

Task 2. To monitor key mohua populations and in years when high stoat numbers are predicted, to undertake predator control at those sites.

All key mohua sites should be monitored annually to judge the effects of management.

Explanation:

The Mohua Monitoring Programme was set up in 1985 (O'Donnell 1985) and standardised methods developed by 1986 (O'Donnell 1986). It is the results of monitoring combined with detailed research that have given us information on rates of decline of mohua populations and identified the role of stoat predation in this decline (Elliott & O'Donnell 1988, O'Donnell et al. 1992).

Three types of population require protection (Table 2). Those in:

- a. representative core areas (highest priority);
- b. medium-sized populations within the range which will become endangered; and
- c. remnant populations on the verge of extinction at the edge of the range.

Populations in core areas will probably not require annual predator trapping because birds are capable of breeding twice each summer. Trapping should be undertaken only when a stoat irruption is predicted. Large scale surveys of the Dart and Eglinton Valleys are required to determine the limits of the core populations and whether or not numbers are declining more rapidly around the edge of the core areas. Information is required on the size of the core areas to be trapped.

All other populations only breed once a year and are not capable of withstanding stoat irruptions. All will probably become extinct in the short or medium term if management is not undertaken. Most outlying populations appear to be close to extinction; they also represent sources of genetic diversity which may be important for future management. In medium-sized populations trapping should be undertaken annually until populations recover. Medium-sized populations would then probably only require trapping in stoat irruption years. A combination of trapping and intensive nest protection is required in populations on the verge of extinction. Individual nest protection is considerably more labour intensive and currently less practical than trapping.

Monitoring will be enhanced by maintaining and updating a database on all known mohua populations. This will provide baseline information to guide future management options. On-going survey of mohua sites should be integrated into each region's survey programmes. Each region has areas where there could potentially be small mohua populations remaining. For example, North-west Nelson, upper Hurunui Valley and Temple Stream (Canterbury), upper Grey Valley (West Coast) and Leithen Bush (Otago).

Table 2. Location of key mohua sites for management

<u>Core populations</u>	<u>Medium-sized populations</u>	<u>Remnant populations</u>
Priority 1	Priority 2	Priority 3
500+ birds each	100-300 birds each	20-50 birds each
Eglinton	Catlins	Mt Stokes
Dart	Rowallan	Western Fiordland-Tutoko
Blue Mountains	Takitimu	Poulter/Hurunui Valleys
	Longwoods	Makarora
	Waitutu	Waikaia
		Landsborough

Workplan Tasks:

<u>LOCATION</u>	<u>COORDINATION</u>	<u>REGION</u>	<u>IMPLEMENTATION</u>	<u>EFFORT (days)</u>
Job 7: Mohua monitoring programme				
1) Mt Stokes	D.Brown	Nelson	Nov.1986	2
2) Hawdon Valley	C.O'Donnell	S&R	Nov 1983	2
3) Windbag Valley	J.Lyall	West Coast	"	2
4) Dart Valley	G.Loh	Otago	Nov 1990	2
5) Makarora	"	"	Nov 1991	5
5) Waikaia Bush	A.Cox	Southland	Nov 1986	2
6) Blue Mountains	"	"	Nov 1986	2
7) Catlins	G.Loh	Otago	Nov 1987	2
8) Eglinton	G.Rasch	Southland	Nov 1984	2
9) Burwood bush	"	"	Nov 1986	2
10) Rowallan	A.Cox	"	"	2
11) Longwood	"	"	Nov 1987	2
12) Landsborough	J.Lyall	West Coast	Nov 1990	4
Job 8: Predator control				
1) Mt Stokes	D.Brown	Nelson	Nov. 1990	20
2) Catlins	G.Loh	Otago	"	20
3) Landsborough	J.Lyall	West Coast	As required	20
4) Blue Mountains	A.Cox	Southland	As required	20
5) Rowallan	A.Cox	Southland	Oct. 1993	20
6) Longwood	"	"	As required	20
7) Makarora	G.Loh	Otago	Nov. 1991	20
8) Dart	"	"	As required	15
9) Eglinton	A.Cox	Southland	As required	20
Job 9: Mohua site inventory				
1) South Island wide	P.Dilks	S & R	June 1993	20
Job 10: Mohua survey as part of regional survey programmes				
1) Nelson	K.Walker	Nelson	As appropriate	
2) Westland	J.Lyall	West Coast	"	
3) Canterbury	A.Grant	Canterbury	"	
4) Otago	G.Loh	Otago	"	
5) Southland	A.Cox	Southland	"	

BUDGET SUMMARY:	PERSON DAYS/YR	OPERATING/YR
NELSON	22	\$1 000
WEST COAST	6-26	\$2 000
OTAGO	29-44	\$8 500
SOUTHLAND	32-92	\$5 000
SCIENCE & RESEARCH	24	NIL

Task 3. Undertaking trial translocations to predator-free sites. Initial trials to be

- (a) Centre Island, Lake Te Anau
- (b) Pigeon Island, Lake Wakatipu;

and assessing larger offshore islands for suitability for establishment of insurance populations

Explanation:

The first priority of the recovery programme is managing and maintaining mohua populations on the mainland. However, while sufficient stocks for transfer still exist in the wild in Southland, translocations to predator-free habitats can be attempted as insurance against extinction on mainland South Island. We envisage that these islands could well provide stocks of birds which can be used for reintroductions of birds to mainland forests. First priority will be given to using islands on mainland lakes.

Trials on small islands in lakes within the current range of mohua is recommended. These islands are predator-free, and do not have high ecological values which would conflict with mohua transfers. Both islands are 10-100 ha and >1 km from the mainland and the risk of stoat invasion low. However, some form of predator monitoring would be required. Transfers should be viewed as experimental, being designed to learn the most about holding and moving mohua.

Assessment of larger islands suitable for the establishment of viable populations of mohua is required in the future, e.g Breaksea, Ulva and Codfish Islands and islands in Lake Manapouri and the Marlborough Sounds. Although none of these islands have forest that would be regarded as optimum mohua habitat, Breaksea has some beech forest and last century mohua did live in podocarp-broadleaved forests similar to that on Codfish and Ulva.

Transfer to islands would be undertaken in accordance with departmental transfer procedures and island management plans.

Transfer to the predator-free Takahē enclosures at Burwood Bush offers many of the advantages of island transfer. Burwood Bush forests can support mohua since there were mohua in forest adjacent to the enclosures. However, the enclosures would support less than 10 pairs, and birds might escape to the neighbouring forest.

Impact assessments for each proposal will be required, along with recommendations for source stocks, transfer numbers, feasibility and monitoring. Assessments will need to address all potential problems including capturing enough birds for release.

Workplan Jobs:

<u>LOCATION</u>	<u>COORDINATION</u>	<u>REGION</u>	<u>IMPLEMENTATION</u>	<u>EFFORT</u> (days)
Job 11: Trial translocations				
1) Centre Island	G.Elliott	Southland	Sept 1992	6
2) Pigeon Island	G.Loh	Otago	Sept 1995	6
3) Future options	TSU	HO	1992	?

BUDGET SUMMARY:	PERSON DAYS/YEAR	OPERATING/YR
OTAGO	6	\$ 1 500
SOUTHLAND	6	\$ 500

Task 4. Developing a captive breeding and release capability.

Explanation:

At present there appears to be virtually no experience in New Zealand for maintaining and breeding captive populations of native insectivorous forest passerines. Thus, before mohua are taken into captivity, skills must first be developed. Extensive published information is available on keeping insectivorous birds overseas. This information needs to be obtained and organisations (either government or non-government) with suitable facilities canvassed to determine their interest in keeping mohua. The Threatened Species Unit has identified a group of people in the New Zealand zoo and wildlife park industry with an interest in undertaking this work. **They will fund this work privately and there will be no DOC operating funds diverted to undertake the work.**

Experience using whiteheads or brown creepers may be desirable before rearing mohua. However, given that these species have different habitat requirements and breeding systems, and that there are still sufficient mohua in the wild to support a breeding programme, we recommend gaining direct experience using mohua.

It is not envisaged at this stage that a full captive breeding programme for mohua would be ongoing, but rather that we develop the capability should the need arise. As part of this programme, techniques for effective release of disease-free captive-raised birds into the wild should also be developed. Any progeny produced by the captive population should be used in these trial translocations. Restocking of wild populations using captive bred birds would complement mainland predator control programmes in the future. Restocking may be particularly useful for restoring the sex imbalance in wild populations which occur as a result of stoat plagues.

The mohua captive management plan (Dilks 1993) outlines these tasks in more detail and documents recent developments.

Information is available on brown creeper and whitehead breeding in the wild (Cunningham 1985, McLean et al. 1986, McLean & Gill 1988, Allen 1988) but the only experience with holding these species in captivity is during recent whitehead transfers (Allen 1989).

Workplan jobs

<u>LOCATION</u>	<u>COORDINATION</u>	<u>REGION</u>	<u>IMPLEMENTATION</u>	<u>EFFORT</u> (days)
Job 12: Develop captive breeding programme				
1. Strategy	P. Dilks	S&R	Apr. 1993	5
2. Implementation	Private Breeders		Apr. 1993	

BUDGET SUMMARY:	PERSON DAYS/YR	OPERATING/YR
SCIENCE & RESEARCH	5	NIL
PRIVATE AVIARIES	?	OWN FUNDS

Task 5. Undertaking research on recovery potential, management techniques, potential causes of decline, the relationship between wasps and mohua and innovations for predator control.

Explanation:

All management programmes must explore the potential of new techniques and innovations. Possibilities for mohua include the development of predator-proof nest boxes or even modification of nesting behaviour. Continued research is required to examine:

- (1) The size of core populations of mohua which need to be managed to ensure viable populations are maintained.
- (2) The degree to which managed core populations can be cropped to supplement wild remnant populations or to supply birds for island transfers.
- (3) The limits and rate of recovery of mohua populations and rehabilitation techniques after severe population crashes in the Hawdon and Eglinton Valleys.
- (4) Other potential causes of decline and their relationship to the role of stoats. Factors such as competition with introduced finches, habitat deterioration, and predation by ship rats, cats and starlings may all influence productivity.
- (5) The relationship between wasps and mohua. Evidence for competitive exclusion of mohua

is largely circumstantial: the local extinction of mohua in northern South Island forests is coincident with the arrival and eruption of vespid wasps, but mohua had already been declining significantly before then. Their late breeding season and long period of juvenile dependence may make mohua particularly vulnerable to wasp competition. Such research would only be justified if wasps could be effectively controlled.

Direct investigation of wasp-mohua competition is not possible because the two species no longer occur together in large enough numbers. The most promising line of research is investigation and comparison of their diets.

An implication of global warming is that beech honeydew might invade the southern South Island and wasps may expand into these areas. If this happens effective wasp control may be essential for the continued survival of mohua. Furthermore, the ability to control wasps as well as predators may be important to enable the reintroduction of mohua to northern South Island forests.

(4) Factors other than the stoat/mouse/beech mast relationship which may be influencing stoat irruptions and factors influencing migration and dispersal of stoats. The beech seedfall relationship may vary with different forest types. For example, different beech species may seed heavily at different intervals and where two or more species occur in the same forests heavy seeding which induces a stoat plague may be more frequent than if only one beech species is present.

(5) Potential innovations for stoat control such as the use of lures, poisons, biological control, chemosterilants, and new trap designs.

Workplan Tasks:

<u>LOCATION</u>	<u>COORDINATION</u>	<u>REGION</u>	<u>IMPLEMENTATION</u>	<u>EFFORT</u> (days)
Job 13: Research				
1) Recovery potential	C.O'Donnell	S & R	July 1990	*
2) Trapping	"	"	"	*
4) Stoat ecology	E.Murphy	"	Nov. 1990	*
5) Poisons etc	"	"	July 1992	*
6) Mohua-wasps	Contract	?	?	
* = part of full time research programme - SEE TASK 1.				

BUDGET SUMMARY:	PERSON DAYS/YR	OPERATING/YR
SCIENCE & RESEARCH	See Task 1	See Task 1

Task 6. Opposing any logging and degradation of indigenous forests in which mohua occur.

Explanation:

Any form of forest logging is clearly detrimental to mohua populations. Even by using so-called "low impact" techniques such as beech management or portable chainsaw mills, mohua will disappear from forests (Coker 1980, O'Donnell & Dilks 1987, Spurr 1987, Buckingham 1989, O'Donnell 1991).

Any logging proposal or other habitat disturbance in mohua forests should be opposed. Grazing is still a threat to the edges of some primary mohua habitats.

Workplan Tasks:

<u>LOCATION</u>	<u>COORDINATION</u>	<u>REGION</u>	<u>IMPLEMENTATION</u>	<u>EFFORT (days)</u>
Job 14: Advocacy 1) South Island	Regional offices	All regions	As required	

Task 7. The promotion of public awareness of mohua and the values and ecology of mainland forests through advocacy.

Explanation:

The mohua is one of our rarest forest birds which still occurs in mainland forests accessible to the public. Developing the ability to manage mohua predators in mainland forests will assist in the conservation and management of other forest birds. There is a strong public interest in conserving these species in mainland forests.

Media releases, displays, public talks, submissions, summer programmes and videos would raise public awareness and appreciation for mohua and mainland forest birds as a group.

Already long hours of voluntary work by members of the public have gone into the study of mohua and contributed to the content of this plan. The public will be encouraged to continue to participate in the mohua recovery programme particularly through advertised summer programme and conservation volunteer activities. Successful survey and trapping projects were run in Southland and Otago Conservancies in 1992-1993. The public have also played an important role in identifying some of the remaining mohua populations and have taken considerable initiatives in setting up and seeking their own funding for key management projects under Task 2 (e.g. Wakatipu Environmental Society).

Priority throughout the recovery programme will be given to protecting mohua in places where the public can be encouraged to visit them.

Workplan Tasks:

<u>LOCATION</u>	<u>COORDINATION</u>	<u>REGION</u>	<u>IMPLEMENTATION</u>	<u>EFFORT</u> (days)
Job 14: Advocacy 1) South Island	Regional offices	All regions	As required	

RECOVERY GROUP

The content of this recovery plan has been reviewed at a meeting of all researchers and managers with an interest or responsibility for mohua conservation. The recovery plan will run between 1992 and 1997 and be overseen by the recovery group, who will review recovery projects annually. The recovery group consists of:

Colin O'Donnell	DOC Science & Research, Christchurch (Recovery Group Leader)
Derek Brown	Havelock Field Centre (Nelson/Marlborough Conservancy)
Graeme Elliott	Consultant, Nelson
Graeme Loh	Otago Conservancy
John Lyall	West Coast Conservancy
Steve Phillipson	Waimakariri Field Centre (Canterbury Conservancy)
Alan Saunders	Threatened Species Unit Contact
Andy Cox	Southland Conservancy

Other members will be co-opted as necessary (e.g. Peter Dilks, DOC Science and Research and a representative from the National Wildlife Centre for the co-administration and development of captive management plan).

The approved recovery plan will be reviewed after five years, because many of the management options involve the development of new techniques.

ACKNOWLEDGEMENTS

Thanks to Derek Brown, Allan Burbidge, Dave Butler, Andy Cox, Alison Cree, Peter Dilks, Graeme Elliott, Malcolm Foord, Andrew Grant, Richard Kennet, Barry Lawrence, John Lyall, Graeme Loh, Peter McClelland, Bruce McKinlay, Colin Miskelly, Don Newman, Fred Overmars, Steve Phillipson, Gretchen Rasch, Christine Reed, Graeme Taylor, Nick Torr, Peter Wilson, the Royal Forest and Bird Protection Society and West Coast and Otago Conservation Boards and to regionally based Kaupapa Atawhai Managers for consultations with the tangata whenua for comments on the draft plan.

The Department would like to acknowledge the considerable input that members of the public, through long hours of voluntary work, have made to the mohua recovery programme to date and look forward to public involvement in the future which will play a key role in the implementation of the plan.

REFERENCES

- Allen, D.G. 1988. Whitehead (*Mohoua albigilla*) behavioural ecology on Little Barrier Island Unpubl M.Sc. thesis. University of Auckland, Auckland.
- Allen, D.G. 1989. Assessment and transfer of the whitehead to Tiritiri Matangi Island. Abstract, Offshore Islands Conference, Auckland.
- Buckingham, R. 1989. Likely impact of sustained yield beech logging on mohua and other bird populations in the Rowallan Forest, Western Southland. Unpubl. report. Timberlands, Southland.
- Coker, P.M. 1980. Wildlife values of the forested areas of the Hokonui and Catlins. NZ Wildlife Service Fauna Survey Unit Report No. 23. Department of Internal Affairs, Wellington.
- Cunningham, J.B. 1985. Breeding ecology, social organisation and communicatory behaviour of the brown creeper (*Finschia novaeseelandiae*). Unpubl. Ph.D. thesis, University of Canterbury, Christchurch.
- Dilks, P.J. 1993. Mohua captive management plan. Threatened Species Unit Occasional Publication No. 4. Department of Conservation, Wellington.
- Dilks, P.; O'Donnell, C.; Elliott, G. 1992. Predator trapping in the Eglinton Valley, Fiordland, 1990-91. The effect of bait type, tunnel design and trap position. Science & Research Internal Report No. 11.4. Department of Conservation, Wellington.
- Elliott, G.P. 1990. The breeding biology and habitat relationships of the mohua. Unpubl. Ph.D. thesis, Victoria University, Wellington.
- Elliott, G.; O'Donnell, C. 1988. Recent decline in mohua populations. Science & Research Internal Report No.29. Department of Conservation, Wellington.
- Elliott, G.P.; Ogle, C.C. 1985. Wildlife and wildlife habitat values of Waitutu State Forest, Western Southland. NZ Wildlife Service Fauna Survey Unit Report No. 39. Department of Internal Affairs, Wellington.
- Gaze, P.D. 1985. Distribution of mohua (*Mohoua ochrocephala*) in New Zealand. Notornis 32: 261-69.
- King, C.M. 1983. The relationship between beech (*Nothofagus* sp.) seedfall and populations of mice (*Mus musculus*), and the demographic and dietary responses of stoats (*Mustela ermina*) in three New Zealand forests. Journal of Animal Ecology 52: 414-66.
- McLean, I.G.; Gill, B.J.; Curthoys, L.P. 1986. Mortality, interference, and injury at Whitehead nests. Notornis 33: 266-68.
- McLean, I.G.; Gill, B.J. 1988. Breeding of an island-endemic bird: the New Zealand whitehead *Mohoua albigilla*; Pachycephalinae. Emu 88: 177-82.
- O'Donnell, C F J 1985. Workshop on mohua (*Mohoua ochrocephala*). Wellington 4 July 1985. Unpubl. Report. NZ Wildlife Service, Christchurch.
- O'Donnell, C F J 1986. The Mohua Monitoring Programme. Unpubl. Report. NZ Wildlife Service, Christchurch.

- O'Donnell, C F J 1991. Application of the wildlife corridors concept to temperate rainforest sites, North Westland, New Zealand. Pp 85-98 In: D.A. Saunders & R.J. Hobbs (eds). Nature Conservation 2: The role of corridors. Surrey Beatty & Sons, Chipping Norton.
- O'Donnell, C.F.J.; Dilks, P.J. 1983. Trends in mohua populations in Westland, New Zealand 1860-1983. Unpubl. Report. NZ Wildlife Service, Christchurch.
- O'Donnell, C.F.J.; Dilks, P.J. 1986. Forest birds in South Westland: Status, distribution and habitat use. NZ Wildlife Service Occasional Publ. No.10. Department of Internal Affairs, Wellington.
- O'Donnell, C.F.J.; Dilks, P.J. 1987. Preliminary modelling of impacts of logging on forest birds in South Westland. Science & Research Internal Report No.1. Department of Conservation, Wellington.
- O'Donnell, C.F.J.; Dilks, P.J.; Elliott, G.P. 1992. Management of a stoat irruption in beech forest to enhance the breeding success of a threatened bird species. Science & Research Internal Report, Department of Conservation, Wellington.
- Read, A.F. 1987. The breeding and flocking behaviour of mohua at Arthur's Pass National Park. Notornis 34: 11-18.
- Read, A.F. 1988a. Habitat use by mohua, *Mohoua ochrocephala* (Aves: Muscicapidae), in the Hawdon River Valley, Arthur's Pass National Park. 1. Habitat preferences. NZ Journal of Zoology 15: 461-70.
- Read, A.F. 1988b. Habitat use by mohua, *Mohoua ochrocephala* (Aves: Muscicapidae), in the Hawdon River Valley, Arthur's Pass National Park. 2. Time budgets and foraging behaviour. NZ Journal of Zoology 15: 471-80.
- Read, A.F.; O'Donnell, C F J 1987. Abundance of mohua in the Hawdon River Valley, Arthur's Pass National Park, in 1984 and 1985. Notornis 34: 307-15.
- Reischek, A. 1884. Notes on New Zealand ornithology. Trans. NZ Institute 17: 187-98.
- Smith, W. W. 1888. On the birds of Lake Brunner District. Trans. NZ Institute 21: 205-24.
- Spurr, E. 1987. Beech management - its effect on bird populations. What's New in Forest Research No. 146. Forest Research Institute, Rotorua.
- Wardle, J.A. 1984. The New Zealand beeches. New Zealand Forest Service, Wellington.

APPENDIX 1: Expert Contacts

Mohua biology

Graeme Elliott
Colin O'Donnell
Peter Dilks

Mohua distribution

Peter Gaze
Peter Dilks

Mohua in Nelson/Marlborough

Graeme Elliott
Derek Brown

Mohua in Westland

Colin O'Donnell
Peter Dilks
John Lyall

Mohua in Canterbury

Colin O'Donnell
Peter Dilks
Stephen Phillipson

Mohua in Otago

Graeme Loh
Malcolm Foord
Andy Anderson

Mohua in Southland

Graeme Elliott
Peter McClelland
Gretchen Rasch
Eric Spurr
Malcolm Foord

Trapping Stoats

Stephen Phillipson
Dave Crouchley
Carolyn King
Rowley Taylor
Elaine Murphy
Colin O'Donnell
Peter Dilks

Stoat Lures

Kay Clapperton
Doug Crump

Wasps

Jacqueline Beggs
Richard Harris
Henrik Moller
Eric Spurr

Effects of logging

Colin O'Donnell
Peter Dilks
Eric Spurr

Contact Addresses

Andy Anderson
Private Bag, Tarras

Derek Brown
DOC, 13 Mahikapawa Road, Havelock.
(03) 574 2019

Kay Clapperton
PO Box 772, Whangarei. (0821) 436 0053

Doug Crump
Chemistry Division, DSIR, Lower Hutt.

Peter Dilks
DOC, Private Bag, Christchurch. (03) 3799
758

Graeme Elliott
549 Rocks Road, Nelson. (03) 5486 421

Malcolm Foord
39 Park Street, Dunedin.

Peter Gaze
DOC, Private Bag, Nelson. (03) 5469 335

Richard Harris
Zoology Dept, Canterbury University,
Christchurch.

Carolyn King
61 Simla Avenue, Havelock North. (06)
8774654

Graeme Loh
DOC, Private Bag, Dunedin. (04) 477 0677

Henrik Moller
Zoology Dept, University of Otago,
Dunedin.

Elaine Murphy
DOC, Private Bag, Christchurch. (03) 3799
758

Colin O'Donnell
DOC, Private Bag, Christchurch. (03) 3799
758

Stephen Phillipson
DOC, Box 8, Arthur's Pass. (0516) 89 211

Eric Spurr
Landcare Research, PO Box 31-011,
Christchurch. (03) 351 7099

Rowley Taylor
C/- Landcare Research, Private Bag,
Nelson. (03) 5481 082