THREATENED SPECIES RECOVERY PLAN SERIES NO.6

(MOHUA) YELLOWHEAD RECOVERY PLAN
(*Mohoua ochrocephala*)

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Frontispiece: *Mohoua ochrocephala.* Photo: M. Soper

CONTENTS

INTRODUCTION

The Mohua (or yellowhead, *Mohoua ochrocephala)* is a small, insectivorous, forest passerine bird, endemic to the South Island. It belongs to an endemic genus along with the whitehead *(M. albicilla),* and the brown creeper *(M. novaezelandiae).*

All three species have suffered through habitat loss at least since the arrival of Europeans in New Zealand, but unlike the whitehead and brown creeper, the mohua has disappeared from large, relatively unmodified forests and is continuing to decline. Last century mohua were one of the most abundant and conspicuous forest birds in the South Island. Historical records show that they were once present in most forest habitats of the South Island and Stewart Island (some 6.5 million ha). They are now all but absent from 75 % of their former range and much reduction in range has occurred in the last 20 years (O'Donnell & Dilks 1983, Gaze 1985).

As a response to concerns about the status of mohua, a workshop was held in 1985 which reviewed the decline, current knowledge, and future research and management possibilities for the species (O'Donnell 1985). As a result of this workshop a monitoring programme was set up at key sites around the South Island (O'Donnell 1986). It was planned that surveys be repeated annually for 10 years to document the pattern of change of mohua populations.

The monitoring programme and associated research showed that mohua suffer periodic population crashes in response to stoat *(Mustela erminea)* irruptions that follow heavy beech seeding, with stoats eating adult females and chicks on the nest. It is also apparent that in populations with low productivity the period between crashes is probably insufficient for mohua to recover fully and consequently such populations are declining. Furthermore, even dense, productive populations such as the one in the Eglinton Valley, are badly affected by stoat irruptions.

Ship rats *(Rattus rattus)* can also eat adult mohua on the nest (pers. obs). Mohua may also be vulnerable to competition with introduced vespulid wasps (Elliott 1990). Changes in forest structure resulting from logging and probably browsing by possums and deer and competition with introduced birds have also contributed to mohua decline.

The mohua recovery programme is important because it addresses conservation problems being faced by many endemic forest birds on the mainland. The mohua is not only threatened but is an indicator of on-going processes and threats in New Zealand forests. Successful mohua recovery has implications not only for other hole-nesting species (e.g. kaka, kakariki), but also for the whole forest bird community.

PAST DISTRIBUTION

Mohua were common throughout the forested areas of the South Island when Europeans arrived in New Zealand (Figure 1, Gaze 1985, O'Donnell & Dilks 1986). For example, Reischek (1884) found them common throughout the West Coast and Smith (1888) noted that they were common in the Lake Brunner district where he saw one flock of 200 birds. Mohua began to decline noticably around the 1890s but their populations have contracted gradually over many years. Between 1900 and 1930 mohua had disappeared from many localities on the West Coast, Stewart Island, Nelson and Marlborough (Gaze 1985, Table 1). They persisted until about 1950 in North Westland and the outlying populations in Otago and Southland but most records ceased soon after.

REASONS FOR DECLINE

The decline of mohua has been attributed to forest clearance, predation by introduced mammals and competition with introduced vespulid wasps (Elliott 1990).

Forest clearance caused the elimination of mohua from many lowland forest areas by the 1920s, including Banks Peninsula and central Westland, but they have also now gone from extensive areas of relatively unmodified forest. Recent logging in Southland has seen the disappearance of more birds (e.g. Coker 1980, Spurr 1987).

Dramatic declines in two mohua populations in beech forest have been recorded following stoat irruptions (Elliott & O'Donnell 1988). Population crashes of mohua by 50% in the Eglinton Valley (Fiordland) and 65% in the Hawdon Valley (Arthur's Pass) coincided with heavy beech seedfall and irruptions of mouse and stoat populations. In the Eglinton Valley there was 43% mortality of incubating female mohua while they were on nests. This was attributed to stoat predation. In the Hawdon Valley only 14 adult mohua remained and only 4 of these were females. The role of ship rats as predators may have been underestimated as they occur only in low numbers in forests where mohua remain. We have one record of mohua predation by a ship rat.

Predation may have eliminated mohua from podocarp-dominated forests where predator numbers (rats and mustelids) appear to be high constantly, such as in Westland and Stewart Island, but they survive in some beech forests where predator numbers only rise dramatically following heavy beech seedfall.

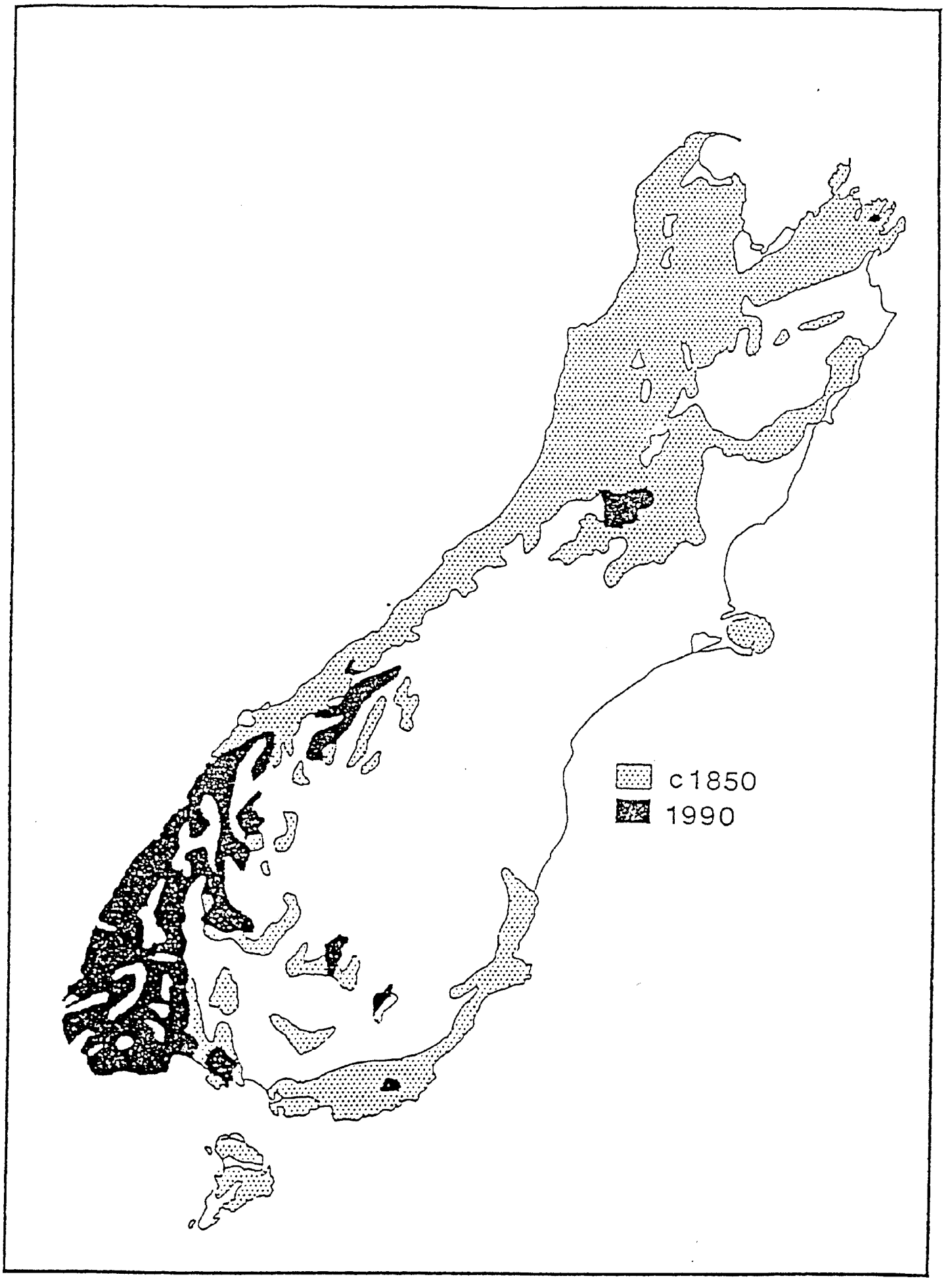
Competition for insect food with vespulid wasps may have contributed to the disappearance of mohua from the beech honeydew forests of the northern South Island where wasps are abundant. Mohua are no longer in any forests of the northern South Island where beech honeydew and wasps are abundant.

Competition for food from introduced finches may also be a factor contributing to decline because they overlap in their foraging techniques (O'Donnell & Dilks 1986).

Table 1. Examples of rate of decline and extinctions of mohua populations (Source: Gaze 1985, O'Donnell & Dilks 1986, unpubl. data)

Years	Extinction/virtual extinction	Dramatic decline
1990s	Hawdon Valley	
1980s	Windbag Valley	Landsborough Valley
	Burwood Bush	Poulter Valley
	Waikaia Bush	Hurunui Valley
	Mt Stokes	Eglinton Valley
	Makarora	Dart Valley
1970s	Karamea	
	North-west Nelson	
	Upper Grey Valley	
	Buller	
	Most of South Westland	
1930-1970	Nelson	All South island regions
	Most of Marlborough	
	Maruia/Lewis Pass	
	North Westland	
	Paparoa Ranges	
	Dunedin area	
1900-1930	Central Westland/Franz Josef	All South island regions
	Invercargill area	
	Taieri, Otago	
	Stewart Island	
Pre-1900	Kaikoura area	All South Island regions
	Lowland Canterbury	
	Banks Peninsula	

Figure 1. The distribution of mohua in 1850 and 1990



PRESENT DISTRIBUTION

Mohua are very rare in Nelson, Marlborough, Buller, North and Central Westland, and western Canterbury, with the only known populations at Mt Stokes in the Marlborough Sounds (c.15 birds) and near Arthur's Pass (<50 birds). In South Westland there are a few small isolated remnants but the one sizeable populations in the Landsborough Valley (c.350 birds, in 1985, O'Donnell & Dilks 1986) has crashed to <30 birds after the last two stoat plagues. In Southland there are isolated populations in the Catlins, Blue Mountains, Takitimu, Longwoods and Waikaia forests. Their stronghold is in Fiordland and Mt Aspiring National Parks, particularly north-east Fiordland and south-east Aspiring, where they are widely distributed and may still number several thousand birds.

WHY MOHUA ARE THREATENED

Mohua are threatened today primarily because of predation by introduced mammals. They are more vulnerable to predation than most other forest birds for four reasons:

(1) Mohua nest in holes. Nest predators not only eat mohua eggs and chicks but also incubating adults which are unable to escape. Furthermore since only females incubate, nest predation results in a biased sex ratio.

(2) Mohua have long incubation and nestling periods (20 and 22 days, about two weeks longer than most introduced passerines) during which they are vulnerable to predation.

(3) Groups of mohua occasionally spend long periods feeding on, or close to, the ground. These groups are very noisy and, although there is no evidence of predation, they would make conspicuous targets for predators.

(4) Mohua nest later than most other forest passerines and are still nesting when stoat numbers reach their summer peak.

Mohua may be vulnerable to competition with wasps because their late breeding and long period of juvenile dependence mean that adult mohua are still feeding dependent juveniles when wasp numbers reach their peak in autumn.

Mohua may be able to withstand either predation or competition alone, but are unlikely to be able to maintain their numbers in the face of both.

RECOVERY POTENTIAL

Mohua have a good potential for recovery if the factors that have caused their decline can be eliminated or reduced significantly. They lay up to four eggs, and are capable of raising two broods per year. When stoat numbers are low adult survival is about 85%, and juvenile survival of 0-38% can rise to 67% when mohua populations are small.

Population recovery has been compared in two areas: The Eglinton Valley, a lowland site where mohua raise two broods a year, and the Hawdon Valley, a more typical higher altitude site where only single broods are raised. In the one brood population mohua numbers have been slower to recover than in the two brood populations (Figure 2). By 1990, the two-brood Eglinton population has almost returned to its former level, whereas the Hawdon population remained critically low. By 1992-93, the Hawdon population had declined to one breeding pair and the stoat plague predicted in 1993-94 may cause their extinction if nothing is done to control predators.

Unfortunately most remaining mohua populations are single-brooded, because the majority of lowland forests where mohua raise two broods have been cleared for farming or logged.

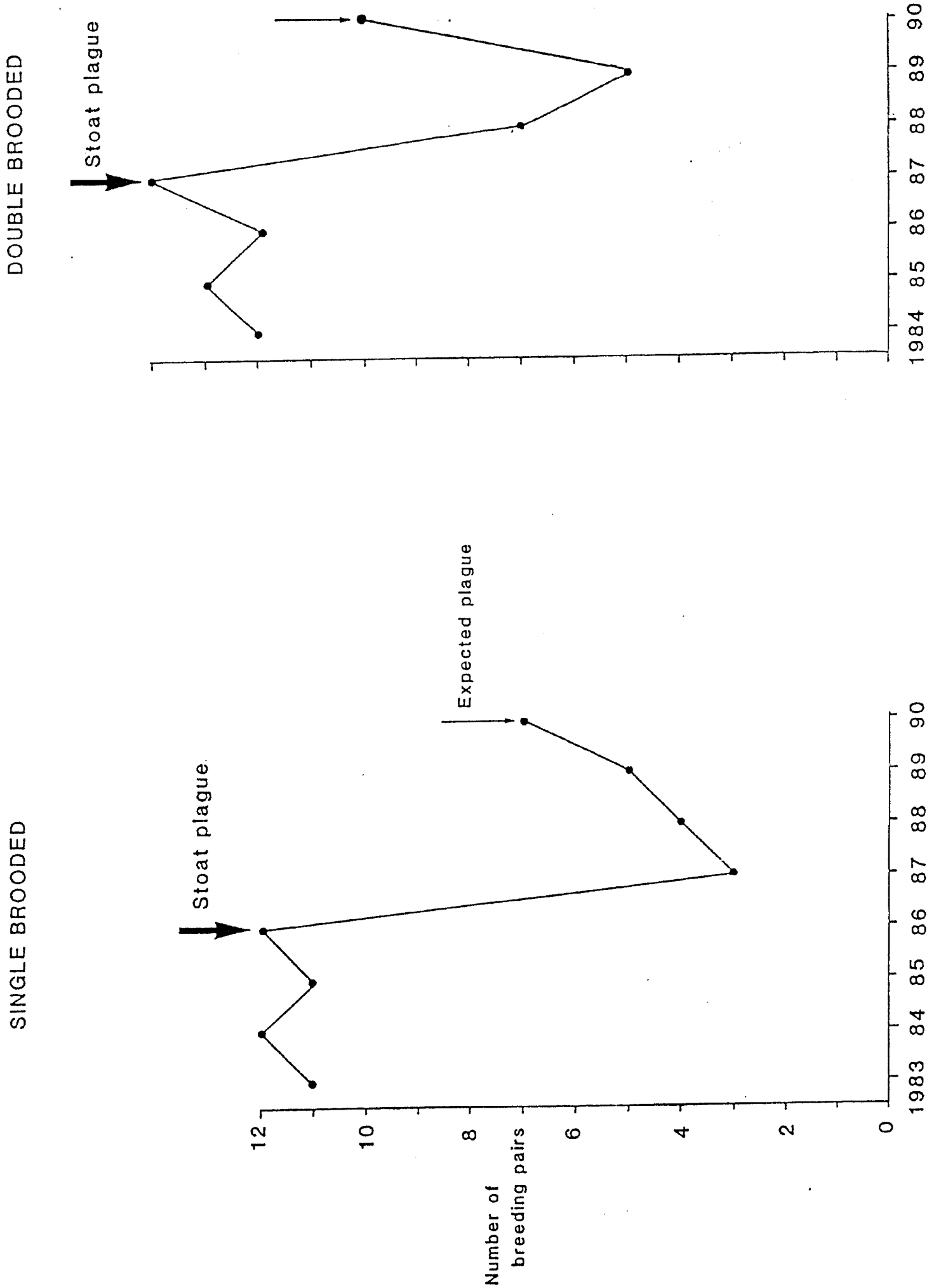
HABITAT REQUIREMENTS

Mohua were once present in podocarp-hardwood forest on Stewart Island and in Westland, but these populations were among the first to disappear. Therefore, nothing is known about the habitat requirements of mohua in these forest types.

All recent records of mohua are from beech *(Nothofagus* spp.) forests but even in areas where mohua are numerous, they are patchily distributed. They appear to have quite specific habitat requirements. In beech forests mohua are almost entirely insectivorous, feeding predominantly in the upper understorey and canopy of tall forests (25-45 m). They show a significant preference for forest with large red beech trees. Mohua appear to be more numerous in forests on fertile sites, perhaps because these forests have greater productivity and invertebrate biomass (Elliott 1990, Elliott & Ogle 1985, O'Donnell & Dilks 1986 & unpubl, Read 1988a, 1988b, Read & O'Donnell 1987).

For a small passerine, mohua have relatively large terriories, ranging from one group/2.85 ha in the Eglinton Valley to 3.4 ha/group in the Hawdon Valley.

Figure 2. Response of single (Hawdon Valley) and double-brooded (Eglinton Valley) mohua populations to predation, 1983-1990



CONSERVATION OBJECTIVE

LONG TERM GOAL

To maintain and enhance mohua populations throughout their present range and beyond, by halting and reversing the degradation of the forest ecosystem.

The mohua is one threatened species which is still accessible to the public in mainland forests. Priority will be given to managing mohua within these mainland forests mainly through the control of introduced predators. Developing the ability to manage mohua predators in these forests will also assist in the conservation and management of other forest birds.

PLAN OBJECTIVE

To halt the current decline of mohua in selected key mainland forest areas (given in priority order) throughout their remaining range:

a. In representative core areas (where populations may become endangered in the medium-long term);
b. In medium-sized populations within the range (which will become endangered in the short-medium term without management);
c. In remnant populations on the verge of extinction at the edge of the range;

and to investigate the establishment of insurance populations in predator-free habitats.

This will be achieved by

1. **Development of management techniques** by improving our ability to control stoat irruptions at key mohua sites and so increase productivity;

2. **Protection of mainland populations** by undertaking predator control in areas occupied by key mohua populations to stop local extinction;

3. **Investigation of island transfers and captive breeding** by developing a captive holding, breeding and release capability and undertaking trial translocations to predator-free sites;

4. **The promotion of public awareness** of mohua and of the values and ecology of mainland forests through advocacy and education.

WORK PLAN

Task 1. Develop the ability to control stoat irruptions at key mohua sites to increase productivity by:

(a) setting up a system for predicting when stoat irruptions are likely to occur; and

(b) developing techniques for effective local stoat control that will benefit mohua populations significantly.

Explanation:

Mouse and stoat numbers increase rapidly following heavy beech seedfall (King 1983). With increased food supply, mouse numbers may rapidly build up and in response to increased prey availability stoat numbers also increase. These stoat irruptions reduce mohua productivity significantly (Elliott & O'Donnell 1988, O'Donnell et al. 1992).

There is usually a year's warning of small mammal plagues, because the beech trees flower about a year before the mammal numbers rise. We will set up a system to predict the occurrence of these irruptions. Beech seed collection trays will be placed in a range of key mohua sites: red beech (Hawdon, Eglinton Valleys), mountain beech (Hawdon, Murchison Mts) and silver beech (Mt Stokes, Takitimu, Catlins, Blue Mountains). Mouse numbers will be monitored in the Hawdon and Eglinton Valleys.

During years with high predator numbers predicted, control operations will be undertaken at key sites. With current technology and resources stoat control will have to be temporary and localised and aim only to minimise peak predation (which may occur every 4-6 years). Fenn trapping is the only effective trapping technique currently available.

Management techniques need to be refined by determining the most effective baits, lures and trap spacings. Recent research in the Eglinton Valley has confirmed that trapping can reduce stoat numbers sufficiently to benefit mohua (Dilks et al. 1992).

Key sites for predator control experiments are Hawdon Valley (Canterbury), Catlins and Dart Valley (Otago) and Blue Mountains and Eglinton Valley (Southland).

Workplan Tasks:

LOCATION	COORDINATION	REGION	IMPLEMENTATION	EFFORT (days)
Job 1: Set up beech seedfall trays				
1) Hawdon Valley	S.Phillipson	Canterbury	complete	-
2) Eglinton	G. Rasch	Southland	"	-
3) Takitimu	"	"	"	-
4) Murchison Mts	"	"	"	-
5) Catlins	G.Loh	Otago	"	-
6) Blue Mountains	P.McClelland	Southland	"	-
Job 2: Collect seedfall at end March, April, May each year; count seeds				
1) Hawdon	S.Phillipson	Canterbury	annually	6
2) Eglinton	G.Rasch	Southland	"	6
3) Takitimu	"	"	"	6
4) Murchison Mts	"	"	"	6
5) Catlins	G.Loh	Otago	"	6
6) Blue Mountains	P.McClelland	Southland	"	6
Job 3: Monitor mouse numbers quarterly				
1) Hawdon	S.Phillipson	Canterbury	"	8
2) Eglinton	C.O'Donnell	S&R	"	8
Job 4: Review data on beech seedfall				
1) DSIR data	C.O'Donnell	S & R	1995	20
2) FRI data	"	contracts	"	30
Job 5: Stoat control experiments				
1) Hawdon	S.Phillipson	Canterbury	Oct. 1990	20
2) Eglinton	C.O'Donnell	S&R	"	50
3) Catlins	G.Loh	Otago	Oct. 1991	20
4) Dart	B.Lawrence/R.Kennett	Otago	Oct. 1990	15
5) Rowallan	G.Rasch	Southland	Oct. 1993	20
Job 6: Monitor effects of trapping on bird populations				
1) Hawdon	C.O'Donnell	S & R	Oct. 1990	10
2) Eglinton	"	"	"	90

BUDGET SUMMARY:	PERSON DAYS/YR	OPERATING/YR
CANTERBURY	34	$ 2 500
OTAGO	41	$ 1 000
SOUTHLAND	26	$ 5 000
SCIENCE & RESEARCH	158	$ 8 000

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