Bird Preservation, Hickey called for an international conference on Peregrine populations, that was held at the University of Wisconsin in September 1965. The response in Europe and North



A 17th Century Dutch painter, Aelbert Cuyp, portrayed this Peregrine falcon and its young master. (Metropolitan Museum of Art)

America was enthusiastic, and 63 members and observers from eight nations attended. Support for the Conference and the studies that were there reported on came from a wide variety of sources; the Federal Government, state conservation departments, private foundations, and the pockets of many individuals who paid their own way.

The picture that emerged was consistent on both sides of the Atlantic; in almost all countries the populations of Peregrines were down to only a few percent of their pre-war numbers. Only in the wilderness areas of Canada and Alaska were they holding their own. A few figures may illustrate this:

What were first believed to be local reductions in isolated areas could now be seen as a population crash on two continents.

The next obvious problem was to determine the cause or causes of this crash. There were a few areas where special factors were operable that could be easily seen. Along the Hudson River, the construction of the Palisades Parkway destroyed one eyrie and caused the abandonment of several others, since the birds are intolerant of human activity around their nests. In some areas of West Germany where the Peregrine fed mostly on homing pigeons, pigeon fanciers persecuted it relentlessly, even to the extent of blasting the cliff faces to destroy the eyries. But these factors, although important locally, cannot explain the synchronicity of the population crash extending over two continents, and even less the fact that other raptors (birds of prey), particularly the Osprey of the eastern seaboard, suffered similar declines simultaneously. The governing cause

	Nesting Pairs	Year	Nesting Pairs	Year	% Decline
Western Wisconsin	11	1955	0	1964	100
Massachusetts	12	1947	0	1957	100
Pennsylvania	17	1946	0	1960	100
Finland	35*	1958	6	1964	83
West Germany	320-380	1950	70-90	1965	78
Sweden	39	1954	8	1963	79

*in itself a low figure that had excited concern.

must be one that is common to developed countries, since only the wilderness populations remain unaffected.

The most obvious culprits, and ones that were fresh in people's minds following the recent publication of Rachel Carson's *Silent Spring*, were the chlorinated hydrocarbon pesticides, DDT, Dieldrin, and their relatives and derivatives. This group of chemicals has one characteristic that makes them extremely effective as a pesticide; they are not only highly toxic but they are persistent, that is, they remain in a toxic form for years instead of quickly breaking down into their harmless constituents. This persistence affords a longer protection against agricultural pests, but it poses a threat to other forms of life because of the cumulative effect of the poisons. When the chlorinated hydrocarbons are consumed by an animal, they are retained in the body rather than excreted, and the continued consumption of small doses may lead to the accumulation of a lethal concentration in the organism.

Against this type of poison, predatory animals are particularly vulnerable because they stand at the end of food chains in which there may be one or more stages of concentration. A striking illustration of this comes from a study of

Lake Michigan by Hickey, Keith and Coon (1966).

PPM of DDT and derivatives (parts per million)	
Bottom sediments	0.014
Invertebrates in sediment	0.4-0.5
Fish feeding on invertebrates	3.4-5.6
Gulls feeding on fish muscle	99.0
Gulls feeding on fish fat	2441.0

The concentration in the fat of the bird is almost 200,000 times that of the bottom sediments. Similar food chains exist on land, and the Peregrine, which breeds and feeds in a variety of habitats, participates in both. The fact that many of our streams and lakes are contaminated,



as well as our agricultural areas, could explain how the bird-eating Peregrine and the fish-eating Osprey could be decimated by a single cause.

The timing in the use of DDT and its derivatives also coincides with what is known of the population decline of the Peregrine. During World War II, DDT was used mainly by the Army in its

delousing and anti-malaria campaigns, but in 1946 its widespread use in agriculture began. It was in the following years that the first declines in breeding success were noted. In low doses, DDT effects breeding success. The reduced number of young per pair, always preceded the reduction in total numbers. Nesting failures took the form of broken eggs that were eaten by the parent, eggs that failed to hatch, or mated pairs that failed to lay at all. Whatever the cause, it affected the reproductive potential before it was lethal to the adults.

Geographically, the areas of drastic reduction of Peregrines and of intensive agriculture and the use of pesticides coincide. In Great Britain, the only area where the Peregrine has maintained its numbers is the northern and western highland of Scotland, and this is the one area where there is no agriculture or agricultural chemicals, the land being used for sheep pasturing. The boglands of northern Finland, where there has been a drastic drop in the population, seems an exception because there is no agriculture that far north. However, banding returns have shown that Finnish birds winter in the heavily agricultural areas of France, where they have ample opportunity to absorb the chemicals prior to their return in the spring to breed. Collection of specimens has shown that they do just that. In North America population levels have remained high only in some remote areas



of the Rockies, and in northern Canada and Alaska.

The above circumstantial evidence pointed strongly toward the chlorinated hydrocarbons as the cause for the loss of the Peregrine, and several studies were made to find direct evidence from actual concentrations in the birds and eggs. The most thorough study was that of Ratcliffe for the British Trust for Ornithology. By analyzing adult specimens and eggs from throughout the British Isles, he was able to demonstrate that contamination by hydrocarbons was general, and even sub-lethal doses had an effect upon reproduction. Although Ratcliffe was unable to demonstrate the mechanism of the latter, Hickey and Anderson have since shown that contamination results in thinner eggshells, which break under the weight of the parent, and eventually the inability to form eggs at all. Ratcliffe even found a dead adult with residues as high as those that had proved lethal in laboratory experiments; evidently even adult birds could be killed outright.

But now the enthusiasm and effort that had been generated to save a bird of immense esthetic and romantic appeal ran head on into the economic interests and concerns of both farmers and chemical manufacturers. There are many men of good will and intelligence who claim that actual step-by-step proof of the lethal effect of the chlorinated hydrocarbons is lacking, and that the influence of other factors has not been sufficiently considered. This is the same type of argument that is used to discount the importance of smoking in causing lung cancer. Actually, whether the chemicals are the sole cause of the decline of the

Peregrine is beside the point; they are so deeply implicated that unless their use is halted the eventual extinction of this bird and numerous other animals is certain. But here we run into the necessity of the farmer for some sort of artificial control of insect pests. There is no use invoking the lost balance of nature. Any field of grain is in itself a wholly unbalanced environment, vulnerable to the explosive increases of various pests, and without any natural protections. Pesticides are here to stay. The problem that must be solved is how to make them so specific in their actions that they will not attack the rest of wildlife and man himself. This demands political courage in controlling the use of dangerous pesticides by forcing changes by those who have made major investments in the present chemicals. We cannot expect the manufacturers to fly in the face of human nature and police themselves.

What has been done by our governments? At the federal level, virtually nothing directly, but through judicial decisions in the U.S. Court of Appeals the Secretary of Agriculture has been ordered to suspend DDT's registration within 30 days, and the Secretary of HEW was ordered to establish zero tolerance levels for DDT in human foods. The burden of proof has now been shifted to the respective Secretaries to show why this is not necessary. In Michigan, the use of DDT has been banned, and in Wisconsin it has been declared a water pollutant, which amounts to the same thing. In Massachusetts and several other states its use has been banned for special purposes such as the control of Dutch Elm Disease.

Where does this leave the Peregrine? It is too early to tell, but for the more resilient and local Osprey we can close on a more optimistic note. From the New York Times of 5 July 1970 comes the following story. On Gardiner's Island in Long Island Sound, there were 350 pairs of Ospreys in 1945; by 1966, when the use of DDT was halted on Long Island, there were only 55 pairs and only *three* young raised. This year there were 38 pairs that successfully raised 34 young, a tenfold increase over 1966. Let us hope the good work spreads.

For Further Reading

- Hickey, Joseph J, editor. *Peregrine Falcon Populations*. Madison: University of Wisconsin Press, 1969.
- Grossman, Mary Louise and John Hamlet. *Birds of Prey of the World*. New York: Clarkson N. Potter, Inc., 1964.



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