

**MOHUA
CAPTIVE
MANAGEMENT
PLAN**



Threatened Species
Occasional Publication No.4

THREATENED SPECIES UNIT
OCCASIONAL PUBLICATION NO. 4

MOHUA CAPTIVE MANAGEMENT PLAN

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MOHUA CAPTIVE MANAGEMENT PLAN

Introduction

The mohua (or yellowhead, *Mohoua ochrocephala*) is a forest dwelling passerine endemic to the South Island of New Zealand. It belongs to an endemic genus along with whitehead (*M. albicilla*) and brown creeper (*M. novaezelandiae*). In contrast with whitehead and brown creeper which have remained widespread, mohua have declined markedly since late last century. Monitoring and research undertaken since 1985 has shown that mohua populations suffer periodic heavy predation and that they are still declining. A species recovery plan has recently been produced for mohua. This interim Captive Breeding Plan has been produced to enable some birds to be taken from the wild so that husbandry techniques can be developed. With experiences gained from these initial birds this Plan will need to be rewritten and updated to guide the future directions of captive mohua breeding and as a means of disseminating information to other interested parties.

Background

When Europeans first arrived in New Zealand mohua were one of the most conspicuous birds found in the forests of the South and Stewart Islands. Historical records show they were once present in most forest habitats, however, the introduction of predators such as rats (*Rattus* spp.) and mustelids (*Mustela* spp.) resulted in a decline in both the numbers and range of these birds. Mohua are now absent from more than 75% of their former range: they no longer occur on Stewart Island and are all but extinct in areas north of the Landsborough Valley (Gaze 1985, pers. obs.).

Initially this decline was dramatic with mohua disappearing from all but beech forests. Since then the decline has been slower but mohua range has continued to shrink: southern populations have become increasingly fragmented and those in the north reduced to isolated remnants. Recent research has identified predation by stoats (*Mustela erminea*) as an important contribution to mohua decline. Periodic heavy beech flowering results in a huge increase in food supplies (seed) to mice and this is followed by a large build-up in stoat numbers. Mohua are particularly vulnerable to stoat predation; they nest in holes in trees, have a long incubation and nestling period and are late breeders still with their first brood when high stoat numbers occur in December. Only females incubate and brood chicks and birds are reluctant to leave the nest when disturbed by an intruder. Predation has resulted in populations where males greatly outnumber females. Many territories are occupied solely by males and when a female is present it is not unusual for two or three "helper males" to be associated with the breeding pair.

Mohua are fortunately still in the position where there are some relatively large populations in the southern parts of their range. Managers have the luxury of being in the position where various options for translocation or captive breeding can be

considered. However it is not at all certain that in the long term these remaining populations can cope with ongoing predation and contingency plans need to be in place to safeguard some populations on predator free islands and/or in captivity. It has been demonstrated that stoat predation on mohua can be prevented by intensive trapping (O'Donnell *et al.* 1992), however, at present this technique is used to protect relatively small mohua populations and all techniques available to assist birds need to be investigated.

Goal of captive breeding programme

The Mohua Recovery Plan (O'Donnell 1993) identifies the development of captive breeding and release capabilities as an important Conservation Objective.

At present, in New Zealand, there is limited expertise at maintaining and breeding entirely insectivorous birds in captivity. However overseas aviculturists and institutions have considerable expertise in keeping and breeding insectivorous birds.

It was originally planned that expertise at keeping whiteheads and brown creeper would be desirable before attempting mohua but more pressing reasons for commencing captive breeding have developed. In the northern parts of the mohua range (north of Haast Pass) all populations appear to be declining steadily and to preserve genetic diversity some of these birds should be bought into captivity.

However, if hand rearing of mohua nestlings is to be attempted it would be worthwhile gaining some experience with whitehead or brown creeper nestlings. This could be carried out in the same season as rearing mohua, as both whitehead and brown creeper nest earlier than mohua.

Goals of Captive Breeding Programme:

Short term.

- i) To develop the expertise to keep and breed mohua in captivity.
- ii) To utilise captive birds to answer management questions that will benefit the wild mohua populations; such as:
 - a) development of a suitable nestbox design that can be used as a predator proof nesting site.
 - b) to determine if mohua roost in holes year round, and if so will they use roost boxes.

Long term.

- i) To safeguard the genetic diversity of mohua populations by maintaining and increasing numbers of birds in small, threatened populations.
- ii) To develop techniques that will allow reintroduction of captive bred birds to wild situations. These could be used to augment declining populations or to

establish populations within former areas of mohua range or to establish birds on predator free "offshore" islands.

| |
|-------------------------------------------------|
| Sources of birds for captive populations |
|-------------------------------------------------|

Birds could be obtained from either of the two types of populations:

- i) the small and potentially rapidly disappearing populations such as at Mt Stokes, Arthurs Pass, the Landsborough Valley and in South Westland. Here the aim would be to preserve the genetic variability from various areas of the species range and hopefully to reintroduce birds at a future time when effective protection techniques have been developed or predator free areas become available.
- ii) the remaining large populations found in the Eglinton Valley, Fiordland National Park and the Dart Valley at the head of Lake Wakatipu.

For the following reasons birds should initially be obtained from the large populations of the Eglinton and Dart Valleys:

- i) it is important to first evaluate the mohua suitability for captive holding and breeding, and to develop suitable techniques for keeping this species in aviaries. Birds from these larger populations by virtue of their higher numbers should be used for this initial experimental work.
- ii) it will be much easier to obtain birds from these larger populations. From past and current research programmes we know we can readily catch mohua in these areas. We also know it is much more difficult to catch birds from the small fragmented populations.
- iii) the small and fragmented populations often have a much more heavily biased sex ratio with few breeding pairs and many lone males.

If hand rearing of mohua chicks can be successfully carried out then birds could be more readily obtained from these small fragmented populations. Many of these populations are at higher altitudes and are single brooded (the Eglinton and Dart populations at lower altitude are double brooded). If chicks are removed for hand rearing from the single brooded populations, the adult birds are likely to reneest and rear a replacement brood of chicks. This has been recorded for birds in the Hawdon Valley at Arthurs Pass when chicks that were near to fledging were killed by a predator.

If mohua adapt well to captivity and breed readily it would then be worthwhile putting effort into obtaining birds from these endangered populations.

Numbers and age of birds

To start with, until husbandry techniques are developed, only small numbers of birds should be caught and these birds used to develop husbandry techniques. Consideration needs to be given to the age of birds that are collected for captivity. Recent discussions with aviculturists from Taronga Park, Sydney and Brookfield Zoo, Illinois indicated that young, near fledged birds are the most adaptable. At this age birds are least stressed by change of environment and can be readily weaned onto an artificial diet that is commercially available for insectivorous birds. They would need little supplementary feeding with live food. Therefore it is recommended that initially:

- i) that a small number of adults (2 pairs) be captured to develop husbandry techniques for adult birds.
- ii) nearly fledged chicks (15 days old approximately) be collected and hand reared using a commercially available diet supplemented with live food.

| |
|----------------------------------------|
| Capture - techniques and timing |
|----------------------------------------|

Adults

Mohua live either in groups that hold a joint territory or as a pair. The groups usually consist of a breeding pair and several (up to four) other males, often subadult birds that sometimes assist with chick rearing. Males do not usually breed until two years old but females may sometimes breed at one year. These group territories may be a result of the heavy predation on breeding females when stoat numbers are high as this results in a marked sex imbalance.

Although mohua can be sexed in a field situation (males and females have different calls) they can not be reliably sexed in the hand. Generally males are more yellow than females but an older female can be more yellow than a young male. However, detailed observation of the pair or group structure in a territory before trapping should enable the female to be identified. Where possible pairs rather than groups should be targeted to avoid these problems.

Effective capture techniques have been developed and are regularly used in research projects and Graeme Elliott, Peter Dilks and Colin O'Donnell are experienced in this procedure. Basically, a mist net rig is erected that enables at least five nets to be set one above the other. Nets can be readily erected up to 20 metres up to the forest canopy. Tapes of adult mohua song and chick distress calls are played to attract birds to the net. Birds are most easily caught just prior to or during breeding as in the non-breeding season birds can become mobile and do not so vigorously respond to tapes.

For the above reasons the most effective time to catch birds would be in late October immediately prior to nesting. Birds can readily be caught later than this when nesting (and the female easily identified) but this would result in the failure of the nest and

could not be justified at this stage. If chicks are being removed for captive rearing the breeding adults could readily be caught at this time if required.

Birds can be caught after breeding has finished but not as readily as during the breeding season. Another complication of post breeding capture is that the family groups may remain together until the next breeding season and chicks have been observed being fed by their parents up to six months after fledging. The effect of breaking up this family group early is unknown.

Chicks

Finding mohua nests for collection of chicks is relatively straightforward. Breeding females can be followed back to their nests whilst incubating eggs or feeding chicks and the nests monitored so that chicks can be collected at a suitable age. Mohua commence nesting in early November and chicks would be at a suitable age for collection between early December and March.

Holding & transport

Trials of holding birds at the capture site have already been carried out in the Eglinton Valley. Birds were captured for transfer to Centre Island in Lake Te Anau in October 1992. Eight birds were caught and held for up to 36 hours. Six birds were transferred to Centre Island and two released where they had been captured. Two methods of holding birds were evaluated; a large tent aviary (4 x 3 x 2 m) and small transport cages (100 x 30 x 50 cm) with netting covered with soft mesh fronts.

All birds reacted well to captivity. When released into the aviary birds initially flew around and banged into the soft mesh windows. After a few minutes they perched and started pecking at their bands which is typical behaviour for newly banded mohua. Within half an hour birds were foraging in leaf litter on the floor of the aviary and taking live food (mealworms and wax moth larvae). The birds in the transport cages could not be observed but ate all live food provided. During the time we held the birds almost all lost some weight (range +0.5 to -4.5 grams).

When capturing birds for captive breeding, birds will be held until the required number are caught and then flown from Te Anau or Queenstown to their final destination. Daily flights operate from both these centres to Christchurch. Birds would be held in a tent aviary for around a week until they are feeding well. Any birds that did not react well to captivity could then be easily released at site of capture.

Aviary requirements

The primary requirement for a mohua aviary would be a well planted enclosure with preferably several large tree trunks or areas of bark. Mohua are not strong fliers and are never seen crossing large open treeless areas within the forest. Birds feed by climbing

up vertical or overhanging tree trunks, bracing themselves with the spines on their tail and vigorously digging or scratching into bark or moss with beak and feet. They primarily forage on trunks, branches, and foliage but also regularly feed on the ground. Birds kept in the tent aviary in the Eglinton Valley spent large portions of their time foraging on the ground therefore a deep layer of leaf litter would be desirable.

Mohua always nest in holes where they construct a well built nest of moss, lichen, small twigs and grass. The nest site may be through a small tight fitting entrance or through a large split in branch or trunk that is more of a cavity. It is likely that birds in an aviary would breed in nest boxes. The incubation period is long for a bird of its size (21 days), and chicks remain in the nest for around a further 18 days. Only the female incubates but both parents may feed the nestlings. A mohua aviary would therefore need natural nest sites in dead branches as well as nest boxes. Trials were carried out this season to see if wild birds would use nest boxes but all used natural nest sites (see Appendix II for designs).

In the wild, mohua are sociable, with disputes between neighbouring pairs rarely involving physical contact. Their most extreme form of dispute consists of the males singing loudly at one another, however, neighbouring pairs often ignore one another and may even forage together. Once chicks have fledged, territory boundaries weaken and several pairs/groups may join together into local flocks of fluid composition. Pairs could probably be housed in adjacent aviaries and possibly more than one pair housed in a large aviary.

Diet

The diet of mohua is almost entirely insectivorous (O'Donnell and Dilks 1989, Elliott 1990) with only very small amounts of fruit being eaten (e.g. Mistletoe fruit, *Rubus* berries). Changes to the forest composition following the introduction of deer and possums have meant that fewer fruit sources are now available and if given the opportunity mohua may partake of a more varied diet.

Development of a suitable diet for captive mohua will need to occur over the first year or so. Overseas institutions keep insectivorous birds on largely artificial diets with small supplements of live food such as mealworms, fruitflies and moths. A range of recipes and manufacturers of 'complete' insectivore diets is provided in Appendix III. This method has been successful for many species but it is easiest to convert birds to this diet if they are obtained as fledglings and hand reared. Wild caught birds of surface gleaning species, such as mohua, are easiest to convert to this artificial diet (Graeme Phipps pers comm). An easily obtained live food supplement to artificial diets can be attracted to aviaries. A food source (stale beer) is painted onto a rough substrate such as bark and lights left on nearby during the night. This attracts moths and other night flying insects which conceal themselves in the bark. The birds are then able to feed on these insects during the day. Moths and other night flying insects can also be caught using a moth trap and fed to the birds during the day.

Location of captive birds

Initially, only one site will be needed to house mohua. This will be at Orana Park, which has two 4 x 8 x 2 metre aviaries - shade cloth tunnels with a netting base - both of which are well planted.

If mohua adapt well to captivity then we plan to create two more captive populations at the National Wildlife Centre at Mount Bruce, and Peacock Springs in Christchurch. Other organisations that may wish to become involved in the Captive breeding Programme are;

- i) Auckland Zoo
- ii) Otorohanga Kiwi House
- iii) Zoo NZ, Hamilton
- iv) Kiwi and Birdlife Park, Queenstown

In the long term, if mohua adapt well to captivity and prove to be prolific breeders then release of birds to experienced private aviculturists could be contemplated.

All captive held birds are to be regarded as part of the overall Mohua Captive Breeding Programme and birds may need be transferred between institutions as the Programme requires. Placement of birds will be the responsibility of the Captive Breeding Co-ordinator in consultation with the Mohua Recovery Group and participating avicultural institutions.

After the initial three populations are established there should be a waiting period of 2-3 years before more birds are taken from the wild unless death of captive held birds requires replacement stock. If mohua settle and breed well in captivity, numbers could rapidly increase to the point where all suitable aviaries are occupied.

Optimistic scenario of captive mohua numbers.

YEAR 1

| | |
|---------------------------|---------|
| 3 pairs @ Mt Bruce | |
| 3 pairs @ Orana Park | 8 pairs |
| 2 pairs @ Peacock Springs | |

| | |
|--------------------------|--------------------------|
| 5 pairs survive to breed | 5 |
| - 3 chicks/pair | |
| (15 chicks - 12 survive) | |
| 6 male/6 female | 6 |
| | 11 pairs @ end of season |

YEAR 2

5 adult pairs survive

| | |
|-------------------------------------------------------------------------------|--------------------------|
| 5 1 year pairs survive | 10 |
| 4 adult & 2 1 year pairs breed - 3 chicks/pair (18 chicks - 14 survive) | 6 |
| 7 male/7 female | 7 |
| | 17 pairs @ end of season |

YEAR 3

| | |
|------------------------------------------------------------------------------------|---------------------------|
| 4 adult pairs survive | |
| 4 2 year pairs survive | 14 |
| 6 1 year pairs survive | |
| 4 adult, 4 2 year & 3 1 years breed - 3 chicks/pair (33 chicks - 26 survive) | 11 |
| 13 male/13 female | 13 |
| | 27 pairs at end of season |

This model may be considered to be very optimistic but in the wild birds on average fledge 2.5 chicks per pair. In a captive situation, with unlimited food and no predation, birds could easily exceed this; if they produced on average 4 chicks per pair, after 3 breeding seasons accommodation would be needed for around 40 pairs. Reintroductions of birds to the wild may need to be contemplated after only 3-4 years.

Releases / reintroductions

As part of this captive breeding programme for mohua there must be a commitment to fully investigate and trial a release programme for excess birds. There is no point in breeding birds in captivity if we produce more birds than can be catered for in suitable holding facilities. Mohua have the ability to produce two broods of three or four chicks each breeding season and if breeding is successful numbers might increase dramatically in a very short time.

Due to predation most of the remaining mohua populations have an excess of male birds and reintroduction of females could boost productivity of these populations.

Initially, birds taken into captivity should be from the largest remaining populations (Eglinton/Dart). However, when avicultural techniques are developed attempts should be made to obtain birds from the fragmented smaller populations as these are most at risk of decline and local extinction.

The offspring of the original Eglinton/Dart birds could then be used to develop and test reintroduction techniques. The captive breeding programme should concentrate on increasing numbers of birds from the most threatened populations. Trials of releasing

females into populations where there is a marked sex imbalance should also be undertaken.

Release of captive bred birds should initially be trialed on a predator free island to enable the outcome to be closely monitored. Suitable sites could be:

Pigeon Island in Lake Wakatipu
Breaksea Island
Ulva Island
Codfish Island

A transfer of six birds (3 pairs) from the Eglinton Valley to Centre Island in lake Te Anau in early November 1992 resulted in successful fledging of chicks by two pairs.

If effective predator control methods are developed, it is possible that birds could also be released back into fragmented populations to enhance numbers.

Summary

- Goals of Captive Breeding Programme
 - i) To develop the expertise to be able to keep and breed mohua in captivity.
 - ii) To safeguard the genetic diversity of mohua populations by maintaining and increasing numbers of birds from small, threatened populations.
 - iii) To develop techniques that will allow reintroduction of captive bred birds to the wild. These could be used to augment declining populations or to establish new populations within the former range of mohua.
 - iv) To utilise captive birds to answer management questions that will benefit the wild mohua population; such as:
 - a) development of a suitable, predator proof nestbox design.
 - b) to determine if mohua roost in holes year round, and if so will they use roost boxes.
- Birds should initially be obtained from the large Eglinton/Dart populations and later when husbandry techniques are developed, from the small endangered populations.
- Subsequently the Captive Breeding Programme should concentrate on breeding birds from these fragmented populations.
- Initially 2-4 adults and 4-6 nestlings will be housed at Orana Park and in the following year further birds will be held at the National Wildlife Centre and Peacock Springs.

- When bird husbandry techniques, diet and aviary requirements are developed an updated version of this Captive Breeding Plan will be produced to document these.
- Techniques to reintroduce birds to the wild in predator protected sites or onto predator free islands will be developed once sufficient numbers of captive bred birds become available.

Tasks/Timetable

(1) Identification of organisations/facilities to participate in Captive Breeding Programme. Inspect and permit facilities.

December 1992 - Identify location for initial development of avicultural techniques. **(Threatened Species Unit, DOC).**

September 1993 - Identify other organisations to participate, in continuing Captive Breeding Programme. **(Threatened Species Unit, DOC).**

Initially Orana Park will receive birds (adults and young) so that aviary requirements and a suitable diet can be evaluated. Compatibility with other species such as kereru and saddleback could be determined. If mohua react well to captivity this information will need to be compiled into a report to be made available to other organisations interested in obtaining birds as part of the continuing captive breeding programme.

(2) Research diet for captive birds.

Gather information from overseas and New Zealand institutions on diets used for insectivorous birds. Trial various foods and document a suitable diet for captive mohua. **(Orana Park; Science & Research Division, DOC).**

(3) Capture of adult birds and collection of chicks.

October 1993 - Capture 4-6 adult birds in the Eglinton Valley and initially hold there to ensure that these birds feed on supplied live food before transport to Christchurch. **(Science & Research Division, DOC; Orana Park).**

December 1993 - Collect chicks for hand rearing from the Eglinton Valley. **(Recipient Institution).**

February/March 1994 - Capture adults for National Wildlife Centre (6) and Peacock Springs (4).

There will be a need to evaluate the pros and cons of adult capture compared with rearing nestlings as this will influence how birds are to be obtained in the future. Small populations may have few breeding pairs and removal of nestlings would have a lesser effect on population viability than the removal of breeding pairs. Removal of nestlings from single brooded populations would probably result in renesting of the adults and little reduction in the number of chicks reared that season.

Develop release/reintroduction techniques - using captive bred birds as soon as there are sufficient birds available. (**Threatened Species Unit, DOC; Science & Research Division, DOC; Appropriate Conservancy, DOC**).

(4) Update captive breeding plan.

Produce an updated version of the Captive Breeding Plan incorporating information on husbandry and diet. A more rigorous timetable can be produced as we will have some indication of the suitability of mohua for a Captive Breeding Programme and we will have indications of their likely productivity and the facilities needed for future planning. (**Threatened Species Unit, DOC**).

| |
|----------------------|
| Key personnel |
|----------------------|

Captive Breeding Co-ordinator

Peter Dilks - Science & Research Division, DOC, Christchurch.

Threatened Species Unit Co-ordinator

Alan Saunders - Dept of Conservation, Head Office, Wellington.

Mohua - General Biology

Graeme Elliott - 549 Rocks Rd, Nelson.

Peter Dilks - Science & Research Division, DOC, Christchurch.

Colin O'Donnell - Science & Research Division, DOC, Christchurch.

Mohua capture/nest finding techniques.

Graeme Elliott - 549 Rocks Rd, Nelson.

Peter Dilks - Science & Research Division, DOC, Christchurch.

Colin O'Donnell - Science & Research Division, DOC, Christchurch.

Avicultural techniques

Peter Dilks - Science & Research Division, DOC, Christchurch.

Rob Lawrence - Orana Park Wildlife Trust, Christchurch.

Murray Willans - National Wildlife Centre, Mt Bruce.

Anne Richardson - Isaac Wildlife Trust, Christchurch.

DOC Conservancy contacts.

Derek Brown - Dept of Conservation, Havelock (Nelson Conservancy).

John Lyall - Dept of Conservation, Hokitika (West Coast Conservancy).

Steve Phillipson - Dept of Conservation, Arthurs Pass (Canterbury Conservancy).

Graeme Loh - Dept of Conservation, Dunedin (Otago Conservancy).

Gretchen Rasch - Dept of Conservation, Te Anau (Southland Conservancy).

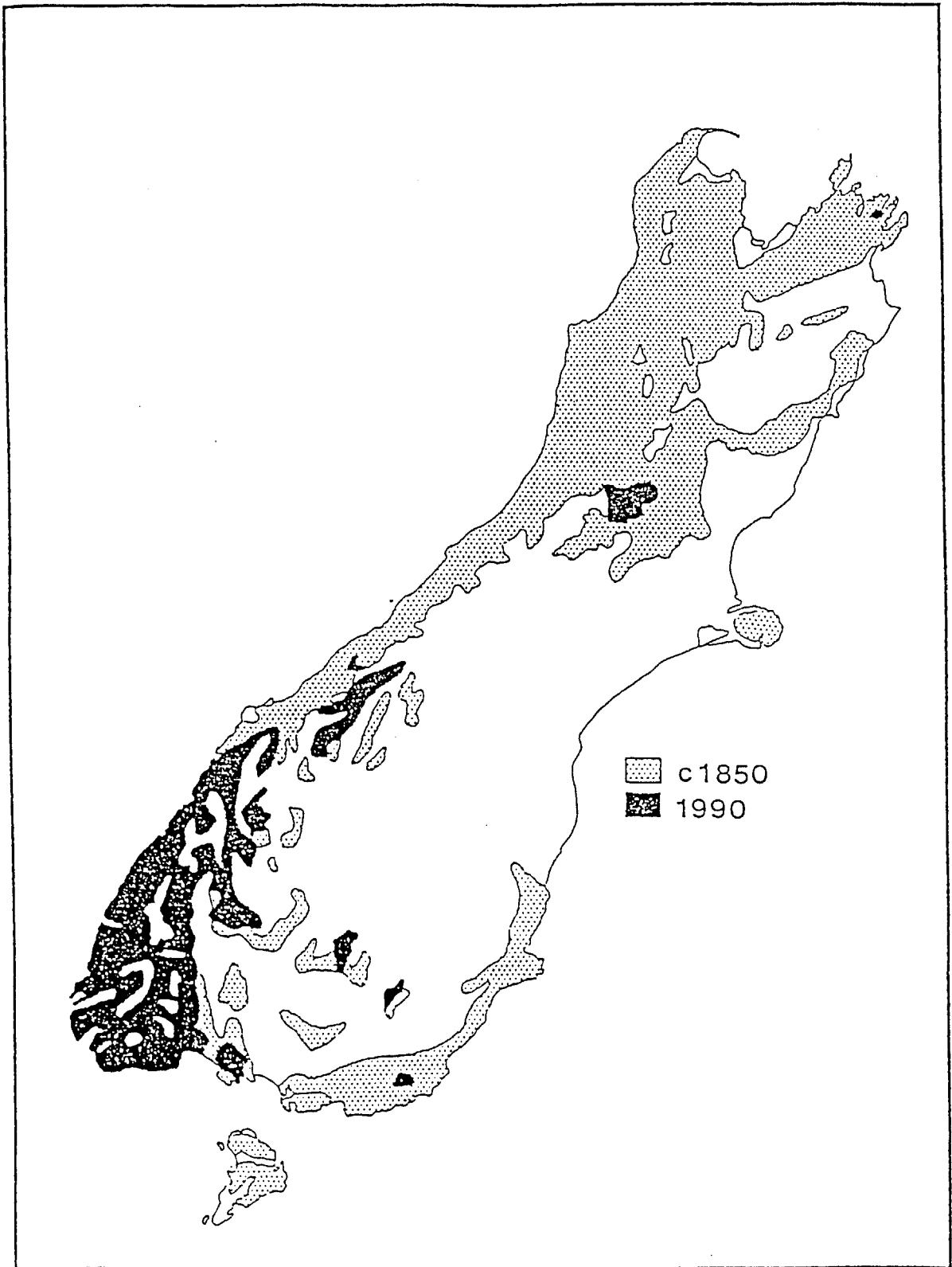
Acknowledgements

Thanks to Dave Butler who as the Captive breeding Co-ordinator of the Threatened Species Unit helped to get this project under way. Colin O'Donnell, Graeme Elliott, Steve Phillipson, Murray Willans and Liz McGruddy provided useful comments on the text.

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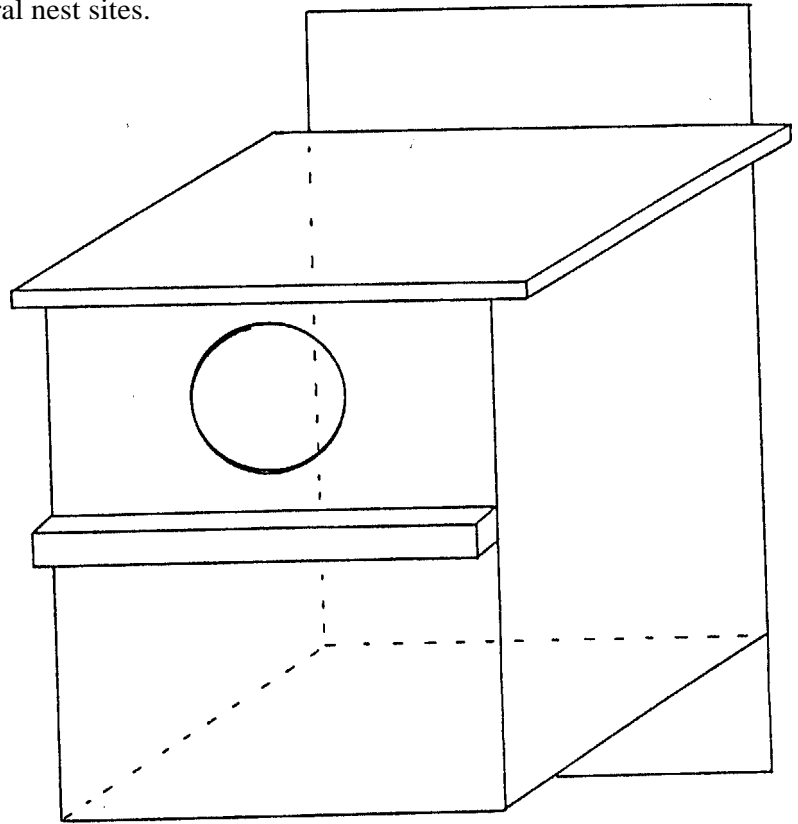
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Appendix 1: The distribution of m ohua in 1850 and 1990.



Appendix II: Mohua nest-box designs.

Two different sizes are being trialed some with, some without, a "perch" and with entrance holes of either 45mm or 55mm. Designs were developed from average nest dimensions of natural nest sites.



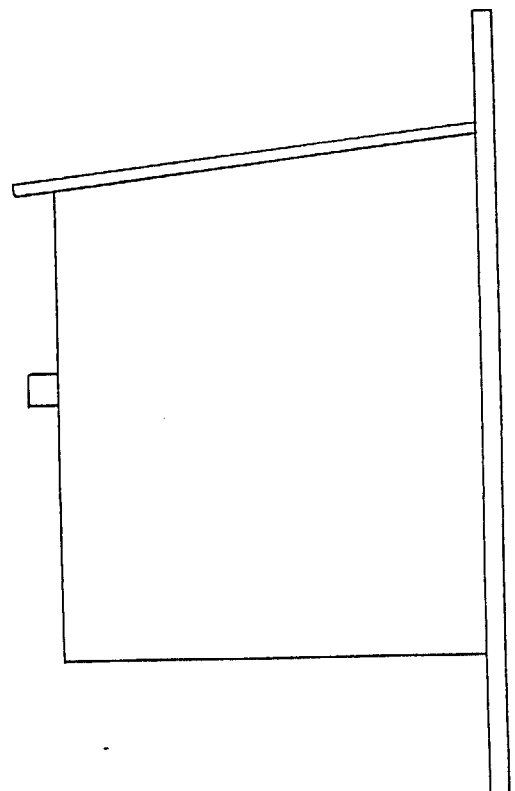
Front 150 x 250
 120 x 150

Side 170 x 260 (240)
 140 x 160 (140)

Back 150 x 350
 120 x 260

Top 170 x 210
 140 x 200

Dimensions: mm
() = internal
dimension



Appendix III: Diets for insectivorous birds

(a) **Taronga zoo recipe**

1 litre of ZEIGLER SOFT BILLED PELLETS (see following page)
Moisten with fig water or fruit juice.
Add 100g of fly pupae.
Mix thoroughly.

Supplement this basic diet with live insects e.g. mealworms, crickets, moths.

(b) **Recipes recommended by Frank Woolham in "The Handbook of aviculture"**

DIET F for flycatchers, redstarts and other small insectivorous species:

- 1 kg proprietary insectivorous food
- 5 g yolk of hard-boiled egg
- 5 g cottage cheese or grated dry cheese
- 10 g shredded whole prawns (or 15 g shelled prawns/shrimps)
- 5 g grated beef heart
- 5 g grated carrot

DIET G for thrushes, Pekin Robins and other medium to large species:

- 1 kg proprietary insectivorous food
- 5 g yolk of hard-boiled egg
- 5 g grated dry cheese
- 5 g grated beef heart
- 5 g grated fish roe
- 5 g grated carrot

(c) **Some manufacturers of proprietary diets for insectivorous birds**

Wombaroo mix for insectivorous birds

Wombaroo
Mt. Barker Road
Glen Osmond
South Australia 5064
Phone 0061 8 3791339

The powdered form of this food appeared to diminish its attractiveness to Magpie Robins (D. Merton pers. comm.) and so its acceptance may also be a problem with mohua. However, this product has been fed to captive black stilts by Christine Reed.

(continued over page)

Haith's insectivore diet
 John E. Haith
 Park Street
 Cleethorpes
 South Humberside DN357NF
 England

ZEIGLER BROS., INC. ● P.O. BOX 95
 GARDNERS, PA 17324-0095
 TWX 510-667-4633 ● 717-677 6181

SOFT-BILLED BIRD DIET
 (73534800)

Triple "A" bird feed
 Available from:
 Nam Tow Bird Shop
 Block 10
 Haig Road 01-351
 Singapore
 Phone 0065 7428855

*(In the absence of information
 on the nutritional analysis of
 this product, its suitability is unknown)*



Soft-billed bird diet is designed as a complete diet for use in feeding soft-billed birds such as Tanagers, Pekin Roblins, Cardinals, etc. It has a semi-moist texture. It supplies all needed nutrients as Identified by leading avian nutritionists. The formula In standardized to contain fixed quantities of the highest quality raw ingredients.

INGREDIENTS

Animal Protein Products, Plant Protein Products, Processed Grain By-products, Salt, Vegetable Fat, Animal Fat, Sodium Proplonata (Prasarvative), Propylene Glycol, Manganese Sulfate, Zinc Oxide, Zinc, Sulfate, Copper Sulfate, Potassium Iodate, dl-Methlonine, Chollne Chloride, Niacin, dl-Aipha Tocopherol Acetate (Source of Vitamin E), Blotin, Menadione Dimethylpyrimidinol Bisulflio (Source of Vitamin K), Riboflavin, D-Activated Animal Sterol (Source of Vitamin D3), Vitamin A Acetate, Thiamine, Vitamln B1 2 Supplement, Pyridoxine, Folic Acid, d-Calcium Panthothenic Acid, Ascorbic Acid, Sodium Selenite.

GUARANTEED ANALYSIS %

| | |
|---------------------|------|
| Crude Protein, Min. | 30.0 |
| Crude Fat, Min. | 12.0 |
| Crude Fiber, Max. | 3.0 |
| Molciure | 16.0 |
| Ash | 8.0 |

SIZE

5/32"Diameter (4nm), 1/4"-1/2" Long.

PACKAGE

Resealable fiberboard drum, 50 lb. (22.7 kg).

FEEDING SUGGESTIONS

Soft-billed bird diet should be fed tree choice as the total diet; no supplementation is required for normal health birds, Most birds will consume the equivalent of one-fifth of their body Weight per day. However, feed requirements will vary depending on species, environment, level of activity and stress factors. Fresh water should be available at all times.

AVAILABILITY

Non cloak Item , made fresh upon order.

23291

DISTRIBUTED IN AUSTRALIA BY .

ZEIGLER DISTRIBUTORS .

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 N. VICTORIA .
 3041 .