

# THE PREDATORS OF EGGS AND CHICKS OF GREENFINCHES IN A MIXED FARMING AREA IN HAWKE'S BAY

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## ABSTRACT

Experiments were undertaken to identify the animals responsible for attacks on nests of Greenfinches (*Carduelis chloris*) on a mixed farm in Hawke's Bay. Nests encased in wire mesh, which excluded all potential predators except mice, suffered no egg losses. Tracking papers placed on wooden poles leading to nests were marked by rats twice. Two ship rats (*Rattus rattus*) were killed at nests with eggs injected with strychnine. Mustelids destroyed one clutch of eggs and were probably responsible for most of the predations on young. The experiments did not test whether Harriers (*Circus approximans*) or other birds were involved.

## INTRODUCTION

The avifauna of the main islands of New Zealand coexists today with introduced mammals which eat eggs and young in the nest. Recent studies have shown that the incidence of nest predation varies with species, localities and seasons, but for most New Zealand birds it generally ranges from 30% to 70% each year (Moors 1983, MacMillan 1985).

Predation attempts are rarely witnessed and the animals responsible for losses of eggs and chicks are seldom identified. However, in Kowhai Bush, near Kaikoura, Moors (1983) deduced the identity of predators by examining the sign in plundered nests. He found that rodents preyed proportionally more often on clutches than broods, whereas mustelids did the reverse.

In a mixed farming area in Hawke's Bay, MacMillan (1985) found that predators destroyed an average of 40% of the eggs laid by Greenfinches and 31% of the young in the nest over three successive breeding seasons. MacMillan saw mice (*Mus musculus*), ship rats, Norway rats (*R. norvegicus*), stoats (*Mustela erminea*), feral cats (*Felis domesticus*), possums (*Trichosurus vulpecula*), magpies (*Gymnorhina hypoleuca*) and Harriers in the general vicinity of the Greenfinch nests, but he did not know which animals caused the losses. Several small experiments were undertaken in the same area from 1980 to 1982 to identify the predators; the results are reported here.

## STUDY AREA

The study was done at Turamoe, a livestock and cropping farm 16 km south-west of Hastings, described by MacMillan (181). The investigation was concentrated on nests in bushes of Holme oak (*Quercus ilex*) and boxthorn (*Lycium ferocissimum*) under a shelterbelt of poplars (*Populus spp.*) bordering a creek. The bushes were 2-6 m in height and were surrounded by rank grass. Silvereyes (*Zosterops lateralis*), Goldfinches (*Carduelis carduelis*), Blackbirds (*Turdus merula*) and Song Thrushes (*T. philomelos*) also nested in the bushes.

A few nests elsewhere on the farm were included in some experiments. Most were about 1.5 km from the shelterbelt in an overgrown *Elaeagnus* hedge about 2 m high, 3 m wide, and 20 m long, growing on a hillside among ornamental garden trees and shrubs.

## METHODS

*Predatory mammals using the shelterbelt:* In October 1980, 25 tracking tunnels were placed in tall fescue grass at the base of the Holme oaks. The floor of each tunnel consisted of a metal tray with an ink pad in the centre and a sheet of tracking paper at each end. Another three tracking tunnels were placed under boxthorn in the first week of November 1980. The tunnels were checked twice in the week after their installation and then fortnightly until 8 December 1980.

*Experimental nests:* An experiment was designed to determine whether the predators were birds, mice, or larger mammals. Twenty-three nests of small birds (Greenfinches, Goldfinches, Chaffinches (*Fringilla coelebs*), Dunnocks (*Prunella modularis*) and Silvereyes) were collected from Turamoe. Each of these nests was seeded with 4 eggs, obtained mainly from finches, House Sparrows (*Passer domesticus*) and Starlings (*Sturnus vulgaris*) elsewhere in Hawke's Bay. Eight of the nests were secured to the end of wooden poles, 1 m long and 3 cm in diameter. An ink pad was fastened to the middle of each pole, and a sheet of tracking paper was taped between the pad and the nest. The pole nests were positioned carefully in the boxthorn bushes so that mammals could reach the nest easily only by walking along the pole. Birds, however, could land directly on the nest and remove the eggs without marking the tracking paper.

Nine other nests were enclosed in domes of 2 cm mesh wire netting. The roof of each dome was at least 5 cm above the eggs and had a 3 cm diameter hole cut in it, which allowed only mice to enter. Laboratory tests verified that mice could enter the nests. The dome nests were placed in boxthorn bushes, often in exactly the same position as natural nests whose contents had recently been raided.

As a control, six nests without domes or other attachments were also placed in the boxthorn clumps to check whether predation was still taking place.

*Nests set on rat traps:* Five break-back rat traps baited with nests containing eggs were set in the boxthorn bushes in mid-November 1980, when the experiments with seeded nests had finished. Six traps baited with a Starling's egg were also set on the ground at the base of the bushes.

*Poisoned eggs:* In late November 1980, eight Greenfinch nests in the boxthorn bushes were seeded with an egg injected with about 0.25 ml of strychnine. Two untreated eggs were also added to each nest to encourage the predator to stay until the poison acted.

This experiment was repeated in late October and early November 1981 by means of one or two poisoned eggs added to natural clutches of Greenfinches (6), Goldfinches (1), Thrushes (3) and Blackbirds (1). It was not always possible

to match the poisoned eggs with those of the recipient clutch; Starling eggs were used in the Song Thrush and Blackbird nests, and House Sparrow eggs were added to some of the finch nests.

## RESULTS

### *Tracking tunnels*

Mice were the only animals to pass through the tunnels under the Holme oaks and boxthorn bushes. They visited the tunnels frequently in the first week, but rarely from then on. Rats seemed to avoid the tunnels; some within a few metres of *R. norvegicus* burrows were never entered, nor were others at the base of trees known to be claimed by *R. rattus*. The tracking tunnels therefore gave a poor indication of the predatory mammals in the vicinity of the Greenfinch nests.

### *Experimental nests*

Eight of the 23 nests seeded into the boxthorn bushes in the evening of 10 November 1980 had been robbed by 9.30 a.m. the next day (Table 1). Five of these were control nests, and three were nests on poles. The tracking sheets on two of the poles were marked with rat prints. No eggs were damaged in any of the nine nests covered with wire mesh that mice could pass through. A rat had defecated on top of one wire dome, but the dropping did not contain egg-shell fragments.

Some of the eggs in robbed nests were not eaten; in one nest, three of the four eggs were left intact, and in another, one egg was holed but not eaten. All of the robbed nests contained fragments of shell, indicating that the eggs were eaten *in situ*. This is characteristic of predation by rats (Moors 1978).

TABLE 1 — Results of the first experiment set up in the evening of 10 November 1980. See text for definition of nest types

| Date        | Nest type              | No. of nests | No. of nests attacked | Eggs missing or damaged |     | Comments                     |
|-------------|------------------------|--------------|-----------------------|-------------------------|-----|------------------------------|
|             |                        |              |                       | No.                     | %   |                              |
| 11 Nov 1980 | natural                | 6            | 5                     | 18                      | 75  |                              |
|             | dome (mice entry only) | 9            | 0                     | 0                       | 0   | one with rat dropping on top |
|             | pole                   | 8            | 3                     | 9                       | 28  | rat tracks on two papers     |
| 12 Nov 1980 | natural                | 1            | 1                     | 4                       | 100 |                              |
|             | dome                   | 9            | 0                     | 0                       | 0   |                              |
|             | pole                   | 5            | 4                     | 13                      | 65  |                              |

On the second night of the experiment, four of the five remaining nests on poles and the last control nest were robbed. The dome nests were again intact. None of the tracking papers on the poles was marked, but the sign in the nests indicated predation by mammals. Some shell fragments had smooth, narrow grooves along their edges, which suggested that the eggs had been opened by biting. The predator may have jumped over the ink pad on the pole, or at two nests, jumped directly on to the nest from an overhanging branch.

The nine dome nests were left in place for the next 15 days. Two were robbed during this period, apparently by rats. One of the nests had tilted, and so the eggs had rolled to within easy reach of the 3 cm hole, and in the other, the predator reached the eggs by squeezing between two layers of wire netting and gnawing through the underside of the nest.

#### *Nests set on rat traps*

Three of the traps baited with finch nests were sprung, but no animals were caught. The six traps baited with a single Starling egg were not disturbed.

#### *Poisoned eggs*

Two of the eight nests seeded with poisoned eggs in November 1980 were attacked, and near one of these a female ship rat was found dead in the branches of a boxthorn bush. Its stomach contained a yellowish gel, probably yolk, but no shell fragments. Egg-shell fragments within the cup of the other nest indicated that its poisoned egg had been eaten there, but no predator was found dead nearby.

The other nests were removed after a week to avoid endangering livestock which had been moved into the shelterbelt.

When the experiment was repeated in 1981, eight of the 11 nests seeded with poisoned eggs were robbed. A male ship rat was found dead beneath one of the nests, and a female Greenfinch under another; she died after eating the House Sparrow egg that had been added to her clutch.

Of the remaining six robbed nests, four contained egg-shell fragments and were probably preyed on by rats. One Greenfinch nest and its eggs disappeared, and the entire clutch from a Blackbird nest in an *Elaeagnus* hedge was removed intact, possibly by a mustelid. A nest robbed in the same hedge the previous year has mustelid hair adhering to the shell fragments. No animals were found dead near these nests.

## DISCUSSION

The experiments proved that ship rats were responsible for some of the predation on finch nests at Turamoe. These agile climbers eat the eggs and chicks of a variety of tree-nesting birds, sometimes inflicting heavy losses. They exterminated five endemic species on Big South Cape Island in the early 1960s (Bell 1978) and probably contributed to the decline of other species in the North Island in the 1870s (Atkinson 1973).

The impact of ship rats and other mammalian predators on the introduced avifauna of New Zealand has not been studied. Introduced birds, however, generally laying large clutches and raising several broods in a season, are less likely to be affected by predation than many of the longer-lived and slower-producing endemic species (Moors 1983). At Turamoe, for example, three-quarters of the clutches of Greenfinches were destroyed or abandoned; yet on average pairs still raised 1.0 chick per nest and probably 2 chicks each season (MacMillan 1985).

House mice were abundant at Turamoe but apparently did not rob the nests. Moors (1983) considered that mice were not important predators in Kowhai Bush, near Kaikoura, but cited several reports from elsewhere in New Zealand where mice were known to have eaten eggs and nestlings of small birds.

Mustelids apparently destroyed few clutches at Turamoe but were probably responsible for most of the predation on broods. Nests which lost chicks were undamaged and never contained carcasses. This lack of sign is characteristic of predation by mustelids, whereas rats generally disturb the lining of the cup and leave partly eaten chicks in the nest (Moors 1978).

The experiments failed to test whether birds were responsible for any of the predation at Turamoe. Harriers have been observed taking chicks from Goldfinch nests in an orchard in Hawke's Bay (J. Crouchley, pers. comm.) but were probably not responsible for any losses by Greenfinches in this study. Our visits to nests within an hour or two of dusk and dawn indicated that predation was probably taking place at night. Moreporks (*Ninox novaeseelandiae*) may have been involved because they are known to eat small birds (Falla *et al.* 1979) and eggs (Oliver 1955).

Limited comparative data indicate that Greenfinches suffer less nest predation in Britain (their country of origin) than at Turamoe, despite being exposed to a greater diversity of predators. Newton (1972) found that, in the south of England, about one-third of Greenfinch nests were robbed, mainly in the first few weeks of the breeding season when deciduous trees were not fully in leaf. As at Turamoe, more clutches than broods were taken, presumably because the more conspicuous nests were found quickly, and so those that escaped until hatching had a good chance of surviving further.

Nest records from the whole of Britain showed that about 25% of Greenfinch clutches failed completely each season, and of these, 41% resulted from interference by humans (egg collectors). Corvids, gulls and mammals accounted for 7.7% of failures (Monk 1954), a conservative estimate because predators would also have been responsible for some of the unexplained losses (47% of all failures).

There are few data on the breeding success of Greenfinches elsewhere in New Zealand, so we do not know if the predation at Turamoe was unusually heavy. Greenfinches nesting in an orchard in Hawke's Bay lost fewer eggs to predators than did those at Turamoe, but they deserted nests more frequently, apparently because they were disturbed when the trees were sprayed (MacMillan, pers. obs). Greenfinches breeding in riparian vegetation and forests

probably suffer less predation than those in farmland, where they generally nest with several other species in small isolated patches of vegetation.

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### SHORT NOTE

#### Hutton's descriptive catalogue of New Zealand birds (1871)

Since I published (*Notornis* 30: 7-14) letters by Hutton and Buller documenting the latter's irritation at the publication of Hutton's *Catalogue* just before the appearance of his own *History of New Zealand Birds* (1872-73), I have come across a letter from Dr James Hector to the Colonial Secretary, in the National Museum letter book, dated 3 August 1871.

Hector forwards "a descriptive catalogue of the native and introduced birds of New Zealand which has been drawn up by Capt'n. Hutton in compliance with my instructions. As it forms a report on the Collection recently purchased for the Colony from Mr Buller and embodies in a form available for general use the chief advantage by that purchase, together with all the other information that can be obtained on the subject, I beg to recommend that it should be printed for distribution".

This clearly confirms that Hector was responsible for publishing the catalogue in the form in which it appeared, despite Buller's suggestion that he was absent overseas during its production and the omission of his name as Director from the title page.

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