When is a pest not a pest? Some cynics might answer 'when it has been investigated by the CSIRO Division of Wildlife Research'. Such an answer would be unfair. Even so, it does contain a grain of truth. On closer study, a number of animals and birds have turned out to be not the major agricultural pests they were cracked up to be.

Living with wildlife on the farm

The agricultural community often accuses wildlife—both native and introduced—on two counts. It's alleged that grazing animals and birds, like kangaroos and magpie geese, damage crops or compete with cattle and sheep for pastures, and that predators like the dingo and the wedge-tailed eagle attack domestic stock —especially young lambs.

During the past 25 years the Division of Wildlife Research has been asked by the various State vermin control and fauna authorities to study in detail the biology of a dozen or more animal and bird pests, and to make recommendations on control methods. More often than not the Division's biologists have confirmed the authorities' suspicions that extensive control campaigns are unnecessary and a waste of effort. Much smaller-scale control measures aimed at local concentrations would suffice. In fact, as a result of the Division's studies, the wedge-tailed eagle is now on the protected list in New South Wales, and in other States the practice of paying bounties on eagles has been discontinued.

Detailed studies have upheld the cases against some grazing animals. Myxomatosis showed very clearly just how much rabbits depress the carrying capacity of the nation's pastures. Red and grey kangaroos do at times compete with domestic stock for pasture, but by no means always. It depends on the circumstances. Research by the Division has shown that often kangaroos and sheep grazing on the same pasture are eating different plant species.

Legend of Humpty Doo

Contrary to popular legend, the magpie goose did not destroy rice-growing prospects at Humpty Doo in the Northern Territory. The geese ate a lot of rice to be sure, but had larger areas been planted, as was planned, and hence the water levels of more of the black soil swamps controlled, the goose habitat would have been destroyed, and the geese eliminated from the area altogether. As it was, the rice crops were close enough to the fairly small breeding areas to supply the geese with plenty of food.

It seems ironic that today, more than 10 years after the debacle at Humpty Doo, the Division is now starting a project, with the cooperation of the Department of Northern Australia, aimed at recommending what can be done to ensure the preservation of the dwindling magpie goose population.

Studies carried out a number of years ago on the Tasmanian native hen showed

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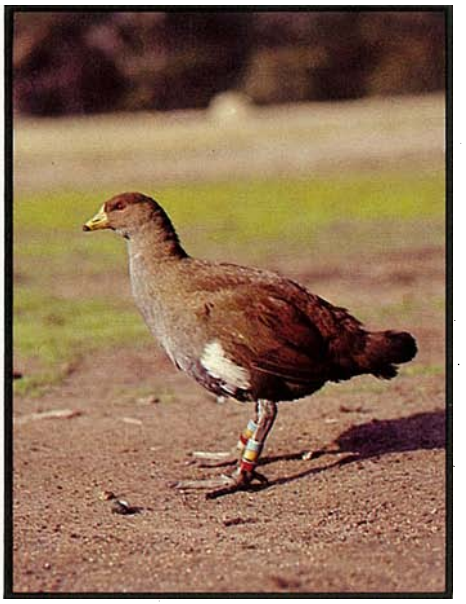
Magpie goose feeding in a Northern Territory swamp.



Tasmanian native hen.

that any really intensive campaign to eradicate these flightless relatives of the mainland moorhens from agricultural areas would drive them to extinction. This is because they occur only in the flatter, well-watered parts of Tasmania—the areas most intensively used for agriculture. Dr Michael Ridpath from the Division studied these birds in cooperation with Mr G. K. Meldrum of the local State Department of Agriculture at the request of the Department.

The Tasmanian native hen was, and still is, classified as vermin. So it is every farmer's duty to destroy these birds. Local farmers accused them of damaging crops and pastures in six ways:

- grazing young cereal crops and newly sown pastures
- grazing established pastures
- fouling pastures
- fouling water holes used by stock
- trampling cereal crops
- eating young peas

In addition to Tasmanian native hens, two other animals—sheep and rabbits—were grazing pastures and cereal crops. (It is standard practice for farmers to turn their sheep onto young oat crops for a week or two, since grazing the shoots promotes tillering.) By enclosing small plots on the pastures and crops with fences that excluded the sheep, the biologists were able to separate out quite easily the effects of sheep grazing from those of the native hens and rabbits. But Tasmanian native hens and rabbits are about the same size, so the technique could not be used to separate these two. Counting their droppings allowed the researchers to deduce their relative effects.

Finding the culprit

There could be no doubt that rabbits and native hens between them did reduce the amount of pasture available to sheep. However, it seemed that rabbits were doing most of the damage. As for the accusation that the native hens were fouling pastures, the biologists found that even an unusually high concentration of these birds was only fouling an area of about 0·2 square metres per ha—that is, 0·002% of the area.

The native hens certainly did also damage oat crops close to creeks, but mainly at the edges. Compared with a protected oat crop, at between 6 and 8 weeks after sowing the native hens reduced the dry weight by between 24 and 36% within 30 metres of open water. Further into the paddock they did very little damage. Over the entire paddock, their grazing accounted for a yield reduction of 8%. Even though the local rabbit population had been reduced to a low level by poisoning, these animals caused as much damage as the native hens over the whole paddock.

Dr Ridpath and Mr Meldrum dismissed the accusation that in summer the birds fouled water holes used by stock. For sure, at five water holes that were observed regularly for 3 years, small amounts of their droppings did appear in the water, but it stayed relatively clear. Sheep continued to drink the water throughout the summer. However, if such water holes begin to dry out during the summer heat, they become fetid if stock are using them anyway, regardless of whether there are any native hens around.

Damage to pea crops proved rare and localized.

The researchers did not show that Tasmanian native hens don't damage pastures and crops. They do. Damage levels close to water may be quite high. Nevertheless, the reduction in yield of the whole crop or pasture did not appear to be as large as many local farmers had asserted.

As a result of their studies, Dr Ridpath and Mr Meldrum suggested that it would be appropriate to remove the Tasmanian native hen from the vermin list, and allow local control measures to be taken should it be necessary. They pointed out that paddocks can be protected by cleaning out reeds and undergrowth along the banks of nearby creeks. Native hens need the reeds and undergrowth; remove these and they go elsewhere. As with the kangaroo, the answer for the native hen seems to be to learn to live with it rather than eliminate it altogether from the well-watered agricultural areas of Tasmania and hence, possibly, drive it to extinction.

Predator puzzle

It's much harder to work out the true losses to the agricultural community caused by predators. You can't blame the grazier for wanting to destroy eagles, ravens, foxes, or dingoes when he sees them feeding on the carcasses of his lambs or calves. Obviously (to him) these predators are killing his stock and should be eliminated. What he doesn't know is whether the eagle or crow gorging itself on his dead lamb actually killed it. The grazier's natural reaction is to regard these predators as guilty of killing his stock until they are proved innocent.

A complicating factor is that most predators are also scavengers that will feed on any carrion that's around. As scavengers they are doing the property-owner a favour by getting rid of disease-infected carcasses of stock. Again and again, detailed studies by State Departments and CSIRO have shown either that the lamb or calf had died before the crow, raven, or fox had found it, and so the eater was actually eating carrion, or else that the predator had picked off the very weak animal that would have died anyway. So although predatory animals and birds may also kill some healthy lambs or calves, their adverse effects on the agricultural community are nothing like as great as has been claimed.

Crows and ravens

A group of birds that has earned graziers' curses is the crows and ravens. They were, and often still are, accused of killing lambs. A detailed study—by Mr Ian Rowley of the Division of Wildlife Research in Canberra—showed that, like the Tasmanian native hen, the crows and ravens were not the pests they seemed.

Most of us would be quite content to label the large black birds of the genus *Corvus* as crows or ravens. When Mr Rowley began his studies, ornithologists had divided this group into three—two crows and a raven. He has now established that there are in fact five species involved—two crows and three ravens. They all look very much alike. Crow body feathers have white bases, while those of ravens are grey. The crows tend to live in the northern half of the continent and the ravens in the south.

It turned out that only the two biggest species—the Australian raven and the forest raven—are likely to trouble lambs. Of the rest, the Australian crow is unlikely to occur near sheep, and the little raven and the little crow cannot damage a live lamb.

Mr Rowley and his colleagues from the Division watched the behaviour of ravens around seven separate flocks of lambing ewes located in South Australia, in the Riverina, and on the Southern Tablelands of New South Wales. They also made less-detailed observations near Roma, Qld, near Trangie, N.S.W., and on properties near Canberra.

In all, they witnessed 81 crow attacks on the South Australian flock, and rather fewer on the Riverina one. It became obvious that such attacks would result in few lamb losses. Usually the ewe drove the birds off, or they became discouraged by the frantic antics of the pecked lambs and flew off. Only at Roma did Mr Rowley see lambs sustain any injuries, and even here they were minor. In fact during more than 600 hours of observations not one fatal attack occurred. Even so, separate studies by Dr Ian Smith of the University of Queensland suggest that lambs may die later as a result of their wounds becoming infected with bacteria carried on the crows' beaks.

Mr Rowley also carried out a survey of the causes of death of 314 lambs in 1965 on four properties on the Southern Tablelands near Canberra. Less than one-third of these dead lambs had wounds of the kind inflicted by ravens or crows, and all but one of the lambs were either starving or had already died before the crows began feeding on them. Mr Rowley judged that foxes and eagles accounted for a further 57 of the lambs, but again only 17 of these appeared to have been in good health at the time of attack.

Studying the wedgie

Eagles have had a hard time at the hands of Man. He glorifies them—the Romans used the golden eagle as the symbol of their standard—yet he ruthlessly persecutes them. As a result, the golden eagle has been eliminated from most of its former ranges in North America and Europe. Since time immemorial, farmers have regarded them as enemies of their domestic stock—hence the persecution.

In North America only about 8–10 000 golden eagles remained in 1968, yet in some recent years in Australia more than 30 000 of the closely related wedge-tailed eagle have been killed in a single year! Most people would probably not like to see the wedge-tailed eagle become a rarity here. Nevertheless, until recently the sight of shot eagles strung up along the fence was common in most States.

The wedge-tailed eagle has received a good deal of scientific scrutiny in recent years, particularly over in the west. At the request of the Western Australian Agriculture Protection Board, Dr Ridpath began studying the bird in 1967, from the Division's laboratory at Helena Valley outside Perth. Mr Michael Brooker

Australian ravens picking over a carcass.

An adult wedge-tailed eagle feeding on a dead kangaroo.

joined him in 1969. These two biologists have studied the eagles' biology, and what they eat.

In order to investigate these birds in two very different environments, Dr Ridpath chose to study them in two areas 1500 km apart. One was about 400 km east of Kalgoorlie near Rawlinna on the edge of the Nullarbor Plain, and the other was on the coast near Carnarvon.

The Carnarvon property ran sheep, and of the three test areas at Rawlinna, one ran sheep, one cattle, and one carried no farm stock. Eagles were known to be common at both Carnarvon and Rawlinna, and complaints about them had been voiced by the local property-owners.

Versatile feeders

By analysing the food remains in occupied and abandoned nests, and also in pellets of indigestible material that had been regurgitated by the birds in the nests, the two scientists were able to work out what the eagles had been eating. They have not yet published their final results, but the preliminary findings suggest very strongly that wedge-tailed eagles are very versatile feeders who, nevertheless, go for the most easily available prey or carrion.

This was rabbits almost exclusively at Rawlinna in good seasons. During a bad drought when rabbits became very scarce, the eagles moved right out of the area that carried no stock.

At Carnarvon, close to the northern distribution limit for rabbits, wedge-tailed eagles ate a much more varied diet. Only one-third of the nests examined between 1967 and 1969 contained rabbit. Three-quarters of the nests contained remains of red kangaroos and euros, most of which were joeys. Three-quarters of the nests also contained the remains of birds—mainly crows or ravens plus the occasional galah, tawny frogmouth, brown quail, and diamond dove. (One nest 200 km from the nearest coastline even contained the remnants of a great-winged petrel.) Lizards, especially shingle-backs, turned up in two-thirds of the nests, and half contained fox and wild domestic cat.

As for lambs, a few did turn up, but the scientists could not tell if they were the remnants of already dead or freshly-killed ones.

Dr Leopold Starker—a visiting expert on wildlife management from the University of California—and Mr T. O. Wolfe carried out studies near Canberra at the Division of Wildlife Research. These showed that there too rabbits, being common, were the eagles' main prey. Hares were the next most important item on the menu, followed by birds, sheep and lambs, other small animals, and lizards. Hares and rabbits between them made up 60% of the species in the diet, and lambs about 7%. Fox, the two local possum species, and lizards each made up about 3%, and birds—particularly crows or ravens, magpies, and parrots—accounted for nearly 20%.

Further studies in the arid inland of New South Wales and southern Queensland revealed that lambs again represented about 7% of fauna in the diet. Rabbits are much less plentiful in these areas than around Canberra, and there are no hares. Rabbits accounted for only 31% of the species in the diet, birds 15%, lizards 18%, and fox and domestic cat 3·5%.

Neither the studies of Dr Ridpath and Mr Brooker nor those of Dr Leopold and Mr Wolfe separated out carrion of dead lambs from freshly killed ones. Nevertheless, considering the low densities of eagles usually found (about one pair for each 30 sq km near Canberra) these figures do not suggest that eagles take a very large number anyway. Nevertheless, it would be surprising if wedge-tailed eagles did not take some live lambs, since Dr Ridpath has seen them pursuing adult euros in the Hamersley Ranges, and other observers have seen them hunt adult red and grey kangaroos.

Complicating the argument

The fact that the eagle diet included rabbit, fox, cat, and crow or raven brings another complication into the argument about this bird's pest status. Keeping down rabbits could well outweigh the disadvantage to graziers of losing lambs. But cats and foxes too are predators of the rabbit, as well as of mice, rats, and other small animals. From the conservationists' point of view, foxes are also undesirable because they prey on small native marsupials. So the effect of a single type of predator is never as simple as it may appear. Remove the predator and unforeseen effects may well crop up. We don't understand the complicated intermeshing of effects that each species has on others. And we will need much more information on this aspect before we can predict with any certainty what the effect of removing any predator will be.

More about the topic:

Damage to pastures by the Tasmanian native hen, *Tribonyx mortierii*. M. G. Ridpath and G. K. Meldrum. *CSIRO Wildlife Research*, 1968, **13,** 11–24.

Damage to oat crops by the Tasmanian native hen, *Tribonyx mortierii*. M. G. Ridpath and G. K. Meldrum *CSIRO Wildlife Research*, 1968, **13,** 25–43.

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Field observations of the behaviour of the wedge-tailed eagle. M. G. Brooker. *Emu*, 1974, **74,** 39–42.

Crows and lambs. *Rural Research* No. 86, 1974, 14–18.

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'Kangaroos.' H. J. Frith and J. H. Calaby. (F. W. Cheshire: Melbourne 1969.)