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THE PEREGRINE FALCON--A VANISHING CALIFORNIAN ^{1/}

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Special Wildlife Investigations

California Department of Fish and Game

A famous ornithologist once described the peregrine falcon as "the embodiment of noble rapacity and lonely freedom." Long respected as one of the finest and most highly skilled products of organic evolution, the peregrine was never an abundant bird, in California or elsewhere. But it was once far more common than it is today.

The peregrine has now joined the ranks of animals in danger of extinction. Unless answers and assistance are provided soon, this species is almost sure to fall permanent victim to man's technological wastes and his disregard for wildlife.

The peregrine is a medium-sized hawk, from 15 to 18 inches in length, with a wingspread of nearly 40 inches. It is a true falcon with the long pointed wings and relatively short tail that characterize that group. As is true for most birds of prey, the females are approximately one-third larger than the males.

In the first year of life, peregrines are mostly brownish with coarse vertical striping on the breast and a uniformly brown back. During the molt of the second year, the plumage changes markedly. The upper breast becomes whitish with prominent black spots, and the back changes to a slate blue or a blue-gray. The legs and feet, usually bluish-gray or blue in the first year, begin to turn bright yellow.

The male and female are marked the same way. One of the best field marks is the combination of the dark, almost black head cap and the malar stripe, a broad dark line running down from the eye and onto the throat.

Peregrines eat birds. They hunt over wide open areas, frequently above water, over a marsh, or along a shoreline. The peregrine is also known as the duck hawk, and it is true that they take an occasional small duck. California duck hunters may on rare occasions see one of these hawks kill a teal, or perhaps even grab a cripple.

The majority of a peregrine's diet is made up of small birds. Peregrines often fly high over their prey, diving on it at a critically timed moment. This dive, which is also known as the "stoop," is sometimes made at speeds of more than 200 miles per hour. Seashore visitors may remember seeing a peregrine harass a flock of migrating sandpipers. Such a sight is still possible, but the probability of seeing a pair of nesting peregrines in California is all but gone.

The Department of Fish and Game, recognizing the plight of the peregrine and its close relative, the prairie falcon, has recently initiated a program under its Special Wildlife Investigations section to evaluate the status of both species in California. From this program may grow a means of further protecting these species and many other nongame animals that help make up our rich variety of California wildlife.

^{1/}Published in "Outdoor California" January-February 1970. Study supported by Federal Aid in Wildlife Restoration Project W-54-R-2, "Special Wildlife Investigations."

Peregrines nest on high cliffs, usually but not always near water. Here they choose a ledge or pothole sufficiently large to hold several young and the parents and set up housekeeping in the early spring. No stick nest is built; the three to five eggs are laid directly on the bare dirt or gravel.

Under normal circumstances, two to four young are raised by a pair in a single year. The same nest site is frequently used by the same pair year after year. In California the young leave the nest in June or early July. There are rare but regular examples of peregrines using ledges on tall city buildings for nesting, and attempts of this kind have been made in San Francisco, Oakland, and San Diego.

The peregrine was once one of the most widely distributed bird species on this planet. It was found nesting on all continents except Antarctica, but was most common as a breeding bird in the northern latitudes.

In the United States, peregrines originally nested in all areas except the deep South, though breeding density was never very high. Most of the breeding cliffs were well known, either to egg collectors, who prized peregrine eggs because of their rich coloration, the difficulty of collecting them, and their relative rarity, or to falconers, for peregrines were the finest of all species that can be trained to kill game.

In California, where Dr. R. M. Bond studied the peregrine in the 1930's, it is known that over 100 nests produced young for many years. California's long coastline, with high cliffs and abundant bird life, supported a large number of nests until the late forties or early fifties. Peregrines also nested on cliffs along rivers on both sides of the Sierra Nevada, and two sites were known on the cliffs that surround Yosemite Valley.

The mountain ranges in the southwest corner of the state, as well as the Channel Islands, also fledged many peregrines every year. Egg collectors robbed many nests regularly, and some nestling peregrines were taken by persons who hoped to train them for falconry. But population levels held well; peregrines could be seen any year by persons interested enough to look for them.

But in the decade following the close of the Second World War, persons in scattered parts of the northern hemisphere began to notice that there were fewer peregrines. Most observers, in the United States as well as elsewhere, felt this phenomenon was local. In 1962 it was rumored that no young peregrines had been raised in the northeastern United States. A survey of known nesting sites in 1964 confirmed the rumor, and it is now known that the peregrine falcon is extinct as a breeding species in the United States east of the Rocky Mountains. A very few pairs continue to nest successfully in the West, however. In California, fewer than five nests are known to have fledged young in 1969, and the prognosis is for fewer successes in the future.

Why this decline? Why should a species of hawk, never common but never before thought to be in danger of extinction, suddenly begin to decline over much of its range? Why in California? For some of the answers to these questions we must begin in England.

Peregrines were regularly and systematically killed in parts of England during World War II. The government shot the falcons because of their habit of killing messenger pigeons necessary to the war effort. The killing was quite thorough, but in 1957, a little more than a decade after the close of the war, the persecuted peregrines had recovered well.

In 1958 Derek Ratcliffe, a British peregrine expert, reported that broken eggs were found in 10 of 59 British nests between 1951 and 1956, in contrast to 1 out of 35 in 1945-50. Dr. Ratcliffe had also seen peregrines eating their own eggs!

Suspecting a structural weakness in the eggshells, he then went to museums and began studying the shells collected by eggers for over a century. One of the things measured was the thickness of the shell. Beginning with measurements of shells collected before the turn of the century, Ratcliffe plotted the shell thickness through the first half of the 1900's. What he found by this means provided a very important clue to the decline of the peregrine falcon.

Between 1945 and 1947, shortly after the end of the Second World War, the thickness of peregrine eggshells dropped abruptly by nearly 20 percent, suggesting that the shell had become weakened, increasing the probability of breakage. Dr. Ratcliffe had found a plausible reason for the breakage; the next step was to find a cause for the eggshell thinning.

The abrupt nature of the thinning suggested a similarly abrupt environmental change as its cause. Radioactive fallout from atomic bomb testing was one possibility; the new organic pesticides, introduced on a wide scale just after the war, were another. Dr. Ratcliffe already had noticed that peregrines were doing best in those areas of the Scottish Highlands where pesticides, including DDT and Dieldrin, were used least. Conversely, reproduction was poorest where pesticides were most commonly used.

Peregrine egg samples from the two kinds of areas were analyzed for these pesticides, and the pattern was confirmed. Furthermore, bird and fish-eating hawks were known to accumulate large concentrations of chlorinated hydrocarbon pesticides because of their position in the food chain. A very strong clue had been found, at least for one area where peregrine had declined.

Shortly after Ratcliffe published the results of his shell thickness work, two scientists from the University of Wisconsin, Dr. Joseph J. Hickey and Daniel Anderson, began making similar measurements of hawk eggs in American museums. Included were many peregrine eggs from California. Following a long tour of many museums, the data were plotted and the results compared very closely with the British conclusion. The same shell weight reduction occurred and at almost the same time. Whatever the cause, it was operative in California, Massachusetts, and Britain.

At this point pesticides were very heavily implicated in the decline, but one major piece of the puzzle remained to be fitted. Would DDT in the diets of experimental birds produce eggshells thinner than normal?

A research team at the Bureau of Sport Fisheries and Wildlife station at Patuxent, Maryland, fed very small amounts of DDE (the form of DDT most commonly found in the environment) to a group of mallard ducks. Another group of mallards was fed clean food. The eggs from both groups were incubated, and the shells were

examined and measured. As predicted, the birds fed small amounts of DDE laid eggs with significantly thinner shells. Thin shells cracked readily. Eggs with hairline cracks hatched at about half the rate of whole eggs; those with definite fractures did not hatch.

Pesticide residues in eggs are also known to cause reproductive failure independent of eggshell thinning.

In another experiment, scientists fed small concentrations of DDT and Dieldrin to American kestrels, close relatives of the peregrine. Again the result was eggshell thinning and other forms of reproductive failure. With these findings the story neared completion; scientists now hope to determine the precise ways in which these poisons act.

Since 1945 several hundred million pounds of DDT and other poisons have been used in California. Peregrine falcons sampled in California have contained very high concentrations of DDT and lesser amounts of other pesticides. It is known that they acquire these levels of contamination from the birds they eat.

There is virtually no question that chlorinated hydrocarbon pesticides, especially DDT and its derivative, DDE, are the primary cause of the decline of peregrines in California and elsewhere.

Were it not for these persistent and mobile poisons, the peregrine could have tolerated well the pressures of several other decimating factors. Under the present circumstances, however, the small remnant population is especially sensitive, and the loss of a single peregrine might well reduce the survival potential of a population.

Other pollutants in the environment also threaten peregrines and wildlife in general. Mercury, for example, is used as a seed dressing and in other parts of the world has been shown to concentrate significantly in wildlife. Lead from the combustion of gasoline is also a threat to some species. The polychlorinated biphenyls (PCB), byproducts of the plastics industry, are also detectable in many wild species.

Peregrines, along with all other hawks, eagles, and owls, have been protected in California for more than ten years, but some shooting continues. As recently as June 1969 an immature female peregrine was shot in the northwest corner of California. The Department of Fish and Game has warned hunters, through a special illustrated note in the published hunting regulations, not to shoot peregrines. And beginning this season, duck hunters using federal and state management areas have been given a verbal reminder of the protected status of our birds of prey.

Illegal falconry activities also harm peregrines. The taking of a peregrine or prairie falcon is prohibited in California, but a few selfish persons continue to harass the very small number of peregrines that are hatched every year. It is imperative that these nestlings be thoroughly protected, for it is with them and their offspring, should they be able to reproduce, that our only hope lies for survival of the species.

It would appear now that DDT use will be severely curtailed in California and elsewhere. Such action will by no means guarantee the survival of the peregrine, for poison residues will remain in the environment for decades. But any hope for peregrine survival must depend on a reduction in environmental pollution and protection of breeding stock.

Recognizing the need for a concerted effort to improve all aspects of raptor protection, falconers, scientists, and representatives of the Department of Fish and Game met for a day at San Diego last June. The meeting, called the Raptor Protection Conference, was hosted by the San Diego Natural History Museum. The three major threats to birds of prey--insecticides, shooting, and illegal falconry activities--were discussed at length. Special attention was given to the problem of identifying legally taken falcons and those already in possession of falconers.

Since the conference, an acceptable method of banding has been developed. The Department of Fish and Game is supplying the cooperation necessary to implement the registration program. Plans for the research program to evaluate prairie falcon and remaining peregrine populations were also discussed at the conference, and a program was initiated in early July.

Interested persons having information on the peregrine falcon, especially if it has to do with nesting, are invited to contact the Special Wildlife Investigations unit of the Department of Fish and Game, in Sacramento.

This combination of protection and research measures may serve to preserve, at least for a time, the few peregrines nesting and wintering in California, but cooperation must include everyone--the sportsman, the scientist, the bird watcher, the falconer--all of us with a stake in conservation.

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