

Alleviating the Impact of Human Disturbance on the Breeding Peregrine Falcon II. * Public and Recreational Lands

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Some potential sources of breeding disruption to Peregrine Falcons are outlined. Though adequate legislation exists and there are many opportunities to protect eyries, little is being done at present. Research, education and planning can help to minimize disruption.

Peregrine Falcon *Falco peregrinus* populations have markedly declined in a number of countries (Hickey, 1969). The peregrine population in Australia may be one of the few relatively intact continental populations in the world. Although there is some evidence that peregrines in certain areas of Australia are suffering declines in productivity (Olsen and Olsen, 1979) there is no evidence as yet that the population as a whole is endangered. However there is some evidence of changes within the total population. Olsen and Olsen (in prep.) found that eggs of peregrines in Australia were larger at southern latitudes and in colder areas in clutches taken before the 1940's. In addition, eggs from falcons nesting in hollow trees were significantly larger than eggs from falcons nesting on cliffs or in stick nests. These clines and differences were no longer present in eggs collected after the 1940's, a change that may be related to disturbance, for example the introduction of DDT around 1946 (Australian Academy of Science, 1972), which may have resulted in lowered productivity in some areas and the mixing of peregrine populations within Australia.

In some countries considerable amounts of money are spent to obtain property frequented by raptors. For example, US \$837 000 were paid for two sites used by roosting Bald Eagles *Haliaeetus leucocephalus* in the United States (Anon, 1977). While it is unrealistic to protect all known

peregrine eyries it would seem desirable to maintain the status quo where the opportunity exists. As numbers of peregrines nest on crown land in Australia, protection from disturbance is feasible for many pairs. Although adequate legislation exists, little has been done to protect these birds on public lands with some exceptions, e.g. Walsh (1978), thus incidents of disturbance are common. One pair in Mt Remarkable National Park, S.A. had young removed in one year and rocks dropped on the young in the two subsequent years. Eyries are deserted along river frontages used for recreation, for example, the Hawkesbury River near Sydney (Bennett, pers. comm.). Some of the more common potential sources of breeding disruption are outlined

Wires

Bijleveld (1974) saw the increasing number of high wires in the landscape to be a detrimental factor in raptor conservation. Of 14 Peregrine Falcons found dead in Switzerland, 5 had been killed by striking such wires (Herren, 1969) and wires are one of the main causes of injury to Merlins *F. columbarius* in Britain (Brown, 1976). Three of six injured Peregrine Falcons and all five injured Australian Hobbies *F. longipennis* brought to the authors appeared to have or were reported to have struck wires. One recently fledged Peregrine Falcon struck a power-line in front of its eyrie and T. Outtrim (pers. comm.) has seen a hunting Peregrine Falcon collide with a telephone line.

*Part I, Corella 1978, 2:1-7.

Much work has been undertaken in the United States on the dangers of power lines to raptors (for example, Raptor Research Foundation, 1975). Some of this work involved surveys underneath section of power lines where a number of electrocuted raptors were found. No similar work has been attempted in Australia.

Destruction of Hollow Trees

Olsen and Olsen (1979) noted that eggs from Peregrine Falcons nesting in hollow trees were significantly larger than eggs from peregrines nesting on cliffs at the same latitude in Victoria before the 1940's. This may indicate a genetically distinct population nesting in hollows that would be difficult to replace if habitats were destroyed. A population of peregrines nesting in hollows at Reelfoot Lake, Tennessee, U.S.A., was extirpated (Hickey and Anderson 1969) and no peregrines have been found nesting in hollows in the U.S.A. since.

W. Emison (pers. comm.) has suggested that river frontages (which in Victoria are often public land with large River Red Gum *Eucalyptus camaldulensis* in which peregrines are nesting) should be protected and managed. Adjacent landowners should not be allowed to remove or otherwise alter the red gum habitat and authorities should ensure that regeneration is occurring.

N. Favaloro (pers. comm.) has pointed out that many of the swamps in Victoria containing peregrines nesting in hollows have been drained and the falcons have subsequently disappeared. Ironically some hollows used by peregrines in Victoria apparently resulted from early ring barking programmes although many farmers are now removing these dead trees and hence the main breeding sites of the peregrine in these areas. Prey species may also be affected by removal of hollow trees.

Campers, Bushwalkers and Nature Trails

Bijleveld (1974) saw increasing 'tourism' as detrimental to the survival of raptors in Europe and gives a number of examples illustrating that recreational activities 'in many cases form a threat to very valuable raptor biotopes' (p. 58). Mebs (1969) documented 'severe disturbance' and subsequent abandonment of sites due to rock climbers in West Germany. Herren (1969) also

notes that climbers and campers cause inadvertent losses in Switzerland. Ratcliffe (1969) stated that two eyries in the Lakeland area of Great Britain were abandoned because of the continual presence of rock climbers and because of the increase of this activity since 1945, he feels that more peregrines will abandon traditional nest sites.

Many peregrine sites in Australia are associated with popular recreational areas largely because much of the terrain preferred by peregrines (mountainous or rocky areas and often sandstone, basalt or limestone cliff lines or gorges) is also preferred by humans for recreation. For example, all six locations listed on the itinerary of one 'outback' bus tour are eyrie sites.

One eyrie we are monitoring in South Australia is located near the top of a peak that is very popular with climbers and bushwalkers. During dry or fine breeding seasons the eyrie often fails and addled eggs have been found, but during breeding seasons with heavy rains the birds have been successful. Perhaps heavy rains discourage bushwalkers and climbers and leave the falcons less disturbed particularly during the incubation period.

Peregrines in some Australian recreational areas have been protected from disturbance. For example, Walsh (1978) working in Werribee Gorge, Victoria noted 'To eliminate disturbance on the rock faces where the Peregrines were selecting their nest site, rock-climbing was banned from August 1 until November 30, 1976; hiking was also banned in the immediate vicinity of the cliff faces. Cooperation by the public was good and few violations of the ban were detected' (p. 137). It is particularly important that disturbance is kept to a minimum during the earliest stages of nesting.

Fire

A fire that burned bushland below a cliff eyrie near Pt Lincoln, South Australia, was followed by two years when no breeding occurred although a pair of falcons remained at the site. Young were raised in the five previous years and again after two years of regrowth. It is possible that fire destroyed habitat for a major source of food, for example Common Bronzewing, *Phaps chalcoptera*. Fire could cause the desertion of tree

nests for similar reasons as well as the destruction of nest sites.

Pesticides

Adult and embryo mortality can occur when peregrines become the non-target victims of pesticides (Ratcliffe, 1969). Declines of peregrines, in some countries have corresponded both temporally and geographically with the use of organochlorine pesticides (Hickey and Anderson, 1969; Ratcliffe, 1973; Peakall, 1976). Decreases in shell thickness associated with DDT use have been reported for peregrines in Australia (Olsen and Olsen, 1979) and for a variety of species on a number of continents (e.g. Anderson and Hickey, 1972). Thin shells may result in an increased incidence of parental egg breakage, either accidentally or as a result of abnormal parental behaviour or a combination of both (Ratcliffe, 1973; Nelson, 1976). Other types of disturbance could compound this situation.

White, *et al.* (1977) found very thin (more than 30% thinner than normal) peregrine eggs in Werribee Gorge National Park and a number of other parks in Australia contain pairs laying very thin eggs. Olsen and Olsen (1979) found that almost one third of all eggs collected in the last decade in Australia were thinner than the 19% critical level of thinning (no population of raptor has been able to maintain a stable self perpetuating population with a mean decrease in eggshell thickness of about 18%). Peregrines in some areas of Australia can be expected to be losing eggs through breakage.

Pigeon Fanciers and Chicken Farmers

Mebs (1960) regarded the repeated destruction of peregrine nestlings by pigeon fanciers to be one of the chief factors in the reproductive failure of the species in Germany in the 1950s. Herbert and Herbert (1969) note that pigeon fanciers took a heavy toll of peregrines in the Hudson River region of the United States and Hickey and Anderson (1969) discussed the effect of pigeon fanciers on the European peregrine population in general.

We know of four peregrines and one Australian Hobby shot and a number of peregrines and other raptors trapped by pigeon fanciers. Another peregrine was shot by a chicken farmer. The toll on peregrines taken by chicken farmers is probably small as these falcons will

seldom go inside a building or run. However, pigeon fanciers do kill numbers of peregrines because some racing pigeons are killed by falcons. Peregrines are still trapped at eyries, for example, in eastern New South Wales and in Tasmania, on both private and public lands using rabbit traps placed on top of small cages of pigeons. The falcon's legs are often broken if they land on these traps. Long poles, apparently used to push young falcons off the ledge, have been found on cliffs above eyries in Tasmania (N. Mooney, pers. comm.).

Cars and Boats

Nelson (1969) noted that three Golden Eagle *Aquila chrysaetus* eyries and Prairie Falcon *F. mexicanus* eyries within 46 metres of a major highway in Idaho, U.S.A. showed no signs of disturbance. However cars can be a danger to birds; three of twelve banded Peregrine Falcons recovered in Victoria had been struck and killed by vehicles (W. Emison, pers. comm.).

Falcons we have observed nesting near navigable rivers were disturbed very little by fast moving boats. Water skiers regularly passing within 50 metres of eyries on coastal rivers had no noticeable effect on the birds. Fishermen do cause more disturbance because they move more slowly and often directly under eyries.

Cars and boats provide access to eyries for picnickers and campers who may also cause disturbance; shotgun shells are often found near such accessible eyries. Nests of Peregrine Falcons in Baja, California, apparently have been abandoned because of disturbance and Banks (1969) believes fishermen shooting at birds and nest sites may be the cause.

Summary

Alleviation of the forms of disturbance outlined above involves education and law enforcement. Research will provide a basis upon which conservation and education programmes can be designed. Eyrie patrols and watches by trained personnel can help protect some eyries and generate data on falcon ecology at the same time (Hagar, 1969). Obviously, in planning parks etc., roads and nature trails should be located in areas of least disturbance to all fauna and the public educated about the impact of disturbance and how to avoid it.

Those areas that warrant investigation and management include:

- *Wires* — It appears that wires of any type (including fences) constructed near eyrie sites or hunting areas may increase the probability of adult or young falcons being injured. It may be advisable to remove unused existing wires near eyries whenever possible, and to investigate alternate routes when installing new wires.
- *Hollow trees* — The effect of felling or destroying hollow red gums requires investigation and may need to be banned, and landowners made aware of the importance of these trees to all fauna.
- *Bushwalkers and Climbers* — These groups are often conservation minded and can therefore be educated about the effects of disturbance to nesting raptors. It appears that a ban on these activities in peregrine areas from late July to early January is necessary. (Timing of the ban would depend on the area. For example falcons lay eggs in July in some areas, but fledge young in January in other areas.)
- *Fire* — Burning off near eyries may detrimentally effect breeding.
- *Pesticides* — Some pesticides used on properties near national parks or other public lands may detrimentally affect peregrines nesting on these lands. Falcons could nest on crown land but secure prey from adjacent farm land.
- *Pigeon Fanciers* — This problem requires further research in conjunction with education and more severe fines. Research may show how pigeons can be re-routed to areas of low peregrine density or systematically released by pigeon racers to avoid extensive depredation by falcons on prized birds.
- *Boats and Cars* — Roads leading to eyries may need to be blocked during the breeding season and fishing banned near eyrie sites during the relevant months.

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