# THE FEEDING ECOLOGY AND BREEDING BIOLOGY OF THE GOLDFINCH (*CARDUELIS CARDUELIS* Linnaeus, 1758) AT HAVELOCK NORTH, NEW ZEALAND.

A thesis presented in partial fulfilment of the requirements for the degree of Master of Science in Zoology at Massey University.

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THE EUROPEAN GOLDFINCH

(CARDUELIS CARDUELIS, Linnaeus, 1758)

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# CHAPTER I

# INTRODUCTION

## 1.1 AIMS OF THE STUDY

During the past ten years increasing attention has been drawn to damage caused to soft fruits by the European Goldfinch, Carduelis carduelis Linnaeus,1758, *(Dawson 1967, Dawson and Bull 1970, Long 1970). The present study was undertaken in an endeavour to find out more about the food habits of this bird in the district where many of the reports of this damage originated.

The aims of this study were to examine 1) the feeding ecology of the adult Goldfinch; 2) the diet of the nestlings; 3) the extent of crop damage caused by the Goldfinch. Because investigation of nestling diet involved numerous visits to nests, aspects of breeding biology were investigated. Also large numbers of goldfinches were measured during the study and it seemed appropriate to compare data with recent work investigating the subspecific status of the Goldfinch in New Zealand (Niethammer,1971).

A number of smaller points were of interest. Newton (1967a) states that in all the carduelines which feed animal and vegetable matter to their young, the proportion of invertebrates given declines with increasing age of the young. After about the tenth day the young often receive seeds only. This was examined.

*Nomenclature for New Zealand birds follows that laid down in the Annotated Checklist of the Birds of New Zealand (Kinsky,1970). Other bird species are as prescribed in the Handbook of British Birds (Witherby et al, 1943) or in the specific reference works quoted.

It became apparent during the 1969-1970 breeding season that because of differences in surrounding vegetation certain breeding areas had larger amounts of animal protein available to the young. Two breeding blocks were chosen, one being surrounded by a plentiful supply of animal protein and the other, by comparison, with very little. An investigation was carried out to see firstly; whether there was any significant difference in the percentage of animal protein fed to the nestlings in the two blocks and if so did this difference affect growth rates; secondly, if there was a significant difference in growth rates of nestlings from different brood sizes; and thirdly, if there was any significant difference in the diet and growth rates of broods reared at different times of the breeding season.

## 1.2 THE HISTORY OF THE GOLDFINCH IN NEW ZEALAND

Thomson (1922) records that the Goldfinch was first introduced into New Zealand by the Nelson Acclimatization Society when ten were first imported to Nelson and liberated in 1862. The origin of this stock is unknown but presumably the birds came from Great Britain and would therefore belong to the British race *Carduelis carduelis britannica*. However, doubt was cast on this conclusion by Moncreiff (1931) who suggested that since the Germans were in the forefront of bird exporters at the time, the birds introduced into New Zealand were more likely to belong to the continental race *C.c.carduelis.*

In a recent article by Niethammer (1971) he uses wing and tail measurements to prove that the New Zealand Goldfinch stems from British stock. However birds introduced to new areas may undergo morphological changes

which subsequently distinguish them from their ancestral race. This is so for the North American House Sparrow, Passer domesticus (Johnston and Selander,1964). In an attempt to verify the origin of the Goldfinch, and to investigate any subsequent morphological change, bill and wing measurements were recorded.

During the 20 years following 1862, the species was liberated in several other places and in the last 100 years it seems to have adapted well to the New Zealand conditions. Oliver (1955) lists it as being found throughout the North and South Islands, Three Kings, Mokohinau, Little Barrier, Kapiti, Stewart and Antipodes Islands and Kinsky (1970), in 'The Annotated Checklist of the Birds of New Zealand', mentions its self-introduction to some of the outlying islands, including Chathams, Kermadecs, Snares and Campbell Islands. The bird distribution mapping scheme carried out by the Ornithological Society of New Zealand (Bull,1970) indicates that the Goldfinch may be more numerous in the northern areas but this is yet to be confirmed.

The Greenfinch Carduelis chloris and the Redpoll Acanthis flammea are the closest relatives to the Goldfinch in New Zealand and with the Chaffinch Fringilla coelebs, inhabit similar areas to the Goldfinch. Differences in size and shape of bills with associated differences in food preferences, enables all four species to coexist.

## 1.3 STUDY AREA

The study area comprised approximately 417 hectares, about one-third of which was orchards and the remainder

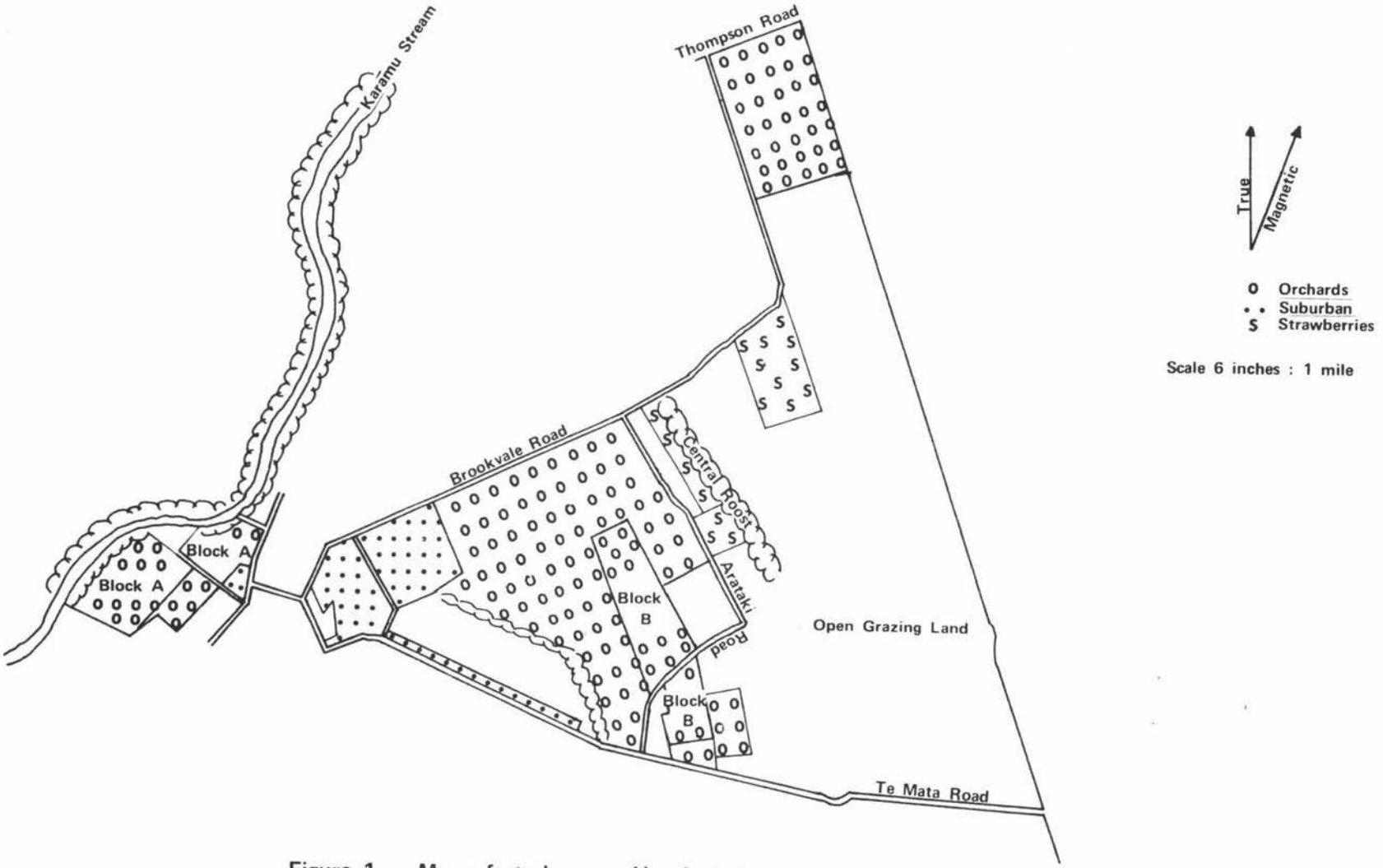


**Figure 1** Map of study area, Havelock North.

market gardens, sheep and cattle pasture and housing blocks (Fig.1). The area lay on the north-east boundary of the town of Havelock North.

Two orchards were chosen as study areas during the breeding season; Block A, which was the Department of Scientific and Industrial Research orchard, approximately 10.5 hectares in area and bordered on its western side by a large number of deciduous trees growing on the banks of the Karamu stream. Block B comprised 15 hectares of fruit trees and was bordered by other orchards and open pasture land. Both orchards were within the main study area (see Fig.1). As already stated, because of differences in surrounding vegetation it became apparent during the 1969-1970 breeding season that the food supply to the nestlings in these two orchards would be different in the amount of animal material available to them and this is why these two orchards were chosen.

Many of the goldfinches in the study area utilised a long plantation of trees (Eucalyptus sp.) for roosting at night (Fig.2). This was situated in a fairly central position in the main study area. Weed patches were prevalent, mostly associated with orchards and market gardens.

FIGURE 2. Trees used for roosting at night. (central roost)