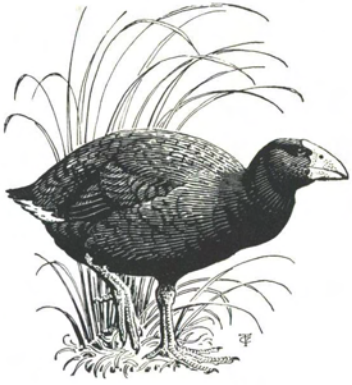
THE ATLAS OF BIRD DISTRIBUTION IN NEW ZEALAND

P.C. BULL
P.D. GAZE
C.J.R. ROBERTSON



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FOREWORD

In his foreword to the provisional atlas *Bird Distribution in New Zealand* (1978), Brian Bell, then President of the Ornithological Society of New Zealand, wrote:

> ''The plan to map the distribution of common New Zealand birds was first proposed to the Ornithological Society by Dr Bull. This suggestion encouraged members to make a definite effort to cover as much of New Zealand as possible over the period 1969-76. The impetus has been maintained by Dr Bull and his assistant Mr P.D. Gaze, who have continually stimulated the scheme, and by Mr C.J.R. Robertson, who planned the data processing which enabled a feed back of information. Members enthusiastically supported the scheme, some travelling hundreds of miles to ensure that mapping squares were covered.''

Since 1976, a concerted effort to complete records from difficult and insufficiently mapped places has filled many of the gaps. This new definitive atlas has a greater overall coverage and constitutes a major advance in our knowledge. The set of accompanying microfiches will allow anyone to extract the information held on thousands of field cards and do their own analyses. Now, and increasingly in the future, the value of the atlas as a database will be inestimable.

This atlas has been produced through the joint cooperation of the Ornithological Society, the Ecology Division of DSIR, and the New Zealand Wildlife Service. In addition, the faith and determination of many hundreds of people and several organisations throughout New Zealand have carried this ambitious project through all its stages over more than 16 years. A worthwhile task has been well and truly done.

Beth Brown
President, OSNZ

THE ORNITHOLOGICAL SOCIETY OF NEW ZEALAND

The Ornithological Society of New Zealand (OSNZ) was formed in 1939. Its objective is to encourage, organise and carry out the study of birds. Anyone who is interested in birds may become a member.

The Society has a 12-member elected council, which handles general policy, finance, publications and other matters of national concern. The council appoints regional representatives to deal with local matters in the Society's 18 regions.

The Society's official journal is *Notornis*, which is published quarterly and contains the results of new studies and observations about birds in New Zealand, the southwest Pacific, and other places with birds closely allied to those of the New Zealand region. *OSNZ News* is a quarterly informal newsletter that contains new and general information and keeps members in touch with one another's activities. In addition, several regions have their own newsletters covering matters of local interest. The Society also produces special publications from time to time; this atlas is one.

The Society has a two-day weekend annual meeting and conference each May in one or other of the larger centres, and also organises study courses and field investigations. At the local level, most of the larger centres have regular evening meetings and field trips. The Society's library, housed at the Auckland Institute and Museum, has a wide range of ornithological journals and books for members to borrow.

Apart from helping members with their personal research, the Society runs several schemes for recording the distribution and movements of birds, changes in their numbers, and details of their breeding and moulting habits. These schemes are designed so that anyone interested in birds can make a worthwhile contribution and gain much pleasure and companionship while doing so. The various schemes are described in detail in the pamphlet *Bird Study in New Zealand* that you are sent when you join the Society.

If you are interested in joining the Society or finding out more about its activities, please contact the Treasurer, whose name and address, together with current subscription rates, are to be found inside the front cover of *Notornis*. If your local library or museum does not have a recent copy of *Notornis*, the Society may be contacted by writing to:

The Ornithological Society of New Zealand,
c/- Auckland Institute & Museum,
Private Bag, Auckland,
NEW ZEALAND.

ACKNOWLEDGEMENTS

The Ornithological Society of New Zealand Inc. is grateful to the many people and organisations who contributed to the Atlas Project, especially the following.

1. The large administrative and financial contribution of the New Zealand Wildlife Service, Department of Internal Affairs, and the Ecology Division, Department for Scientific and Industrial Research. Without their contribution and day to day support, this joint atlas project would not have been possible.

2. The comprehensive efforts and commitment of more than 800 field observers and groups as listed in Appendix 3, who, along with the Regional Representatives of the Ornithological Society, provided the observation records from which this atlas has been compiled. Without their dedication, the national coverage could not have been comprehensive.

3. The permanent and temporary staff employed to code the field data for computer input (Roderick Cossee, Lillian Billington, Gerard Hatzakortzian, the late Jean Llewellyn, Elizabeth Perks, Bruce Dyer, George Bradford, Phillip Ogden, Margaret Robinson and Maria Grice), the Banding Office of the Wildlife Service, which serviced requests for information while managing the computer processing of field data, and the staff of the Government Computer Centre who, serviced the project computer systems.

4. Barrie Heather, editor of *Notornis*, who contributed his ornithological knowledge and editorial skill to the final manuscript.

5. The management and staff of Microfile, Challenge Computers Ltd, especially Nigel Grange, for the technological facilities and patient assistance needed first to test the feasibility and later to provide the microfiche elements of the map production. Their donation not only enabled the development of a unique method of mapping but also dramatically assisted with the atlas production.

The final publication of the atlas has been supported by generous financial grants from the following organisations:

THE NEW ZEALAND LOTTERY BOARD
THE NEW ZEALAND FOREST SERVICE
THE DEPARTMENT OF LANDS AND SURVEY
THE ENVIRONMENTAL COUNCIL
MOBIL OIL NEW ZEALAND LTD
THE J.R. McKENZIE TRUST BOARD

INTRODUCTION

This atlas presents information on bird distribution collected between September 1969 and December 1979 during a joint undertaking by the Ornithological Society of New Zealand, the Ecology Division of the Department for Scientific and Industrial Research, and the New Zealand Wildlife Service, Department of Internal Affairs. Field observers were encouraged to compile lists of bird species from as many as possible of the 10 000-yard squares of the national map grid (Lands and Survey Department map series NZMS1 and NZMS18). There are 1614 of these squares in the North Island and 2016 in the South Island, while a further 45 squares cover Stewart Island and its smaller neighbours. The data were coded and a computer was used to prepare maps showing the squares from which species had been reported. These species maps, supplemented by tables, constitute the main printed part of the present atlas.

Data collected up to December 1976 were summarised in a provisional atlas (Bull *et al.* 1978). That publication fulfilled two needs: it made available information urgently required for wildlife management and research, and it showed which parts of the country were most in need of further survey. Field observers quickly set about filling the gaps and, in doing so, greatly increased the number of species lists. The maps in the present atlas are based on just under 19 000 species lists compiled during the ten years 1969-1979, while the accompanying microfiches supply a great deal of supplementary information.

The production of the atlas is described in this introduction under three main headings: the field survey, processing the data, and presenting the information. A fourth section illustrates some of the ways in which the data may be used.

THE FIELD SURVEY

This atlas is based on information provided by more than 800 field naturalists (listed in Appendix 3) who gave freely of their energy, time and money in surveying 96% of the 3675 squares that together cover the whole of mainland New Zealand and its offshore islands.

The minimum information required was a list of species, the square number, and the date. These data and supplementary information on habitat, breeding and, where appropriate, abundance, were entered by the field observer on a special card provided by the Ornithological Society. Although the mapping scheme was devised primarily for members of the Society, it was open to anyone able to identify common birds. The detailed instructions for completing the cards are given in Appendix 1.

By the end of 1979, 98% of the 1614 North Island squares had been visited at least once, as had 95% of the 2061 squares that cover the South Island and Stewart Island. Many squares were visited several times. The 8185 species list cards contributed after 1976 (when card processing was temporarily halted while the provisional atlas was prepared) raised the mean number of cards per square from 4.4 to 6.4 in the North Island and from 2.7 to 4.5 in the South and Stewart Islands. The most frequently surveyed square in the country (N2312, Wellington) has 174 cards recording 56 species.

The mean number of species per square for the whole ten years was 31 in North Island and 27 in the South and Stewart Islands. The largest number of species (111) was reported from square N2722 (Manawatu River mouth), which is characterised by a diversity of habitats (farmland, swamp, tidal estuary, beaches and open sea) and frequent visits by several observers who contributed a total of 140 cards.

The field survey was based on 10 000-yard squares, rather than the 10km squares used in the *Atlas of Breeding Birds in Britain and Ireland* (Sharrock 1976), because suitable maps marked in metric units were not available for New Zealand when the project began. Similarly, with the maps available at the time, it was more convenient to use 10 000-yard squares than areas based on latitude and longitude as in the *Atlas of Australian Birds* (Blakers *et al.* 1984).

PROCESSING THE DATA

Observers were asked to send their completed cards to the nearest Regional Representative of the Ornithological Society so that the cards could be checked for errors by someone with local knowledge. The cards then went to Ecology Division for registration and further checking, and finally to the Wildlife Service, who arranged for the data to be encoded on to magnetic tape and fed to the computer which eventually produced the maps. A summary of the computer procedures and programmes is provided in Appendix 2.

The struggle to ensure accuracy has been long and hard. Errors can occur through faulty field identifications and through lapses while copying data on to cards or coding them for the computer. Where possible "surprising" reports were referred back to the observer for confirmation, but unless he or she admitted to some doubt, the report was accepted. In this regard the Atlas Committee was perhaps a little more lenient in accepting reports than are the Society's Checklist and Rare Birds Committees. These latter bodies were in recess during part of the period covered by the atlas and have not had the opportunity of assessing the validity of all the reports listed in Tables 1 and 2. While the existence of any error is a matter for serious concern, the system is to some extent self-correcting. The plotting of data in many relatively small squares produces a kind of voting system. The user can be confident about the presence of a species when it is reported from several adjacent squares by different observers. On the other hand, a single report from one square of a species not reported elsewhere in the district should be a strong incentive for ornithologists to visit the locality and report their findings. Note especially the four records of Bush Wren in the tables and microfiches, which seem genuine but urgently need confirmation.

PRESENTATION OF THE DATA

The data are presented in maps, tables, loose-leaf overlays and microfiches.

[i] The Maps

The maps show, for all but the rarest of New Zealand's land and freshwater birds, the squares from which each species was recorded as present. Maps are also provided for resident shorebirds and for a few of the non-breeding migrants. No maps are provided for the less common arctic migrants or for birds that are mainly pelagic such as the petrels. Better information (much of it quantitative) is available for these species from harbour surveys, beach patrol reports and the bird logs of seafarers. However, information on these species noted by observers working in coastal squares can be retrieved from the microfiches inside the back cover of this atlas.

Separate North and South Island maps have been prepared for each species that is widespread and common in both islands (subspecies are not usually differentiated). For economy, however, some of the rarer or geographically restricted species are shown two to a map. This requires the use of three symbols: one for each of the two species illustrated, and a third to indicate that both species were present in the same square. The usual criterion for deciding which species should be paired was that their ranges should overlap as little as possible. This makes the map easier to read, but it does occasionally result in quite unrelated species sharing the same map.

Parakeets were awkward to map because they are much more often heard than seen and few observers can reliably identify the different species from sound alone. Consequently, many record cards contained the imprecise entry "parakeet species". These records have been mapped because all the native parakeets have rather restricted distributions and any locality record is valuable

even if the precise species of parakeet is uncertain. Similar considerations apply to kiwis in the South Island.

Some of the maps seem to show that land birds were recorded at sea, but this was not really so. Occasionally, the birds were on islands too small to show on the map, but more commonly the visual effect results from the way in which the computer plots the symbols. Some squares consist partly of sea and partly of land, but the computer always prints its symbol in the centre of the square, even if this is the sea. Conversely, seabirds on the upper reaches of harbours and sounds may appear to be rather far inland.

The most important thing to remember is that the maps are based solely on the lists of species received at the Mapping Office during the period 1969-1979. Facts of distribution that may be common knowledge, or published elsewhere, do not appear here unless the relevant information was sent to the Mapping Office on a standard card. Some major omissions of this sort are noted below the appropriate maps together with references to information on population size and demographic trends.

How the species lists were compiled places some constraints on the analyses that can be made. The first priority was to get accurate bird lists from as many squares as possible. With this in mind, contributors tended to visit new squares rather than to improve the seasonal or yearly coverage of squares already surveyed once. Consequently, the data are of limited value for investigating seasonal movements of migratory birds or the spread of colonising species.

The inclusion of maps to show the seasonal distribution of certain species, as in the provisional atlas, was considered and rejected because the maps were found to reflect the seasonal activity of ornithologists rather than of birds. Likewise in the present atlas, Spur-winged Plovers in Southland seem to have been scarce in 1975-1979 (page 107) compared with 1969-1974 (page 106) only because the few observers available in Southland, having completed most of their square surveys during the first five years, became preoccupied with other activities in the second period. The plovers were still there in 1975-1979, but few reports were sent to the atlas office (R.R. Sutton, pers. comm.)

The maps are based on reported presence rather than on breeding records. Although observers were asked to record breeding (and their results are on the microfiches), too many squares lacked resident ornithologists, who are the ones most likely to record breeding. As a result, too few breeding records were received to yield maps that adequately illustrated current distributions. Maps based on presence seem to be satisfactory because, apart from pelagic species and migrant waders, most New Zealand birds breed throughout their ranges, and the exceptions are noted with the relevant maps.

Maps based merely on reports of presence or absence are of course influenced by observer effort. Cursory observation may detect only the most common species, whereas observations continued for a long period may, through the gradual accumulation of unusual sightings, give some species apparently wider ranges than they normally have. Unusual sightings can, however, be recognised as such, by considering how many cards include the par-

ticular species and comparing this figure with the total number of cards received from a square or group of squares. The data for such checks are available from the microfiches. This procedure was used to show the frequency with which Australian Magpies were encountered in different parts of New Zealand (Bull and Gaze 1973).

[ii] The Tables

Tables 1 and 2 show the number of records available for each species and the seasonal distribution of records. This information reveals interesting seasonal variations in the activities of ornithologists and of birds and may be useful in showing whether there are enough records to justify further analyses of data available on the microfiches. The tables include some records from outlying islands such as the Chathams. Such records have not been mapped, but they are shown on the microfiches.

[iii] The Loose-Leaf Overlays

At the back of the Atlas are maps which have been produced on transparent material so that, when placed over other maps in the atlas, the underlying symbols can still be seen. This will facilitate the further interpretation of information on the species maps.

Two sets of the overlay maps summarise the number of cards received from each square and the number species recorded per square. They are reproduced in this format so that they may be used to assess how thoroughly any particular square was surveyed.

There are also two sets of a blank national grid and coastal outline. The distribution of any species may be traced on these blank maps and then placed over the map of any other species to allow comparisons to be made. If the recording is done in pencil, the marks can later be rubbed out and the overlay map used again.

[iv] The Microfiches

The envelope inside the back cover of the atlas contains microfiches with two sets of supplementary data. These can be viewed on an enlarger to provide more detailed information than is available on the maps in the atlas. These microfiches make available to all atlas users a summary of the bird distribution and breeding data and a means of finding which cards for a species have non-standard extra notes. Instructions for use of the microfiche and information on the codes used are in Appendix 2 and allow a full interpretation of the data.

Microfiches 001-007 summarise information for *each square.* Information listed includes the card reference numbers, the dates of observations, the code numbers of observers contributing the records (names listed in Appendix 3), the code numbers of the species recorded, their relative abundance and

breeding status, and the number of times each species was recorded. Microfiches 101-109 supply for *each species* a list of card reference numbers each with square number and date of observation and whether extra notes are on the card.

Once the card reference number is known, for either species or mapping square, the card can be easily located for whatever supplementary notes it records on such matters as identification, precise locality, breeding and numbers. The cards are stored in the Banding Office of the New Zealand Wildlife Service, Wellington.

POTENTIAL USES OF THE ATLAS

The main value of the maps and associated data is as a baseline from which to measure future changes in distribution (and, to a more limited extent, in the numbers) of the various species. The information should also be useful for administrators concerned with making or reviewing decisions on land use. Finally, the atlas provides a starting point for researchers wanting to determine more precisely the various patterns of distribution and the factors that influence them.

Some of the interesting information available from the atlas is illustrated by the New Zealand flycatchers, in which a restricted distribution (strictness of habitat requirements) is directly related to the degree of endemism (pages 182 to 187 inclusive). The New Zealand fantails (only subspecifically distinct from Australian ones) have much wider distributions than the tits (endemic species), which in turn have wider distributions than the robins (endemic subgenus).

Other items of general interest include recent increases in the ranges of Spur-winged Plovers and Welcome Swallows, and the fact that some forest areas in both islands are still populated mainly by native Grey Ducks rather than introduced Mallards.

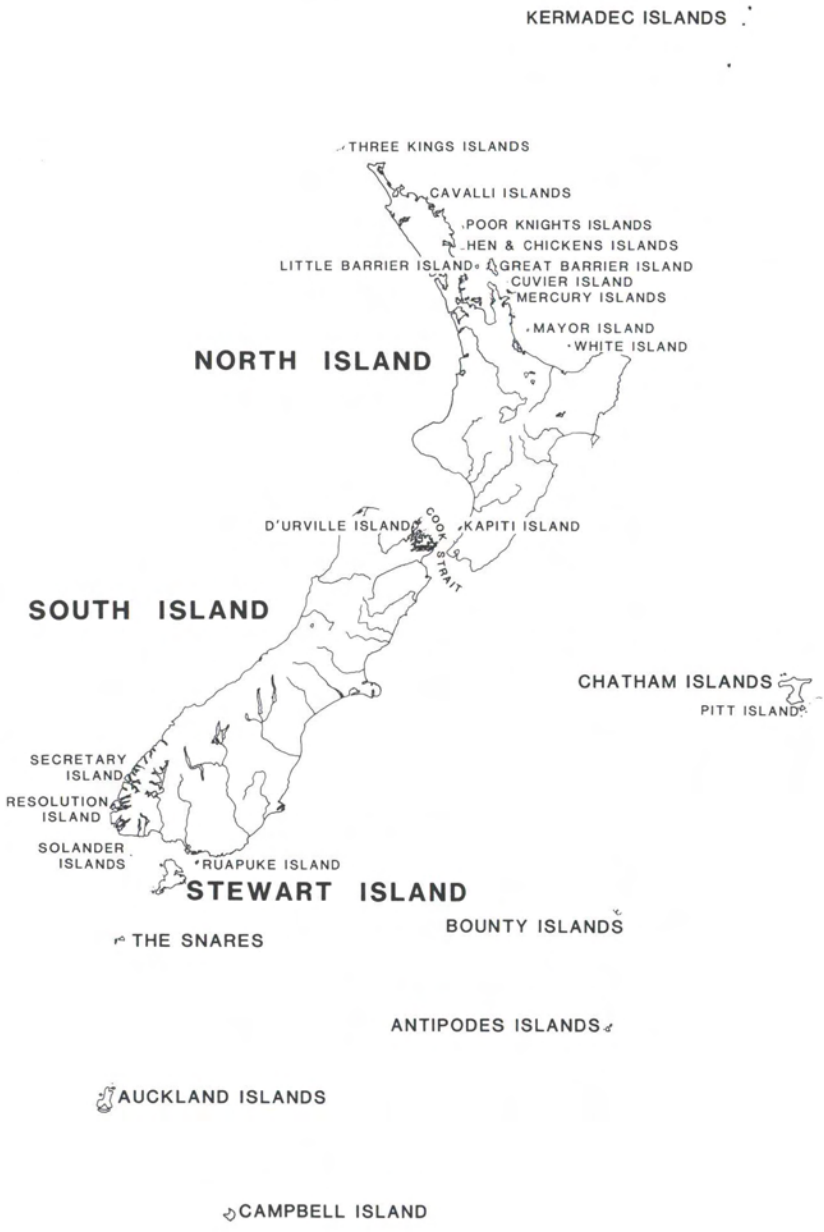
The four most frequently recorded species of birds in New Zealand were:

Blackbird	(12 124 records from 3259 squares),
Chaffinch	(11 111 records from 3284 squares),
Starling	(9 861 records from 2696 squares),
Grey Warbler	(9 324 records from 3021 squares).

Comparable information for all the other species recorded is available in Tables 1 and 2.

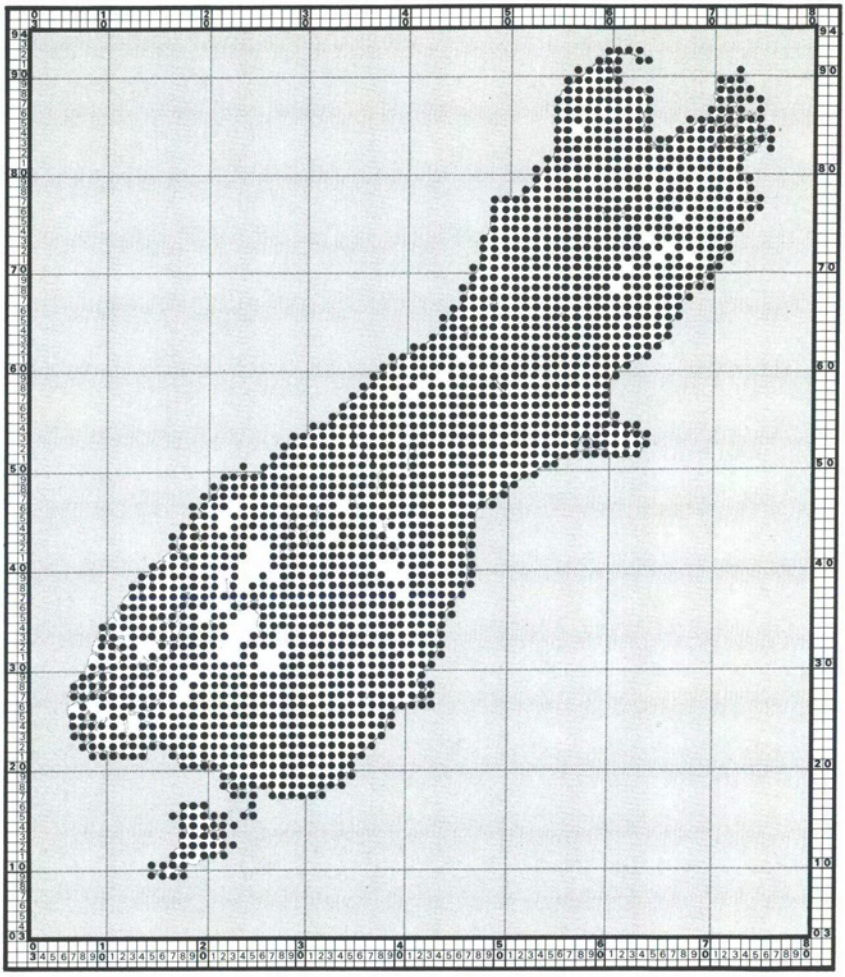
Apart from its value as a reference book for such facts, the atlas is also a reservoir of information still to be researched. For example, the maps summarising the number of species recorded per square show some marked regional differences in the number of species recorded. As coastal squares contain both sea and land birds, the number of species encountered there is likely to be higher than in inland squares (except where wetlands and lakes contribute many waterbirds).

Even allowing for this, however, there remains an unexplained preponderance of squares with a high number of species in North Auckland and along the western side of the North Island as far south as North Taranaki. The reasons for this are open to investigation by overlaying the appropriate maps with other data such as species composition, rainfall, altitude, land use and the intensity of ornithological survey. Indeed, one of the most important contributions of the atlas may prove to be its value as a source of data for further research. Project data and the provisional atlas have already been used in this way by Dawson (1977) and Spurr (1979).


KERMADEC ISLANDS
THREE KINGS ISLANDS
CAVALLI ISLANDS
POOR KNIGHTS ISLANDS
HEN & CHICKENS ISLANDS
LITTLE BARRIER ISLAND
GREAT BARRIER ISLAND
CUVIER ISLAND
MERCURY ISLANDS
MAYOR ISLAND
WHITE ISLAND
NORTH ISLAND
D'URVILLE ISLAND
COOK STRAIT
KAPITI ISLAND
SOUTH ISLAND
CHATHAM ISLANDS
PITT ISLAND
SECRETARY ISLAND
RESOLUTION ISLAND
SOLANDER ISLANDS
RUAPUKE ISLAND
STEWART ISLAND
BOUNTY ISLANDS
THE SNARES
ANTIPODES ISLANDS
AUCKLAND ISLANDS
CAMPBELL ISLAND

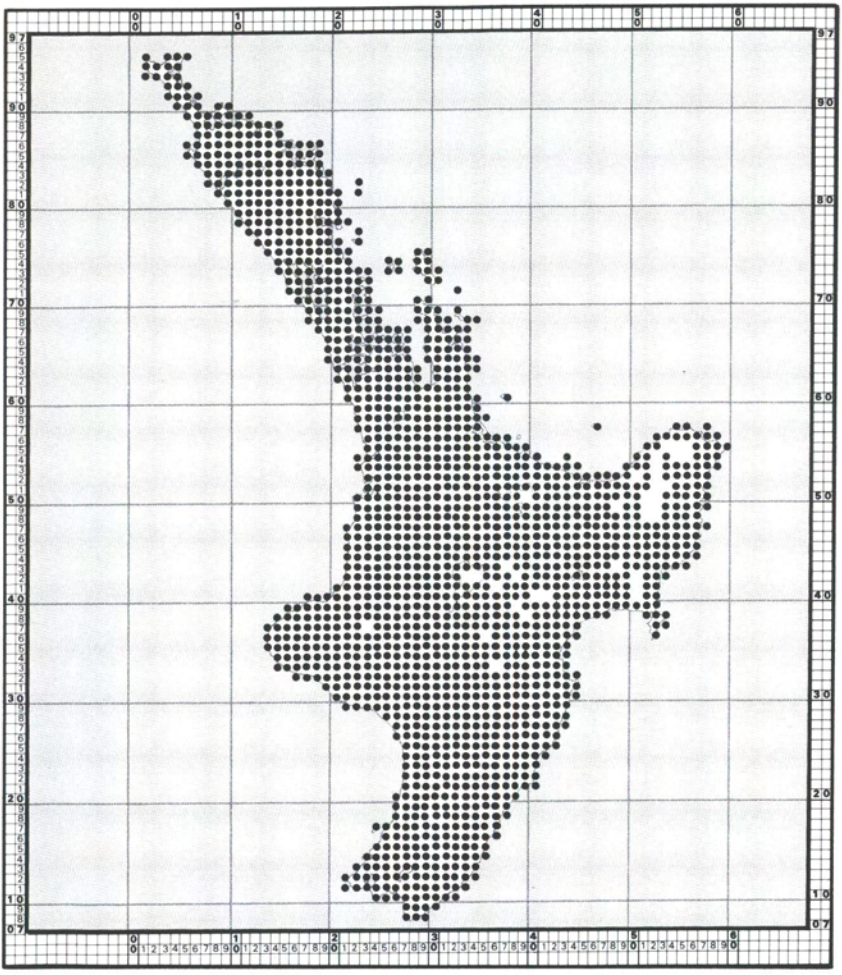
SOUTH ISLAND LOCATIONS


Cape Reinga
North Cape
Cape Karikari
KAITAIA
Bay of Islands
Cape Brett
Hokianga Harbour
WHANGAREI
DARGAVILLE
Kaipara Harbour
Hauraki Gulf
AUCKLAND
Coromandel Peninsula
Manakau Harbour
THAMES
Waikato River
Bay of Plenty
Cape Runaway
HAMILTON
TAURANGA
East Cape
WHAKATANE
Kawhia Harbour
ROTORUA
Lake Rotorua
Lake Waikaremoana
GISBORNE
Poverty Bay
TAUMARUNUI
NEW PLYMOUTH
Lake Taupo
Cape Egmont
Mt. Egmont
Mt. Ruapehu
Hawke Bay
Mahia Peninsula
STRATFORD
RAETIHI
OHAKUNE
NAPIER
TAIHAPE
HASTINGS
WANGANUI
Wanganui River
DANNEVIRKE
PALMERSTON NORTH
Manawatu River
Cape Turnagain
MASTERTON
LOWER HUTT
WELLINGTON
Cape Palliser



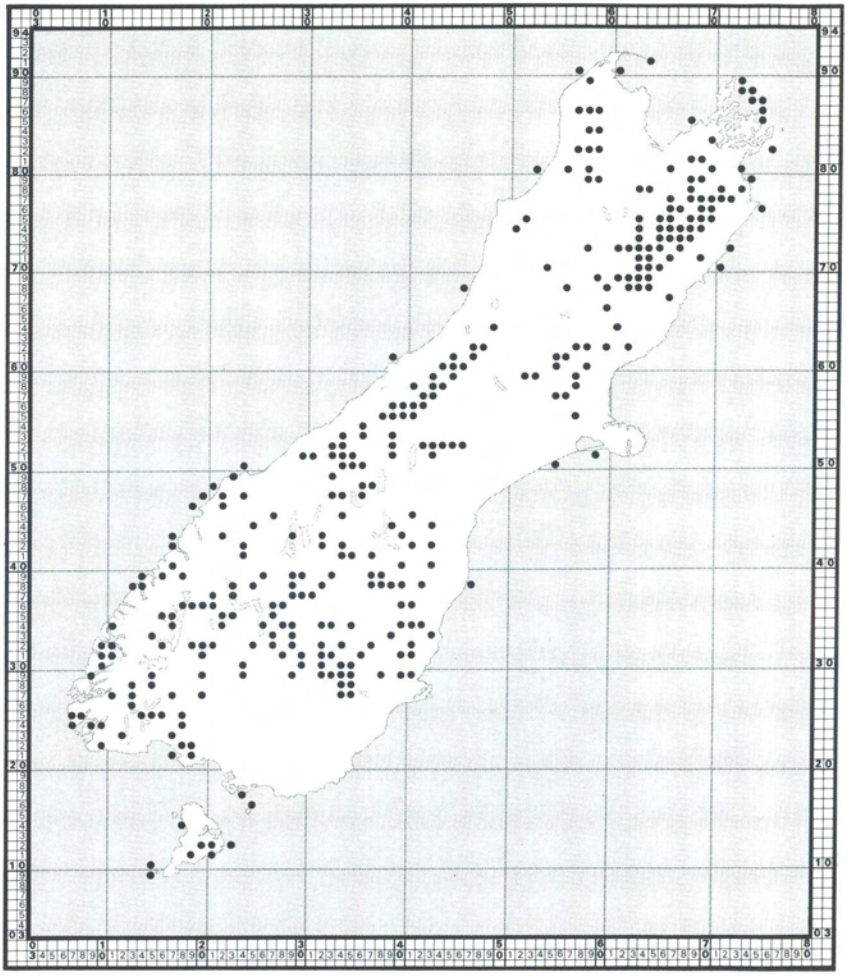
Survey Coverage 1969 - 1979

There are 2061 grid squares covering the South and Stewart Islands. All grid squares marked on the map (95% of the total of 2061) were visited at least once during 1969-1979. Overlay 1 (page 289) summarises the number of field cards returned per square.



Survey Coverage 1969 - 1979

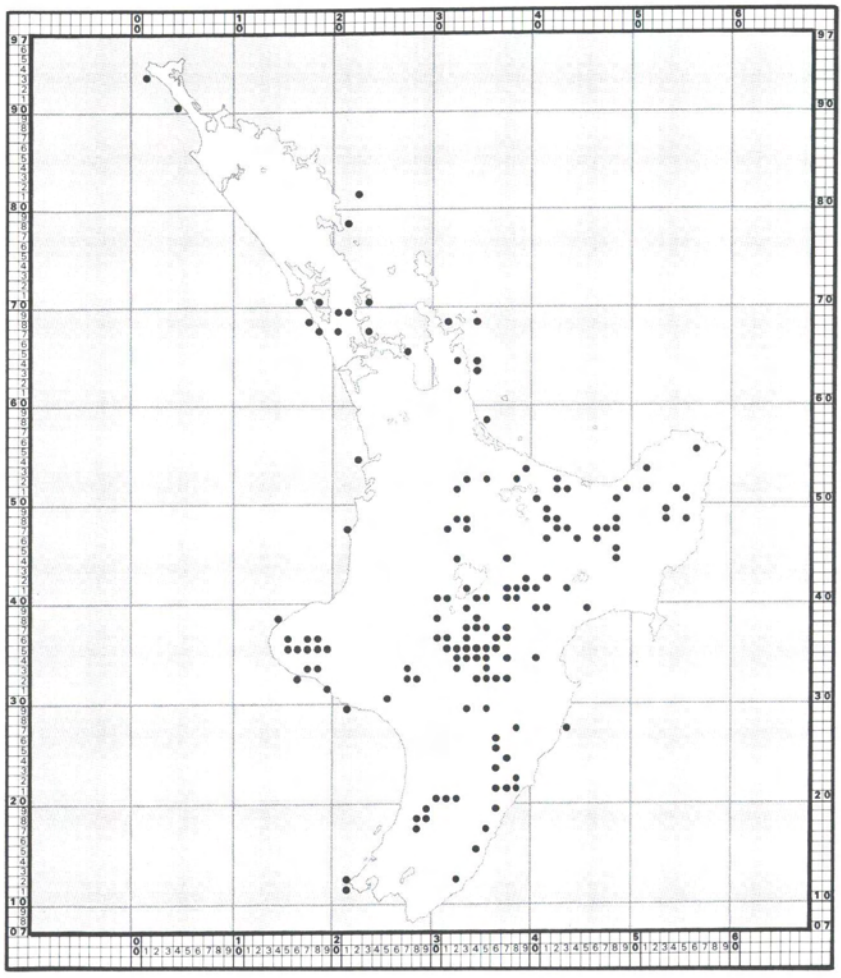
There are 1614 grid squares covering the North Island. All grid squares marked on the map (98% of the total of 1614) were visited at least once during 1969-1979. Overlay 2 (page 290) summarises the number of field cards returned per square.



Number of Species Recorded per Square

● = **1 to 15 species**

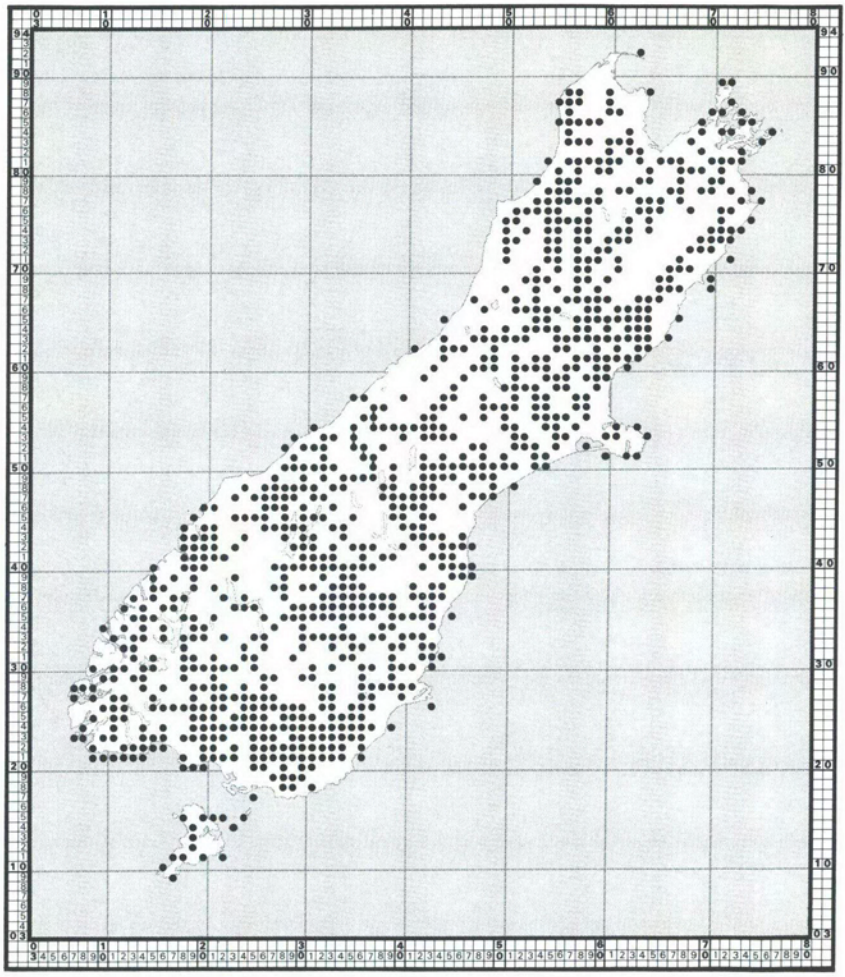
Overlay 3 (page 291) summarises the number of species recorded in each 10 000-yard square.



Number of Species Recorded per Square

● = **1 to 15 species**

Overlay 4 (page 292) summarises the number of species recorded in each 10 000-yard square.



Number of Species Recorded per Square

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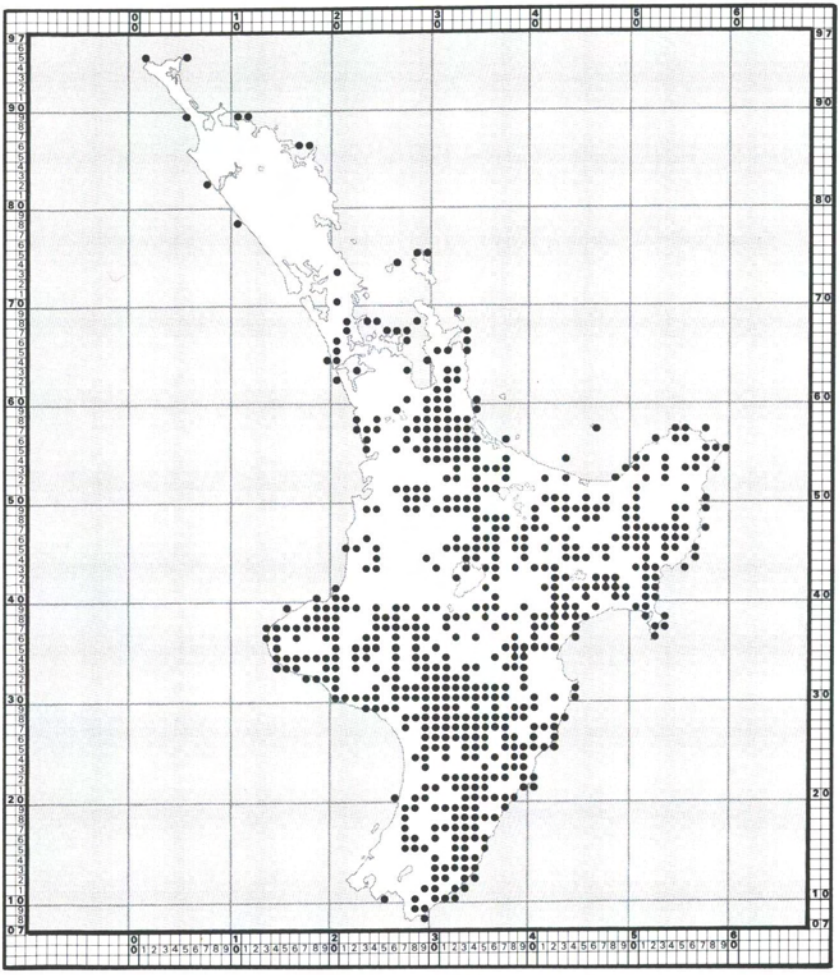

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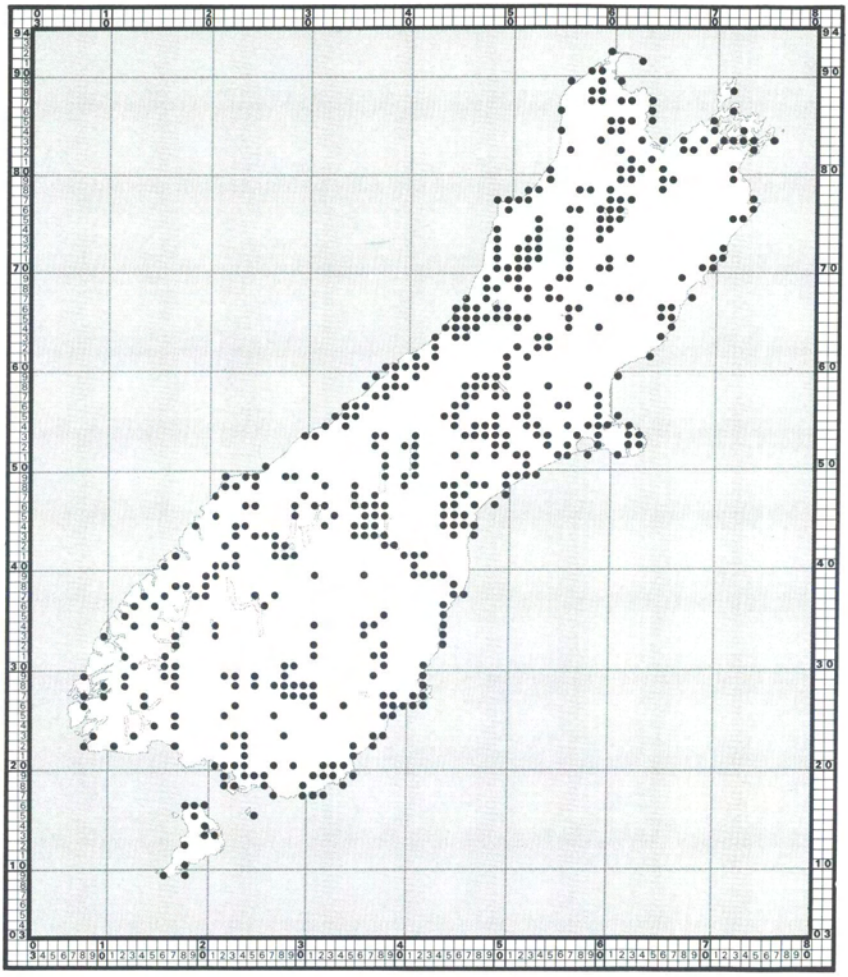

Number of Species Recorded per Square

● = **31 to 45 species**

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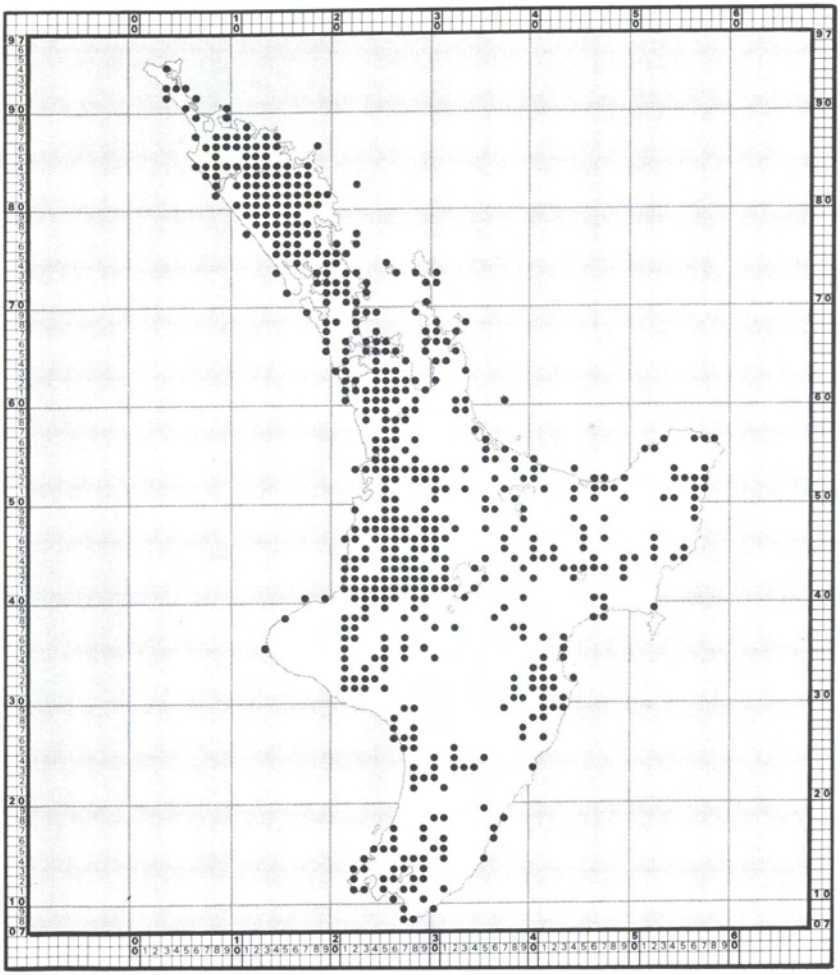

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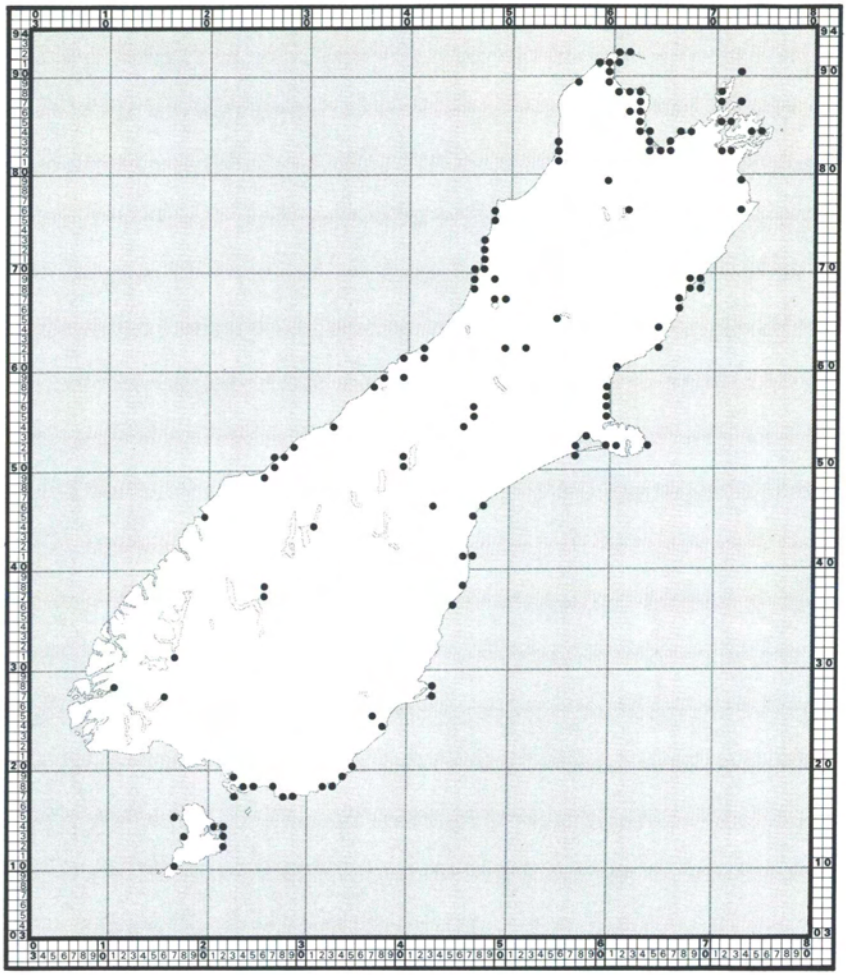

Number of Species Recorded per Square

● = 46 or more species

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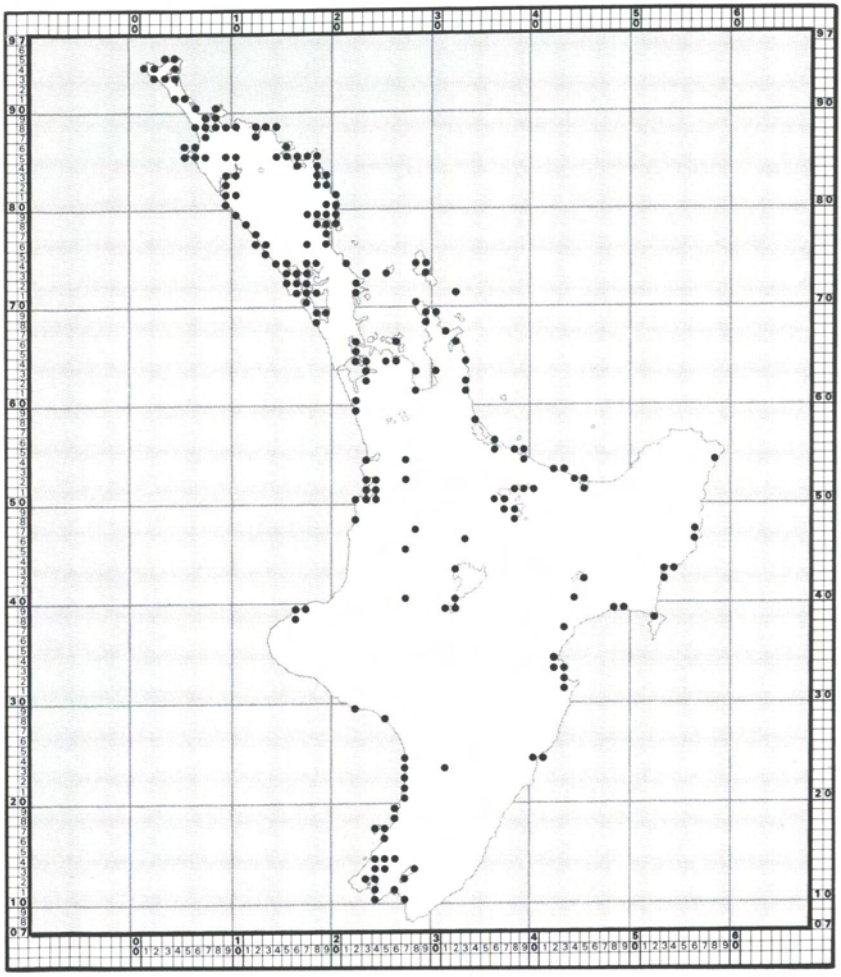

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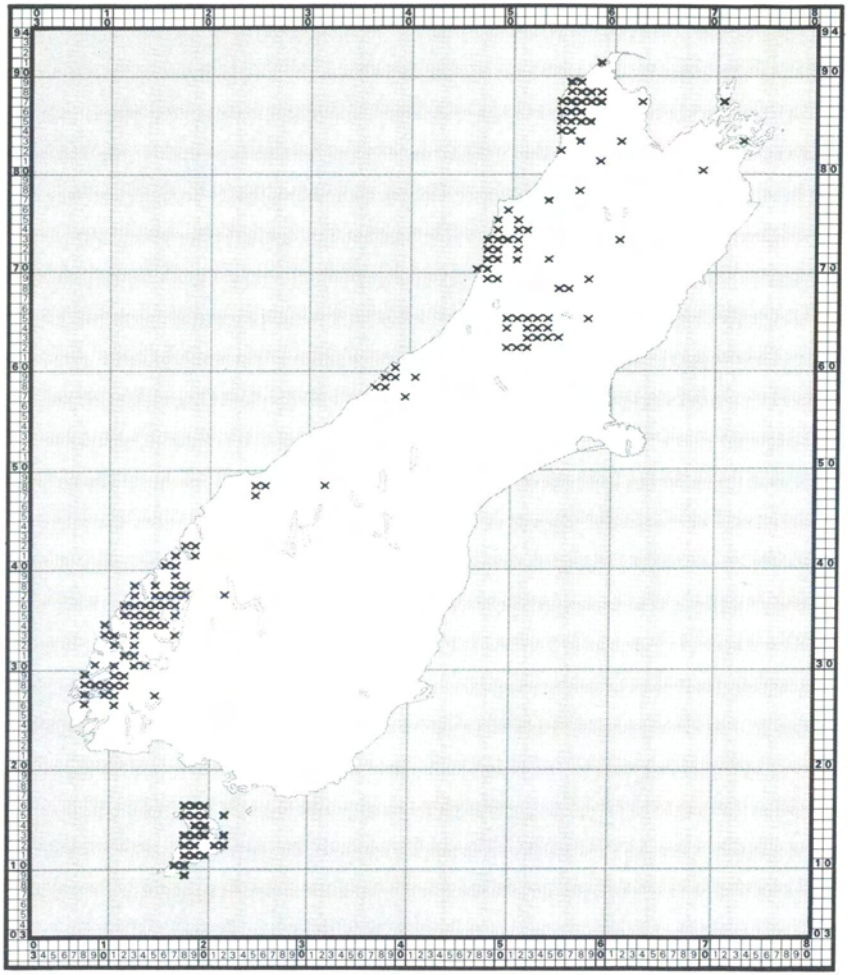
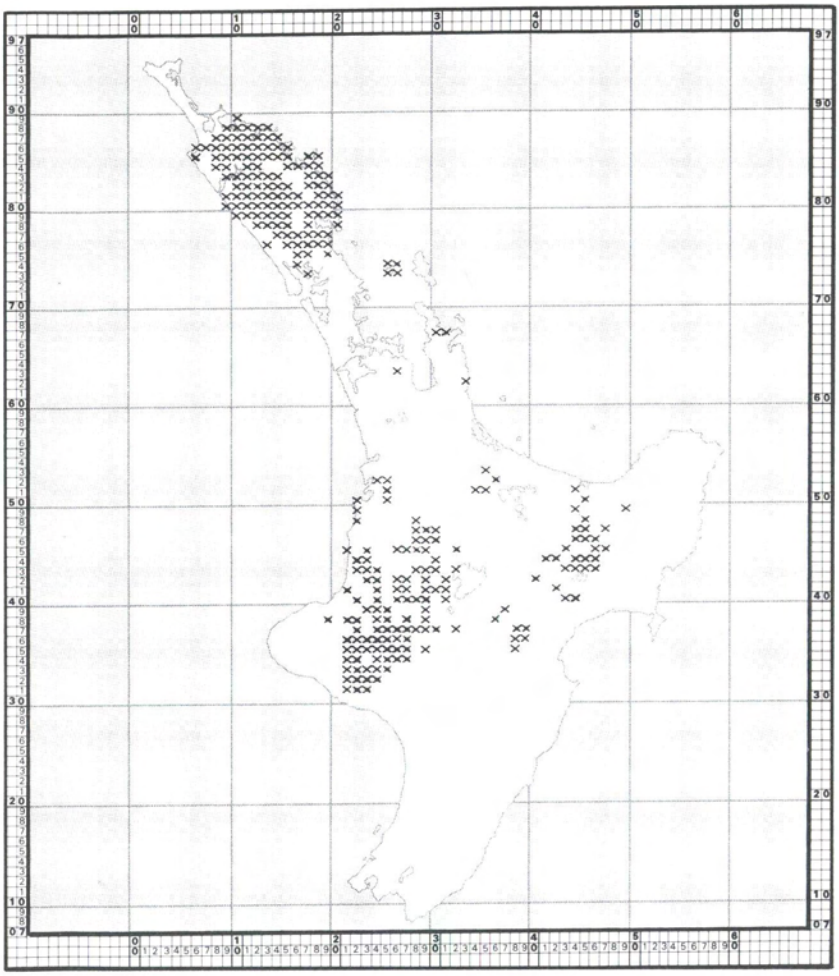


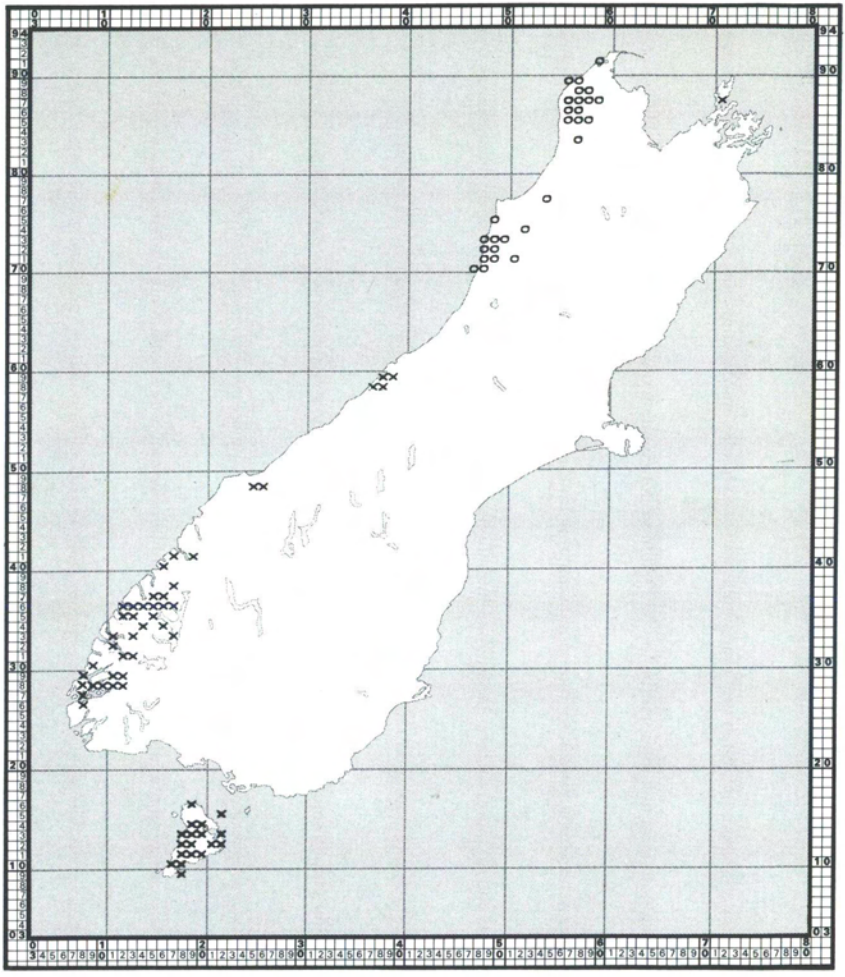
× = **Kiwis** *(Apteryx* spp.*)*

Many of these reports are from people who heard kiwis, but were uncertain of the species. The map includes reports of Great Spotted and Brown Kiwis, which are plotted again separately on page 32.



✕ = **Brown Kiwi** *(Apteryx australis)*

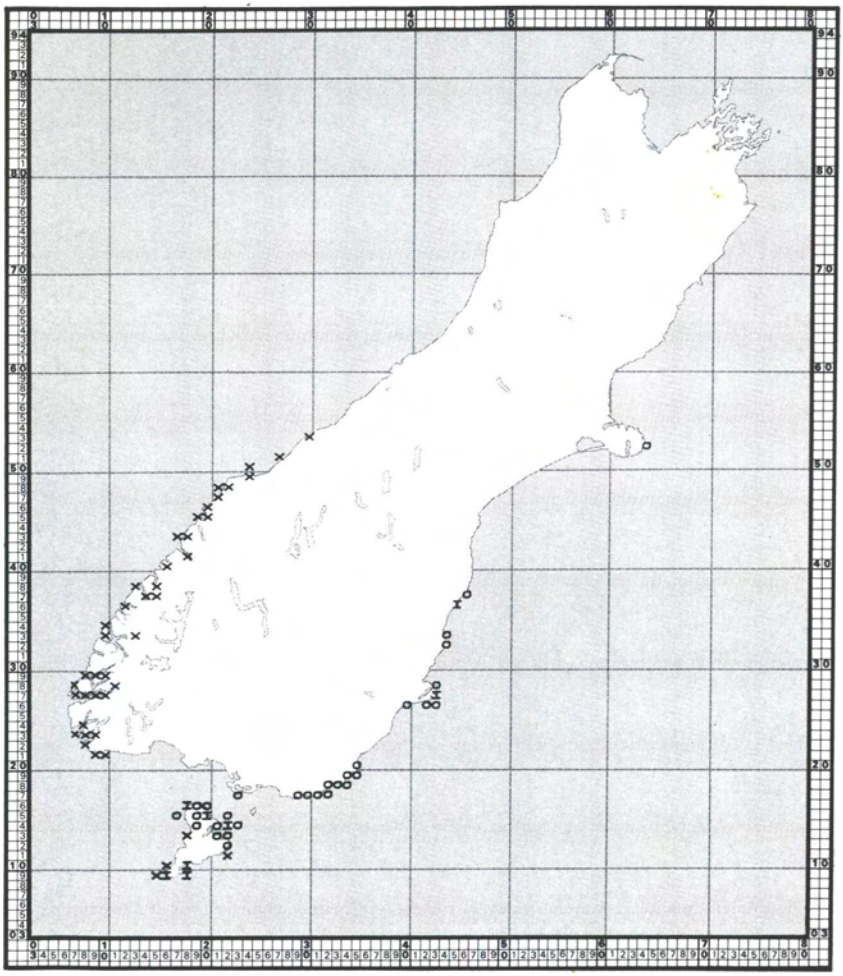
This is the only species now living wild on the North Island mainland. Colbourne & Kleinpaste (1983) reported a high density of Brown Kiwis (about 1 pair per 5 ha) in Waitangi State Forest, North Auckland. Little Spotted Kiwis *(A.owenii)*, derived from South Island stock liberated early this century, survive on Kapiti Island. Twelve birds from this population (provisionally estimated at over 1000 birds) were transferred to Red Mercury Island in 1983 (J.N.Jolly, NZ Wildlife Service, pers.comm.).



× = **Brown Kiwi** *(Apteryx australis)*

O = **Great Spotted Kiwi** *(Apteryx haastii)*

Records of Brown Kiwis from near Charleston and from Arthur's Pass National Park need confirmation (they may be Great Spotted Kiwis). Three reports of Little Spotted Kiwis *(A.owenii)* in Westland (square S3960, S4872 and S4972), submitted for this atlas, were not confirmed by a Wildlife Service survey in 1981, and *A.owenii* may be extinct on the South Island mainland, as it has been on D'Urville Island since 1980 (J.N.Jolly, NZ Wildlife Service, pers.comm.).

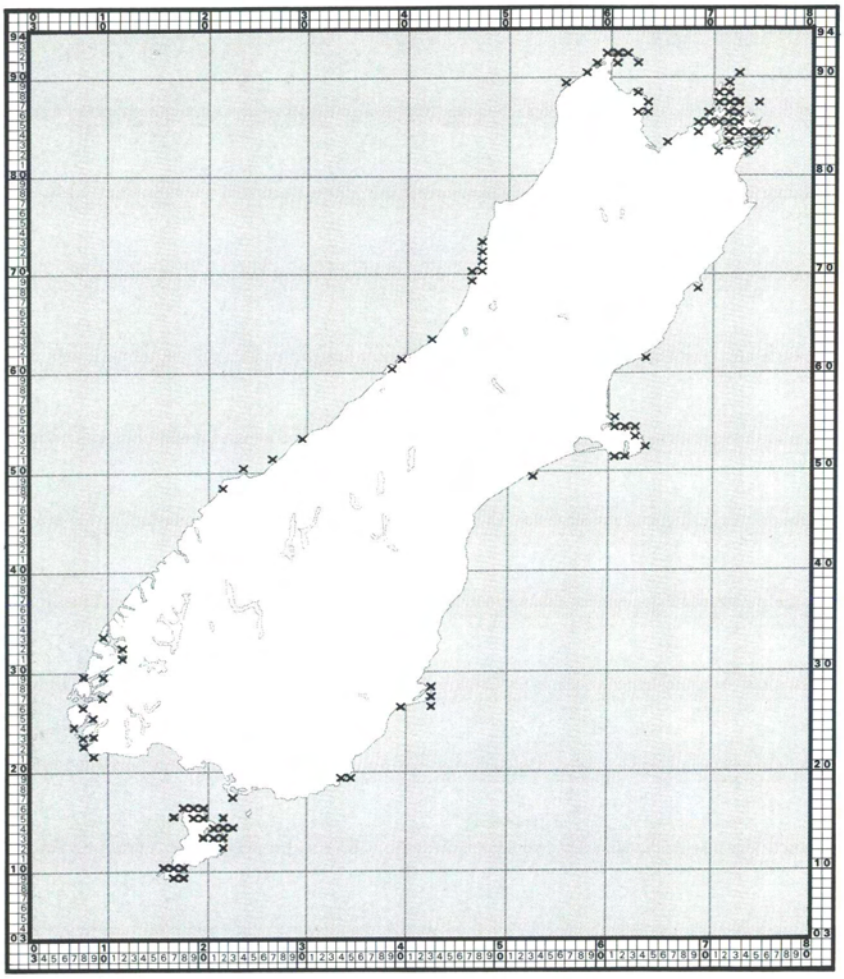


× = **Fiordland Crested Penguin** *(Eudyptes pachyrhynchus)*

o = **Yellow-eyed Penguin** *(Megadyptes antipodes)*

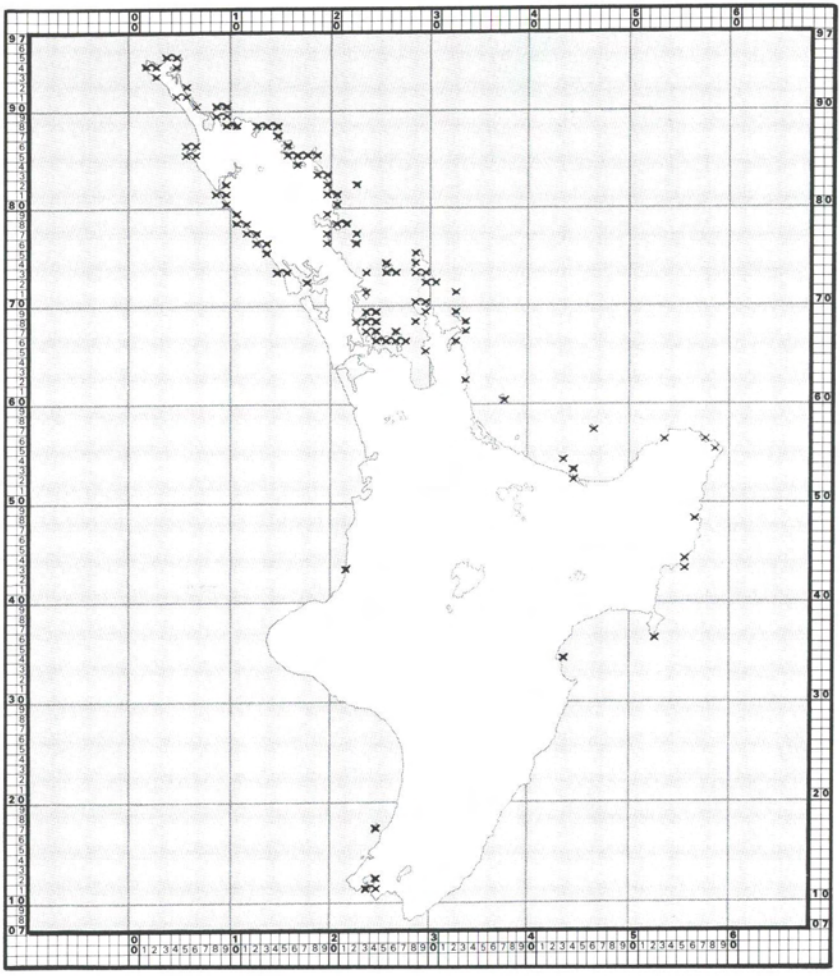
I = **Both species reported**

The Fiordland Crested Penguin has the rather restricted range shown, but the Yellow-eyed Penguin extends as far south as subantarctic Auckland and Campbell Islands.

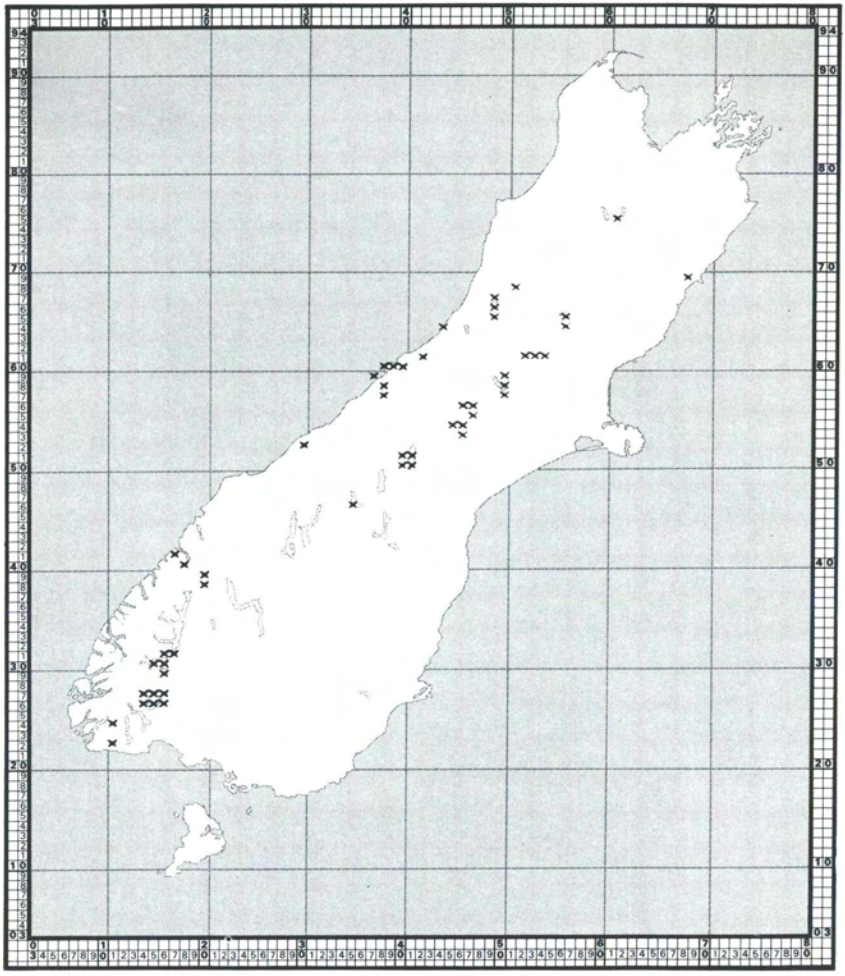


× = **Blue Penguin** *(Eudyptula minor)*

The maps on pages 34 - 35 combine sightings of four recognised subspecies (Kinsky & Falla 1976) and all records of Blue Penguins with the subspecies not recorded.



× = **Blue Penguin** *(Eudyptula minor)*

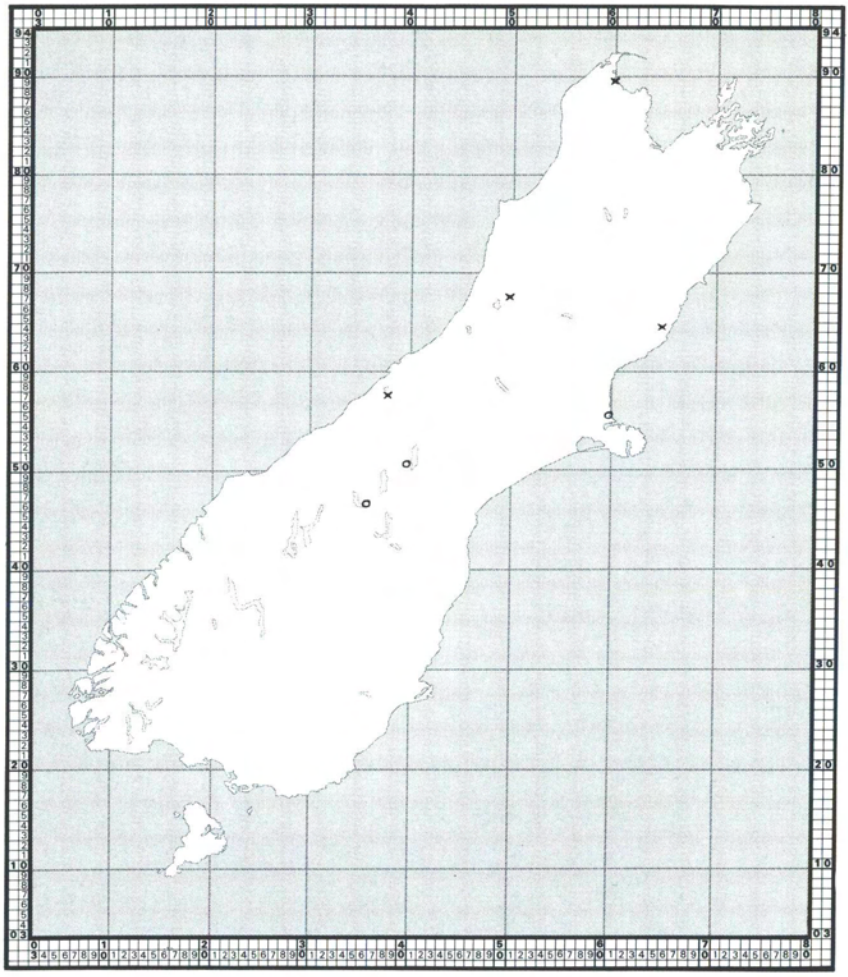


× = **Southern Crested Grebe** *(Podiceps cristatus australis)*

Confined to the South Island, the breeding population in 1980 was estimated to be 240-250 adults, about 55% in Canterbury (Sagar 1981; Sagar & O'Donnell 1982). Recent North Island records were of single birds near Taupiri (Mayhill 1977) and at Lake Rotorua (Palliser 1977) and of two birds near Te Awamutu (Goulding 1981).

× = **New Zealand Dabchick** *(Podiceps rufopectus)*

No recent records from the South Island, where it is apparently extinct.

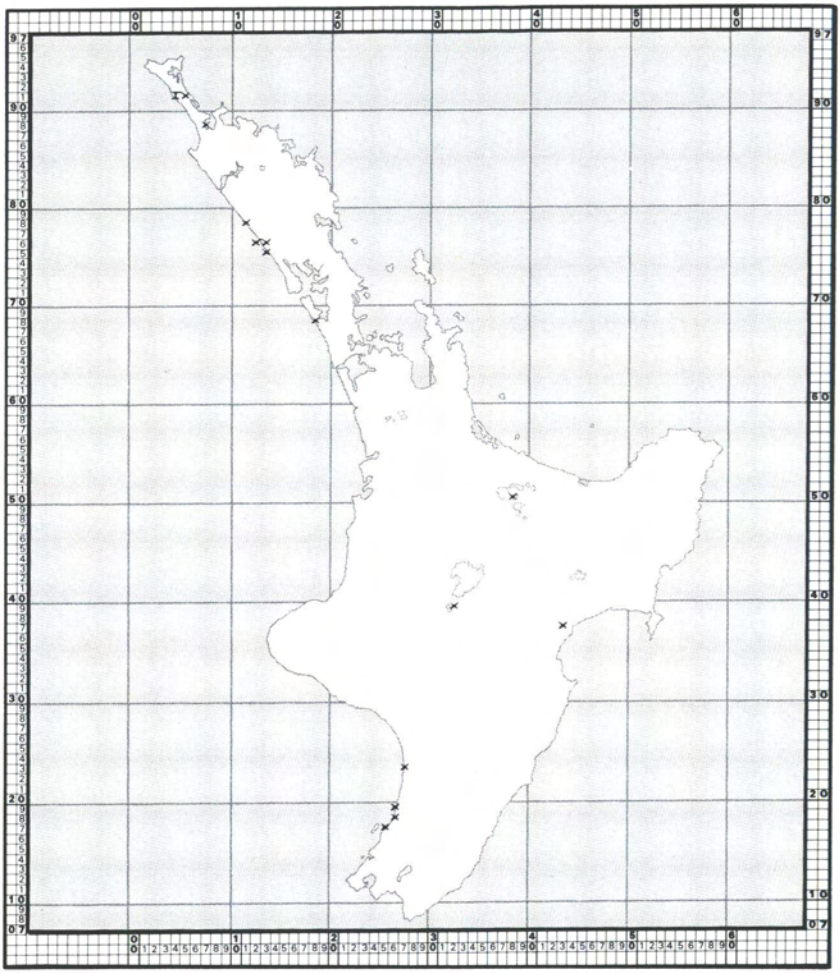


X = **Australian Little Grebe** *(Tachybaptus n.novaehollandiae)*

O = **Hoary-headed Grebe** *(Podiceps poliocephalus)*

I = **Both species reported**

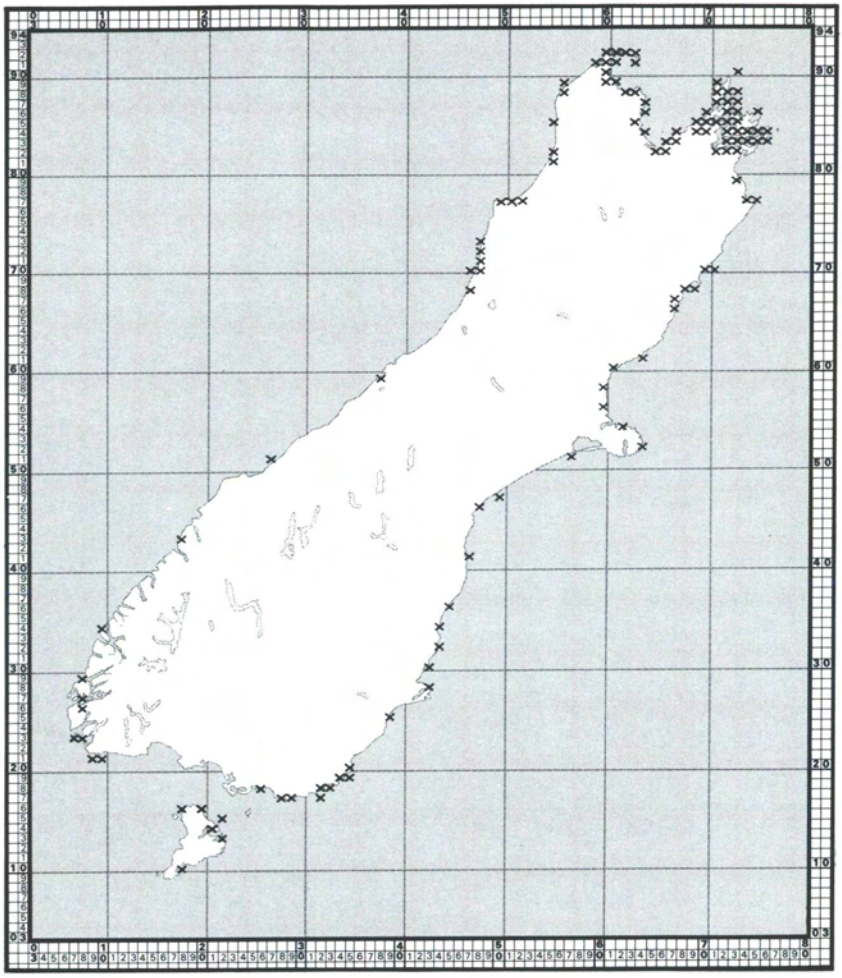
The Australian Little Grebe (pages 38 - 39) was first recorded in New Zealand in 1968 (breeding Lake Wanaka) and the Hoary-headed Grebe in 1975 (breeding in Southland 1976). See Kinsky (1980) for a summary of recent records.



× = **Australian Little Grebe** *(Tachybaptus n.novaehollandiae)*

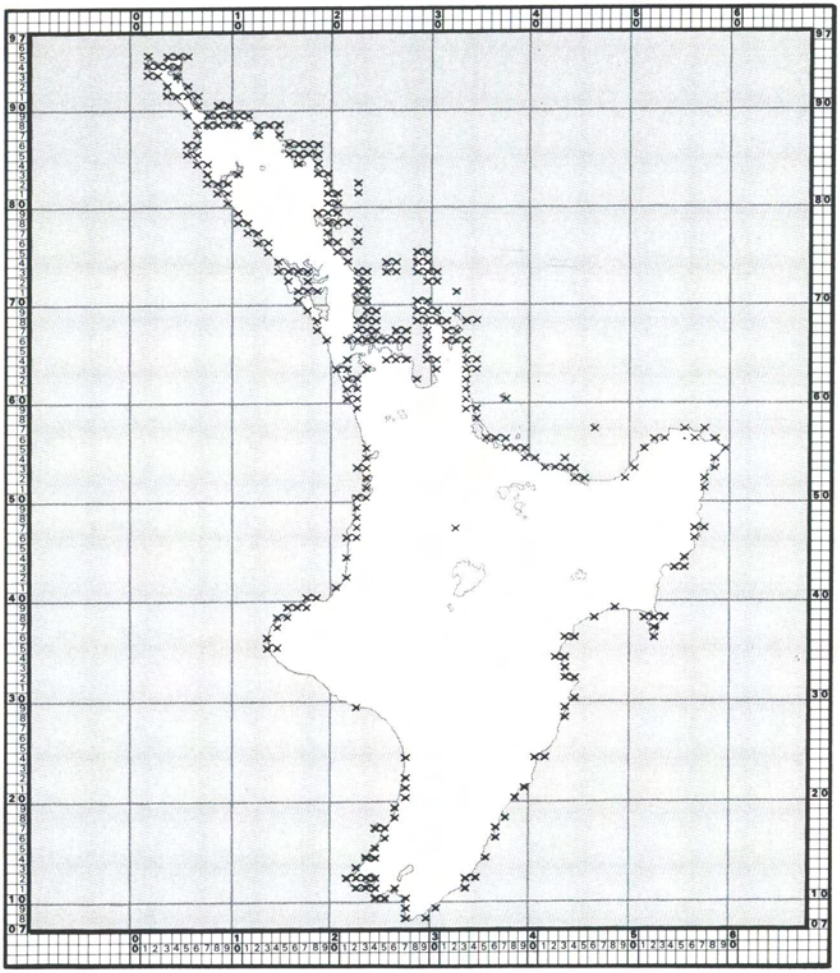
o = **Hoary-headed Grebe** *(Podiceps poliocephalus)*

I = **Both species reported**



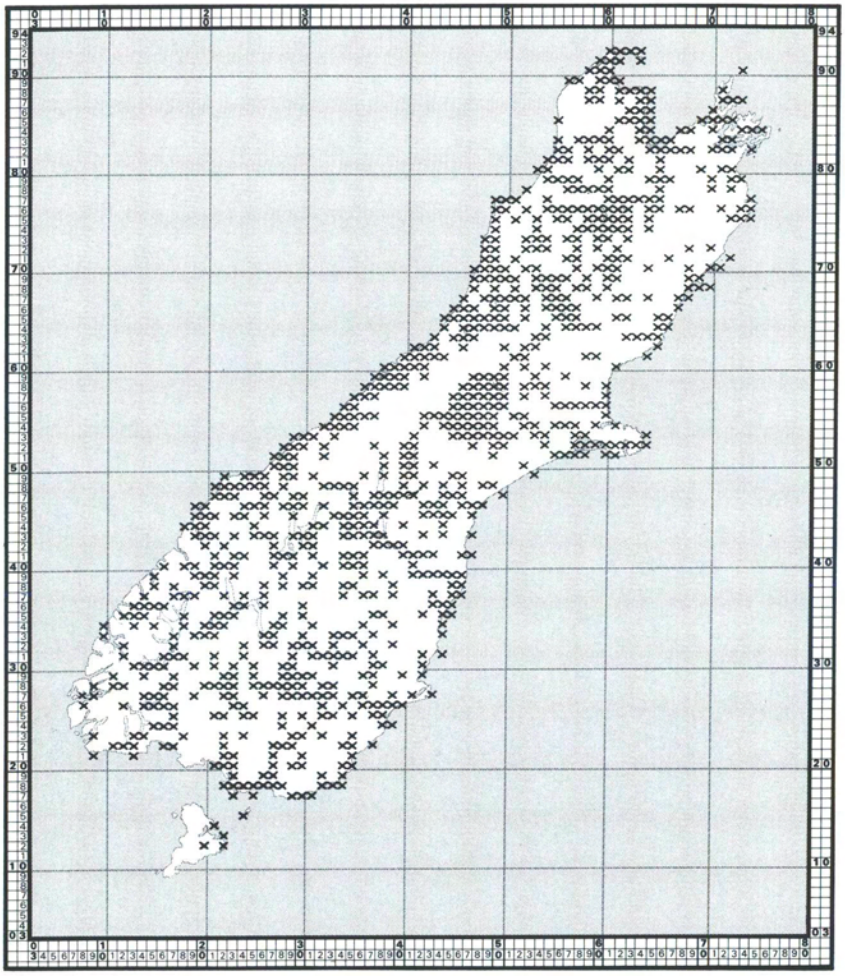
✕ = **Australasian Gannet** *(Sula bassana serrator)*

The Australasian Gannet (pages 40 - 41) has 27 breeding colonies in New Zealand with a population in the 1980/81 nesting season estimated at 46 004 pairs. Over 99% of gannets nested in 23 breeding colonies north of latitude 40° S. Censuses based on air photographs suggest that the population has doubled since 1946/47, the mean annual rate of increase over the period being 2.3% (Wodzicki *et al.* 1984). The "inland" records in the north-eastern South Island are from the Marlborough Sounds, where breeding was first recorded in 1970/71.

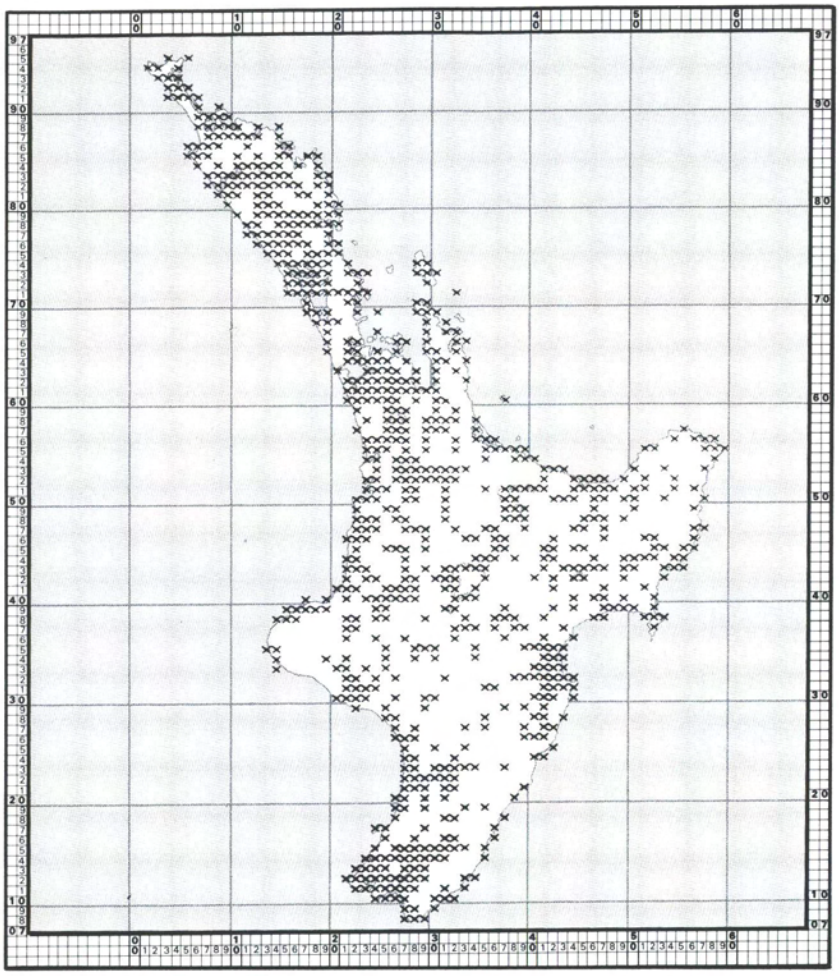


× = **Australasian Gannet** *(Sula bassana serrator)*

The one record from the central North Island (square N3247) is obviously a stray, but other inland records (e.g. near Auckland) are from harbours.

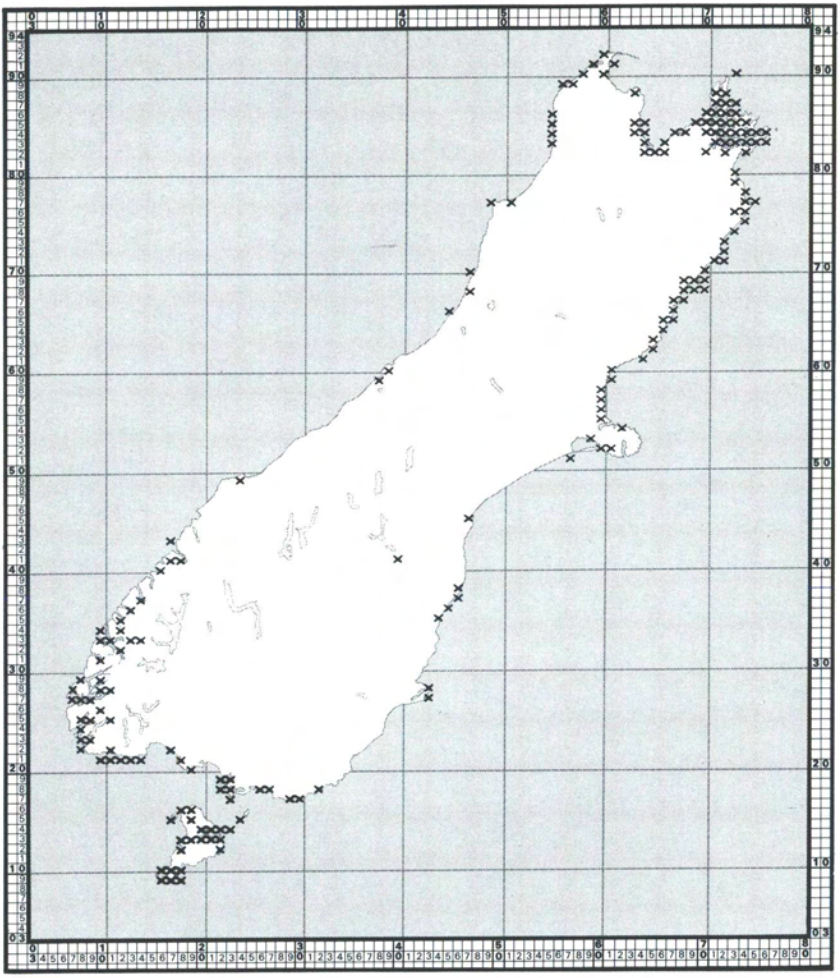


× = **Black Shag** *(Phalacrocorax carbo)*



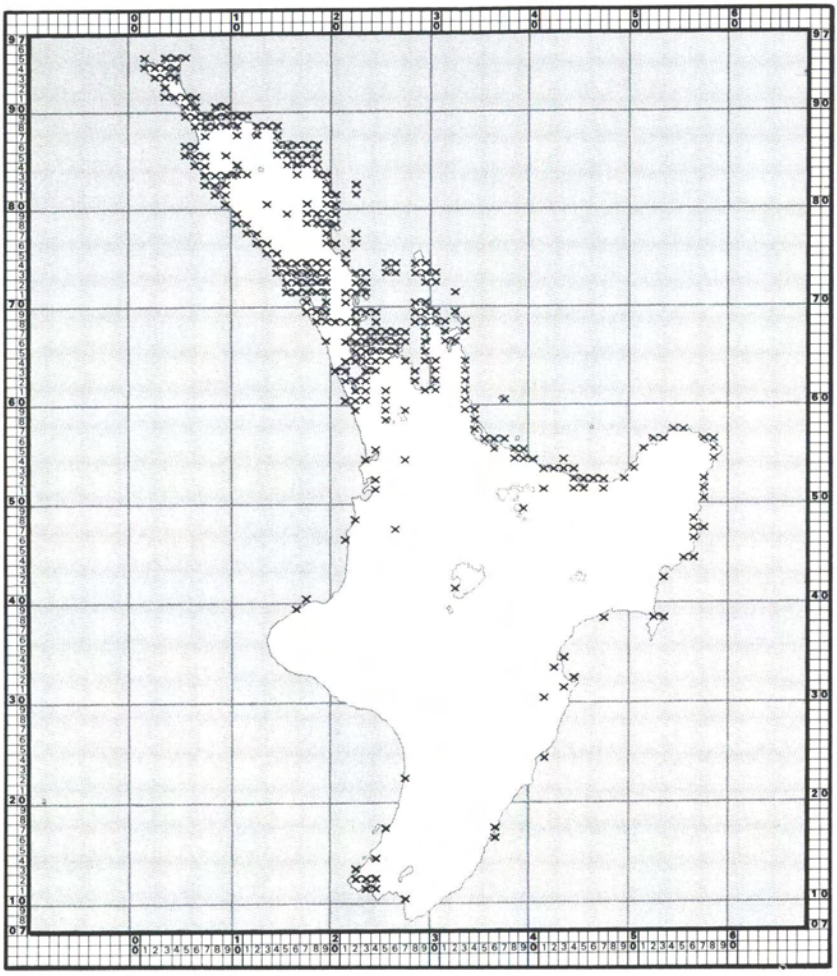
✕ = **Black Shag** *(Phalacrocorax carbo)*

The seeming scarcity of Black Shags in the coastal area south of Mount Egmont probably reflects insufficient observation; the species is widely distributed there (B.D. Heather, pers.comm.).



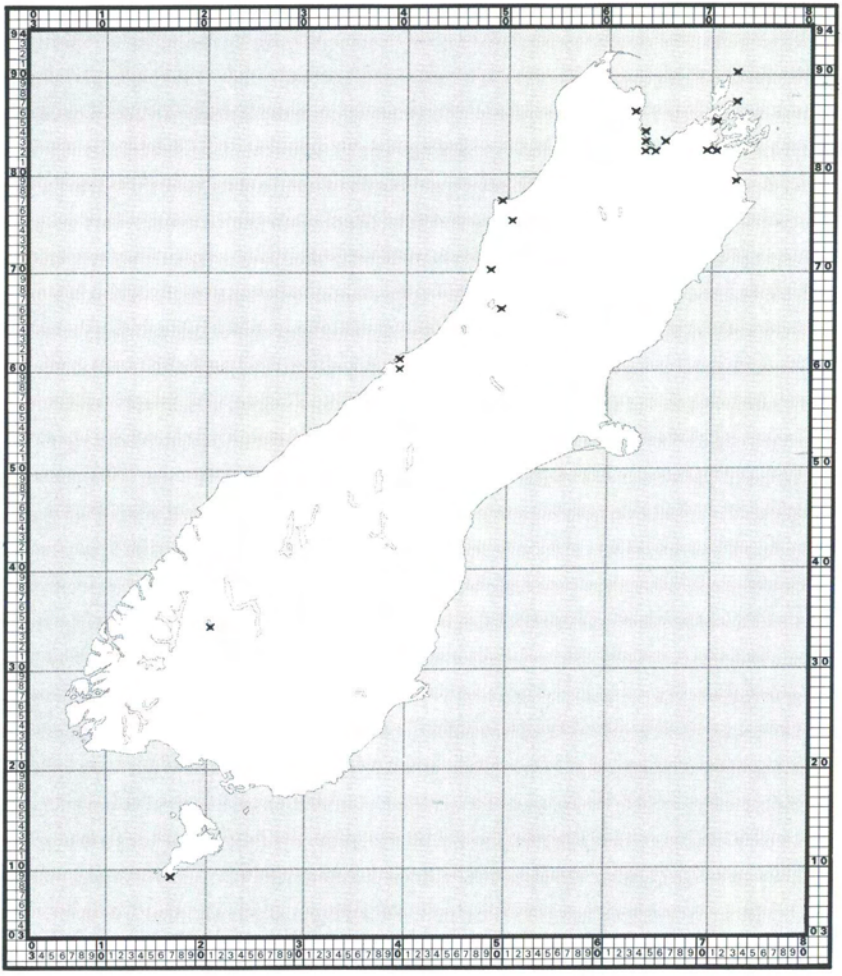
× = **Pied Shag** *(Phalacrocorax varius)*

The few reports of this coastal species from far inland need confirmation because of possible confusion with the pied form of the Little Shag. Most "inland" records from the northeast of the South Island are from the Marlborough Sounds.



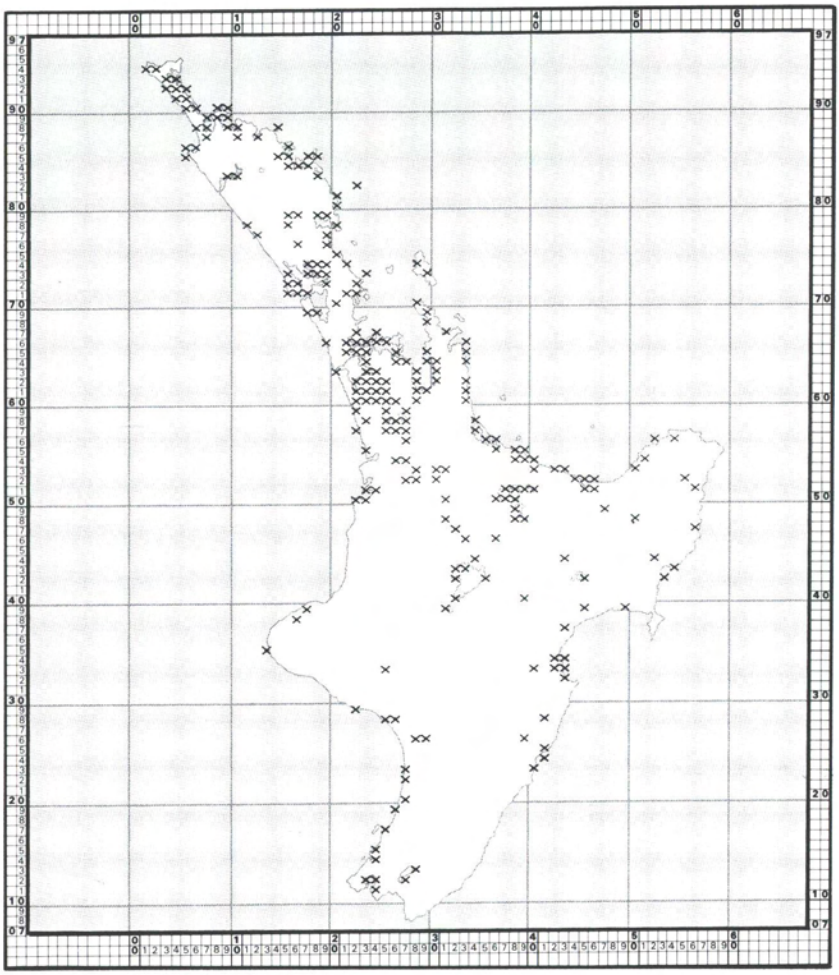
× = **Pied Shag** *(Phalacrocorax varius)*

''Inland'' records, particularly in the Auckland district, are mostly from harbours and tidal creeks.

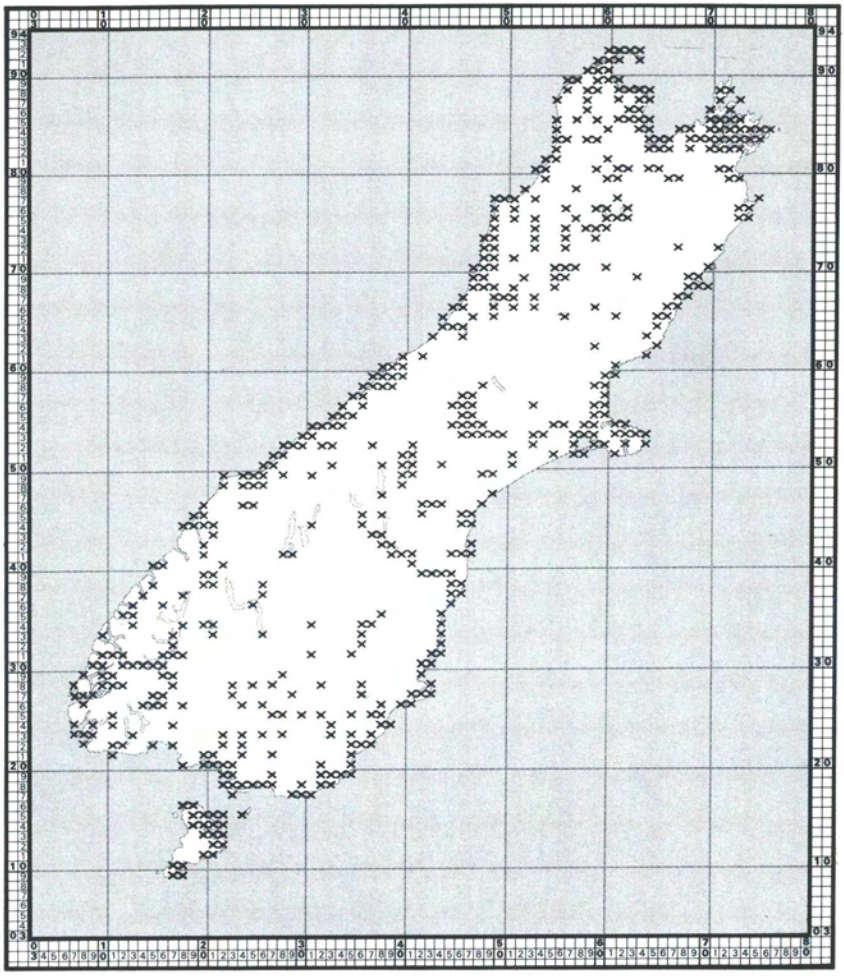


× = **Little Black Shag** *(Phalacrocorax sulcirostris)*

The report from Stewart Island seems valid (R.H.Taylor, pers.comm.), but the few reports from Otago and Southland need confirmation because of possible confusion with juvenile Little Shags.

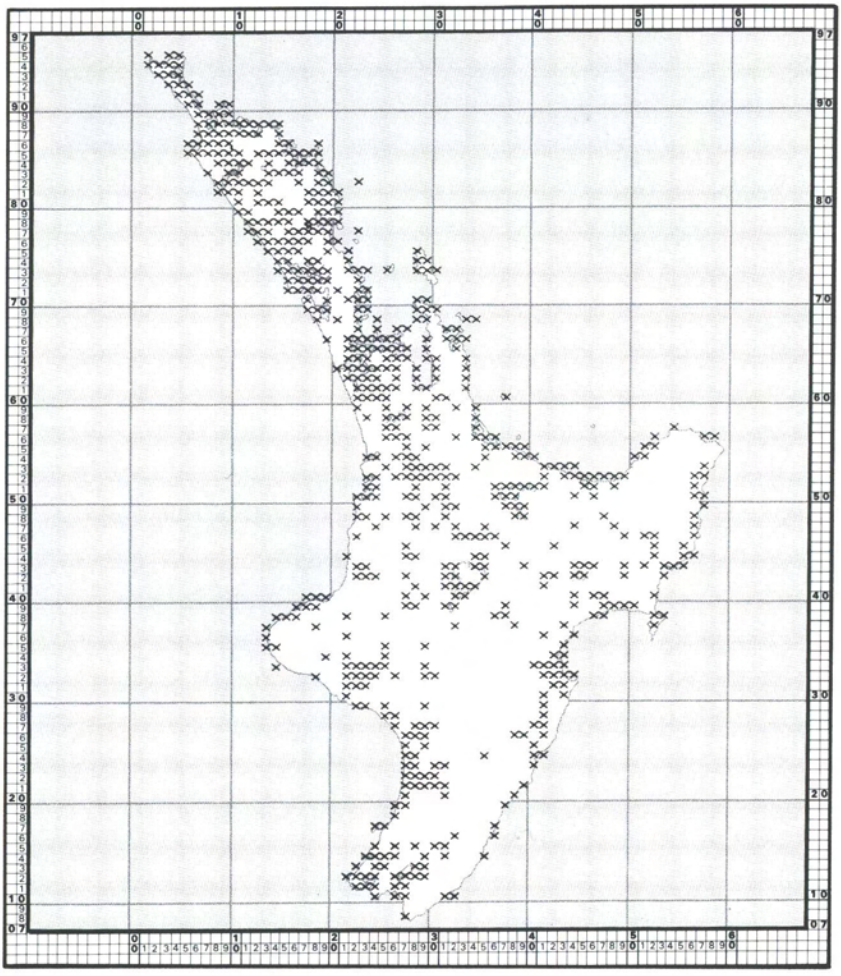


× = **Little Black Shag** *(Phalacrocorax sulcirostris)*

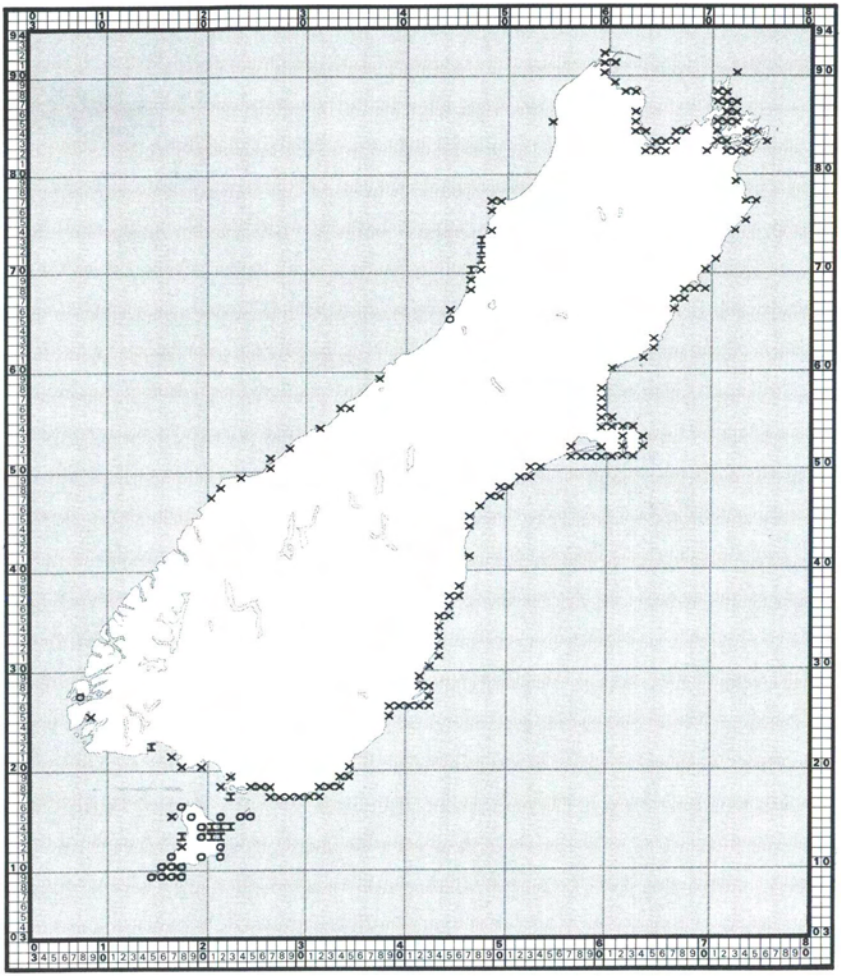


× = **Little Shag** *(Phalacrocorax melanoleucos)*

The New Zealand subspecies *(P.m.brevirostris)*, unlike the Australian one *(P.m.melanoleucos)* has two colour forms : ''white-throated'' and ''little pied'', the former being more common (See illustrations in Falla *et al.* 1979).



× = **Little Shag** *(Phalacrocorax melanoleucos)*

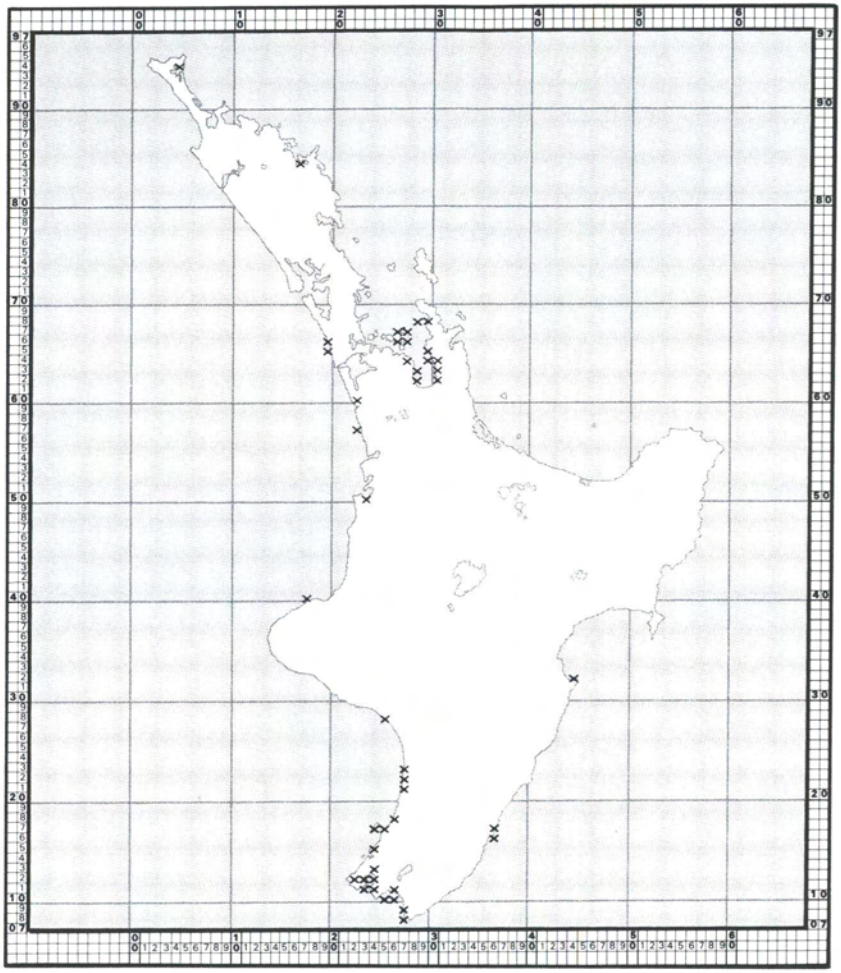


× = **Spotted Shag** *(Stictocarbo punctatus punctatus)*

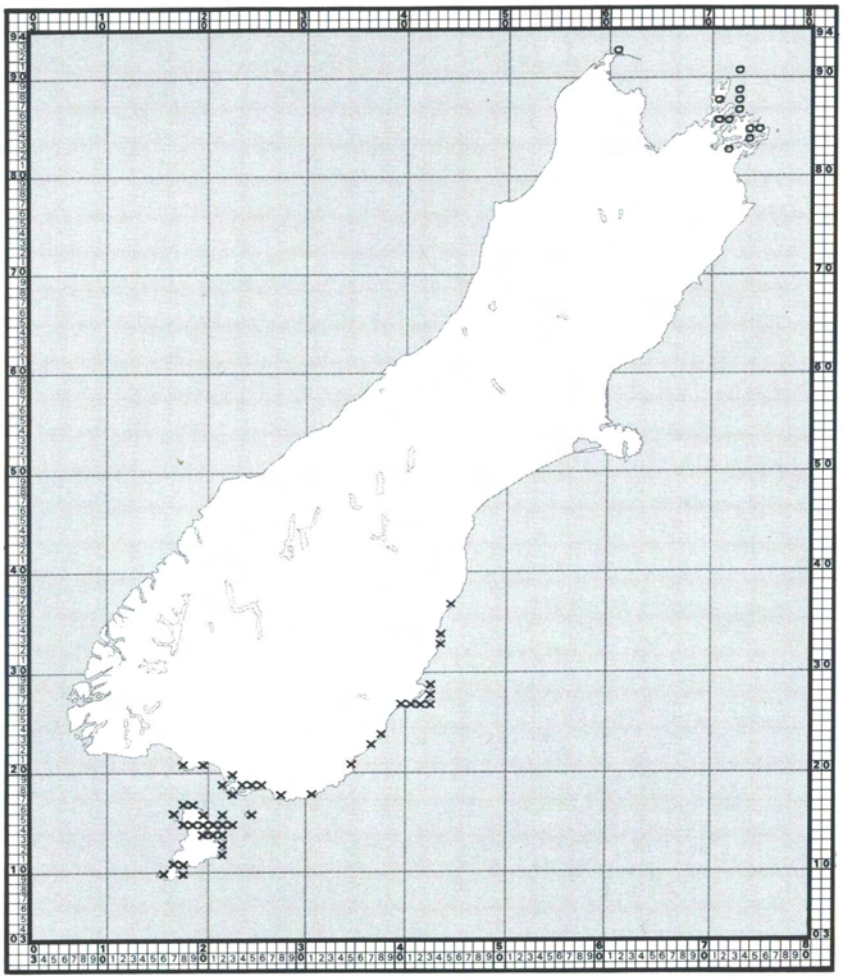
o = **Blue Shag** *(Stictocarbo punctatus steadi)*

I = **Both forms reported**

The Spotted Shag (pages 50 - 51) is a strictly marine species and the few seemingly inland records from the northeast of the South Island are from the Marlborough Sounds.



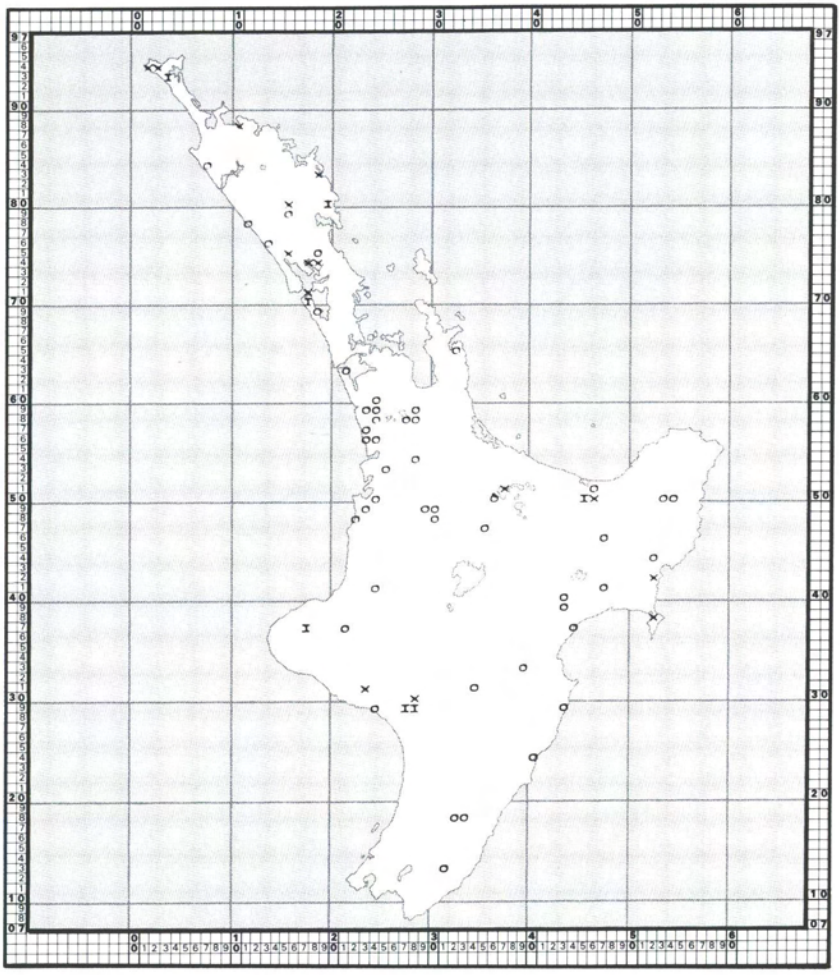
✕ = **Spotted Shag** *(Stictocarbo punctatus punctatus)*



× = **Stewart Island Shag** *(Leucocarbo carunculatus chalconotus)*

o = **King Shag** *(Leucocarbo carunculatus carunculatus)*

The population of the King Shag in 1964/65 was only some 200 - 300 birds — little more than the 160 recorded in 1773 by J.R.Forster during Cook's second voyage (Nelson 1971).

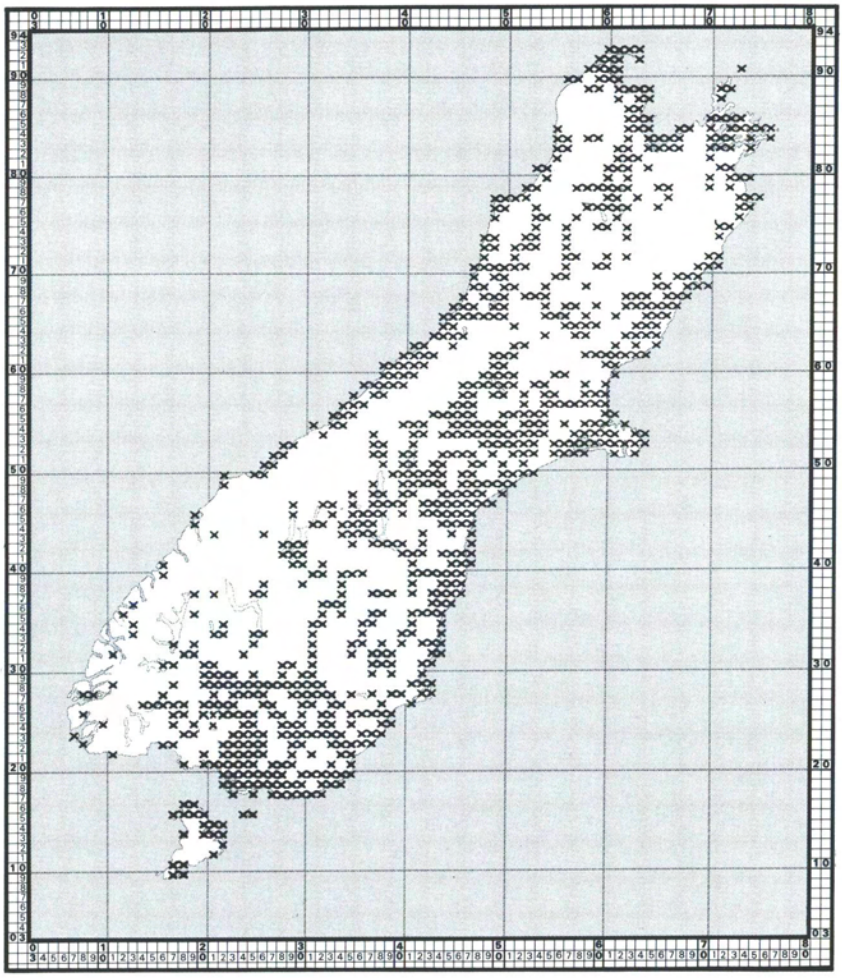


X = **Peafowl** *(Pavo cristatus)*

O = **Turkey** *(Meleagris gallopavo)*

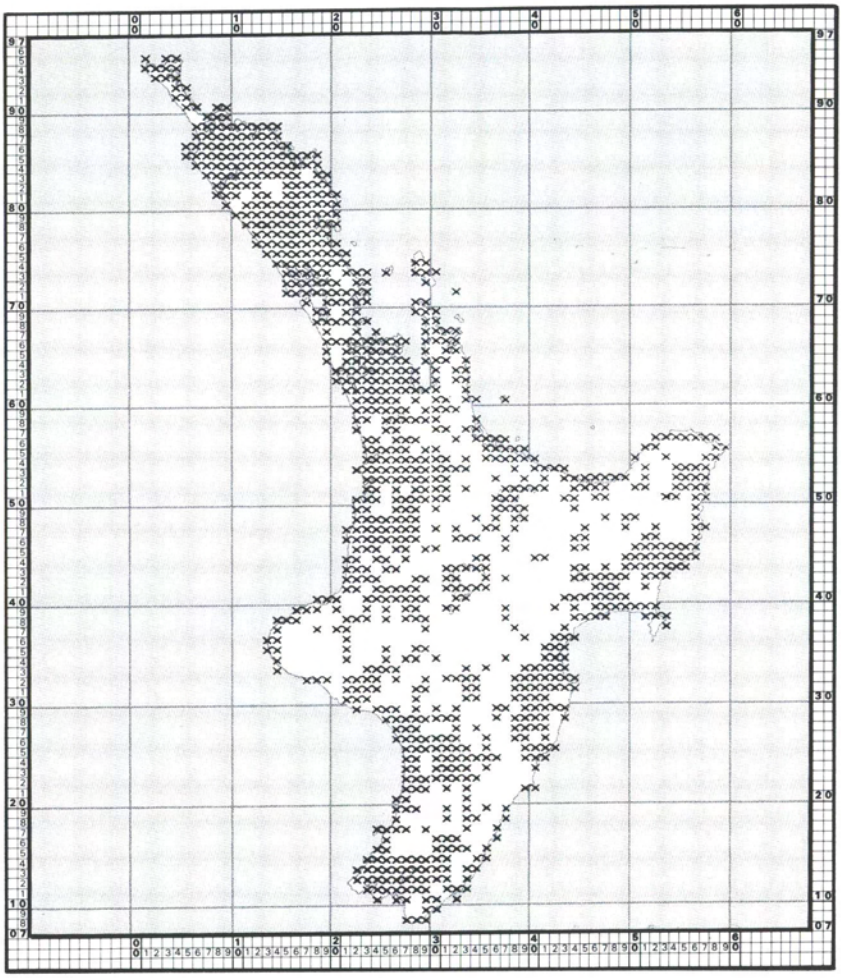
I = **Both species reported**

Some of both species are semi-domesticated (free ranging but maintained by supplementary feeding or occasional releases of new stock), and others are fully feral. One South Island record was received of Peafowl (square S5581) and five of Turkeys (squares S4546, S6365, S6778, S7078, and S7479).

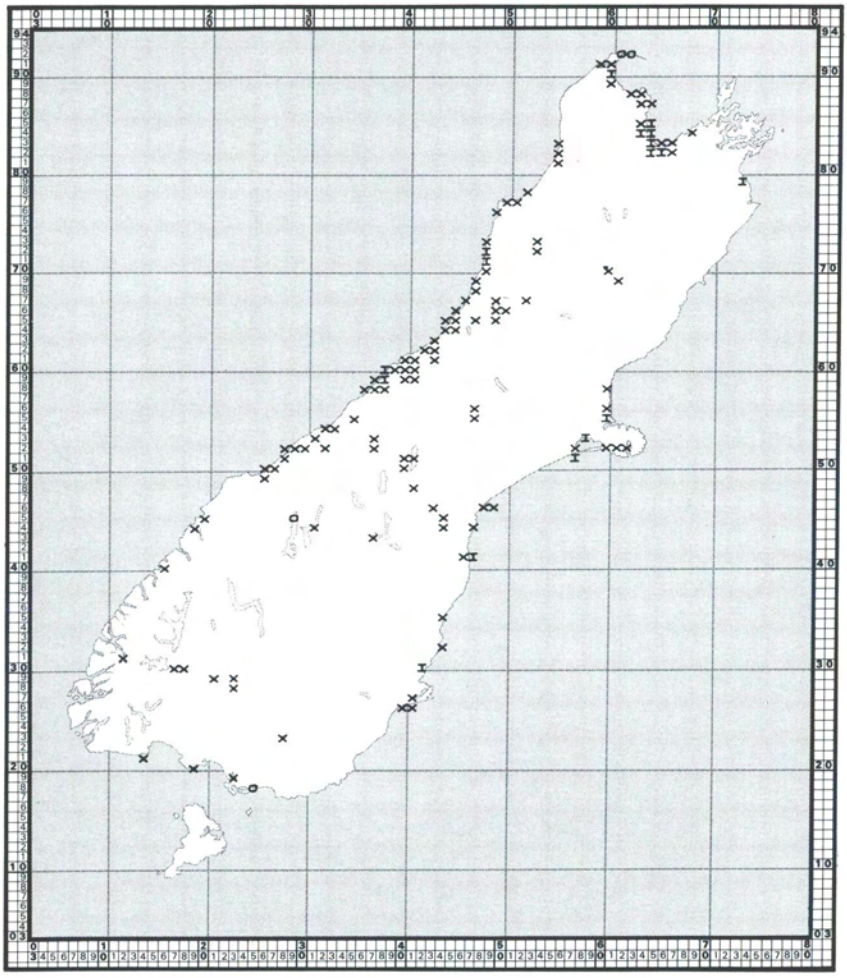


× = **White-faced Heron** *(Ardea novaehollandiae)*

This Australian species (pages 54 - 55) was rare in New Zealand until about 1941, when breeding was confirmed in Otago. Its spectacular increase in distribution and numbers since then was described by Carroll (1970).

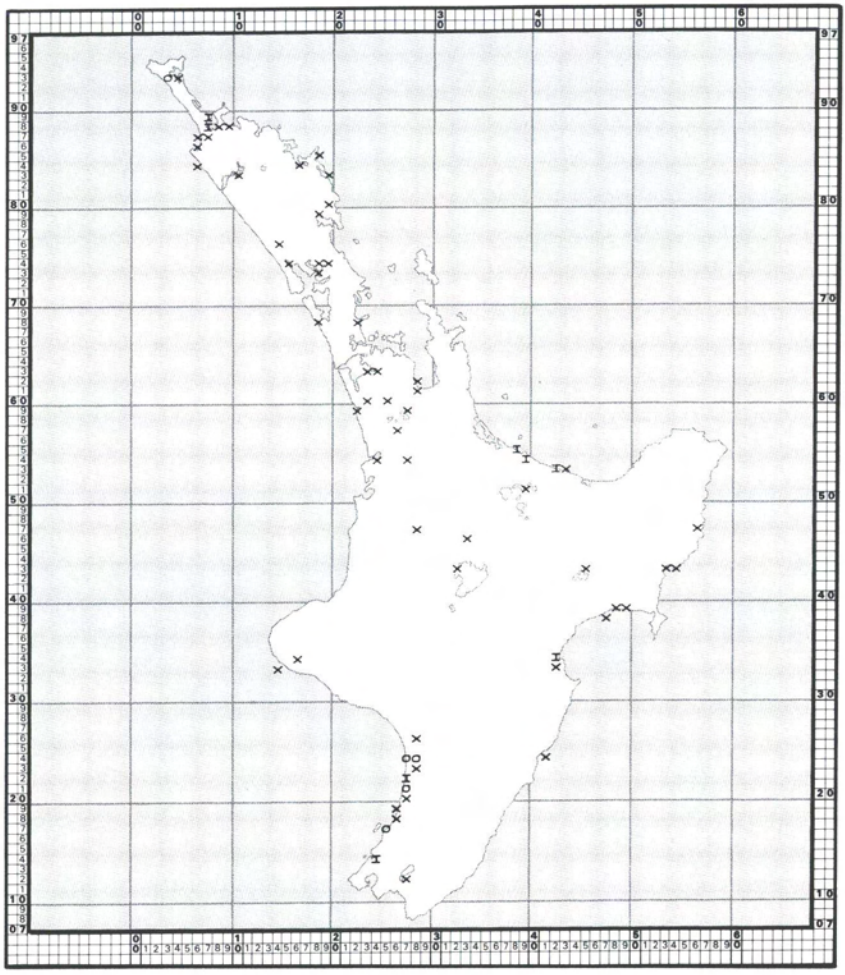


× = **White-faced Heron** *(Ardea novaehollandiae)*



× = White Heron *(Egretta alba)*
o = Royal Spoonbill *(Platalea leucorodia)*
I = Both species reported

In New Zealand, White Herons breed only at Okarito in South Westland. The maps on pages 56 - 57 include reports of birds in passage between Okarito and wintering places. Such accumulated reports over 10 years make the species seem more common than it is. Even so, in some years, wintering bird numbers (up to c.200 in 1957) are large in relation to the 12-20 breeding pairs at Okarito, suggesting the arrival of immigrants from Australia (Andrew 1963). An OSNZ national census of egrets in August 1977 gave a total of 83 White Herons (Heather 1978).

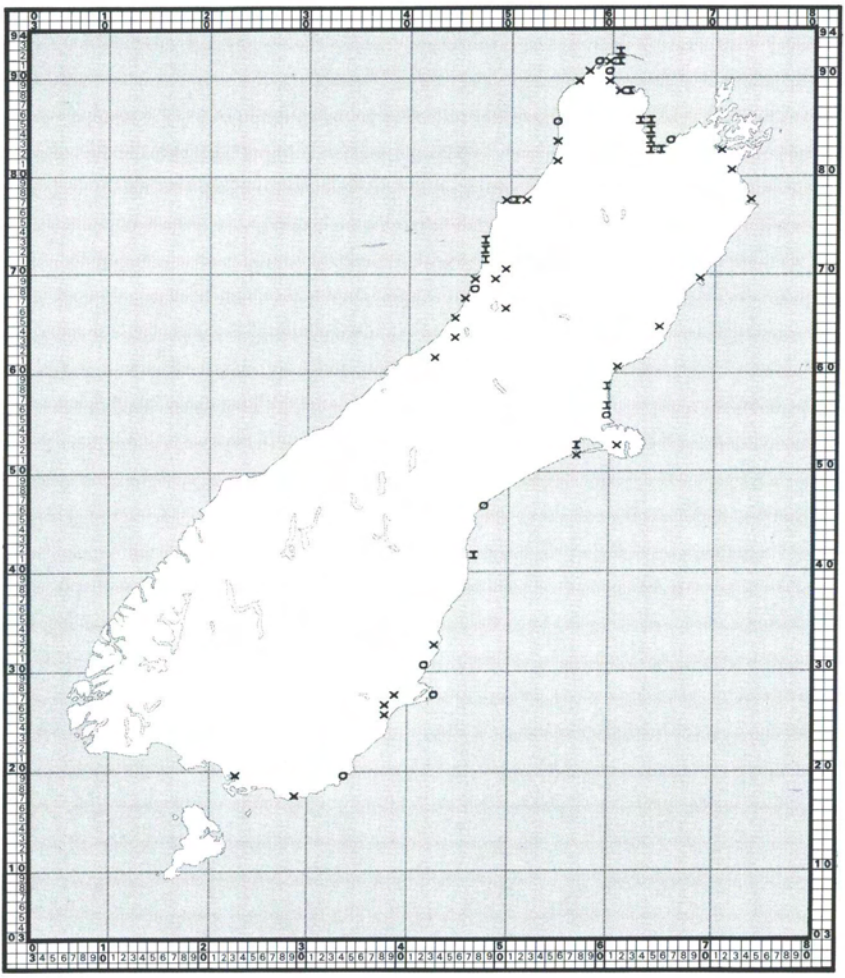


X = White Heron *(Egretta alba)*

O = Royal Spoonbill *(Platalea leucorodia)*

I = Both species reported

Royal Spoonbills used to nest only at Okarito. Numbers declined from 52 birds in 1978 to 26 in 1983 (A.Cragg per R.N.Holdaway, pers.comm.), but a new colony (Holdaway 1980) of 42 birds in 1982 (R.N.Holdaway, pers.comm.) developed in Marlborough. Regular wintering occurs at Farewell Spit, Motueka and Manawatu R. estuary. Accumulated reports over 10 years of birds in passage between breeding and wintering sites makes the species seem more common than it is. An OSNZ census in 1977 gave a total of 49 Royal Spoonbills (Heather 1978).

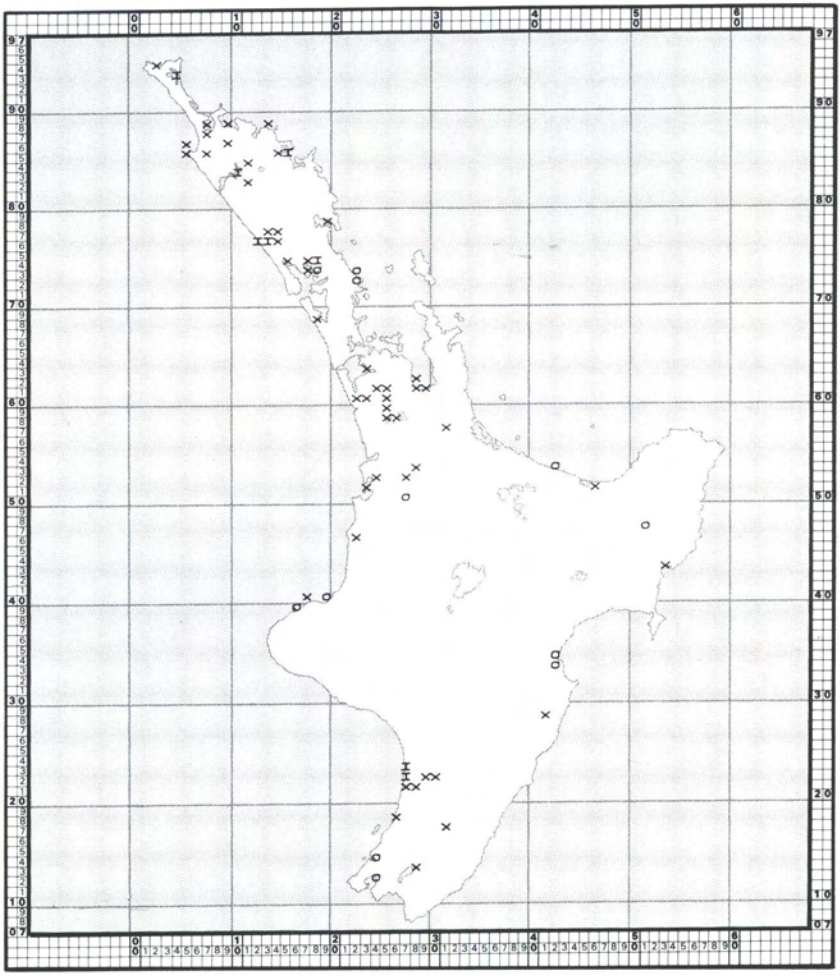


X = **Cattle Egret** *(Bubulcus ibis)*

O = **Little Egret** *(Egretta garzetta)*

I = **Both species reported**

Cattle Egrets, first occurring as strays in the mid-1960s, became regular visitors from Australia from about 1973 onwards. Numbers increased rapidly from at least 266 in 1978, to 624 in 1979, to 771 in 1980 and then declined somewhat (Heather 1982). Breeding is not yet known in New Zealand. The apparent absence of records in southern Taranaki (page 59) reflects inadequate observations (see maps in Heather 1982). Over 1500 were recorded in 1984 (Heather, pers.comm.).

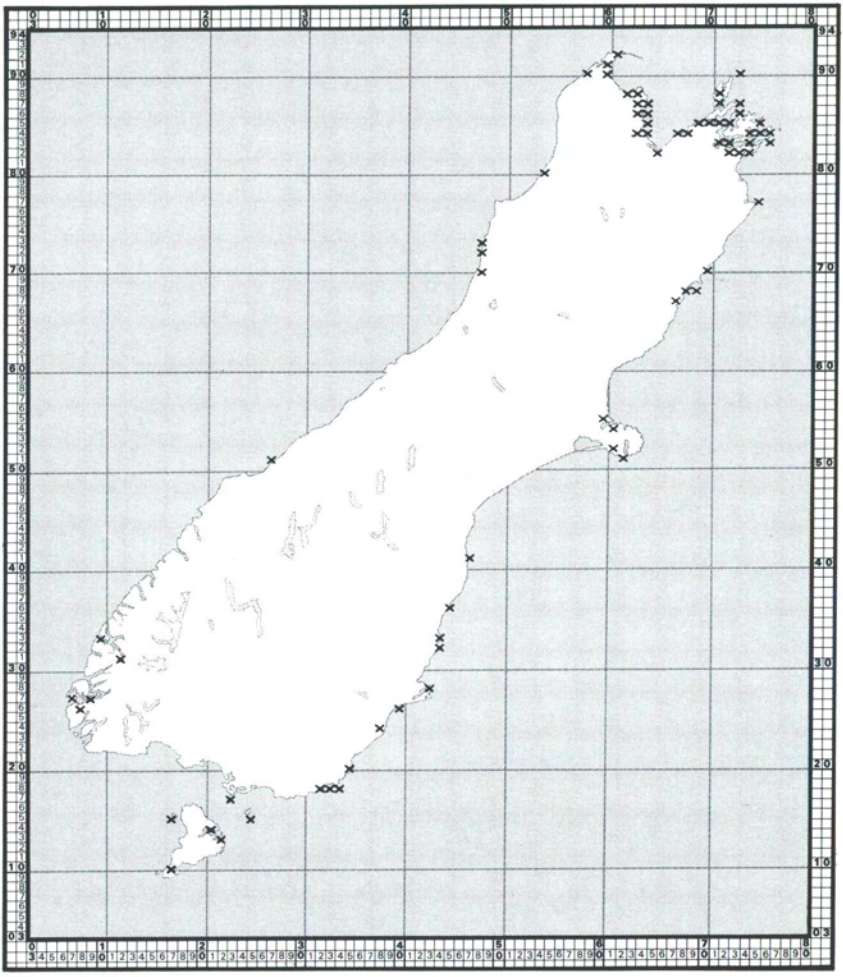


X = Cattle Egret *(Bubulcus ibis)*

O = Little Egret *(Egretta garzetta)*

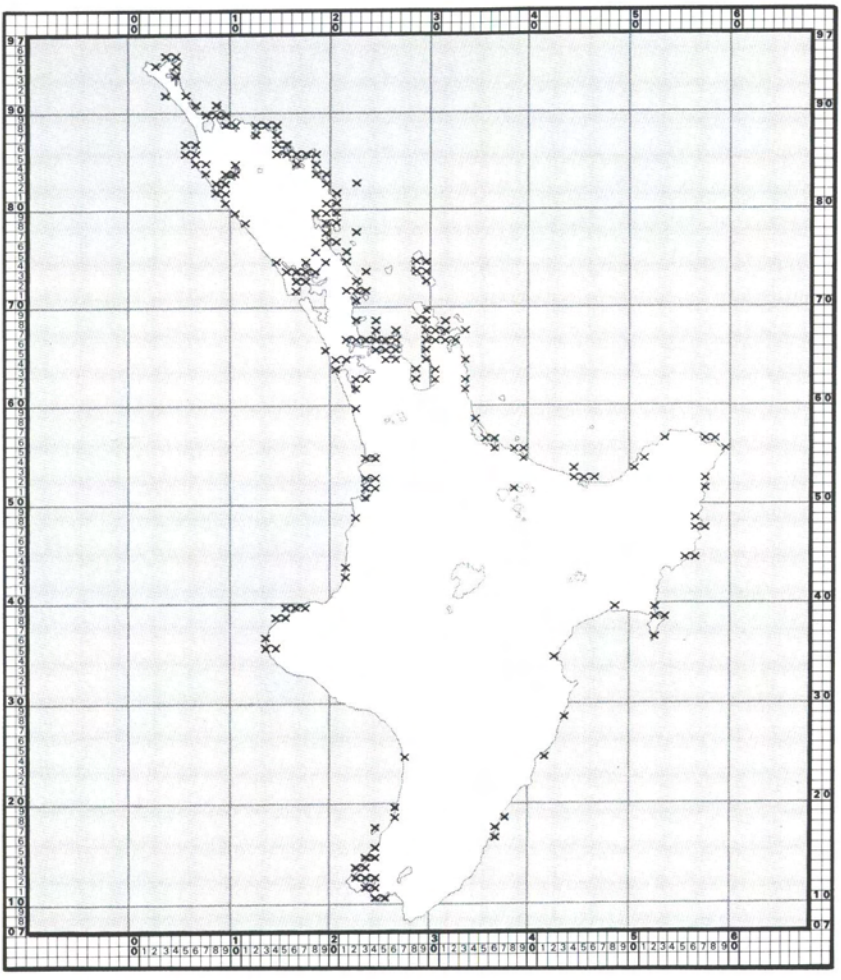
I = Both species reported

Small numbers of Little Egrets, presumably from Australia, appear in New Zealand each winter. The maps on pages 58 - 59, being based on the records accumulated over 10 years, exaggerate the abundance of this species. A national census of egrets by the Ornithological Society in August 1977 recorded 22 Little Egrets (Heather 1978).

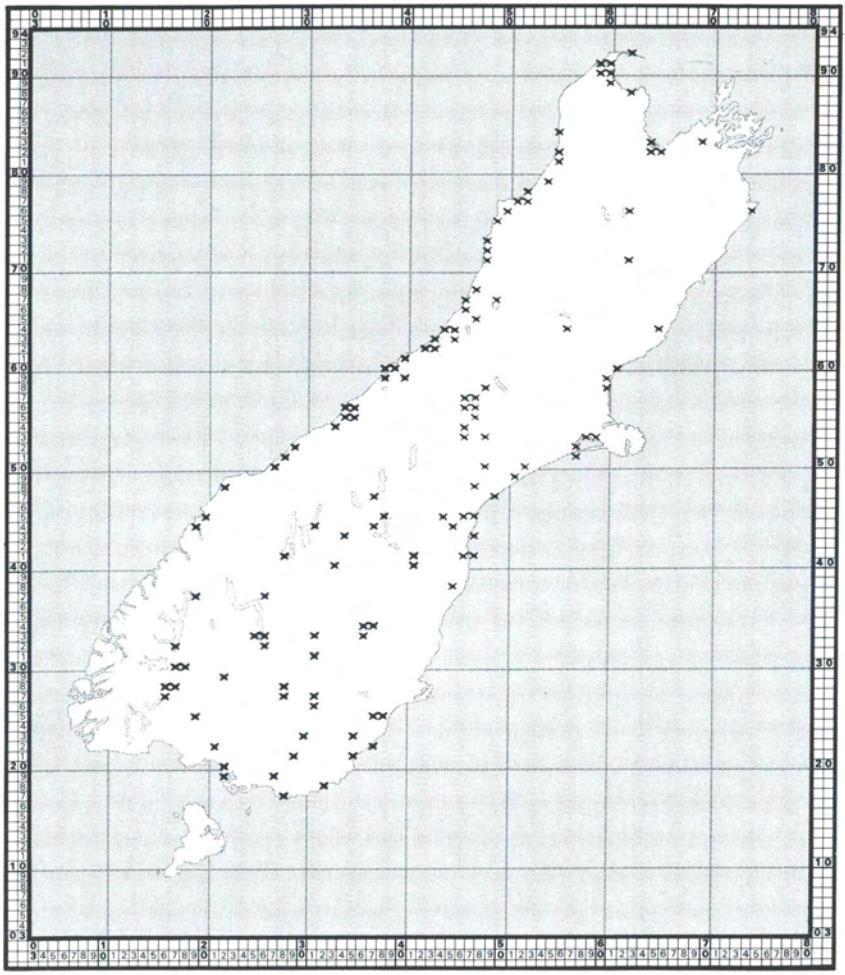


✕ = **Reef Heron** *(Egretta sacra)*

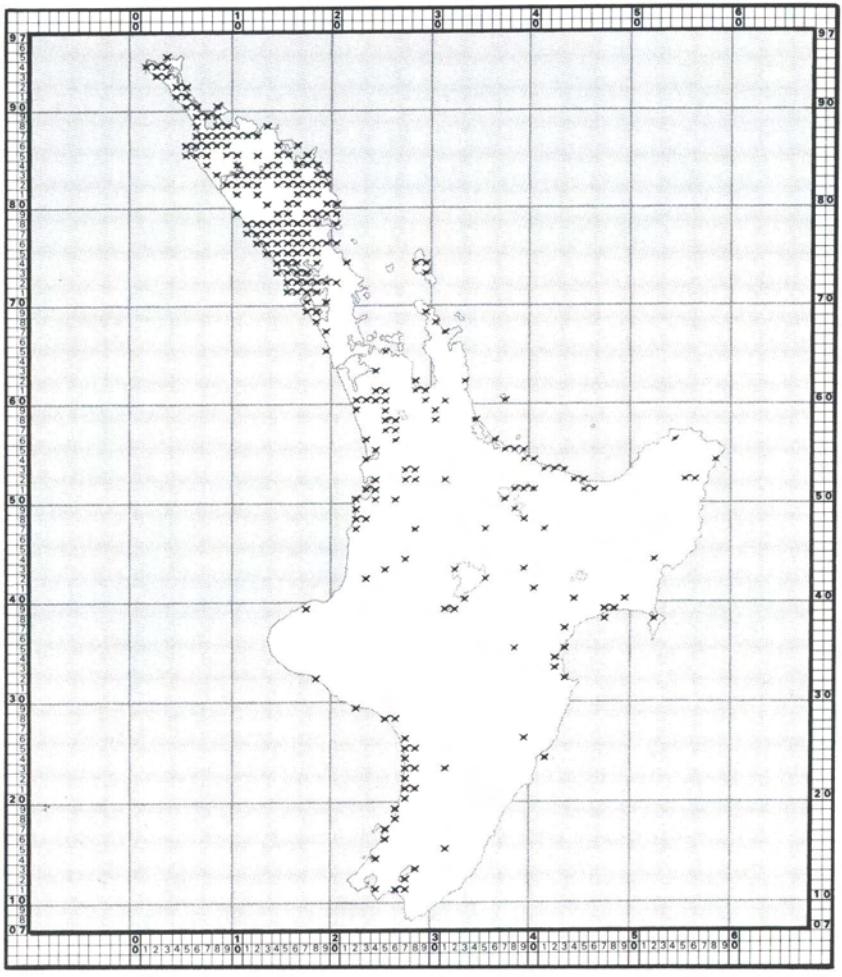
Edgar's (1978) detailed account of the distribution and numbers in New Zealand during 1975-1976 concluded that the Reef Heron (shown here on pages 60-61) had markedly declined in some districts over recent years.



× = **Reef Heron** *(Egretta sacra)*

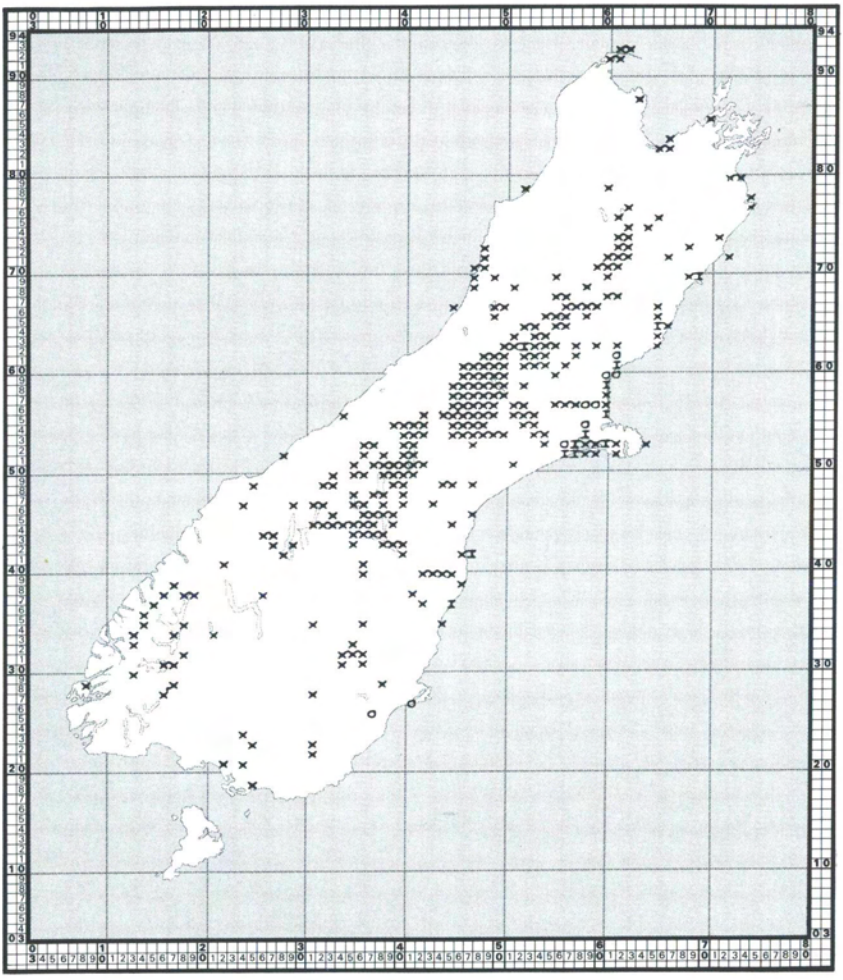


× = **Australasian Bittern** *(Botaurus stellaris poiciloptilus)*



× = **Australasian Bittern** *(Botaurus stellaris poiciloptilus)*

The largest recently recorded breeding population of bitterns in New Zealand (possibly 20-25% of the national total) was in the Whangamarino wetlands of the lower Waikato River, where 145 birds were located, mostly by the booming calls of males, during a survey in 1980 (Ogle & Cheyne 1983).

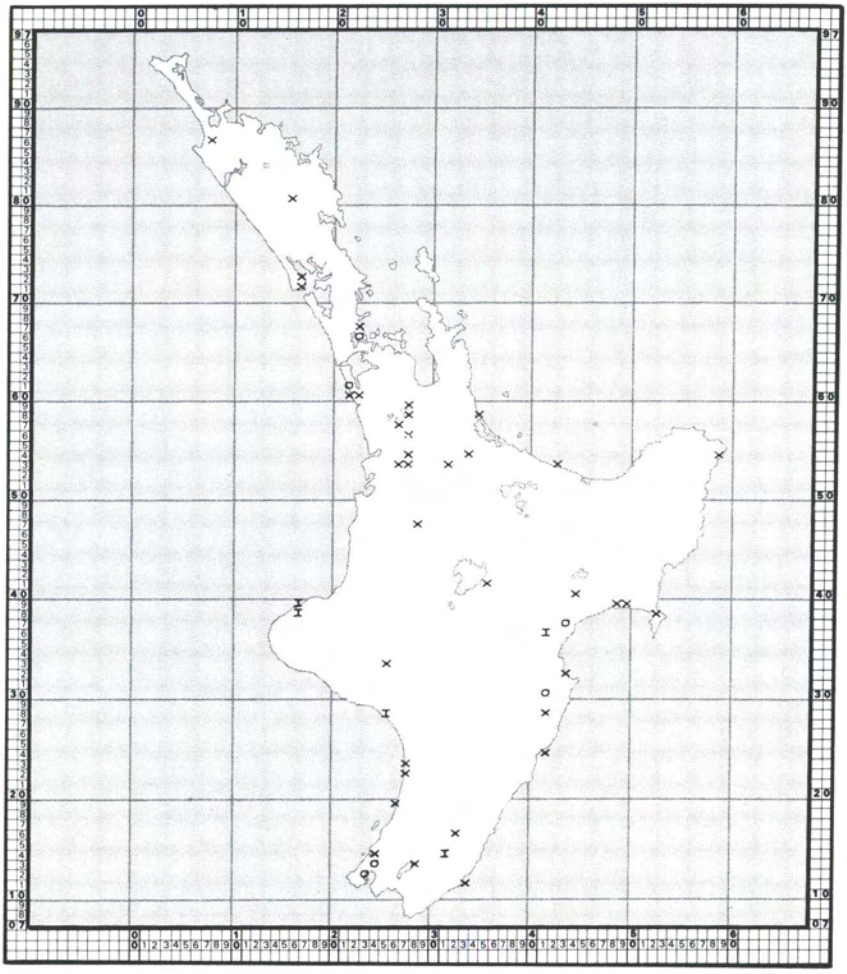


× = **Canada Goose** *(Branta canadensis)*

O = **Mute Swan** *(Cygnus olor)*

I = **Both species reported**

New Zealand's population of Canada Geese is derived from 50 birds liberated in the South Island in 1905. Some 18 000 Canada Geese were in the South Island in 1981 (Williams 1981). A few Mute Swans were brought to New Zealand as ornamental waterfowl in the 1860s and 1870s (Thomson 1922). The wild population currently numbers less than 200, mostly at Lake Ellesmere and in North Canterbury (M.J.Williams, pers.comm. 1984).

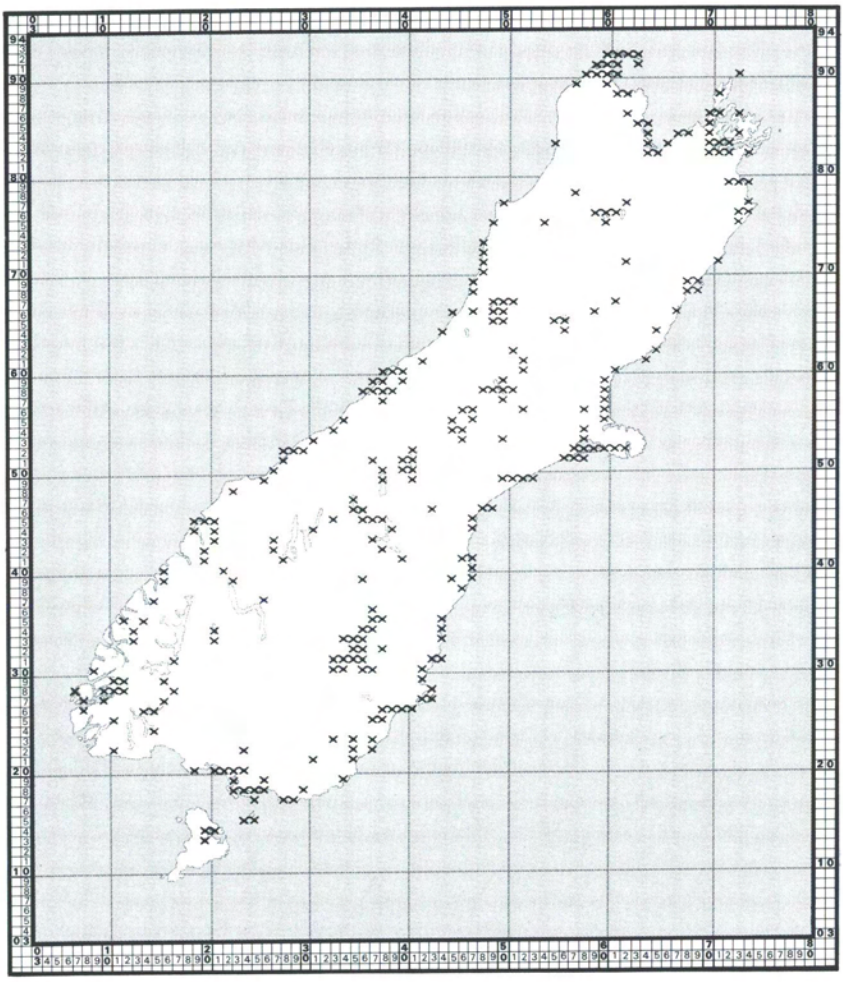


× = **Canada Goose** *(Branta canadensis)*

O = **Mute Swan** *(Cygnus olor)*

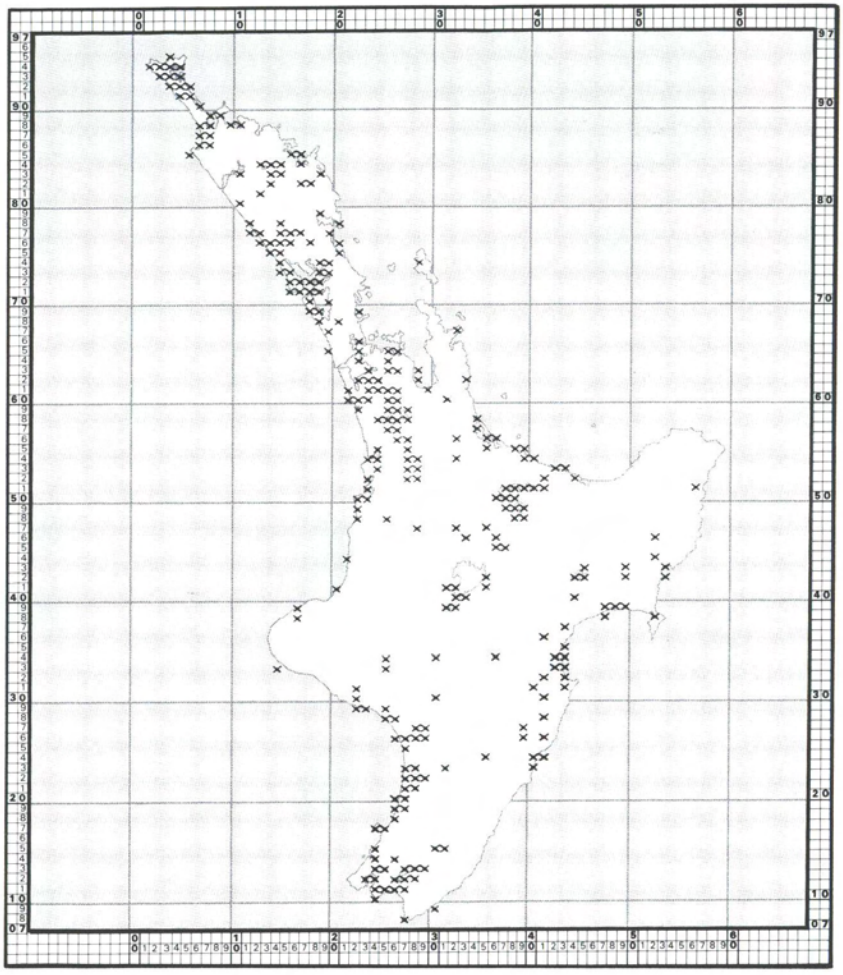
I = **Both species reported**

Many North Island reports of Canada Geese refer to birds only recently liberated for game or ornamental purposes, whose survival is not yet assured. The North Island population was only about 1000 birds in 1981, nearly half of them at Whakaki Lagoon near Wairoa (Williams 1981).



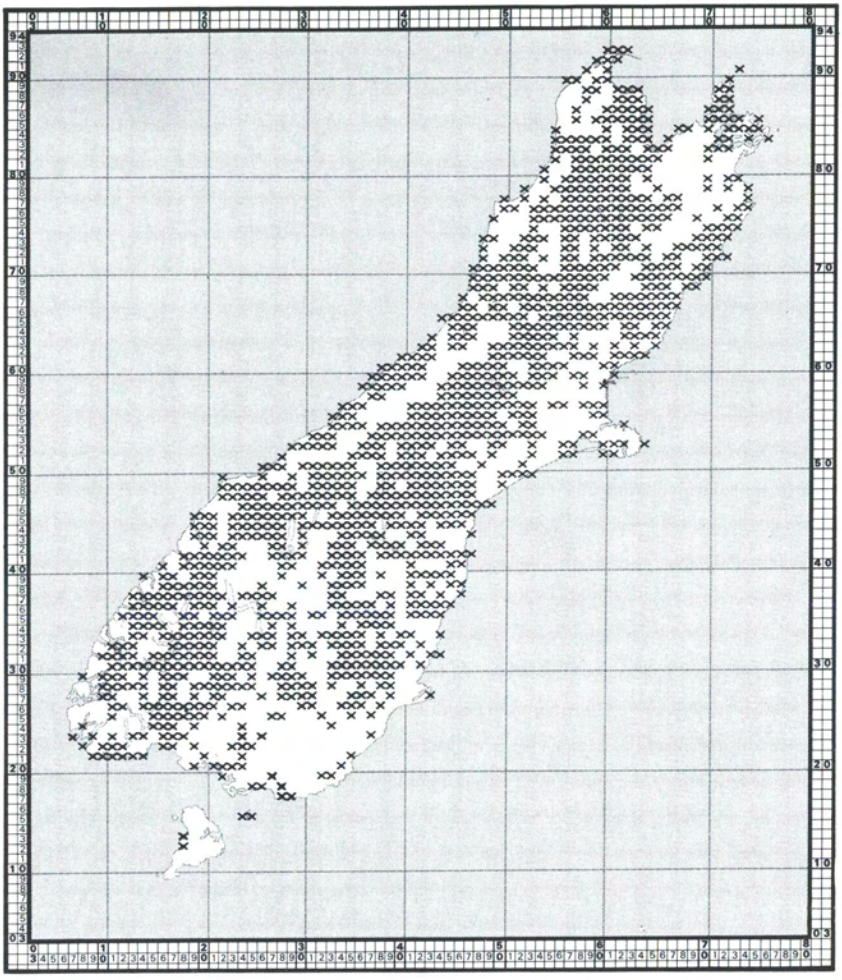
× = **Black Swan** *(Cygnus atratus)*

About 100 of this Australian species were liberated in several parts of the South Island between 1864 and 1868, but the subsequent increase of the species was so rapid as to suggest that many were arriving from Australia of their own accord at that time (Williams 1981).



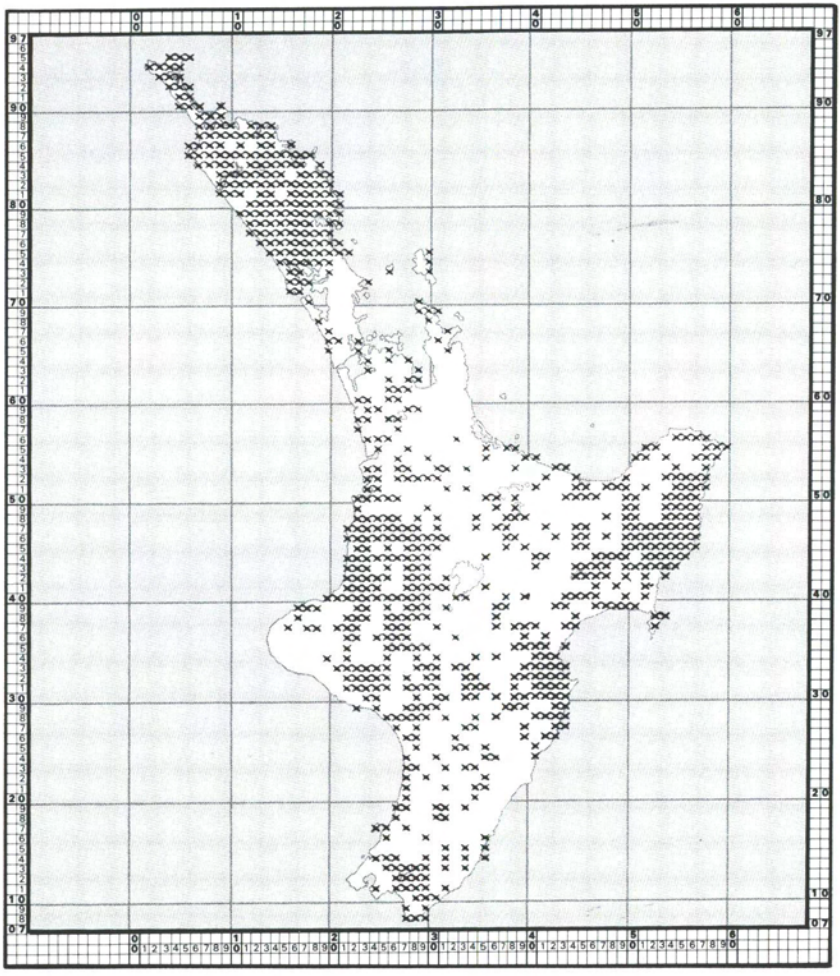
× = **Black Swan** *(Cygnus atratus)*

The species was widespread and common in both main islands by the turn of the century and occupied all the former haunts of its extinct New Zealand relative *(Cygnus sumnerensis)*. The total number of Black Swans in New Zealand in 1977 was almost 70 000 but had declined to 60 000 (4500 to 5000 breeding pairs) at the beginning of 1981 (Williams 1981).



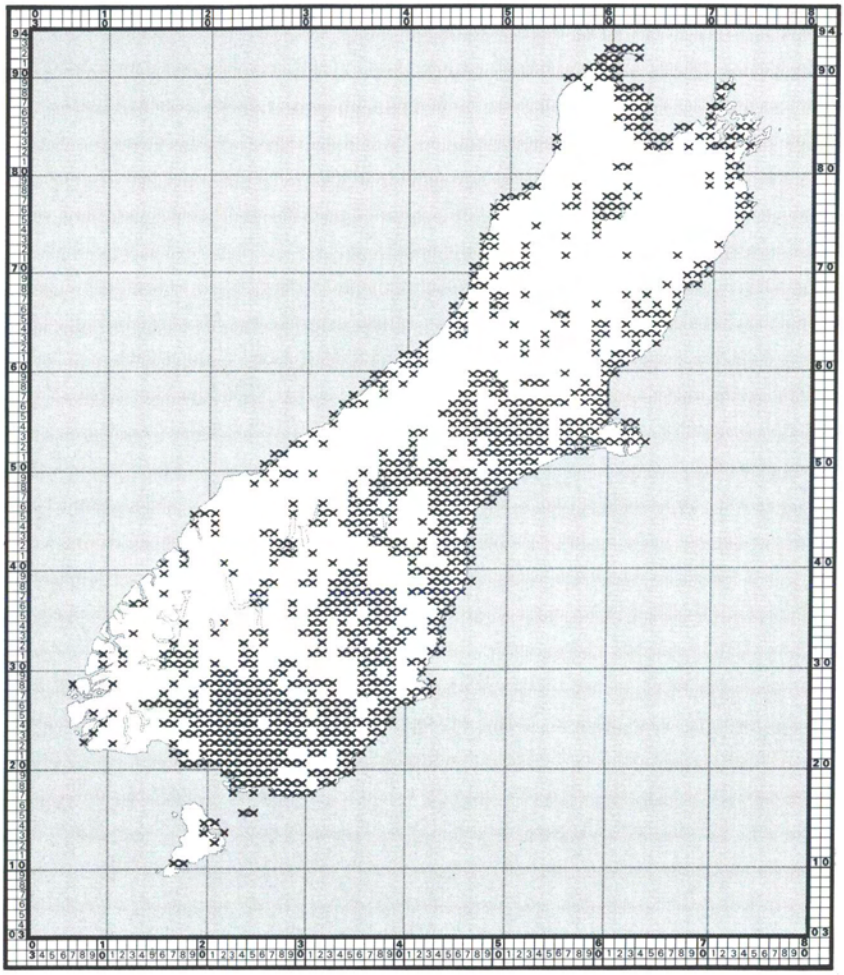
× = **Paradise Shelduck** *(Tadorna variegata)*

The South Island population declined last century but, under protection, increased again to reach a peak in about 1935. A dramatic decline occurred after 1950 (Williams 1971). In 1981 the South Island population was about 50 000 birds (Williams 1981).



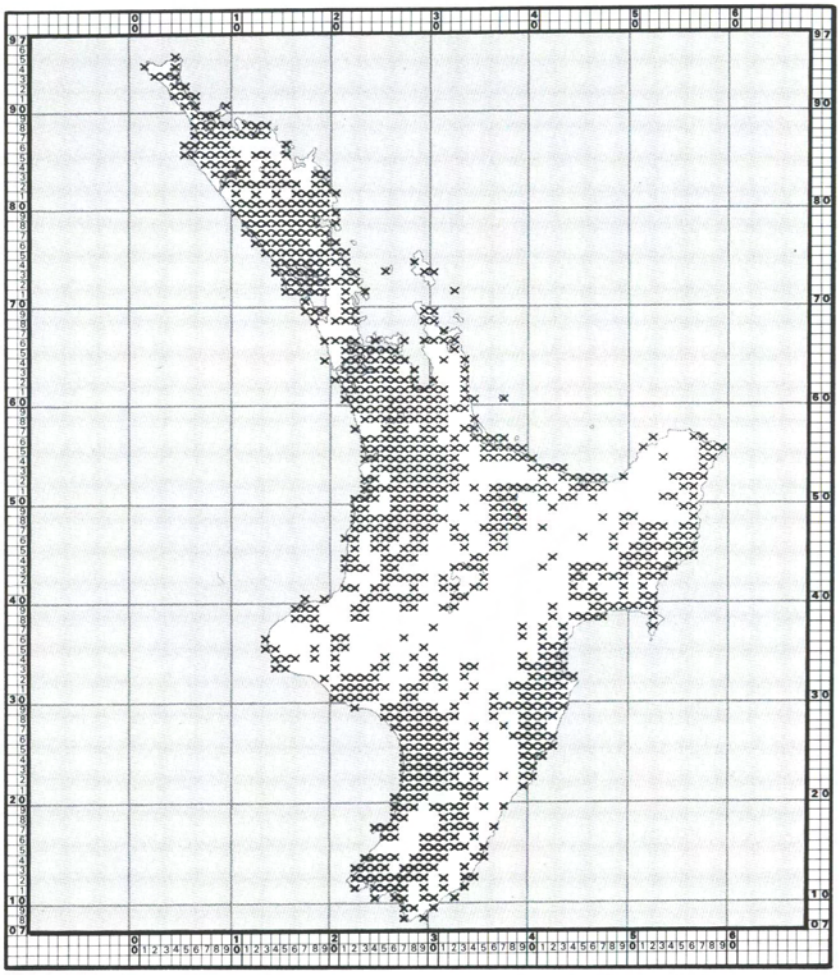
× = **Paradise Shelduck** *(Tadorna variegata)*

The species has greatly increased in the North Island this century as a result of liberations and natural spread into areas cleared of scrub or forest (Williams 1971). In 1981 the North Island population was about 70 000 birds (Williams 1981).



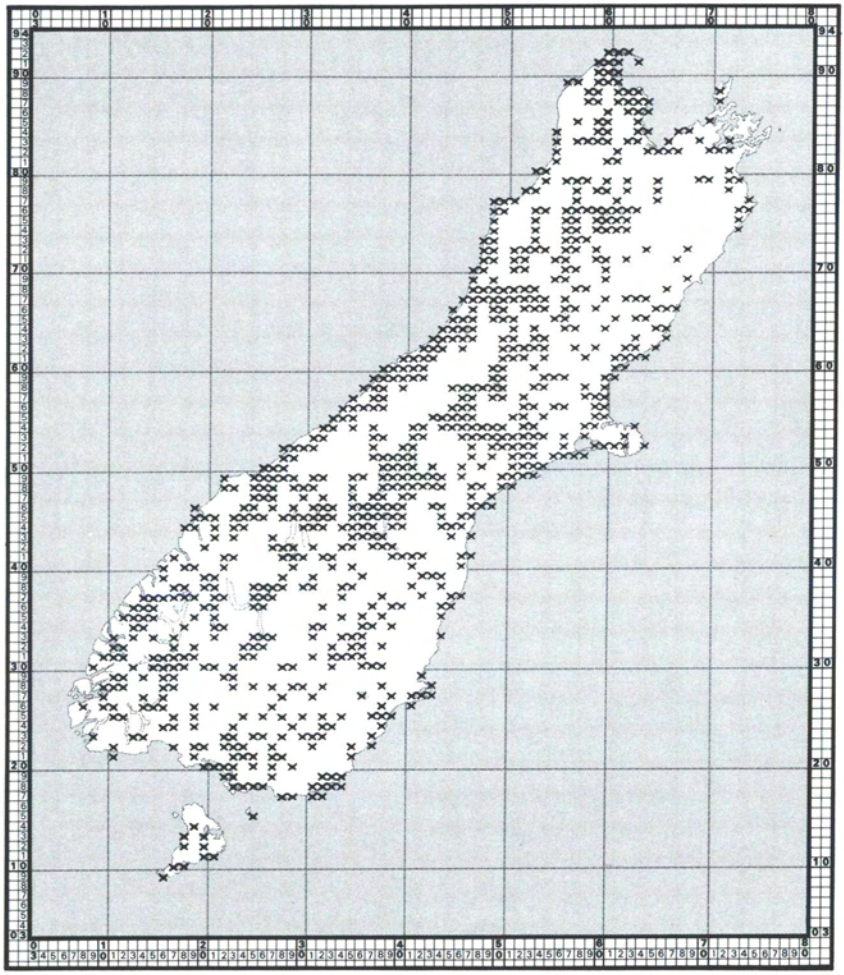
× = **Mallard** *(Anas platyrhynchos)*

Mallards of British stock were widely liberated in New Zealand from 1867 onwards and soon became established in modest numbers. The species increased spectacularly, however, following the liberation of American stock in the 1930s.



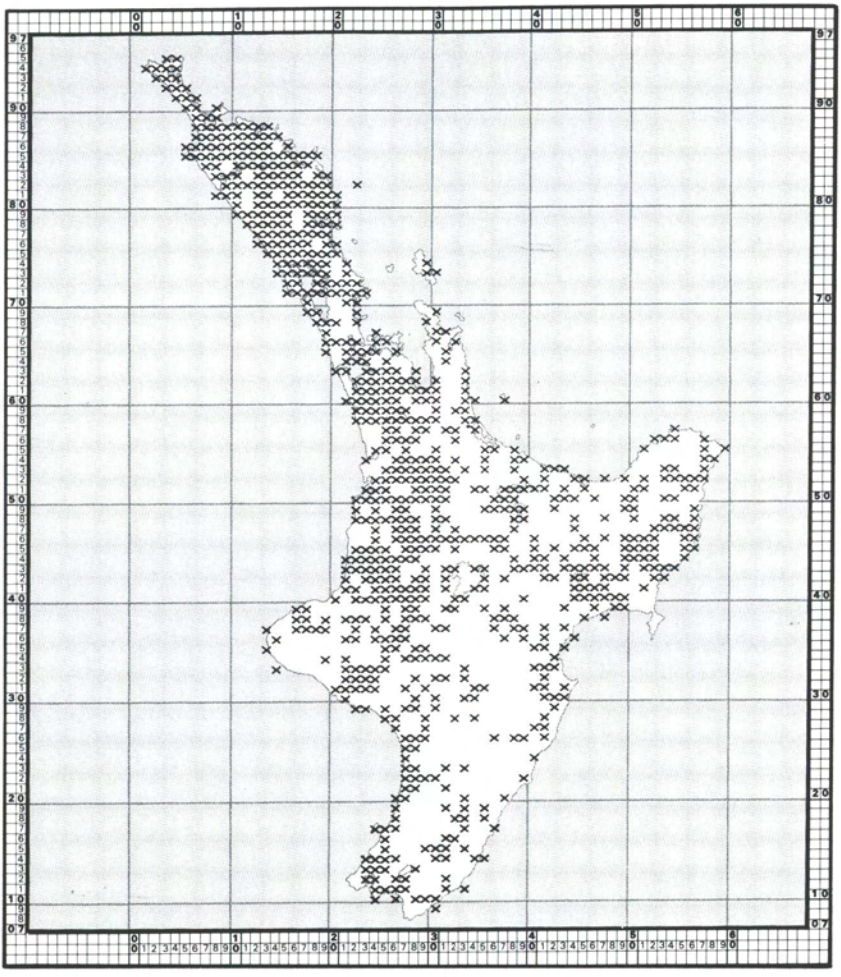
× = **Mallard** *(Anas platyrhynchos)*

The Mallard population for New Zealand in 1981 was some 5 million and still increasing (Williams 1981). Mallard/Grey Duck hybrids are present in some localities.

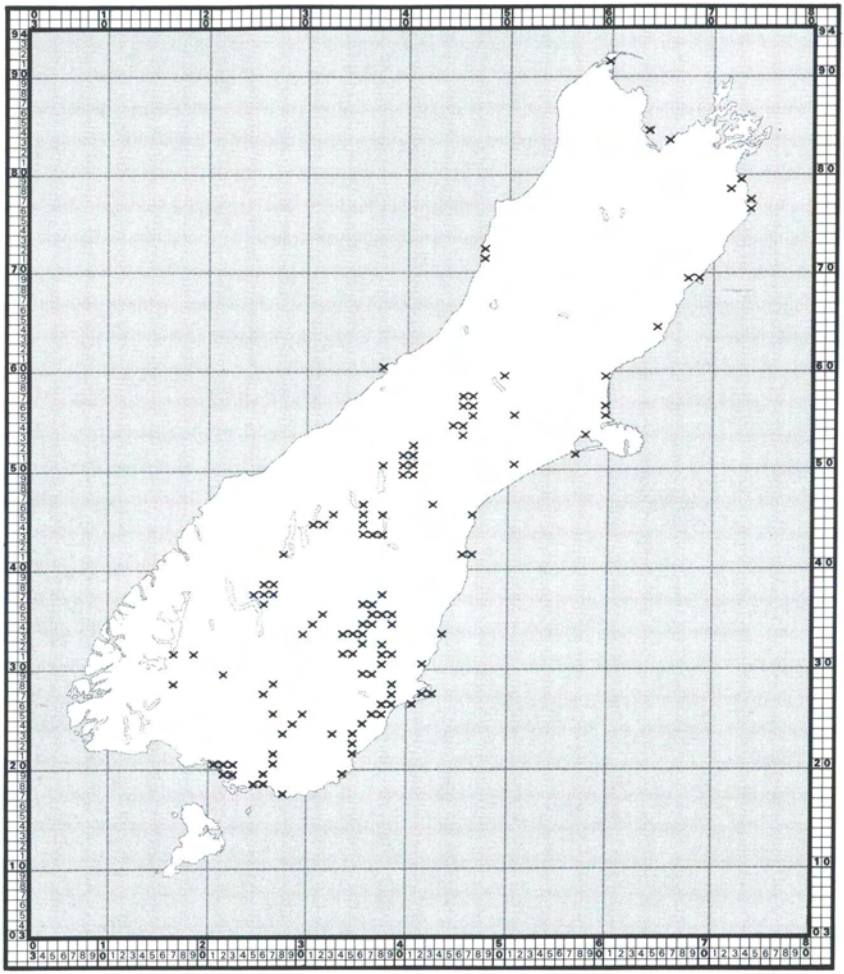


× = **Grey Duck** *(Anas superciliosa)*

The Grey Duck population of New Zealand had declined from about 1.5 million in 1970, to some 1.2 million by 1981 (Williams 1981).

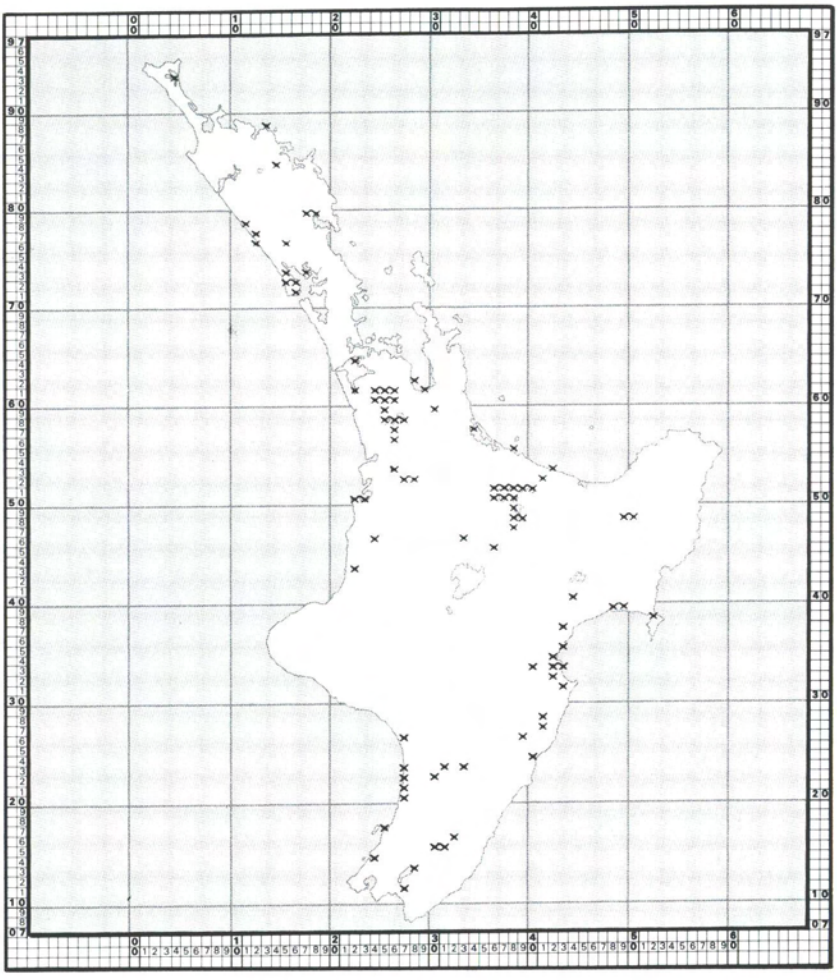


✕ = **Grey Duck** *(Anas superciliosa)*

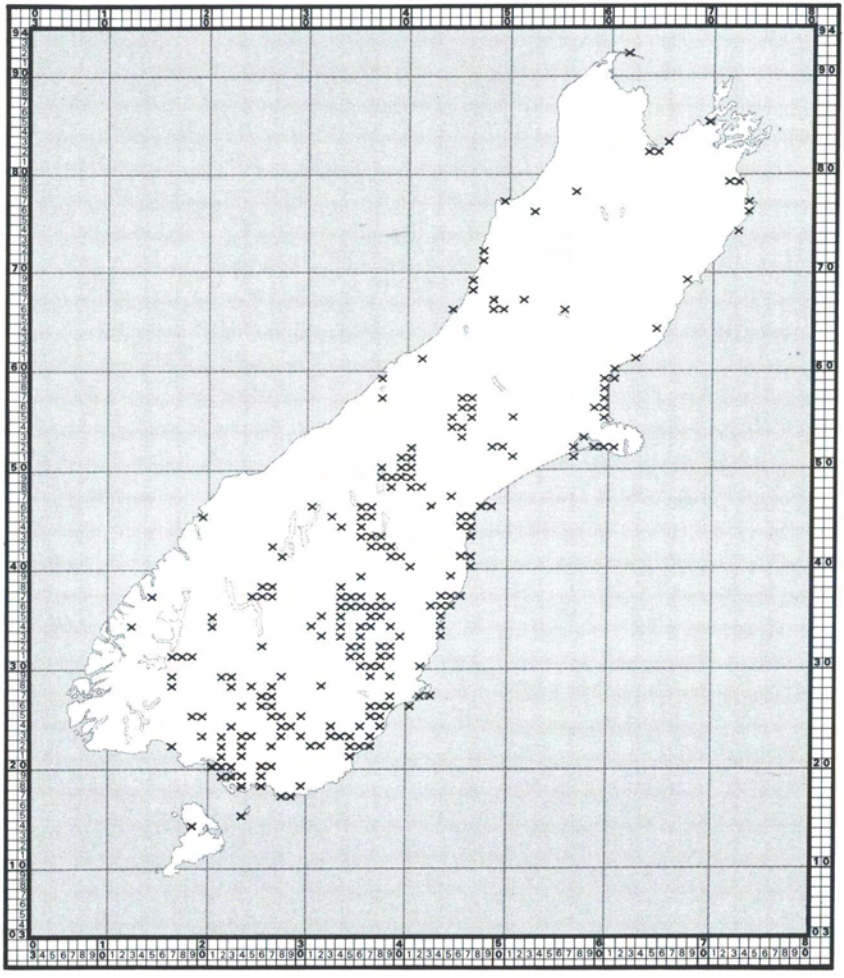


× = **Grey Teal** *(Anas gibberifrons)*

Mills (1976) estimated the total New Zealand population of Grey Teal at ''less than 20 000'' but, perhaps aided by the widespread use of nest boxes (McFadden 1981), the population now seems much higher.

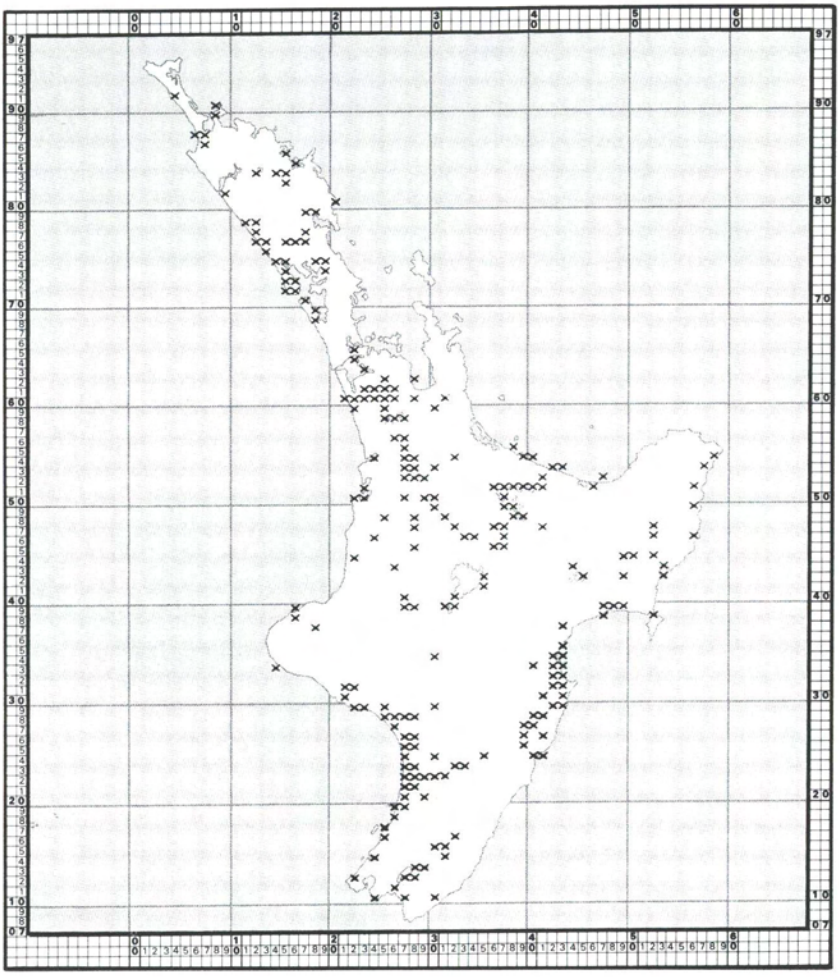


✕ = **Grey Teal** *(Anas gibberifrons)*

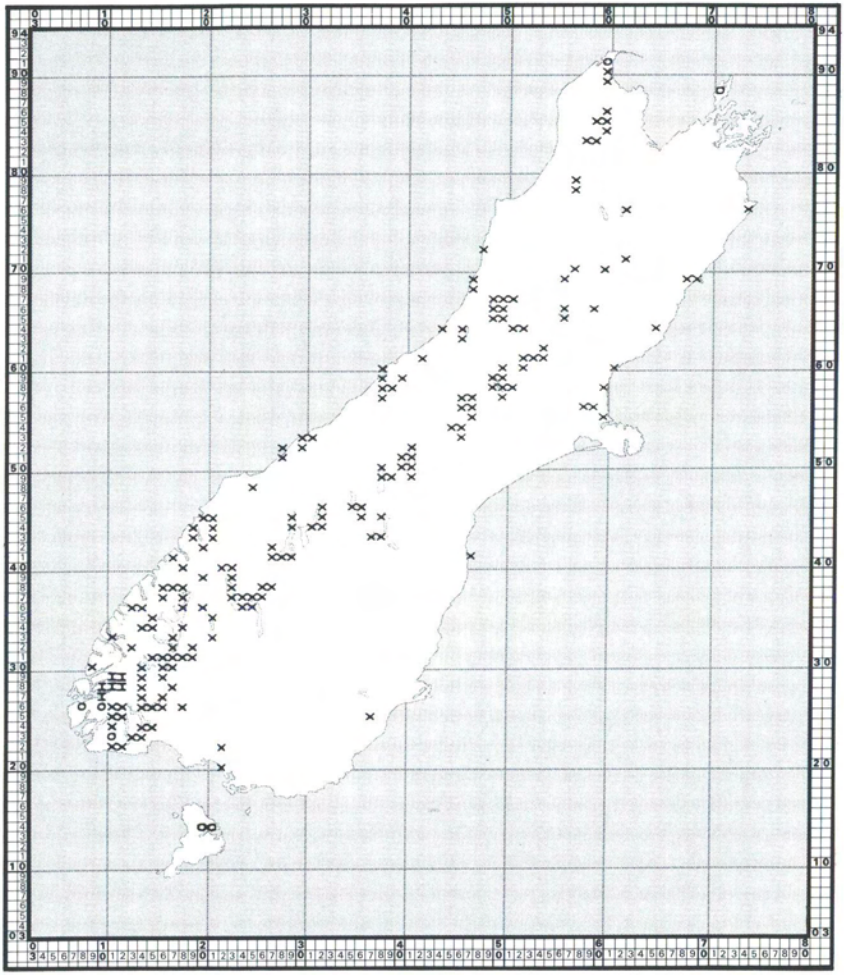


× = **New Zealand Shoveler** *(Anas rhynchotis)*

The NZ Shoveler population which seems stable, was estimated at 100 000 to 150 000 in 1981 (Williams 1981).



× = **New Zealand Shoveler** *(Anas rhynchotis)*

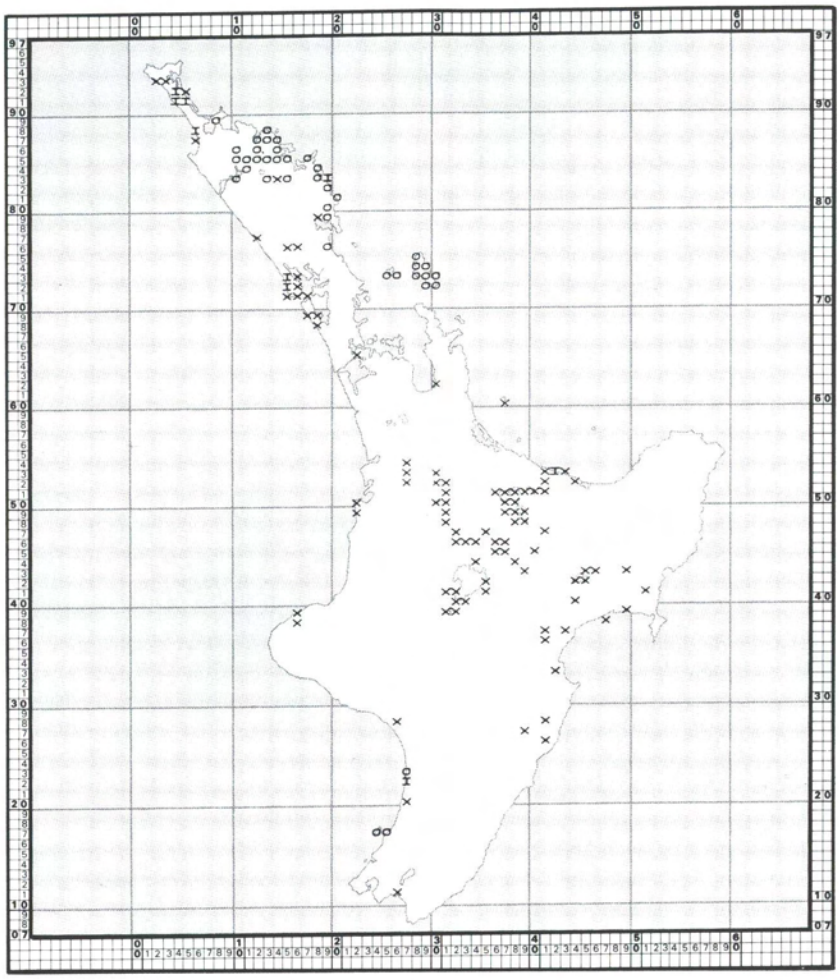


× = **New Zealand Scaup** *(Aythya novaeseelandiae)*

o = **Brown Teal** *(Anas aucklandica)*

⊻ = **Both species reported**

The Brown Teal population of the South Island is now reduced to a small remnant in Fiordland. Although a few Brown Teal persisted on Stewart Island until 1972, the species is now believed to be extinct there (Hayes & Williams 1982). No estimate is available for the number of Scaup in New Zealand but, where it occurs, the species is often quite numerous.

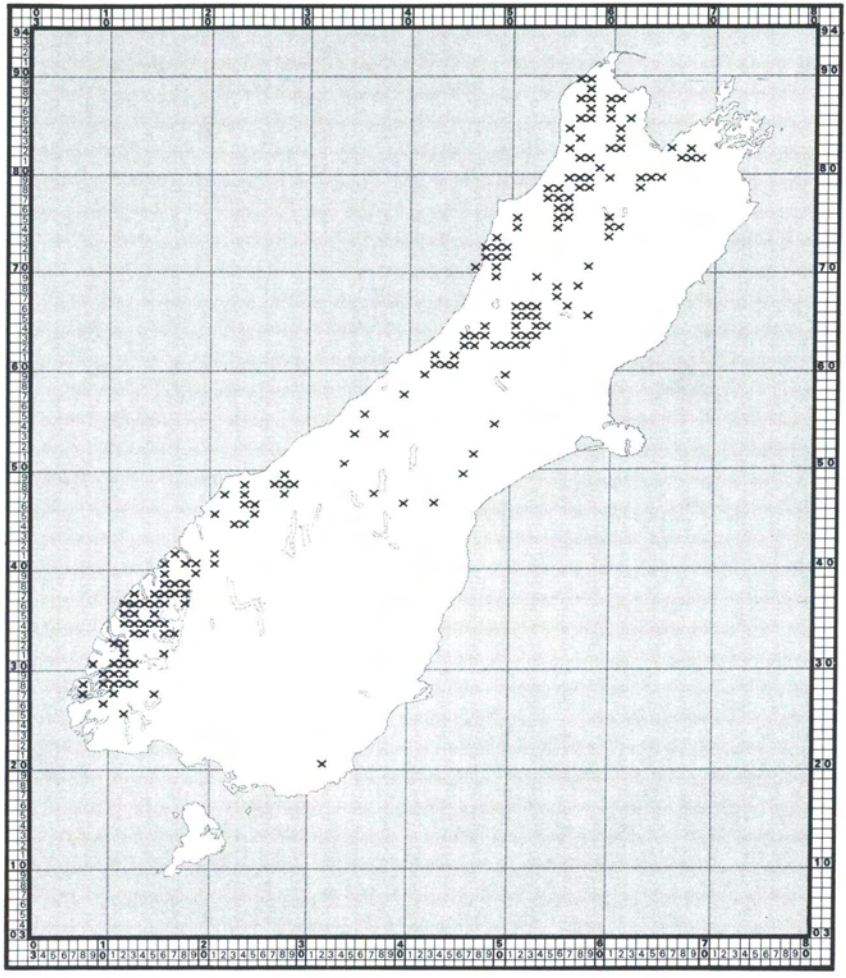


× = **New Zealand Scaup** *(Aythya novaeseelandiae)*

o = **Brown Teal** *(Anas aucklandica)*

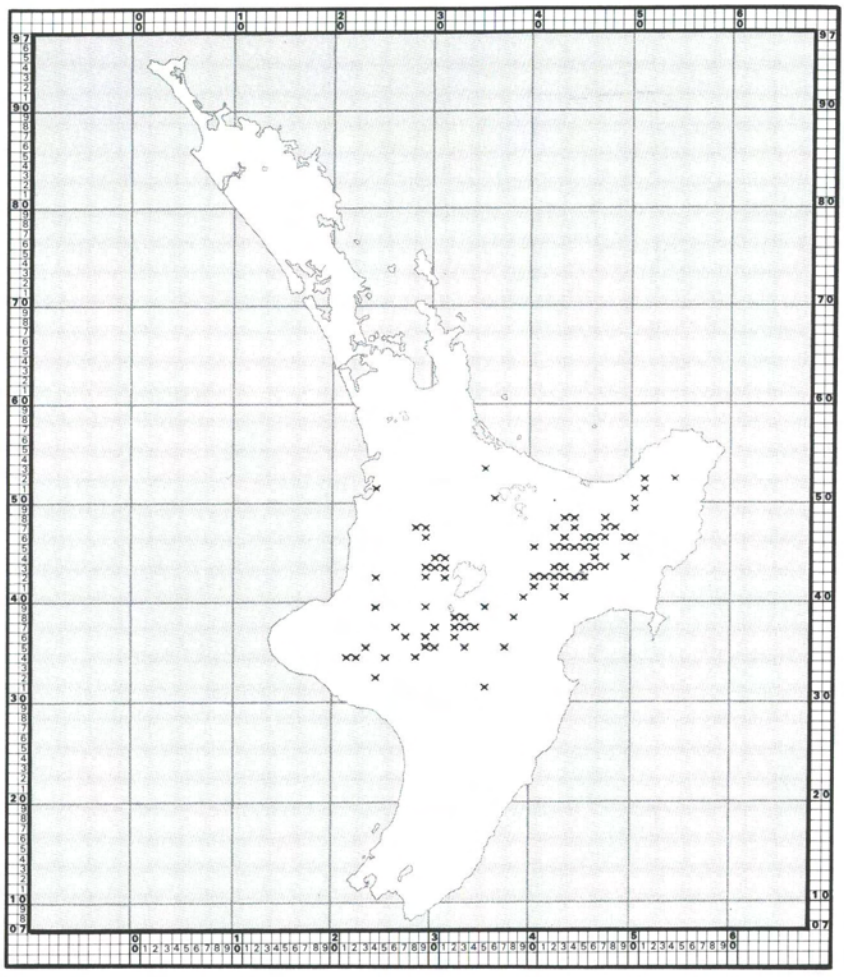
I = **Both species reported**

Except for a few pairs in the Bay of Plenty and Waikato districts, Brown Teal are now largely restricted to Great Barrier Island (about 1000) and North Auckland (about 500). Reports from the southwest of the North Island may result from captive-reared birds liberated on Kapiti Island in 1968 and in the Manawatu in 1973 (Hayes & Williams 1982).

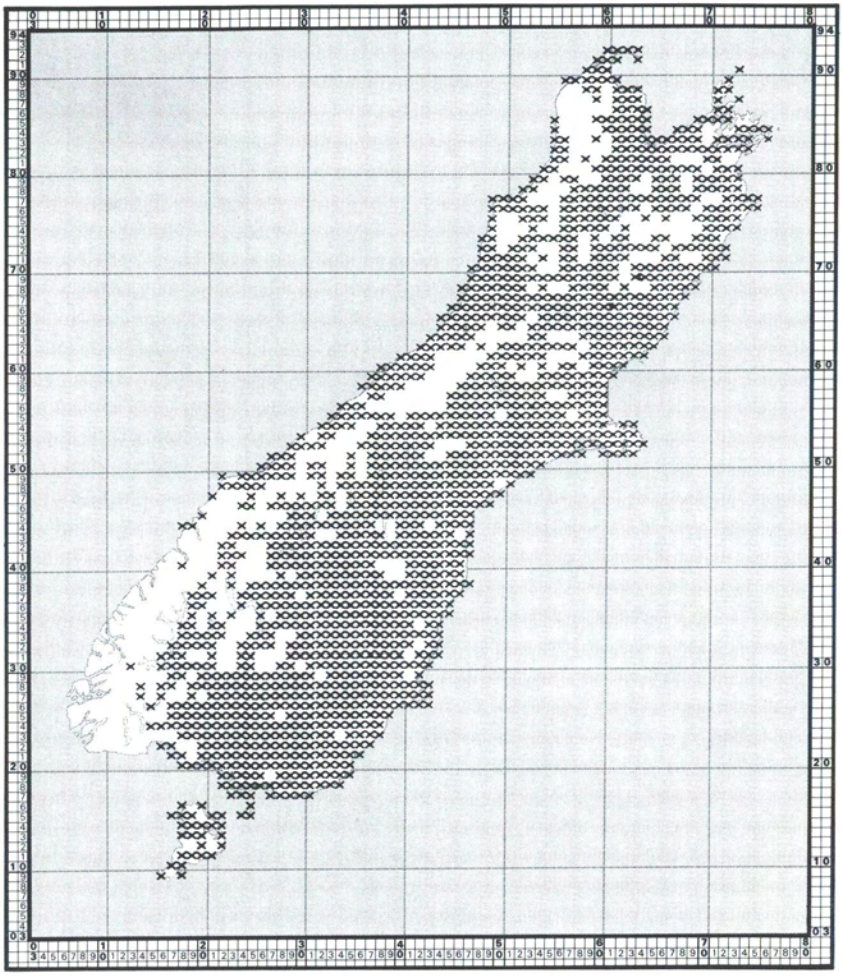


× = **Blue Duck** *(Hymenolaimus malacorhynchos)*

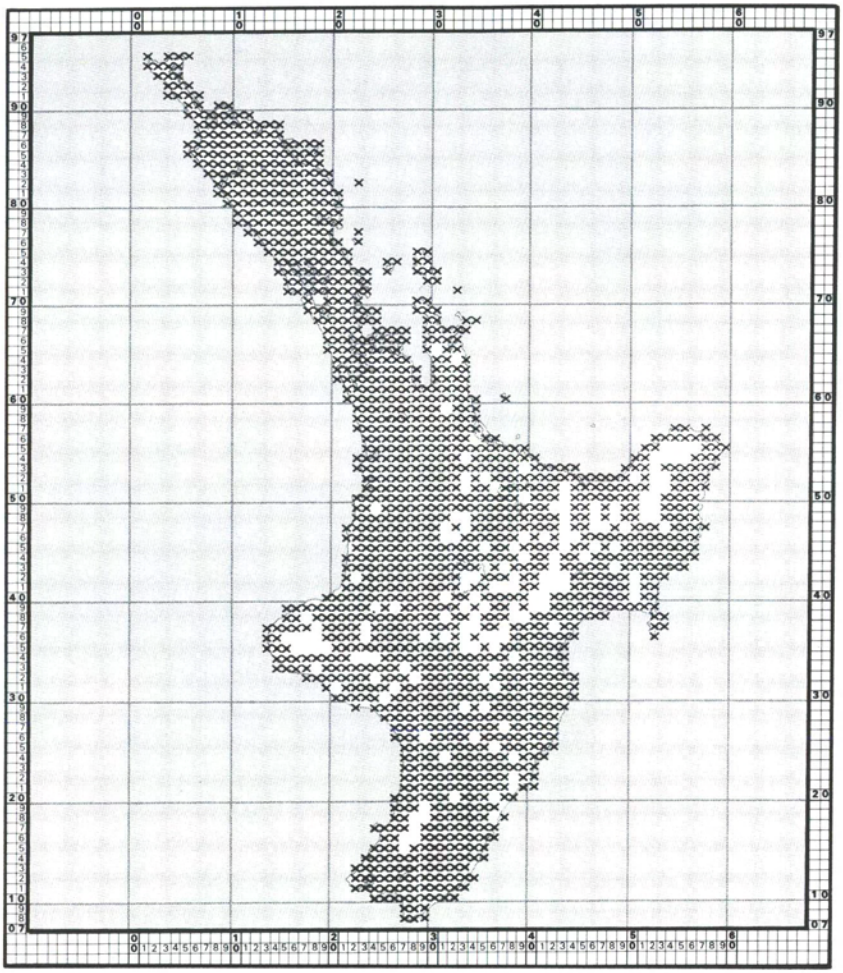
Although this species may be holding its own in the South Island, its range in the North Island is becoming increasingly discontinuous (M.J.Williams, pers.comm. 1984).



× = **Blue Duck** *(Hymenolaimus malacorhynchos)*

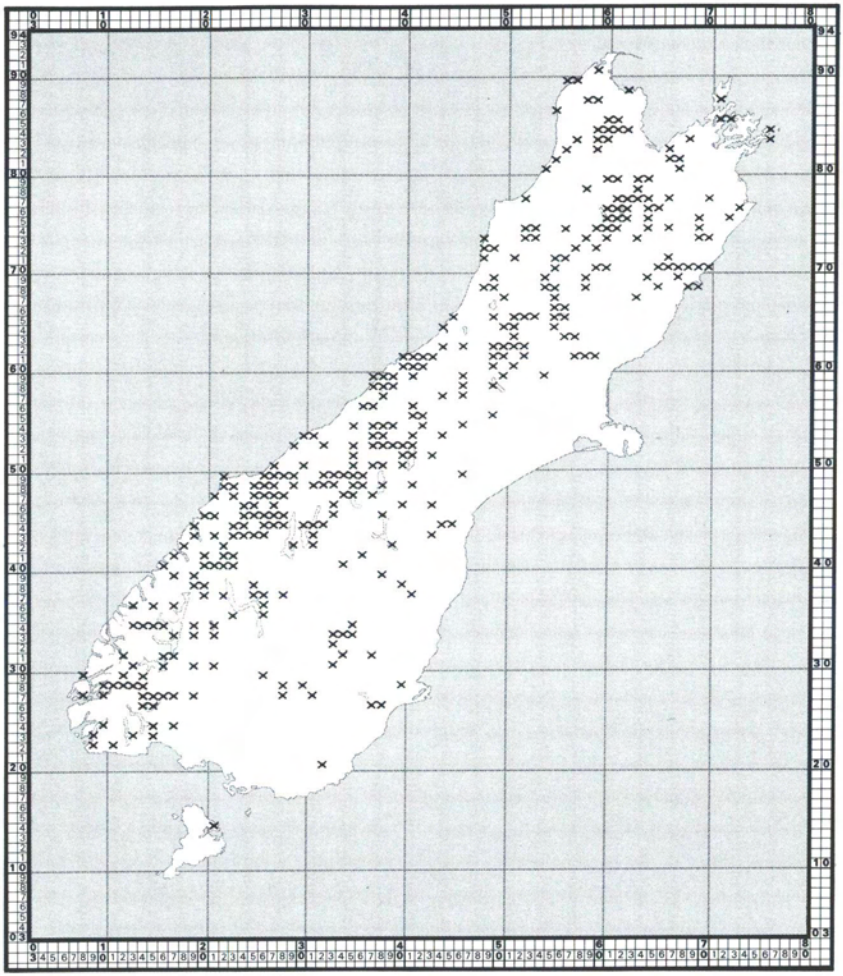


× = **Australasian Harrier** *(Circus approximans gouldi)*



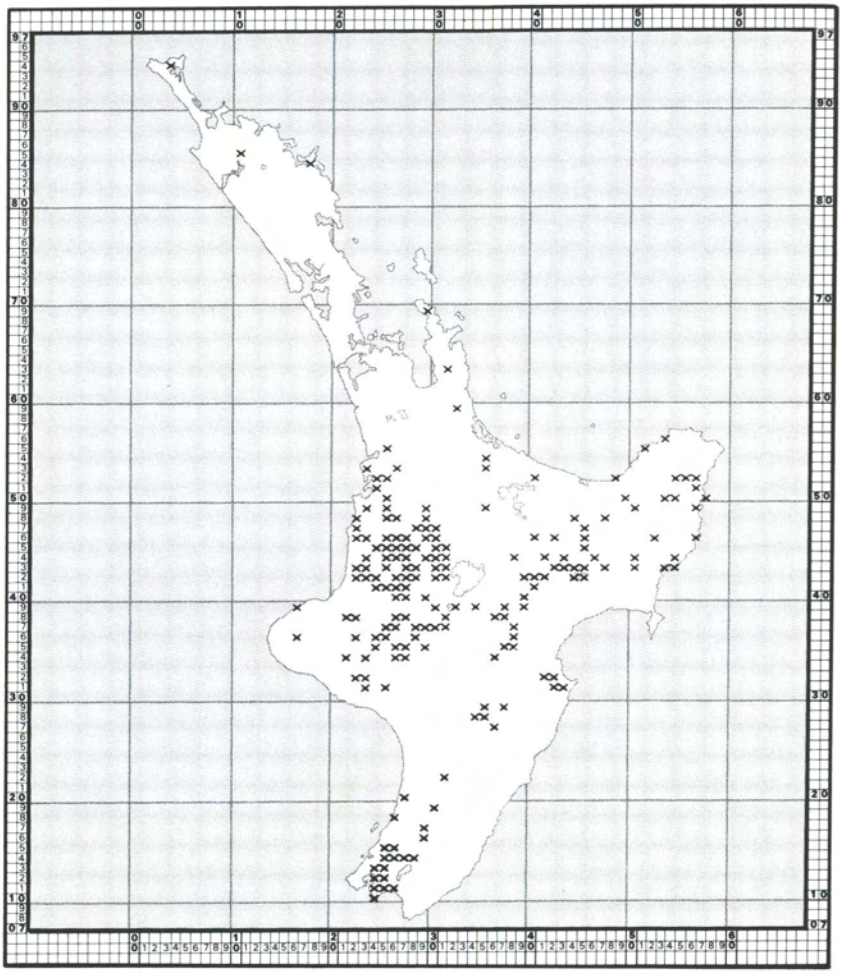
✕ = **Australasian Harrier** *(Circus approximans gouldi)*

Baker-Gabb (1981) found a population density of one bird per 50 ha in sand country in the southwest of the North Island. The home ranges of four pairs averaged 900 ha. His study area, however, was chosen for its high density of birds and so may not be typical.

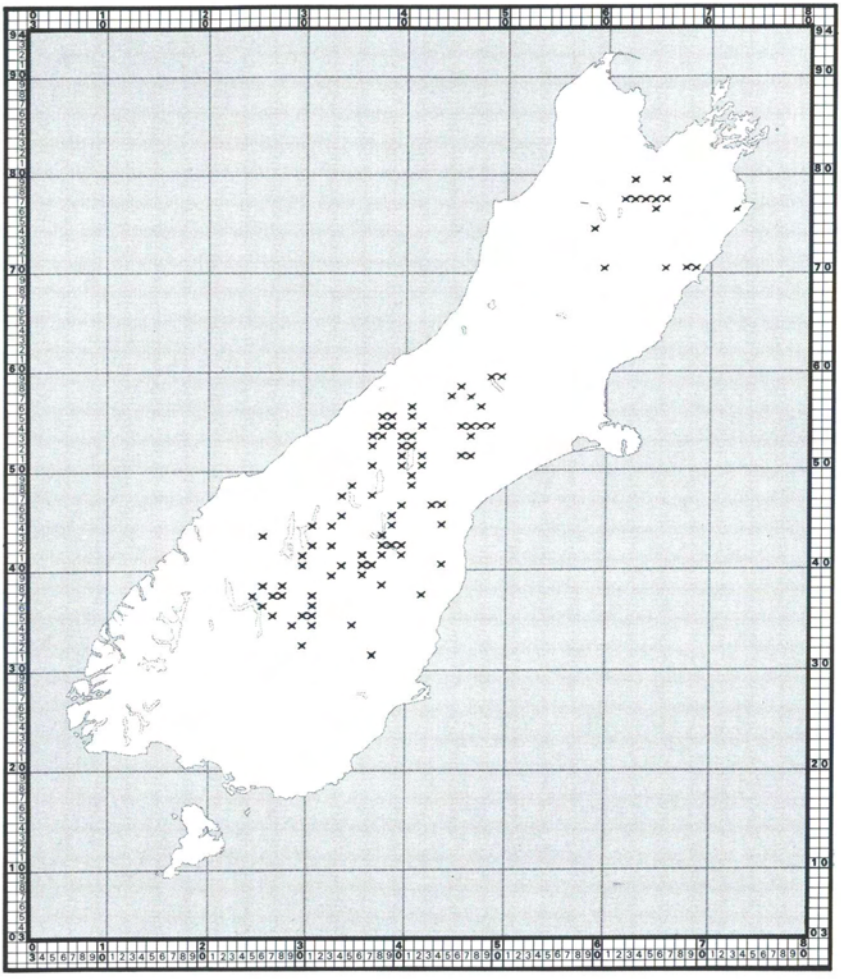


× = **New Zealand Falcon** *(Falco novaeseelandiae)*

According to Fox (1978), the total New Zealand population consists of "probably 3000 to 4500 pairs... ; 2000 pairs at least."

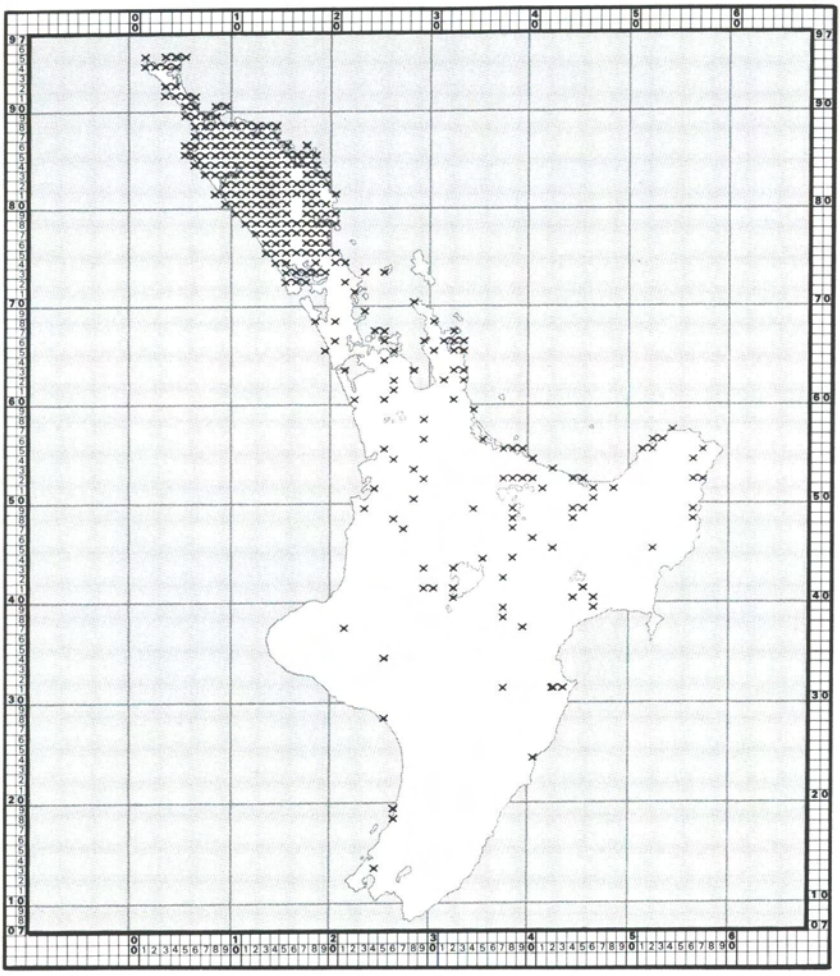


× = **New Zealand Falcon** *(Falco novaeseelandiae)*



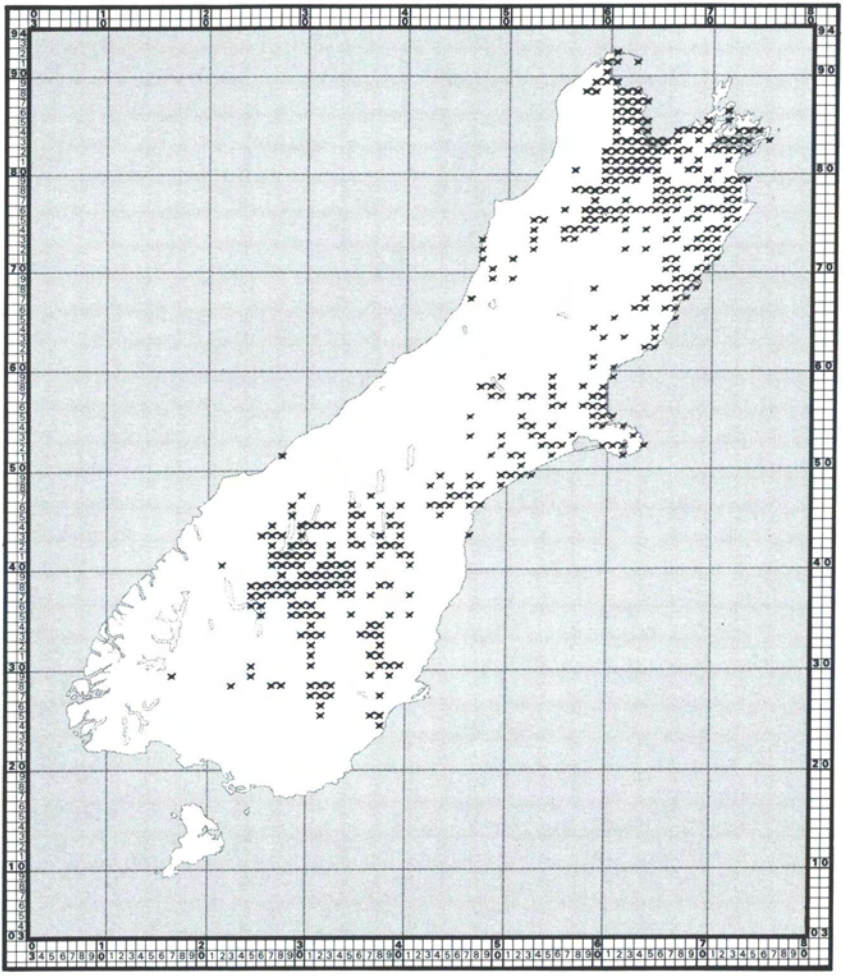
× = **Chukor** *(Alectoris chukar)*

Some 500 Chukor, including birds of both Himalayan and Persian races, were liberated in the South Island on 18 occasions between 1926 and 1932; three early liberations in the North Island were unsuccessful (Williams 1951). No records of Chukor in the North Island were received for the atlas despite recent liberations.



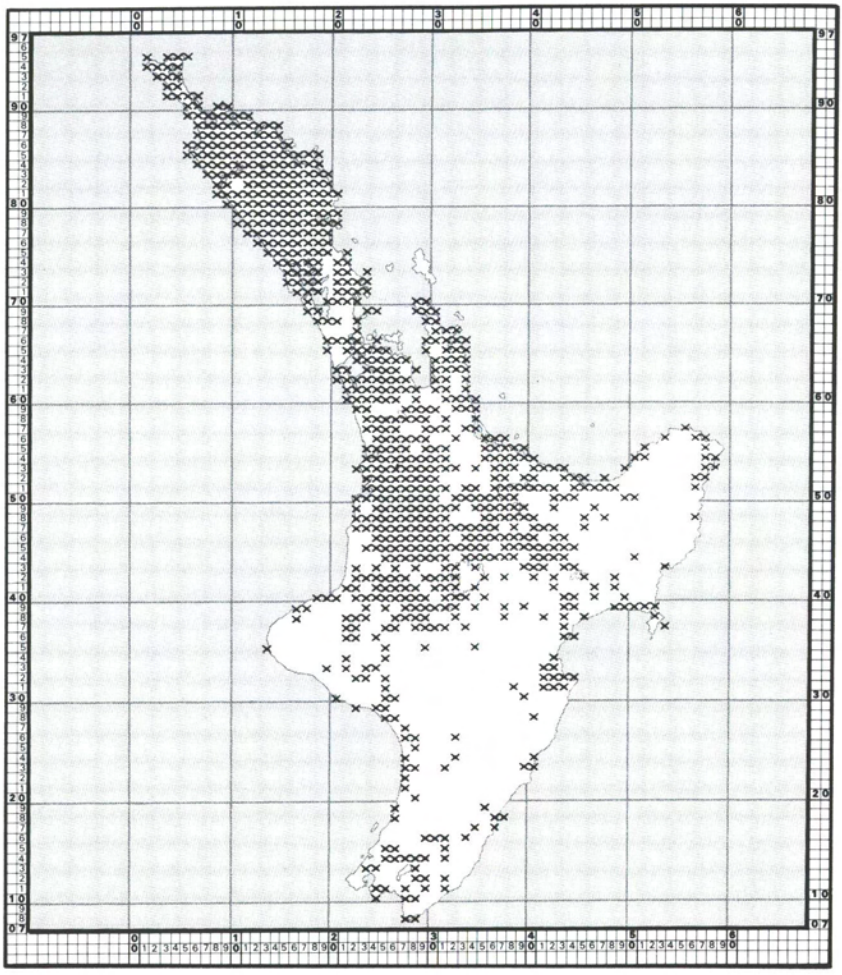
× = **Brown Quail** *(Synoicus ypsilophorus)*

This Australian species was introduced on several occasions between 1866 and 1876, the largest consignment being 510 birds to the Auckland district in 1871 (Thomson 1922). No South Island records of Brown Quail were received for the atlas.

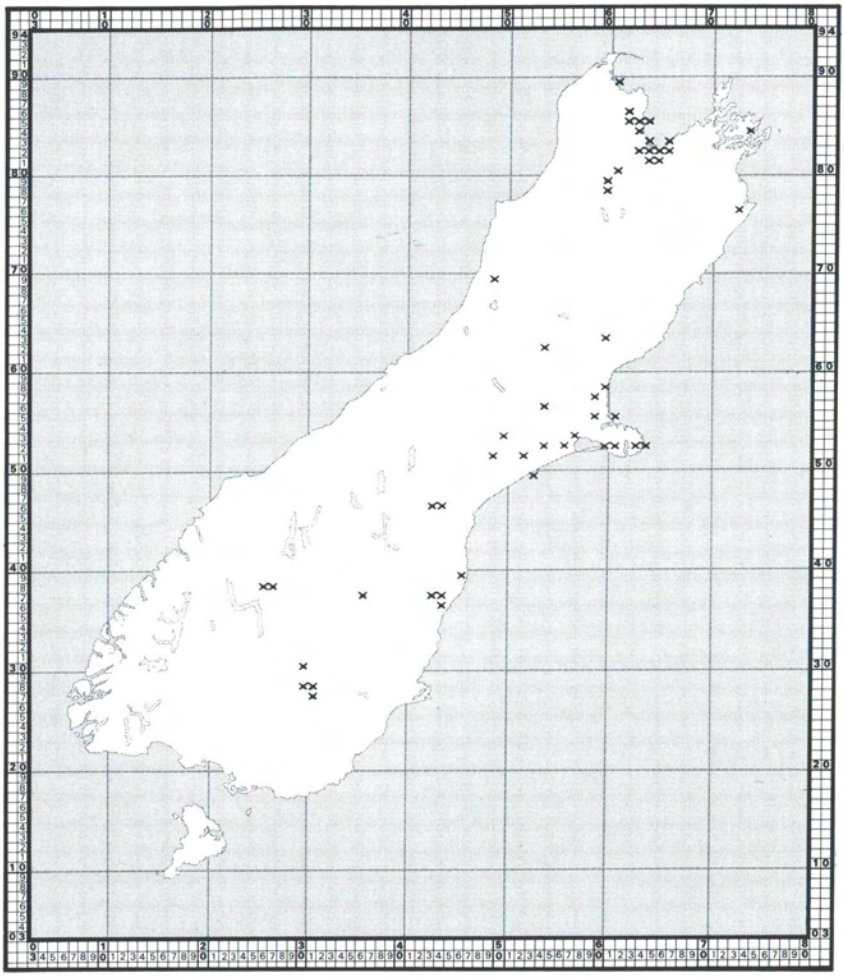


× = **California Quail** *(Lophortyx californica)*

Initial importations to both the North and South Islands were made during the decade 1860 to 1870. The spread of the species was accelerated by many subsequent liberations of New Zealand-bred stock (Williams 1952).

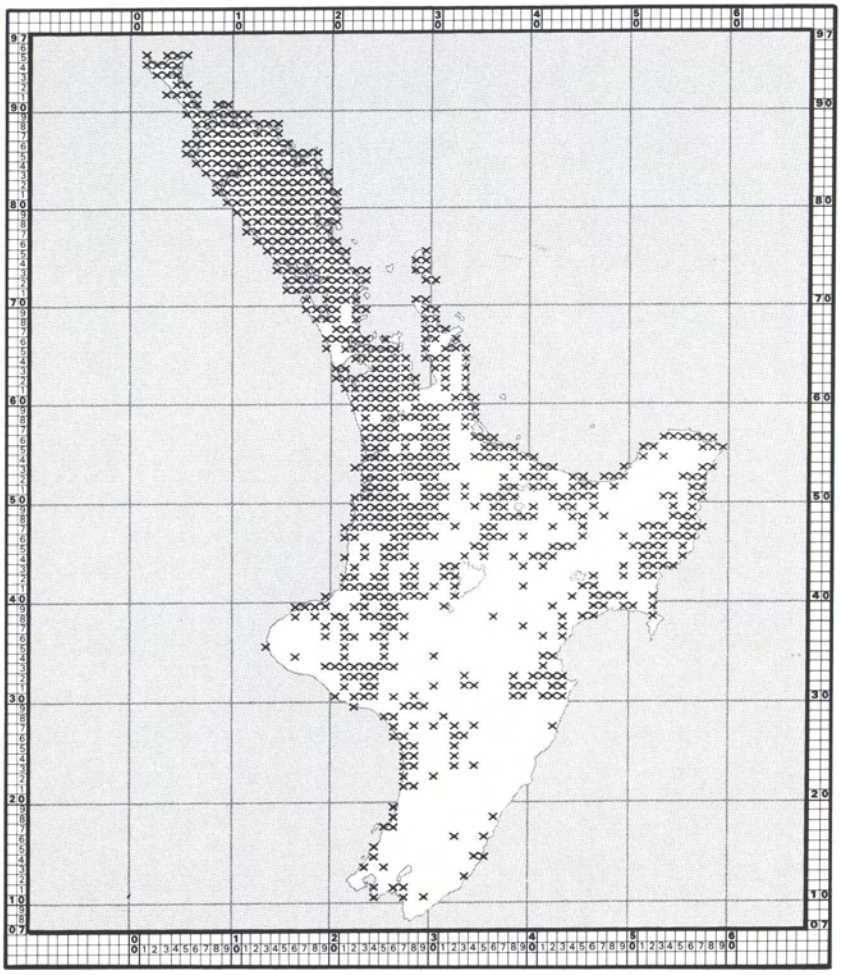


× = **California Quail** *(Lophortyx californica)*

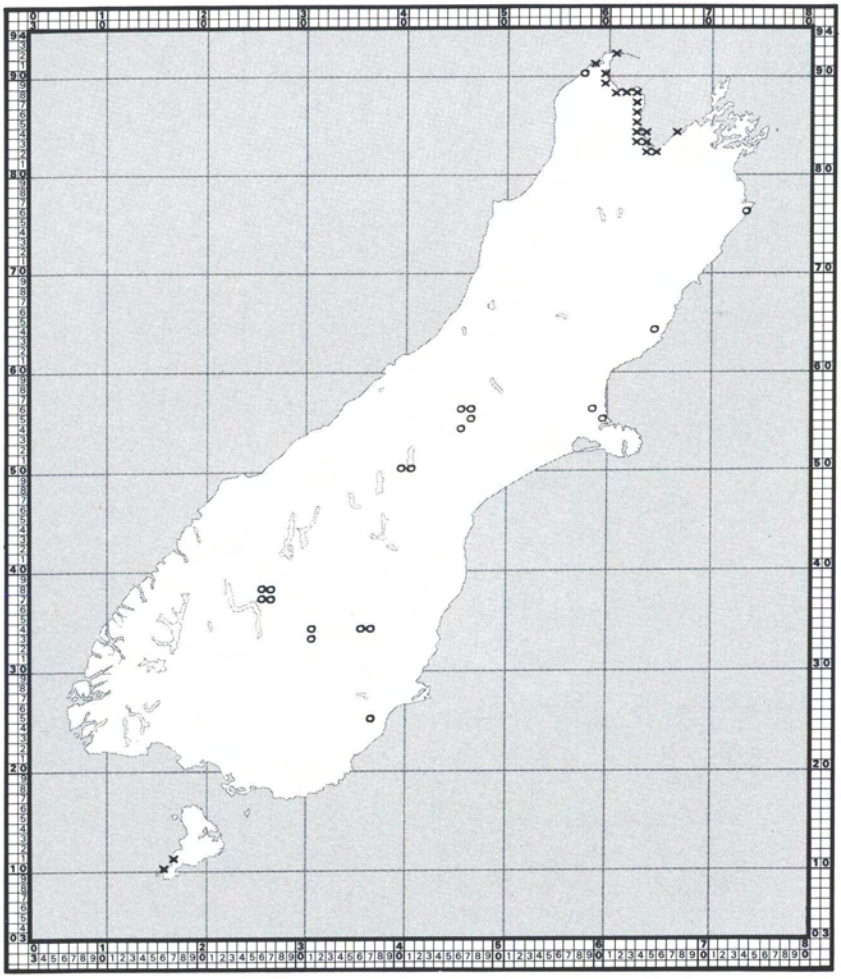


× = **Pheasant** *(Phasianus colchicus)*

Repeated importations, involving several subspecies, were made between 1842 and 1938, some direct from China and others from England (Westerskov 1955). The species was further spread by numerous releases of New Zealand-bred stock. In some districts local populations are still periodically reinforced in this way.



× = **Pheasant** *(Phasianus colchicus)*

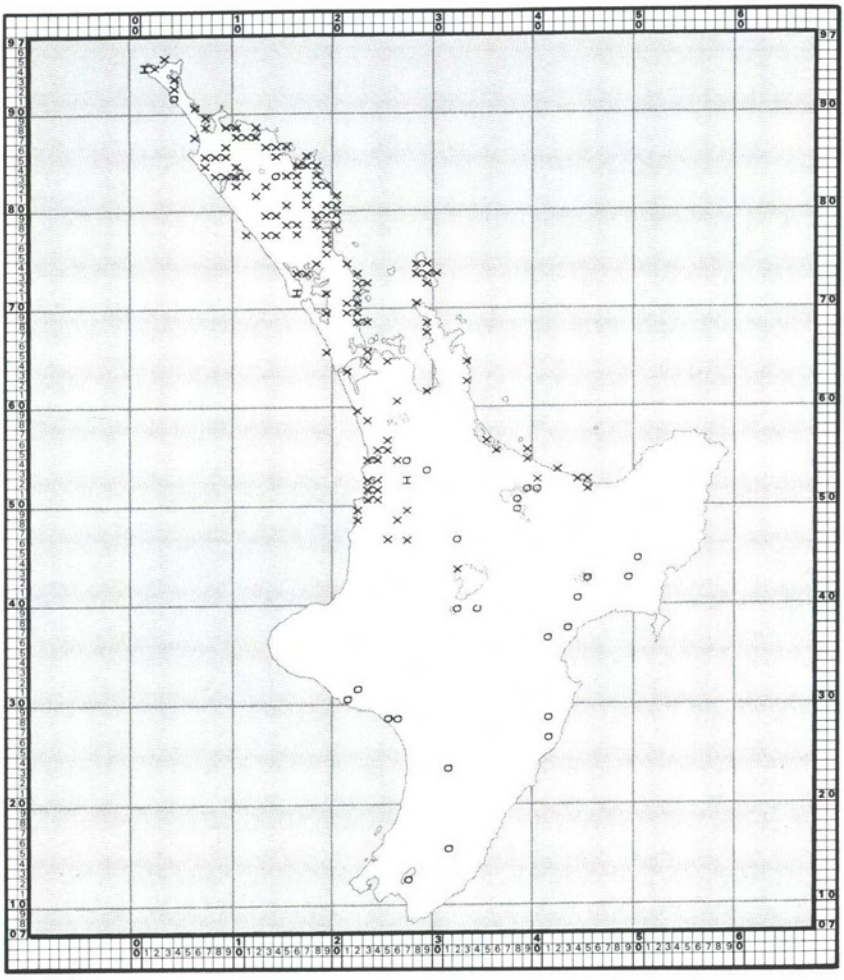


× = **Banded Rail** *(Rallus philippensis)*

o = **Australian Coot** *(Fulica atra australis)*

⧗ = **Both species reported**

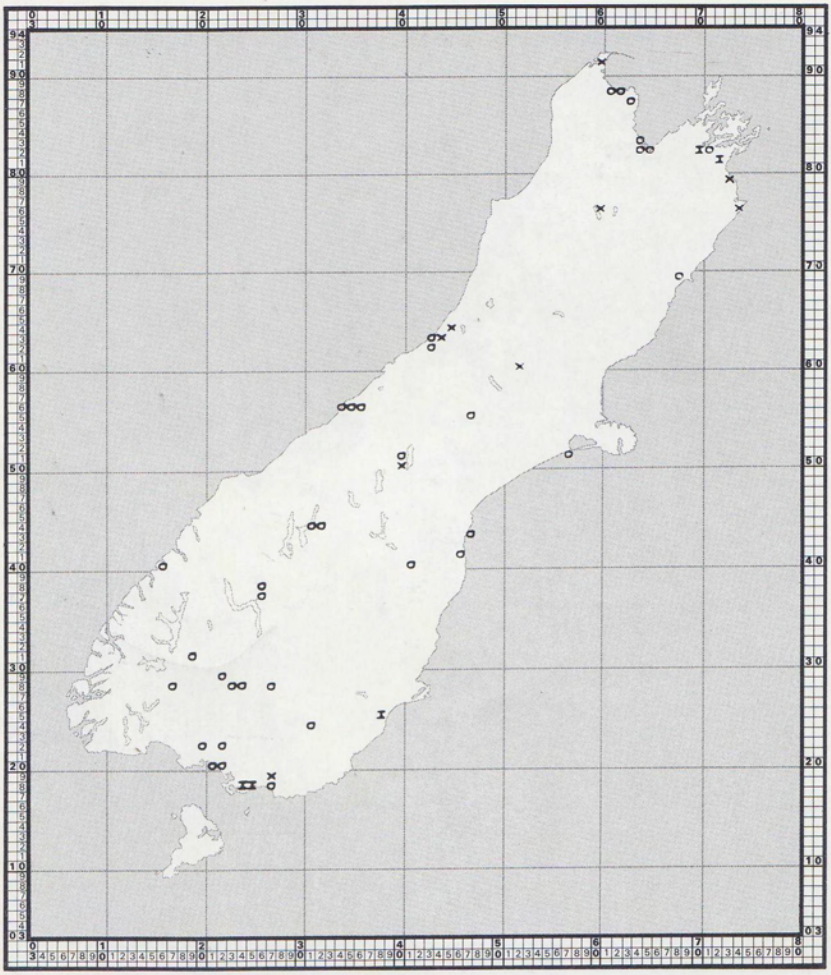
The Australian Coot, formerly regarded as a straggler to New Zealand (eight records 1873-1953), became established during the mid-1950s. Breeding, first recorded at Lake Hayes (Otago) in 1958, was soon reported from other localities in both main islands (details in Kinsky 1970).



× = **Banded Rail** *(Rallus philippensis)*

O = **Australian Coot** *(Fulica atra australis)*

I = **Both species reported**

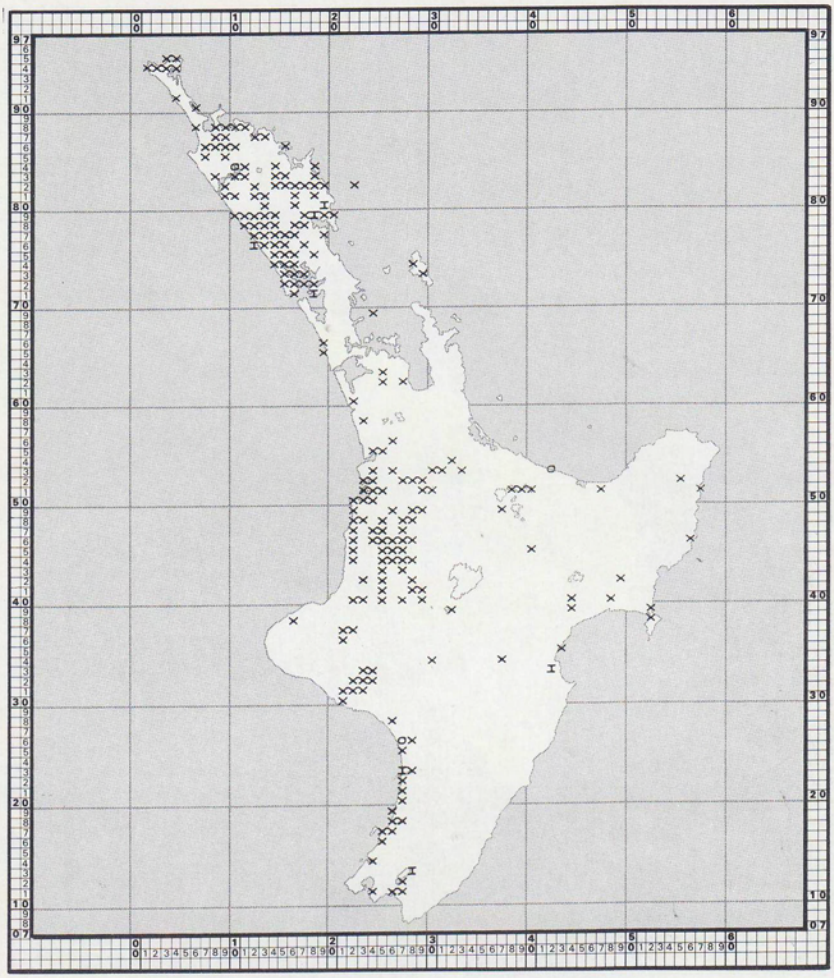


× = **Spotless Crake** *(Porzana tabuensis)*

o = **Marsh Crake** *(Porzana pusilla)*

I = **Both species reported**

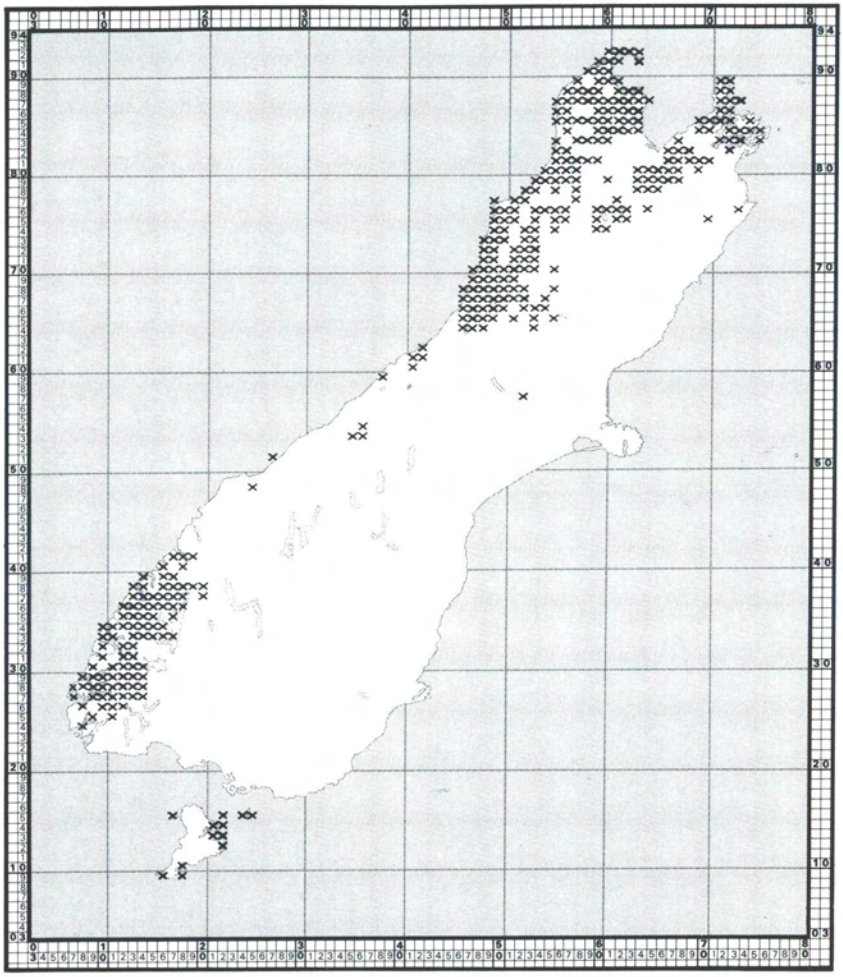
The playing of tape recordings of Spotless Crake calls (to which the birds readily respond) has shown in recent years that this species is far more widely distributed than was formerly realised. Marsh Crakes (for which satisfactory tapes are only just becoming available) may also prove to be much more common than the maps (pages 94 - 95) show.



× = **Spotless Crake** *(Porzana tabuensis)*

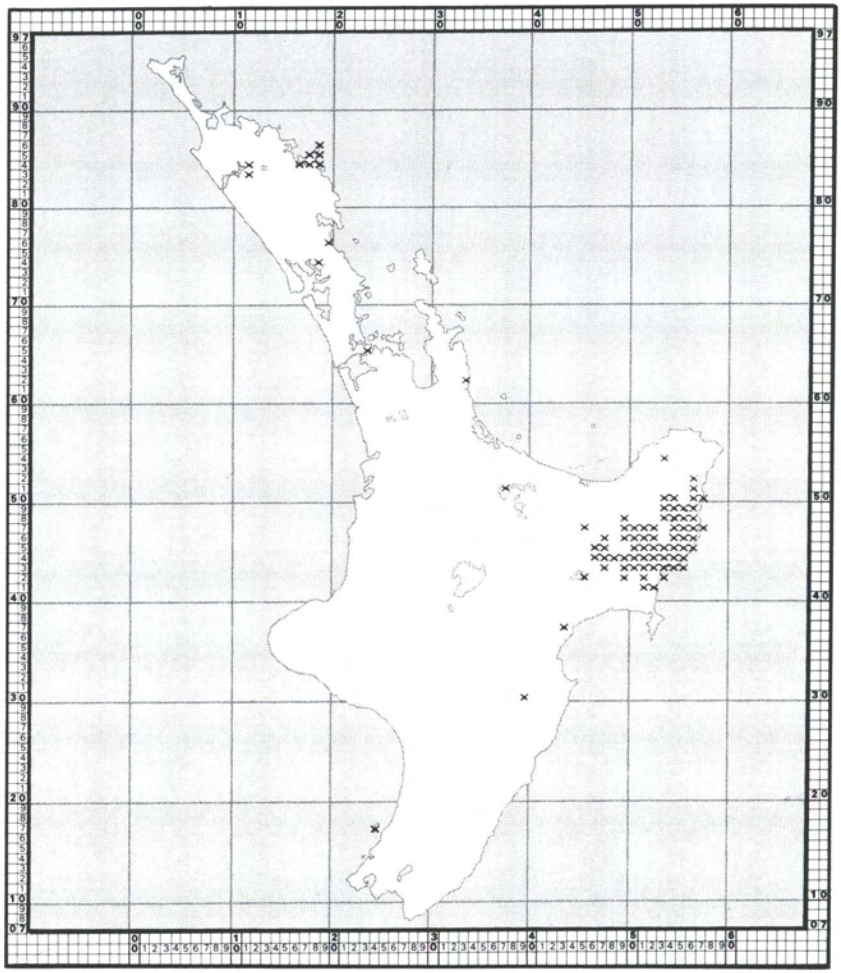
O = **Marsh Crake** *(Porzana pusilla)*

I = **Both species reported**



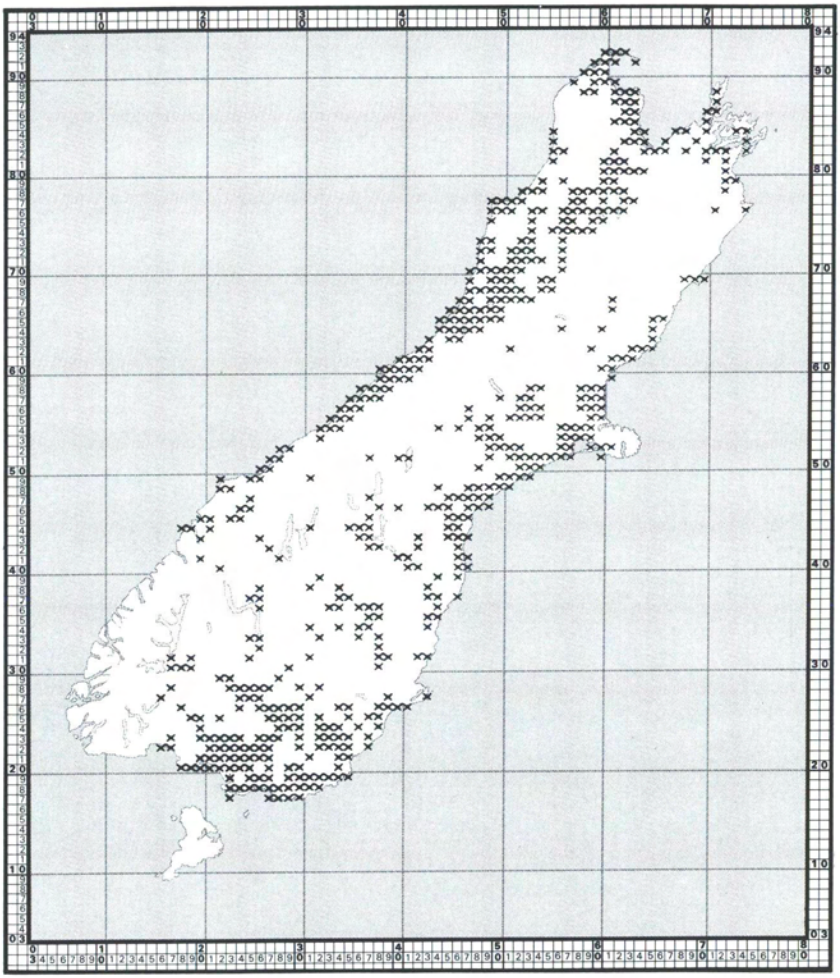
× = **Weka** *(Gallirallus australis)*

The map does not differentiate between the three subspecies *(australis, hectori* and *scotti)* that occur in the South Island or on Stewart Island. *Gallirallus a.hectori*, formerly widespread on the eastern parts of the South Island, was introduced to the Chatham Islands in 1905. It later became extinct in the South Island, but was reintroduced to Arthur's Pass National Park in 1962 with wild stock from the Chatham Islands (Kinsky 1970).



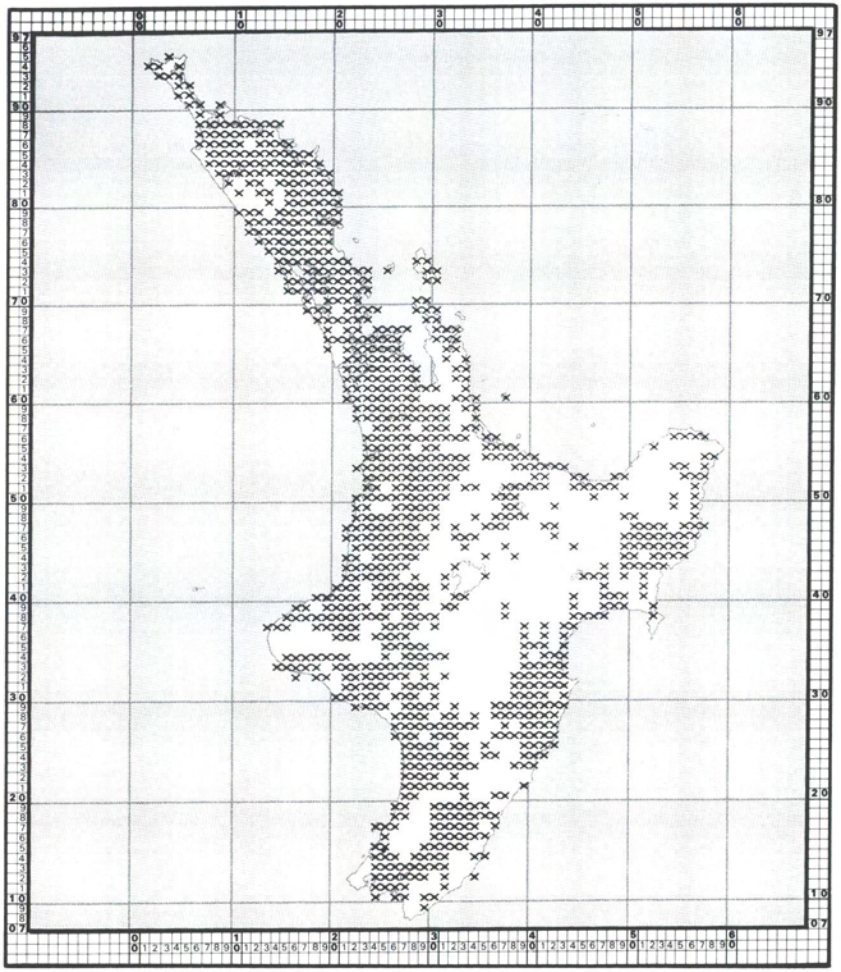
✕ = **Weka** *(Gallirallus australis)*

Formerly widespread in the North Island, this race *(G.a.greyi)* is now confined mainly to the Poverty Bay district. Attempts to re-establish wekas in other North Island districts have been unsuccessful except on Kapiti Island, on Mokoia Island (Lake Rotorua) and in the Bay of Islands.

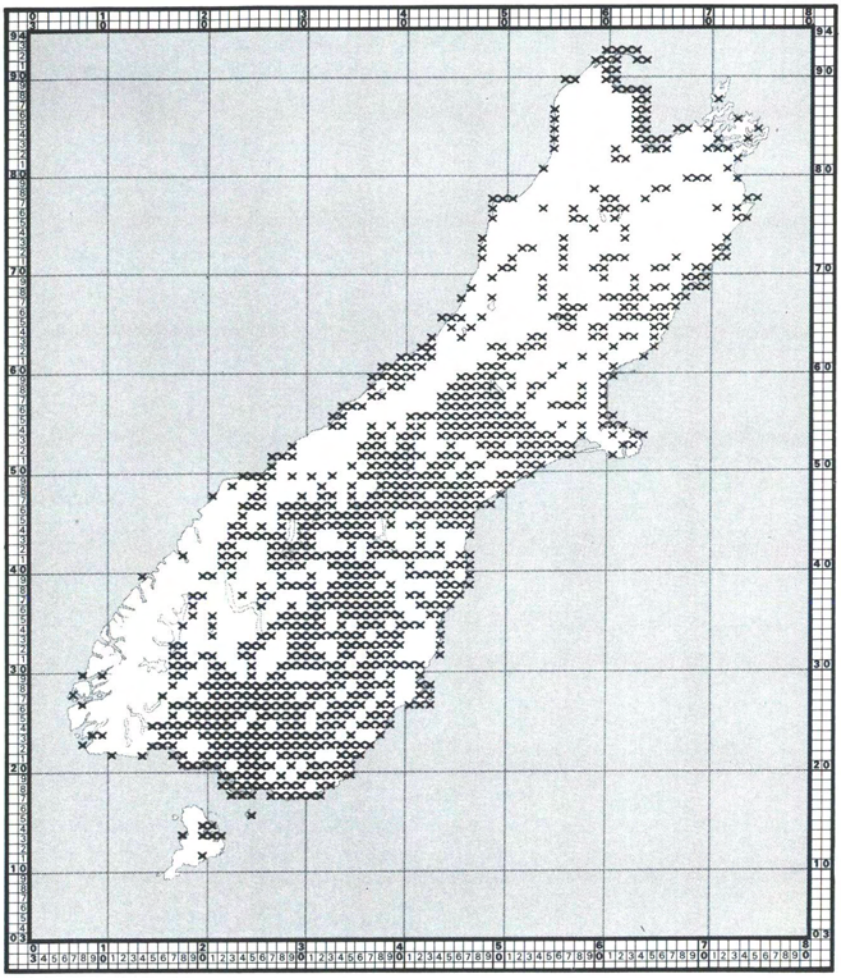


× = **Pukeko** *(Porphyrio porphyrio melanotus)*

The New Zealand population has been estimated at some 600 000 birds (Williams 1981), and Carroll (1969) indicated relative abundance in different districts.

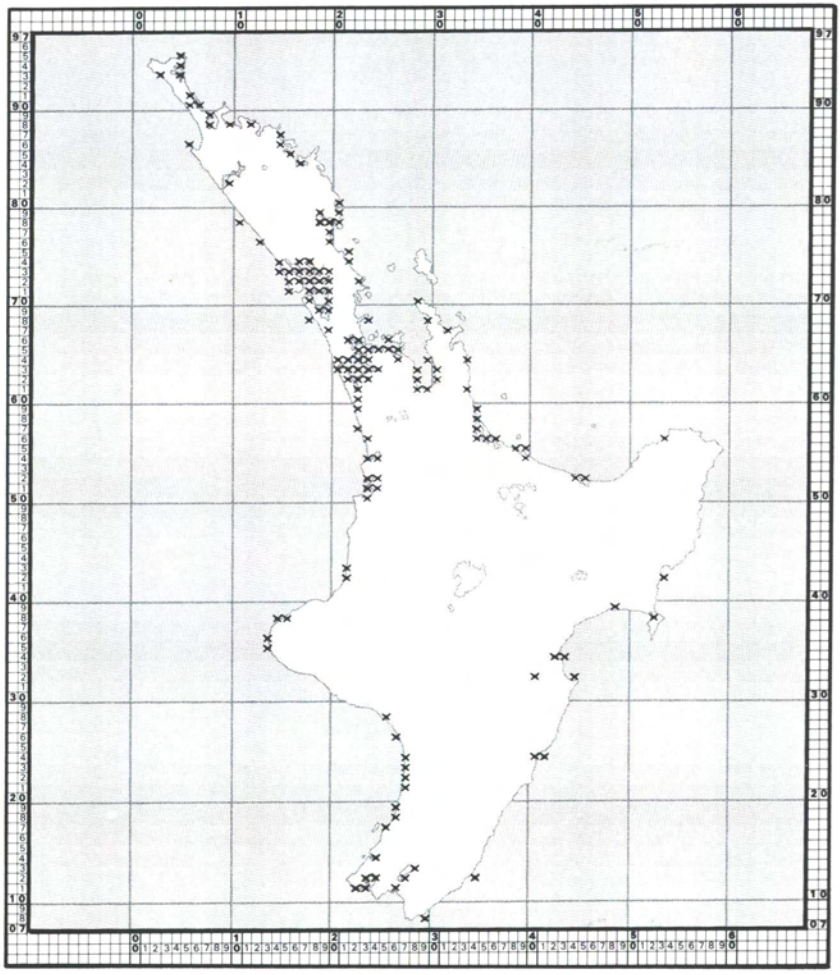


× = **Pukeko** *(Porphyrio porphyrio melanotus)*

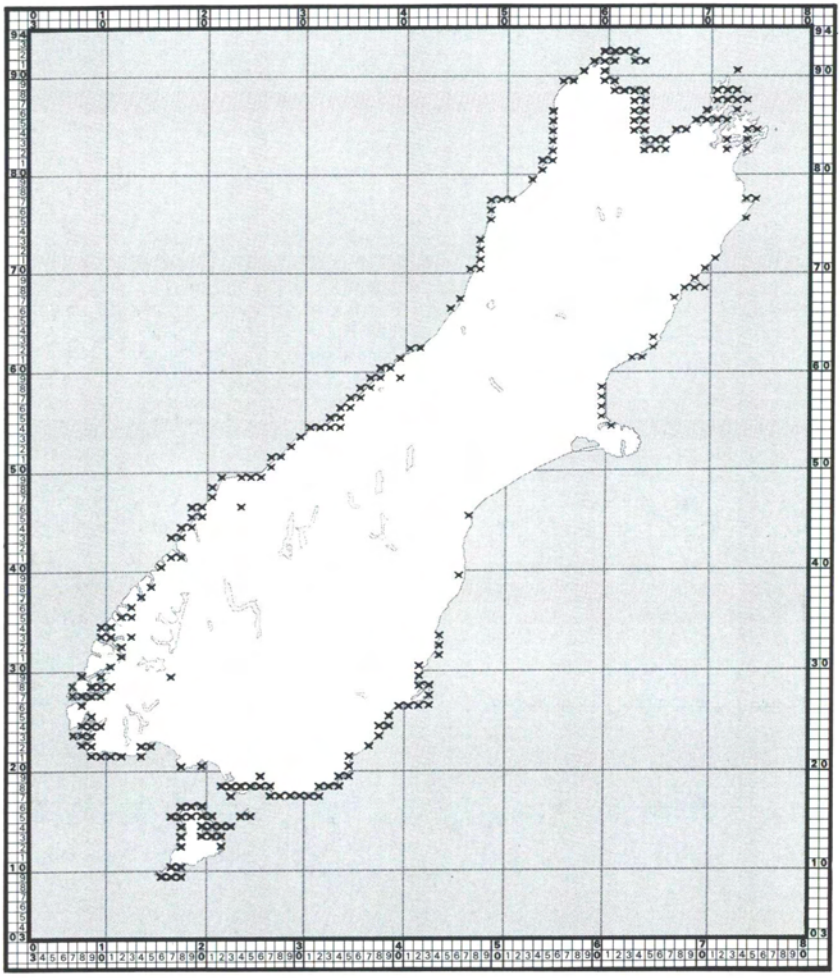


× = **South Island Pied Oystercatcher** *(Haematopus ostralegus finschi)*

This species breeds in inland districts of the South Island, and the 1970s population was estimated to be 49 000 (Baker 1972). A large part of the population, however, winters in harbours and estuaries in northern districts of the North Island (Baker 1973). The species seems to have increased greatly over recent years, and an OSNZ national wader count in June 1984 (winter) recorded 79 900 with 68% in the North Island (P.M.Sagar, pers.comm.).

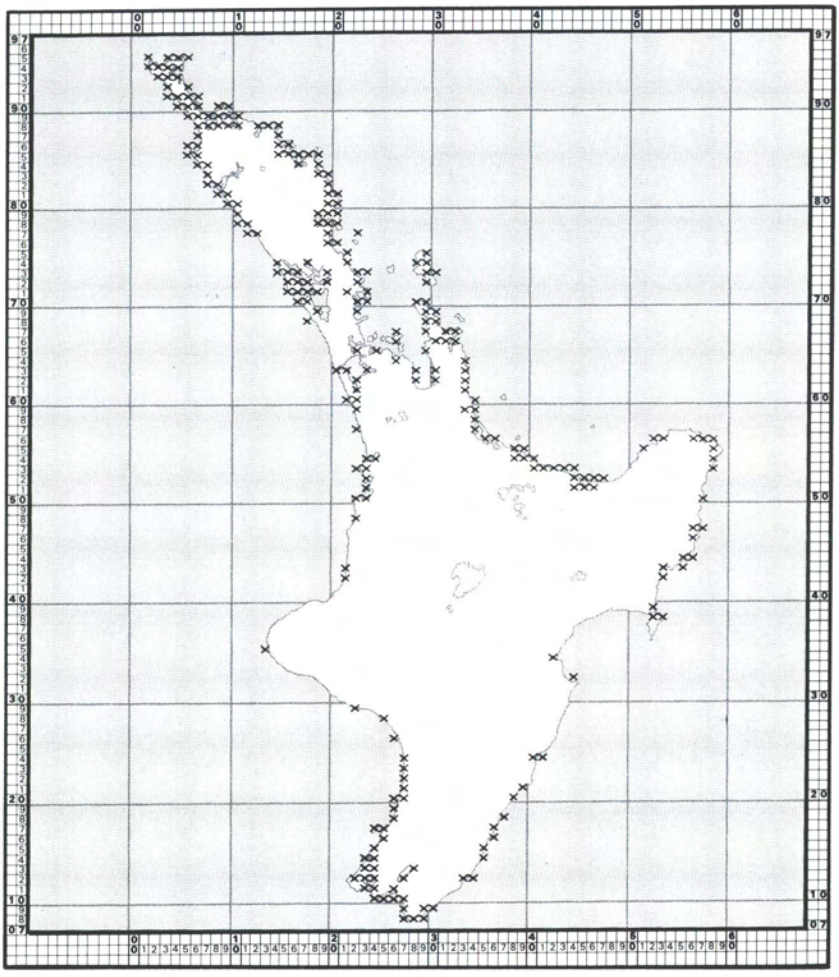


× = **South Island Pied Oystercatcher** *(Haematopus ostralegus finschi)*

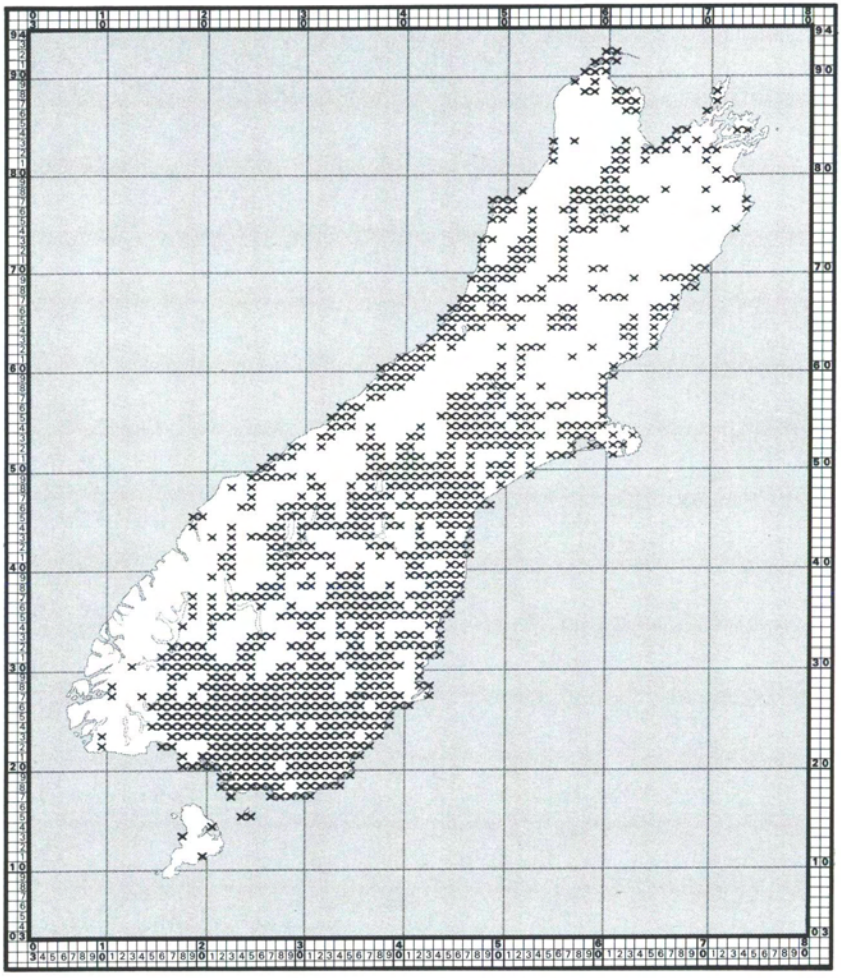


✖ = **Variable Oystercatcher** *(Haematopus unicolor)*

The Variable Oystercatcher (pages 102 - 103) is a coastal breeder in both islands.

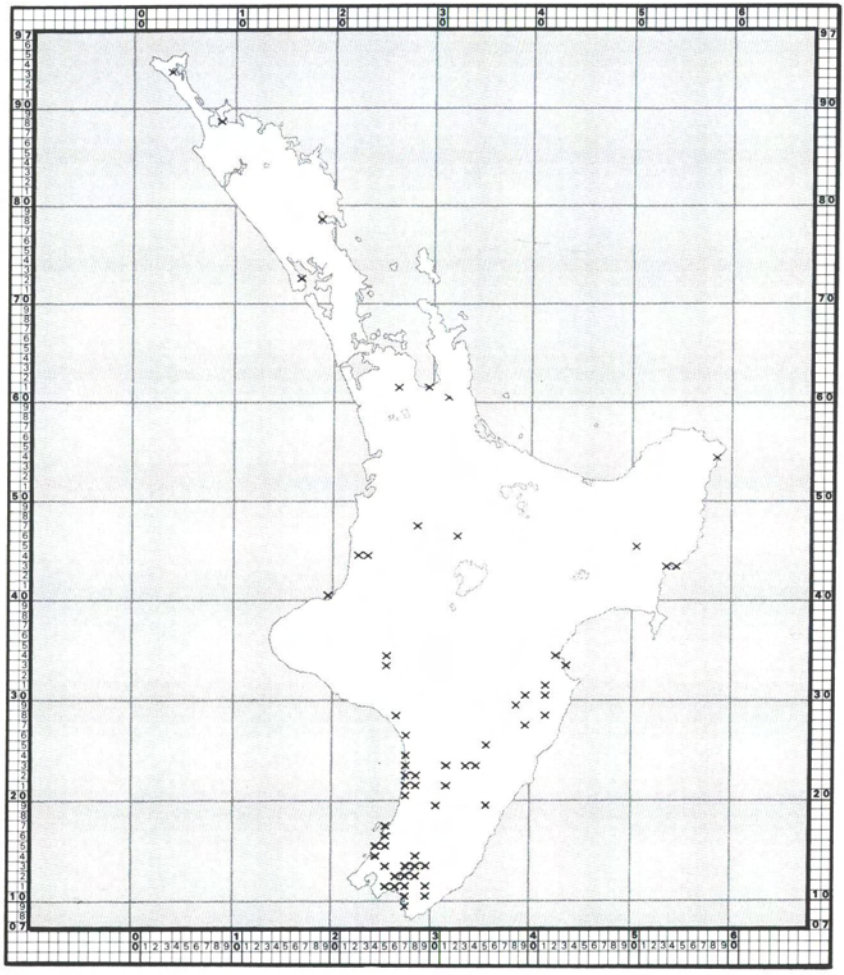


× = **Variable Oystercatcher** *(Haematopus unicolor)*

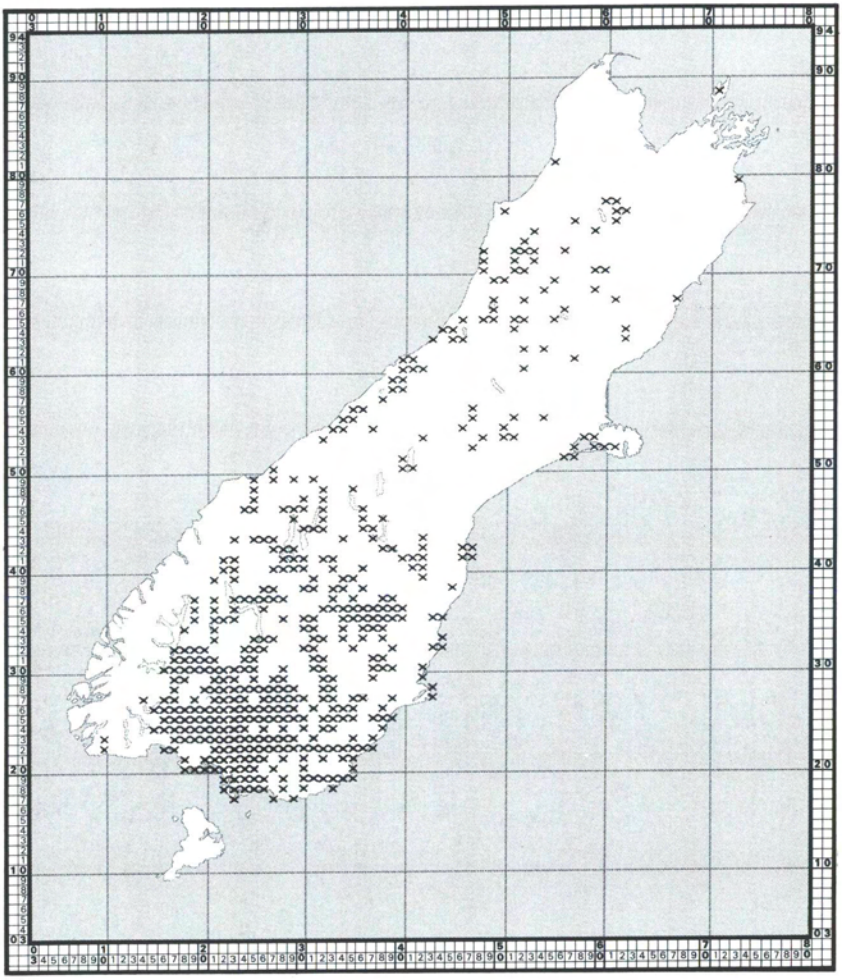


× = **Spur-winged Plover** *(Vanellus miles novaehollandiae)*

This Australian species established itself and began breeding in Southland in about 1932 and has since spread throughout the South Island (Barlow 1972). It is now rapidly colonising the North Island (See pages 108 - 109).

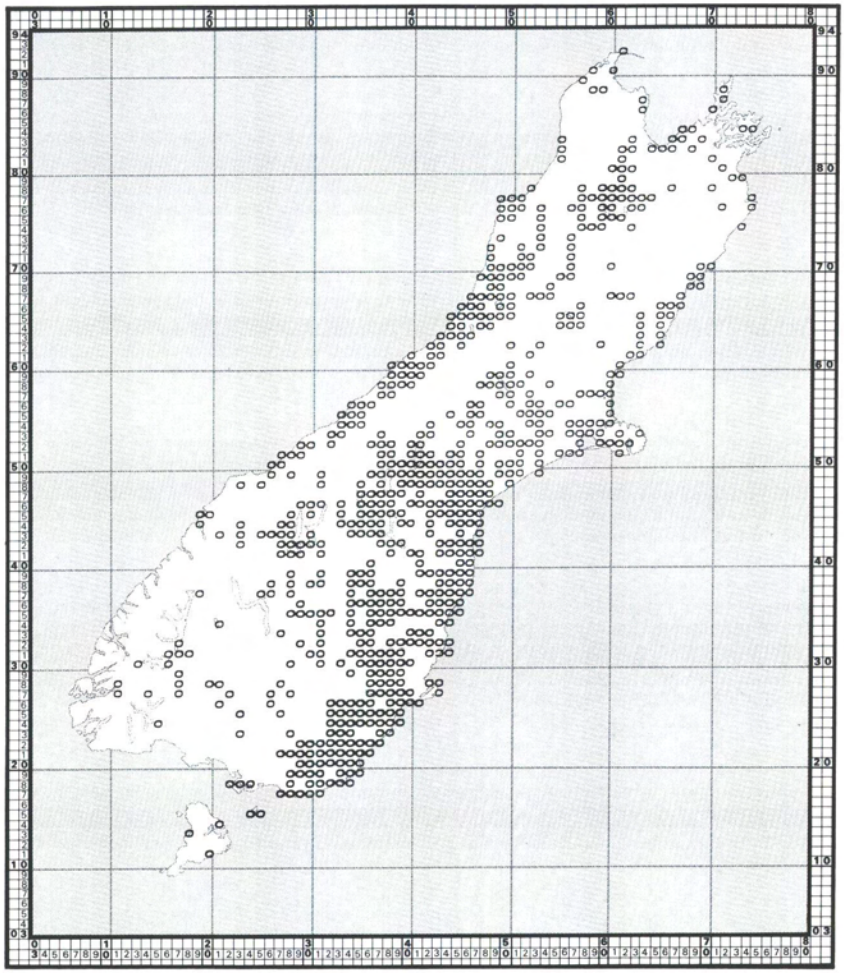


× = **Spur-winged Plover** *(Vanellus miles novaehollandiae)*



× = **Spur-winged Plover** *(Vanellus miles novaehollandiae)*

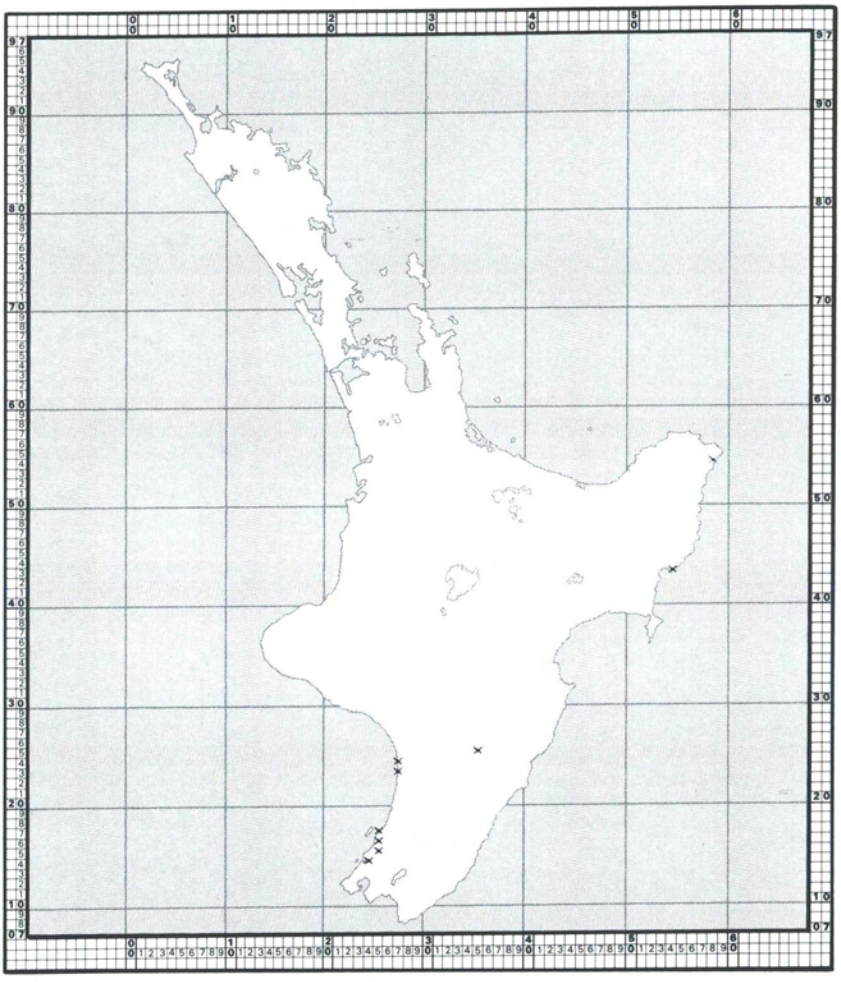
Reports from 1969 to 1974 inclusive



O = Spur-winged Plover *(Vanellus miles novaehollandiae)*

Reports from 1975 to 1979 inclusive

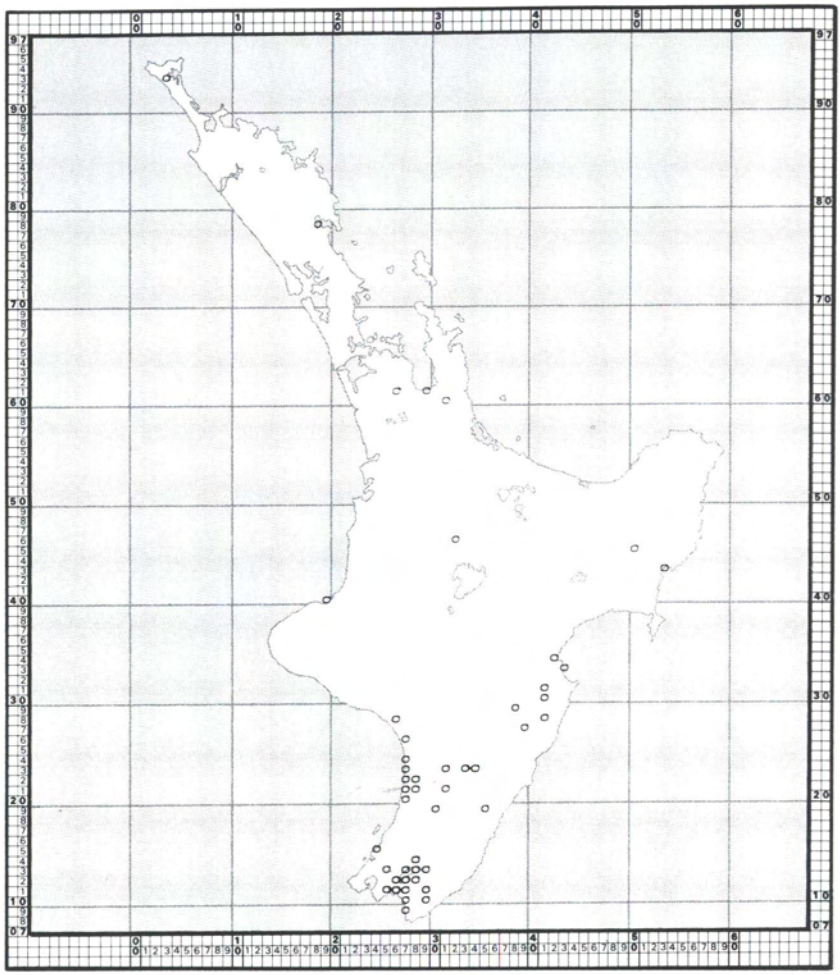
The seeming scarcity of Spur-winged Plovers in Southland in 1975-1979 (compared with 1969-1974) is an artifact because many fewer cards were submitted from Southland during 1975-1979. The greater number of records in other parts of the South Island in 1975-1979, probably reflects a real spread of the species. Such a noisy bird, had it been present, is unlikely to have been overlooked in the many squares surveyed in 1969-1974.



× = **Spur-winged Plover** *(Vanellus miles novaehollandiae)*

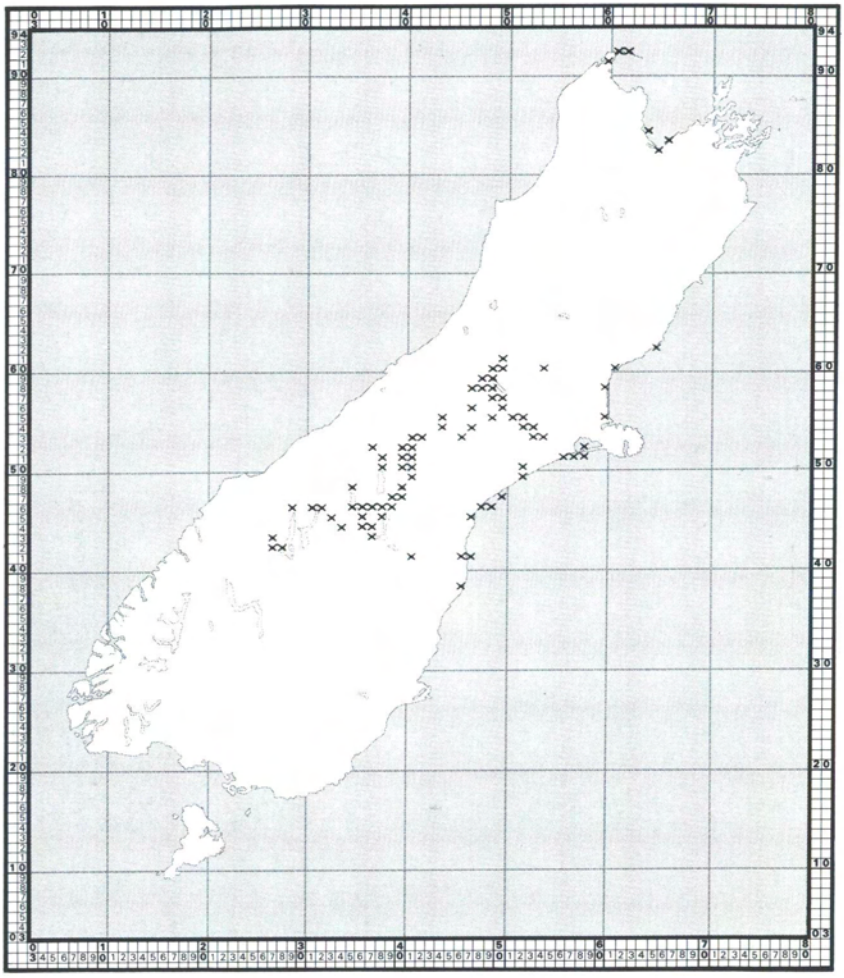
Reports from 1969 to 1974 inclusive

With roughly similar survey effort in the two periods, Spur-winged Plovers were recorded in five times as many North Island squares in 1975-1979 as in 1969-1974, reflecting the species' recent spread.



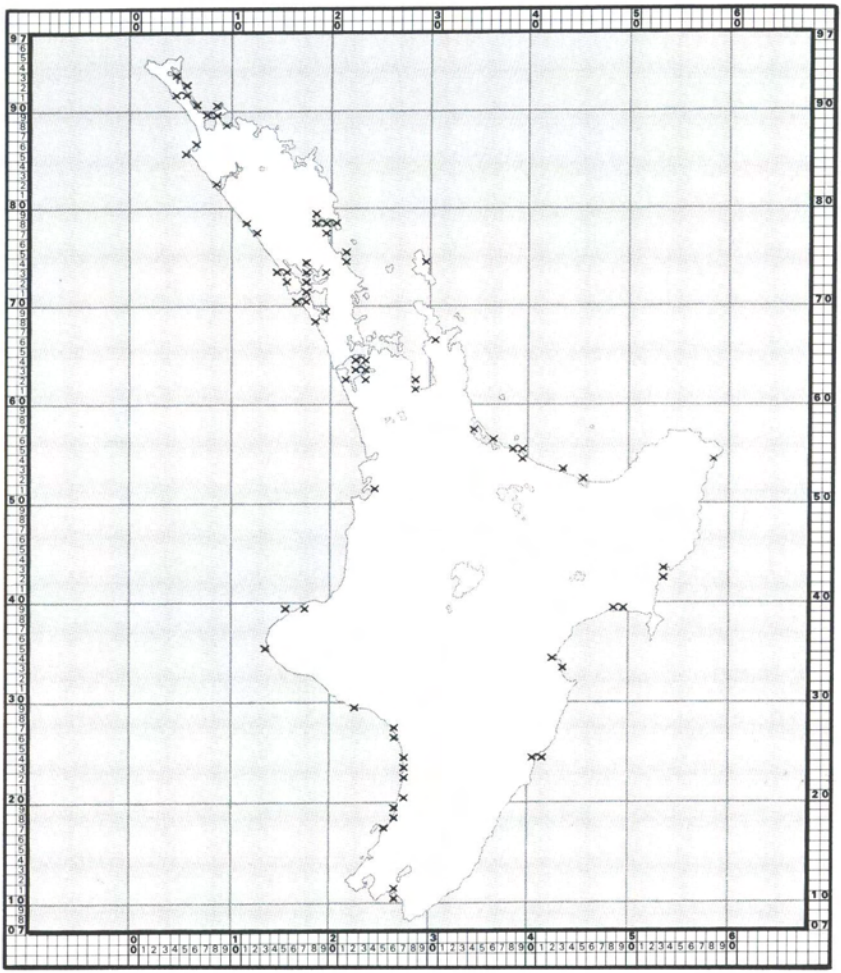
o = **Spur-winged Plover** *(Vanellus miles novaehollandiae)*

Reports from 1975 to 1979 inclusive

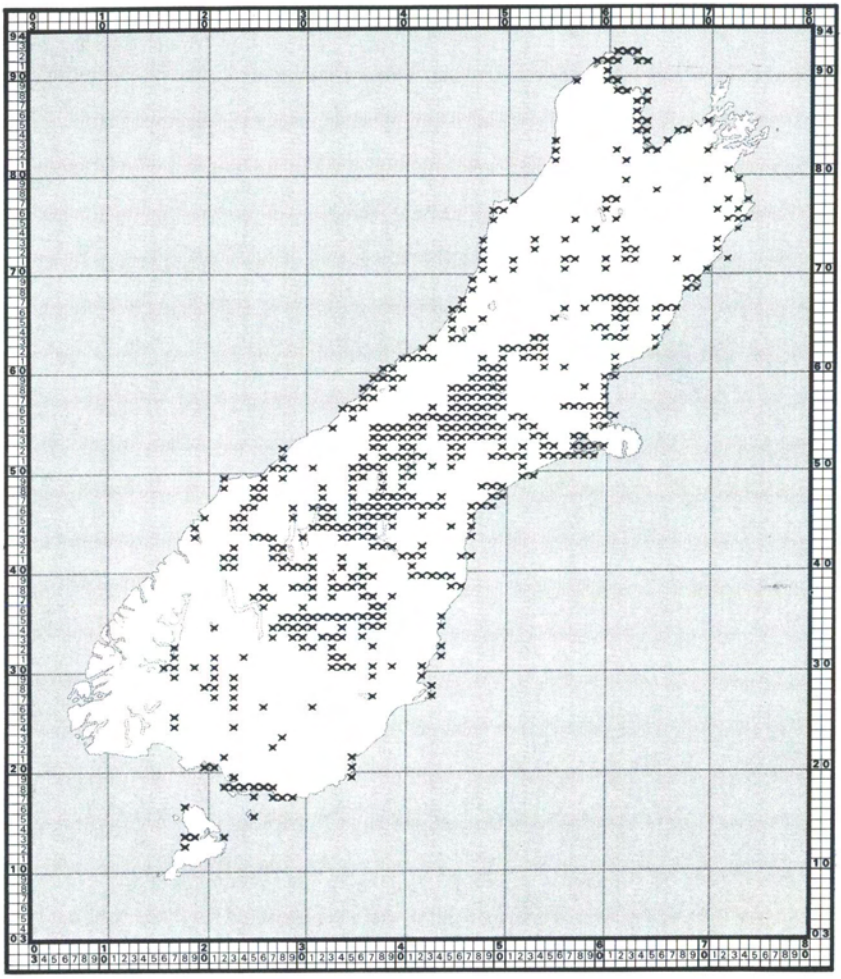


× = **Wrybill** *(Anarhynchus frontalis)*

The Wrybill breeds only on the larger Canterbury and North Otago shingle riverbeds and winters mainly at harbours and estuaries in the northern part of the North Island. Sibson (1963) estimated the total population at 5000, and Hay (1979) estimated between 5000 and 7000 birds. Recent surveys on the breeding grounds have failed to record numbers approaching this level and an OSNZ national count in June 1984 gave a total of 3883 (P.M.Sagar, pers.comm.).

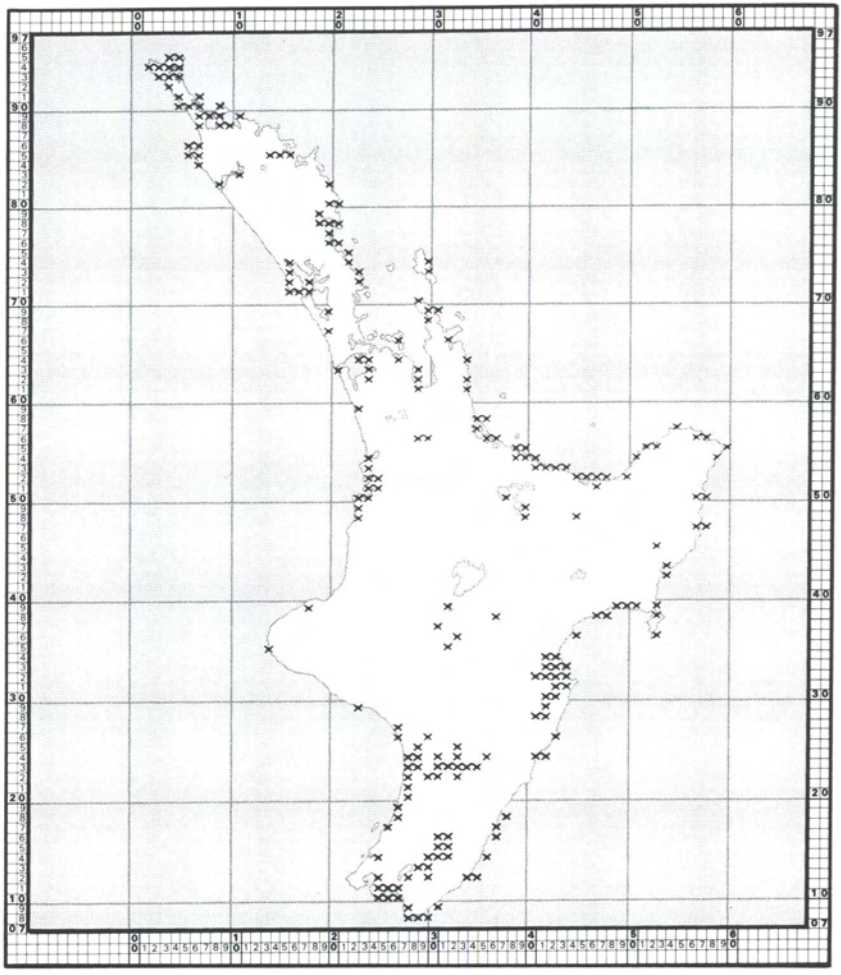


× = **Wrybill** *(Anarhynchus frontalis)*

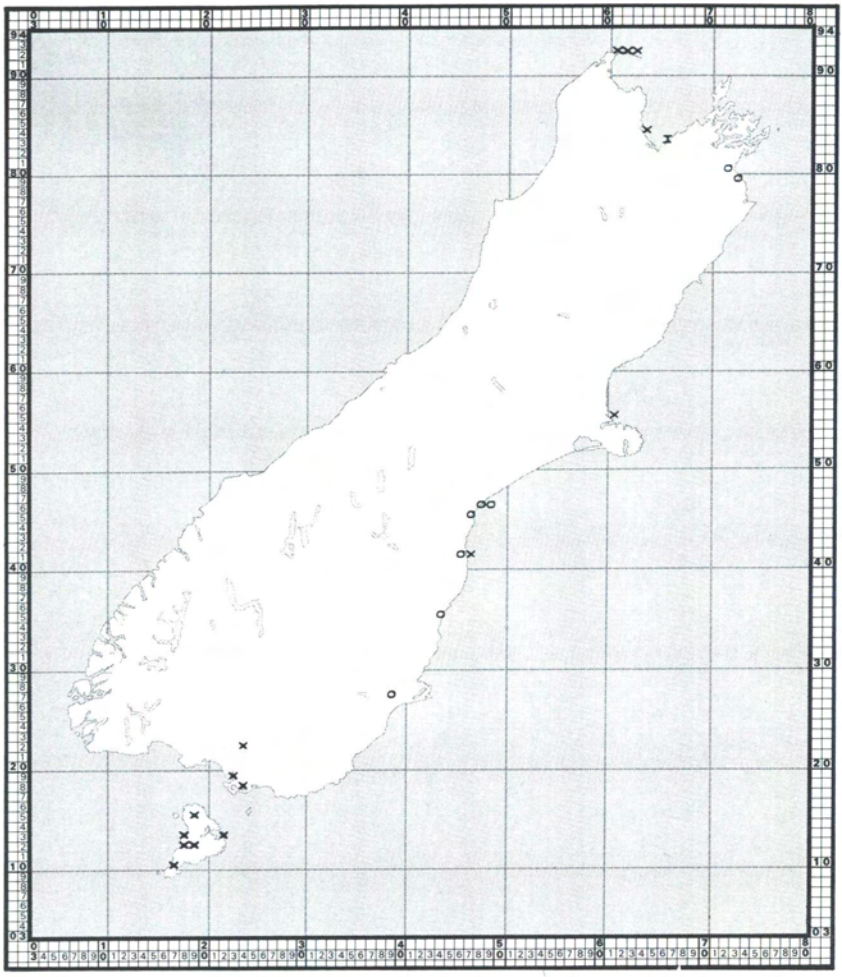


× = **Banded Dotterel** *(Charadrius bicinctus)*

The Banded Dotterel (pages 112-113), which breeds both inland and along the coast of both main islands, is the most numerous and widespread of the smaller plovers breeding in New Zealand (Falla *et al.* 1979). An OSNZ national count in June 1984 gave a total of over 7500. Together with some 5000 birds that migrate to Australia in the winter, the population is at least 12 500 (P.M.Sagar, pers.comm.).



× = **Banded Dotterel** *(Charadrius bicinctus)*

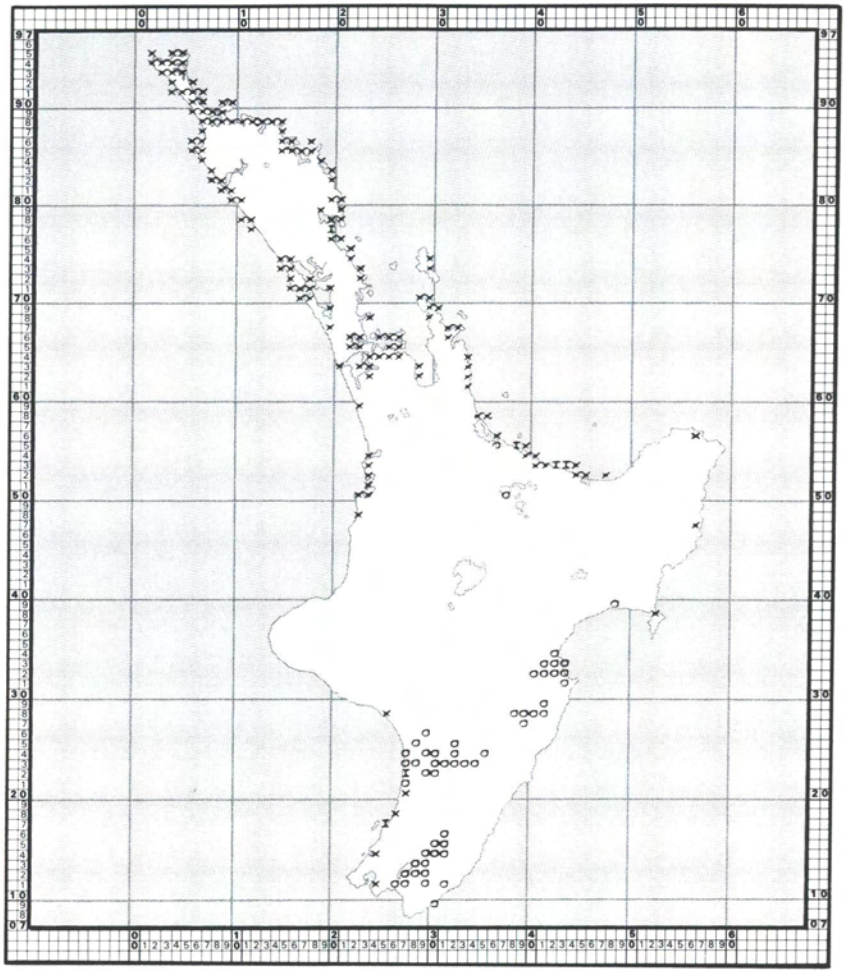


× = **New Zealand Dotterel** *(Charadrius obscurus)*

O = **Black-fronted Dotterel** *(Charadrius melanops)*

I = **Both species reported**

The North Island population of the New Zealand Dotterel in 1968 was estimated at 1114 birds (Edgar 1969). A small population of several hundred birds is present on Stewart Island.

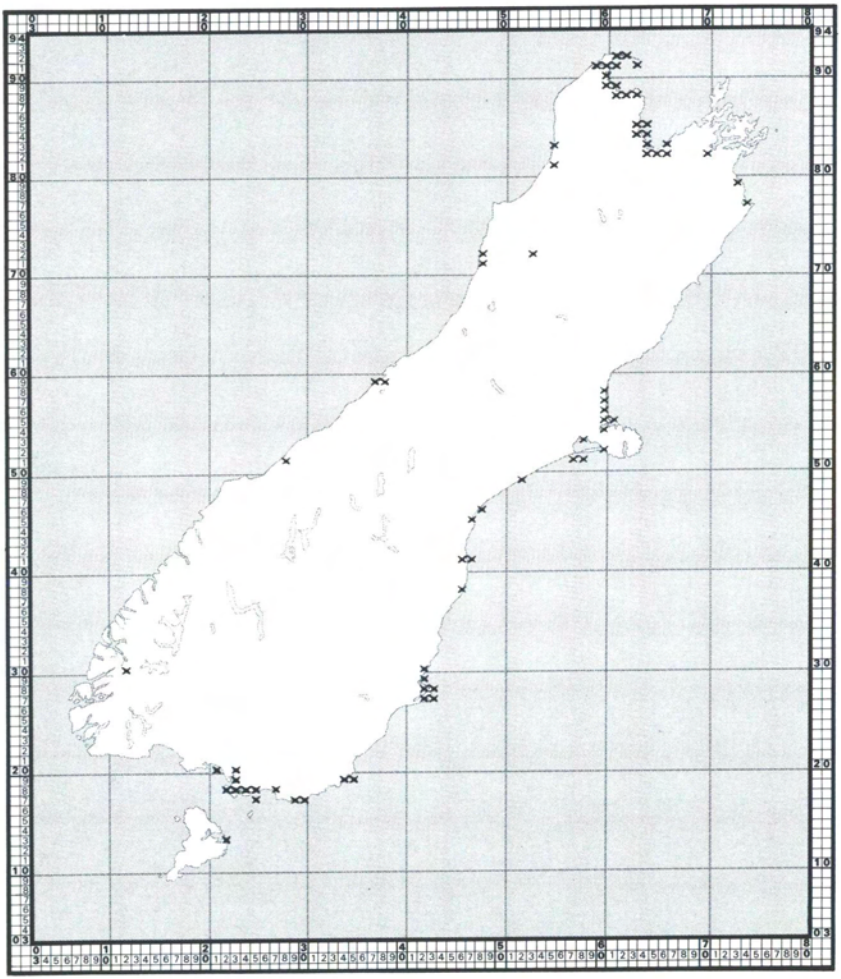


× = **New Zealand Dotterel** *(Charadrius obscurus)*

o = **Black-fronted Dotterel** *(Charadrius melanops)*

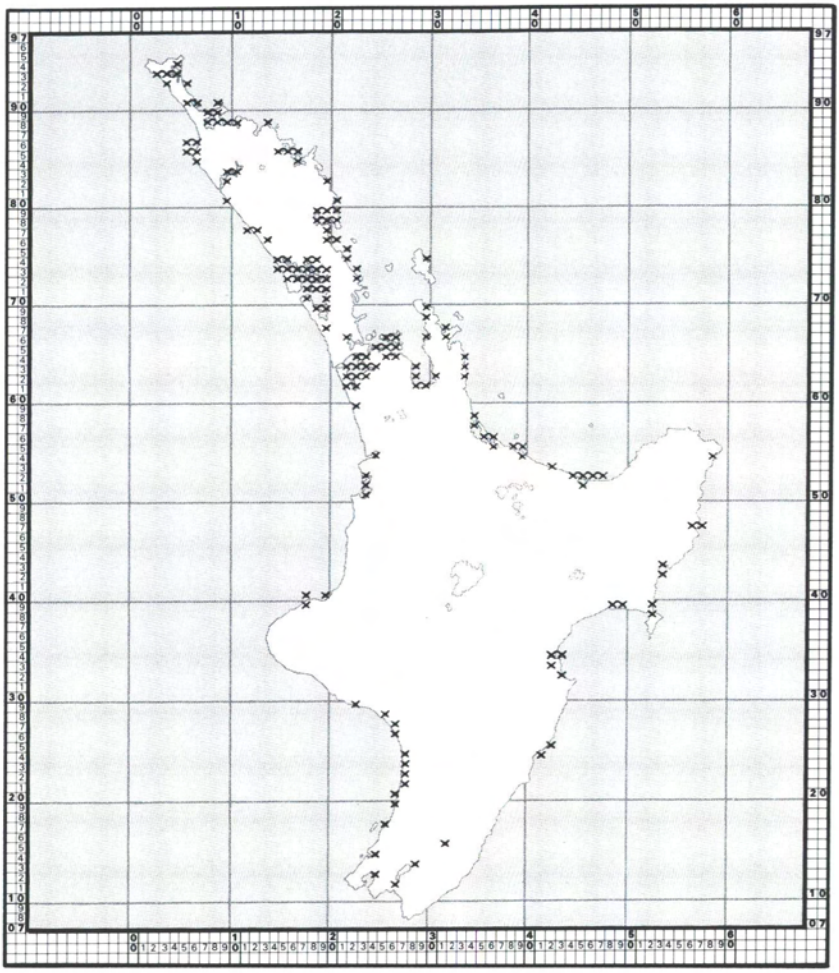
I = **Both species reported**

The Black-fronted Dotterel, an Australian species, was first reported in New Zealand (at Hawke's Bay) in 1954 and was breeding there in 1961. Surveys in Hawke's Bay showed at least 109 birds in 1962 (Mackenzie 1963), 323 in 1967 and 383 in 1972 (N.B.Mackenzie pers.comm.). A Wairarapa survey gave a total of 78 birds in 1972 (Heather 1973). Since then numbers have increased in these districts and the species has spread widely, with small numbers breeding in Marlborough, South Canterbury, Otago and Southland (B.D.Heather pers.comm.).

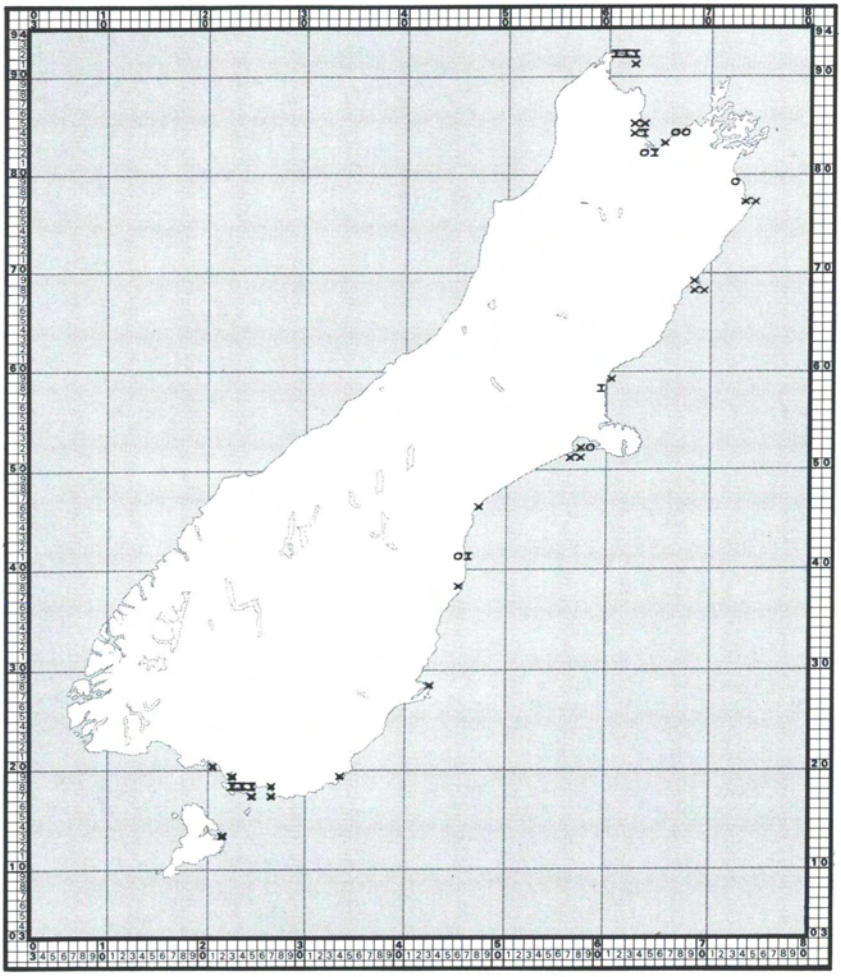


× = **Bar-tailed Godwit** *(Limosa lapponica)*

Breeds in the Northern Hemisphere. The total population ''wintering'' in New Zealand has been estimated at 100 000 birds (Veitch 1977).



× = **Bar-tailed Godwit** *(Limosa lapponica)*

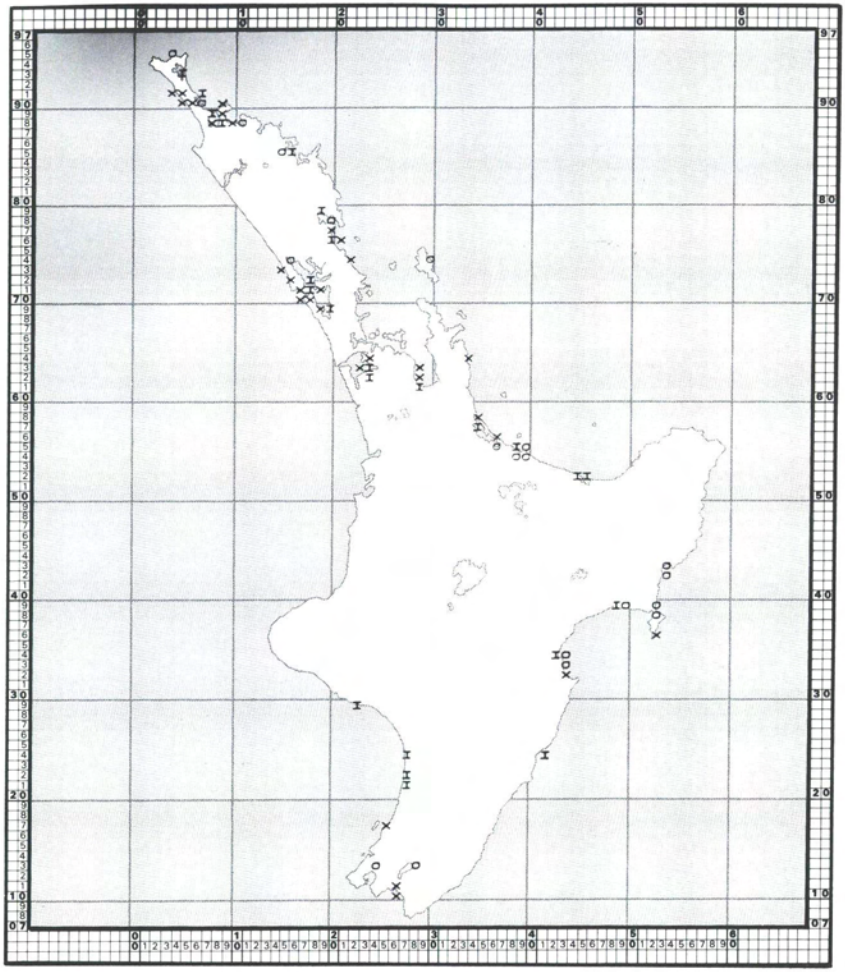


X = **Turnstone** *(Arenaria interpres)*

O = **Least Golden Plover** *(Pluvialis fulva)*

I = **Both species reported**

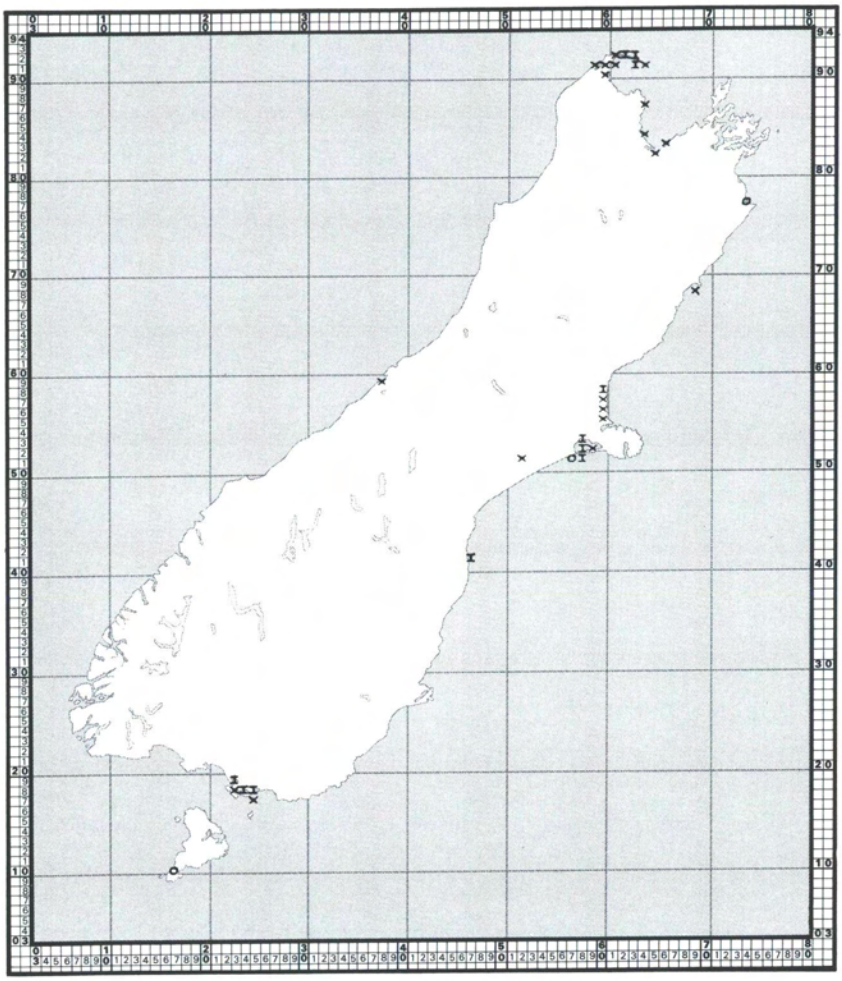
Both species breed in the Northern Hemisphere and appear regularly in New Zealand as ''wintering'' migrants, with Turnstones numbering some 4000 birds and Golden Plover probably less than 1000 (Veitch 1977).



X = **Turnstone** *(Arenaria interpres)*

O = **Least Golden Plover** *(Pluvialis fulva)*

I = **Both species reported**

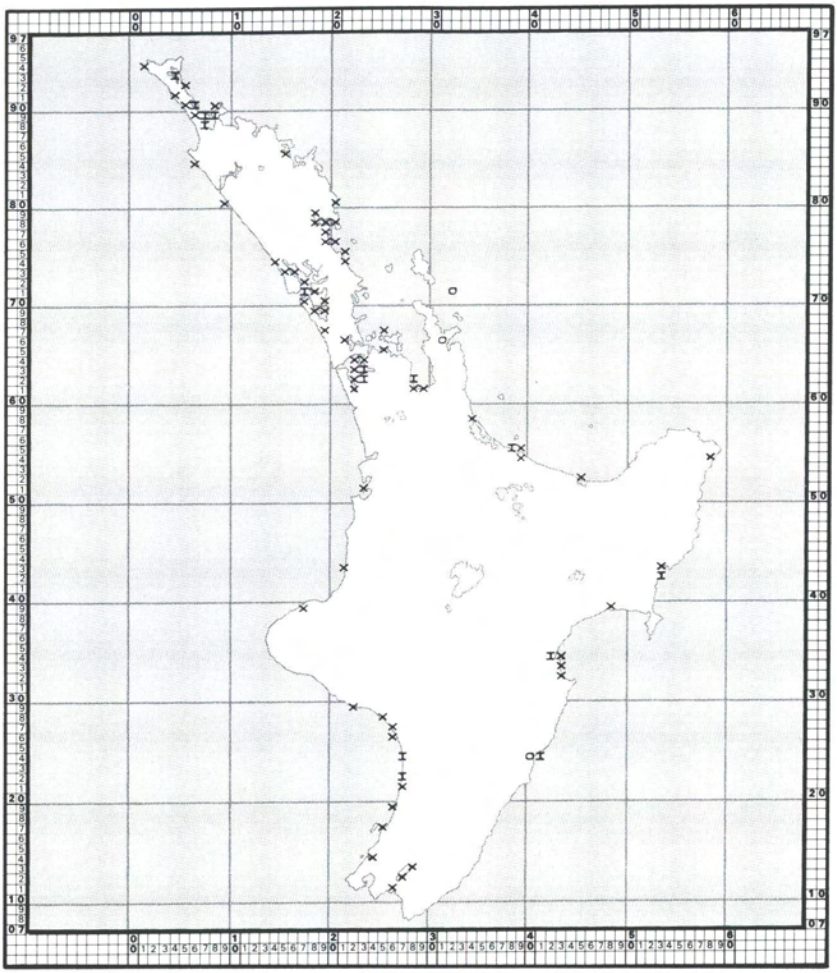


× = **Knot** *(Calidris canutus)*

o = **Red-necked Stint** *(Calidris ruficollis)*

I = **Both species reported**

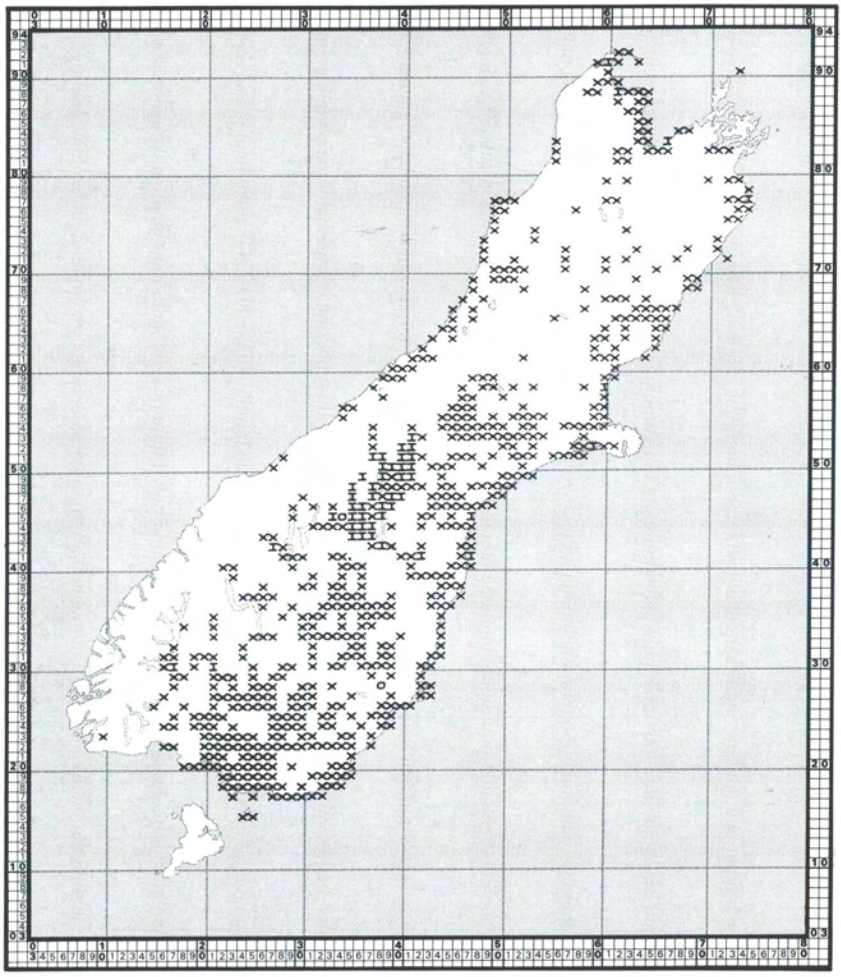
The Knot is the second most abundant of the arctic-breeding waders which ''winter'' in New Zealand (some 50 000 birds estimated). The Red-necked Stint, another arctic migrant, occurs regularly in New Zealand, but only in small numbers (Veitch 1977).



× = **Knot** *(Calidris canutus)*

o = **Red-necked Stint** *(Calidris ruficollis)*

I = **Both species reported**

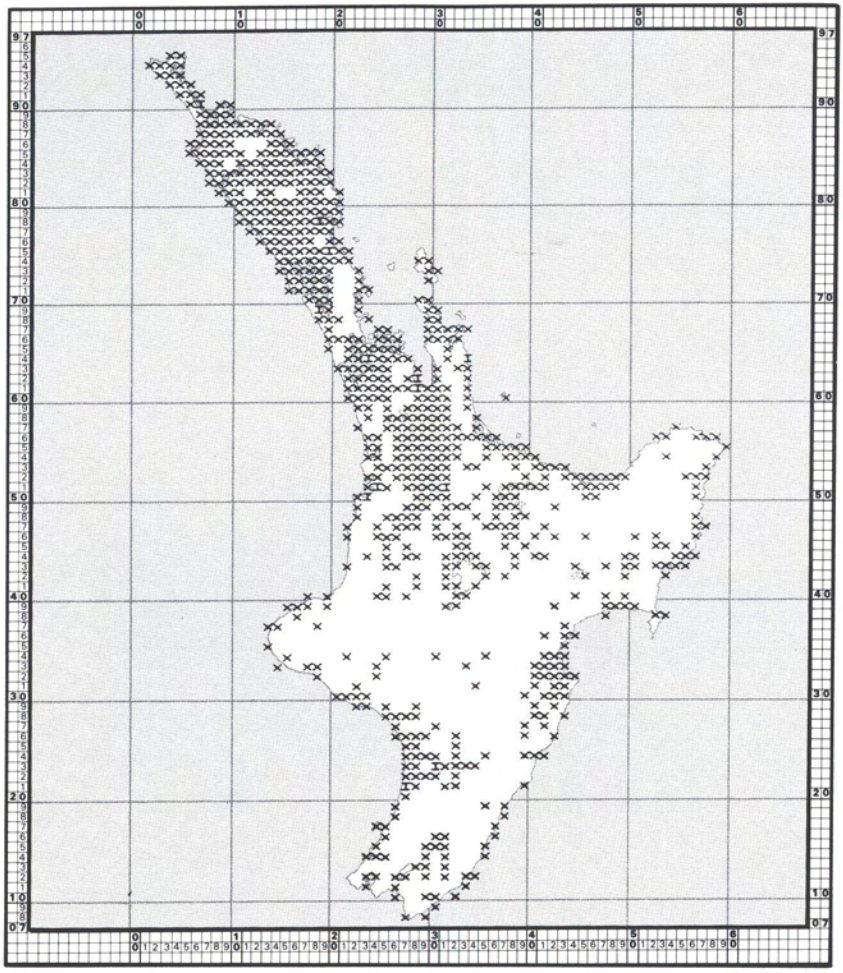


× = **Pied Stilt** *(Himantopus himantopus leucocephalus)*

O = **Black Stilt** *(Himantopus novaezealandiae)*

I = **Both species reported**

The Black Stilt, with a recently diminished and endangered population now numbers under 100 birds (Robertson *et al.* 1983). From a population of perhaps 500-1000 in the 1940s, the species has declined to 10-15 breeding pairs, which now nest only in the Upper Waitaki River Basin (Pierce 1984). Some birds are recorded wintering in northern harbours.

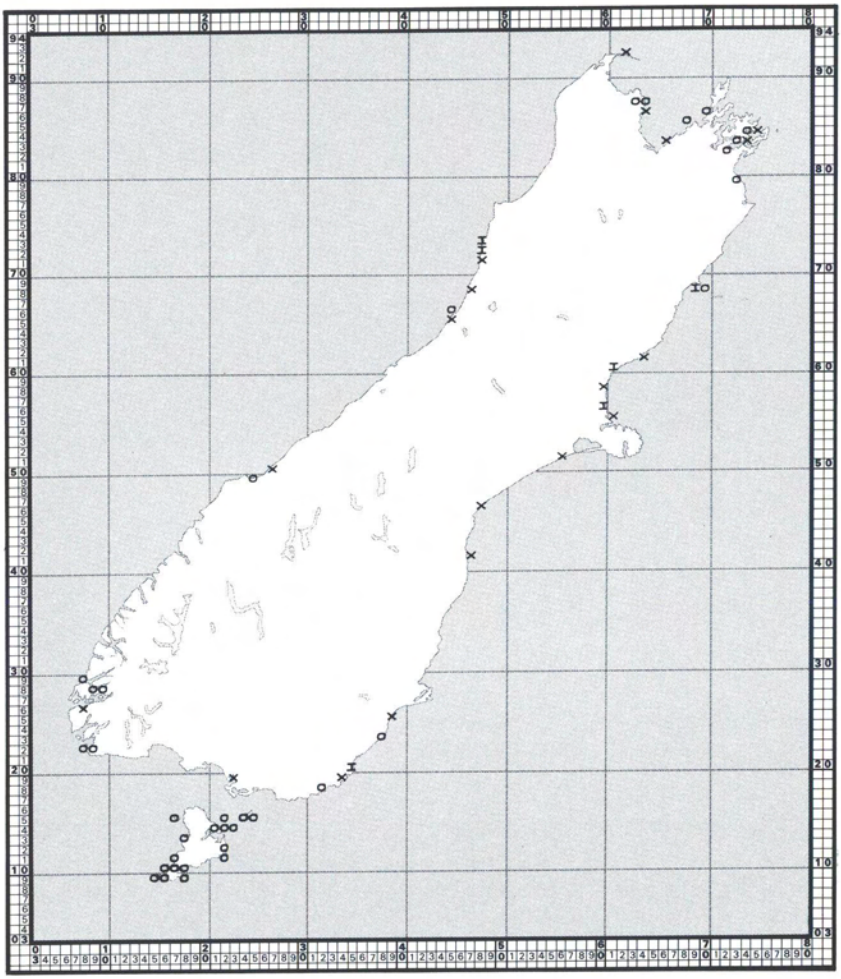


× = **Pied Stilt** *(Himantopus himantopus leucocephalus)*

o = **Black Stilt** *(Himantopus novaezealandiae)*

I = **Both species reported**

Pied Stilts breed in many inland and coastal localities on both main islands, with some northward migration in winter. Apparently rare in the middle of the 19th century (Falla *et al.* 1979), especially north of Auckland (Pierce 1984), the Pied Stilt population expanded rapidly from about the 1870s to the early 20th century at least. The national total may now be in the order of 30 000 birds (Pierce 1984).

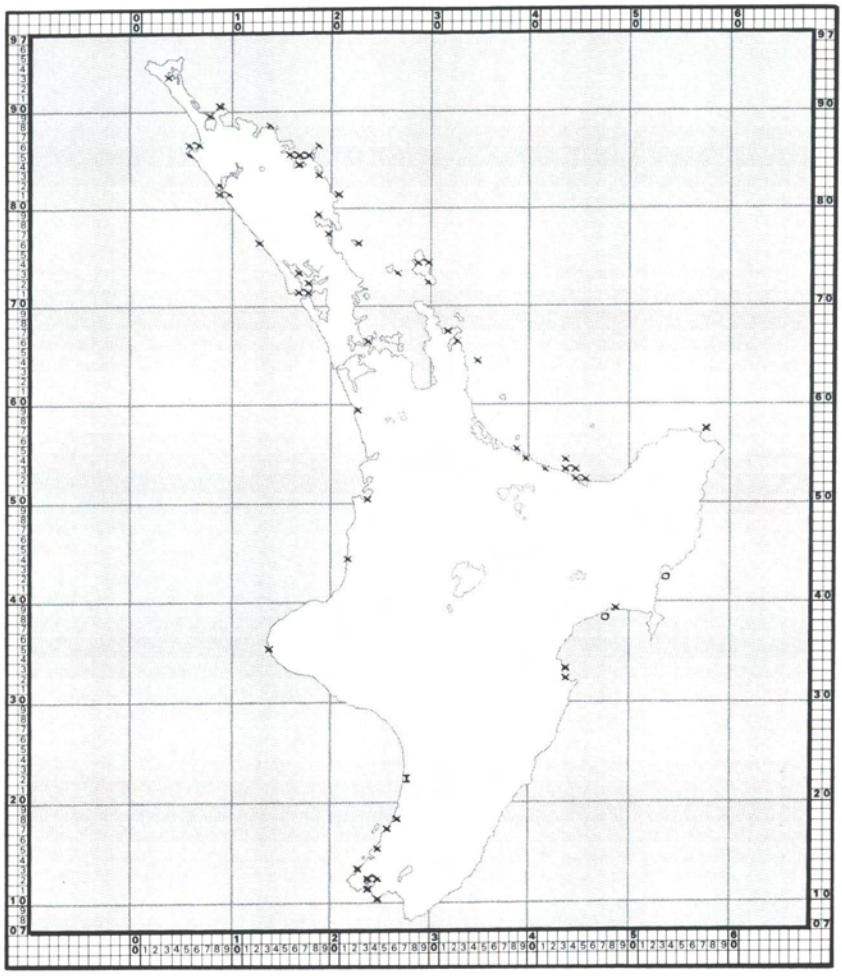


X = **Arctic Skua** *(Stercorarius parasiticus)*

O = **Southern Great Skua** *(Stercorarius skua lonnbergi)*

I = **Both species reported**

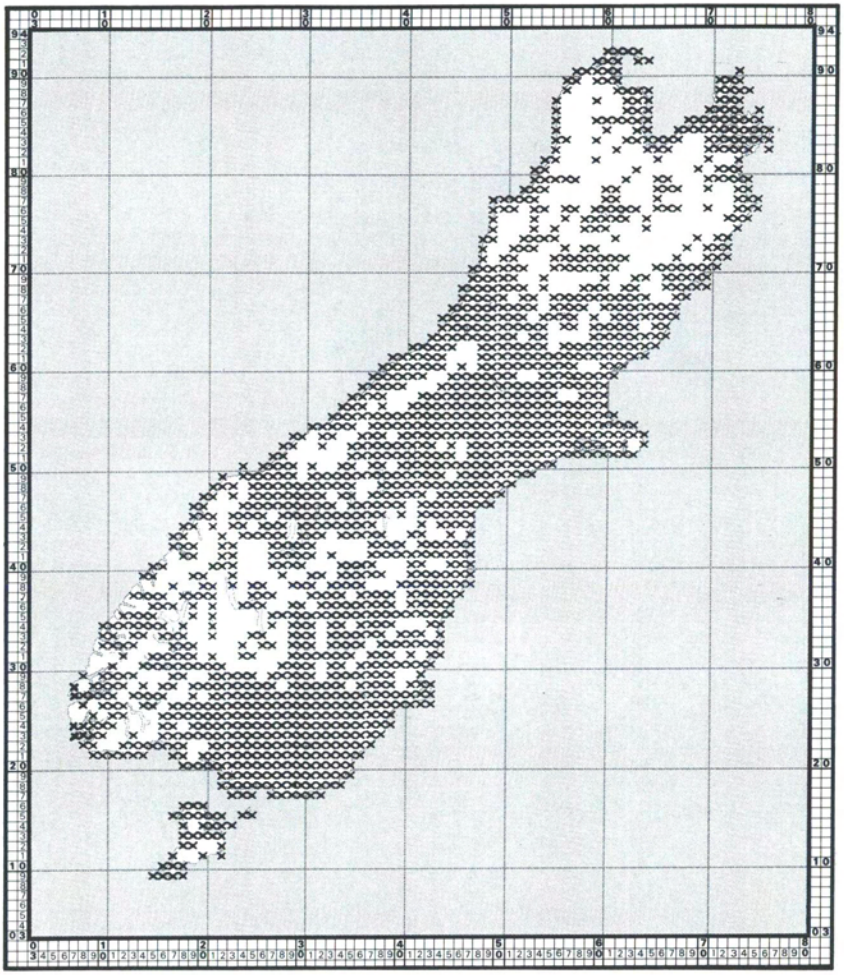
The Arctic Skua is an arctic-breeding migrant, but the Southern Great Skua breeds on Stewart Island and, more abundantly, at the Chatham and sub-antarctic islands.



× = **Arctic Skua** *(Stercorarius parasiticus)*

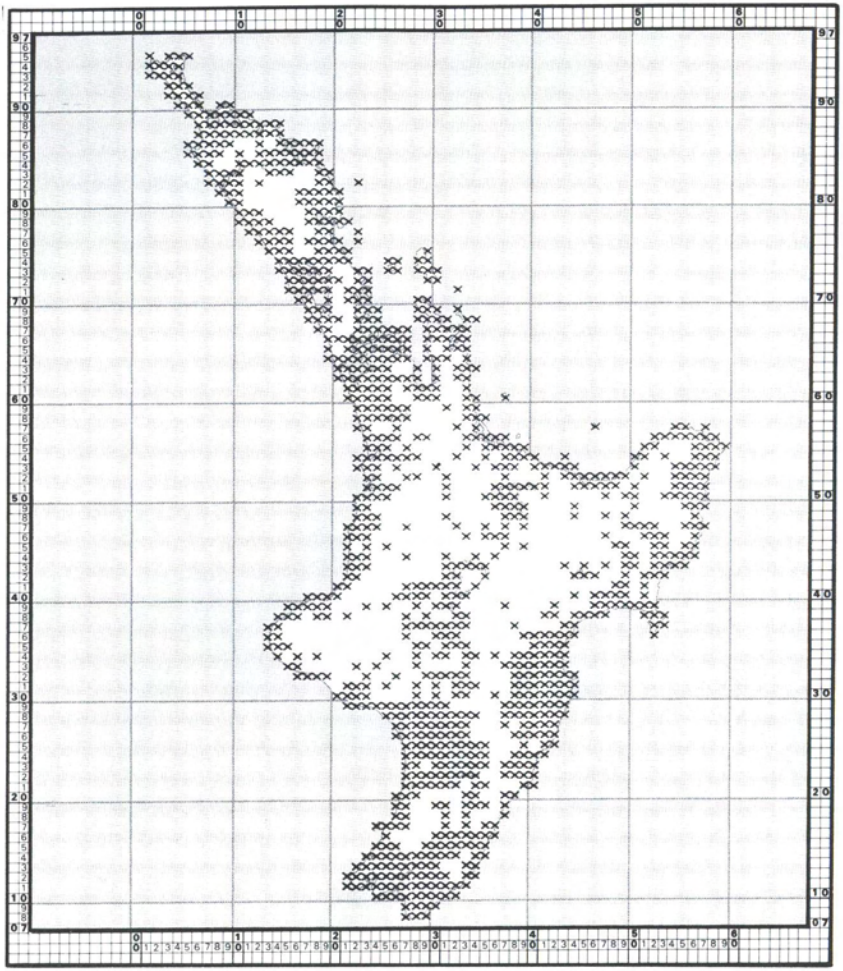
o = **Southern Great Skua** *(Stercorarius skua lonnbergi)*

I = **Both species reported**



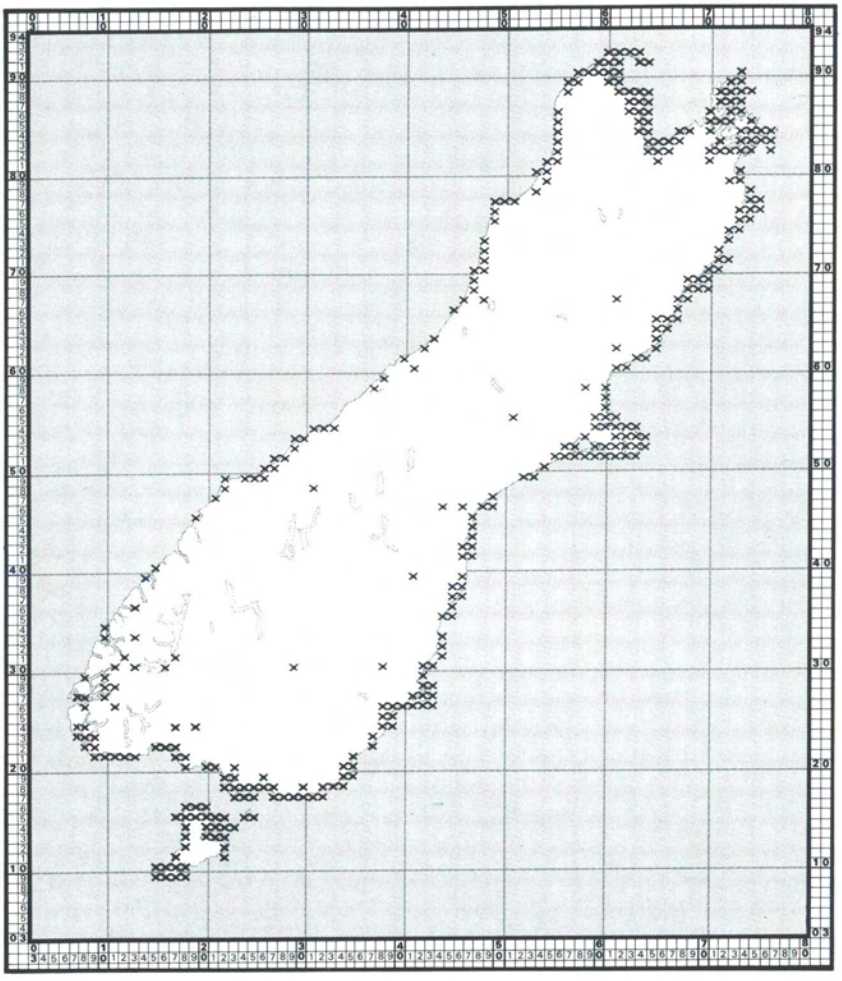
✕ = **Southern Black-backed Gull** *(Larus dominicanus)*

The most common and widespread gull in New Zealand, being found from coastal to subalpine zones. Since European colonisation its population has increased and the greatest numbers are found near supplies of offal and rubbish and the smallest where it has to rely on shellfish and seafood (Falla *et al.* 1979). Robertson *et al.* (1984) recorded c.15 000 birds on the 65 km of the Lower Waitaki riverbed (1 to 3 km wide) surveyed in November 1983.



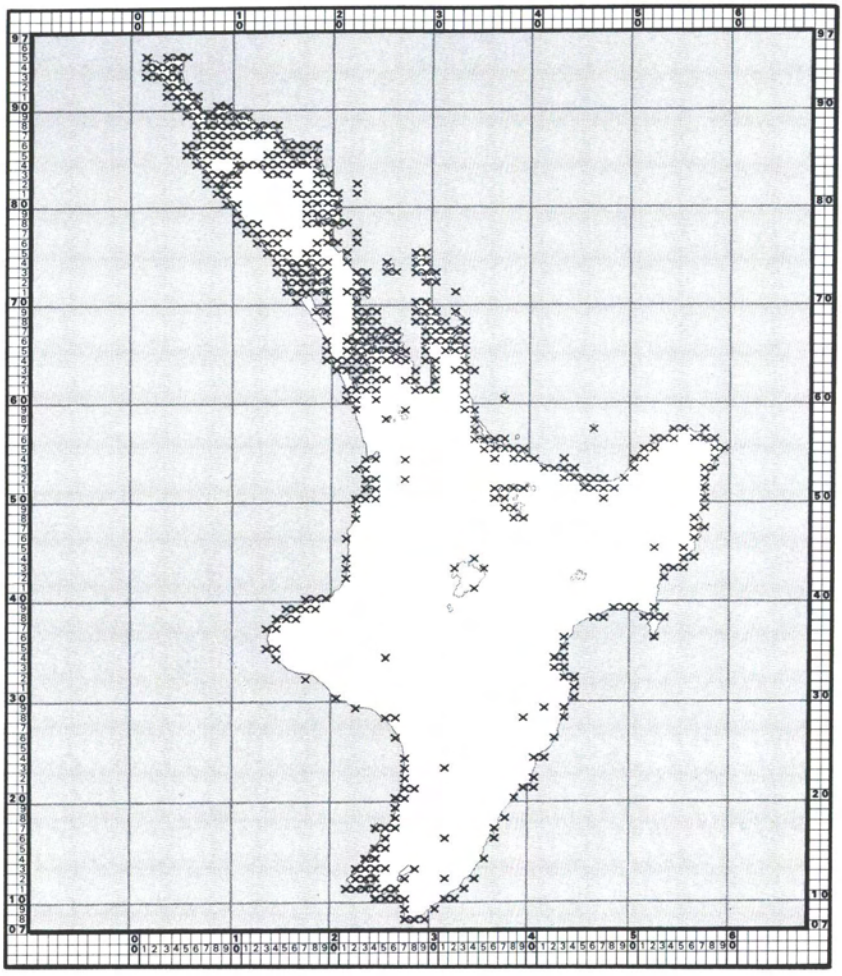
× = **Southern Black-backed Gull** *(Larus dominicanus)*

Detailed population dynamics of this species are known only for the Wellington area but the situation is probably similar elsewhere. Fordham (1967) stated that the Wellington population began to increase before 1890 and has grown rapidly in the last quarter century. He recorded 31 breeding colonies in the Wellington district alone with a total of c.5700 breeding pairs in 1963-64; the total number of birds in the district was put at c.15 200.

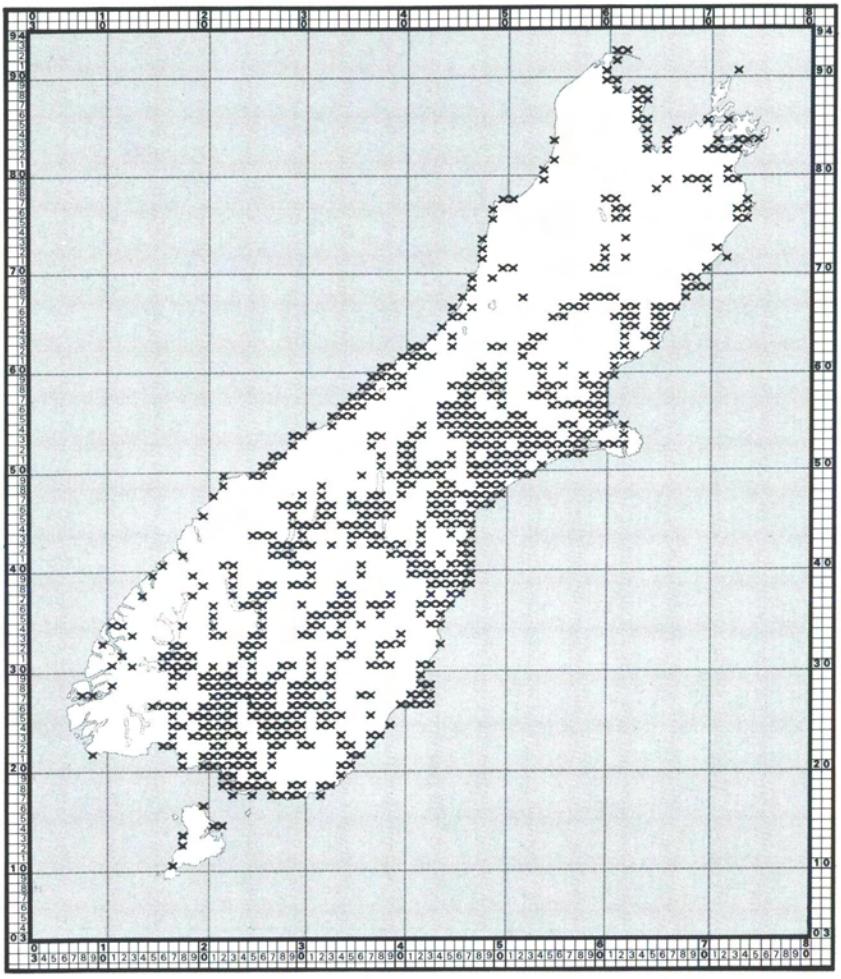


× = **Red-billed Gull** *(Larus novaehollandiae scopulinus)*

Gurr & Kinsky (1965) plotted the distribution of the 166 breeding colonies of this species known in 1960 and concluded that "... a conservative estimate of the total breeding population... would be something of the order of 40 000 breeding pairs".

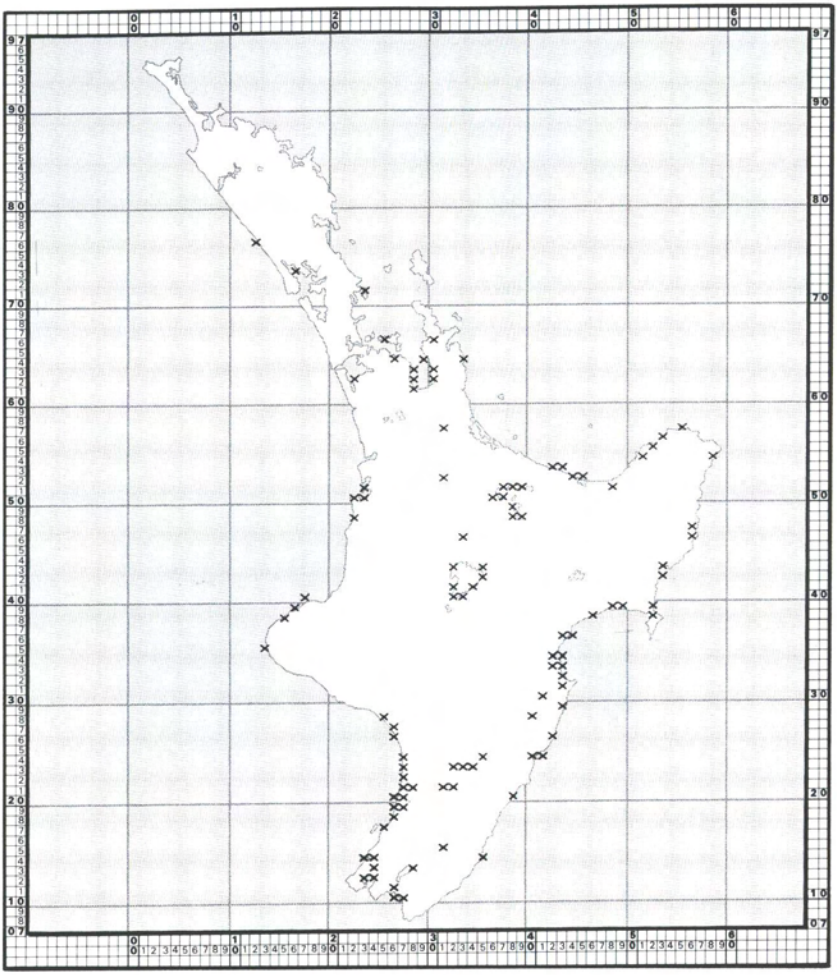


× = **Red-billed Gull** *(Larus novaehollandiae scopulinus)*



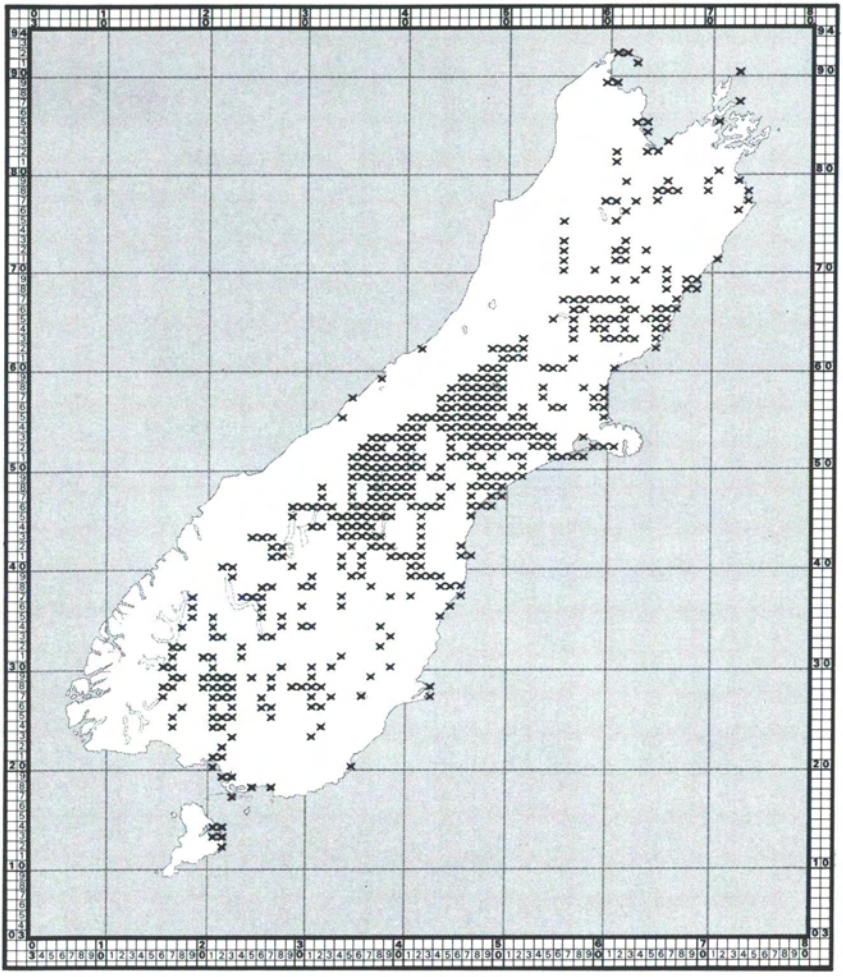
× = **Black-billed Gull** *(Larus bulleri)*

Most numerous in the southern parts of the South Island. The Southland population, based on a survey of 37 of 40 known breeding colonies was estimated at 75 000 breeding pairs in 1977 (Sutton 1978).



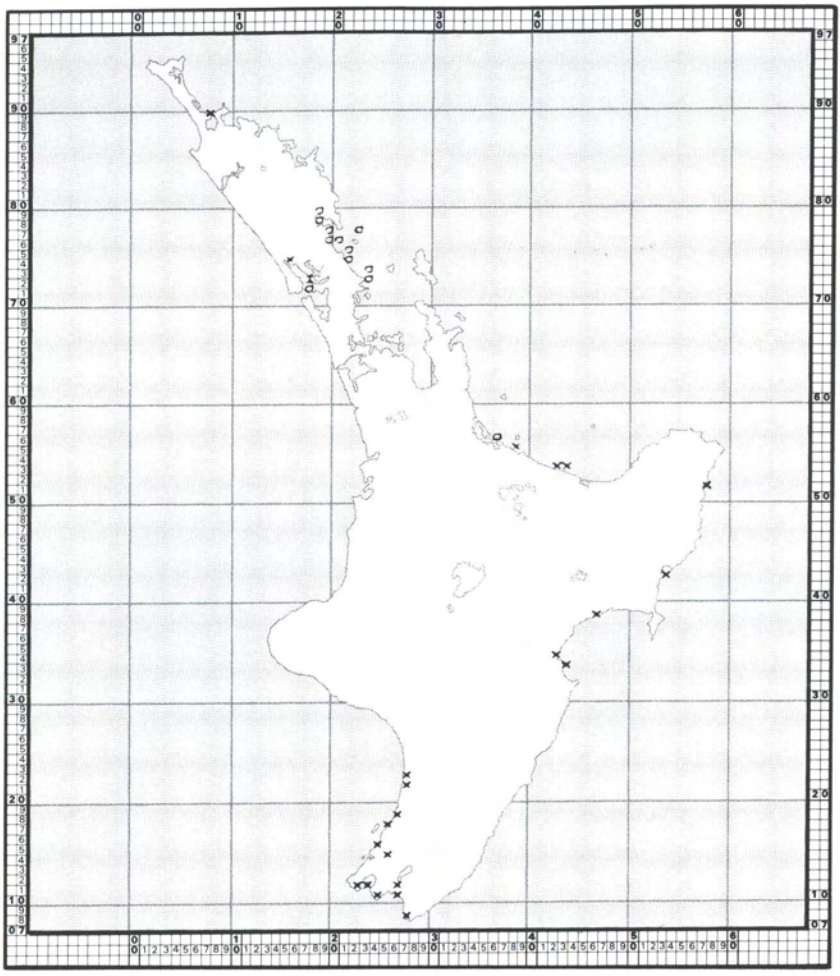
× = **Black-billed gull** *(Larus bulleri)*

The Lake Rotorua breeding colony, perhaps the largest of the few North Island ones, was estimated to contain c.500 pairs in 1961 (Reid & Reid 1965).



× = **Black-fronted Tern** *(Sterna albostriata)*

The Black-fronted Tern, an inland breeder, nests only in the South Island (mainly on braided shingle riverbeds east of the main mountain ranges) and disperses to coastal regions after breeding (Lalas 1979). Evidence of a decline in the numbers of this species was reviewed by Latham (1981).

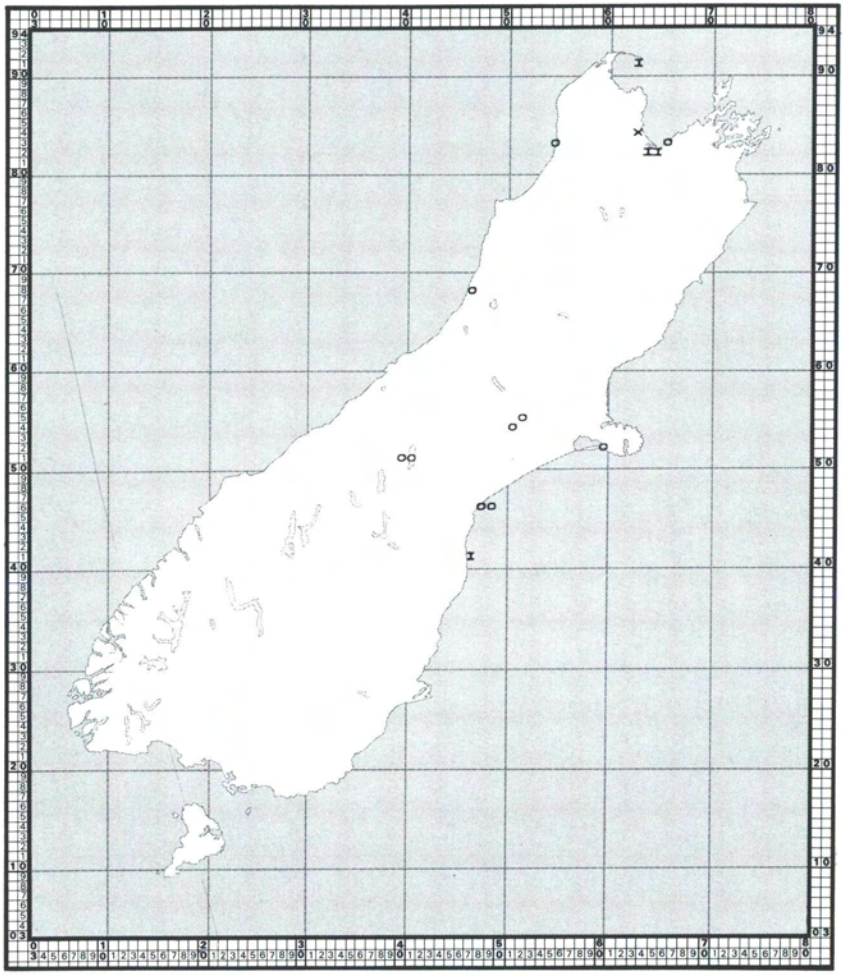


× = **Black-fronted Tern** *(Sterna albostriata)*

o = **Fairy Tern** *(Sterna nereis)*

I = **Both species reported**

The few pairs of Fairy Terns in New Zealand breed on sandy beaches of the North Auckland peninsula (Falla *et al.* 1979).

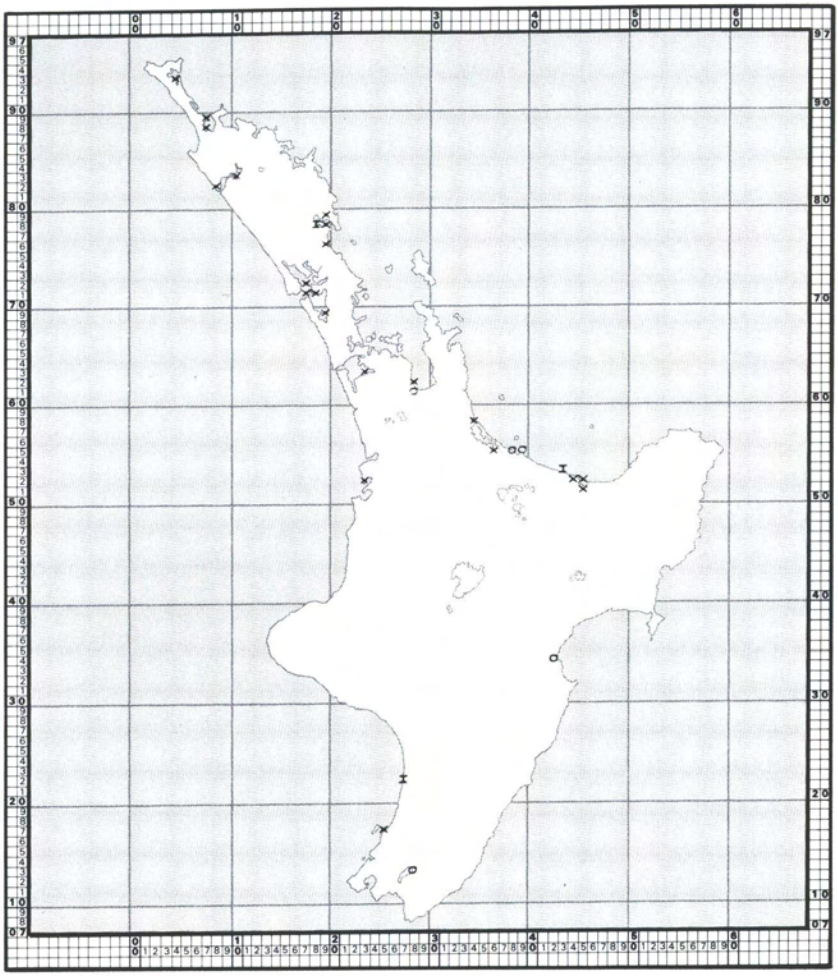


X = Eastern Little Tern *(Sterna albifrons sinensis)*

O = White-winged Black Tern *(Chlidonias leucopterus)*

I = Both species reported

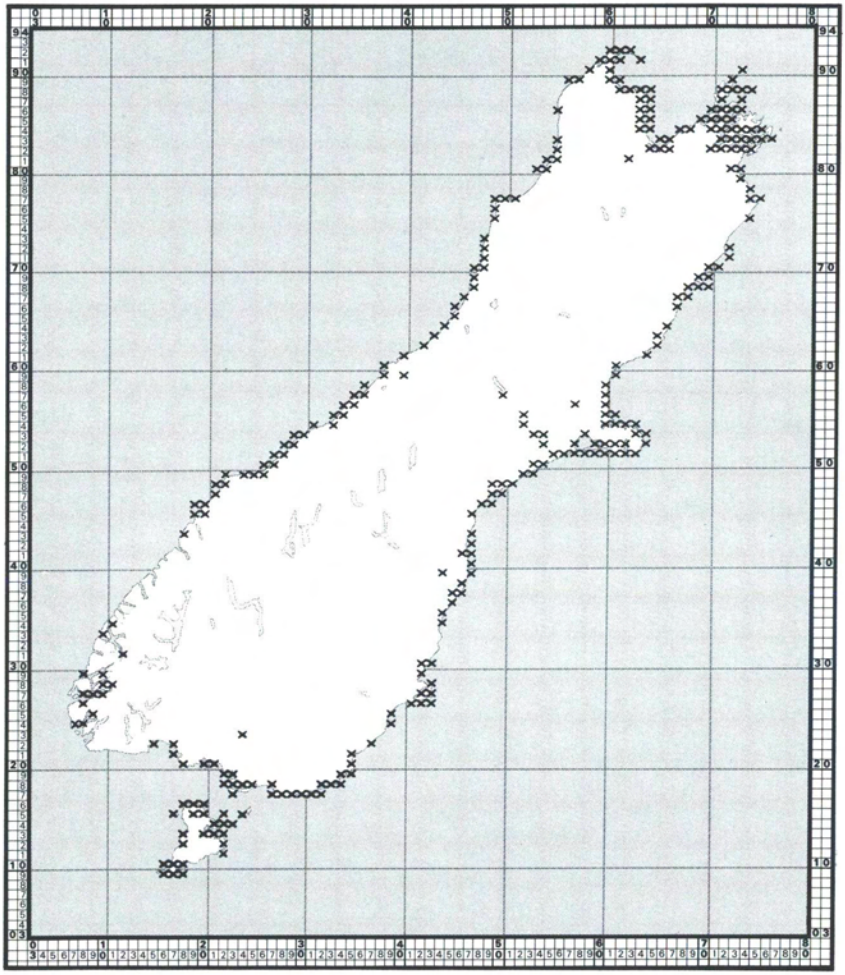
Both species occur fairly regularly in small numbers as non-breeding migrants. A pair of White-winged Black Terns attempted to breed in South Canterbury in 1973 (Pierce 1974).



X = **Eastern Little Tern** *(Sterna albifrons sinensis)*

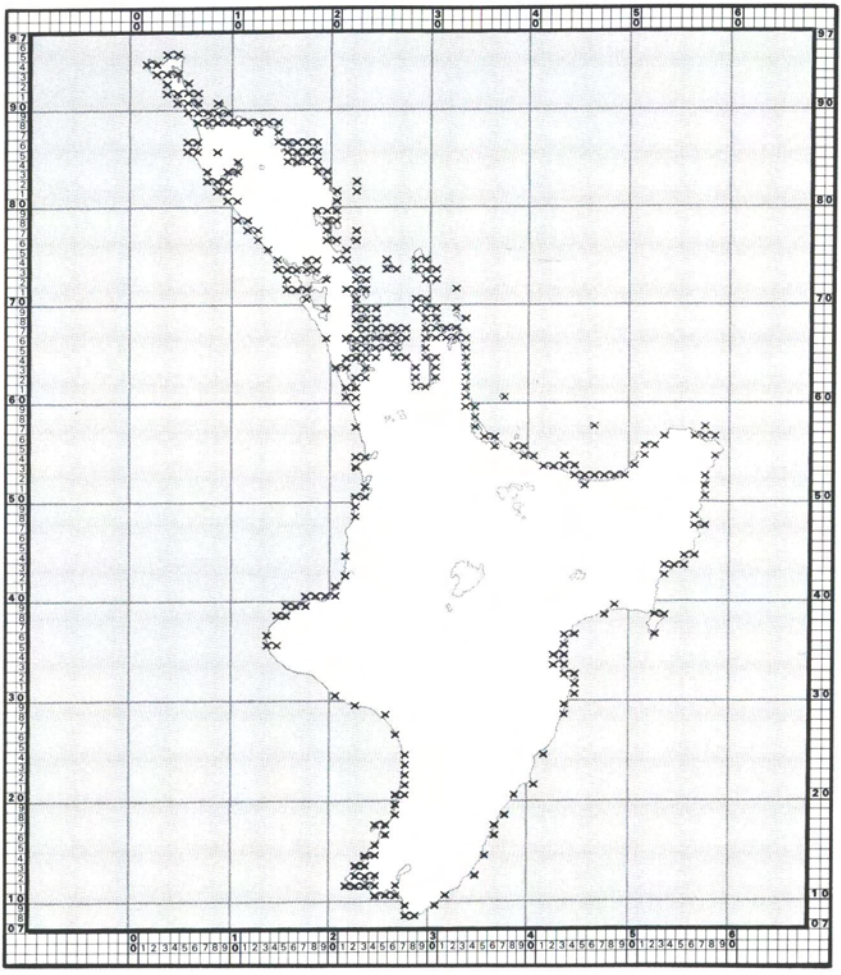
O = **White-winged Black Tern** *(Chlidonias leucopterus)*

I = **Both species reported**

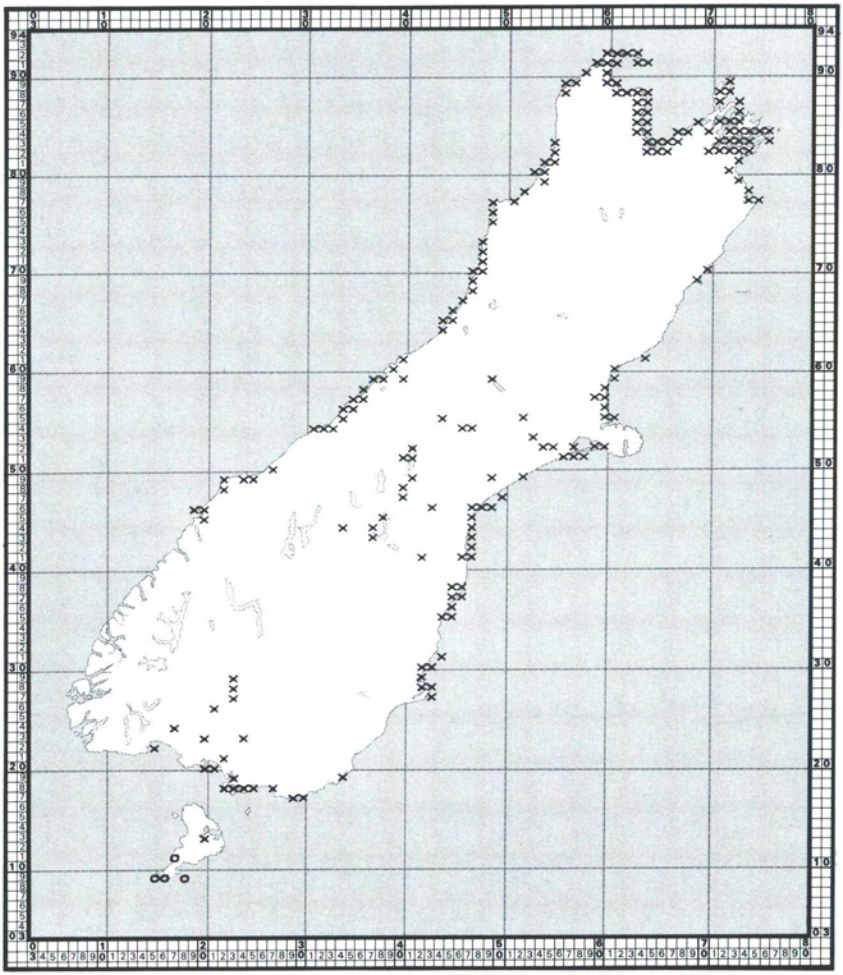


✕ = **White-fronted Tern** *(Sterna striata)*

The White-fronted Tern is the most common tern in New Zealand breeding mainly on the coast. Many, especially young birds, migrate to southeastern Australia in autumn. Inland feeding occurs on some major South Island rivers and breeding up to 40 km from the sea has been recorded on the Lower Waitaki River (Robertson *et al.* 1984).



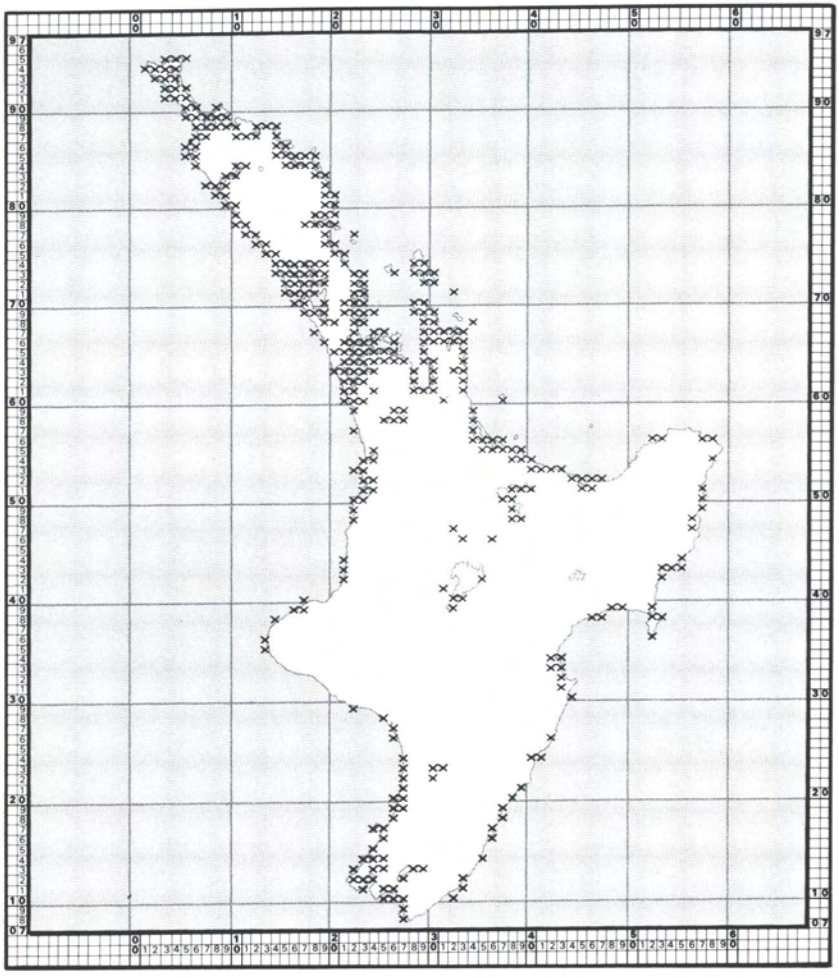
× = **White-fronted Tern** *(Sterna striata)*



× = **Caspian Tern** *(Hydroprogne caspia)*

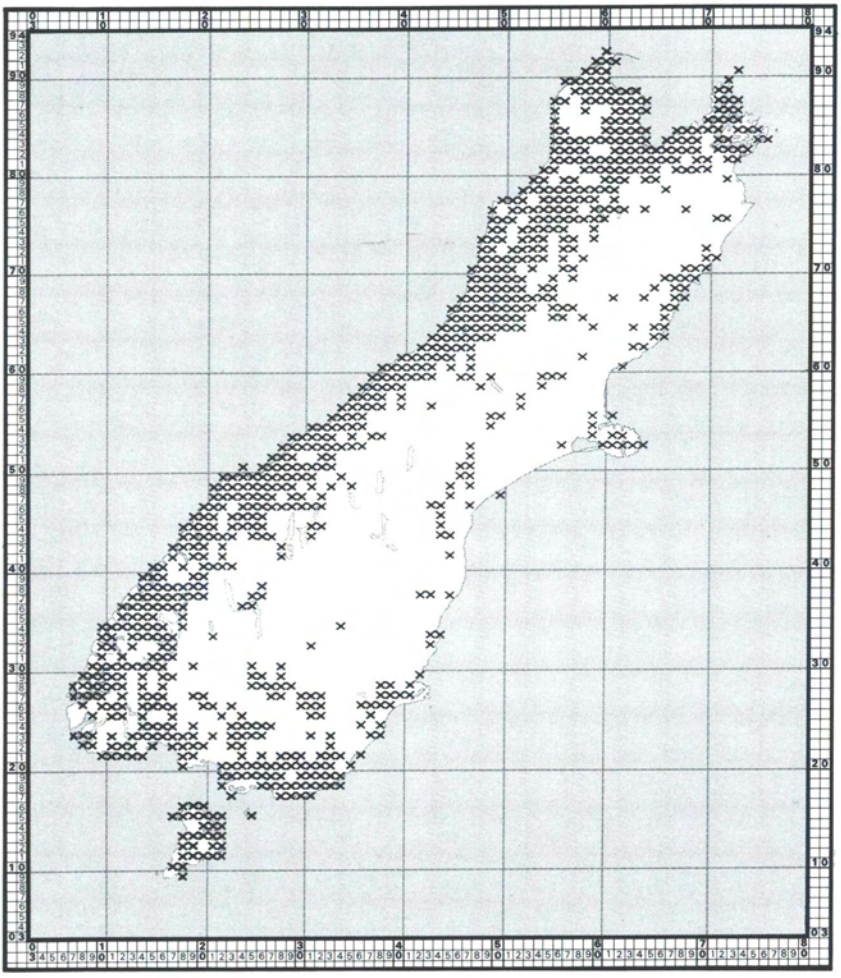
o = **Antarctic Tern** *(Sterna vittata)*

Although a few Antarctic Terns nest on islands off Stewart Island, most of the New Zealand population breeds further south on the subantarctic islands.



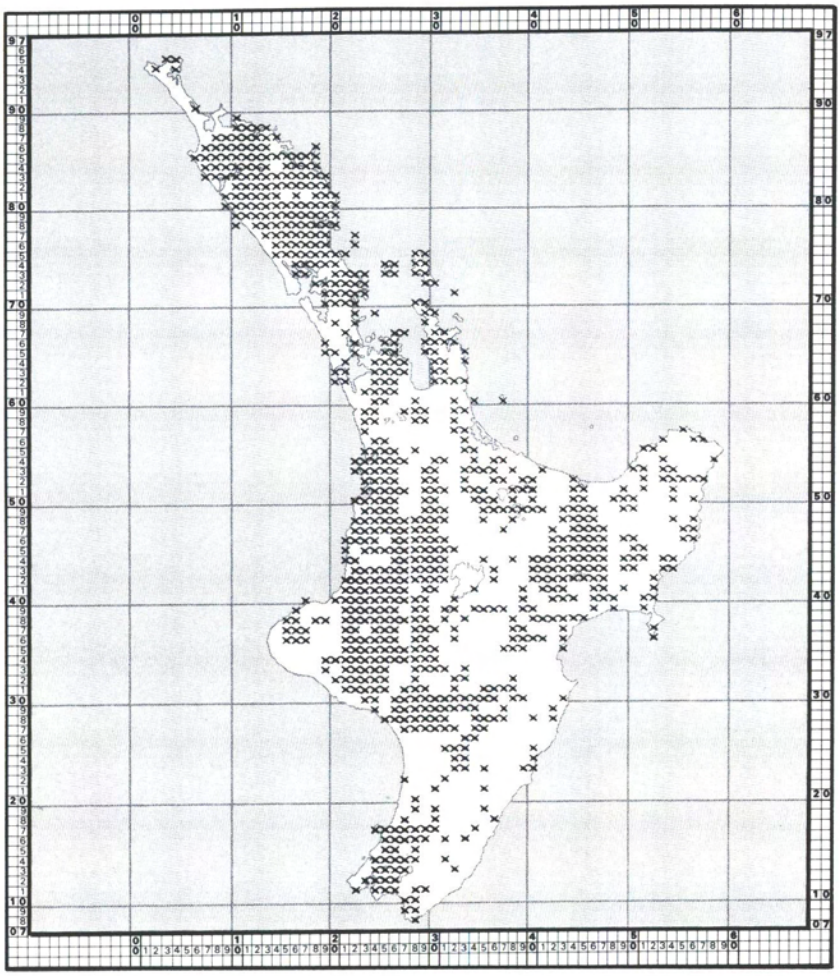
× = **Caspian Tern** *(Hydroprogne caspia)*

The small population of Caspian Terns is concentrated mainly in the north of the North Island. Though predominantly a coastal species, these terns may be found on inland lakes and major rivers. Low numbers breed on South Island braided rivers up to 110 km inland (O'Donnell & Moore 1983).

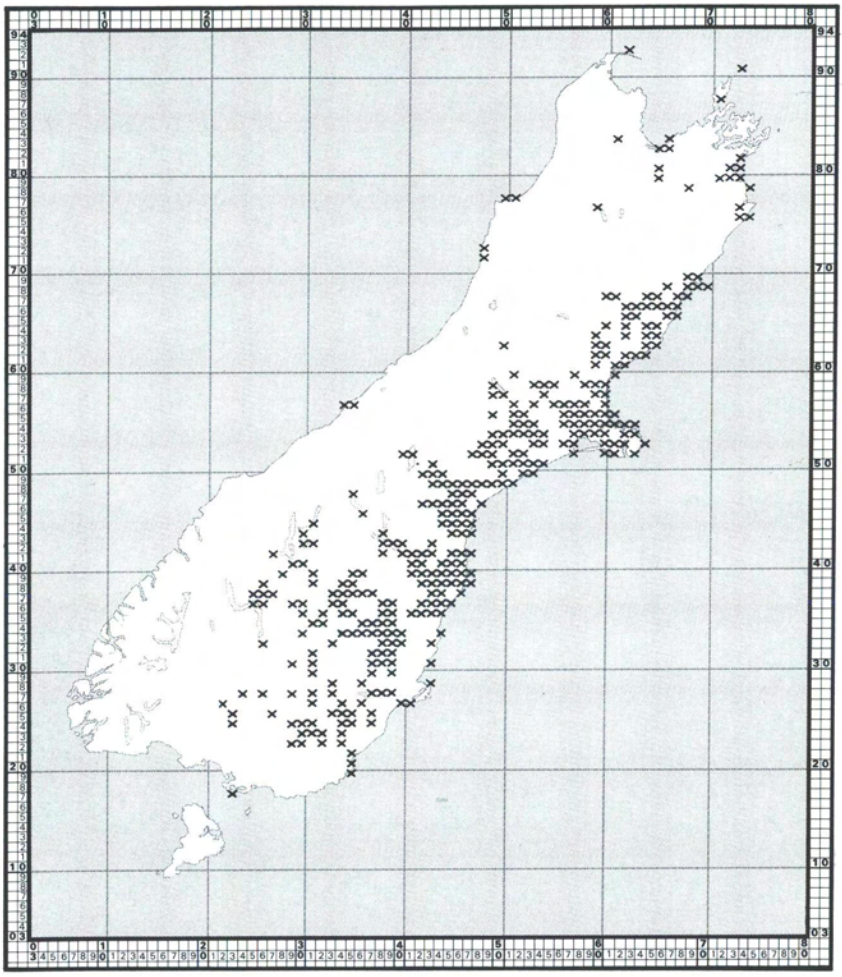


✕ = **New Zealand Pigeon** *(Hemiphaga novaeseelandiae)*

In some districts, this species disperses seasonally from its normal home in native forests to feed on new foliage (especially willows) and blossom (broom, tree lucerne, etc.) on farmland and in suburban gardens.

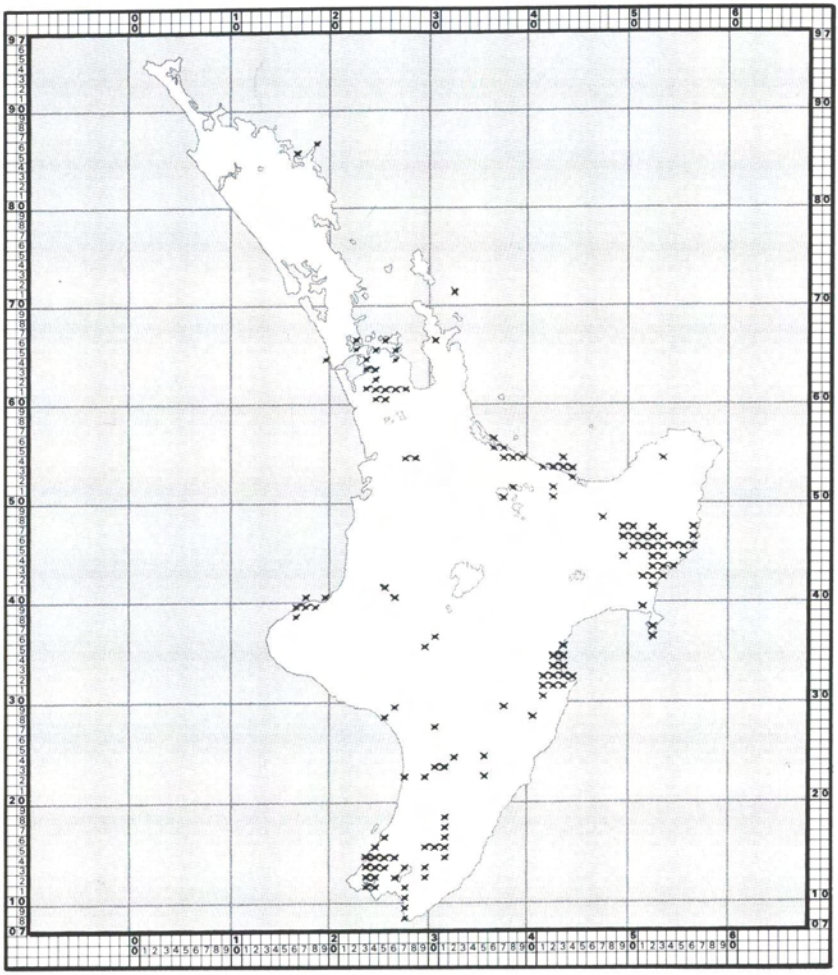


× = **New Zealand Pigeon** *(Hemiphaga novaeseelandiae)*



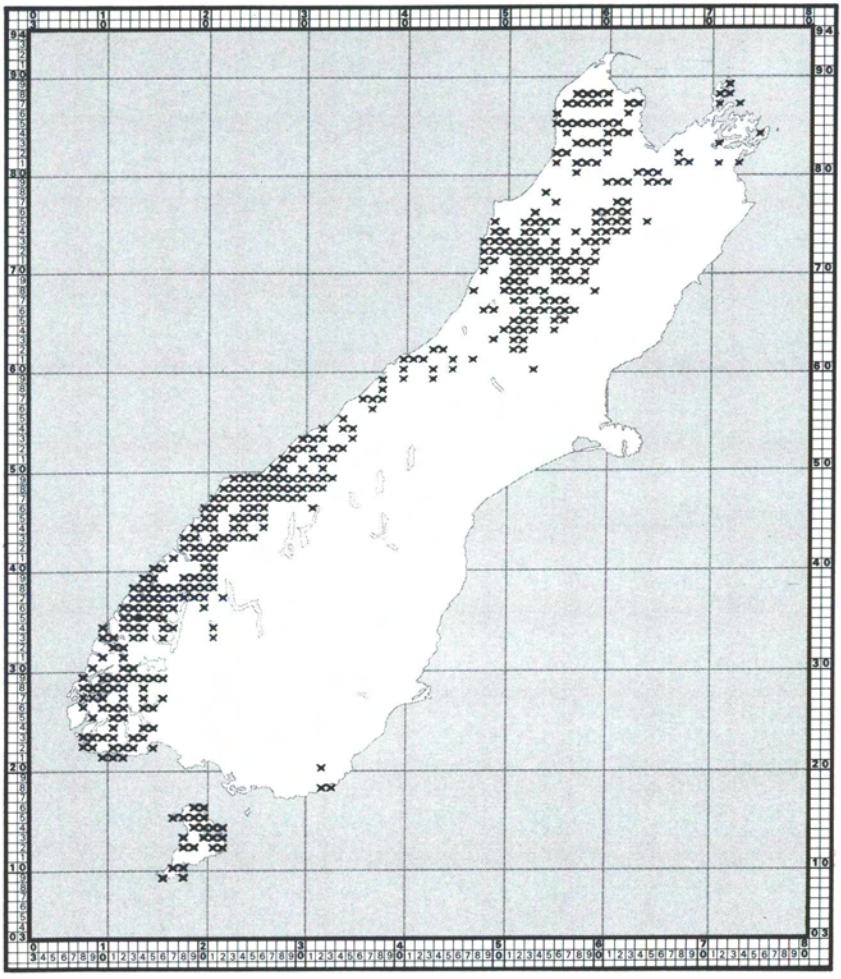
× = **Feral Pigeon** *(Columba livia)*

Domestic pigeons were brought to New Zealand in the early days of European settlement. Some soon escaped form captivity and gave rise, as early as the 1880s, to large feral populations breeding on cliffs and rocky outcrops, especially in eastern parts of the South Island (Thomson 1922).



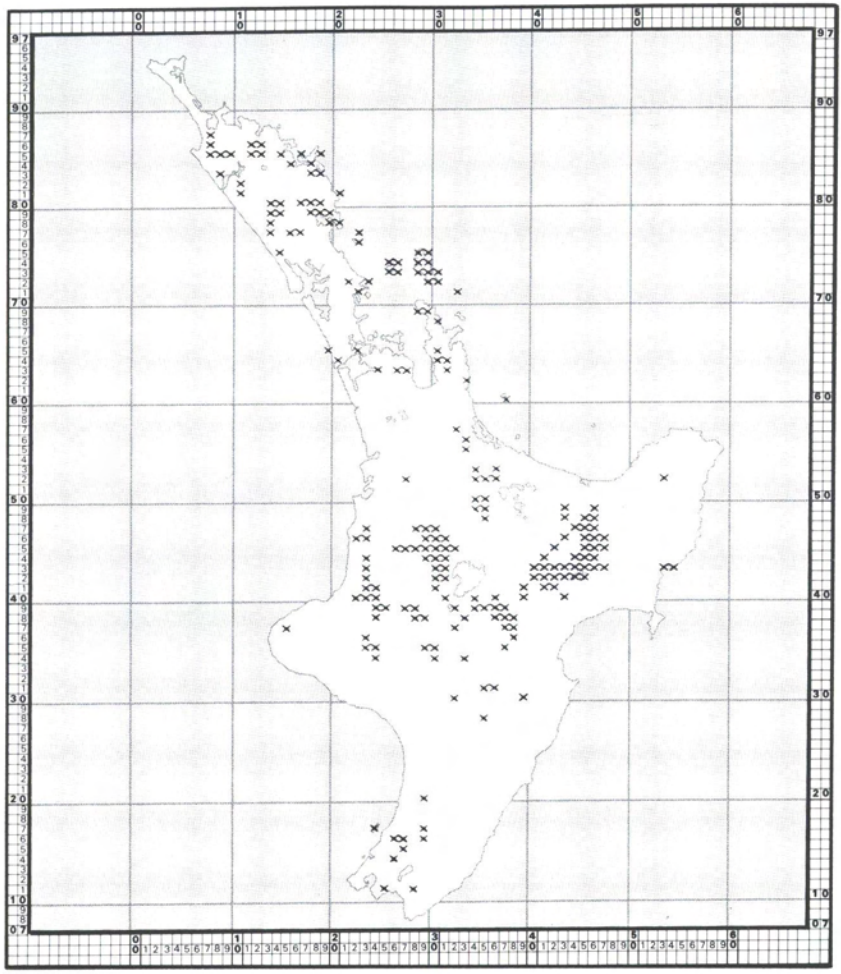
× = **Feral Pigeon** *(Columba livia)*

Populations of feral pigeons, sometimes re-inforced by lost racing pigeons, are now common in many rural and urban areas in both main islands, often nesting under bridges and on buildings

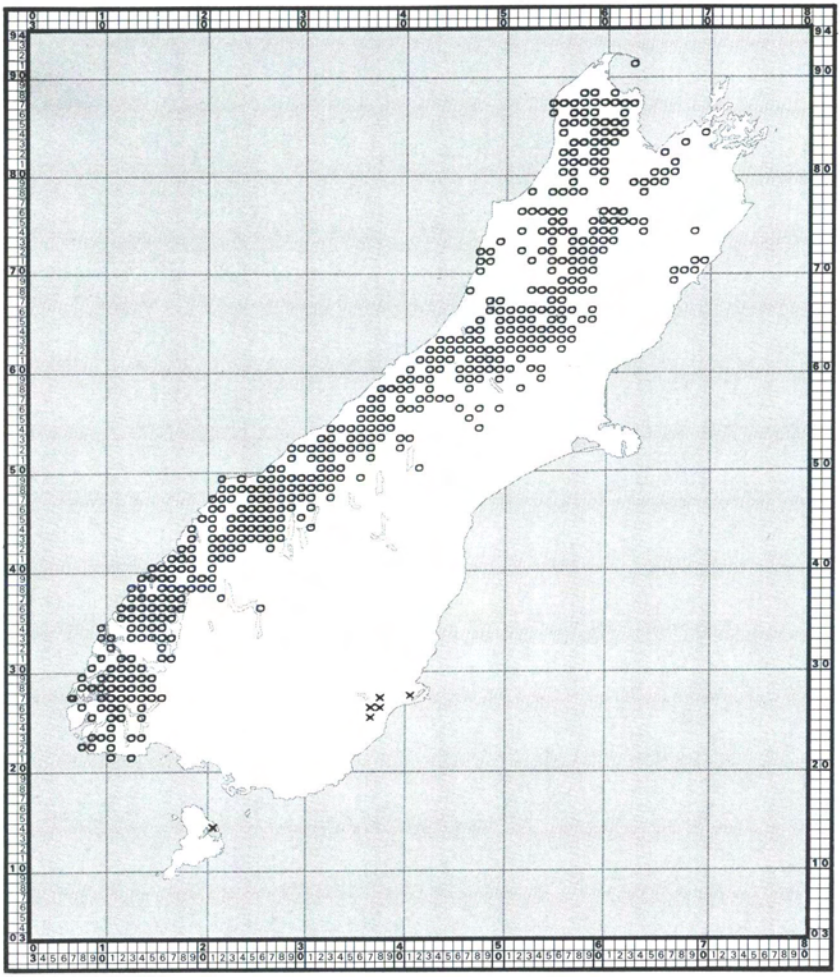


× = **Kaka** *(Nestor meridionalis)*

This species is almost confined to large areas of native forest.



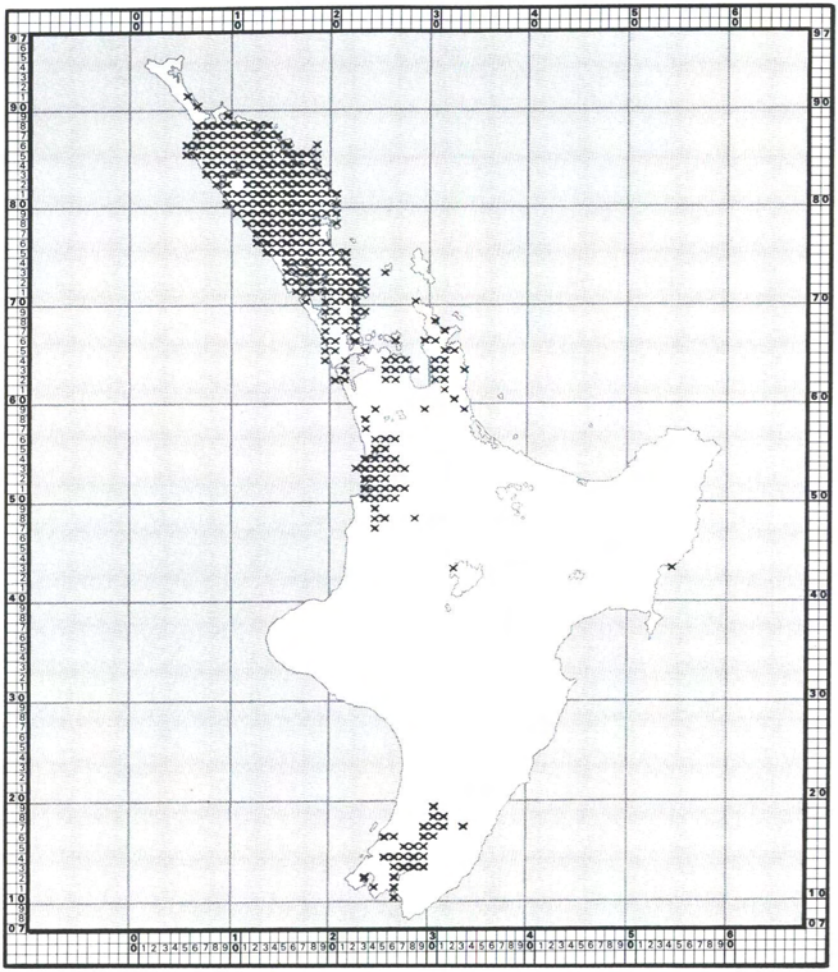
× = **Kaka** *(Nestor meridionalis)*



× = **Eastern Rosella** *(Platycercus eximius)*

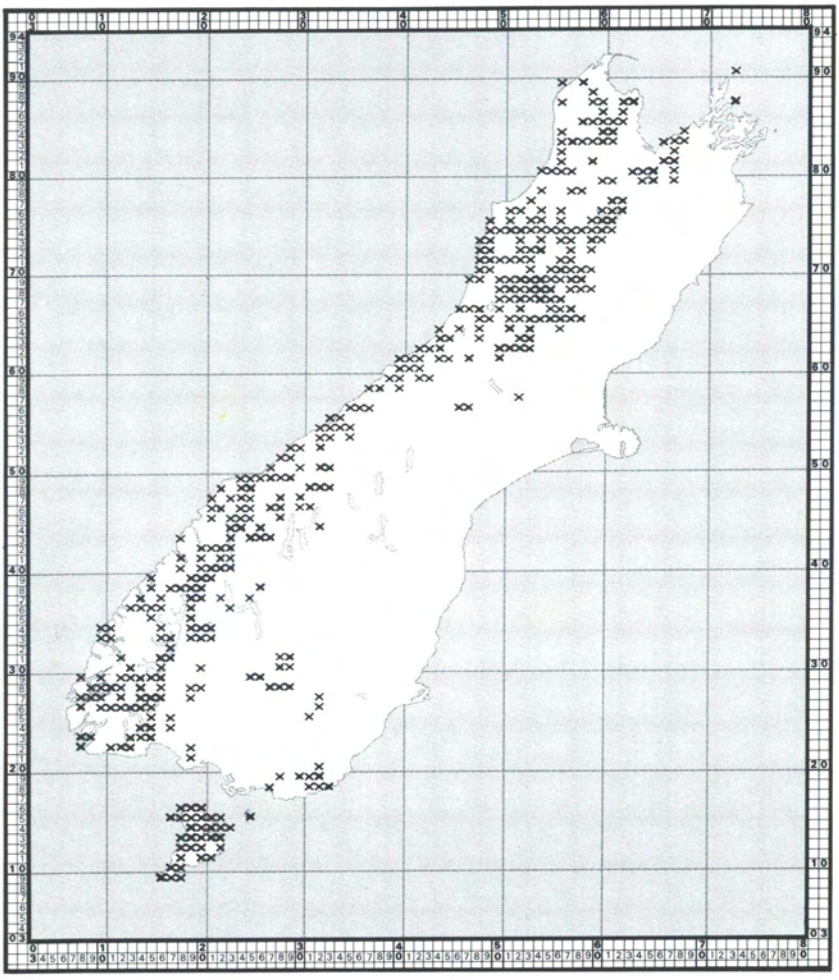
o = **Kea** *(Nestor notabilis)*

In New Zealand "rosella" is commonly used for Eastern Rosella as the other species, the Crimson Rosella *(P. elegans)*, is rare and localised in the wild. They are both Australian species established from escaped or liberated aviary birds. There is one atlas record of the Crimson Rosella (Wellington, square N2312). The single report of an Eastern Rosella on Stewart Island probably refers to an aviary escapee. Hamel (1970) reported a marked decrease in Eastern Rosella numbers near Dunedin. Keas do not occur in the wild in the North Island.



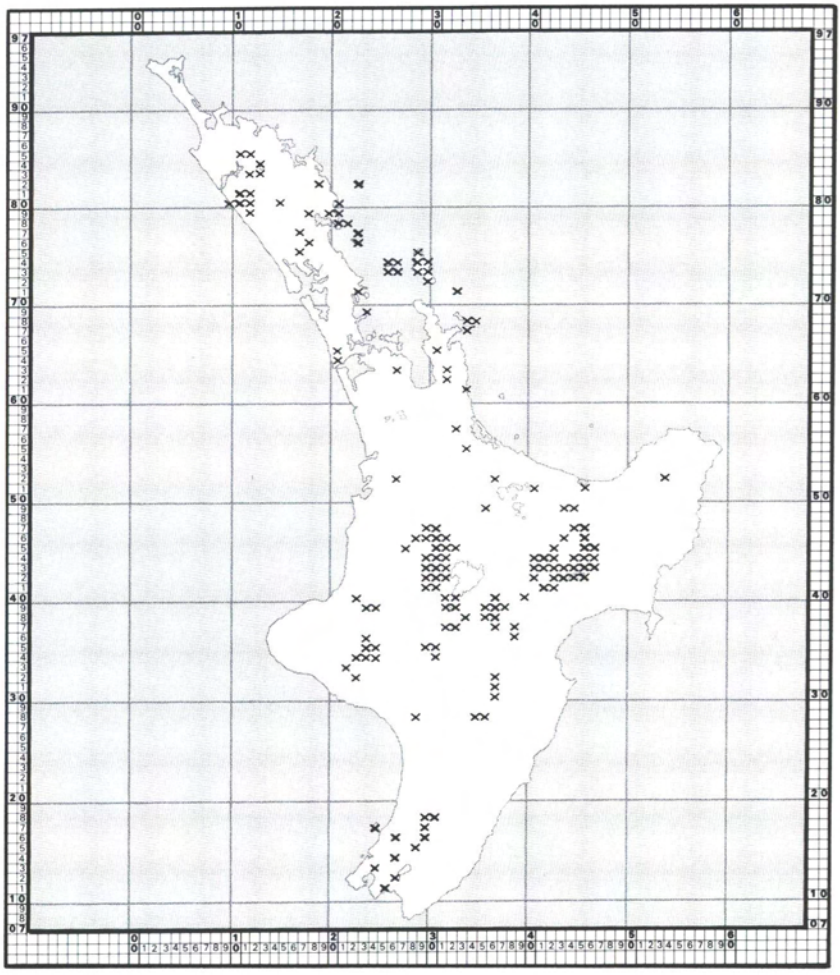
× = **Eastern Rosella** *(Platycercus eximius)*

Reports of Eastern Rosella and of ''rosella'' are combined on pages 146-147.

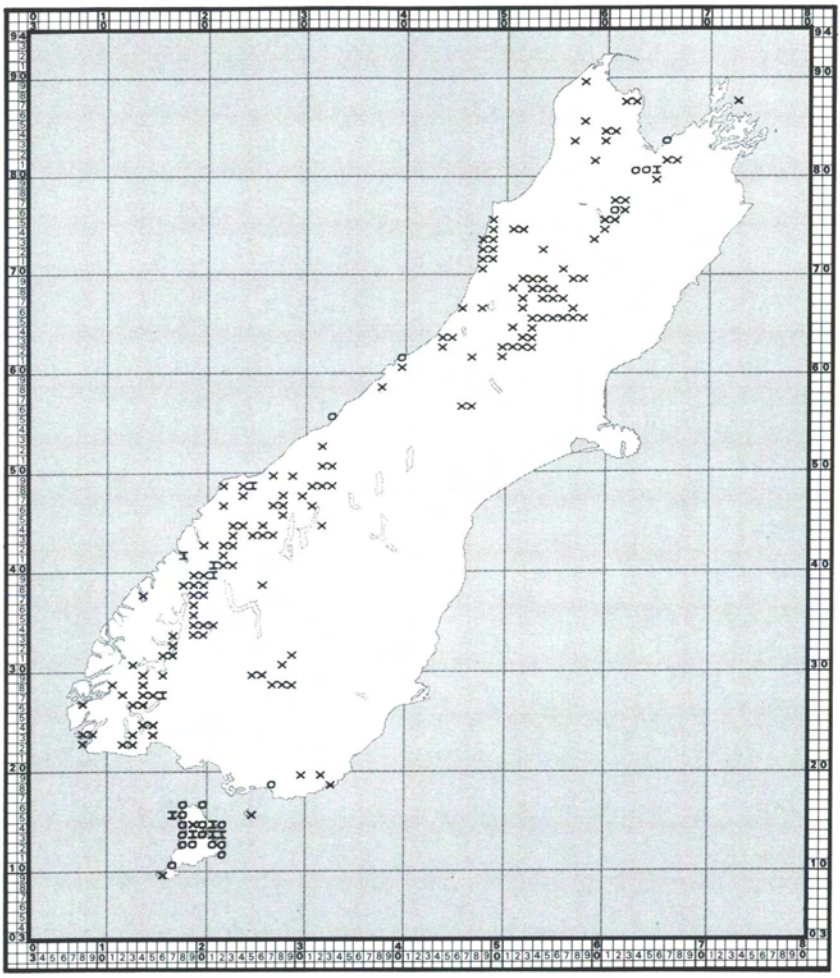


× = **Parakeets** *(Cyanoramphus* spp.*)*

Parakeets are far more often heard than seen and few observers could determine the species from sound alone. To make full use of those reports based on sound alone, pages 148-149 show the distribution of all parakeet records irrespective of species. Positive identifications of species are shown separately on pages 150-151.



× = **Parakeets** *(Cyanoramphus* spp.*)*

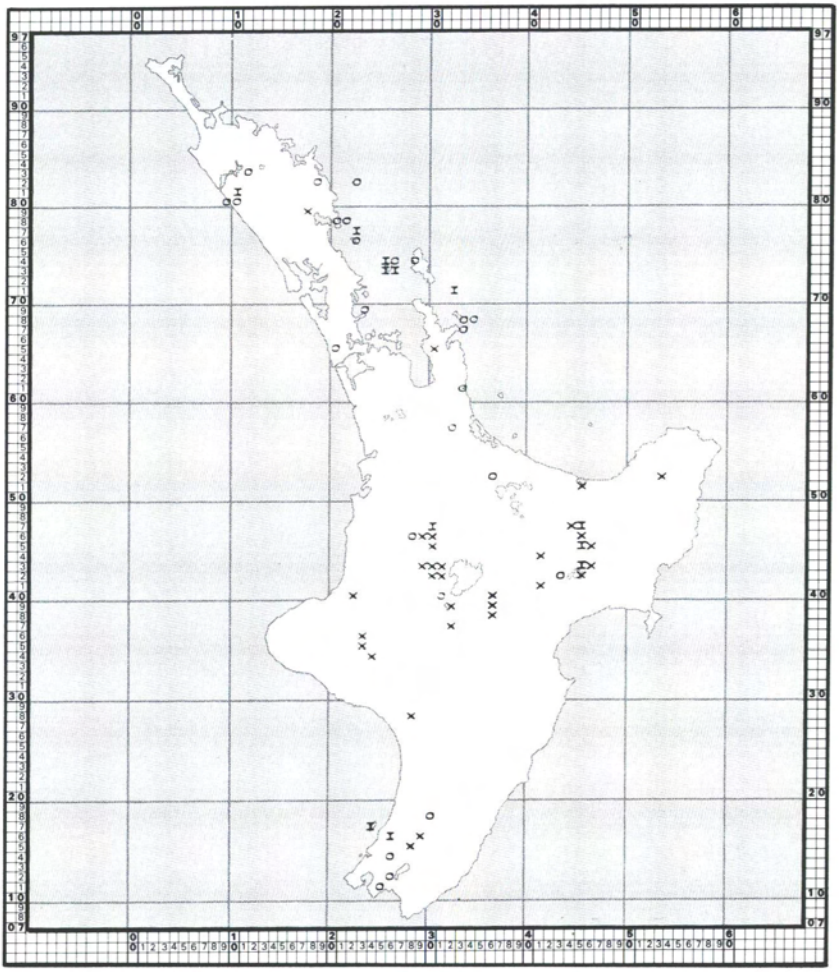


× = **Yellow-crowned Parakeet** *(Cyanoramphus auriceps)*

o = **Red-crowned Parakeet** *(Cyanoramphus novaezelandiae)*

I = Both species reported

A third ''species'', the Orange-fronted Parakeet *(Cyanoramphus malherbi)* is of uncertain taxonomic status (Nixon 1981). It was reported only from square S5778, but the ''species'' is now known to occur in the Lake Sumner area (Nixon 1981) and in Arthur's Pass National Park (Read & McClelland 1984). Its former distribution was reviewed by Harrison (1970).

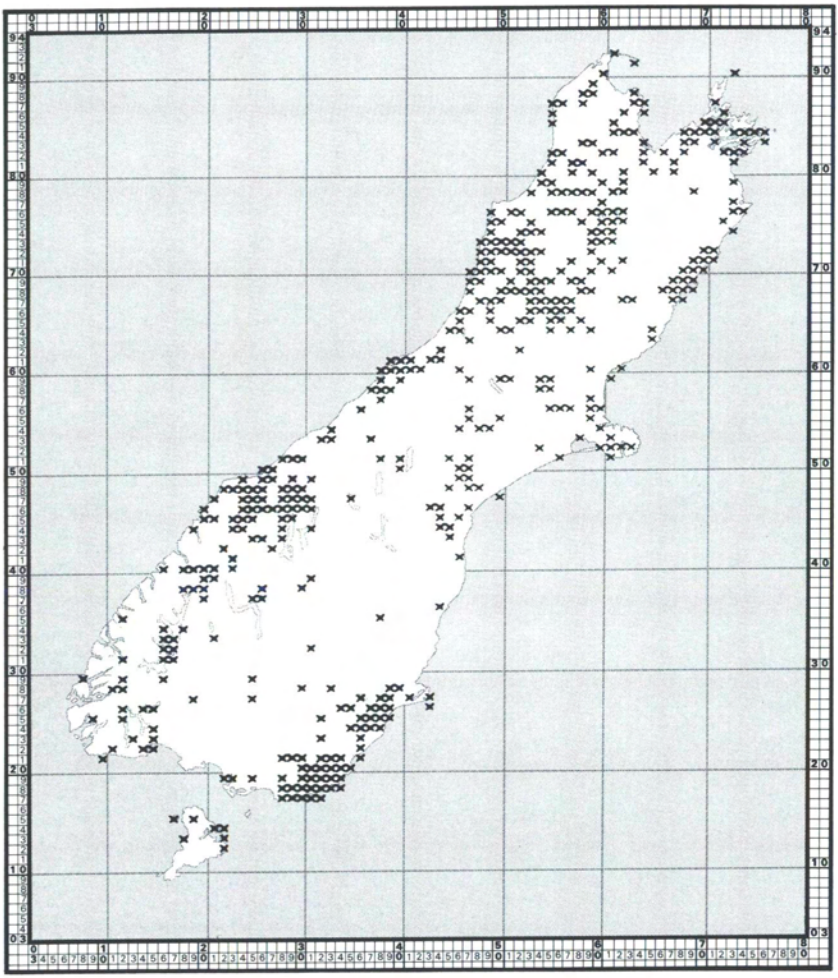


X = Yellow-crowned Parakeet *(Cyanoramphus auriceps)*

O = Red-crowned Parakeet *(Cyanoramphus novaezelandiae)*

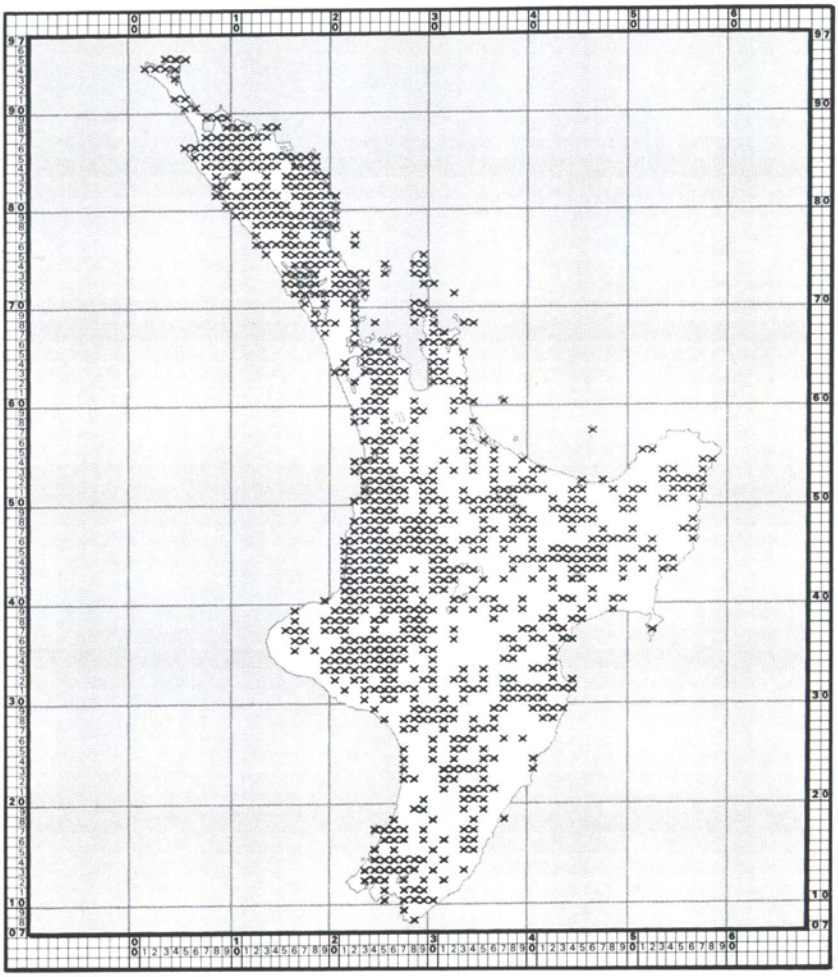
I = Both species reported

A few of the records shown on pages 148 to 151 may refer to aviary-bred birds that have recently escaped or been liberated.

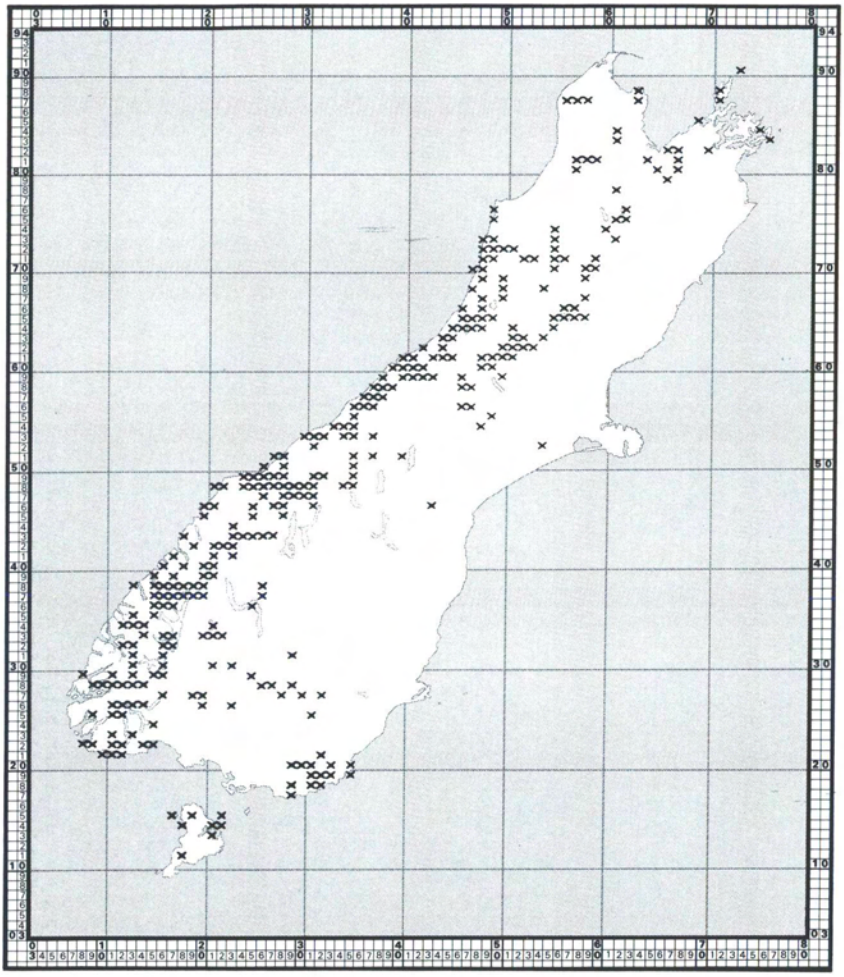


× = **Shining Cuckoo** *(Chrysococcyx lucidus)*

Breeds in New Zealand (normally parasitising the Grey Warbler) and winters in the Solomon Islands and Bismarck Archipelago.

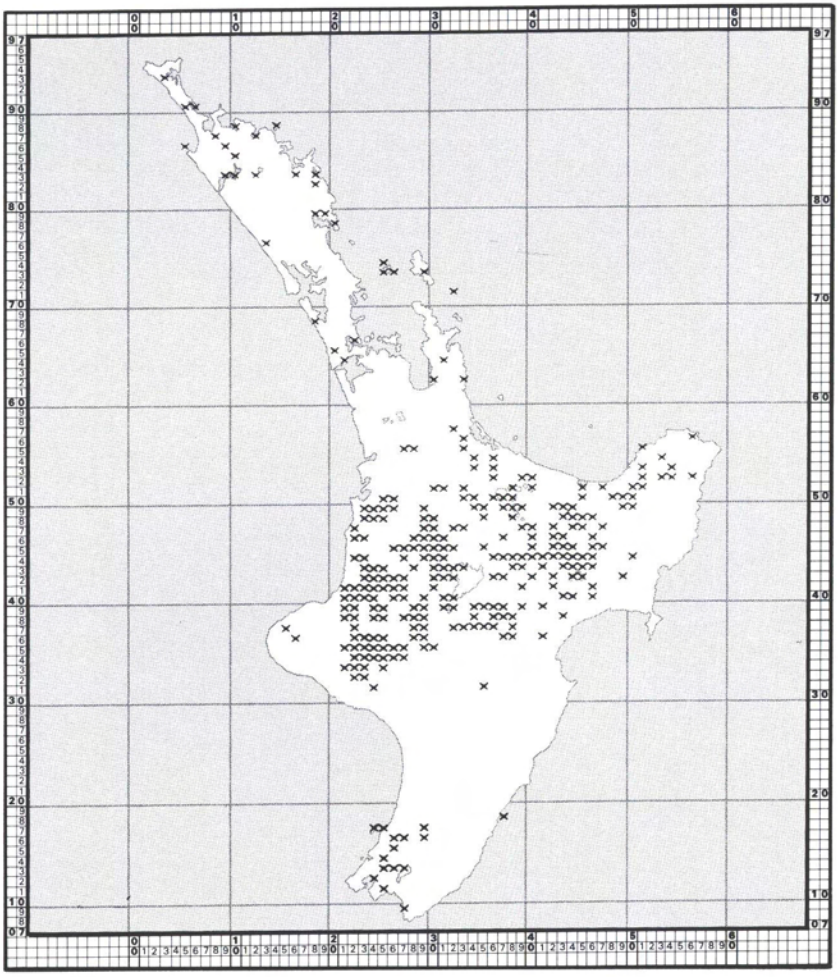


× = **Shining Cuckoo** *(Chrysococcyx lucidus)*

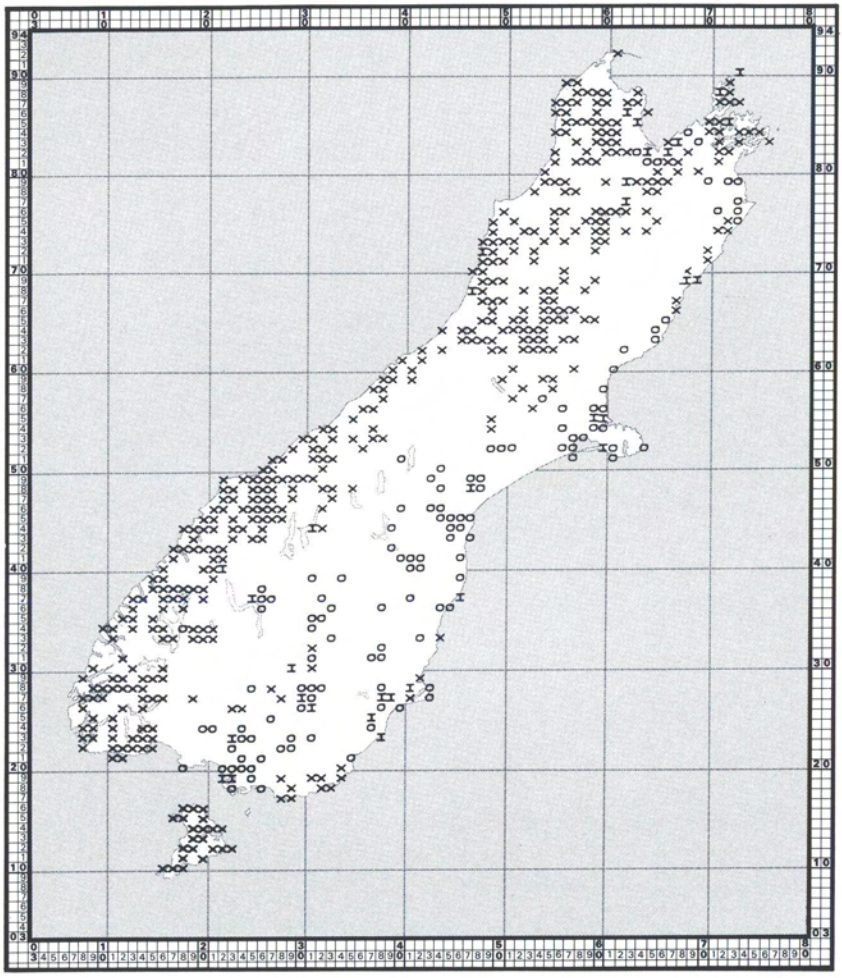


✕ = **Long-tailed Cuckoo** *(Eudynamys taitensis)*

Breeds in New Zealand (usually parasitising the Whitehead and the Brown Creeper) and winters from Papua New Guinea region east to the Marquesas Islands, but mainly Fiji to the Society Islands (Kinsky 1970).



× = **Long-tailed Cuckoo** *(Eudynamys taitensis)*

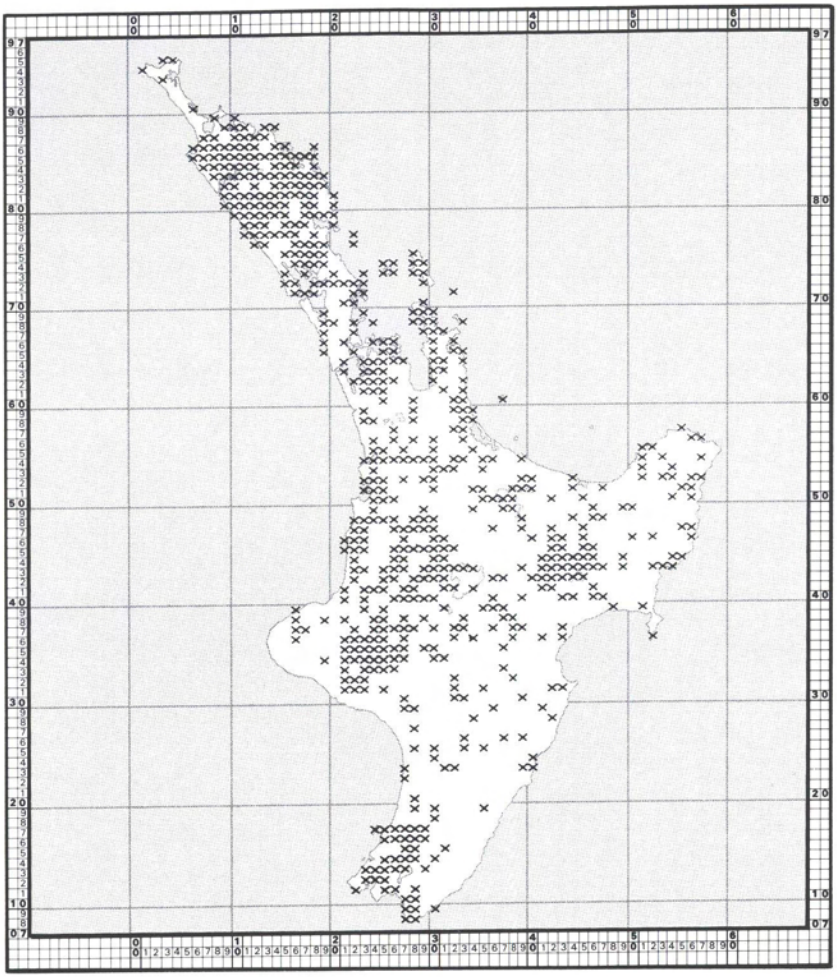


× = **Morepork** *(Ninox novaeseelandiae)*

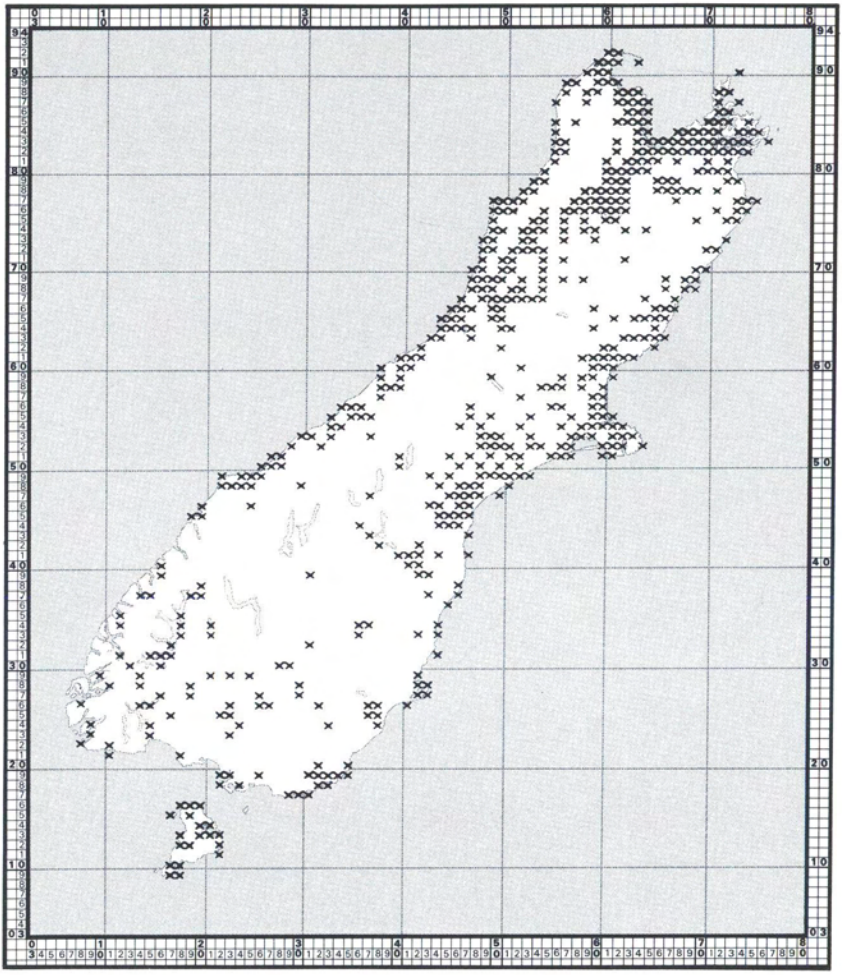
o = **Little Owl** *(Athene noctua)*

I = **Both species reported**

The Otago Acclimatisation Society imported 219 Little Owls (some from Germany) between 1906 and 1910 to help control various passerines imported earlier and proving damaging to fruit and grain (Thomson 1922). In 1940, Little Owls apparently occurred only as far north as Parnassus in North Canterbury (Marples 1942). If this was correct, the atlas records imply a substantial spread northward. There are no recent records of the Little Owl in the North Island.

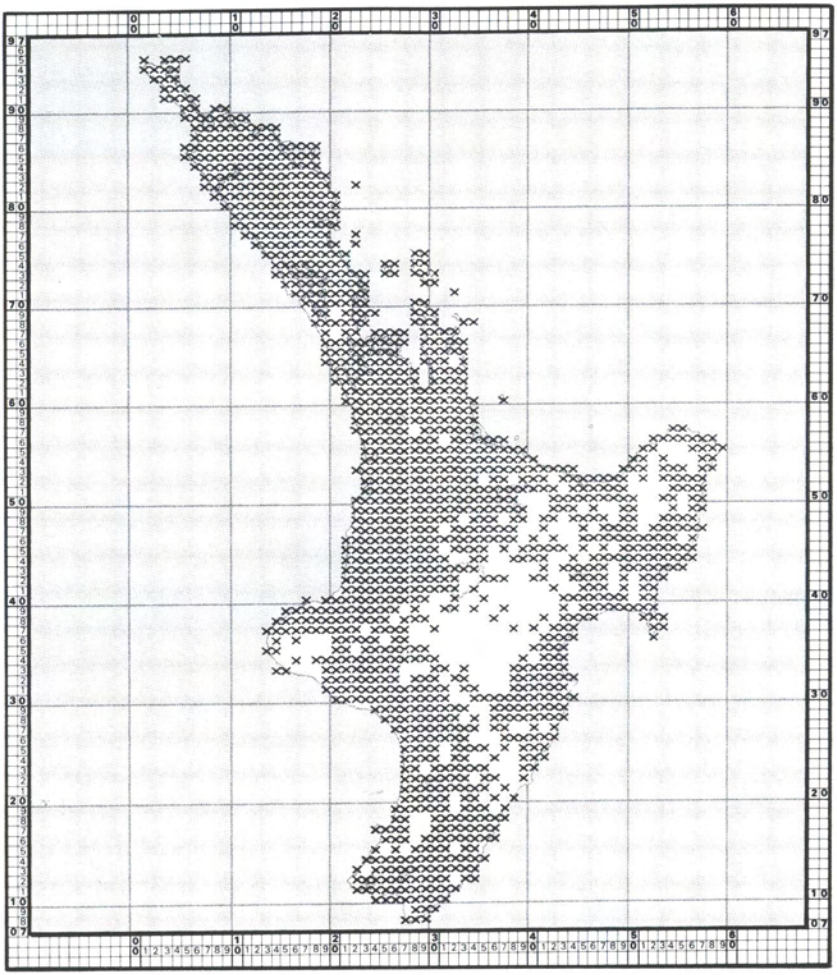


× = **Morepork** *(Ninox novaeseelandiae)*

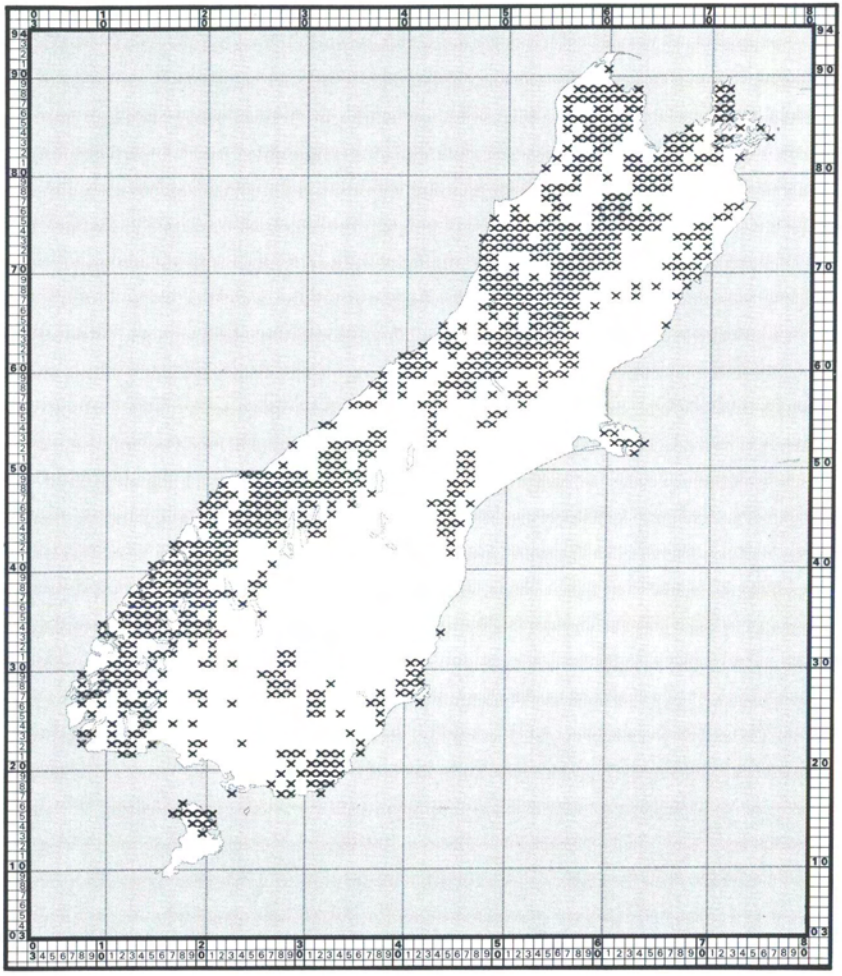


× = **New Zealand Kingfisher** *(Halcyon sancta vagans)*

Very common in northern districts but rather scarce over much of the South Island (Falla *et al.*). Taylor (1966) showed that Kingfishers were quite numerous at higher altitudes (250-800m a.s.l.) in the Nelson-Marlborough area in spring and early summer but virtually absent in winter.

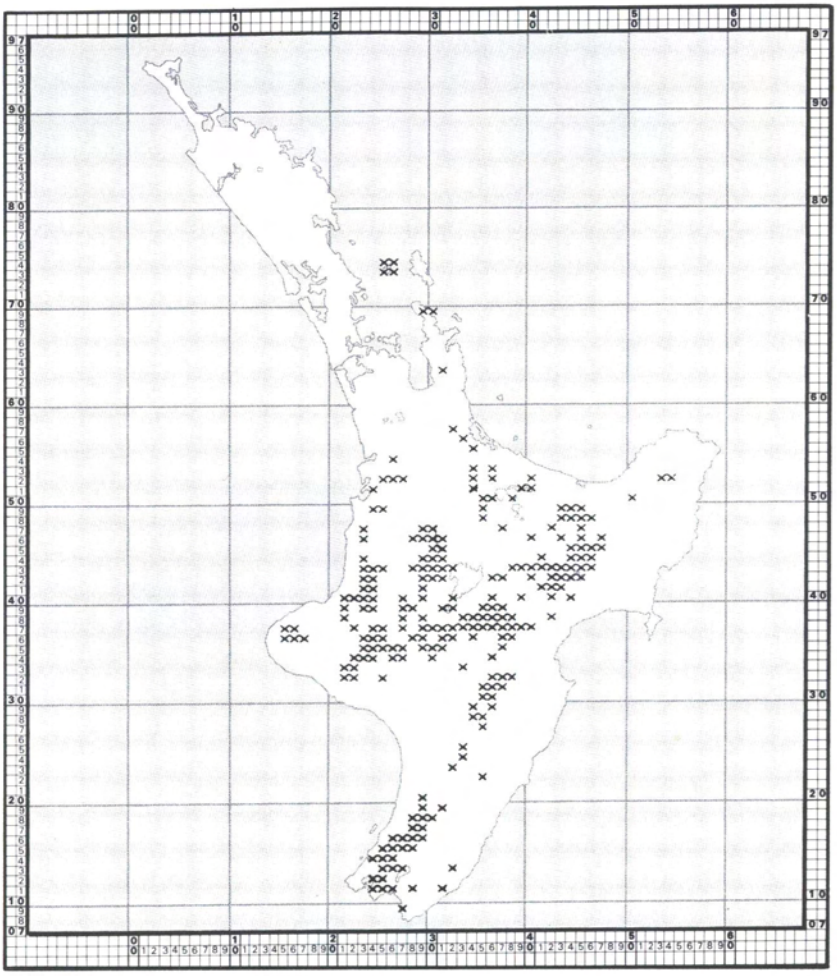


× = **New Zealand Kingfisher** *(Halcyon sancta vagans)*

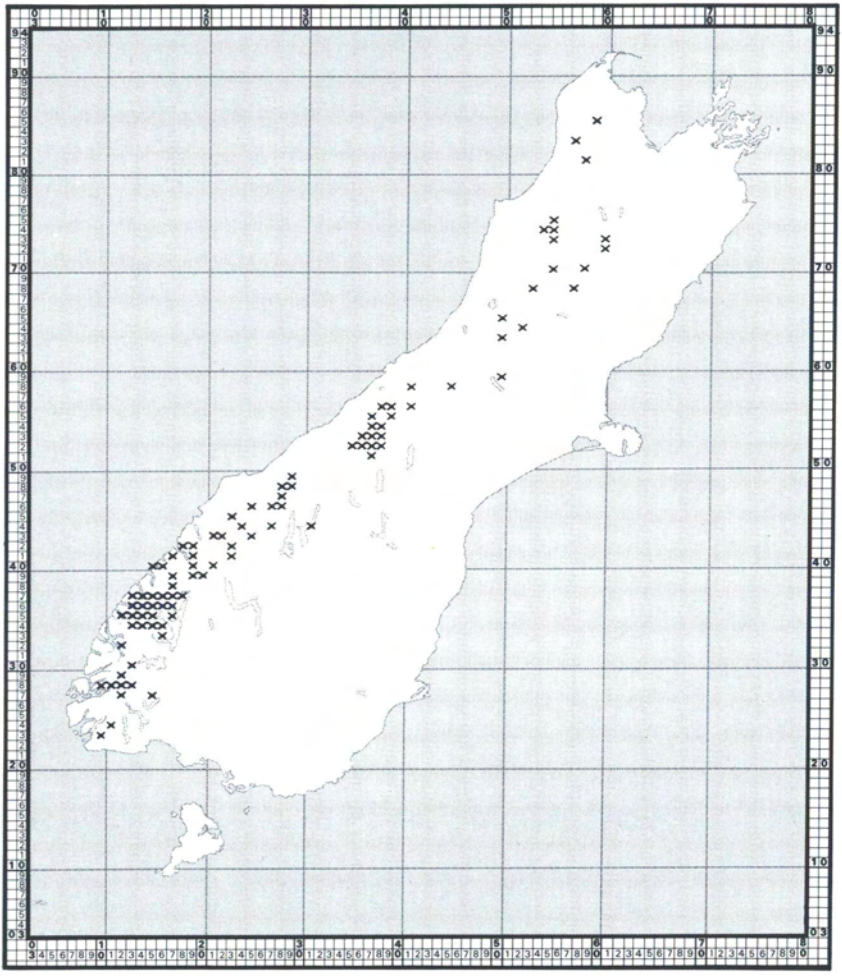


× = **Rifleman** *(Acanthisitta chloris)*

In the Reefton district of the South Island the Rifleman, unlike other species (except the Kea), was much more numerous in forests at high altitudes (820-1070m a.s.l.) than in those at lower altitudes (Dawson *et al.* 1978). Clout (1980) found that Riflemen in the Nelson district were virtually restricted to native forest though a few Riflemen have been recorded in some mature exotic pine forests elsewhere (references in Bull 1981).

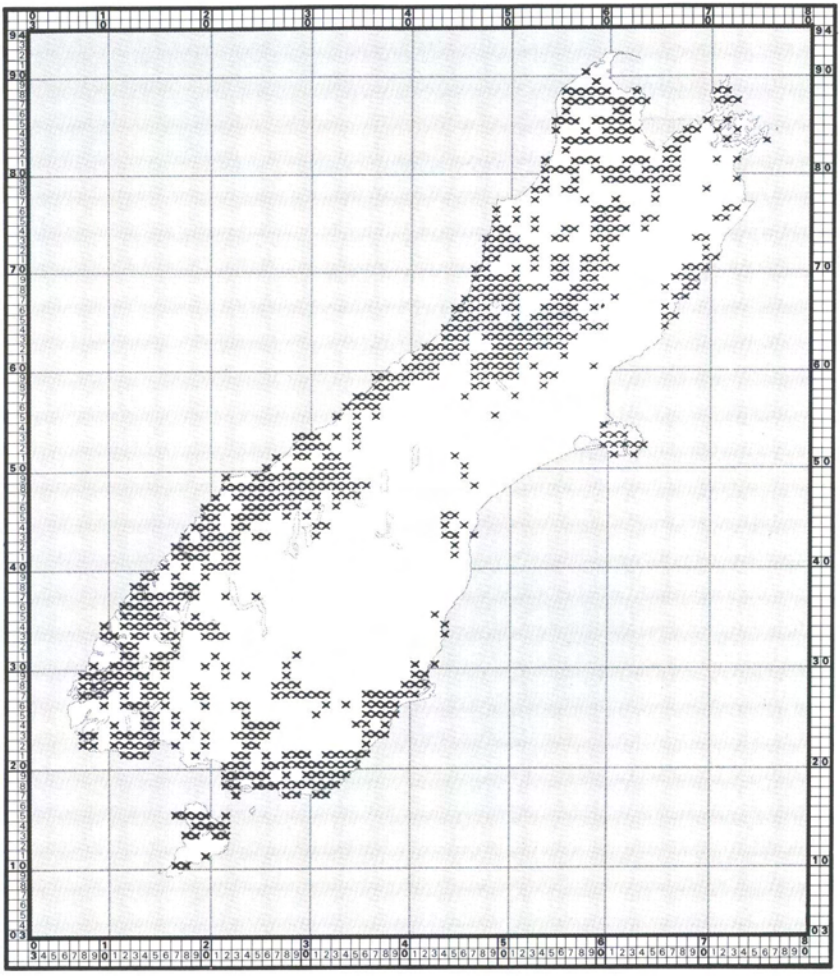


× = **Rifleman** *(Acanthisitta chloris)*



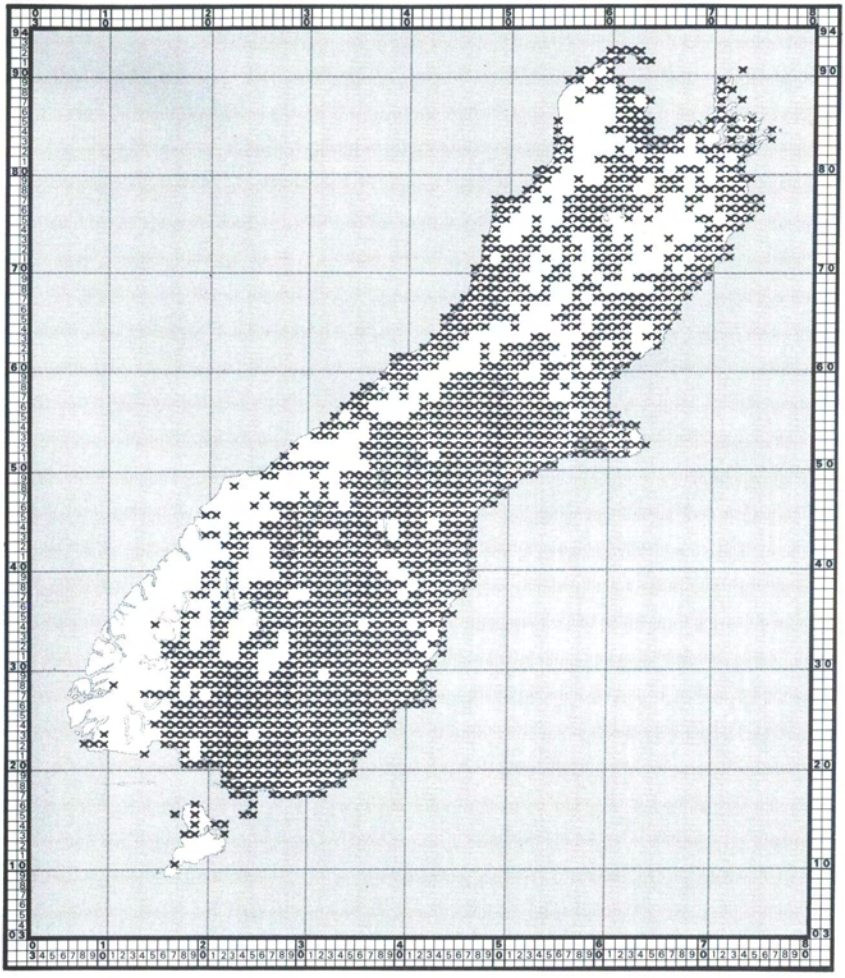
× = **Rock Wren** *(Xenicus gilviventris)*

Rock Wrens do not occur in the North Island.



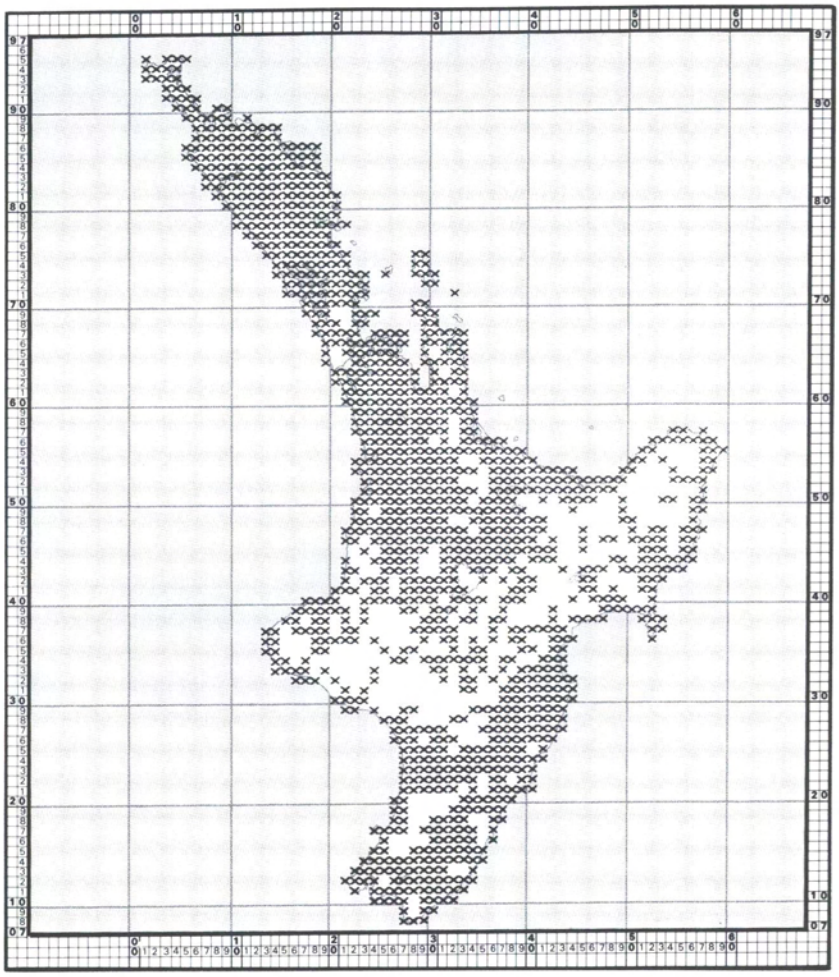
× = **Brown Creeper** *(Finschia novaeseelandiae)*

Brown Creepers do not occur in the North Island.

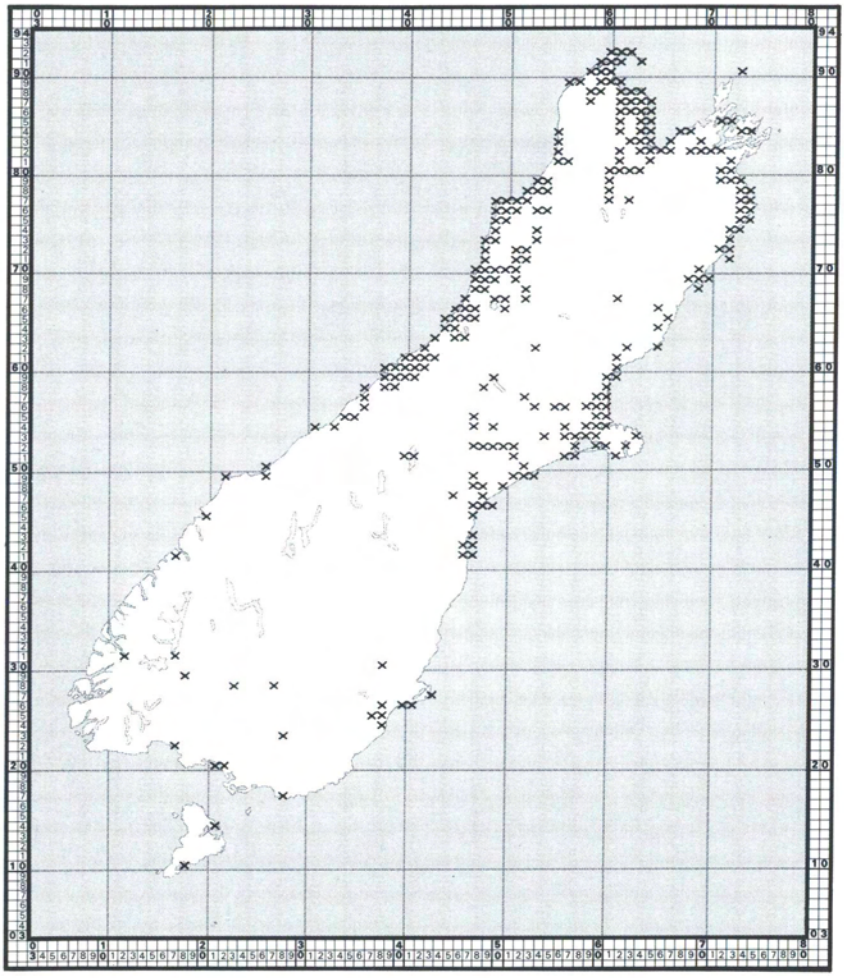


✕ = **Skylark** *(Alauda arvensis)*

At least 964 Skylarks were imported from Britain in several shipments between 1864 and 1875 and were liberated in the Auckland, Hawke's Bay, Wellington, Nelson, Canterbury and Otago Acclimatisation districts (Thomson 1922). The species was well established in open country throughout New Zealand before the turn of the century (Drummond 1906).

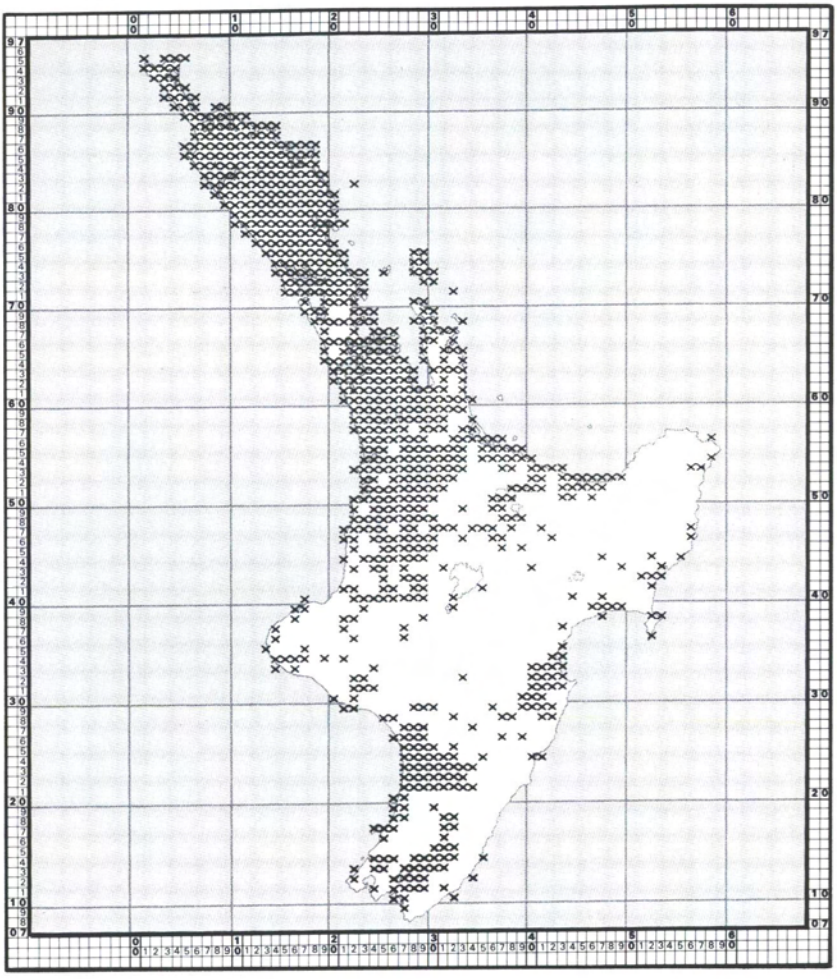


× = **Skylark** *(Alauda arvensis)*



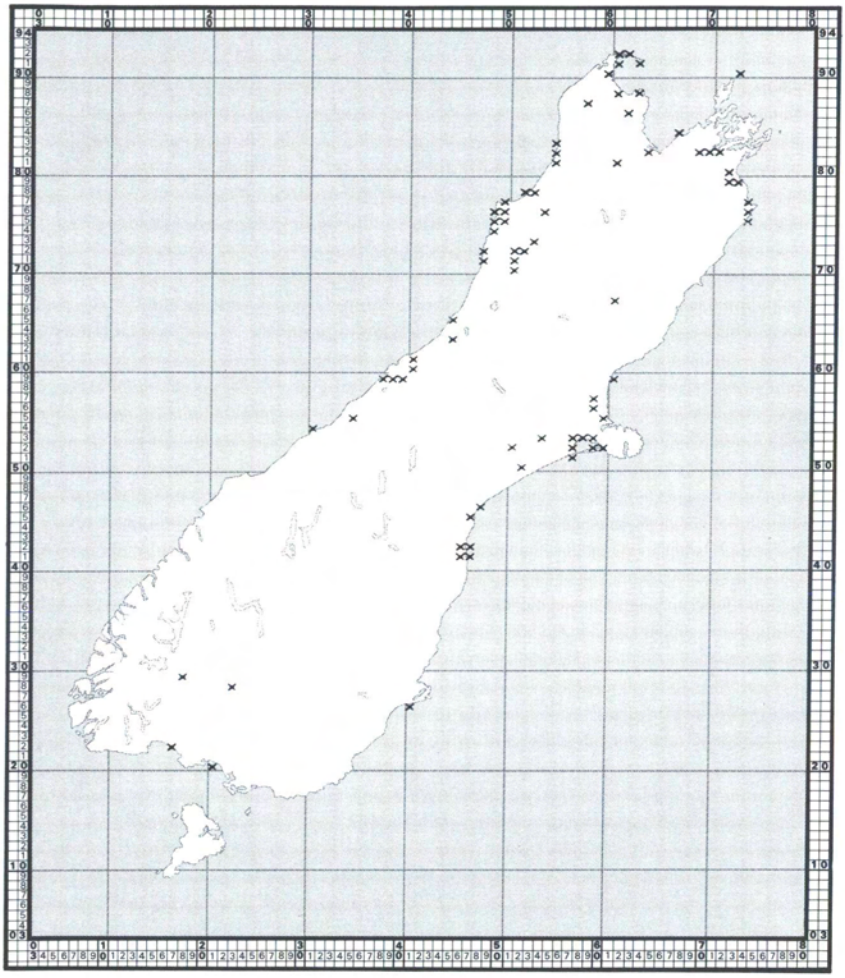
× = **Welcome Swallow** *(Hirundo tahitica neoxena)*

The absence of records in the coastal area between Dunedin and Wainono Lagoon is misleading. Welcome Swallows have been present in several localities in the lower Waitaki River valley since about 1972; they apparently arrived at Wainono Lagoon as early as about 1955-56 (Robertson *et al.* 1984).



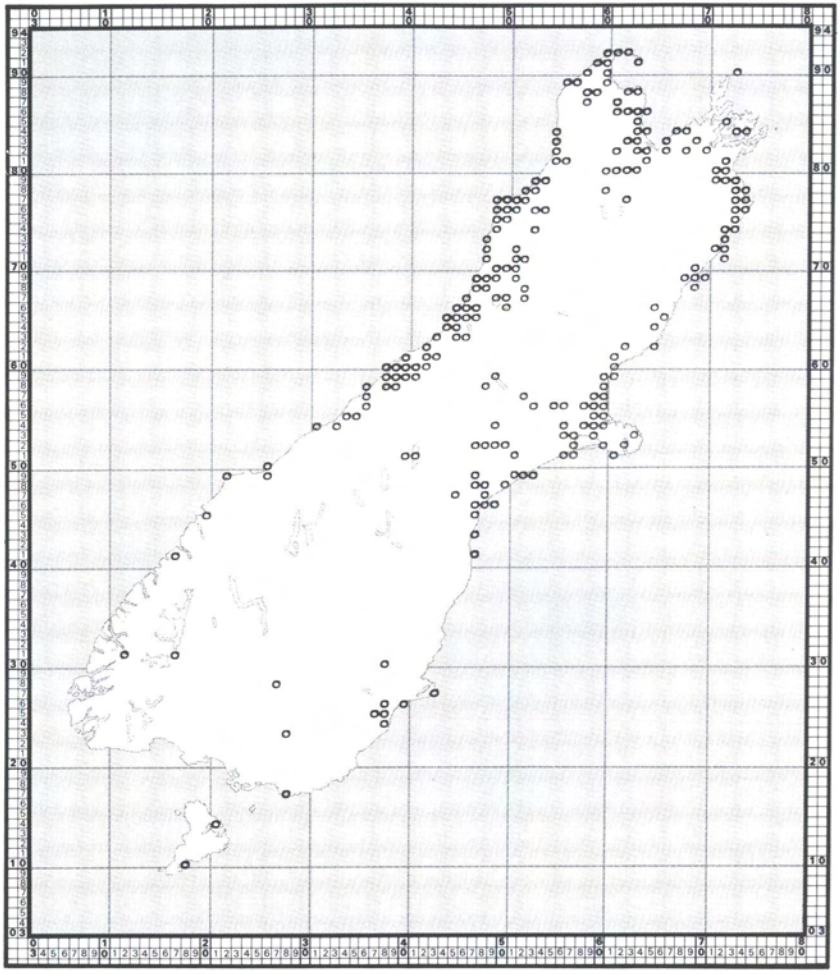
× = **Welcome Swallow** *(Hirundo tahitica neoxena)*

Edgar (1966) traced the establishment and spread of this species from the first recorded breeding in 1958 until 1965, when he thought the population had reached at least 1080 pairs with about half of them in the Mangonui County of North Auckland. The species has greatly increased in numbers and range since then (see pages 168 to 172).



× = **Welcome Swallow** *(Hirundo tahitica neoxena)*

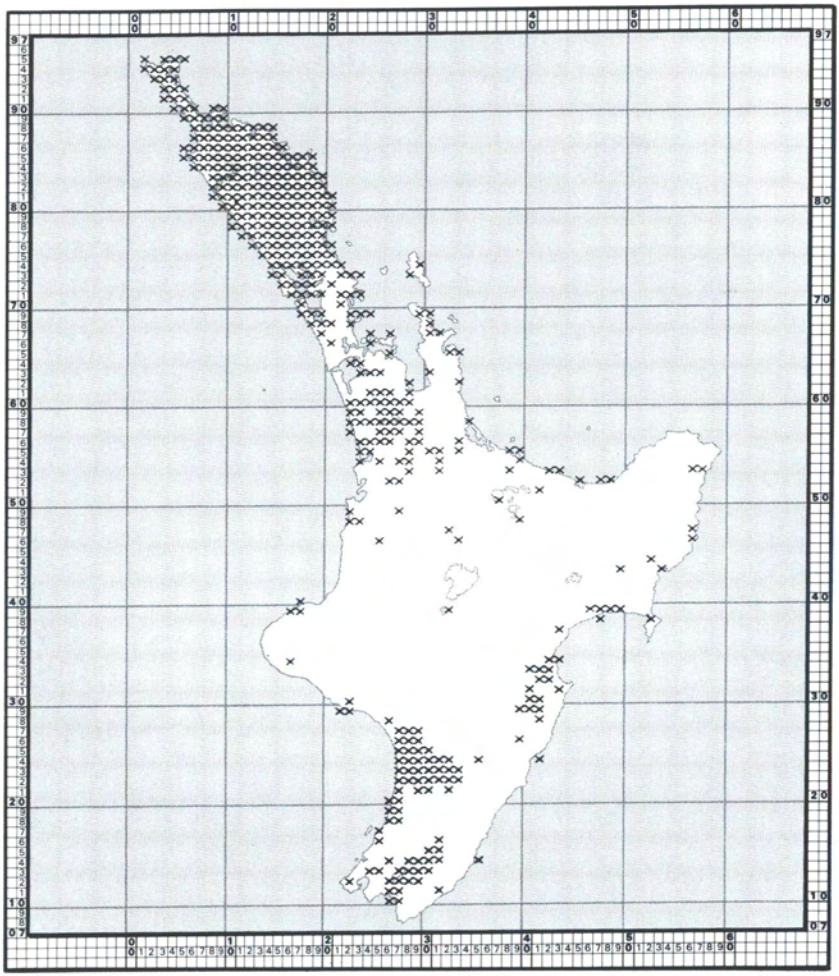
Reports from 1969 to 1974 inclusive



o = Welcome Swallow *(Hirundo tahitica neoxena)*

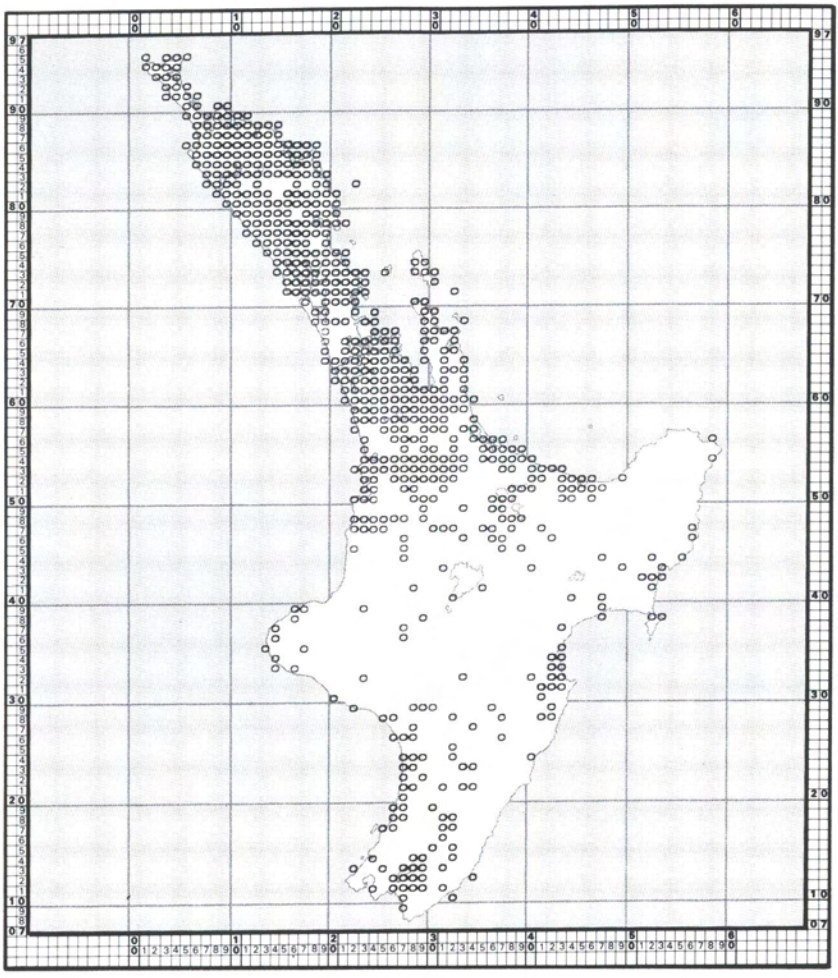
Reports from 1975 to 1979 inclusive

The greater number of South Island records of Welcome Swallow in 1975-1979 than in 1969-1974, despite roughly equal surveying effort in the two periods (except in Southland), reflects the recent spread of the species.



× = **Welcome Swallow** *(Hirundo tahitica neoxena)*

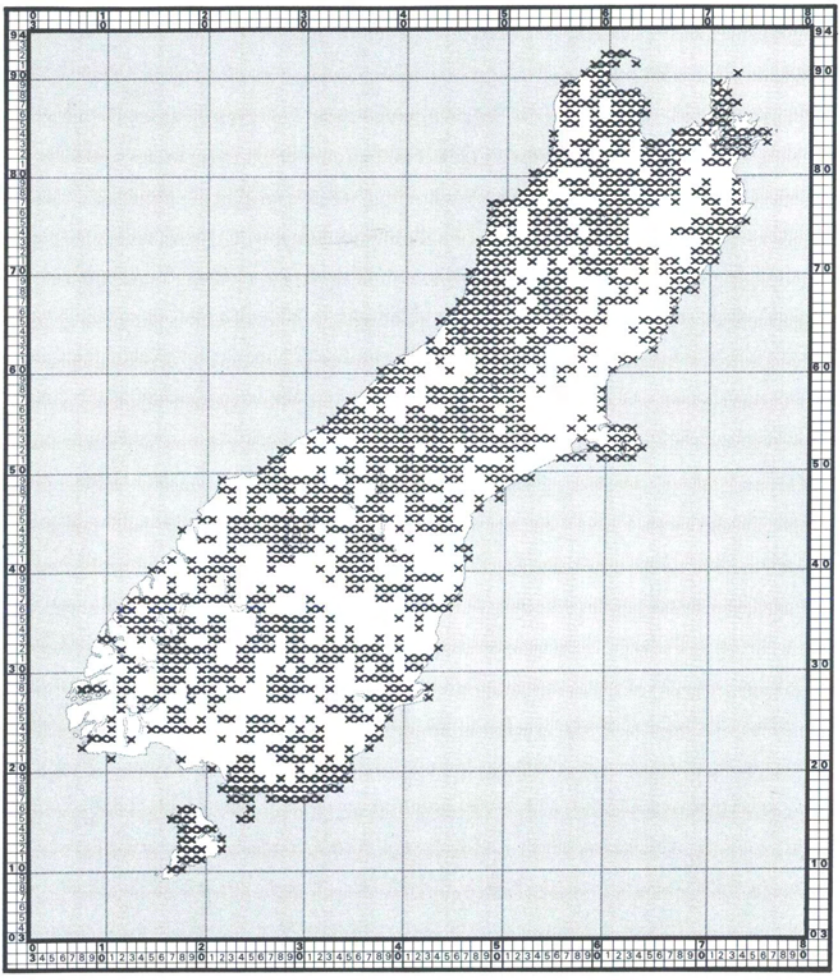
Reports from 1969 to 1974 inclusive



o = **Welcome Swallow** *(Hirundo tahitica neoxena)*

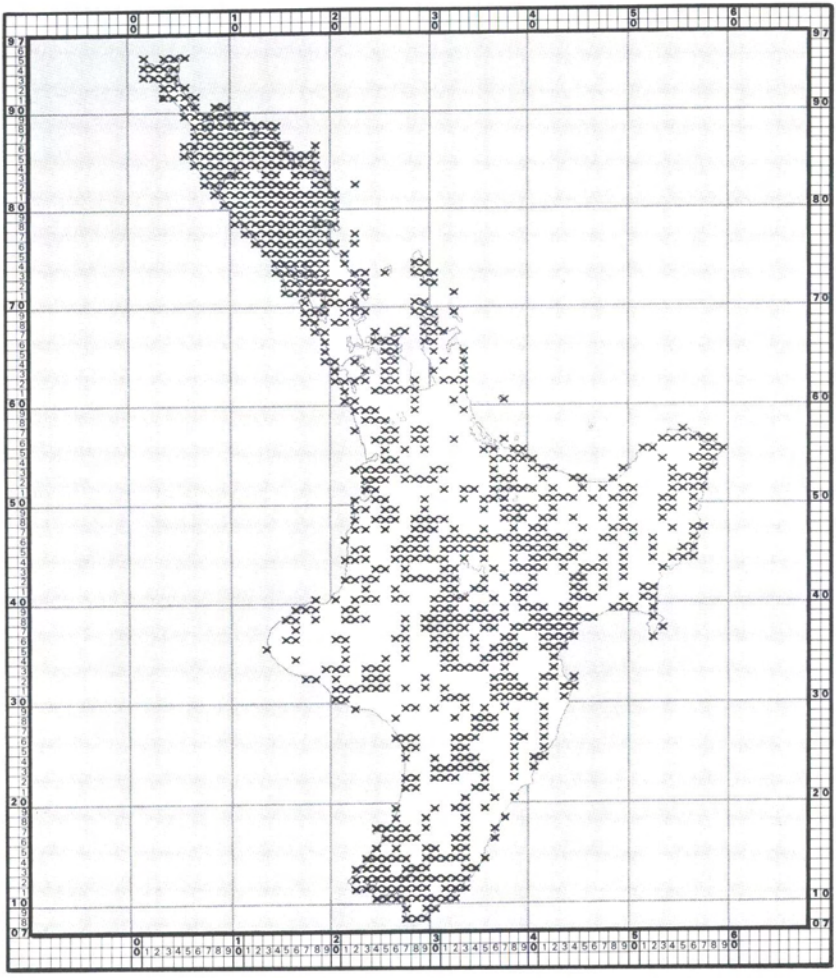
Reports from 1975 to 1979 inclusive

With roughly similiar survey effort over the two periods, Welcome Swallows were recorded in 1975-1979 in many central North Island squares where they were apparently absent in 1969-1974.

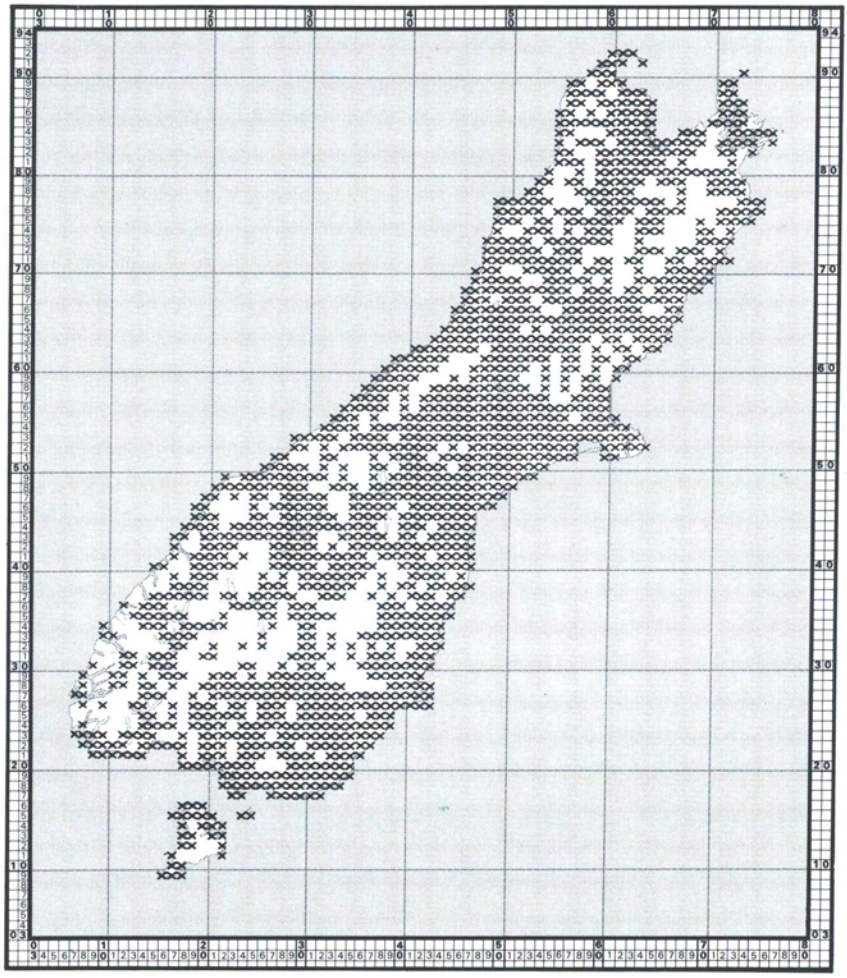


× = **New Zealand Pipit** *(Anthus novaeseelandiae)*

During the breeding season, the native Pipit in Otago seemed to avoid areas with a mean annual rainfall of less than 767 mm. In contrast, Skylarks were abundant even when the mean annual rainfall was as low as 330 mm (Hamel 1972).

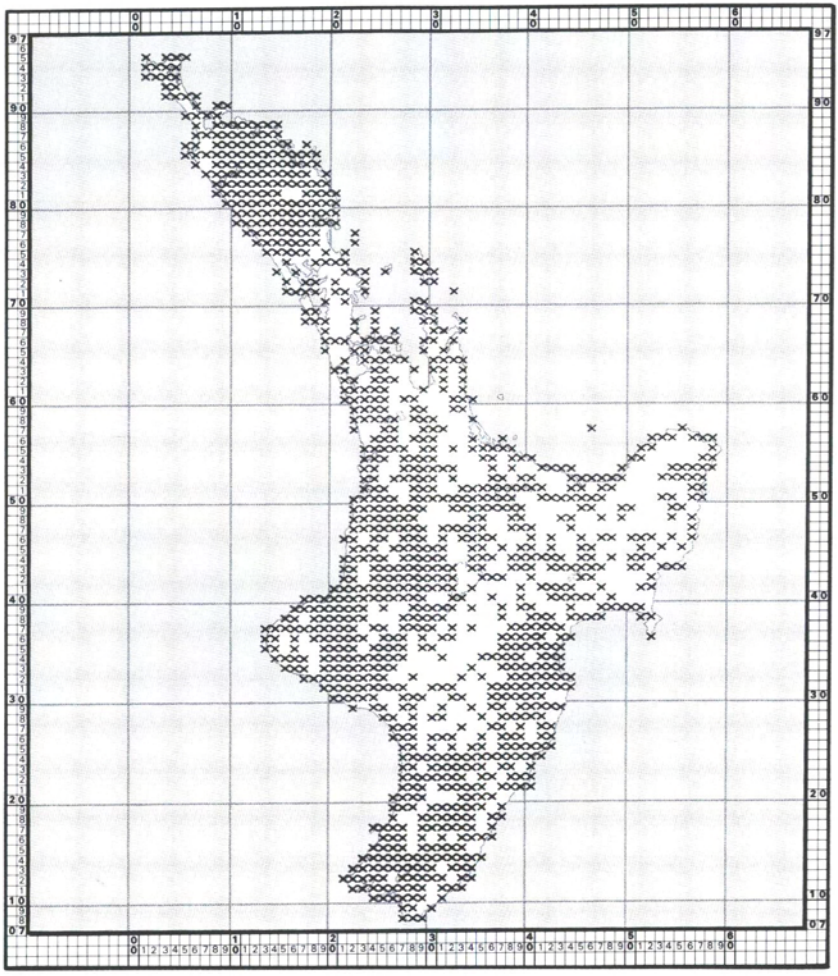


× = **New Zealand Pipit** *(Anthus novaeseelandiae)*

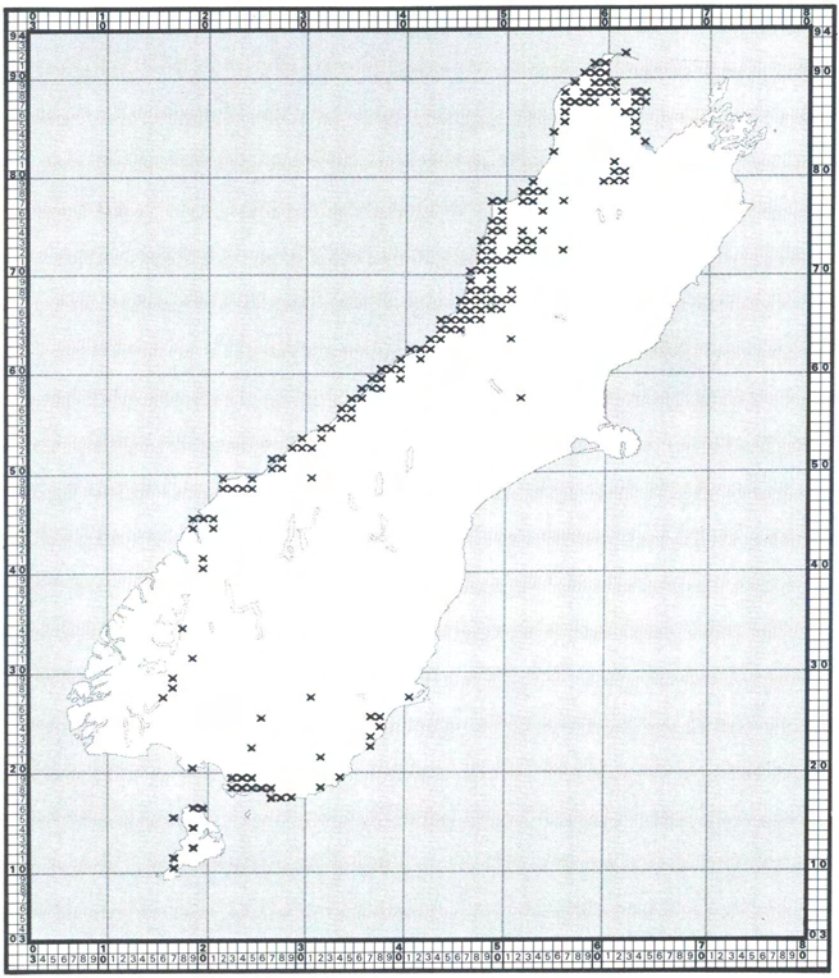


× = **Hedgesparrow** *(Prunella modularis)*

Several importations of Hedgesparrows, comprising more than 241 birds, were made between 1867 and 1882 to the Auckland, Hawke's Bay, Wellington, Canterbury and Otago districts (Thomson 1922). The species was apparently slow to establish in the Hawke's Bay and Auckland districts, but it has managed to reach the Chathams and other outlying islands.

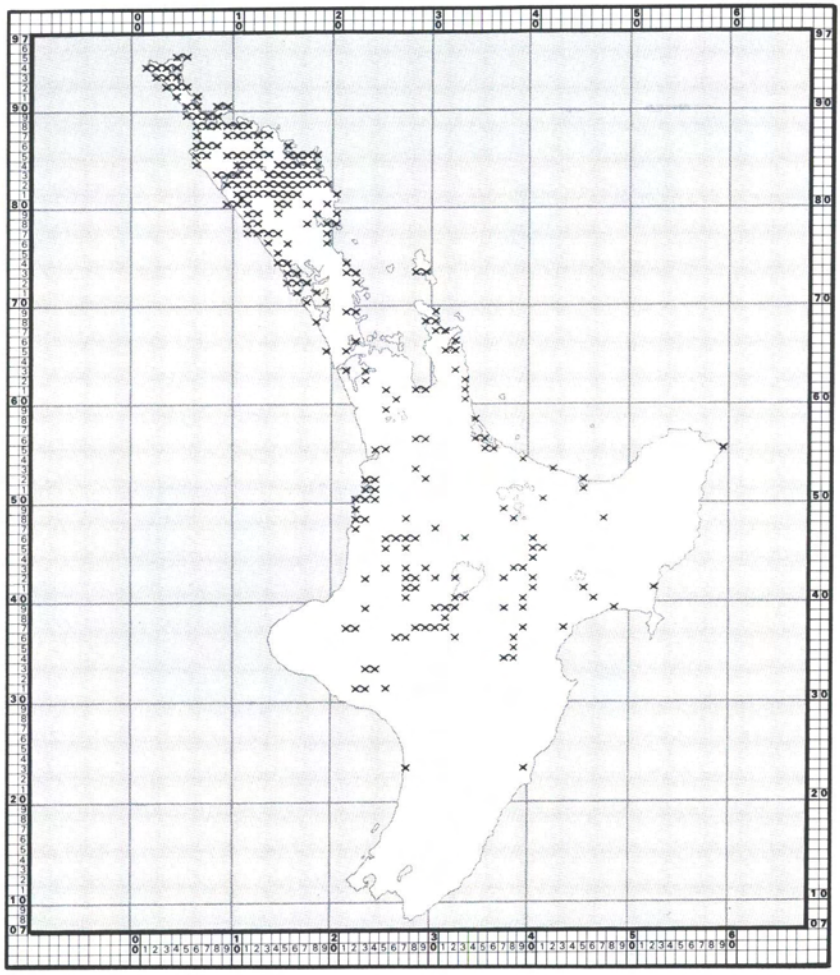


× = **Hedgesparrow** *(Prunella modularis)*

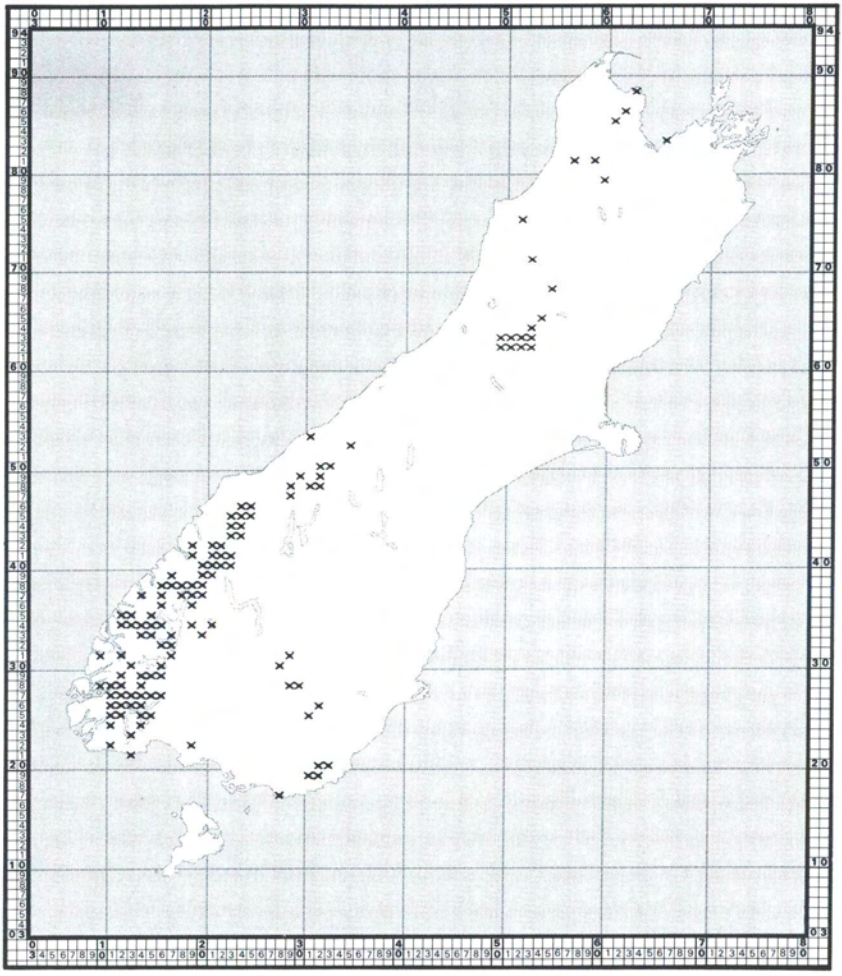


× = **Fernbird** *(Bowdleria punctata)*

The rather strict ecological requirements of the South Island and southern subspecies have been described by Best (1979) and Barlow (1983).

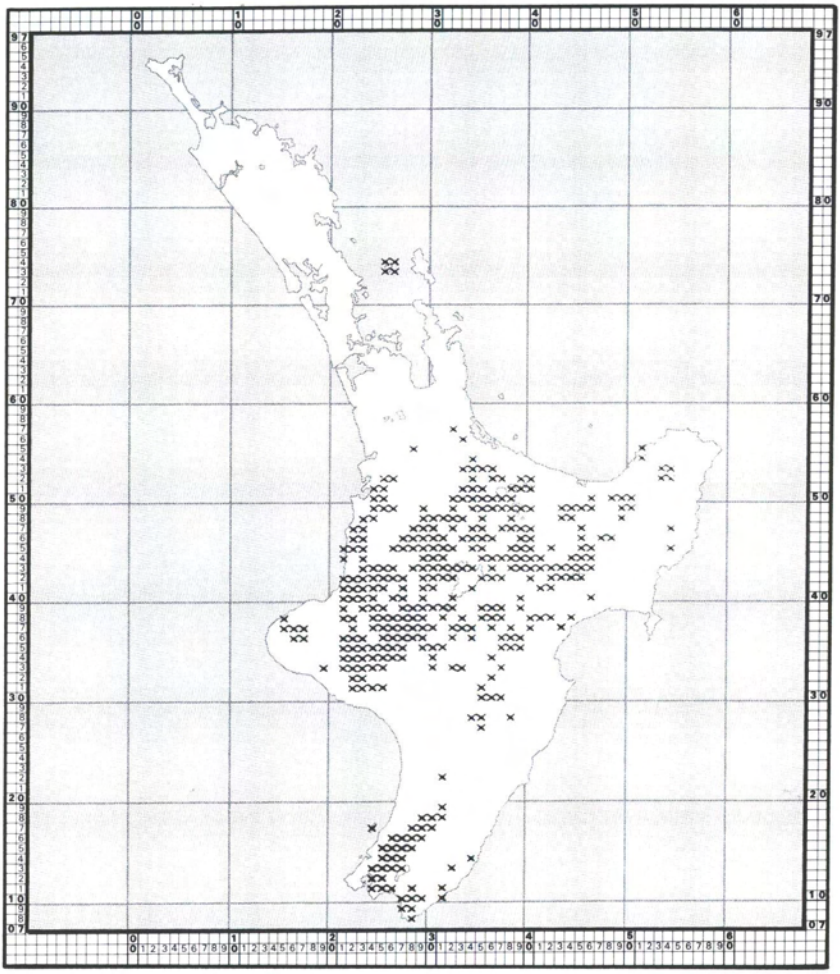


× = **Fernbird** *(Bowdleria punctata)*



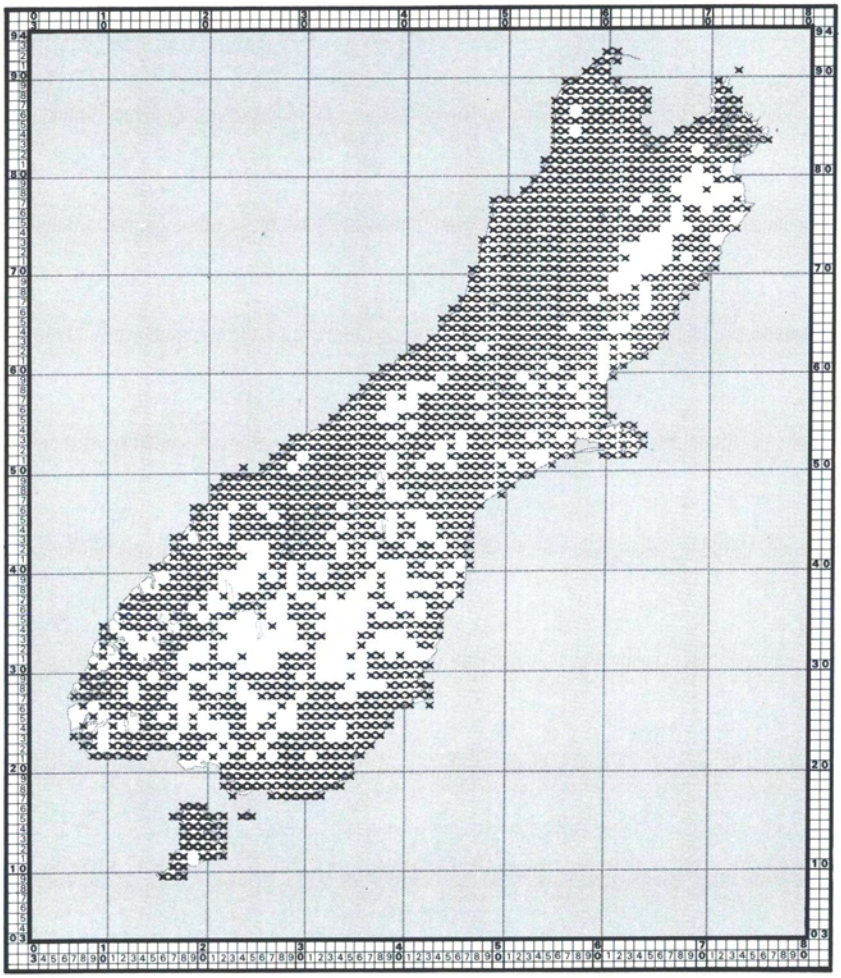
× = **Yellowhead** *(Mohua ochrocephala)*

Yellowheads do not occur in the North Island.



× = **Whitehead** *(Mohua albicilla)*

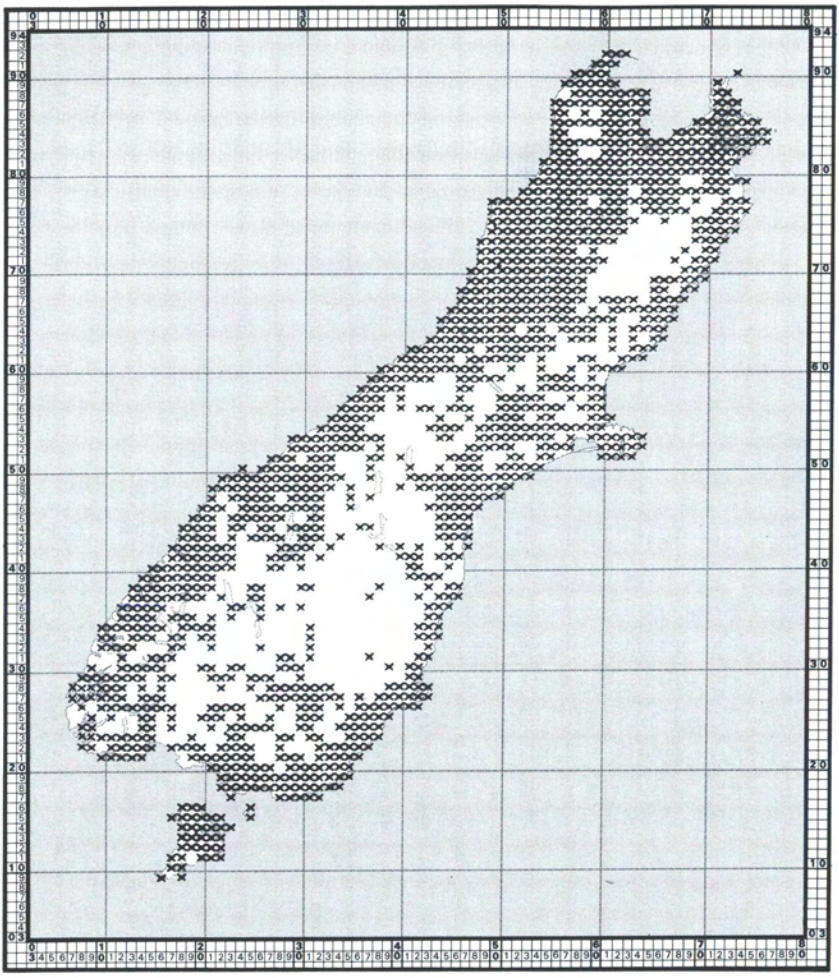
Gibb (1961) found that Whiteheads, which belong to an endemic New Zealand genus, were a good deal more numerous in some central North Island exotic pine forests than in most native forests. Whiteheads do not occur in the South Island.



× = **Grey Warbler** *(Gerygone igata)*

The ubiquitous Grey Warbler is the normal host of the Shining Cuckoo (see details in Gill 1982).

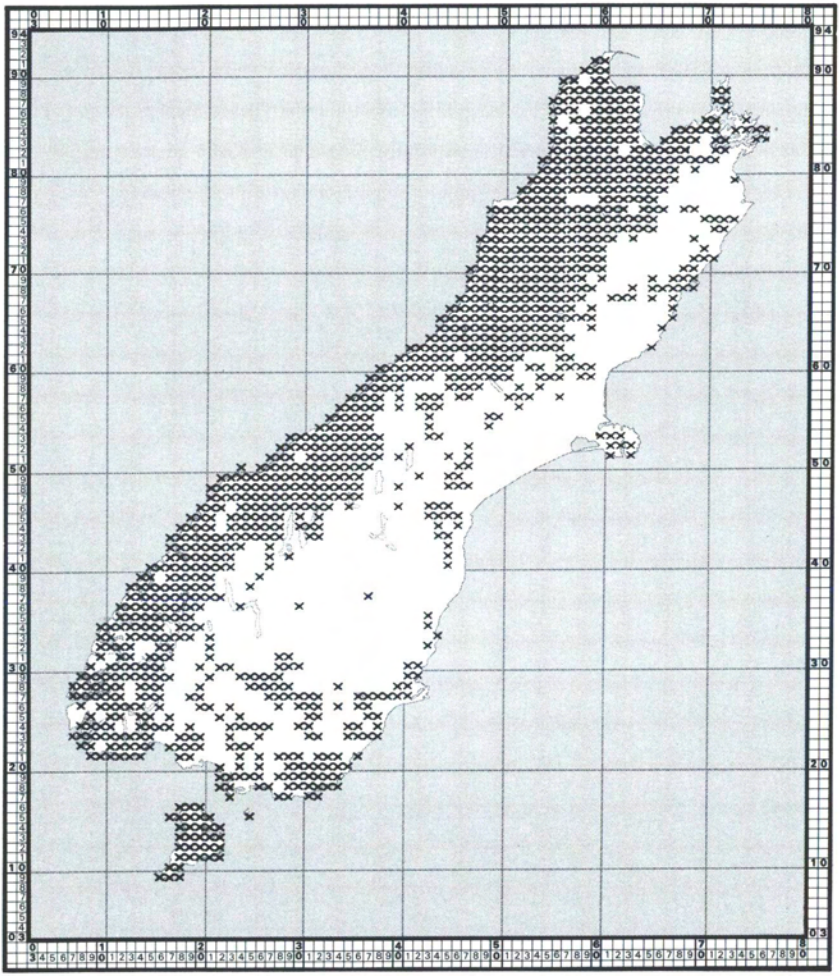
✕ = **Grey Warbler** *(Gerygone igata)*



× = **Fantail** *(Rhipidura fuliginosa)*

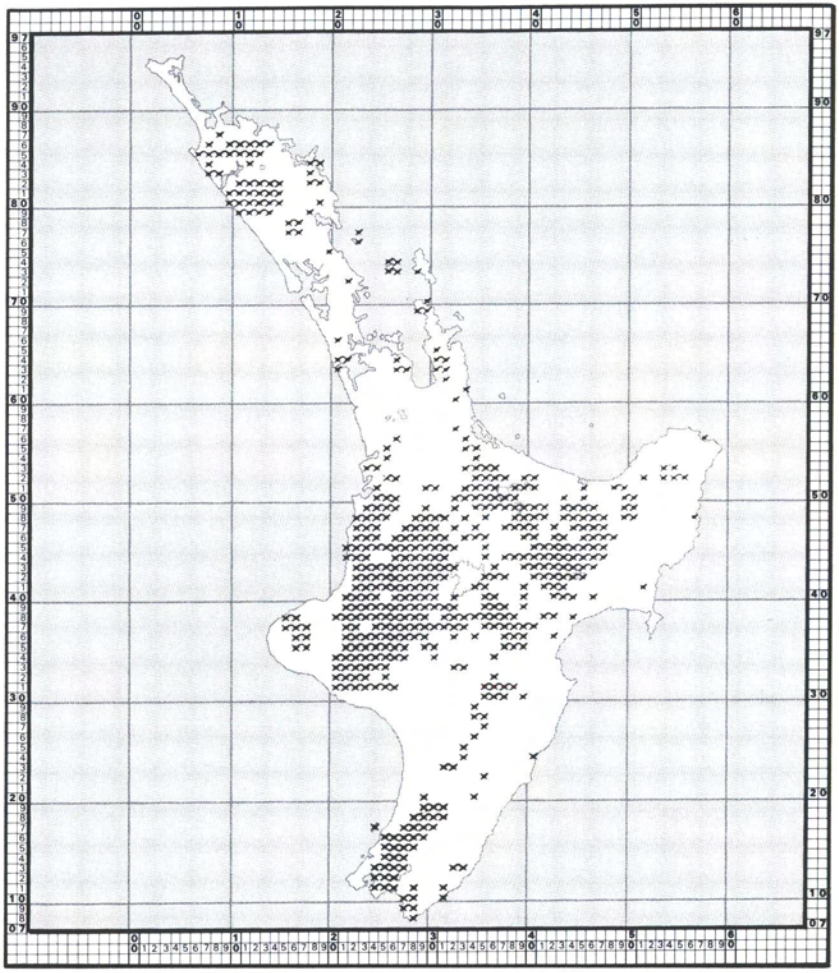
This is one of the few native passerines that is common around garden and farmland trees as well as in native forest.

× = **Fantail** *(Rhipidura fuliginosa)*

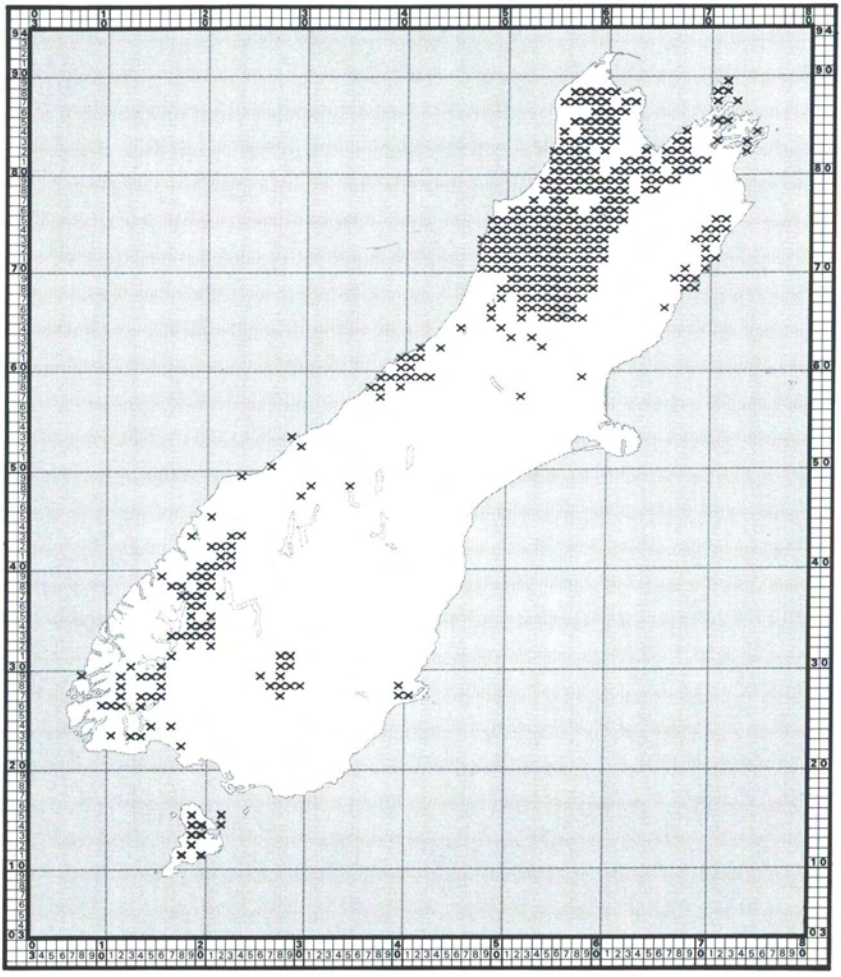


✕ = **Yellow-breasted Tit** *(Petroica macrocephala macrocephala)*

Tits occur in both native and exotic forests and, in some districts, in nearby scrubland. It lacks the Fantail's ability to survive in garden and farmland habitats.

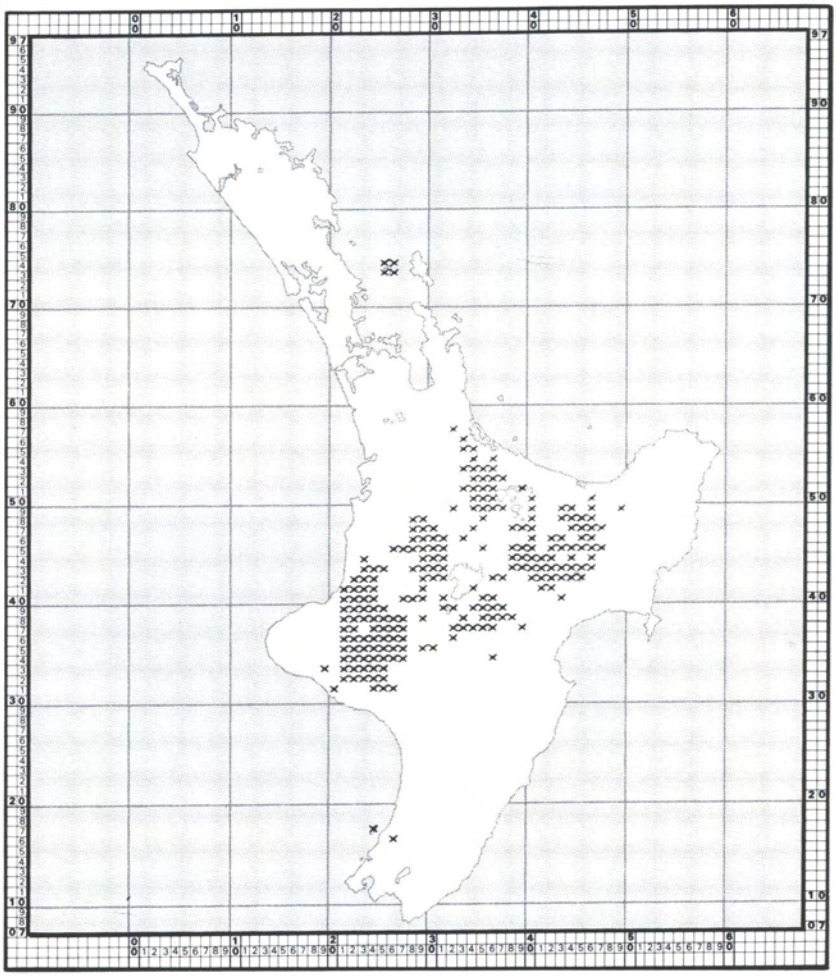


× = **Pied Tit** *(Petroica macrocephala toitoi)*

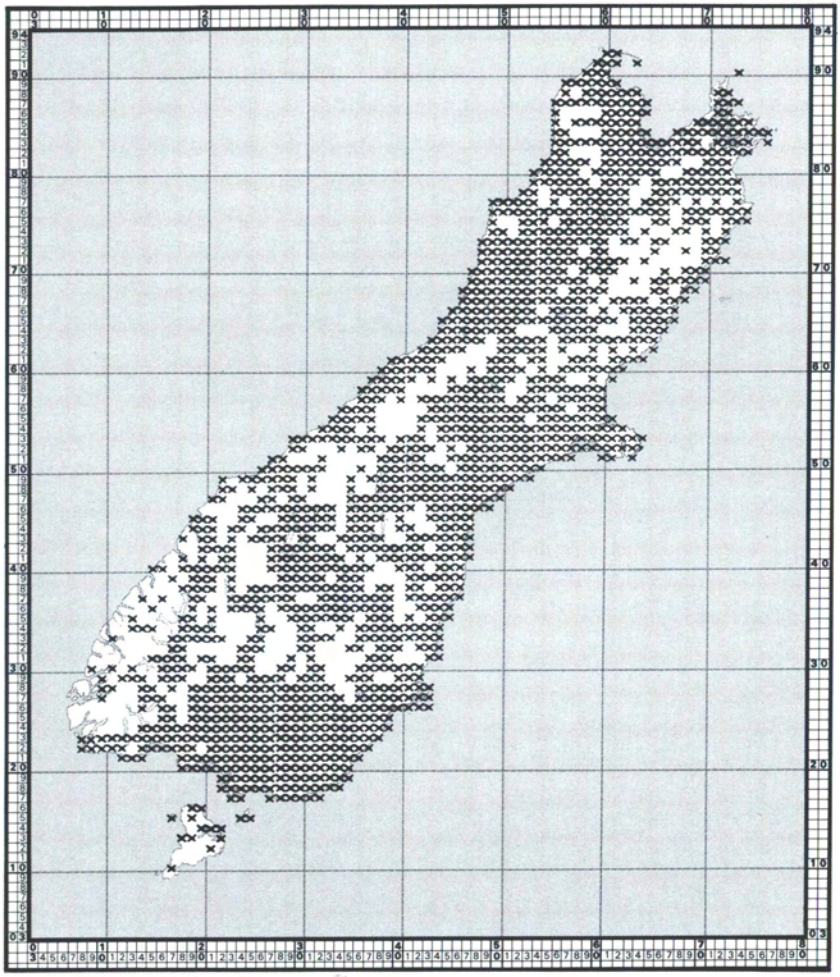


× = **New Zealand Robin** *(Petroica australis)*

Mainly found in large areas of native forest but, in some districts, also in some of the older pine plantations (Gibb 1961, Clout 1980).

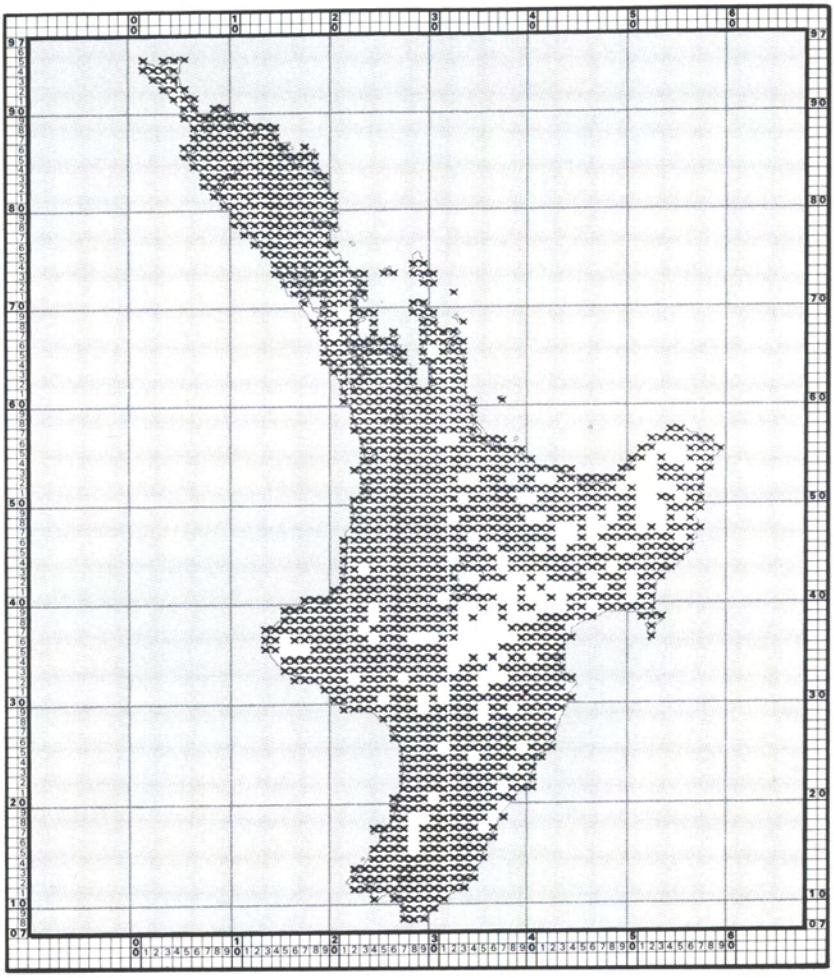


× = **New Zealand Robin** *(Petroica australis)*

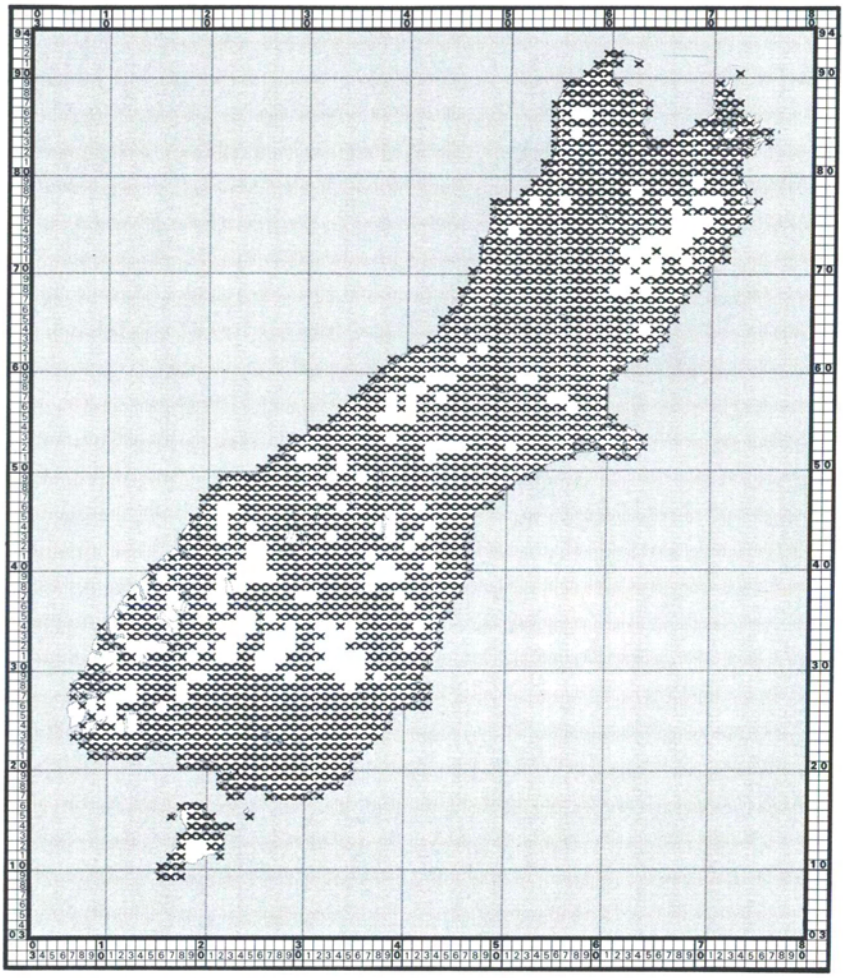


✕ = **Song Thrush** *(Turdus philomelos)*

Song Thrushes were brought from Britain on several occasions from 1862 to 1878. Altogether, at least 400, but probably many more, were released in several localities in both main islands. They had spread throughout the country before the turn of the century and have since spread to many of the outlying islands (Drummond 1906; Williams 1953).

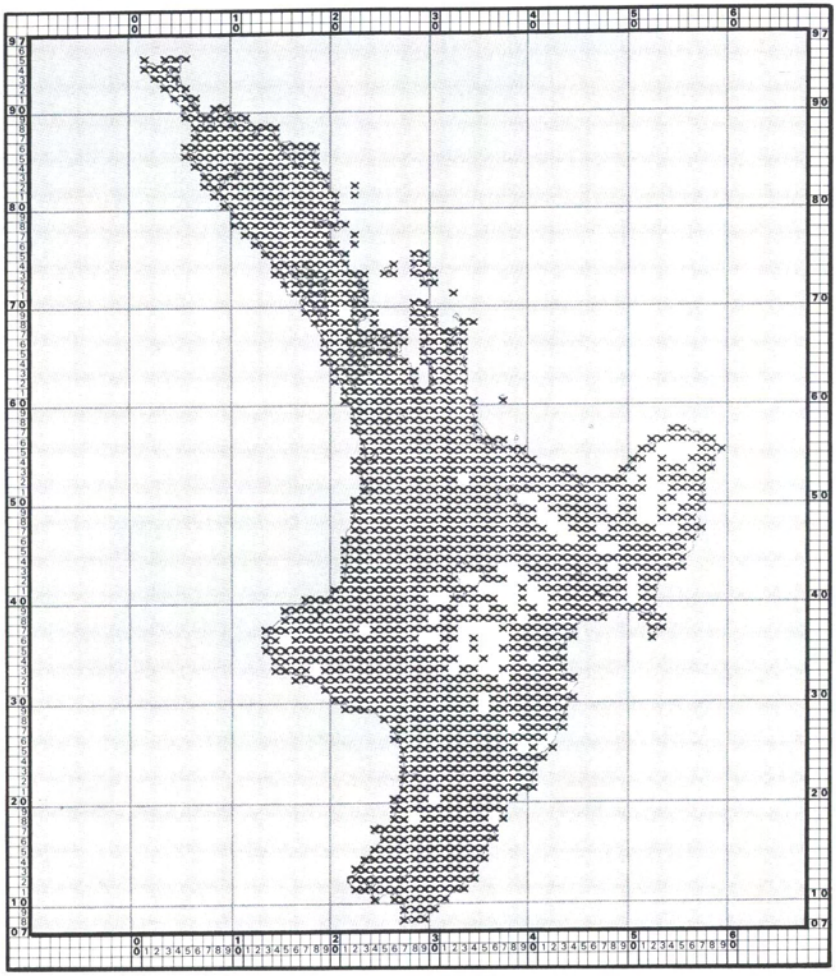


× = **Song Thrush** *(Turdus philomelos)*

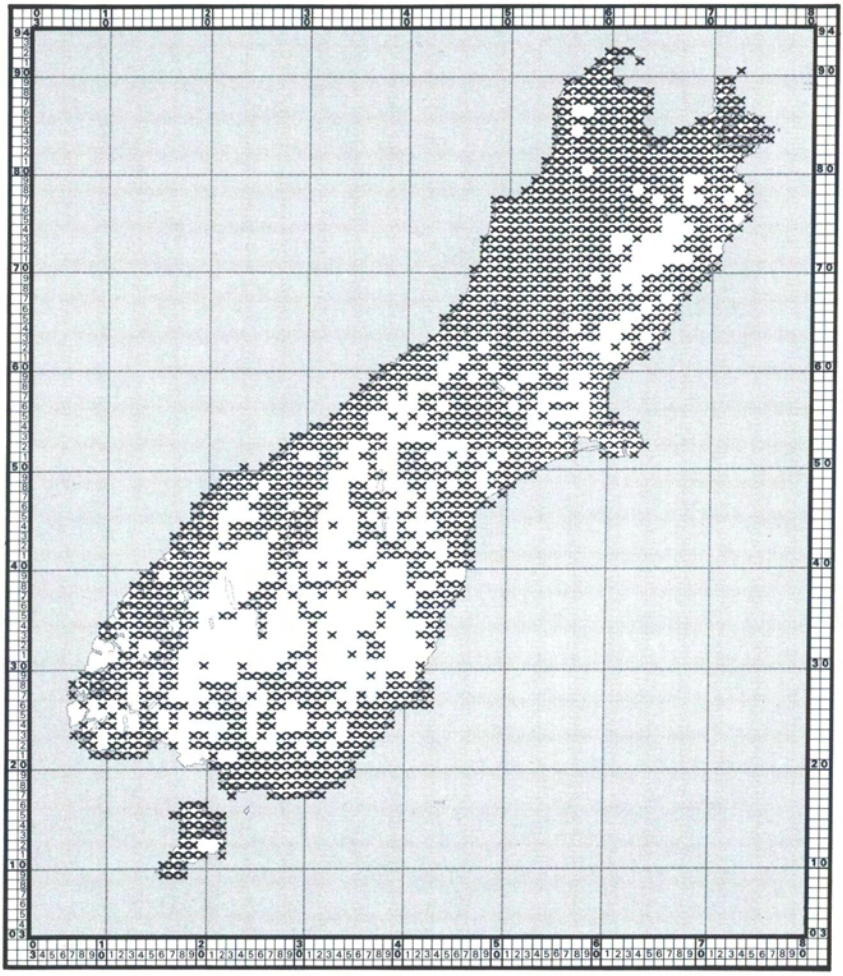


× = **Blackbird** *(Turdus merula)*

Blackbirds were imported from Britain on several occasions between 1862 and 1874, apparently in even greater numbers (more than 600) than were Song Thrushes (Thomson 1922). Their spread was similar to that of Song Thrushes, but Blackbirds have been much more successful in adapting to New Zealand's native forests.

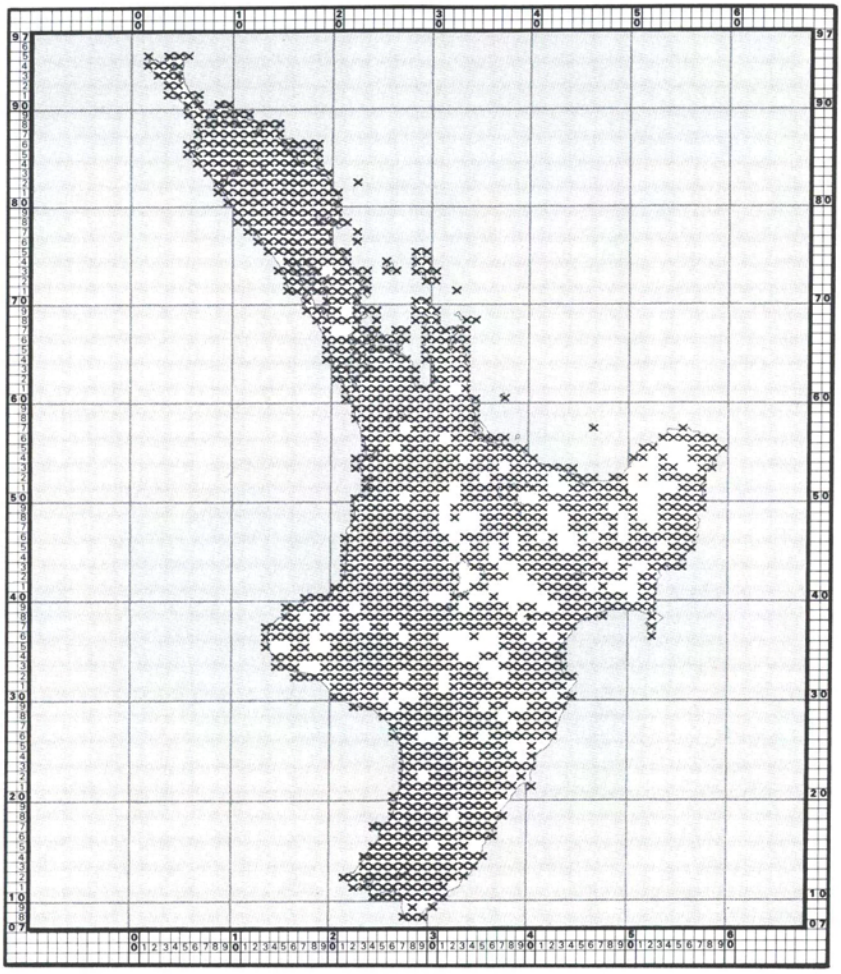


× = **Blackbird** *(Turdus merula)*

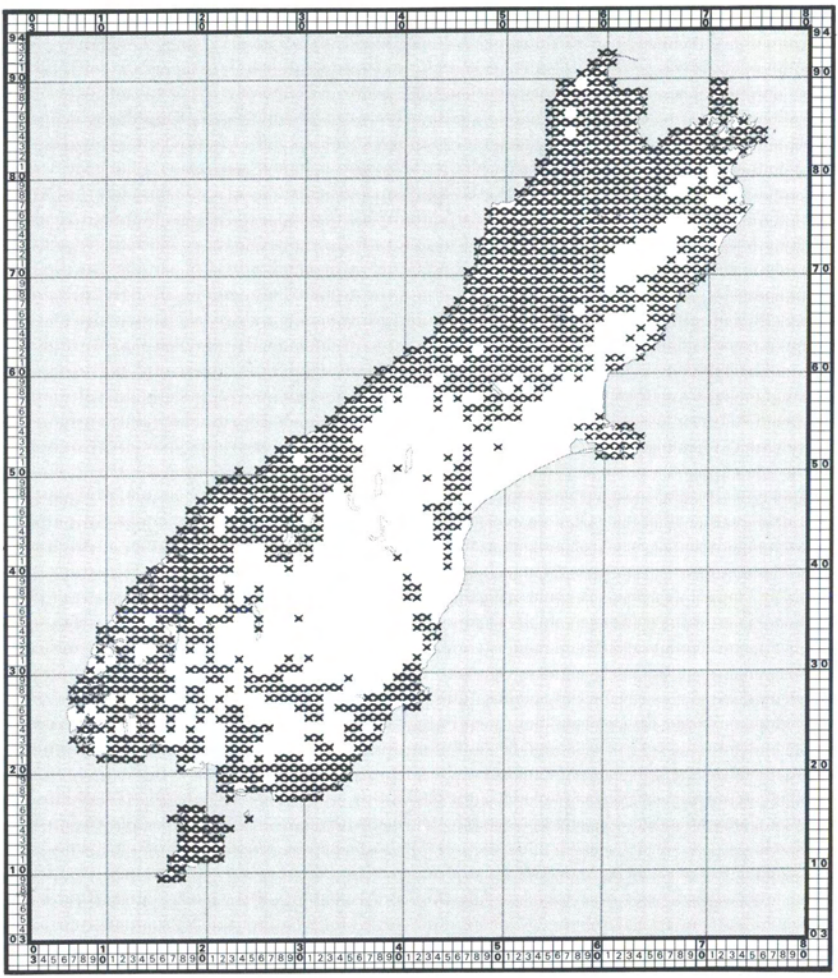


× = **Silvereye** *(Zosterops lateralis)*

Buller (1871) described the spread of this species in New Zealand after its arrival from Australia in 1856 or perhaps earlier.

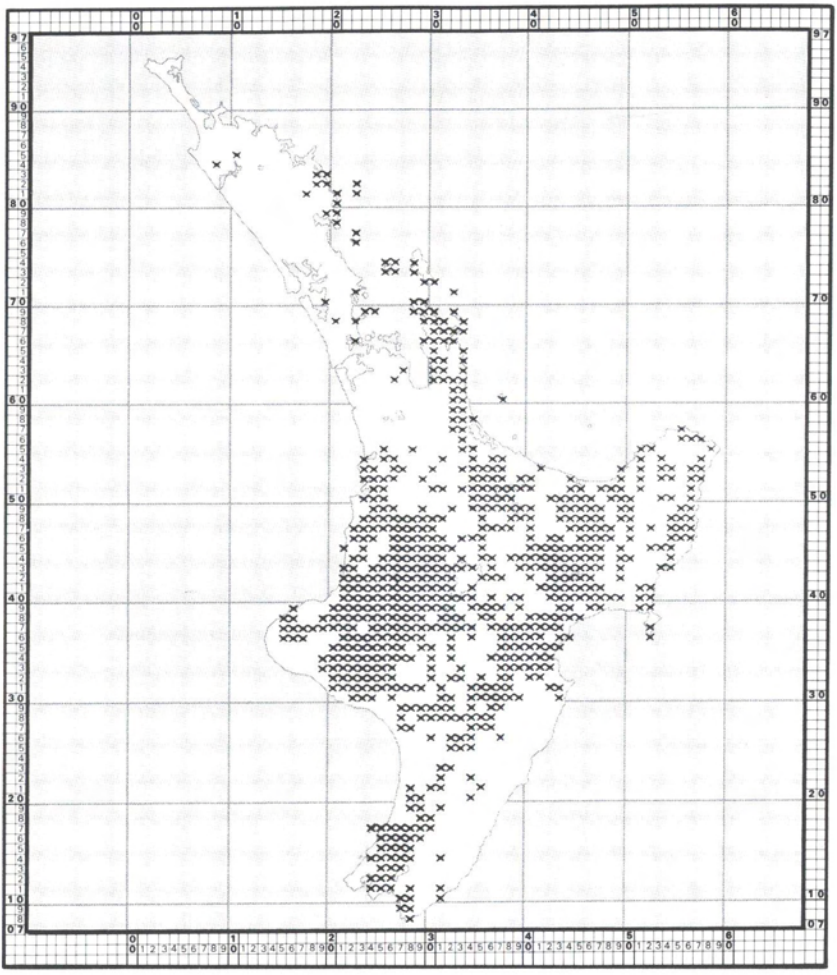


× = **Silvereye** *(Zosterops lateralis)*



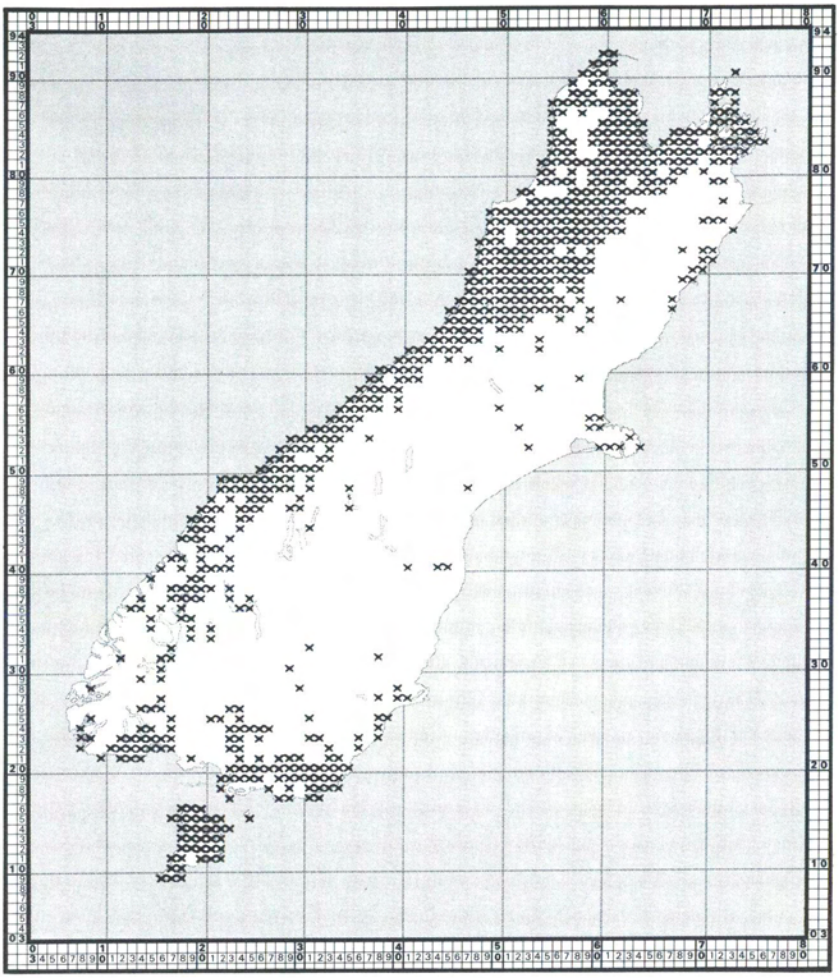
× = **Bellbird** *(Anthornis melanura)*

In the Reefton district of the South Island Bellbirds tended to be more numerous in hill-country beech-podocarp forests than in either lower altitude forest on alluvial flats or in higher altitude beech forest (Dawson *et al.* 1978).



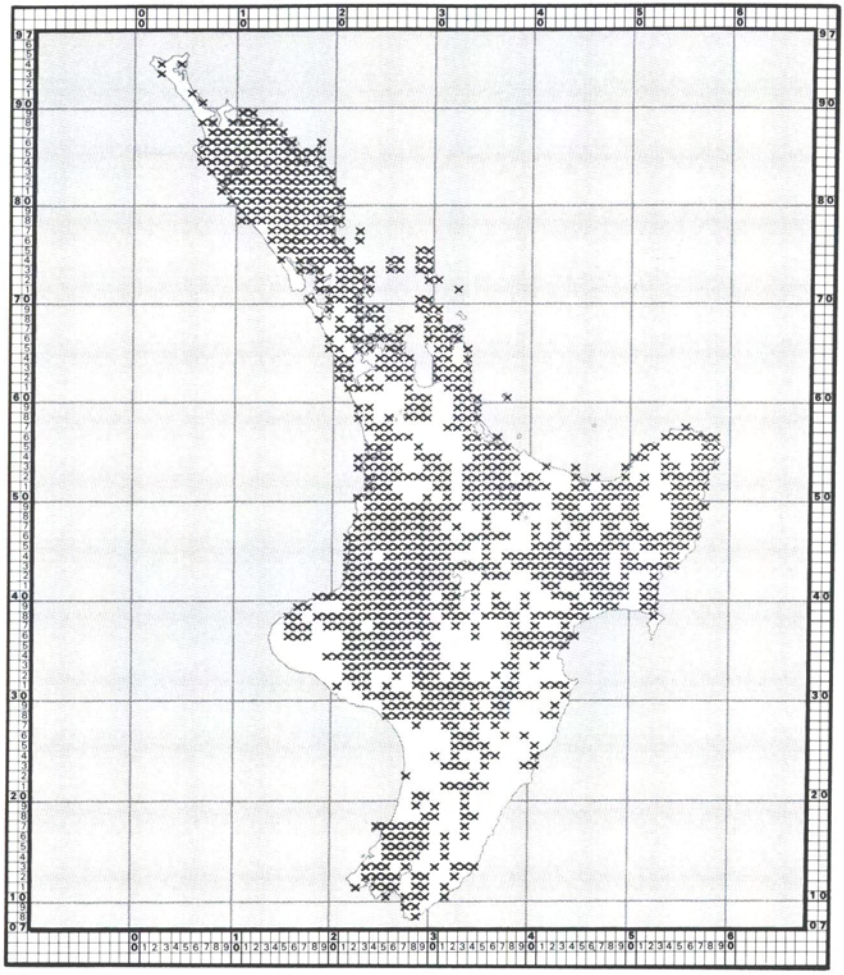
× = **Bellbird** *(Anthornis melanura)*

The decline, almost to extinction, of the Bellbird in North Auckland last century was reviewed by Turbott (1953), and its current status there was reported by Craig & Douglas (1984).



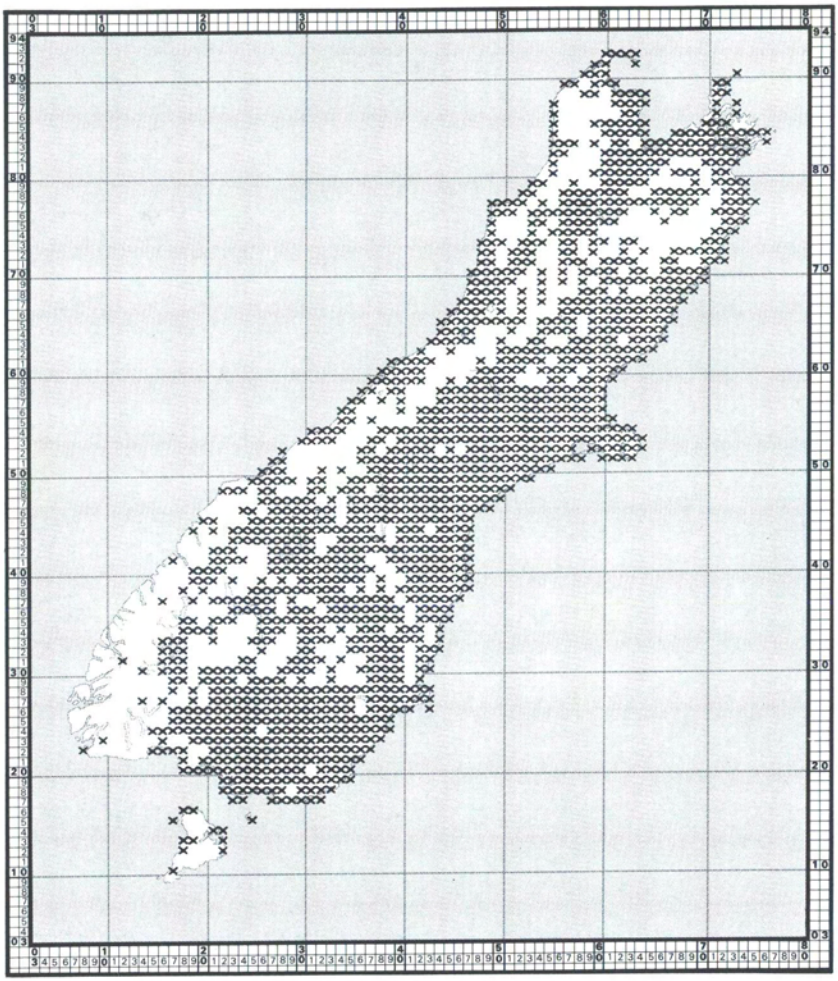
× = **Tui** *(Prosthemadera novaeseelandiae)*

In the Reefton district of the South Island, Tuis, unlike Bellbirds, were more numerous in silver beech-podocarp forest on alluvial flats than in nearby hill-country forests (Dawson *et al.* 1978).



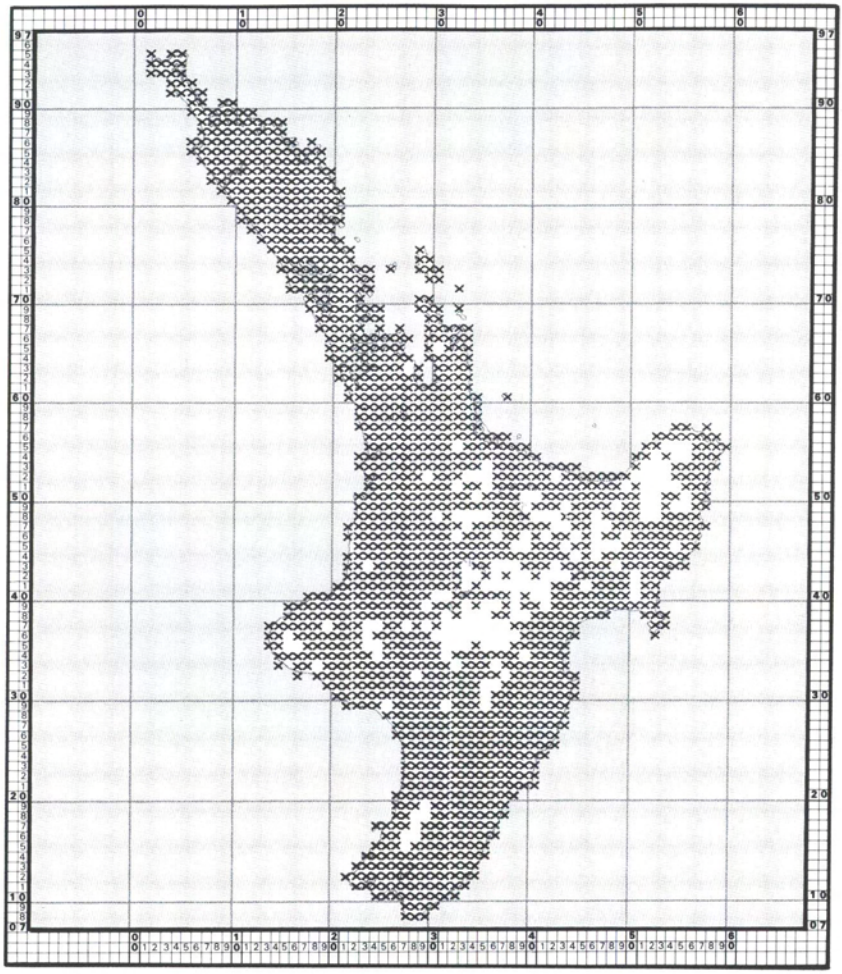
× = **Tui** *(Prosthemadera novaeseelandiae)*

New Zealand's third species of honeyeater, the Stitchbird *(Notiomystis cincta),* is common only on Little Barrier Island where, after the removal of cats, the species became numerous enough to permit the recent transfer of a few birds to Hen Island (Angehr 1984) and to Kapiti Island. Stitchbirds were widespread on the North Island mainland until the middle of the last century. They then rapidly declined in numbers and became extinct on the mainland, probably about 1885 (Kinsky 1970).

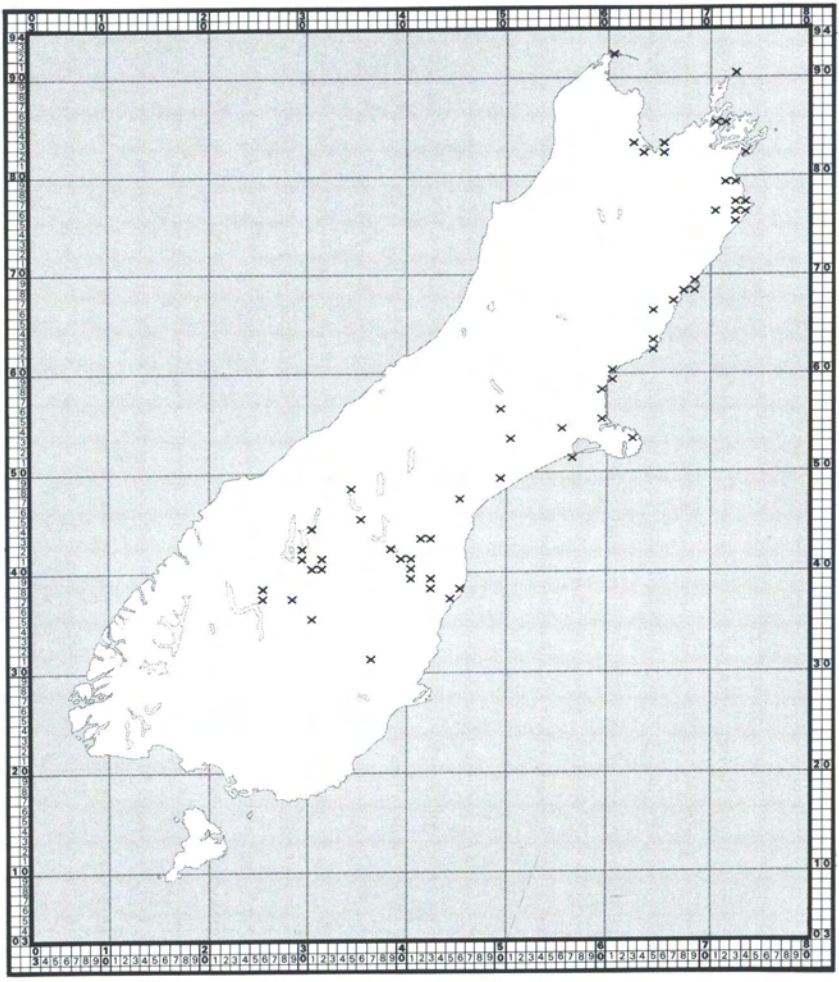


× = **Yellowhammer** *(Emberiza citrinella)*

The Yellowhammer was introduced by Acclimatisation Societies to the Auckland, Nelson, Canterbury and Otago districts on several occasions between 1862 and 1871, the total number of birds being over 400 (Thomson 1922). The species was present in many localities on both the North and South Islands before the turn of the century (Drummond 1906) and has subsequently spread to some of the outlying islands.

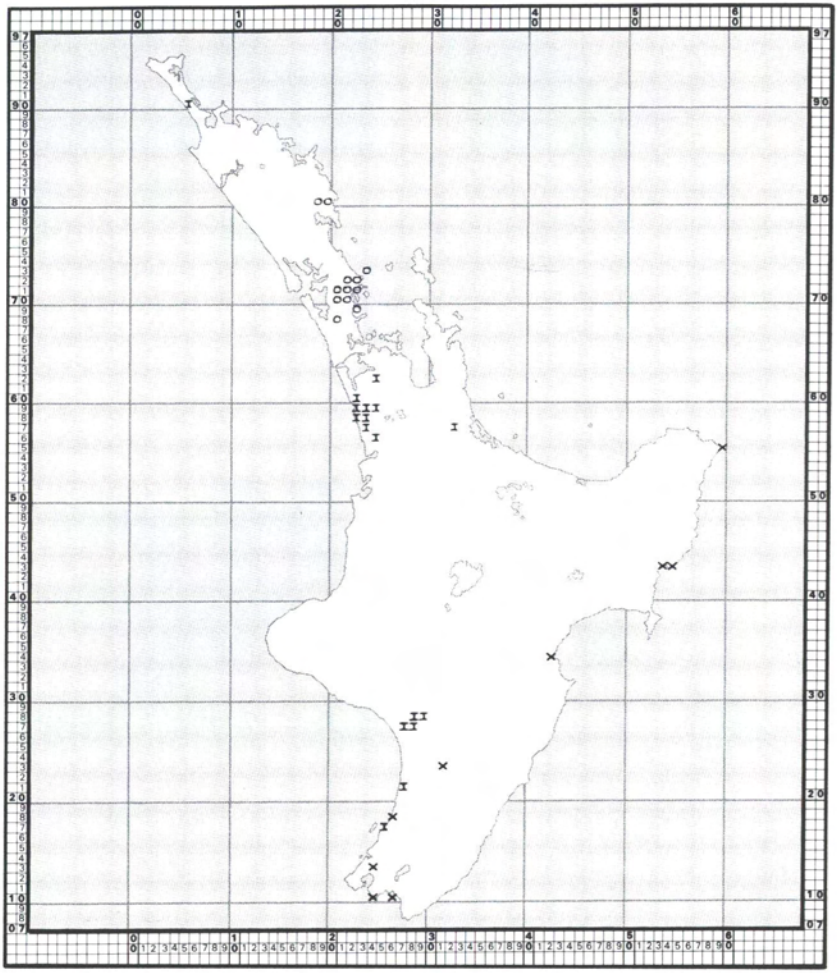


✕ = **Yellowhammer** *(Emberiza citrinella)*



× = **Cirl Bunting** *(Emberiza cirlus)*

Of all the European passerines successfully introduced to New Zealand the Cirl Bunting seems to have had the smallest initial stock. Seven birds were liberated in Otago in 1871 and four in Wellington in 1880 (Thomson 1922) although other unrecorded liberations may have been made. In Marlborough, Taylor (1978) recorded 12 territorial males in two square miles of farmland.

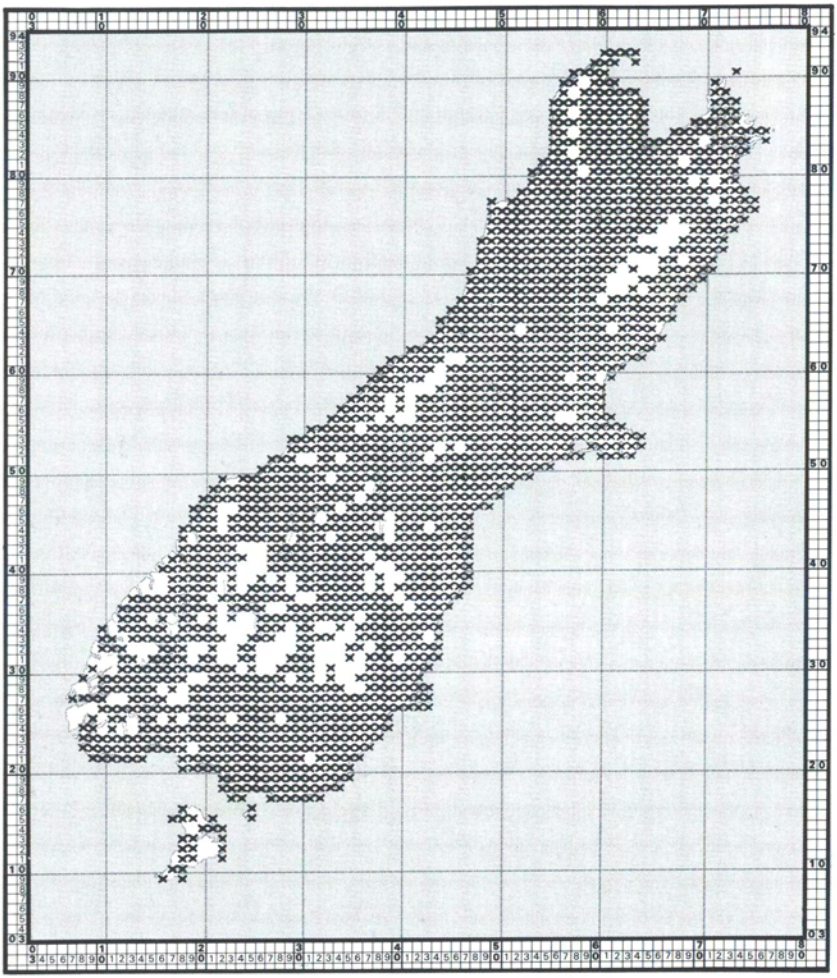


× = **Cirl Bunting** *(Emberiza cirlus)*

O = **Kookaburra** *(Dacelo novaeguineae)*

I = **White Cockatoo** *(Cacatua galerita)*

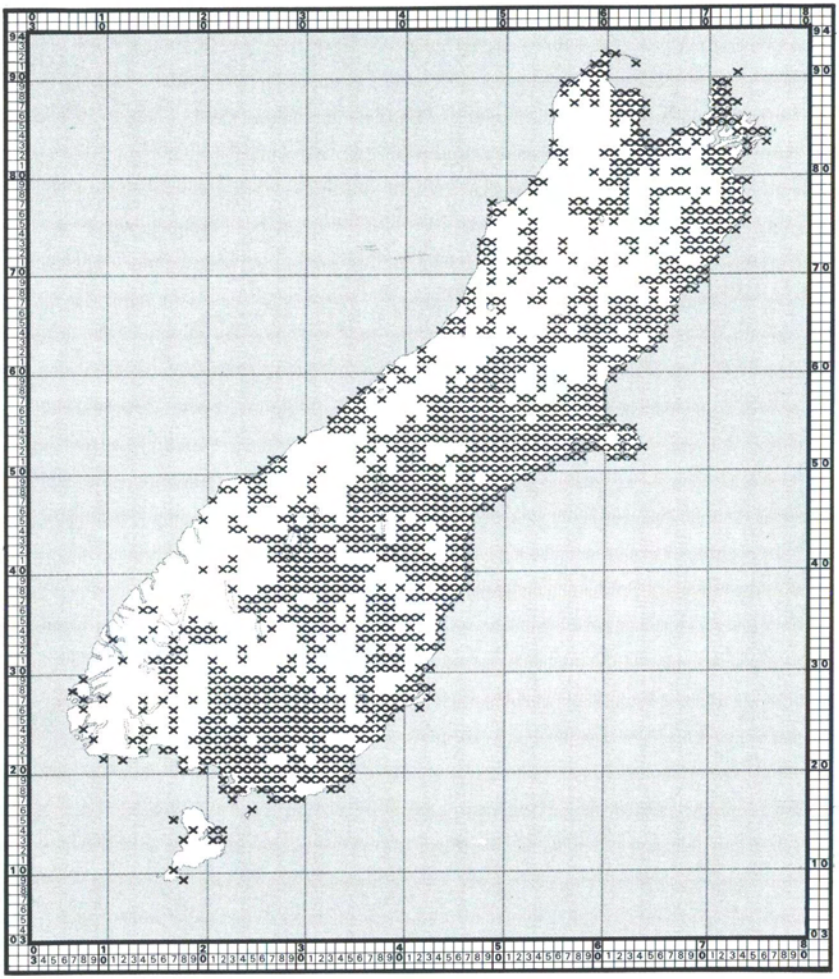
The small population of Australian Kookaburras in North Auckland is centred on Kawau Island, where they were introduced by Sir George Grey in the 1860s. However, according to Thomson (1922), those birds all died. The White Cookatoos are presumably derived from escaped or liberated cage birds, although wind-blown stragglers could conceivably have arrived direct from Australia (Falla *et al.* 1979). No reports of Kookaburras or Cockatoos were received from the South Island.



✕ = **Chaffinch** *(Fringilla coelebs)*

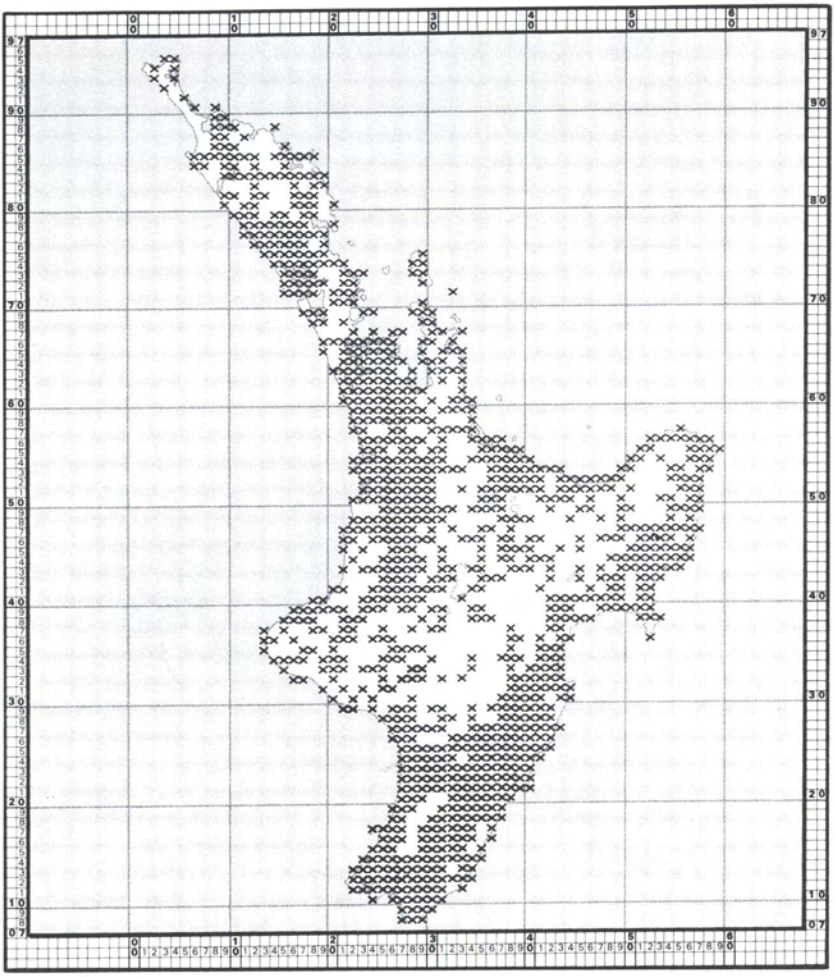
The Chaffinch was introduced by Acclimatisation Societies several times between 1862 and 1867 and released in the Auckland, Wellington, Nelson, Canterbury and Otago districts. In all, over 400 birds were imported (Thomson 1922). They had become widely distributed in both the North and South Islands by 1900 (Drummond 1906) and have subsequently spread to several of the outlying islands (Williams 1953).

× = **Chaffinch** *(Fringilla coelebs)*

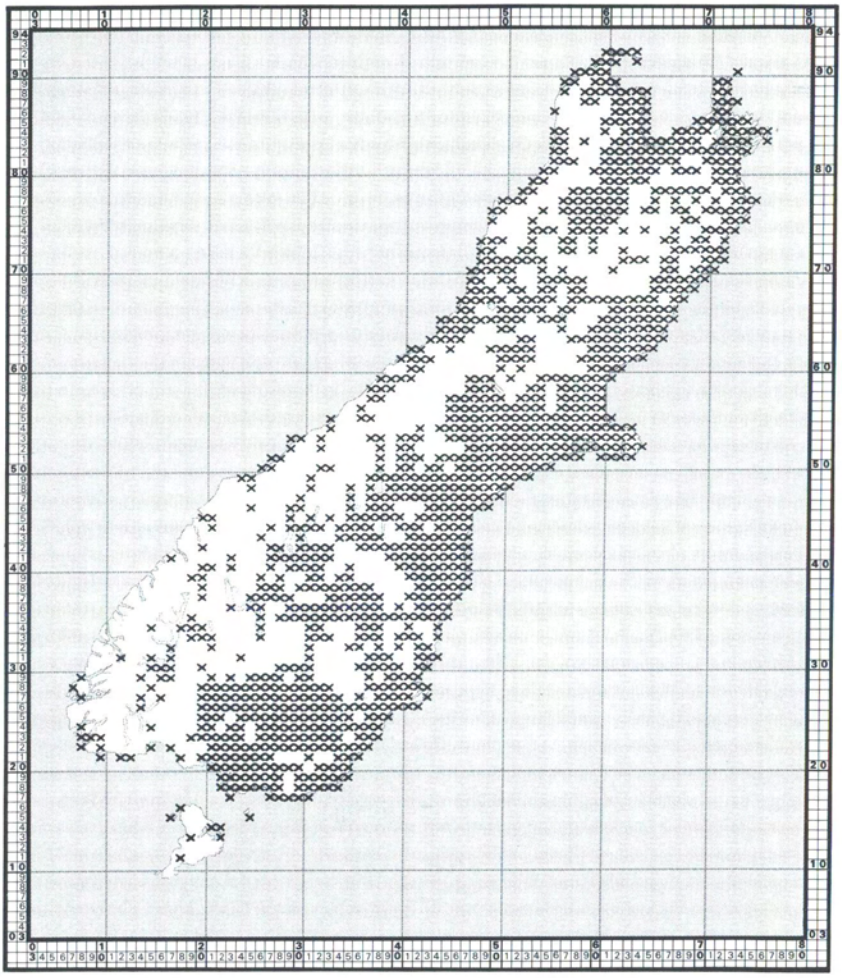


✕ = **Greenfinch** *(Carduelis chloris)*

The main introduction of the Greenfinch was to the Auckland district, where over 50 were liberated between 1865 and 1868. Smaller releases (15 birds in all) were made in the Nelson, Christchurch and Otago districts between 1862 and 1865 (Thomson 1922). The species was widespread in both the North and the South Islands by 1900 (Drummond 1906).

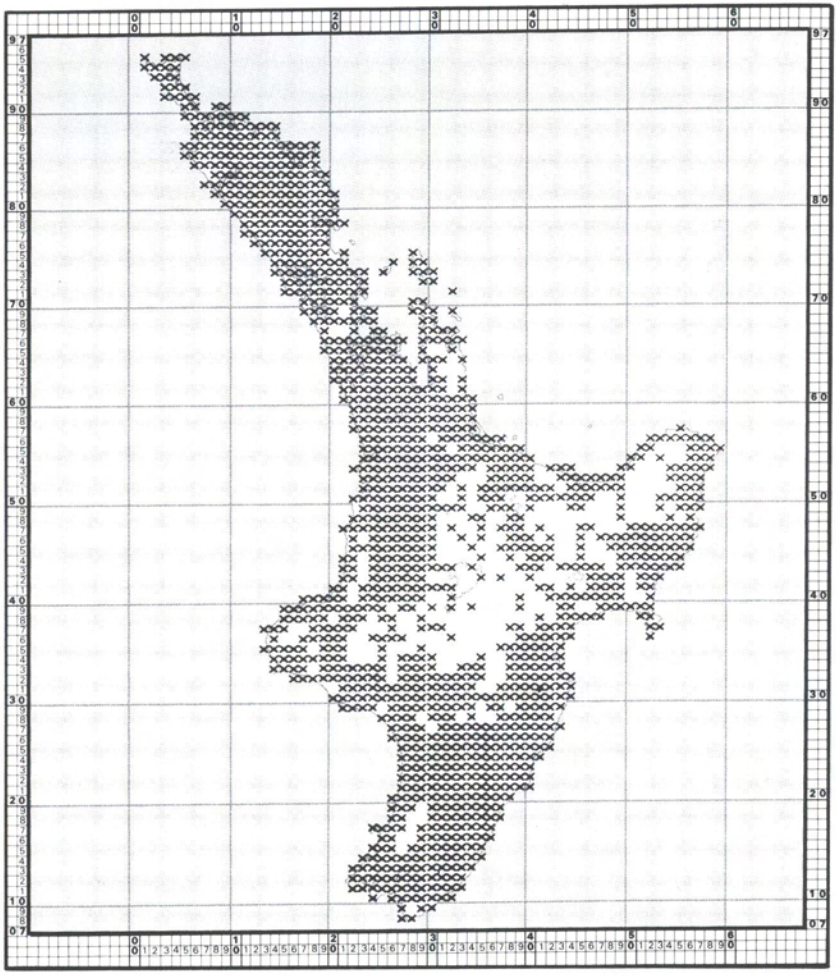


× = **Greenfinch** *(Carduelis chloris)*

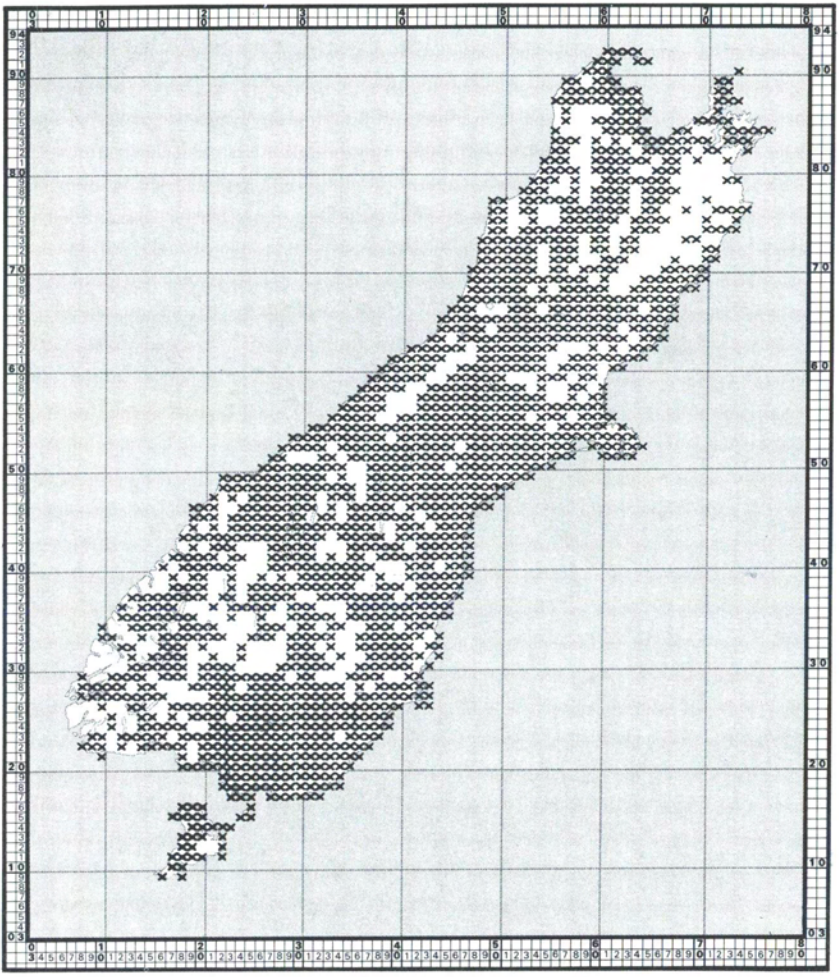


× = **Goldfinch** *(Carduelis carduelis)*

The Goldfinch was liberated in the Auckland, Hawke's Bay, Wellington, Nelson, Canterbury and Otago districts on several occasions between 1862 and 1883. In all, more than 456 birds were released (Thomson 1922). The birds soon became well established and had spread throughout New Zealand by the early 1890s (Drummond 1906).

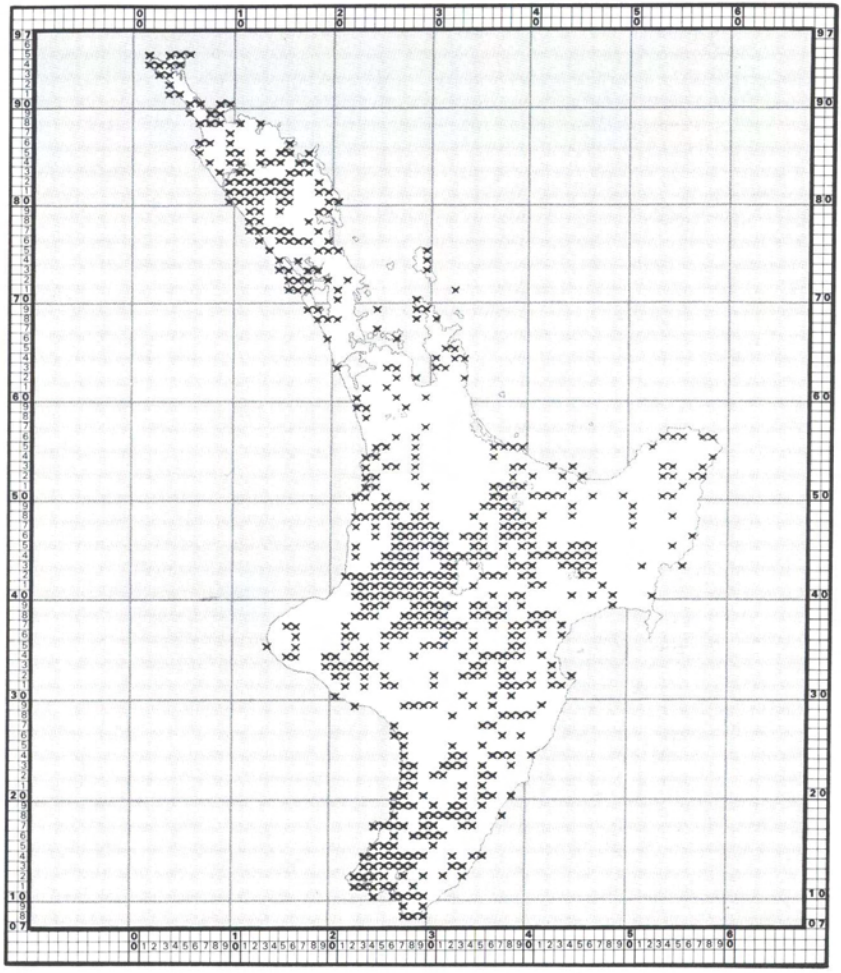


✕ = **Goldfinch** *(Carduelis carduelis)*

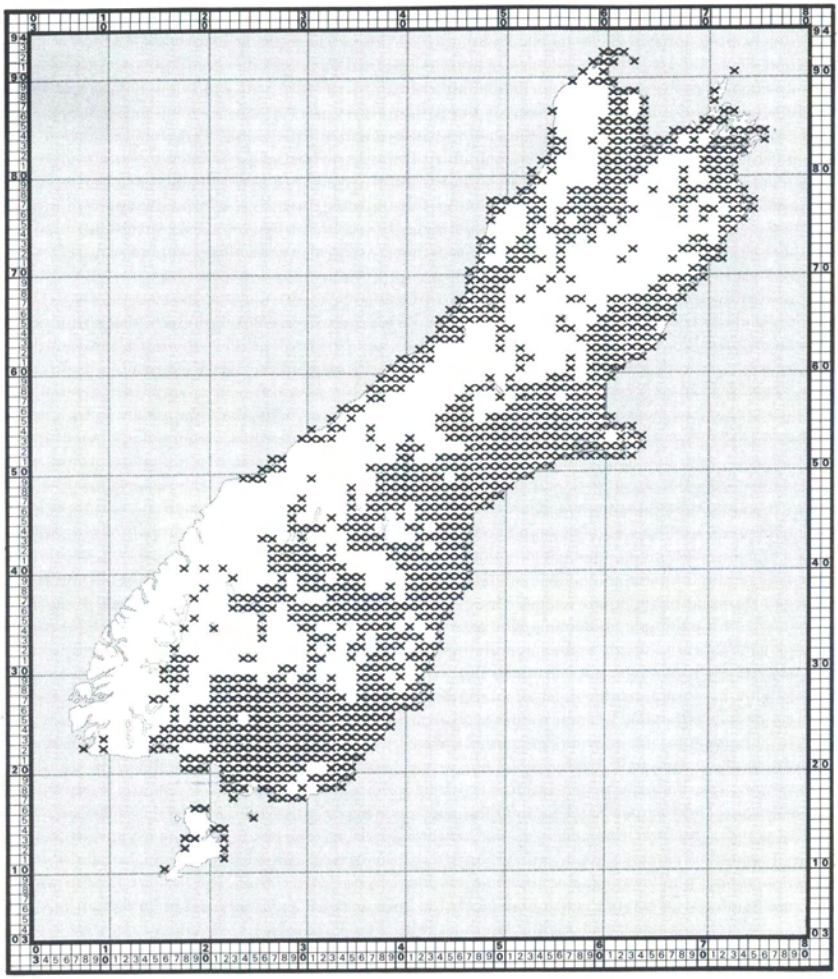


× = **Redpoll** *(Carduelis flammea)*

The Redpoll was imported on several occasions between 1862 and 1875. The total number exceeded 428 birds. Most were liberated near Auckland, Christchurch and Dunedin, but a few were released in the Nelson and Wellington districts (Thomson 1922). Redpolls soon became abundant, especially in the South Island, and have subsequently spread to most of the outlying islands.

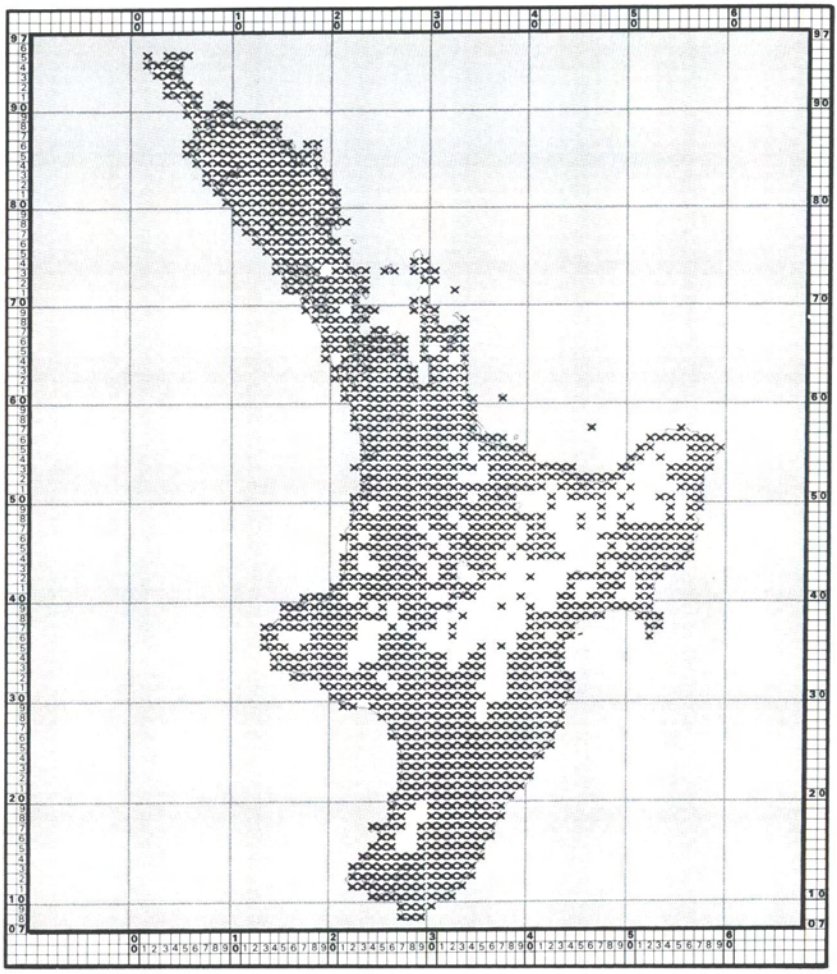


× = **Redpoll** *(Carduelis flammea)*

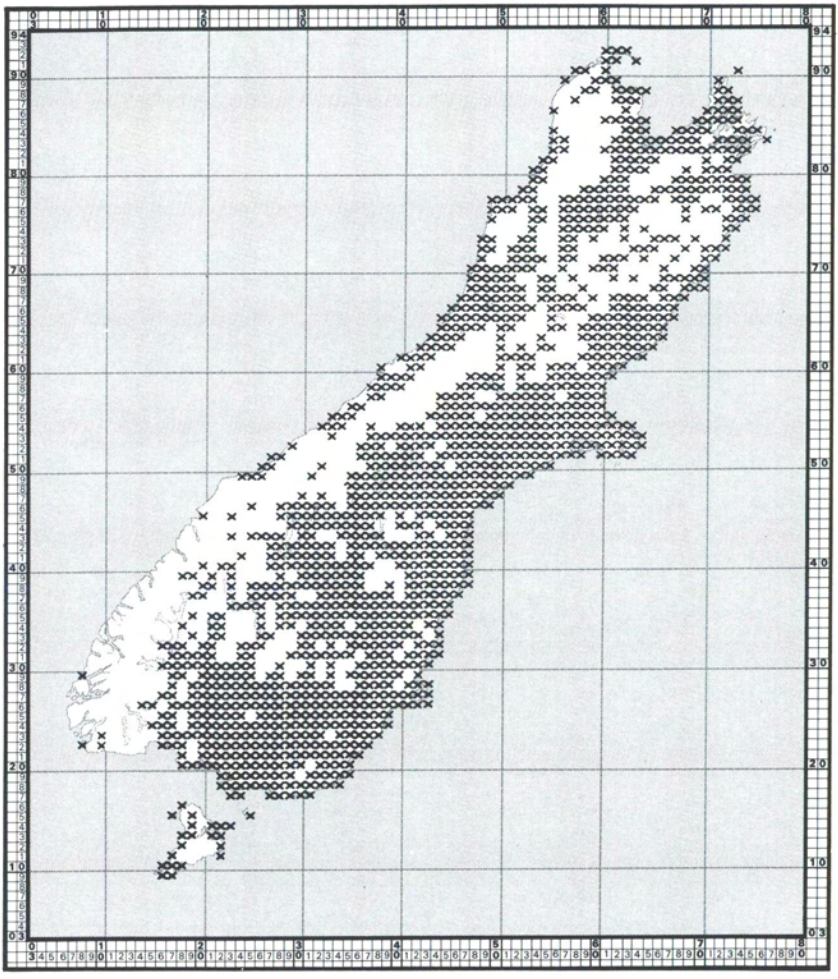


× = **House Sparrow** *(Passer domesticus)*

The House Sparrow was liberated in Wanganui in 1866 and several other releases, of at least 107 birds, followed over the next few years in the Auckland, Nelson, Canterbury and Otago districts (Thomson 1922). The species was widespread throughout the settled parts of New Zealand by the mid-1890s (Drummond 1906).

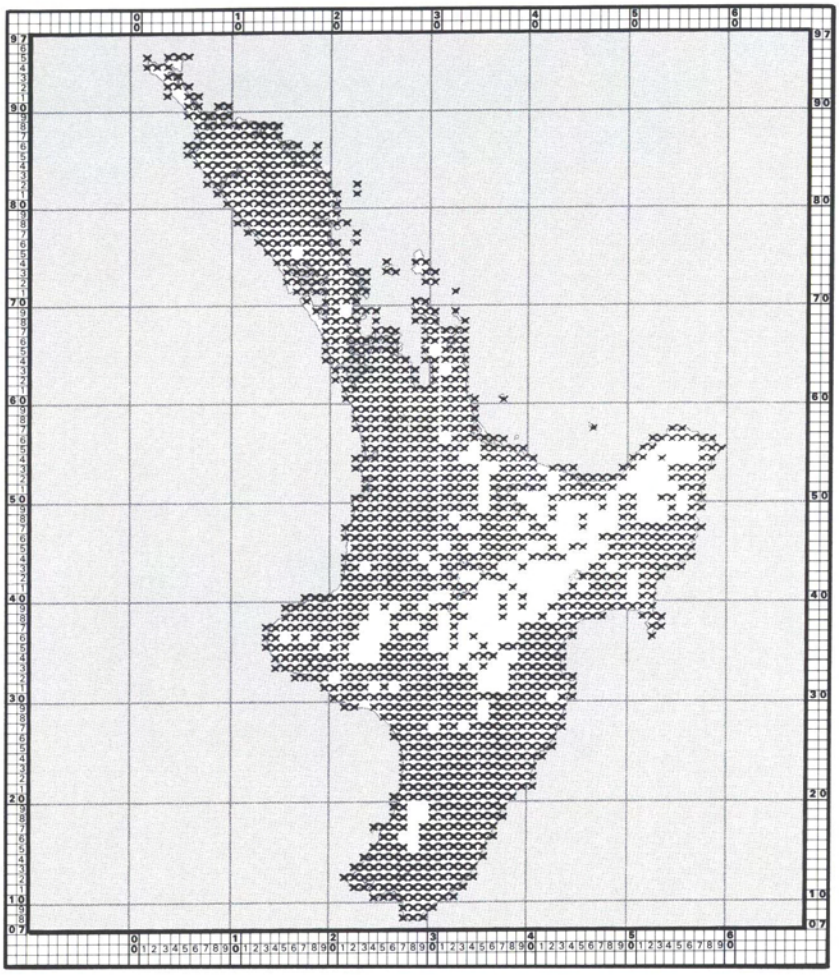


× = **House Sparrow** *(Passer domesticus)*

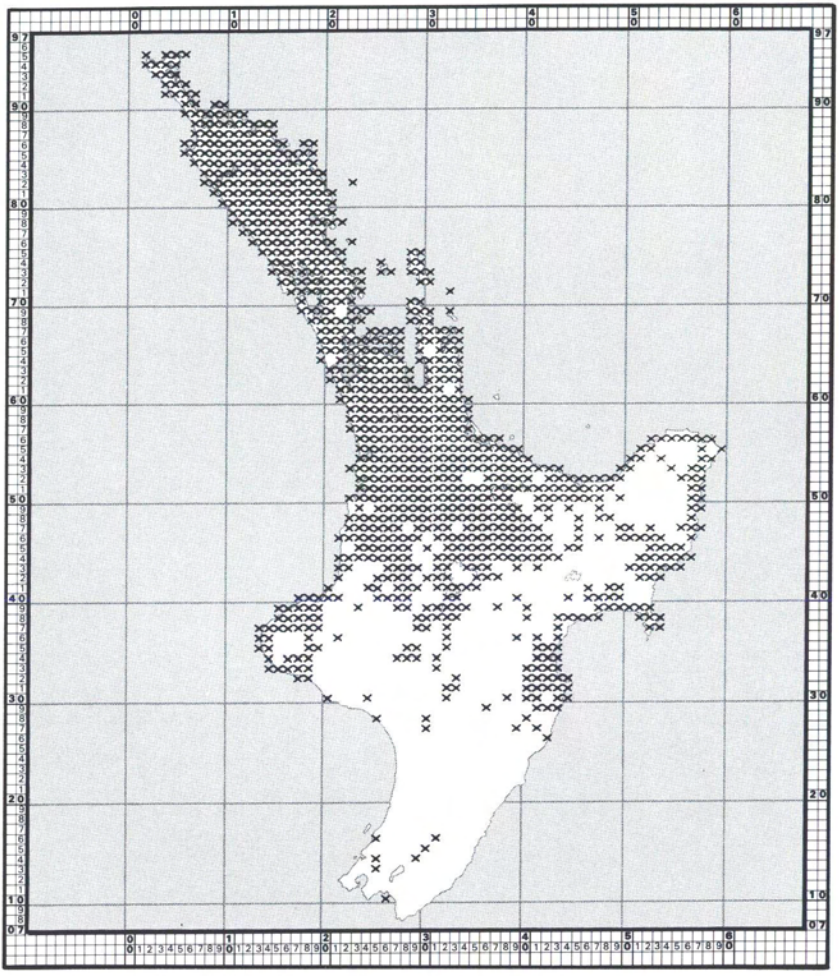


× = **Starling** *(Sturnus vulgaris)*

The first Starlings in New Zealand were 17 released in Nelson in 1862. Many other releases, totalling over 636 birds, followed between 1865 and 1883 in the Auckland, Wellington, Canterbury and Otago districts (Thomson 1922). Starlings, often in very large numbers, became widespread in New Zealand during the 1880s and 1890s (Thomson 1922) and have since spread to nearly all the outlying islands (Williams 1953).

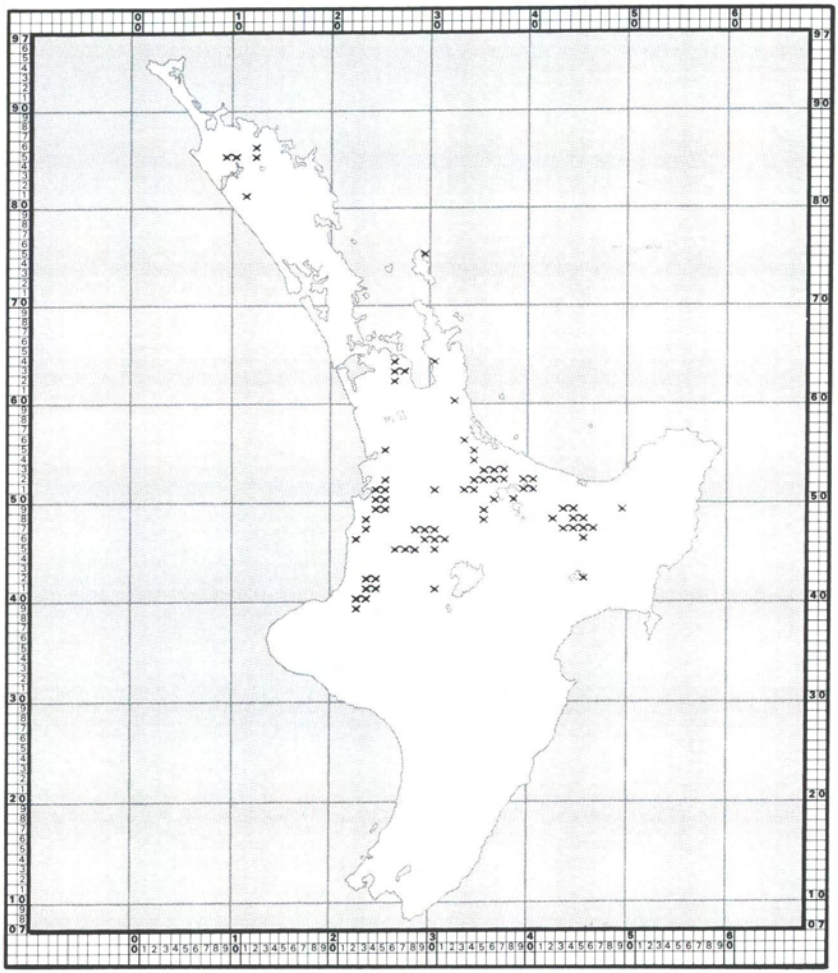


× = **Starling** *(Sturnus vulgaris)*



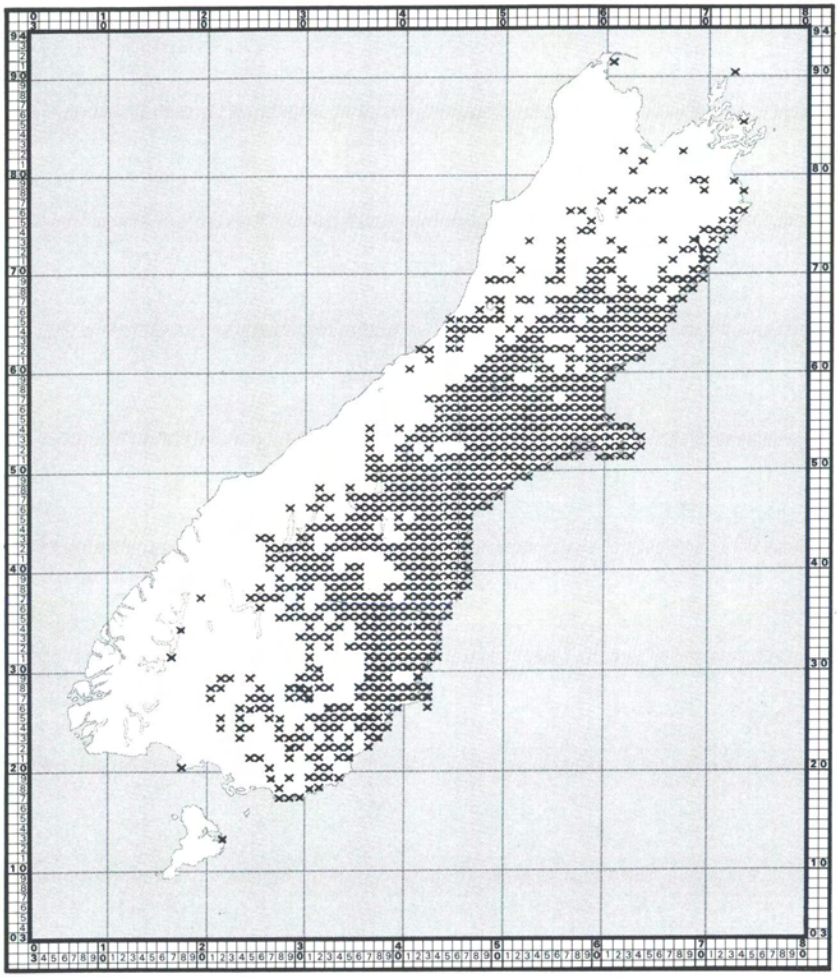
× = **Indian Myna** *(Acridotheres tristis)*

Mynas were liberated in both the North and South Islands several times between 1870 and 1879. Total numbers apparently exceeded 288. Mynas were extinct in the South Island by 1890 but flourished in the North Island (Thomson 1922). The remarkable northward spread of Mynas during the 1940s and early 1950s was documented by Cunningham (1948, 1951 & 1954). Only one atlas report was received of Mynas in the South Island (Canterbury, square S5453). However, other South Island records, some perhaps of aviary escapees, were listed by Tunnicliffe (1982).



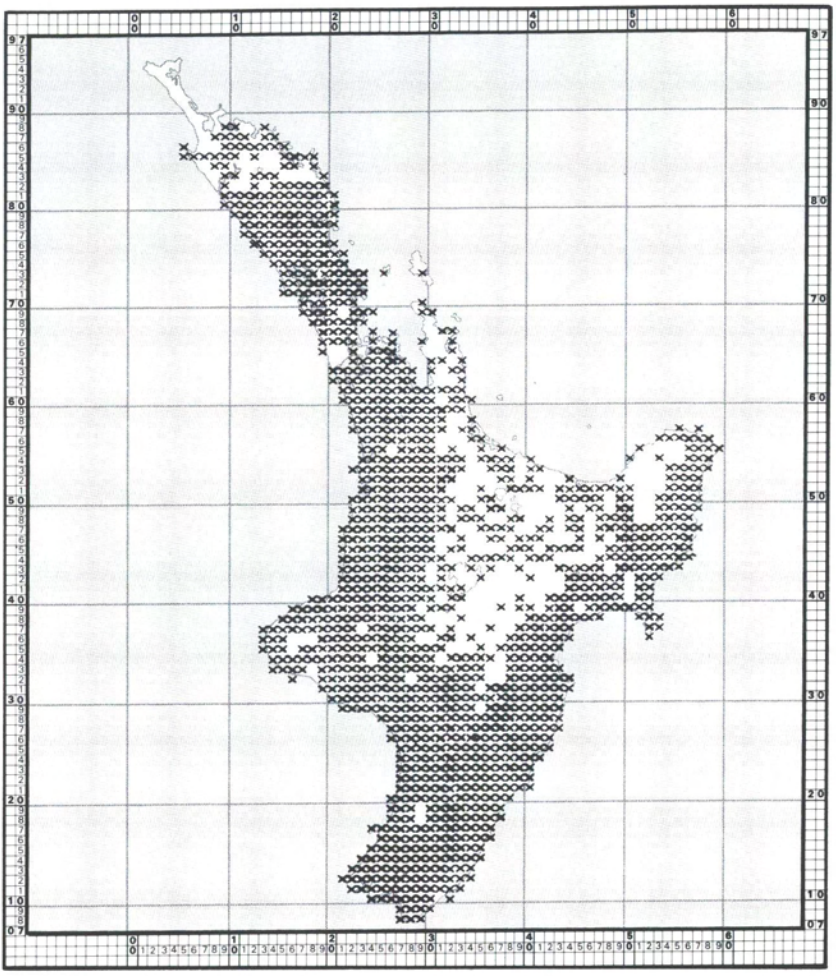
× = **Kokako** *(Callaeas cinerea)*

The past and present distribution of the Kokako in the North Island was reviewed by Lavers (1978); see also O'Donnell (1984). No South Island records were received for Kokako. The other surviving wattlebird, the Saddleback *(Philesturnus carunculatus)* is confined to small islands, mostly in the outer Hauraki Gulf and off Stewart Island. The Wildlife Service has increased the species' range by liberating surplus wild stock on several other islands, sometimes very successfully (Cuvier and Stage Islands) and sometimes not (Maud Island).



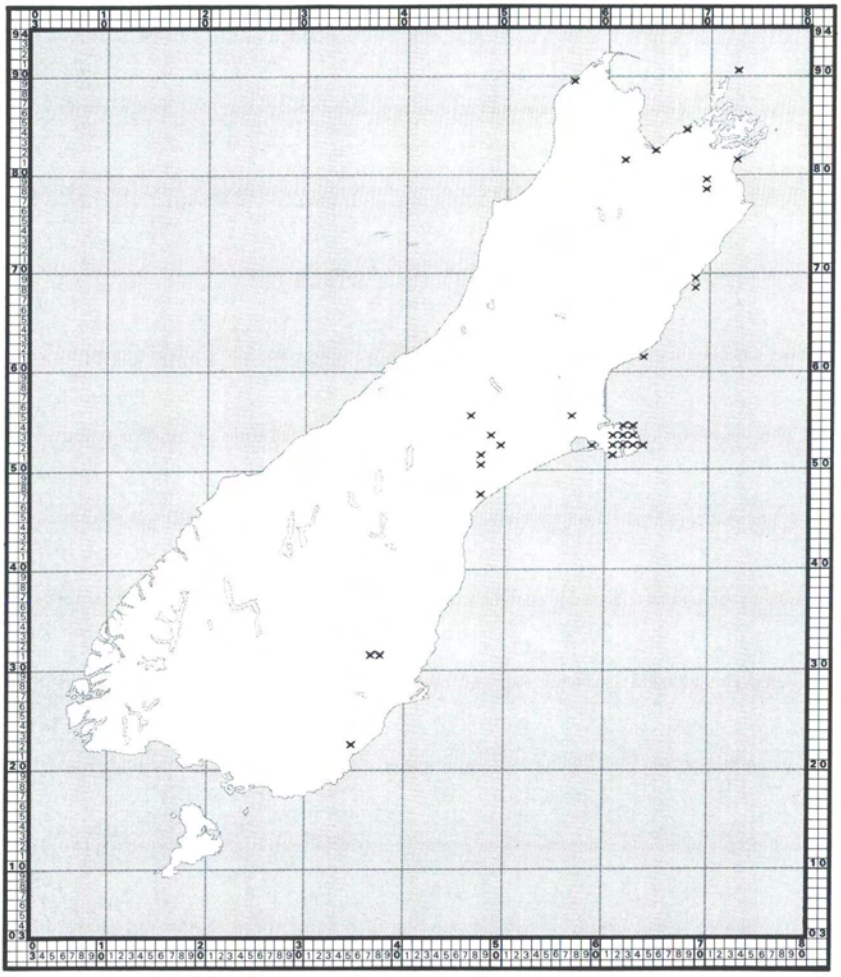
× = **Australian Magpie** *(Gymnorhina tibicen)*

More than 546 Australian Magpies were liberated in Canterbury between 1864 and 1870, some from Victoria and others from Tasmania. Other liberations, altogether comprising 352 birds, were made on Kawau Island and in the Auckland, Hawke's Bay, Wellington and Otago districts between 1865 and 1874 (Thomson 1922).



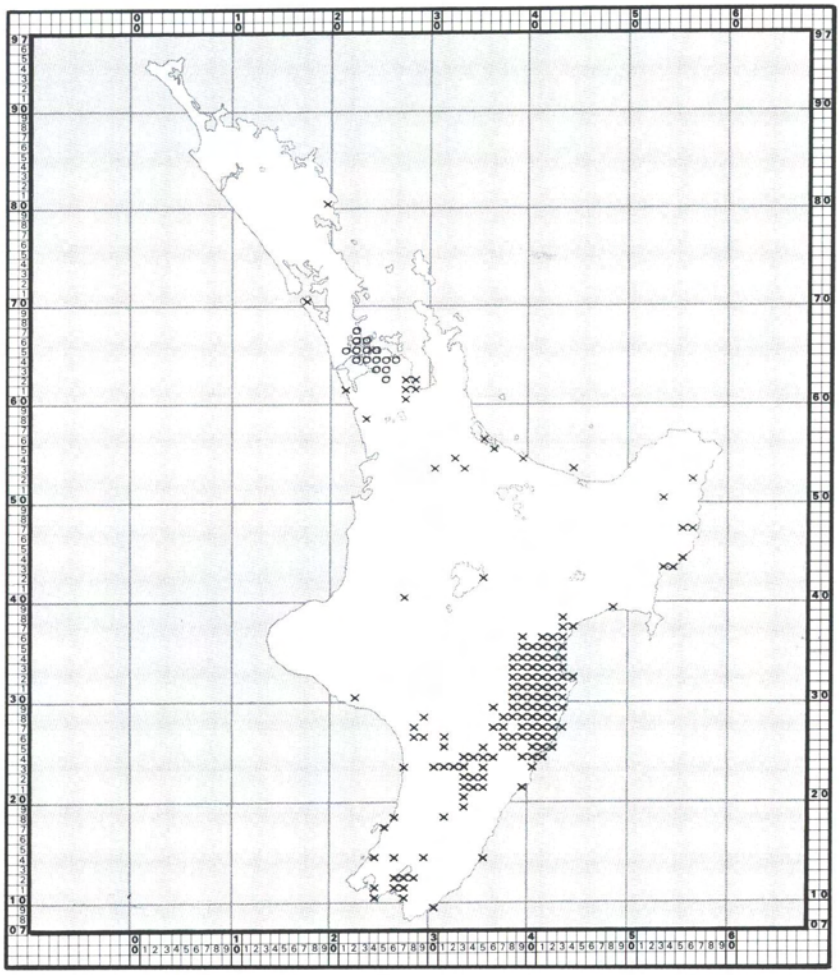
× = **Australian Magpie** *(Gymnorhina tibicen)*

The spread of Magpies in New Zealand was documented by McCaskill (1945 & 1946), and an indication of the relative abundance in different districts was provided by Bull & Gaze (1973). The distribution of the two colour forms in the North Island was mapped by Wodzicki (1965).



× = **Rook** *(Corvus frugilegus)*

The spread of Rooks in New Zealand after their introduction from Britain in the 1870s until 1971 was described by Bull (1957), Coleman (1971) and Bull & Porter (1975). Hawke's Bay which is the main centre of the population, had some 20 000 breeding adults in 1969.



× = **Rook** *(Corvus frugilegus)*

o = **Malay Spotted Dove** *(Streptopelia chinensis tigrina)*

The population of Malay Spotted Doves in the Auckland area probably originated from escaped cage birds and from a substantial release at Mount Eden in the 1920s (Turbott pers.comm.). No South Island records of doves were received. The establishment of Barbary Doves *(Streptopelia roseogrisea)* in the wild near Masterton was reported by Stidolph (1974). The atlas received reports of this species from North Island squares N1485, N2514, N3067, N3116, N4031, N4032 and N4331.

TABLE ONE MONTHLY DISTRIBUTION OF OBSERVATIONS

SPECIES	CODE	NUMBER OF CARDS PER MONTH											
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
KIWI SP.	KIW	210	64	78	69	87	104	82	129	163	274	134	206
N.I. KIWI	001	27	18	20	7	9	27	16	24	32	51	25	38
S.I. KIWI	002	9	6	8	5		1		1	1	7	2	9
STEWART ISLAND KIWI	003	2	1		6	1			8	3	2	5	4
LITTLE SPOTTED KIWI	004				1								1
GREAT SPOTTED KIWI	005	1	1	4	9	1	4	3	1		5		
PENGUIN SP.	PEN	1	1	1			1			3	5	1	4
KING PENGUIN	011			1									
YELLOW-EYED PENGUIN	012	11	8	8	2		4	1	1	4	14	21	11
BLUE PENQUIN SP.	PEB	42	31	27	20	13	30	30	44	45	54	36	43
COOK ST. BLUE PENGUIN	014	3	3	6	2	2			1	5	10	2	2
WHITE-FLIPPERED PENGUIN	016	8	2		1				2	3	4	5	6
S. BLUE PENGUIN	015	6	4	1			1	2		1	2	3	2
ROCKHOPPER PENGUIN	017		1	1									
FIORDLAND CRESTED PENGUIN	019	7	21	9	1			3	6	10	7	9	8
SNARES CRESTED PENGUIN	020		1										
ERECT-CRESTED PENGUIN	021		3	1								1	1
S. CRESTED GREBE	031	15	7	6	7	3	7	4	5	9	22	17	17
N.Z. DABCHICK	032	21	43	29	41	17	35	27	35	49	56	26	33
HOARY-HEADED GREBE	034	1					1	2		1			2
AUSTRALIAN LITTLE GREBE	033	1	4	6	3	1		2	6	3	1	3	2
ALBATROSS SP.	ALB	44	27	29	20	10	11	7	27	27	9	29	27
WANDERING ALBATROSS	041	9	2	3	6	7	1	4	7	4	7	7	2
ROYAL ALBATROSS SP.	ROY	7	7	5	4	1	1	3	4	2	8	7	10
N. ROYAL ALBATROSS	044			1	1	1				1	1		
S. ROYAL ALBATROSS	043		1		1						3		1
MOLLYMAWK SP.	MLY	4	2		1	1			2	2	3	5	4
BLACK-BROWED MOLLYMAWK	045	1		1	2	1	1	4	6		2		
N.Z. BLACK-BROWED MOLLYMAWK	046	1					1						
GREY-HEADED MOLLYMAWK	047		2	1	1				1			2	
YELLOW-NOSED MOLLYMAWK	048							1	1				
BULLERS MOLLYMAWK	049	13	11	9	8	6		3	4	2	4	5	5

TABLE ONE *(Continued)* MONTHLY DISTRIBUTION OF OBSERVATIONS

SPECIES	CODE	NUMBER OF CARDS PER MONTH											
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
WHITE-CAPPED MOLLYMAWK	050	13	11	7	7	3	2	4	1	1	6	9	6
SALVINS MOLLYMAWK	052	1	2	2				1				5	1
CHATHAM I. MOLLYMAWK	051									1	1		
LIGHT-MANTLED SOOTY ALBATROSS	054			2			1				1		
GIANT PETREL SP.	NEL	5	1	1						1	2	3	3
N. GIANT PETREL	109			2					1	1			1
S. GIANT PETREL	061										2		
ANTARCTIC FULMAR	064								1				
ANTARCTIC PETREL	108								1				
CAPE PIGEON	062	14	7	3	3	1	4	4	16	11	20	20	7
PETREL SP.	PTR	3	4	2						1	3	1	3
GREY-FACED PETREL	093	3	1	1	4	1	2	6	10	1	12	5	7
WHITE-HEADED PETREL	094					1					2		
MOTTLED PETREL	098	3	4	1	1				1		3	2	
KERMADEC PETREL	100										1	1	
CHATHAM I. TAIKO	111	2											1
PYCROFTS PETREL	101	1	1	1							1	2	
COOKS PETREL	104	4	1	3			1	1	1		2	5	4
BLACK-WINGED PETREL	106	3	2	1									1
CHATHAM I. PETREL	105	1	1	1									
PRION SP.	PRI	28	18	18	15	10	15	11	23	77	93	73	89
BROAD-BILLED PRION	066	1	1	3								1	2
LESSER BROAD-BILLED PRION	067	1	1					1		3	2	1	2
ANTARCTIC PRION	069	1		1									1
AUCKLAND I. PRION	071	1											
FAIRY PRION	073	9	12		1	1	1	2	6	3	6	5	6
GREY PETREL	089		1	1					1				
BLACK PETREL	090	1	2	2				2				1	2
WESTLAND BLACK PETREL	091	1		2	4	3	1	2	2	1	2	2	1
SHEARWATER SP.	SHW	3	1	5	1				2	2	1	1	1
FLESH-FOOTED SHEARWATER	077	15	2	2	5	3	1			1	4	9	9

TABLE ONE *(Continued)* MONTHLY DISTRIBUTION OF OBSERVATIONS

SPECIES	CODE	NUMBER OF CARDS PER MONTH											
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
BULLERS SHEARWATER	079	23	7	2	5	1				2	7	3	11
SOOTY SHEARWATER	080	46	41	28	19	14	1	2	4	10	42	32	49
SHORT-TAILED SHEARWATER	081										1		
FLUTTERING SHEARWATER	082	56	24	20	29	13	25	21	29	27	28	23	49
HUTTONS SHEARWATER	083	2	1	1					1		6	5	4
KERMADEC LITTLE SHEARWATER	085										1		
N.I. LITTLE SHEARWATER	086	2		1		1		2	1	1	3	1	1
STORM PETREL SP.	SPT	1		3			1			1	4		4
GREY-BACKED STORM PETREL	123	6	1							1	1		1
WHITE-FACED STORM PETREL	124	9	6	2				1		2	5	6	8
BLACK-BELLIED STORM PETREL	126	2											
N. DIVING PETREL	131	1		1						1	4	1	1
S. DIVING PETREL	132		1							1		1	
S. GEORGIAN DIVING PETREL	134											1	
DIVING PETREL SP.	DIV	7	7	5	4	1	1	3	4	2	8	7	10
RED-TAILED TROPIC BIRD	141	1			1								
AUSTRALASIAN GANNET	161	167	80	76	53	61	75	84	85	123	160	103	156
BROWN BOOBY	162			1			1						
MASKED BOOBY	163								1		1		
SHAG SP.	SHG	4		3	1	1	3			1	4	4	3
BLACK SHAG	171	526	268	264	276	232	224	244	333	420	636	430	490
PIED SHAG	172	181	105	93	88	69	77	73	104	148	207	104	147
LITTLE BLACK SHAG	173	50	16	34	29	36	38	56	65	53	77	37	36
LITTLE SHAG	144	359	218	232	232	188	202	206	283	340	438	264	285
KING SHAG	175	1	2	1		2	2		2		1	1	3
STEWART I. SHAG	176	15	13	10	10	5	2	1	6	7	13	15	15
CHATHAM I. SHAG	177	16	1	2		1				2	1	4	2
CAMPBELL I. SHAG	180			1									
SPOTTED SHAG	182	55	28	30	34	47	44	26	55	54	45	49	49
BLUE SHAG	183	15	12	5	6	3	1	4	5	6	10	12	15
PITT I. SHAG	184	23	3	5		2				2	2	7	4
FRIGATE BIRD SP.	FRG	3		1	3	1				1		3	

TABLE ONE *(Continued)* MONTHLY DISTRIBUTION OF OBSERVATIONS

SPECIES	CODE	NUMBER OF CARDS PER MONTH											
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
LESSER FRIGATE BIRD	202	2										1	
WHITE-FACED HERON	216	606	305	310	287	259	267	290	375	555	843	557	565
WHITE-NECKED HERON	212							1					
WHITE HERON	213	45	9	33	40	50	35	25	44	26	35	16	22
LITTLE EGRET	214	2	2	1	13	13	14	14	7	4	7	1	8
REEF HERON	215	93	31	45	48	39	38	46	39	63	93	52	79
CATTLE EGRET	220	2	3	2	23	39	17	17	26	7	14	3	6
AUSTRALASIAN BITTERN	218	75	42	32	39	32	32	35	57	72	115	73	64
GLOSSY IBIS	231	3	4	2	3	1		2	4	2	3	2	4
AUSTRALIAN WHITE IBIS	232	3	1	1	2	2	2		1				3
ROYAL SPOONBILL	233	15	14	15	17	17	17	16	19	11	18	5	17
YELLOW-BILLED SPOONBILL	234								2	1	1		
MUTE SWAN	242	8	4	4	9	8	11	7	13	15	22	8	8
BLACK SWAN	243	189	126	116	115	112	113	120	186	174	234	169	162
CANADA GOOSE	241	47	40	45	29	30	28	21	25	61	100	103	122
PARADISE SHELDUCK	245	377	222	233	335	172	205	200	334	465	686	519	537
MALLARD OR GREY SP.	MAX	35	14	19	12	20	13	12	11	12	51	27	29
MALLARD	252	439	207	232	238	204	210	251	428	669	994	543	470
HYBRID MALLARD X	259	3	2	1	1				2	2	6	1	1
GREY DUCK	251	425	227	230	204	129	119	145	227	387	578	353	409
GREY TEAL	247	38	27	24	21	27	19	18	28	44	66	61	45
BROWN TEAL	248	24	9	13	8	1	1	4	3	18	14	11	11
N.Z. SHOVELER	253	89	50	38	59	56	49	49	72	147	224	140	118
BLUE DUCK	254	54	32	29	33	19	24	18	24	30	23	39	54
N.Z. SCAUP	256	86	56	40	39	33	30	28	53	55	113	80	95
AUSTRALASIAN HARRIER	272	1082	513	416	480	401	426	421	633	1015	1574	1018	1038
FIJI HARRIER	271			1									
N.Z. FALCON	281	78	58	59	61	36	37	27	41	54	90	83	101
NANKEEN KESTREL	282	1			2	1	2						
CHUKOR	296	12	8	2	2	1	4	4	3	7	23	30	34
GREY PARTRIDGE	298			2						1	2		
BROWN QUAIL	292	48	26	14	16	18	34	26	43	94	134	48	65

TABLE ONE *(Continued)* MONTHLY DISTRIBUTION OF OBSERVATIONS

SPECIES	CODE	NUMBER OF CARDS PER MONTH											
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
CALIFORNIA QUAIL	295	254	138	72	68	62	74	76	126	265	579	405	368
PHEASANT	293	161	65	60	72	68	86	86	131	258	499	261	259
PEAFOWL	297	1	1	3	1			2	2	4	2	6	7
GUINEAFOWL	311										2		
TURKEY	321	6	1	1		8	2	3	3	5	16	8	9
BANDED RAIL	331	39	6	12	7	6	11	16	16	23	28	16	22
WEKA SP.	WEK	34	28	23	22	24	21	23	30	50	47	35	42
N.I. WEKA	335	17	8	5	22	11	12	10	12	20	35	12	21
WESTERN WEKA	336	6	13	23	15	10	11	11	14	9	11	8	12
BUFF WEKA	337	30	4	1		2				1	1		2
STEWART I. WEKA	338	7	5	1	1			1	2		7	11	4
CRAKE SP.	CRK										1		
MARSH CRAKE	340	16	5	1	5	4	3		1	3	5	4	8
SPOTLESS CRAKE	341	33	21	21	15	16	21	23	25	15	34	23	37
PUKEKO	342	431	219	219	226	178	212	242	365	570	829	441	385
NOTORNIS	343	2	3	1	6	1				1	1	2	2
AUSTRALASIAN COOT	345	9	7	3	10	7	5	6	10	16	31	12	20
OYSTERCATCHER SP.	YST	146	87	77	81	29	21	15	44	34	52	61	85
S.I. PIED OYSTERCATCHER	401	309	89	110	94	95	97	94	176	314	527	407	411
VARIABLE OYSTERCATCHER	402	268	104	114	117	72	100	92	116	145	257	163	216
CHATHAM I. OYSTERCATCHER	404	12	3	3		1				1	1	2	6
SPUR-WINGED PLOVER	411	246	102	105	114	92	88	96	167	262	418	317	258
GREY PLOVER	412	1		1						1		1	
GOLDEN PLOVER	413	36	20	28	11		1		1	5	36	17	23
N.Z. DOTTEREL	418	103	21	26	22	13	28	25	37	67	93	57	62
RED-CAPPED DOTTEREL	414			1	2	1	1						
BANDED DOTTEREL	415	253	92	92	79	56	56	63	101	180	303	261	338
MONGOLIAN DOTTEREL	421	1		5	3	2	4	1	1	2	3	3	
LARGE SAND DOTTEREL	416	2	1	3								4	
ORIENTAL DOTTEREL	417	1											
BLACK-FRONTED DOTTEREL	422	5	8	5	9	6	12	17	10	13	25	27	14
N.Z. SHORE PLOVER	419	1	1	2						1	1	1	2

TABLE ONE *(Continued)* MONTHLY DISTRIBUTION OF OBSERVATIONS

SPECIES	CODE	NUMBER OF CARDS PER MONTH											
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
WRYBILL	420	50	27	36	20	18	12	21	24	39	75	44	50
CURLEW SP.	CUR												1
FAR-EASTERN CURLEW	441	8	6	10	4	3		1	3	5	7	7	8
WHIMBREL SP.	WHI	1	1	2	1			1				1	1
ASIATIC WHIMBREL	443	9	2	8	4		3	1	4	2	13	6	10
AMERICAN WHIMBREL	444										3	2	
LITTLE WHIMBREL	442	2	1								1		
GODWIT SP.	GOD	69	23	20	17	12	15	10	14	21	44	34	45
ASIATIC BLACK-TAILED GODWIT	466			2					1	1	1	1	
AMERICAN BLACK-TAILED GODWIT	446			1			1			1	1		1
EASTERN BAR-TAILED GODWIT	445	108	50	67	43	30	37	40	29	52	144	75	79
LESSER YELLOWLEGS	468		2	3	1								
GREENSHANK	447	7	1	1	1	2	1				3	1	1
MARSH SANDPIPER	469		1							1		1	
TATTLER SP.	TAT	5		4					1	2	6	2	
WANDERING TATTLER	449	1		1							1	2	
SIBERIAN TATTLER	450	4	3	2				1	3	1	5	7	2
COMMON SANDPIPER	470				1								1
TEREK SANDPIPER	448	2	3	3	1	1	1	1	1		6	3	4
TURNSTONE	451	55	19	20	7	7	8	12	9	16	42	34	42
CHATHAM I. SNIPE	453	1	2	2						1	1	1	2
JAPANESE SNIPE	457											1	1
KNOT	458	48	23	33	14	3	8	7	5	22	71	39	39
GREAT KNOT	471												1
BAIRDS SANDPIPER	474										1		
SHARP-TAILED SANDPIPER	459	18	15	16	5			2		1	14	10	15
PECTORAL SANDPIPER	460	4	5	2							3	3	6
WHITE-RUMPED SANDPIPER	475							1					
CURLEW SANDPIPER	461	12	2	5	1	2	2	2		3	17	6	6
WESTERN SANDPIPER	472	1		1								1	
RED-NECKED STINT	462	15	6	9	4		1	3	1	2	21	11	6
SANDERLING	464	3		1									2

TABLE ONE *(Continued)* MONTHLY DISTRIBUTION OF OBSERVATIONS

SPECIES	CODE	NUMBER OF CARDS PER MONTH											
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
PIED STILT	481	474	203	190	179	172	197	229	333	487	735	495	486
BLACK STILT	482	8	8	12	4	2	9	3	6	14	11	15	36
HYBRID STILT	483		1		1		1						
GREY PHALAROPE	491						1						
SKUA SP.	SKU										1	1	
S. GREAT SKUA	511	12	11	5	5		2		4	4	6	10	13
ANTARCTIC SKUA	512			1	1								2
POMARINE SKUA	513	4	1	3		2							1
ARCTIC SKUA	514	34	16	18	19	6	1	2		1	4	7	26
S. BLACK-BACKED GULL	521	1118	529	412	394	365	397	427	693	1076	1481	1013	1041
RED-BILLED GULL	523	474	236	262	232	191	183	189	268	368	450	283	343
BLACK-BILLED GULL	524	324	105	72	83	88	76	75	116	203	319	235	255
TERN SP.	TER	91	78	97	92	21	20	18	35	47	47	61	77
WHISKERED TERN	540							1	1	1			
WHITE-WINGED BLACK TERN	526	1	5	4		1		3	2	2	3	3	7
GULL-BILLED TERN	538	2											
CASPIAN TERN	527	250	103	133	118	113	129	135	161	211	293	146	191
BLACK-FRONTED TERN	525	118	51	36	32	30	30	20	36	108	158	144	234
ANTARCTIC TERN	529		2	2								2	
ARCTIC TERN	530					1							
FAIRY TERN	531	4	2	3	1		1		2	3	2	5	9
EASTERN LITTLE TERN	539	11	2	13	4	1	1			2	10	11	24
WHITE-FRONTED TERN	532	353	164	158	147	89	87	62	95	143	217	194	266
WHITE-CAPPED NODDY	535								1		1		
WHITE TERN	536										1		
GREY TERNLET	537				1				2		1	1	
N.Z. PIGEON	551	593	335	309	209	130	130	144	258	364	560	429	449
CHATHAM I. PIGEON	552	5		1									
ROCK PIGEON	553	83	67	36	48	69	48	63	90	139	169	146	92
MALAY SPOTTED DOVE	554	1	2	1	2	3		2	4	8	11	2	2
BARBARY DOVE	555				1						4	3	
KAKAPO	561	3			2								1

TABLE ONE *(Continued)* MONTHLY DISTRIBUTION OF OBSERVATIONS

SPECIES	CODE	NUMBER OF CARDS PER MONTH											
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
WHITE COCKATOO	565	2		1				3	3	3	8	4	3
COCKATIEL	500		1										
N.I. KAKA	562	72	24	25	20	18	14	13	21	31	61	59	56
S.I. KAKA	563	143	99	70	43	17	16	19	40	43	71	89	110
KEA	564	167	98	78	74	23	36	38	54	55	70	113	131
ROSELLA SP.	RSL	9	12	6	8	11	5	3	1	10	14	16	11
CRIMSON ROSELLA	576	2		1		1			1	2	2		
EASTERN ROSELLA	566	7	9	9	8	10	44	46	43	37	79	25	28
PARAKEET SP.	PRK	1		1				1	1	2			1
RED-CROWNED PARAKEET	568	18	5	16	6	8	2	5	12	6	12	21	20
CHATHAM I. RED-CROWNED PARAKEET	569	10	2	2						1	1	1	2
YELLOW-CROWNED PARAKEET	573	55	26	18	16	9	12	11	24	19	36	20	31
CHATHAM I. YELLOW-CROWNED PARAKEET	574		1	3									
SHINING CUCKOO	583	308	50	30	4	3	4	2	12	56	732	637	549
LONG-TAILED CUCKOO	584	280	76	29	2	1	2		1	12	109	170	216
MOREPORK	601	231	128	165	135	93	90	78	126	181	248	211	252
LITTLE OWL	604	26	17	2	14	13	8	13	13	26	29	28	17
SPINE-TAILED SWIFT	611	2	1	1							1	1	
N.Z. KINGFISHER	621	574	251	282	356	299	337	325	456	732	1081	600	608
KOOKABURRA	622	1			3		2	3	1	1	2	3	6
BROAD-BILLED ROLLER	631												
N.I. RIFLEMAN	641	88	37	31	26	31	20	15	32	43	45	53	66
S.I. RIFLEMAN	642	233	157	117	139	49	54	41	83	87	136	208	211
N.I. BUSH WREN	643	1										1	
S.I. BUSH WREN	644	1											
ROCK WREN	646	34	23	17	9	1	1	1	2	5	2	15	23
SKYLARK	651	1034	361	194	319	291	256	295	604	1024	1643	1096	1046
AUSTRALIAN TREE MARTIN	661			1	4	1		1					
WELCOME SWALLOW	662	332	176	175	165	170	221	236	293	356	494	348	345
N.Z. PIPIT	741	554	305	259	303	175	201	191	270	403	651	460	559

TABLE ONE *(Continued)* MONTHLY DISTRIBUTION OF OBSERVATIONS

SPECIES	CODE	NUMBER OF CARDS PER MONTH											
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
HEDGESPARROW	731	698	280	242	321	264	266	239	431	816	1050	734	688
N.I. FERNBIRD	701	53	20	19	14	19	21	24	43	48	76	49	33
S.I. FERNBIRD	702	80	34	43	39	9	11	12	17	17	24	20	15
CODFISH FERNBIRD	704										1	1	
STEWART I. FERNBIRD	703		2			2				2	1	2	3
BROWN CREEPER	711	257	145	100	98	35	39	47	82	91	150	200	166
WHITEHEAD	712	106	49	48	38	30	28	16	50	73	109	89	95
YELLOWHEAD	713	32	22	9	15	3	1	4	7	8	19	37	31
GREY WARBLER	714	1036	558	519	537	350	357	391	690	1058	1598	1058	1051
CHATHAM I. WARBLER	715	10	2	5						1	1		3
N.I. FANTAIL	681	519	220	232	270	241	255	277	465	626	1019	473	541
S.I. FANTAIL	682	540	279	269	357	201	156	139	222	300	378	379	353
CHATHAM I. FANTAIL	683	19	2	10						2	2	1	4
PIED TIT	684	148	72	71	66	60	53	32	92	109	199	140	173
YELLOW-BREASTED TIT	685	478	263	240	292	110	103	98	163	195	252	314	317
CHATHAM I. TIT	686	3	1	3						1	1	1	2
N.I. ROBIN	689	67	21	42	18	18	11	6	20	46	53	51	52
S.I. ROBIN	690	145	68	80	136	40	47	26	61	77	69	73	66
STEWART I. ROBIN	691	2	2		1				6			3	5
BLACK ROBIN	692		1	1									
SONG THRUSH	721	1085	387	283	347	311	368	382	659	1125	1864	1166	1105
BLACK BIRD	722	1386	604	512	601	481	483	531	869	1426	2221	1478	1399
SILVEREYE	761	1094	575	530	584	395	376	387	565	861	1249	874	896
STITCHBIRD	751	1	1			5	3	1	3	2		1	3
BELLBIRD	753	770	419	381	434	227	176	164	327	409	753	591	588
TUI	755	722	285	263	229	151	180	174	292	483	779	533	611
CHATHAM I. TUI	756	6	1	3								1	2
YELLOWHAMMER	775	1069	366	252	342	313	362	354	556	962	1556	1034	1073
CIRL BUNTING	776	16	13	6	6	5	10	8	12	8	8	5	7
CHAFFINCH	774	1344	509	430	552	402	427	450	749	1264	2070	1432	1349
GREENFINCH	771	731	280	170	200	169	183	210	301	502	1002	656	688
GOLDFINCH	772	869	399	297	405	355	355	335	426	818	1443	846	810

TABLE ONE *(Continued)* MONTHLY DISTRIBUTION OF OBSERVATIONS

SPECIES	CODE	NUMBER OF CARDS PER MONTH											
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
REDPOLL	773	809	285	219	248	170	146	146	210	408	712	719	686
HOUSE SPARROW	781	1124	536	361	404	392	394	411	673	1144	1673	993	938
STARLING	791	981	438	395	442	411	445	442	732	1223	1912	1289	1039
INDIAN MYNA	792	427	273	147	156	151	177	218	371	501	830	441	446
N.I. SADDLEBACK	821	3	2	2		1		1	2		1	4	2
S.I. SADDLEBACK	822		3										
N.I. KOKAKO	824	20	7	2	7	1	4	2	18	10	21	16	10
MASKED WOOD-SWALLOW	664	1			1								
WHITE-BROWED WOOD-SWALLOW	663	1			1								
MAGPIE SP.	MAG	10	3	6	4	4	7	5	4	4	9	4	8
BLACK-BACKED MAGPIE	811	24	26	21	21	36	19	24	39	111	172	41	34
WHITE-BACKED MAGPIE	812	422	252	195	261	207	252	236	392	574	849	634	566
ROOK	802	27	17	11	18	27	17	19	40	108	193	28	21

TABLE TWO SQUARES AND CARDS HELD PER SPECIES

SPECIES	CODE	NUMBER OF SQUARES				NUMBER OF CARDS			
		NORTH	SOUTH	OUTLY	TOTAL	NORTH	SOUTH	OUTLY	TOTAL
KIWI SP.	KIW	87	117		204	106	166		272
N.I. KIWI	001	210			210	303			303
S.I. KIWI	002		40		40		51		51
STEWART ISLAND KIWI	003		18		18		32		32
LITTLE SPOTTED KIWI	004	1	1		2	1	1		2
GREAT SPOTTED KIWI	005		28		28		43		43
PENGUIN SP.	PEN	1	5		6	2	5		7
KING PENGUIN	011			1	1			1	1
YELLOW-EYED PENGUIN	012		38	1	39		84	1	85
BLUE PENQUIN SP.	PEB	100	84	3	187	146	170	23	339
COOK ST. BLUE PENGUIN	014	25	2		27	34	2		36
WHITE-FLIPPERED PENGUIN	016		13		13		31		31
S. BLUE PENGUIN	015		14	3	17		18	4	22
ROCKHOPPER PENGUIN	017		1	1	2		1	1	2
FIORDLAND CRESTED PENGUIN	019		50		50		81		81
SNARES CRESTED PENGUIN	020		1		1		1		1
ERECT-CRESTED PENGUIN	021		4	1	5		5	1	6
S. CRESTED GREBE	031		51		51		126		126
N.Z. DABCHICK	032	136			136	412			412
HOARY-HEADED GREBE	034	1	3		4	1	6		7
AUSTRALIAN LITTLE GREBE	033	15	4		19	17	16		33
ALBATROSS SP.	ALB		1		1		1		1
WANDERING ALBATROSS	041	10	12	1	23	45	13	1	59
ROYAL ALBATROSS SP.	ROY		4	3	7		7	5	12
N. ROYAL ALBATROSS	044		1	1	2		3	2	5
S. ROYAL ALBATROSS	043		1		1		6		6
MOLLYMAWK SP.	MLY	8	30		38	34	34		68
BLACK-BROWED MOLLYMAWK	045	9	3	2	14	12	4	2	18
N.Z. BLACK-BROWED MOLLYMAWK	046	1	1		2	1	1		2
GREY-HEADED MOLLYMAWK	047	2	4	1	7	2	4	1	7
YELLOW-NOSED MOLLYMAWK	048	1			1	2			2
BULLERS MOLLYMAWK	049	2	25	3	30	2	53	16	71

TABLE TWO *(Continued)* SQUARES AND CARDS HELD PER SPECIES

SPECIES	CODE	NUMBER OF SQUARES NORTH	SOUTH	OUTLY	TOTAL	NUMBER OF CARDS NORTH	SOUTH	OUTLY	TOTAL
WHITE-CAPPED MOLLYMAWK	050	5	34		39	10	60		70
SALVINS MOLLYMAWK	052		10		10		12		12
CHATHAM I. MOLLYMAWK	051			1	1			2	2
LIGHT-MANTLED SOOTY ALBATROSS	054	3		1	4	3		1	4
GIANT PETREL SP.	NEL	59	74	5	138	253	138	29	420
N. GIANT PETREL	109	2	3		5	2	3		5
S. GIANT PETREL	061	1		1	2	1		1	2
ANTARCTIC FULMAR	064	1			1	1			1
ANTARCTIC PETREL	108	1			1	1			1
CAPE PIGEON	062	17	32	4	53	28	75	7	110
PETREL SP.	PTR	6	6		12	10	7		17
GREY-FACED PETREL	093	34		1	35	52		1	53
WHITE-HEADED PETREL	094	3			3	3			3
MOTTLED PETREL	098		10	1	11		13	2	15
KERMADEC PETREL	100	1		1	2	1		1	2
CHATHAM I. TAIKO	111			1	1			3	3
PYCROFTS PETREL	101	5			5	6			6
COOKS PETREL	104	12	1		13	21	1		22
BLACK-WINGED PETREL	106	1		3	4	1		6	7
CHATHAM I. PETREL	105			1	1			3	3
PRION SP.	PRI	6	7	1	14	8	8	1	17
BROAD-BILLED PRION	066		4	4	8		4	4	8
LESSER BROAD-BILLED PRION	067	1		3	4	4		7	11
ANTARCTIC PRION	069	1		1	2	1		2	3
AUCKLAND I. PRION	071			1	1			1	1
FAIRY PRION	073	14	13	1	28	20	32	1	53
GREY PETREL	089	2	1		3	2	1		3
BLACK PETREL	090	6	1		7	9	1		10
WESTLAND BLACK PETREL	091		3		3		24		24
SHEARWATER SP.	SHW	9	12		21	12	12		24
FLESH-FOOTED SHEARWATER	077	33	6		39	44	9		53

TABLE TWO *(Continued)* SQUARES AND CARDS HELD PER SPECIES

SPECIES	CODE	NUMBER OF SQUARES				NUMBER OF CARDS			
		NORTH	SOUTH	OUTLY	TOTAL	NORTH	SOUTH	OUTLY	TOTAL
BULLERS SHEARWATER	079	42	5	1	48	58	5	1	64
SOOTY SHEARWATER	080	43	96	6	145	73	204	20	297
SHORT-TAILED SHEARWATER	081	1			1	1			1
FLUTTERING SHEARWATER	082	96	43		139	250	97		347
HUTTONS SHEARWATER	083	1	10		11	2	18		20
KERMADEC LITTLE SHEARWATER	085			1	1			1	1
N.I. LITTLE SHEARWATER	086	7	1		8	12	1		13
STORM PETREL SP.	SPT		2		2		2		2
GREY-BACKED STORM PETREL	123			2	2			10	10
WHITE-FACED STORM PETREL	124	13	2	4	19	15	8	16	39
BLACK-BELLIED STORM PETREL	126			1	1			2	2
N. DIVING PETREL	131	9	1		10	9	1		10
S. DIVING PETREL	132		2	1	3		2	1	3
S. GEORGIAN DIVING PETREL	134		1		1		1		1
DIVING PETREL SP.	DIV	14	16	4	34	18	29	12	59
RED-TAILED TROPIC BIRD	141	2			2	2			2
AUSTRALASIAN GANNET	161	317	119		436	1005	241		1246
BROWN BOOBY	162	1			1	2			2
MASKED BOOBY	163			1	1			2	2
SHAG SP.	SHG	57	28		85	72	34		106
BLACK SHAG	171	797	912	3	1712	2546	1867	24	4437
PIED SHAG	172	321	183	1	505	973	439	1	1413
LITTLE BLACK SHAG	173	242	20	1	263	513	22	1	536
LITTLE SHAG	144	639	554		1193	2062	1254		3316
KING SHAG	175		12		12		16		16
STEWART I. SHAG	176		43		43		112		112
CHATHAM I. SHAG	177			2	2			29	29
CAMPBELL I. SHAG	180			1	1			1	1
SPOTTED SHAG	182	44	167		211	136	396		532
BLUE SHAG	183		32		32		94		94
PITT I. SHAG	184			5	5			48	48
FRIGATE BIRD SP.	FRG	2			2	2			2

TABLE TWO *(Continued)* SQUARES AND CARDS HELD PER SPECIES

SPECIES	CODE	NUMBER OF SQUARES NORTH	SOUTH	OUTLY	TOTAL	NUMBER OF CARDS NORTH	SOUTH	OUTLY	TOTAL
LESSER FRIGATE BIRD	202	2	1		3	2	1		3
WHITE-FACED HERON	216	971	880	3	1854	3162	2107	45	5314
WHITE-NECKED HERON	212	1			1	1			1
WHITE HERON	213	61	124		185	128	273		401
LITTLE EGRET	214	20	27		47	45	56		101
REEF HERON	215	199	72		271	575	114		689
CATTLE EGRET	220	57	48		105	92	88		180
AUSTRALASIAN BITTERN	218	271	128		399	527	161		688
GLOSSY IBIS	231	10	11		21	16	18		34
AUSTRALIAN WHITE IBIS	232	6			6	15			15
ROYAL SPOONBILL	233	13	21		34	129	61		190
YELLOW-BILLED SPOONBILL	234	2			2	4			4
MUTE SWAN	242	11	22		33	43	74		117
BLACK SWAN	243	282	291	2	575	1029	797	27	1853
CANADA GOOSE	241	41	305		346	81	605		686
PARADISE SHELDUCK	245	745	1218		1963	1531	2851		4382
MALLARD OR GREY SP.	MAX	88	166	1	255	127	257	1	385
MALLARD	252	918	864	2	1784	2898	2057	12	4967
HYBRID MALLARD X	259	13	5		18	13	6		19
GREY DUCK	251	792	834	4	1630	1822	1674	29	3525
GREY TEAL	247	89	120		209	194	236		430
BROWN TEAL	248	48	13		61	96	22		118
N.Z. SHOVELER	253	226	235		461	571	532		1103
BLUE DUCK	254	80	181		261	120	275		395
N.Z. SCAUP	256	102	182		284	328	392		720
AUSTRALASIAN HARRIER	272	1410	1491	5	2906	5067	4027	48	9142
FIJI HARRIER	271			1	1			1	1
N.Z. FALCON	281	184	355		539	267	483		750
NANKEEN KESTREL	282	3	2		5	4	3		7
CHUKOR	296		96		96		134		134
GREY PARTRIDGE	298	2	3		5	2	3		5
BROWN QUAIL	292	289			289	573			573

TABLE TWO *(Continued)* SQUARES AND CARDS HELD PER SPECIES

SPECIES	CODE	NUMBER OF SQUARES				NUMBER OF CARDS			
		NORTH	SOUTH	OUTLY	TOTAL	NORTH	SOUTH	OUTLY	TOTAL
CALIFORNIA QUAIL	295	779	426	2	1207	1795	732	3	2530
PHEASANT	293	783	51		834	1973	63		2036
PEAFOWL	297	22	1		23	28	1		29
GUINEAFOWL	311	1			1	2			2
TURKEY	321	54	5		59	58	5		63
BANDED RAIL	331	130	19		149	188	23		211
WEKA SP.	WEK	13	294	2	309	16	689	7	712
N.I. WEKA	335	76			76	187			187
WESTERN WEKA	336		111		111		155		155
BUFF WEKA	337			2	2			41	41
STEWART I. WEKA	338		12		12		39		39
CRAKE SP.	CRK	1	3		4	1	3		4
MARSH CRAKE	340	10	41		51	13	50		63
SPOTLESS CRAKE	341	219	14		233	275	14		289
PUKEKO	342	962	569	3	1534	2932	1426	17	4375
NOTORNIS	343		9		9		19		19
AUSTRALASIAN COOT	345	29	20		49	79	59		138
OYSTERCATCHER SP.	YST	10	13		23	10	14		24
S.I. PIED OYSTERCATCHER	401	146	969		1115	541	2247		2788
VARIABLE OYSTERCATCHER	402	258	247		505	1125	673		1798
CHATHAM I. OYSTERCATCHER	404			3	3			29	29
SPUR-WINGED PLOVER	411	62	975	1	1038	156	2164	1	2321
GREY PLOVER	412	3	1		4	3	1		4
GOLDEN PLOVER	413	44	16	2	62	150	24	6	180
N.Z. DOTTEREL	418	154	16		170	529	29		558
RED-CAPPED DOTTEREL	414		1		1		5		5
BANDED DOTTEREL	415	220	535	2	757	753	1164	17	1934
MONGOLIAN DOTTEREL	421	3	7		10	6	19		25
LARGE SAND DOTTEREL	416	5	2		7	8	2		10
ORIENTAL DOTTEREL	417	1			1	1			1
BLACK-FRONTED DOTTEREL	422	58	9		67	133	18		151
N.Z. SHORE PLOVER	419			2	2			9	9

TABLE TWO *(Continued)* SQUARES AND CARDS HELD PER SPECIES

SPECIES	CODE	NUMBER OF SQUARES NORTH	SOUTH	OUTLY	TOTAL	NUMBER OF CARDS NORTH	SOUTH	OUTLY	TOTAL
WRYBILL	420	75	82		157	271	151		422
CURLEW SP.	CUR	8	3		11	17	3		20
FAR-EASTERN CURLEW	441	14	11	1	26	52	14	1	67
WHIMBREL SP.	WHI	10	2		12	14	2		16
ASIATIC WHIMBREL	443	20	6	2	28	46	16	2	64
AMERICAN WHIMBREL	444	3			3	5			5
LITTLE WHIMBREL	442	3	1		4	3	1		4
GODWIT SP.	GOD	78	49		127	130	127		257
ASIATIC BLACK-TAILED GODWIT	466	4	1		5	5	1		6
AMERICAN BLACK-TAILED GODWIT	446	4	1		5	5	1		6
EASTERN BAR-TAILED GODWIT	445	156	69	2	227	581	182	10	773
LESSER YELLOWLEGS	468	1	2		3	2	4		6
GREENSHANK	447	5	10	1	16	7	13	1	21
MARSH SANDPIPER	469	3			3	3			3
TATTLER SP.	TAT	2	4		6	4	4		8
WANDERING TATTLER	449	2	3		5	2	4		6
SIBERIAN TATTLER	450	9	8	1	18	11	16	1	28
COMMON SANDPIPER	470	2			2	3			3
TEREK SANDPIPER	448	11	1		12	26	2		28
TURNSTONE	451	54	34	3	91	175	88	13	276
CHATHAM I. SNIPE	453			2	2			10	10
JAPANESE SNIPE	457	1			1	2			2
KNOT	458	78	30	2	110	252	57	7	316
GREAT KNOT	471	1			1	1			1
BAIRDS SANDPIPER	474	1			1	1			1
SHARP-TAILED SANDPIPER	459	18	8		26	78	18		96
PECTORAL SANDPIPER	460	7	5		12	17	6		23
WHITE-RUMPED SANDPIPER	475	1			1	1			1
CURLEW SANDPIPER	461	15	9		24	45	13		58
WESTERN SANDPIPER	472	2			2	3			3
RED-NECKED STINT	462	18	14		32	52	27		79
SANDERLING	464	1	4		5	1	5		6

TABLE TWO *(Continued)* SQUARES AND CARDS HELD PER SPECIES

SPECIES	CODE	NUMBER OF SQUARES NORTH	SOUTH	OUTLY	TOTAL	NUMBER OF CARDS NORTH	SOUTH	OUTLY	TOTAL
PIED STILT	481	718	655	1	1374	2657	1597	1	4255
BLACK STILT	482	13	50		63	17	111		128
HYBRID STILT	483		3		3		3		3
GREY PHALAROPE	491	1			1	1			1
SKUA SP.	SKU	6	13	1	20	6	13	1	20
S. GREAT SKUA	511	3	41	5	49	3	55	18	76
ANTARCTIC SKUA	512	3	1		4	3	1		4
POMARINE SKUA	513	4	3	1	8	7	4	1	12
ARCTIC SKUA	514	58	26	1	85	101	34	6	141
S. BLACK-BACKED GULL	521	1007	1519	7	2533	4435	4547	74	9056
RED-BILLED GULL	523	499	355	6	860	2330	1134	62	3526
BLACK-BILLED GULL	524	105	730	2	837	369	1630	2	2001
TERN SP.	TER	7	5	1	13	8	5	1	14
WHISKERED TERN	540	2			2	3			3
WHITE-WINGED BLACK TERN	526	8	14		22	13	20		33
GULL-BILLED TERN	538	1	2		3	1	2		3
CASPIAN TERN	527	375	199		574	1539	482		2021
BLACK-FRONTED TERN	525	23	469	1	493	56	982	1	1039
ANTARCTIC TERN	529		4	1	5		5	1	6
ARCTIC TERN	530	1	1		2	1	1		2
FAIRY TERN	531	13			13	32			32
EASTERN LITTLE TERN	539	24	5		29	76	5		81
WHITE-FRONTED TERN	532	329	286	5	620	1173	788	51	2012
WHITE-CAPPED NODDY	535			1	1			2	2
WHITE TERN	536			1	1			1	1
GREY TERNLET	537	2		1	3	3		2	5
N.Z. PIGEON	551	813	838		1651	1930	2059		3989
CHATHAM I. PIGEON	552			1	1			6	6
ROCK PIGEON	553	136	345		481	457	603		1060
MALAY SPOTTED DOVE	554	15			15	38			38
BARBARY DOVE	555	7			7	8			8
KAKAPO	561		5		5		6		6

TABLE TWO *(Continued)* SQUARES AND CARDS HELD PER SPECIES

SPECIES	CODE	NUMBER OF SQUARES NORTH	SOUTH	OUTLY	TOTAL	NUMBER OF CARDS NORTH	SOUTH	OUTLY	TOTAL
WHITE COCKATOO	565	17			17	27			27
COCKATIEL	500	1			1	1			1
N.I. KAKA	562	207			207	423			423
S.I. KAKA	563		406		406		785		785
KEA	564		487		487		964		964
ROSELLA SP.	RSL	226	4		230	467	8		475
CRIMSON ROSELLA	576	1			1	9			9
EASTERN ROSELLA	566	223	4		227	342	7		349
PARAKEET SP.	PRK	126	328	1	455	200	546	1	747
RED-CROWNED PARAKEET	568	37	32		69	77	55		132
CHATHAM I. RED-CROWNED PARAKEET	569			3	3			19	19
YELLOW-CROWNED PARAKEET	573	43	169		212	61	231		292
CHATHAM I. YELLOW-CROWNED PARAKEET	574			3	3			4	4
SHINING CUCKOO	583	857	460	2	1319	1665	765	3	2433
LONG-TAILED CUCKOO	584	290	313	1	604	473	450	1	924
MOREPORK	601	611	455		1066	1222	770		1992
LITTLE OWL	604		152		152		221		221
SPINE-TAILED SWIFT	611		5		5		7		7
N.Z. KINGFISHER	621	1306	565	1	1872	4721	1268	2	5991
KOOKABURRA	622	12			12	22			22
BROAD-BILLED ROLLER	631		1		1		1		1
N.I. RIFLEMAN	641	236			236	493			493
S.I. RIFLEMAN	642		759		759		1550		1550
N.I. BUSH WREN	643	2			2	2			2
S.I. BUSH WREN	644		2		2		2		2
ROCK WREN	646		94		94		137		137
SKYLARK	651	1215	1430	4	2649	4389	3820	56	8265
AUSTRALIAN TREE MARTIN	661	4	2		6	5	3		8
WELCOME SWALLOW	662	792	274	2	1068	2751	617	3	3371
N.Z. PIPIT	741	919	1214	3	2136	2011	2365	49	4425

TABLE TWO *(Continued)* SQUARES AND CARDS HELD PER SPECIES

SPECIES	CODE	NUMBER OF SQUARES				NUMBER OF CARDS			
		NORTH	SOUTH	OUTLY	TOTAL	NORTH	SOUTH	OUTLY	TOTAL
HEDGESPARROW	731	1100	1513	6	2619	2620	3495	32	6147
N.I. FERNBIRD	701	253			253	423			423
S.I. FERNBIRD	702		176		176		347		347
CODFISH FERNBIRD	704		1		1		2		2
STEWART I. FERNBIRD	703		7		7		12		12
BROWN CREEPER	711		731		731		1442		1442
WHITEHEAD	712	354			354	738			738
YELLOWHEAD	713		125		125		195		195
GREY WARBLER	714	1423	1598		3021	4988	4336		9324
CHATHAM I. WARBLER	715			5	5			22	22
N.I. FANTAIL	681	1433			1433	5170			5170
S.I. FANTAIL	682		1338		1338		3646		3646
CHATHAM I. FANTAIL	683			3	3			40	40
PIED TIT	684	514			514	1229			1229
YELLOW-BREASTED TIT	685		1075		1075		2873		2873
CHATHAM I. TIT	686			4	4			12	12
N.I. ROBIN	689	221			221	411			411
S.I. ROBIN	690		369		369		913		913
STEWART I. ROBIN	691		10		10		19		19
BLACK ROBIN	692			2	2			2	2
SONG THRUSH	721	1386	1513	4	2903	4978	4197	22	9197
BLACK BIRD	722	1485	1767	7	3259	6509	5580	35	12124
SILVEREYE	761	1379	1469	6	2854	4702	3773	39	8514
STITCHBIRD	751	4			4	20			20
BELLBIRD	753	691	1258		1949	1595	3727		5322
TUI	755	1025	693	2	1720	2905	1868	4	4777
CHATHAM I. TUI	756			3	3			13	13
YELLOWHAMMER	775	1405	1421	3	2829	4826	3521	4	8351
CIRL BUNTING	776	9	59		68	13	93		106
CHAFFINCH	774	1508	1771	5	3284	5841	5236	34	11111
GREENFINCH	771	1055	1143	3	2201	2739	2429	12	5180
GOLDFINCH	772	1279	1188	4	2471	4552	2893	18	7463

TABLE TWO *(Continued)* SQUARES AND CARDS HELD PER SPECIES

SPECIES	CODE	NUMBER OF SQUARES				NUMBER OF CARDS			
		NORTH	SOUTH	OUTLY	TOTAL	NORTH	SOUTH	OUTLY	TOTAL
REDPOLL	773	628	1561	6	2195	1083	3728	45	4856
HOUSE SPARROW	781	1342	1127	1	2470	5896	3225	20	9141
STARLING	791	1358	1332	6	2696	5796	4001	64	9861
INDIAN MYNA	792	932	1		933	4156	1		4157
N.I. SADDLEBACK	821	5			5	18			18
S.I. SADDLEBACK	822		2		2		3		3
N.I. KOKAKO	824	74			74	121			121
MASKED WOOD-SWALLOW	664		1		1		2		2
WHITE-BROWED WOOD-SWALLOW	663		1		1		2		2
MAGPIE SP.	MAG	659	169		828	1387	226		1613
BLACK-BACKED MAGPIE	811	225	27		252	530	39		569
WHITE-BACKED MAGPIE	812	1062	803		1865	2932	1969		4901
ROOK	802	147	32	1	180	473	56	1	530

APPENDIX ONE

NZ BIRD DISTRIBUTION MAPPING SCHEME INSTRUCTIONS TO CONTRIBUTORS

The mapping scheme aimed to obtain information on the distribution of birds in New Zealand from 1969 to 1979 and thus to provide a baseline from which future changes could be measured. The scheme was based on the 10 000-yard squares of the national grid and was open to anyone able to identify common birds accurately and willing to follow the rules. The species lists, together with supporting details, were recorded on 6'' x 4'' cards. All completed cards are held at the Banding Office, NZ Wildlife Service, Private Bag, Wellington.

The following instructions were issued to those who contributed to the scheme.

WHEN TO USE A RECORD CARD

The cards should be used:

1. By *anyone* who can identify common birds *accurately* (only list species you know for sure).
2. *Anywhere* in New Zealand or its off lying islands, provided you can find the spot on a map.
3. *Anytime* you have ten minutes or more to spare and there are birds around.

The most productive time to make lists is spring and early summer (say 1 August to 31 January) when most species are conspicuous and breeding (and ornithologists are on holiday). But never miss the opportunity to make a bird list in a remote area, irrespective of the season or conditions for observation; it may be the only chance of getting any record at all from that particular square.

WHEN TO START A NEW CARD

Start a new card:

1. Whenever you move from one 10 000-yard square to another.
2. At the beginning of each new calendar month.

This ensures that all birds listed on one card will have been seen in one square in one month. Provided you keep to the one square, observations from say 1 November to 30 November may go on one card but, if time permits, it would be better to start a new list each week. On the other hand, observations over the two days 30 November to 1 December, even at one place, must be put on two cards, one for each day, because the months are different.

HOW TO FILL IN THE CARDS

The cards are a compromise between the conflicting requirements of small size to fit pockets and adequate space for clear writing. Please try to keep your writing small and, above all, *legible*. If the card can't be read, all your effort is wasted and, if it's misread, other people's work is wasted too. A *sharp* pencil (HB) is best for field use (ink blots, and some ballpoints fade), but use ink if you are filling in cards from field notebooks at home.

If you copy a list onto a new card, please destroy the old one, or mark it, so that at some future date it will not be sent in error to the mapping office as a new list. If you want to keep your own lists of species for the squares in your district please use foolscap sheets which provide more space for adding new species as you see them.

FIGURE 1A Front side of field observation card.

N.Z. BIRD DISTRIBUTION MAPPING SCHEME 6/71 | Checked | Coded | Office Use Only

OBSERVER A. SAMPLE
831 Waterloo Rd, Lower Hutt.

OBS CODE NO

DATE 12-16 / 5 / 71 (D / M / Y)

MAP SERIES NO. N.Z.M.S 1

MAP NUMBER (H / S / X) 1 3 6

GRID REFERENCE 0 7 4 (WEST) 0 4 7 (SOUTH)

SQUARE NUMBER 2 0 (WEST) 3 0 (SOUTH)

HABITAT

1 Beech Forest.
2 Other Native Forest.
3 Exotic Forest.
4 Scrub & Second Growth.
5 Developed Farmland.
6 Undeveloped Tussockland.
7 Alpine & Sub-alpine.
8 Swamps & Marsh.
9 Lake, Pond, Lagoon.
10 River, Stream, Riverbed.
11 (Estuary) & Mudflat.
12 Sandy Coast & Dunes.
13 Rocky Coast.
14 At Sea.
15 Residential & Urban.

LOCALITY NAME Small island in estuary of WHENUAKURA RIVER S.E. of PATEA.

FULL LIST ✓

PART LIST

LOCALITY DESCRIPTION & NOTES River in moderate flood; strong S.W. wind; no exposed mud banks.
The Starlings were flying high over the island on way to roost.
Broken Starling's eggs found in old nest in rotten end of large driftwood stump.

The notes below refer to each section of the record card in turn (See Figures 1A and 1B).

'Checked']
'Coded'] Please leave blank
'Office Use Only']

'OBSERVER':
Enter your name (or the leader's name if more than one or two people) on every card, and your address on at least your first card each year.

'OBS CODE NO':
Leave blank at present; code numbers will be allocated later to regular observers.

'DATE':
Enter day, month and year in the spaces labelled 'D', 'M' and 'Y'. If observations have been accumulated over several days, enter the first and last days of the period e.g. 12-16/5/71.

'MAP SERIES NO':
Usually this will be 'NZMS1' (one mile to one inch) or 'NZMS18' (about four miles to one inch), but sometimes forestry, geological, or other special maps may be the only ones available. Maps of the NZMS1 and NZMS18 series are usually marked as such at the top right hand corner of the sheet, but occasionally at the bottom left hand corner.

'MAP NUMBER' (or more correctly, 'Sheet No'):
Circle 'N' (for North Island), 'S' (for South Island), or 'X' for other places that do not have a national grid (e.g. some islands). Then enter the sheet number of the map you are using; this number is usually printed at the top of the map.

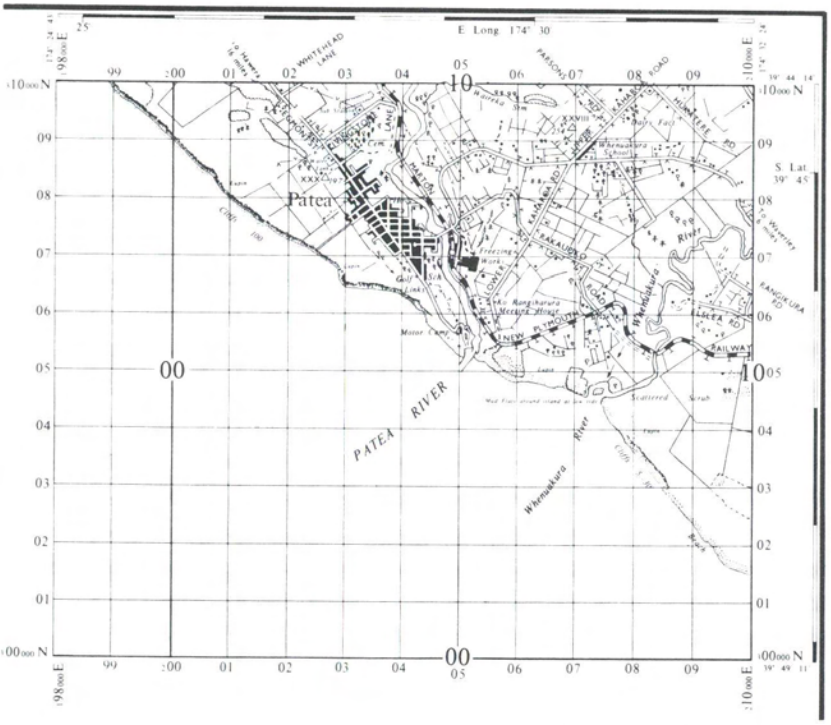
For example, the small island at the mouth of the Whenuakura River in south Taranaki (Figure 2) is on sheet N136 (Patea) of the NZMS1 series. If your bird list was from this island, you would enter 'NZMS1' under 'MAP SERIES NO.', circle the 'N' in the next space to the right, and enter the figures '136' in the three spaces immediately below the words 'MAP NUMBER' (see Figure 1A). If your list was from Doubtless Bay (sheet N7), you would again circle the 'N' and then enter '007' in the three spaces.

'GRID REFERENCE':
Needed only:—
1. *When* the rarity or other special interest of a species justifies recording the precise locality, or
2. *When* the whole list is compiled at just one restricted locality, e.g. a river mouth or small lake.

The form of the grid reference differs slightly according to the kind of map; detailed instructions are given on the lower magins of the sheets. The record card (Figure 1A) provides six spaces for the six figure references on NZMS1 maps (most likely to be used when the precise locality is important).

FIGURE 2 This map shows one complete 10 000-yard square (No. 2030) and, to the left, part of an adjoining square (No. 1930) which is mostly sea. A bird list from the small island in the estuary of the Whenuakura River would have the following map references:—

MAP SERIES NO.	MAP NUMBER	GRID REFERENCE		SQUARE NUMBER	
NZMS 1	136	074 WEST	047 SOUTH	2030 WEST	SOUTH



As an example, the grid reference for the island at the mouth of the Whenuakura River (Figure 2) is obtained as follows:—

1. First note the two figures (07) at the ends of the first vertical line to the **left** (west) of the island.
2. Now estimate in tenths the distance the island is to the **right** (east) of line 07 (In this instance 4). The first three figures of the reference are thus '074'; enter these on the card in the three spaces above the word 'WEST'.
3. Now read the two figures (04) at the ends of the horizontal line immediately **below** (south of) the island.
4. Finally, estimate in tenths (about 7) the distance the island is **above** (north of) line 04. The second three figures are therefore '047'; enter these on the card in the three spaces above 'SOUTH'. The complete reference is '074047'.

A grid reference from an NZMS18 map has a letter and two figures (indicating the hundred thousand yard square) and then a four figure reference. The record card does not provide for this sort of reference so, if you have to use it, please enter the letter and two figures in the small space to the left of the words 'GRID REFERENCE' and the four figure reference in the corresponding space to the right.

'SQUARE NUMBER':

This entry is most important because the 10 000-yard squares are the basic mapping units. Please follow instructions carefully, and consult your regional representative if in any doubt.

On NZMS1 maps, the 10 000-yard squares are the larger, more heavily marked ones with sides a little over 5.5 inches; ignore the smaller squares with sides of about half an inch. Figure 2 shows one whole 10 000-yard square (No. 2030) which is partly sea. Most NZMS1 map sheets cover about twelve 10 000-yard squares. Sheet N136 (illustrated in Figure 2) is exceptional; it is an inset from a larger sheet and was chosen because it was small enough to reproduce in these instructions without too much reduction.

To find the reference number for the square containing the small island at the mouth of the Whenuakura River (Figure 2), take the first **heavy** vertical line to the **left** (west) of the island and note the first two figures (20) of the three figure number (200) at the ends of this line on the upper or lower margins of the map (the first of these figures is in smaller print). Next take the first **heavy** horizontal line **below** (south of) the island and note the first two figures (30) of the three figure number (300) at the ends of this line on the right or left margins of the map.

The number of the square is therefore '2030'. Enter the '20' in the two spaces on the card above the word 'WEST' and the '30' in the spaces above 'SOUTH'.

A few NZMS1 maps have only two-figure numbers at the ends of the lines bounding the 10 000-yard squares. In this event, get your first figure by working from the six-figure numbers at the corners of the sheet (e.g. 300000 N and 198000 E in the lower left corner of Figure 2). These figures

merely indicate the number of yards north and east from where the grid starts and we are concerned only with ten thousand yard units.

Maps in the NZMS18 series show only the 10 000-yard squares and the lines have two-figure reference numbers which are the ones you need (again the first figure is in smaller print). Use them as for NZMS1. The same place will have the same numbered map square whichever series of maps you use. For example, the mouth of the Whenuakura River (NZMS18 sheet 10) will again be found in square 2030, though the island is too small to be shown on a map of this scale.

'HABITAT':

Please circle **one or more** of the listed habitats which most closely describe where your observations were made. Circle the appropriate habitat rather than its number. For instance, if you were walking up a river valley with tussock and scattered bushes and with beech forest on the sides (close enough for you to record birds from), you would circle 'Beech Forest', 'Scrub', 'Undeveloped Tussockland' and 'River'.

'Scrub & Second Growth' means areas of gorse, manuka, fern etc. and may include stands of forest species regenerating after fire.
'Developed Farmland' may include **small** patches of bush, shelter belts, **small** plantations, crops, orchards, stock ponds, homestead gardens, farm houses and outbuildings (**small** means less than 10 acres).
'Alpine' means above the tree line.
'Swamps & Marsh' have the water largely hidden by **emergent** vegetation.
'Lake, Pond, Lagoon' have open water, or water covered by **floating** plants.
'At Sea' includes both open ocean and sheltered harbours.
'Residential & Urban' means cities, towns, townships, beach settlements, and their associated parks, but **excludes** farm homesteads.

'LOCALITY NAME':

The minimum requirement is a place name which **appears on the map you have used** and is in the same square as your list. This name is important because it provides the only means of detecting an error in the square number (an error of even one figure in the square number could result in serious misinformation). Often the place name will be amplified, e.g. 'small island in the estuary of the Whenuakura River southeast of Patea'. In some remote areas the lack of place names may necessitate using the names of streams or other natural features marked on the map, but please amplify these if they could apply to more than one square.

'FULL LIST':

Tick this space if all the species seen or heard are recorded on the card. Make a full list wherever possible because several such lists from one square help to show which species are common and which are rare. (N.B. See 'PART LIST' for restrictions to 'FULL LIST'.)

'PART LIST':

Tick this space if some **'groups'** have been omitted because of the difficulty of identification (e.g. arctic waders) or observations. A full list cannot be made while travelling in a car, train etc., because there is little chance of identifying small or secretive species. You may enter just one, or a few

species on a card if you think they are new for the square and you have no time to make a full list; these are also 'part lists'.

'LOCALITY DESCRIPTION & NOTES':
Use this space to make other **relevant** comments, e.g. to indicate:
1. Whether the observations refer to a particular place in the square or to the whole square.
2. If the observations were made under circumstances that would greatly influence the species seen, e.g. from a moving car or in extremes of weather.
3. Any seemingly **important** detail not covered in the habitat categories (e.g. 'maize stubble', 'recent scrub fire', 'severe browsing by opossums', 'altitude c.5000ft asl.' etc.).
4. The main diagnostic features of an unfamiliar species, or that an unexpected record **was** confirmed by other named observers or supported by the finding of feathers or other remains.

FIGURE 1B Reverse side of field observation card.

SPECIES NAME	SPECIES REF. NO.	ESTIMATED NUMBERS				BREEDING
		UNKNOWN	1 to 10	11 to 100	100+	
1 B-Back Gull		(S) H	6			C P
2 W-F Heron		(S) H	1			C P
3 Starling		(S) H			✓	(C) P 5
4 B. Shag		(S) H	2			C P
5 Little Shag		(S) H	1			C P
6 House Sparrow		(S) H		✓		C P
7 P. Stilt		S (H)				C P
8 R. Bill Gull		(S) H		15		C P
9 Mallard		(S) H	7			C P
10 N.Z. Pipit		(S) H	2			C P
11 Kingfisher		(S) H	1			C P
12 Hedge Sparrow		S (H)				C P
13 Harrier		(S) H	1			C P
14 Chaffinch		(S) H	6			C P
15		S H				C P
16		S H				C P
17		S H				C P
18		S H				C P
19		S H				C P
20		S H				C P
21		S H				C P
22		S H				C P
23		S H				C P
24		S H				C P
25		S H				C P
26		S H				C P
27		S H				C P
28		S H				C P
29		S H				C P
30		S H				C P

The remaining notes refer to the reverse side of the card. (Figure 1B)

'SPECIES NAME':

Use the common name shown in the 1970 Checklist of New Zealand Birds, and use only one line for each species. If you do need to abbreviate, make sure that your meaning is clear; for instance 'BBG' could mean either black-billed gull or black-backed gull.

Some recommended abbreviations are:— F = faced; T = throated; fr = fronted; cr = crowned; Tail. = tailed; Wing. = *winged; Bill.* = billed; Back. = backed; B = Black; R = Red; W = White; Y = Yellow; P = Pied; SIPO = South Island Pied Oystercatcher; VOC = Variable Oystercatcher; NI = North Island; SI = South Island; St. I = Stewart Island; NZ = New Zealand.

Please avoid ambiguous names such as 'sparrow' or 'pigeon'. Occasionally, the seeing or hearing of a bird that you cannot identify as to species is nevertheless worth recording. Enter such records as 'kiwi sp.' or 'parakeet sp.'.

If your list contains more than the 30 species allowed for on the card, you will need to use two cards. In this event please clip the cards together and enter at the bottom of **each** card 'SEE OTHER CARD'.

'SPECIES REF. NO.':

Please leave this space blank; it **is** required for office use.

'ESTIMATED NUMBERS':

If a species is **seen** circle the 'S' in the column headed 'UNKNOWN'; if it is **heard** and not seen, circle the 'H'. At least one of these letters must **always** be circled. Try to **see** the bird if you can; if one bird is seen then circle the 'S' however many of the others of that species are heard.

If you cannot reasonably estimate the numbers, leave the next three columns (headed 1 to 10, 11 to 100, and 100+) blank.

If you can estimate the numbers, then tick the appropriate column if the estimate is very rough, or write in the actual figures. Use 'c.' to indicate ''approximately' (e.g. c.50).

These numbers should indicate birds **actually** seen and/or heard, **not** the number you think might be in the locality or square to which the list belongs. If you remain in one place for several days only enter the number of birds recorded in **a single day**. Birds seen on **different** days can be added together if this does not involve the same birds being counted twice. If you are counting birds, please do your sums in the margin of the card, or on a separate sheet of paper **NOT** in the space for office use.

BREEDING':

Circle the 'C' if breeding is confirmed by seeing:—

1. A nest with eggs or young
2. Newly hatched or newly fledged young
3. Adults removing faecal sacs from, or **repeatedly** carrying food to a probable nest site
4. An adult performing a distraction display (e.g. injury feigning) normally associated with breeding; but **not** courtship displays
5. A used nest (use this criterion only if the nest found is sufficiently characteristic for its identity to be certain)

Circle the 'P' if breeding is probable based on:—

6. a male singing regularly and/or strongly defending territory during the breeding season
7. an adult carrying nesting material or food (not courtship feeding).

If you circle 'C' or 'P', please also enter, in the right hand margin of the card, a figure from 1 to 7 to indicate which of the above classes of evidence applies. (See Figure 1B 'starling')

APPENDIX TWO

COMPUTER AND MICROFICHE SYSTEMS

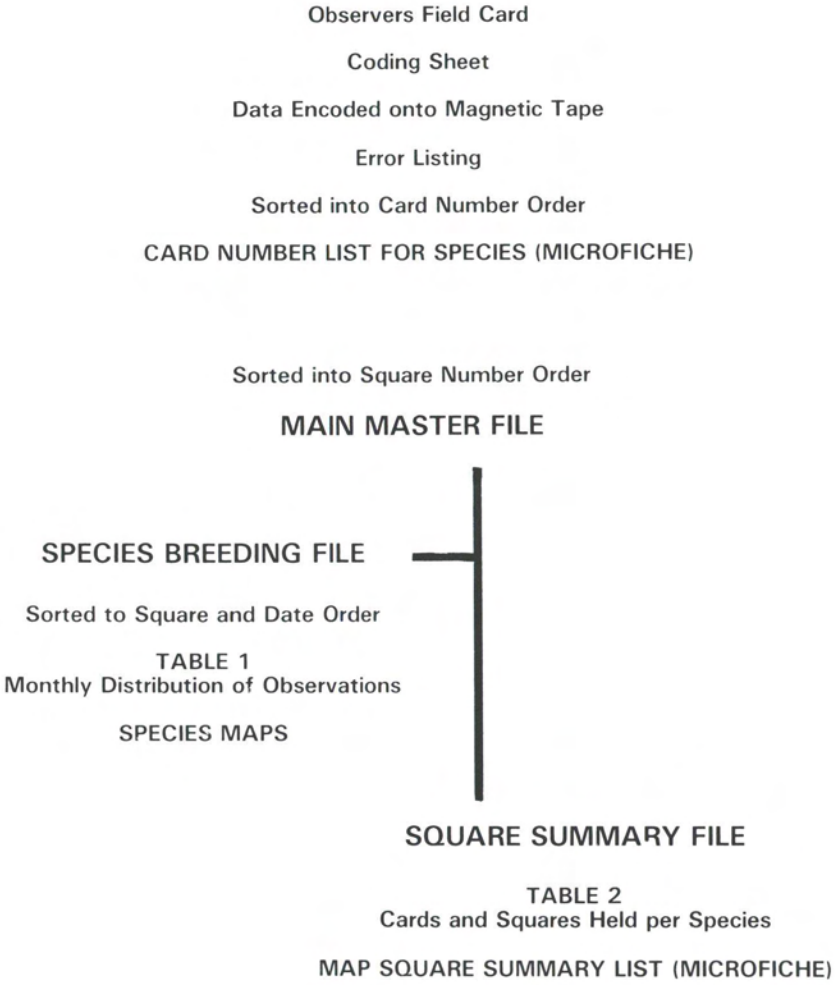
INTRODUCTION

The computer system for the Bird Distribution Mapping Scheme was designed to store the basic information which was extracted and coded from the field cards returned by observers. The primary requirement was the ability to vary the questions asked of the system without having to write special programmes for each question. In the early 1970s this was a fairly radical specification, which had by the mid-1980s become a standard requirement of any good computer-information management system. Unfortunately, the lack of these special software packages in the early 1970s required the creation of a massive suite of COBAL programmes. This did the job effectively, but without the ease of construction or flexibility available in systems today. The operating system consists of various parts, each designed to produce maps, tables or summaries according to variable parameters.

Other advances in technology during the atlas project were used to enhance the atlas and make it more than just a collection of maps. Some 19 000 field cards were recorded in the atlas project (10 112 North Island, 8804 South and Stewart Islands, 133 outlying islands). The coded and summarised data for each of the 10 000-yard squares in the system, would require a massive printout of over 1700 pages. Further, a simplified listing of some data and the square numbers recording the distribution of each species of bird present in the system, would require over 2500 pages of computer printout. These 4200 pages of coded information, covering much of the basic information in the atlas scheme, have been reproduced on just *sixteen* small sheets of microfiche film, copies of which are included with this atlas. By using a microfiche reader (available in most public libraries) students can extract a great deal of extra information from this database to suit their requirements. There are also microfiche printers which can print the pages being researched.

FIGURE 3

SUMMARY OF THE COMPUTER SYSTEM



The microfiches provide the means of finding squares and species so that, if necessary, the individual field card can be accessed (by application to the Banding Office, NZ Wildlife Service, Wellington) for details of any extra uncoded information. For this reason alone the New Zealand Bird Atlas is a unique presentation of the time and effort spent by more than 800 field observers.

The original basis of the computer system design was that maps should be produced by the computer's printer. The main problem with this concept has been that the dimensions of a printed character are oblong rather than square. The provisional atlas (Bull *et al.* 1978) used the printed character method and had maps of New Zealand which contained accurate distribution data but were 'fattened' in shape.

Redrawing all maps by hand to a final atlas format was rejected, primarily on the grounds of cost and the problems of ensuring accuracy. Cost and local availability were problems with other production methods using mechanical plotters or printing machines specially adapted to use tapes provided by the computer. Finally after extensive enquiries, it was decided to produce the maps directly from the computer data tape to microfiche. It was found that by distorting the 'normal' oblong printed character a 'square' character could be formed on the video screen photographed by the microfiche camera. This meant that the maps of New Zealand were now the right natural shape. There is, however, a tiny residual distortion due to the curvature of the video screen from which the microfiche photo is taken. This distortion prevented the final map outline and grid being fitted to the distribution maps at the microfiche stage as the national grid is not distorted in the same manner. A special grid was drawn later to fit the microfiche maps and applied photographically during production of the atlas.

The final maps produced in the atlas are an unusual example of the cartographer's art in that they are the result of a unique blend of advanced technology and ingenuity which saved many thousands of dollars in production costs. The maps showing various aspects of national coverage, included in the atlas as overlay pages (after the Species Index), were drawn by hand and took as long to produce as all the other maps together.

CODING AND CHECKING OF DATA

Each field card received was allocated a unique reference number which acts as the principal identification for that record and its parts throughout the system. It also enables the later cross checking of any square of species summary information with that held on the field card. Specific items of information on the field card (except descriptive or explanatory notes) were converted to alpha/numeric coded data. Coding of data can be very tedious and prone to error. After our experiences with coding for the provisional atlas the team coding the extra data for this atlas applied stringent cross checks. The coded data sheets (one to each card) were then 'punched' or encoded on to magnetic tape. These raw data were then fed into the computer system and again thoroughly checked for errors. Any record that did not pass the error check was rejected and then corrected or recoded.

All data accepted into the system were sorted and stored in the **Input Master File** in order of card reference numbers. This is the equivalent for the computer of the field card file held in the Banding Office. The use of a **card number list for the whole file** enabled a check to be made for any coded records which may have been mislaid or not returned to the system after correction.

FIGURE 4 Example page from microfiche of Card Number List for Species

```
                                         A1
                          INTERNAL AFFAIRS    BIRD DISTRIBUTION SYSTEM          16/04/84
        SPECIES 001       NORTH ISLAND BROWN KIWI                                       PAGE   1
020257 N38003600 Y C 0272-027073 N49004900 Y D 0472-030287 N34005100 N D 0970-030295 N35005100 N C 0970-031887 N35005300 Y C 0272
039845 N08008400 N C 1070-039853 N08008400 N C 1069-039861 N08008400 N C 1270-039942 N12008400 N C 0969-039950 N12008400 N C 1069
040002 N15008400 N C 0272-040053 N16008400 Y C 0969-040282 N17007900 Y C 0872-040452 N18007900 Y C 0071-040479 N19867924 Y C 1272
040509 N19007900 N C 0871-040517 N19287901 Y C 1271-040649 N19008200 N C 1270-040894 N17008400 N C 0969-040908 N17008400 N C 0970
040947 N06008500 Y C 1069-042455 N15007800 Y C 0272-042587 N20007800 Y C 1272-043729 N25007300 Y C 0172-043737 N25007300 Y C 0769
043745 N26007300 Y C 0271-043826 N16007400 N C 0272-045020 N17007600 Y C 0471-045195 N12008500 Y C 0171-045209 N12008500 N C 0969
045233 N13008500 N C 1069-045241 N13008500 N C 0969-046728 N13008500 N C 1069-046736 N14008500 Y C 0969-046744 N14008500 Y C 1069
046914 N18008500 N C 1069-046973 N07008600 Y C 1069-047074 N14008600 Y C 0969-047104 N15008600 Y C 0969-049247 N22003200 Y C 1073
049638 N11007900 Y C 0873-050105 N23003600 Y C 1073-051934 N18007900 Y C 0873-069930 N17008200 N C 0069-069957 N14008100 N C 1273
070025 N15008000 N C 0973-070068 N10008000 N C 1273-070084 N09008000 Y C 1873 070092 N18007900 Y C 1273-070157 N11007900 Y C 0069
070955 N20007800 Y C 0072-070998 N17007800 Y C 1072 071072 N14007700 N C 0673-071161 N13007600 N C 1173-071242 N16007500 N C 1273
071617 N32004300 Y C 0173-071757 N33006200 Y C 0372 178071 N45004600 Y C 9978 178284 N46004500 Y C 1279 178292 N46004400 Y C 1279
179302 N30004700 Y C 1079-179647 N32003700 Y C 0471 180130 N23003900 N C 0181 180177 N24003800 N C 0999 180181 N24003900 N C 0181
180394 N28004800 N C 0181-180653 N22004300 N C 0181-180661 N23004300 N C 0181 180858 N24004300 N C 0281 180882 N26004100 N C 0281
180890 N26004200 N C 0281-181153 N22004900 N C 1280-181366 N21004500 N C 1280 181439 N23004400 N C 1280 181668 N25005200 N C 1080
181692 N25005100 N C 1180-181722 N25005000 N C 1180-181730 N22005000 N C 1180 182001 N21003600 Y C 0381 182028 N22003600 Y C 0381
182036 N23003600 Y C 0381-182044 N21003500 Y C 0381 182052 N22003500 N C 0381 182060 N23003500 Y C 0381 182079 N24003500 N C 0381
182087 N25003500 N C 0381-182095 N21003400 Y C 0381-182125 N24003400 Y C 0381 182141 N21003300 Y C 0381-182176 N23003300 Y C 0381
182184 N24003300 N C 0381-182206 N21003200 N C 0381-182222 N23003200 Y C 0381 182257 N21003100 Y C 0381 182397 N17007600 N C 0179
760390 N10008800 N C 0274-760447 N10008000 N C 0274-760455 N11007900 Y C 0274 760676 N12008300 N C 0969-792438 N30006700 Y C 1174
792799 N11008100 Y C 1274-792837 N10008600 Y C 1274-792853 N14008200 Y C 1274 792934 N15008200 Y C 1074-792942 N15008100 Y C 1174
793469 N18008200 Y C 1074-793493 N13007900 Y C 1274-793507 N14008000 Y C 1274 793515 N13008000 Y C 1274 793531 N14007900 Y C 1274
793655 N16008400 N C 0175-793663 N15008500 N C 0175-799548 N29004300 N D 0575-812420 N22004400 Y C 0175-812668 N45004700 Y C 0177
812706 N46004400 Y C 1076-814695 N45004300 Y D 0177-816000 N44004400 N C 0178-816019 N44004300 N C 0178-816027 N45004400 Y C 0178
816973 N12008600 Y C 1077-817074 N18008200 N C 0170-818739 N25007300 N C 0578-818763 N25007400 N C 0578-819867 N30006700 N C 0375
819999 N46004300 N C 0178-821403 N44004900 Y C 0173-823570 N36003800 N C 0278-823783 N37003900 N C 0278-823813 N46004500 Y D 0278
825514 N25007400 Y C 1278-825522 N25007300 Y C 1278-825832.N43004000 Y C 0479-825859 N43004300 N C 0579-825964 N44004000 Y C 1078
826219 N14008600 N C 0978-826235 N08008500 Y C 1078-826243 N09008500 N C 1078-826251 N10008500 N C 1078-826286 N12008500 N C [illegible]
```

CARD NUMBER LIST FOR SPECIES
(Figure 4 and Microfiches 101-109)

Records for individual species are scattered over a large number of cards, squares, months and years. This card number list is a useful part of the system which allows the checking of all cards for a particular species. As part of the atlas we have used this system (Figure 4 and Microfiches 101-109) to produce a summary file for each species recorded during the project. Many of these species do not appear as maps in the atlas, and so it is possible to construct maps from the data provided on Microfiches 101-109. *The microfiche sheet number for each species can be found in the Species Index*. As the com-

puter system contains codes for all the species on the current New Zealand list, there are some species headings on the microfiche without any records because they were not recorded for the atlas.

Another important use for this file of information is to look for cards that *may* give extra descriptive information. A research worker may then use a list of card numbers to apply for information held on the field cards stored at the Banding Office.

An example of *one* page (270 pages on one microfiche) of a species summary is shown as Figure 4. Each page starts with a header section. This includes in large type the page reference on the microfiche (A1). The main reference line gives the species number, the common name of the species and the page number of the data for that species.

Each species page is made up of a collection of short records in card-number order from left to right across the page. Each record consists of the following elements of information:-

Example **-020257 N38003600 Y C 0272-**

a. **'020257'**
Card number.

b. **'N38003600'**
Island indicator (N or S or X for offshore islands) followed by the square or grid reference number (see Appendix 1 for the construction of the square or grid number; also under Map Square Summary List for the grid codes used to record offshore islands not in the national grid).

c. **'Y'**
Whether there are any notes or other descriptive information on the field card recorded under the heading 'LOCALITY DESCRIPTION AND NOTES' (Y = Yes; N = No).

d. **'C'**
Whether all the data on that field card are stored in the computer system, or whether a record elsewhere on the card has been ignored because of illegibility
(C = Complete; D = Deletion).

e. **'0272'**
Month and year when the record was made (0172 = January 1972)

MASTER FILES

Using master files of collated information provides quicker access to data for specified tasks. In the Input Master File, all the stored information from each field card is held in order of card record numbers. The **Main Master File** is created by sorting all the records so that they are held in grid square order. This type of master file is important as a source file because the preliminary sorting and checking have been done and do not need to be repeated each time a new analysis or a new file based on the master is wanted.

Not every item of information in the record stored from the field card is needed each time an analysis is done or a map is created. The Input and Main Master Files are used as the source material for the **Working Master Files** which create new (usually shorter) records using only the information required for the job.

SPECIES BREEDING FILE

In this working master file, a special short record is created for every observation made of a species. This record consists of the three-figure species number, a composite three-character code containing the method of observation, estimated numbers for that observation and any observed information about breeding. The date of observation, square reference and the card number are also held, after the species information.

While the productions of maps is the prime function, data may sometimes be presented more usefully as a table or summary. Table 1 of the atlas shows the number of cards completed monthly for each species throughout the atlas project. This is an important reference for assessing the reliability of a distribution map. Observations may prove to have been concentrated at certain times of the year and lacking at others. This may mean that the species was indeed absent in certain months, or that the observers were looking elsewhere, or even that they were not looking at all.

By a suitable selection of parameters it is possible to produce many different maps for the same species from this working master file. The provisional atlas (Bull *et al.* 1978) contained seasonal maps for species based on records from certain groups of months. It is also possible to compare distribution from year to year, or to compare groups of years with others, as shown in this atlas for Spur-winged Plover and Welcome Swallow. Other possible maps include the distribution of methods of recording (seen or heard) and the distribution obtained by either of these methods.

Although these are only examples of questions which might be asked, it is important to realise that there are limitations to the data available. A major limitation is the uneven spread of information throughout the years of the project and the quite large proportion of squares which have fewer than three observation cards per square (30% in the North Island; 41% in the South and Stewart Islands). The object has been to map the distribution of New Zealand's birds and there is considerable danger in trying to make the data do more than they were designed for.

SQUARE SUMMARY FILE
(Figure 5 and Microfiches 001-007)

Most of the information presented in the atlas originates from this organisation of the basic data. All the data held for each 10 000-yard grid square are combined and condensed so that there is one master record for each square.

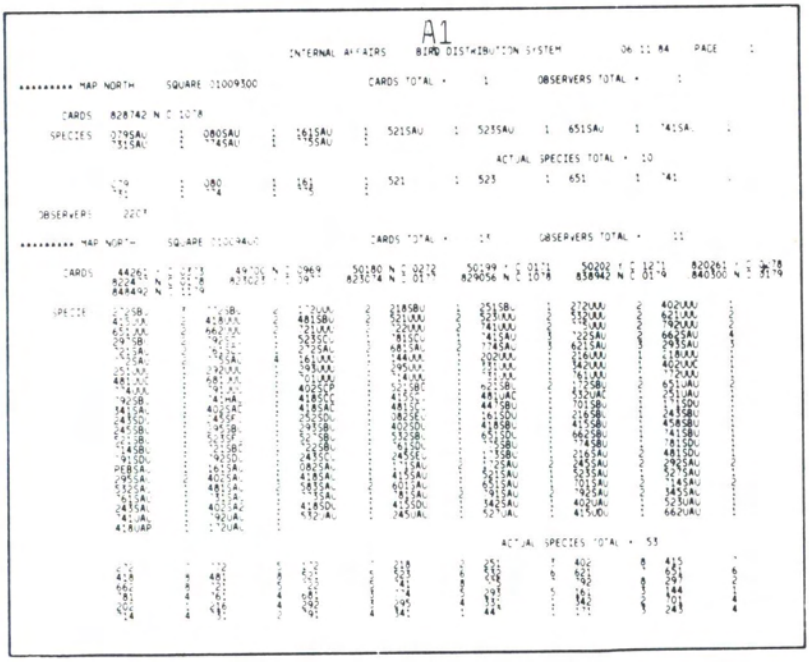
The results of map production from this source are adequately illustrated throughout the atlas. Basically, most of the maps represent the most simple parameter:— For what squares were there observations of a particular species? Some maps show two or more species at once. In this case a sep-

arate character symbol is used for each species and a third symbol if both occur in the same square. In some maps (Kiwis, page 30) all species may be shown together, without differentiation, by the same symbol.

The data in Table 2 show the number of cards on which each species is recorded plus the tally of squares for each species. These are drawn from the Square Summary File and provide a ready guide to the relative abundance or conspicuousness of all species recorded.

Figure 5 gives an example of one page of the Square Summary File listing showing the complete data for one square and part of the data for another square. This is also the format used for Microfiches 001-007 enclosed at the back of the atlas.

FIGURE 5 Example page from microfiche of Square Summary File.



MAP SQUARE SUMMARY LIST
Explanation of Format and Codes Used

1. HEADING FOR EACH SQUARE

Example
**********MAP NORTH SQUARE 01009300**
CARDS TOTAL = 1 OBSERVERS TOTAL = 1

a. Each heading is introduced with a line of asterisks.

b. **'MAP NORTH'**
Indicates the island being referred to by the following square number (N = North, S = South, X = Outlying Islands).
The following list shows the parts of the country that are recorded on each microfiche.

Microfiche Sheet No.	Grid Square Numbers		
001	N0193	-----	N2469
002	N2510	-----	N3426
003	N3426 cont.	-----	N5955
	S0723	-----	S1232
004	S1234	-----	S3355
005	S3355 cont.	-----	S5062
006	S5062 cont.	-----	S6869
007	S6869 cont.	-----	S7684
	X Outlying Islands		

c. **'SQUARE'**
Gives the grid or square number (see Appendix 1 for details on the construction of the square or grid number). For the outlying islands not covered by the national grid, each island was given its own eight-letter code. The first six letters give the island group, and the last two give the island. The following islands are recorded in the system:

Code	Island
CAMPBEMI	Campbell, 'main' Island
CHATHSBM	Chathams, Big Mangere Island
CHATHSFF	Forty Fours Islands
CHATHSLM	Little Mangere Island
CHATHSMI	'main' Island
CHATHSPI	Pitt Island
CHATHSSE	South East Island
KERMADRA	Kermadecs, Raoul Island

d. **'CARDS TOTAL'**
Records how many field cards have been coded and stored for the square during the atlas project.

e. **'OBSERVERS TOTAL'**
Records how many registered observers who returned cards which have been coded and stored for the square (See section 5 below).

2. CARDS

Example **828742 N C 1078 -**

a. **'828742'**
Records a card number for the square. The whole format shown in the example is given for each card recorded in the square.

b. **'N'**
Indicates whether the field card with that number has any notes or other descriptive information (Y = Yes; N = No.).

c. **'C'**
Indicates whether all the data for that field card are stored in the computer system or whether a record on the card was ignored because of illegibility (C = Complete; D = Deletion).

d. **'1078'**
Gives the month and year when the field card was recorded (1078 = October 1978). If the month was not recorded, '99' is the month code.

e. The dash mark indicates the end of a card record and may be followed by further card records, each terminated with a dash.

3. SPECIES

This record always consists of a mixture of *six* numbers or characters to indicate the species, the numbers of birds recorded, and breeding, followed by a space and then a number to indicate on how many cards this code occurs in the records for that square. The same species may occur many times, but if parts of the code vary, there is a separate listing in this section for each code combination.

Example **079SAU 1**

a. **'079'**
These first three characters indicate the species. In this case '079' refers to a record for Buller's Shearwater. Each species recorded in the atlas system has a unique code. All of these three-figure number codes are listed after the species name (taxonomic order) in Tables 1 & 2 and before the species names in the Species Index (alphabetic order of species). If a record was not identified to a species or subspecies (e.g. the kiwis), a unique character code is used (e.g. 'KIW' = Kiwi sp.).

b. **'S'**
The fourth position of the code indicates how the observer recorded the method of observation on the card. ('S' = Seen; 'H' = Heard; 'U' = Unknown because method not marked).

c. **'A'**
The fifth position of the code shows what information was recorded on numbers of birds for the species. The following codes are used to indicate estimates or actual counts.

Numbers	Code		Interpretation
1 to 10	A	=	Marked as Estimate
	B	=	Actual Count on card
11 to 100	C	=	Marked as Estimate
	D	=	Actual Count on card
100+	E	=	Marked as Estimate
	F	=	Actual Count on card
BLANK	U	=	Species present, but no data recorded on numbers

d. **'U'**
The sixth position of the code indicates whether information was recorded on breeding. *for information on what breeding information has been recorded by the code used, see Appendix 1.*
'C' = Breeding Confirmed
'1, 2, 3, 4, 5' = Breeding Confirmed (Why? See Appendix 1)

'P' = Breeding Possible
'7, 8' = Breeding Possible (Why? See Appendix 1)

'U' = No information on breeding marked on field card

e. The six-figure code giving information about the species is followed by a space and then a number. The number indicates on how many cards that combination of species information occurs for the square.

4. ACTUAL SPECIES TOTAL

This records the total number of species which have been recorded in the square. If *more than one* field card is stored for a square, the information about numbers and breeding can result in a large number of different records for each species within the square. After the 'TOTAL', all species are listed with just the species code and the number of cards on which the species occurred.

Example **079 1** (see Tables 1,2 & Species Index for codes).

5. OBSERVERS

The code numbers of all the observers who sent in cards for the square are listed. Over 800 registered observers (individuals or groups) provided the field records for the atlas project. All observers are listed in Observer Code Number Order in Appendix 3.

USING THE MICROFICHE

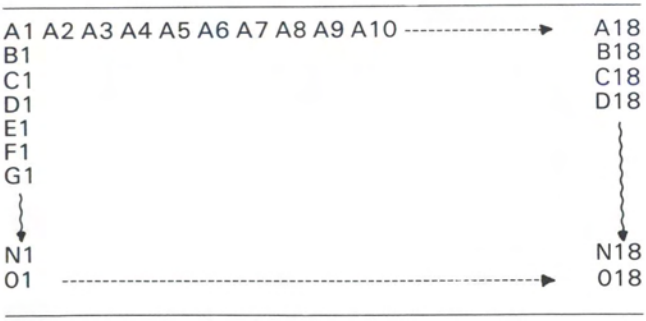
The sixteen sheets of microfiche stored in the envelope inside the back cover of the atlas contain the two sets of data which have been described elsewhere in Appendix 2. Each sheet contains up to 270 pages of computer-coded summary information.

Each set has a different coloured strip at the top of the sheet, and each sheet has its own sheet number and title line printed on the coloured strip.

WHITE STRIP
001-007 NZ BIRD ATLAS (MAP SQUARE SUMMARY LIST)

YELLOW STRIP
101-109 NZ BIRD ATLAS (CARD NUMBERS, SQUARE NUMBERS AND DATES FOR EACH SPECIES)

Each of the data pages on each sheet has its own reference number printed at the top of the page (See Figures 4 & 5). This is so that you can find your way around the sheet without getting lost among the 270 pages.



The data is recorded on each sheet in the following vertical order of pages:– A1, B1, C1, D1, E1, etc. to 01.

The order than continues A2, B2, C2, D2 etc. down the second column to line 0, and so on in columns right across the sheet to A18, B18, C18 etc.

Having found the page of data you want to study, refer to the following pages for details of how to interpret the coded information.

MICROFICHES 001-007 Pages 256 to 260
101-109 Pages 254 to 255

APPENDIX THREE

REGISTER OF FIELD OBSERVERS

1, ANDREW I G; 2, ASPINALL J C; 3, ANDREW J; 4, ANDERSON STELLA;
5, HOLLOWAY H F; 6, ARDMORE COLLEGE TEAM; 7, ADAMS G P; 8, ARNOLD G;
9, ALLEN G G; 10, ATKINSON I A E; 11, APLIN M J; 12, ADAMS J S;
13, ALLAN G P S; 14, ASH NEIL; 15, AWARU BILL; 16, ANDERSON G;
17, ALBERTS E M & C J; 18, ANDERSON R A; 19, ANDREWS PETER;
20, ANDERSON P; 21, ANDERSON J A; 22, ASHCROFT L; 23, ARMSTRONG M.

100, BULL P C; 101, BOESON B W; 102, BELL BEN D; 103, BAGLEY STEVEN;
104, BEATTIE MRS D A; 105, BROWN J; 106, BROWN BETH; 107, BUCHENDAHL G;
108, BROCKIE BOB; 109, BATLEY R A L; 110, BAIRD J W; 111, BARTRAM D;
112, BAIN J W; 113, BLACKBURN A; 114, BARNES P; 115, BROWN W J & M;
116, BARLETT J; 117, BUCHANAN C; 118, BARR S; 119, BARWELL A F;
120, BARLOW C H; 121, BLUNDELL MRS M J; 122, BUCHLER MARIE P;
123, BARLOW MRS M J; 124, BOND K; 125, BARRETT R S; 126, BRIGHT A E:
127, BOYCE F H; 128, BYSOUTH M W; 129, BROWN C W; 130, BEATSON T R;
131, BRATHWAITE D; 132, BARLOW M L; 133, BARNICOAT C R; 134, BROWN S;
135, BUCHANAN M; 136, BOUD R; 137, BARTLETT J L; 138, BELL BRIAN D;
139, BASTIDA A; 140, BURROWS L; 141, BATLEY R A L; 142, BORLACE STUART;
143, BARTLE J A; 144, BROCKIE R E; 145, BRIERS DR J D; 146, BELL D F;
147, BERGER W; 148, BROWN KERRY; 149, BRADLEY LETT; 150, BURCH B J;
151, BURGESS L; 152, BELLRINGER C J; 153, BUCKINGHAM RHYS;
154, BETTESWORTH D; 155, BRASH K; 156, BRIND D; 157, BARROW K & P;
158, BAKER D; 159, BARNES M A; 160, BINNING BETTY; 161, BRADY PETER;
162, BUTLER K E; 163, BRADFIELD P; 164, BLACK JOHN;
165, BISHOP MARGARET.

200, CROXALL J P; 201, CODY P F; 202, COOK J; 203, CAMPBELL PERCY;
204, CROOK IAN; 205, COWIE J A; 206, CHALLIES C N; 207, CROCKETT D E;
208, CALDER BRENT D; 209, COOK JIM; 210, COWAN R S; 211, CRESSWELL R A;
212, CHAMBERLAIN S P; 213, COTTER REG; 214, CRESSWELL RICHARD;
215, CHILD P; 216, CHAPLIN A; 217, CALDER BERNIE & B A; 218, CROMBIE P T;
219, COLES J; 220, CLARK-HALL J L; 221, CALVERT TERRY; 222, COOKSEY B;
223, CLUNIE C D; 224, CASH W F; 225, CAMPBELL W; 226, CLUNIE C D;
227, CRAIG J L; 228, CAMPBELL BRUCE; 229, CALLAGHAN C J;
230, COOPER MRS E; 231, COWAN A C; 232, COOPER D; 233, COCKREM JOHN;
234, COLLINS MR; 235, COOK HELEN; 236, CLARK N B; 237, CAUGHEY JOHN;

238, CHANCE G R; 239, CHORLTON J R; 240, CHAPMAN B;
241, CROCKER TONY C; 242, CHEYNE J; 243, CRYSTAL B; 244, CRACK E W;
245, CLARKSON JULIA; 246, COLLIGAN MRS J I; 247, COLEMAN J D;
248, CRAVEN MISS M; 249, CAWTHORN M W; 250, CLARK JOHN;
251, CHARTERIS J; 252, COOK SIMON; 253, COZENS P;
254, CLARBROUGH MAL; 255, CLOUT M N; 256, COMER V; 257, CAMPBELL A D;
258, CALVERT D E; 259, COMMINS P; 260, CLARE M R; 261, COOKSEY B S;
262, CROUCHLEY D; 263, CLIFTON H; 264, CONWAY H; 265, COOK M;
266, COCCON B A; 267, CARPENTER ALAN; 268, COULDREY CAPT E;
269, COKER P; 270, COX ANDREW; 271, CLIFTON N; 272, CARLIN G.

300, DRAKE J R; 301, DILKS P J; 302, DOUGLAS M E; 303, DAVENHILL N;
304, DAWSON D G; 305, DICKSON R A; 306, DWYER DIANNE;
307, DELAMORE A M; 308, DELPH W; 309, DEVONSHIRE C W; 310, DEEMING A B;
311, DON J; 312, DAVIS S; 313, DENNISON MICHAEL; 314, DIVERS M;
315, DAVENPORT J C; 316, DUFF R A; 317, DAVIS M; 318, DOUGLAS JOAN;
319, DRUCE A P; 320, DAVIES L J; 321. DAWSON KAY; 322, DAWSON B;
323, DAY ROGER; 324, DYER W; 325, DICK N; 326, DENSEMAN P;
327, DANIEL M J; 328, DORIZAC P; 329, DARBY d'E C; 330, DUMBELL G S;
331, DON GRAHAM; 332, DALE FAMILY; 333, DAKEN ANDREW;
334, DENCH ROY; 335, DRIESSEN J; 336, DUVAL C T; 337, DUDER B F.

400, ELLEN G; 401, ELDER H; 402, ELLER MISS G; 403, EDGAR A T;
404, ELLIS D R; 405, ELLIS B A; 406, ELLIOTT G P; 407, EVISON A;
408, ENSOR P; 409, EAGLE M; 410, EDWARDS SHEILA; 411, ELLIOTT BEV.

500, FLEMING C A; 501, FOWLER J A; 502, FITZGERALD B M; 503, FOREMAN G;
504, FALLA R A; 505, FLACK J A D; 506, FIELDING A J; 507, FLUX J E C;
508, FALCONER M L; 509, FOGARTY SUE; 510, FOOKS L & P; 511, FAGAN J A;
512, FINDLAY M A; 513, FROGGAT R; 514, FORDHAM R A; 515, FORSYTH W R;
516, FOGGO MARTIN; 517, FOORD M R R; 518, FRENCH R & MR; 519, FISHER T P;
520, FOX N C; 521, FORBES D; 522, FARRELL DOUG; 523, FIELD C O;
524, FLETCHER K; 525, FERRIS J V; 526, FOX M T; 527, FLOYD RAE;
528, FOORD MALCOLM; 529, FRAME J; 530, FIELD M; 531, FOX AILEEN;
532, FORD RAYMOND; 533, FIELD-DODGSON M; 534, FENNELL J; 535, FLUX IAN;
536, FIELDER G; 537, FOREST SERVICE.

600, GAZE P D; 601, GODFREY J K; 602, GRANT P; 603, GRANVILLE I;
604, GIBB J A; 605, GALBRAITH M P; 606, GILLESPIE MRS W; 607, GLEDHILL R;
608, GRANT GEORGE; 609, GRAY R; 610, GOODWIN A J;
611, GOULDING JEANNE H; 612, GRAHAM B A; 613, GILLESPIE MRS E M;
614, GUY G; 615, GOUDSWAARD RON; 616, GILL BRIAN; 617, GRIFFIN R G;
618, GREW M L; 619, GILLESPIE MRS E M; 620, GIBSON W R; 621, GOLDING R;
622, GODSIFT TREVOR; 623, GUEST R; 624, GEDDES DONALD;
625, GRAHAM MRS P; 626, GRAHAM MRS E; 627, GRINDELL JUDY;
628, GORDON A H; 629, GOFFIN R BRUCE; 630, GUEST G P; 631, GRANT SUE;
632, GOODALE D; 633, GARRICK D; 634, GRANT G A & D; 635, GREGORY G K;
636, GRAY JOHN; 637, GILLETT F S; 638, GRIEBEL L; 639, GILMORE N;
640, GROSE R

700, HARDACRE C H; 701, HATZAKORTZIAN G; 702, HADDEN D;
703, HENLEY J C; 704, HEDDERWICK G W; 705, HAMEL MRS G B; 706, HOGG H;
707, HERTZ T & H; 708, HUXLEY H G; 709, HOPPER J I; 710, HUNTER J;
711, HAMILTON W G; 712, HUDSON F P; 713, HENLEY G D; 714, HORN J K;
715, HOWS MRS M; 716, HEINEKAMP H F; 717, HICKMAN DENNIS;
718, HAMILTON DR W M; 719, HAGEN H L; 720, HARPER P C & PADDY;
721, HORGAN K P; 722, HOLLAY F G; 723, HILTON J E; 724, HOLLOWAY W A;
725, HEATHER B D; 726, HARROW G; 727, HOLLIN PAUL; 728, HODGKIN A J;
729, HAYWARD JACK; 730, HERBERT J; 731, HOSKYN DAVE;

732, HODGSON A LUCY; 733, HARLOW E & D; 734, HOLDAWAY R N;
735, HAY MARK; 736, HURFORD E M; 737, HUGHES J S; 738, HUGHES A J;
739, HABRAKEN A; 740, HAWKINS JENNY; 741, HARTY TOM & HAZEL;
742, HADDON; 743, HEINE MARTIN; 744, HOWELL P A; 745, HEAPS J;
746, HORNBL C; 747, HATCH T; 748, HAWKEN J; 749, HINDMARSH SCOTT;
750, HATCH T; 751, HODSON RON; 752, HELLYER N; 753, HORNE MASON;
754, HAINES M C; 755, HALLAM M; 756, HAY ROD; 757, HARINGTON T C;
758, HOLLAY F & P; 759, HENSLEY V H; 760, HARRINGTON TIM;
761, HORRE MR & MRS DON; 762, HUGHES GRAEME; 763, HEAPHY JOHN;
764, HARRIS A C; 765, HODSELL C; 766, HUDSON CARLA; 767, HUTTON W M;
768, HARDING D L; 769, HACKWELL K.

800, IRELAND JOHN; 801, IMBER MIKE; 802, INNES J.

900, JONES E B; 901, JACKSON J R; 902, JACKSON R W; 903, JACKSON D S;
904, JUKES W M; 905, JENKINS MRS P; 906, JOHNSON S W; 907, JOLLY JIM;
908, JOBLIN ROB; 909, JENNINGS J; 910, JENKINS S; 911, JONES T;
912, JONES L D; 913, JOWETT C; 914, JOHNSON J; 915, JELENECK LEO;
916, JOHNSTON J; 917, JANSEN P.

1000, KESZEGI L; 1001, KARL B J; 1002, KENDRICK J; 1003, KNOWLES F B;
1004, KINGDOM H; 1005, KINGS COLL. BIRD CLUB; 1006, KEY-JONES J:
1007, KELLY B R; 1008, KENNINGTON S R; 1009, KEY-JONES JOYCE;
1010, KING C M; 1011, KEARNS R A; 1012, KAYE D; 1013, KEARNS M P;
1014, KENNEDY E; 1015, KELLY G C; 1016, KLEINPASTE R.

1100, LEARY GORDON; 1101, LAMBERT K N; 1102, LLOYD MISS JANET;
1103, LAWRENCE S B; 1104, LYALL H; 1105, LAWRIE D A; 1106, LANE MARION;
1107, LARCOMBE M F; 1108, LEES J A; 1109, LOVEGROVE T G;
1110, LOBBAN C D R; 1111, LINSCOTT O J; 1112, LOBB S L; 1113, LACEY A R;
1114, LANE G; 1115, LLEWELLYN J M; 1116, LAVERS ROD; 1117, LEWIS R;
1118, LOWE G; 1119, LATHAM P C M; 1120, LAUDER STEWART;
1121, LORIMER TONY; 1122, LARRITT R D; 1123, LEWIS C B; 1124, LUMLEY D R;
1125, LYTHGOE J; 1126, LOK I; 1127, LAVERS R B; 1128, LUSK C H.

1200, MACDONALD A; 1201, MASON K D; 1202, MASON K D;
1203, MEADS M J; 1204, McKENZIE H R; 1205, MACDONALD R W;
1206, MEDWAY D G; 1207, MACKENZIE N B; 1208, MAYO W;
1209, MARFURT A L; 1210, MORRIS R G; 1211, MILLS B D; 1212, MULOOLY D;
1213, McLINTOCK MRS R V; 1214, McMILLAN G; 1215, McKELLOR M;
1216, MULLER P M & W F; 1217, MACPHERSON P L; 1218, McINTYRE M;
1219, MOON G J H; 1220, MUNRO M; 1221, MOORE EUAN; 1222, MERTON D V;
1223, MADGWICK MRS E; 1224, MICHIE R H; 1225, MILLER PATRICK;
1226, McPHERSON L B; 1227, MOORE J L & M; 1228, McLYMONT MISS H;
1229, MATHIESON I A; 1230, McLAUGHLIN M; 1231, MACKAY C;
1232, MORRIS L R; 1233, McLAREN I G; 1234, MAWSON W R;
1235, McVINNIE I L; 1236, McSWEENEY J; 1237, MILES PROF JOHN;
1238, MORRIS ROD B; 1239, McNAB C; 1240, MARSTON O J;
1241, McSWEENEY G D; 1242, MILLER MARY-ANNE; 1243, MILLS JIM;
1244, McCONKEY B F; 1245, MANSON BRIAN; 1246, McCASKILL L W;
1247, MORRISSON KIM; 1248, MEYER SNOW; 1249, MAGNUSSEN W B;
1250, MACLENNON J A; 1251, MORAN L R; 1252, McLAY R;
1253, McKELLAR IAN; 1254, McGAHON P; 1255, MITCHELL G;
1256, MT COOK NAT PARK STAFF; 1257, McCLYMONT H;
1258, MAYHILL ROGER; 1259, McKENNA N C; 1260, MISKELLY C;
1261, McPHERSON A; 1262, McCALLUM J; 1263, MITCHELL J;
1264, McCORMACK F; 1265, MANVILLE PAMELA; 1266, McCUTCHEON MISS A;
1267, MILLER BRUCE; 1268, McKENZIE M E; 1270, MOORE S;
1271, McKENZIE P; 1272, MACMILLAN BRUCE; 1273, MACE JIM;

1274, MORTENSON G M; 1275, RINGER W; 1276, MORTON PAT;
1277, MAIR NEIL; 1278, MERTON J; 1279, McKINLEY B; 1280, MOORE MISS J V;
1281, MANNIX W; 1282, McCALLUM J; 1283, MACDONALD A;
1284, McCOLL PAULINE; 1285, MORRISON J S; 1286, MOFFAT C;
1287, McDONALD G; 1288, MARSHALL B; 1289, McKENZIE A; 1290, MILLS R:
1291, MANHINE J; 1292, MACCULLOCK A I; 1293, McFADZIEN J & M;
1294, MUNN ALAN.

1300, NICHOLSON G I; 1301, NYE G; 1302, NICHOLSON J A;
1303, NICHOLAS G W; 1304, NEVILL A L; 1305, NEWBY JOY;
1306, NISBET MR & MRS; 1307, NICHOLSON S; 1308, NEILSON J M.

1400, O'SHEA M; 1401, O'CALLAGHAN T; 1402, ONLEY DEREK;
1403, O'DONNELL COLIN; 1404, O'DONNELL VINCENT; 1405, OWEN K;
1406, OVERMARS FRED; 1407, OGLE COLIN; 1408, OMBLER J S;
1409, OWEN JANET; 1410, O'CALLAGHAN A P; 1411, OGDEN PHILLIP.

1500, PENGELLEY W J; 1501, PEART J A; 1502, PORTER R E R;
1503, PAULIN C; 1504, PROUSE J C; 1505, PRICKETT NIGEL; 1506, PATRICK M;
1507, PURCHAS T P E; 1508, PLOGER J; 1509, PHILIPSON P W;
1510, POWER M E; 1511, POULTON G; 1512, POULTON P;
1513, HALLS M PATRICK; 1514, PRICKETT MRS A; 1515, PANKHURST D J;
1516, PIERCE R; 1517, POLLOCK R J; 1518, PURDIE C L; 1519, PALMER DEAN;
1520, PERRETT A P; 1521, PEACOCK RON; 1522, PINE IAN; 1523, POULTON A T;
1524, PALLISER TONY; 1525, POWELL W J; 1526, POWLESLAND R;
1527, PEACHMAN N & R; 1528, PETERSON R; 1529, POSTILL B;
1530, PEACHMAN NORAH; 1531, PERRY DAVID; 1532, PENWARDEN M;
1533, PARK G N; 1534, PARROT ARTHUR; 1535, PITT SARA; 1536, PLATT K H;
1537, PYE M S; 1538, PARRISH R; 1539, PARKER E G; 1540, PREECE B R;
1541, PERRY MRS M; 1542, PURSER P W; 1543, PARKES J.

1600 QUIN PAT; 1601, QUINN GRAEME; 1602, QUIN D; 1603, QUIN S R;
1604, QUINN M.

1700, ROBINSON G; 1701, ROBERTSON C J R; 1702, REED MRS S M;
1703, ROWE L K; 1704, ROBERTSON HUGH; 1705, ROSE T; 1706, RIDDEL BRIAN;
1707, ROSS L J; 1708, RAWLING G B; 1709, RUDGE M R; 1710, RYDER P;
1711, RIGG A; 1712, REESE P J; 1713, ROSS DR W; 1714, ROBERTS PETER;
1715, REYNOLDS MRS K; 1717, ROOK H; 1718, ROSS K; 1719, ROBINSON N;
1720, RATKOWSKY A V; 1721, ROGERS BILL; 1722, RODER GREG;
1723, ROUND MARTIN; 1724, ROGERS ALAN; 1726, ROSS F B;
1727, RAWSON G I; 1728, ROBINSON A D; 1729, RENNISON J;
1730, REED ANDREW.

1800, SLACK R S; 1801, SECKER H L; 1802, SECKER A; 1803, SUTHERLAND D;
1804, SCADDEN D; 1805, STIDOLPH R H D; 1806, SAVELL A A;
1807, SCHWEIGHMAN P; 1808, SEDDON DR JOHN; 1809, STACEY A;
1810, SWINBURN HELEN; 1811, SYMES MR; 1812, St GEORGE V D;
1813, St PAUL E; 1814, SPAAI GERRI; 1815, SOPER M F; 1816, SUTTON R R;
1817, STEAD G; 1818, SENIOR G F; 1819, STEIN P; 1820, SINCLAIR STEPHEN;
1821, SPRAGG E; 1822, SANDERSON E; 1823, SMUTS-KENNEDY C;
1824, SHANLEY GRANT; 1825, SMITH KEITH; 1826, SOPER F C;
1827, SHISCHKA C; 1828, SANSON OLGA; 1829, SCHERRIFF A;
1830, SAGAR P M; 1831, SMITH R F; 1832, SMITH MRS P G; 1833, SHARPE E;
1834, SUTTON P J; 1835, SPARROW S; 1836, SMITH W;
1837, STEFF-LANGSTON MRS; 1838, SMART I R; 1839, SINCLAIR D H;
1840, SHAND MRS DIANA; 1841, STAPLETON G A; 1842, SCOTT DONALD;
1843, SHAW DERYK; 1844, SHAW W; 1845, SEDDON BETTY; 1846, SMITH N J;
1847, SKINNER JEAN; 1848: SHAW W & T; 1849, SIBSON R B; 1850, SPURR E B;

1851, SIM D M; 1852, SIM ANDREW; 1853, SILCOCK L; 1854, SWETNAM G;
1855, SNOW D F; 1856, SQUIRE J E; 1857, SOUTHY I; 1858, SLADE A;
1859, SMITH JOHN; 1860, SUCKLING GRACE; 1861, SEARLE BETTY;
1862, SCRIVENS L D; 1863, SAXBY MISS A C; 1864, SHAW PETER;
1865, SHORT F; 1866, SMITH PEN; 1867, SUTTON P J; 1868, STANILAND J E;
1869, SPIERS G; 1870, SIMPSON BOB; 1871, SALE E V; 1872, SCOTT M;
1873, STRACY D M & B M; 1874, SPRANGER R; 1875, STRINGER I;
1876, SMITH M H; 1877, SHERLEY GREG; 1878, STRACY D M & B M;
1879, SIDWELL D.

1900, TRUMAN C; 1901, TAYLOR R H; 1902, TAYLOR DR M J;
1903, THOMAS B W; 1904, TODD K V; 1905, TANNER N D; 1906, TAYLOR T J;
1907, TOWLE SIMON; 1908, TIZARD J M; 1909, TAYLOR T B S;
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1920, TAI GEORGE; 1921, TURNER M; 1922, TAYLOR JANE & K T;
1923, TROTT V & B; 1924, TAYLOR GRAEME.

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2206, WATERS HAZEL; 2207, WESTON ROY M; 2208, WALLER M A;
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2212, WALTER D M; 2213, WILKINS TONY; 2214, WHITTLE J P;
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2236, WHITTLE MISS M; 2237, WASLEY RODGER; 2238, WILLIAMS G S;
2239, WHITE BRENT; 2240, WARD R W; 2241, WARNE MARTYN; 2242, WATT A;
2243, WELLS G; 2244, WILKINSON P M; 2245, WIDGERY D E;
2246, WALLIS M E; 2247, WILSON PETER; 2248, WATT R J & M R;
2249, WATSON G; 2250, WEBB R C & S A; 2251, WHEELER R W;
2252, WOODS S J; 2253, WILLIAMS ERIC; 2254, WALTERS W A;
2255, WESTLAND NAT PARK STAFF; 2256, WINSTANLEY W J;
2257, WENDON MAX; 2258, WHYTE D M; 2259, WILEY H F;
2260, WALTHERT ULRICH; 2261, WARNER W; 2262, WAGHORN ELSPETH;
2263, WILKE; 2264, WHEELER W.

2400, YARDLEY MRS D; 2401, YULE DEAN; 2402, YOUNG A; 2403, YORKE B;
2404, YOCKNEY G L; 2405, YOUNG ANNE.

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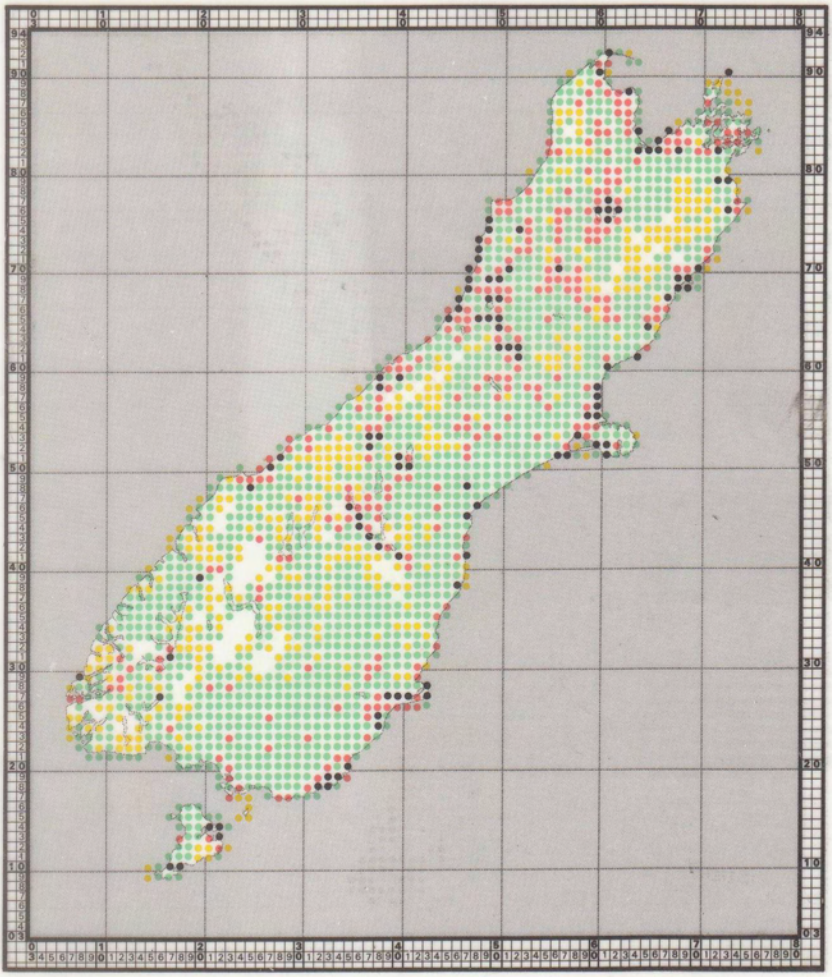
SPECIES INDEX

Note. Page numbers are indicated in three different type styles.
E.g. **100-1** = Species distribution shown on map.
223 = Species information shown in text or Table.
f103 = Species information on Microfiche sheet 103.



Summary of the Number of Field Cards Received per Square.

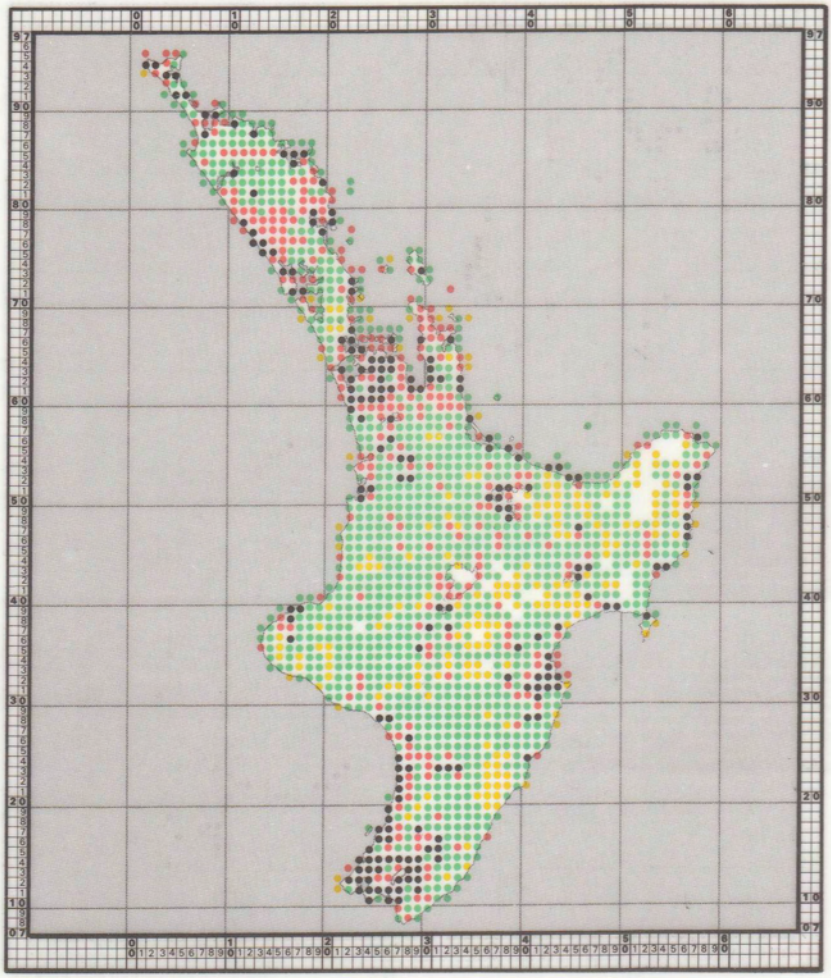
Blank = No cards received

● = One card

● = 2 to 6 cards

● = 7 to 11 cards

● = 12 or more cards



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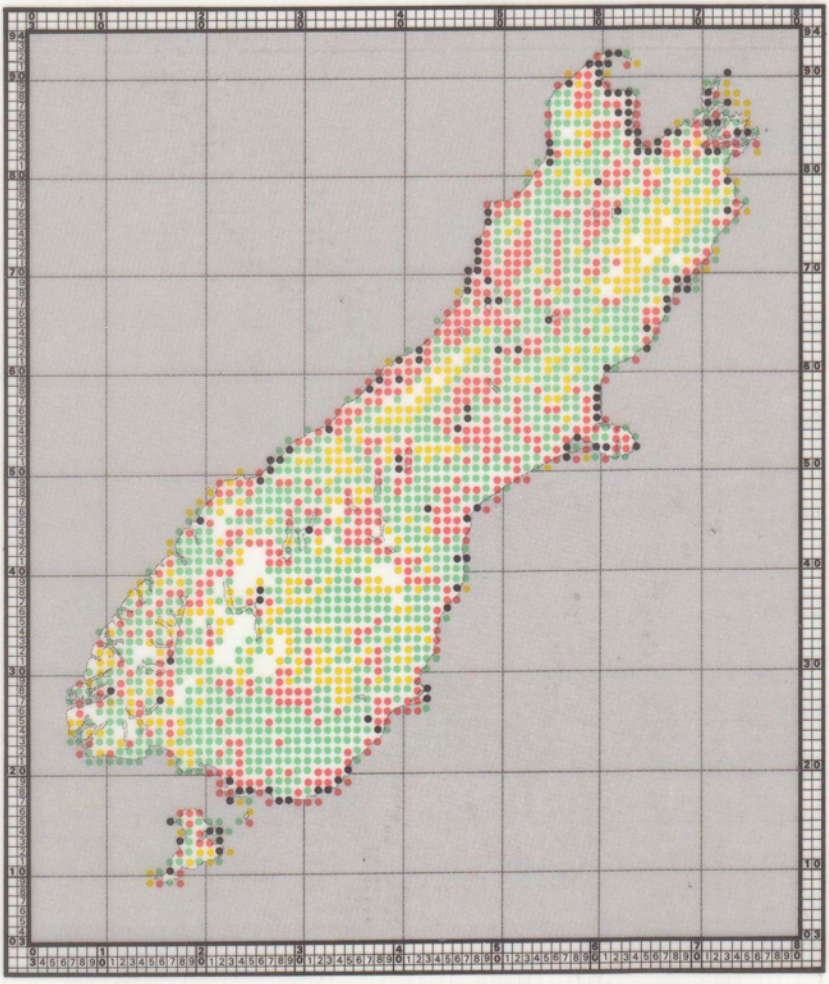


Summary of the Number of Species Recorded per Square.

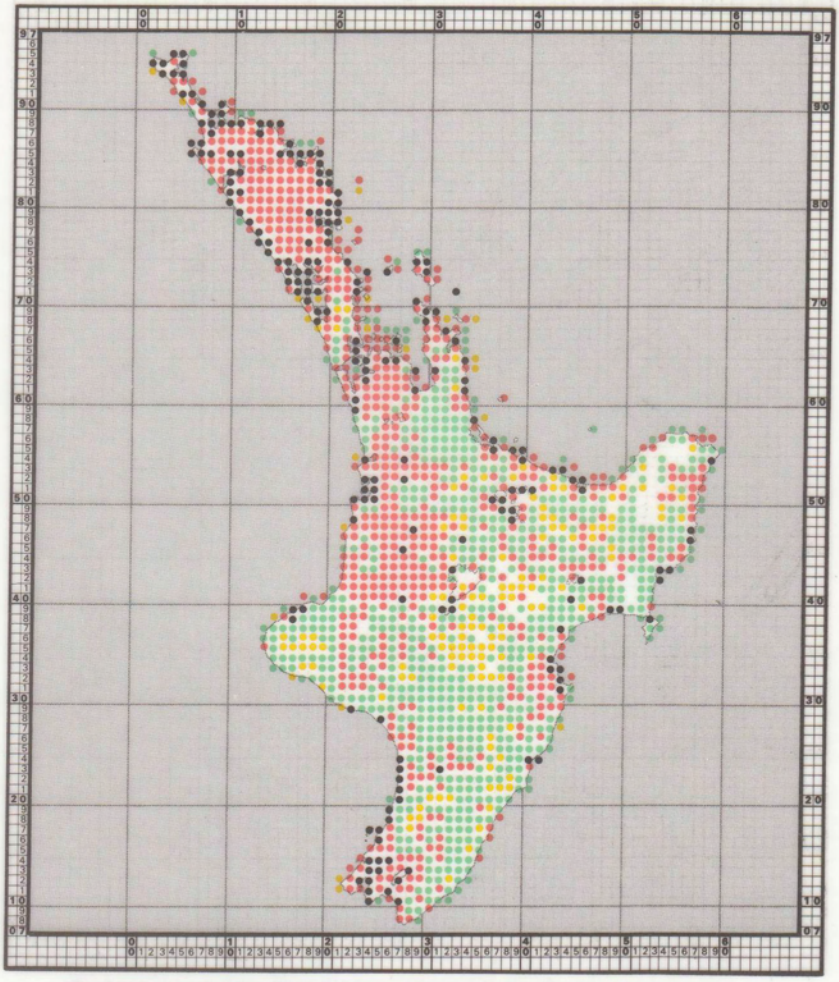
Blank = No records received

● = 1 to 15 species

● = 16 to 30 species

● = 31 to 45 species

● = 46 or more species



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