

The biology of the stoat (*Mustela erminea*) in the National Parks of New Zealand

I. General introduction

C. M. KING*

J. E. MOODY

Ecology Division

Department of Scientific and Industrial Research

Private Bag, Lower Hutt, New Zealand

Abstract Stoats are an introduced species in New Zealand, and are considered to be a pest, especially in the National Parks. Basic information on their biology is required to assist development of a rational control policy. Between 1972 and 1976, 1599 stoat carcasses were obtained from 14 collection areas, including all 10 National Parks. In a suite of 7 papers we describe their gut contents, body measurements, pelage and reproductive condition, and the distribution of certain parasites (the nematode *Skrjabinogylus nasicola*, and fleas). This introductory paper describes the collection areas, and gives definitions and other information necessary for interpretation of what follows.

Keywords *Mustela erminea*; New Zealand National Parks; trapping; collection areas

Three species of mustelids—the weasel (*Mustela nivalis* L.), the stoat (*M. erminea* L.), and the ferret (*M. putorius furo* (L.))—were introduced to New Zealand towards the end of the nineteenth century, to control rabbits (Gibb & Flux 1973). Within a few years stoats, particularly, had spread into the native forests, and they are commonly believed to have contributed substantially to the marked decline in numbers and species of native birds observed since European settlement began (documented by Mills & Williams (1979)).

The 10 National Parks of New Zealand cover about 2 million ha, mostly still under their original forest vegetation, in which native species are protected and introduced species are supposed to be controlled so far as is possible. The potential effect of predation by mustelids on native birds in the National Parks has caused considerable concern.

While it is obvious that predators are not the sole cause of the decline in birds, nevertheless most National Park Boards have at one time or another attempted to control mustelids, though without any means of assessing whether or not their efforts were efficient, successful, or even necessary. There is obviously a great need for biological information on which to base a management policy concerning the control of mustelids in National Parks. The study reported here was planned with a view to obtaining some of this information.

The stoat is by far the commonest of the 3 mustelid species occurring in New Zealand forests. The collecting methods used should catch all 3 species quite readily, but at the end of the survey the tally was 1599 stoats, 40 weasels, and 56 ferrets. Ferrets are common on pastureland with rabbits, but virtually absent from forest (Gibb & Flux 1973). An hypothesis explaining the generally poor success of weasels in colonising New Zealand was offered by King & Moors (1979). The present survey concerns only stoats.

Data accumulated over the 8 years of this study have been organised as follows. The results of a general survey of the biology of stoats, based on analysis of carcasses collected from all the National Parks between 1972 and 1976, are presented in the suite of papers of which this is the first. Changes in the numbers, productivity, and food habits of stoats through 3 population peaks of mice (in 1974-75, 1976-77, and 1979-80) were monitored in 3 areas, and will be described separately. The possible future management of stoats in Parks is discussed elsewhere (King 1981).

Habitats of the collection areas

Samples of stoats were collected from 14 areas, which comprised the 10 National Parks, 1 Forest Park, 1 Wildlife Service aviary, and 2 areas of private land (see Table 1 and Fig. 1).

The most heterogeneous areas were divided into distinct localities differing from each other in various ways. Some were completely different in habitat—for example, those on the eastern and western sides of the Main Divide in the 3 National Parks which straddle the Southern Alps (Arthur's Pass, Mount Aspiring, and Fiordland). Stoats collected near villages or at rubbish dumps were separated from those from natural habitats. Several

Received 28 September 1981

*Present address: 3 Waerenga Road, Eastbourne, New Zealand

Table 1 The collection areas (FP, Forest Park; NBR, Native Bird Reserve; NP, National Park).

Collection Area	Locality	Abbreviation	Latitude (° S)	Region	Altitude (m a.s.l.)
Urewera NP	—	UW	38.40	1	600–790
Tongariro NP	Whakapapanui Track	TGw	39.10		970–1160
	Chateau Village	TGv	''		1160
Egmont NP	Stratford Rd	EGs	39.20		560–850
	Dawson Falls Rd	EGd	''		460–900
Mount Bruce NBR	—	MB	40.40		300
Abel Tasman NP	—	AT	40.50	2	0–20
Nelson Lakes NP	St Arnaud beech forest	NLb	41.50		670–700
	St Arnaud village	NLv	''		670
	L. Rotoroa	NLt	''		450
	Mt Misery	NLm	''		460–1490
Kaikoura Peninsula	—	KK	42.30		Sea level
Arthurs Pass NP	Canterbury side	APe	43.00		580–850
	Westland side	APw	42.50		380–760
	Summit	APs	''		850–910
Craigieburn FP	—	CB	43.10		790–1340
Mt Cook NP	Ball Hut Rd	MCb	43.40	3	690–910
	Village	MCv	''		730
Westland NP	Franz Josef Glacier Rd	Wlf	43.20		150
	Franz Josef Village	WLj	''		120
	Fox Glacier	WLx	43.30		120
	Mapourika	Wlm	43.20		120
	Karangarua	WLk	43.40		150
Mt Aspiring NP	Makarora	MAe	44.10	4	370
	Pleasant Flat	MAw	44.00		300
Fiordland NP	Eglinton Valley	FLe	44.50		270–550
	Hollyford Valley	FLh	45.00		90–370
	Milford	FLm	44.40		30
	Te Anau	FLt	45.30		200
Takaro Lodge	—	TK	45.20		450

subsamples were distinguished by the trapping regime used.

The habitats represented were mostly native vegetation, unexploited by man but degraded to various degrees by introduced browsing mammals. The following major habitats were recognised.

(1) Beech forest (*Nothofagus* spp.): often in pure stands, and with understorey limited or sometimes absent. Most of the beech forests sampled stood adjacent to large areas of grassland.

(2) Podocarp/broadleaved forest (beech absent): commonly multi-layered and with richer understorey.

(3) Mixed forest: beech and podocarps both present, the proportion of beech increasing with altitude.

(4) Scrub: closed canopy second-growth bush, often an early stage in succession to 1, 2, or 3.

(5) Grassland: open ground with scattered shrubs or trees.

(6) Alpine: above treeline.

These categories are of course gross oversimplifications; for further details, see Wardle (1973) and the literature cited in Table 1. Cobb & Duncan (1980) illustrate the general appearance of beech forest, podocarp/broadleaved forest, and grassland habitats in the National Parks.

Prey fauna

In their native habitat (Eurasia) stoats are specialised predators of small mammals and birds. In New Zealand the choice of such prey is limited. There are only 8 species of mammals within the range of sizes acceptable by stoats as prey, and on average they are larger than prey species in Britain (King & Moors 1979). There are fewer land bird species in New Zealand than in most parts of the Holarctic, particularly in beech forests (Kikkawa 1966, Child 1981): in most of the areas sampled there are less than 30 common species. On the other hand, there are several common species of small lizards (geckos and skinks), and also many species of large Orthoptera, collectively known as wetas. Some of these may weigh up to 5 g, and have been referred to as 'invertebrate mice'.

The relative abundance of these prey species was not determined for any study area, but the general pattern is as follows.

Opossum (*Trichosurus vulpecula* Kerr) – Abundant in podocarp/broadleaved forest; less common or rare in beech forest; absent at Mount Cook.

Lagomorphs – Rabbits (*Oryctolagus cuniculus* L.) locally common in some years on grassland, especially at Mount Cook; absent at Westland.

Table 1 (continued)

Habitat	Description of vegetation	Mean annual rainfall (mm) ⁽¹⁾	Annual range of monthly temperature (°C) ⁽²⁾	
			Means	Minima
Mixed Beech Village	Current Park Handbook	2484	6.1 to 16.1	3.1 to 11.7
Podocarp Domestic (near podocarp)	Current Park Handbook	2914	2.5 to 12.2	-1.1 to 7.3
Podocarp	Current Park Handbook and Druce (1977)	2149-6700	3.7/7.0 to 12.9/15.7	0.6/3.3 to 8.0/10.8 ⁽³⁾
Domestic (near podocarp)	—	2232	6.2 to 15.7	2.3 to 10.6
Scrub Beech	Current Park Handbook	1250	7.0 to 17.2	1.3 to 11.3
Scrub + village Beech	Current Park Handbook	1595	3.0 to 14.5	-2.2 to 8.1
Beech + alpine	—	1844	—	—
Seashore	—	865	7.8 to 16.3	4.7 to 12.5
Beech + grass + village	Current Park Handbook	1674	3.9 to 15.5	-1.1 to 9.7
Mixed Alpine	—	5074	—	—
Beech	—	1450	1.5 to 13.5	-2.8 to 7.2
Grass Village	Wilson (1976)	—	0.8 to 13.2	-5.4 to 6.3
Podocarp	Wardle (1979)	4071	1.9 to 14.1	-2.4 to 8.4
Village + podocarp	—	5130	6.7 to 14.9	2.0 to 10.3
Pod. + village + tip	—	4769	—	—
Podocarp	—	5130	—	—
Podocarp	—	3846	—	—
Beech	Mark (1977)	2024	—	—
Mixed Beech	—	3870	—	—
Beech	Current Park Handbook;	2300	—	—
Mixed Tip	Mark & Sanderson (1962)	4250	—	—
Tip	—	6236	5.6 to 14.5	1.7 to 10.5
Grass + domestic	—	1136	3.9 to 14.0	-0.3 to 7.4
Beech	—	1394	—	—

⁽¹⁾ From 'Rainfall Normals for New Zealand 1941-70' (N.Z. Meteorological Service 1973).

⁽²⁾ From 'Temperature Normals 1941-70' (N.Z. Meteorological Service 1978).

⁽³⁾ Depending on altitude.

Table 2 Sample sizes and provenance of material from each study area and locality (A, trapped; B, shot; C, killed on road; D, found dead; E, killed by cat or dog; O/U, other or unknown).

Sample or subsample	Number of stoats:						
	A	B	C	D	E	O/U	
EGs	52	3	1			2	58
EGd	27						27
O/U	4				1	3	8
TGw	37						37
TGv	6						6
O/U	—		1			1	2
UW	17		2	4	1		24
MB	56					8	64
AT	8		1				9
NLb	58						58
NLv	12	2				1	15
NLr	6	1					7
NLm	10						10
O/U	7				1	5	13
APe	58		2		1	2	63
APw	15		1			1	17
APs	12						12
O/U	2					13	15

Sample or subsample	Number of stoats:						
	A	B	C	D	E	O/U	
MCb	135				1		136
MCv	42	4					46
O/U	—		1				1
CB	165	1					166
WLf	19					2	21
WLj	21		4	1	2	10	38
WLx	31		2			7	40
WLm	25		6			2	33
WLk	20		1			2	23
O/U	—	1	2			7	10
MAw	5						5
MAe	23						23
O/U	—					2	2
TK	82			1			83
FLe	219			2		4	225
FLh	156		1				157
FLm	41						41
FLt	27	1		1		3	32
O/U	35					3	38
KK	20	5		3		2	30
	1453	18	25	13	6	84	1599

Table 3 Some important local variables in the composition of the total sample.

Variable	Percentage of subsample from:										TK	FL	KK	% of total	
	UW	EG	TG	MB	AT	NL	AP	CB	MC	WL					MA
PRINCIPAL HABITATS															
Beech forest	4	0	82	0	0	87	40	100	1	0	82	100	58	0	46
Podocarp/mixed forest	91	97	0	0	0	0	19	0	0	73	18	0	26	0	24
Grassland	0	0	2	0	11	4	0	0	73	1	0	0	3	0	11
Disturbed ⁽¹⁾	0	0	12	100	0	4	0	0	25	24	0	0	13	0	15
Other ⁽²⁾	5	3	5	0	89	5	41	0	1	2	0	0	0	100	4
ALTITUDE (m)															
0-349	0	0	0	100	100	0	0	0	0	100	18	0	60	100	36
350-849	96	81	0	0	0	95	85	29	100	0	82	100	39	0	51
850-1450	4	19	100	0	0	5	15	71	0	0	0	0	1	0	13
AGE AND SEX RATIOS⁽³⁾															
% young + subadult males	23	20	27	77	20	29	35	41	56	63	31	50	39	94	43
% young females	0	36	21	46	33	38	12	37	40	32	0	33	44	64	38
% males (all ages)	72	83	68	44	63	68	60	54	48	57	84	66	61	49	60
TRAP TYPE															
Fenn	0	35	96	0	78	37	41	97	94	48	17	18	70	67	73
GIN	71	47	0	88	11	46	40	2	0	16	60	81	3	0	26
Not trapped, or unknown	29	17	4	12	11	17	19	1	6	36	23	1	27	33	1
SEASON															
Spring	38	23	33	3	22	36	21	24	17	9	30	5	15	0	18
Summer	13	9	27	48	22	28	9	38	42	32	7	37	43	97	35
Autumn	4	19	29	25	0	18	45	27	35	41	17	31	15	3	25
Winter	38	46	11	8	56	13	19	10	5	13	33	25	21	0	18
Unknown	8	3	0	16	0	5	7	2	1	5	13	1	6	0	5
SAMPLE SIZES															
Total	24	93	45	64	9	103	107	166	187	165	30	83	493	30	1599
Aged, sexed, and dated	18	65	44	50	8	91	86	156	181	143	19	70	412	27	1370

⁽¹⁾ Domestic premises (huts, campsites, farm buildings), villages, and rubbish tips.

⁽²⁾ Scrub, alpine, seashore, other, or unknown.

⁽³⁾ Dated, aged, and sexed animals only; age ratios for each sex given as % of total in each sex that were aged.

Hares (*Lepus capensis* L.) widely distributed, especially on alpine grasslands; seen occasionally in all kinds of forest margins; especially common at Craigieburn.

Hedgehog (*Erinaceus europaeus* L.) - Widely distributed and common.

Rats - *Rattus rattus* (L.) widely distributed, more common in podocarp/broadleaved forests than in beech forests except after a good seed year; absent at Craigieburn. *R. exulans* (Peale) present in Hollyford Valley. *R. norvegicus* (Berkenhout) probably absent or only local in most study areas except perhaps in villages and rubbish tips, or near water.

Mouse (*Mus musculus* L.) - Widely distributed; subject to large population fluctuations in beech forest in relation to seedfall (monitored at Craigieburn and in Eglinton and Hollyford valleys during most of this survey) (Fitzgerald 1978).

Birds - Widely distributed but not generally abundant.

Freshwater crayfish (*Paranephrops* spp.) - Probably present in streams in most study areas.

Skinks (*Leiopisma* spp.) and geckos (*Hoplodactylus* spp.) - Widely distributed and locally common. Ground wetas (*Hemidrus* spp.) - In burrows in open country and at forest margins.

Large cave wetas (*Gymnoplectron* spp.) - Found among fallen logs and damp litter in thick forest, often in groups.

Tree wetas (*Hemideina* spp.) - Usually arboreal; small form on ground at Mount Cook.

Carrion and offal of opossum and deer - Opossum carrion common in podocarp and mixed forest, and along roads; deer offal especially in South Island National Parks.

Origin of field collections

Stoats from National Parks were collected entirely by Rangers or Park Assistants, either in their own traplines or from commercial opossum trappers. Stoats from Craigieburn Forest Park were collected by New Zealand Forest Service Meteorological Officers, and those from Mount Bruce and Kaikoura Peninsula by New Zealand Wildlife Service officers. One collection, from Takaro

Table 4 Some important variables in the monthly composition of the total sample.

Percentage of each monthly <i>n</i> representing:	Spring			Summer			Autumn			Winter			Month unknown	All months
	S	O	N	D	J	F	M	A	M	J	J	A		
HABITAT														
Beech forest	71	51	61	28	39	43	40	26	54	51	55	33	29	42
Podocarp forest	12	12	13	5	6	5	10	18	26	22	12	35	4	12
Mixed forest	6	4	5	9	9	21	15	8	6	9	8	5	1	9
Grassland	5	16	9	12	16	9	11	25	1	5	8	12	1	10
"Disturbed"	4	10	8	31	24	11	21	16	9	10	10	6	17	14
Other or unknown	2	6	3	16	6	11	4	7	4	3	7	9	47	12
ALTITUDE (m)														
0-249	21	11	13	44	33	27	24	24	29	13	24	9	28	25
250-549	25	14	29	27	27	34	21	14	31	35	50	35	35	29
550-849	34	46	29	22	20	30	40	45	24	40	17	40	8	30
850-1149	15	16	19	5	12	6	11	12	9	5	3	11	1	9
1150-1449	1	7	5	1	4	1	4	1	4	2	4	5	0	3
Unknown	4	5	4	1	2	2	1	4	1	6	2	0	28	4
REGION														
North I.	19	18	12	16	10	5	13	14	10	16	13	48	20	14
Northern South I.	28	40	40	28	22	22	26	28	31	29	13	12	20	26
Central South I.	7	24	16	15	32	22	29	45	27	12	13	6	13	22
Southern South I.	45	17	32	41	36	51	32	14	32	43	60	34	47	38
TRAP TYPE														
Fenn	47	60	71	52	70	80	79	65	53	42	49	42	29	60
Gin	25	29	19	14	10	14	8	18	36	43	27	35	15	21
Alive in either	15	14	11	3	5	4	7	8	16	23	9	14	7	9
TOTAL <i>n</i>	95	110	75	152	186	228	136	126	136	109	106	65	75	1599
AGE AND SEX RATIOS (excluding 138 with age, sex, or month unknown)														
% young + subadult males	—	—	3	29	38	31	35	30	31	20	22	13	—	—
% young females	—	—	3	26	39	42	—	—	—	—	—	—	—	—
% males (all ages)	73	77	76	53	52	44	43	50	51	58	64	70	—	—
<i>n</i>	95	110	74	148	185	224	129	119	131	95	95	56	—	1461

Lodge, was made by a private individual out of his own interest.

Most stoats (91%) were trapped, and a few were shot, killed by cats, or picked up dead (Table 2). In all National Parks except Urewera there was at least one trapline operated by Rangers; at Nelson Lakes, Fiordland, and Mount Bruce trapping was begun before our study. In the other 7 National Parks traplines were set up at our request. The different circumstances in which different trappers worked made a standardised routine impossible, but, following our advice, most either (a) set baited traps for 1-2 weeks a month and inspected them daily or (b) left unbaited traps set permanently and inspected them whenever possible.

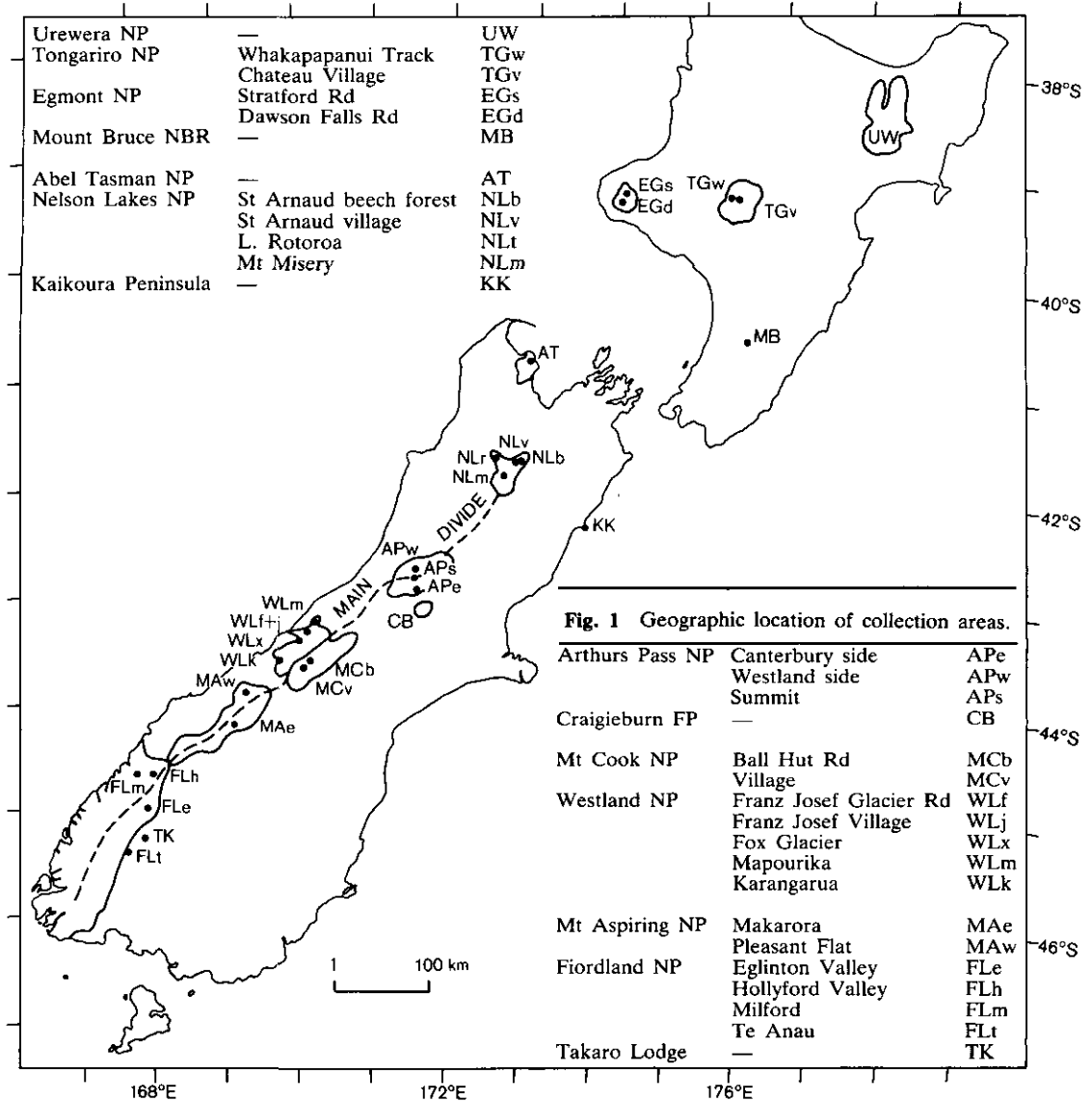
The intensity of trapping in each area varied from casual to concentrated. The effective area sampled in any locality is unknown, but the traplines varied from those with closely spaced traps inspected on foot along a route of 1-5 km (Tongariro, Whakapapanui Track; Mount Bruce; Nelson Lakes, St Arnaud beech and Mount Misery areas) to those with more widely spaced traps set along roadsides for 5-40 km (Egmont; Mount Cook; Mount

Aspiring; Fiordland, Eglinton and Hollyford valleys). The number of stoats collected from each area therefore may not reflect local population densities.

At the beginning of the survey (August 1972) National Park Boards ordered stocks of humane Fenn traps (described by King & Edgar (1977)); DSIR's Ecology Division supplied these traps to the other areas. When properly set, the Fenn trap kills relatively quickly and allows collection of stoats with gut contents intact and teeth undamaged by attempts to escape. However, gin traps were used until the Fenns arrived in mid 1973, and in some areas the bulk of the sample was collected in gin traps (see Table 4).

Statistical analyses

Because of the way in which stoats were collected we could not predict the number of carcasses that might be sent in, so planned sample sizes were not possible. Nor could we exert rigorous control over the means by which the stoats were obtained. As a result, the samples are rather heterogeneous. On the other hand, the total sample was large (1599 stoats) and came from enough local subsamples to



allow many interesting comparisons between groups of stoats from different environments. This analysis is therefore a simple description of the variability within and between the samples in the size, food habits, reproduction, pelage, and certain parasites of stoats in relation to age, sex, season, and geographical distribution; it is not a demographic analysis. Interpretation of the results is conditioned by the unequal structuring of the samples, and therefore tables are provided here to show the distribution of some important local and seasonal variables in the composition of the samples (Tables 3 and 4).

Definitions

Names of collection areas

Abbreviated in tables and figures as shown in Fig. 1 and Table 1.

Seasons

Spring, September–November; summer, December–February; autumn, March–May; winter, June–August.

Age

1. Less than full grown:

1a. Young – young of the year of either sex in November–February inclusive; distinguished by the

appearance of the skull. Note that young females are reproductively mature, but young males are not; this invalidates the more convenient term 'juvenile'.

1b. Subadult - immature males with a baculum weight of 37 mg or less collected in March-August inclusive. No equivalent category for females.

2. Adult: full-grown animals of both sexes collected in November-February, and mature males collected in March-August.

3. Unclassified (nominal adults): all females from March to August, and all stoats of both sexes in September and October.

Regions

1. North Island: EG, TG, UW, MB (approximate latitude 38-40°S).

2. Northern South Island: AT, NL, AP, CB, KK (40-43°S).

3. Central South Island: MC, WL (43°S).

4. Southern South Island: MA, TK, FL (44-45°S).

GENERAL ACKNOWLEDGMENTS

A survey such as this requires much assistance, and not everyone who has contributed can be named, although all have been thanked. The following list includes those who have been particularly helpful. DSIR employed C. M. King 1972-1977, J. E. Moody 1973-76, and M. G. Efford 1977-1978, when all the practical work and analysis was done. The writing up was supported by a contract between DSIR and C.M.K. from 1977 to 1980. Other financial and field support: Fiordland National Park Board; New Zealand Forest Service; National Parks Authority. Field work: many National Park Rangers, especially A. Cragg, B. Thorpe, R. Slater, M. Clarbrough, N. Judd, R. Peacock, J. Blount, B. Heslop, B. Ellis, L. Busby, A. Perrett, B. Miller, and B. Arnold; many Forest Service Meteorological Officers, especially J. Scriven, R. Lye, and P. Milne; also J. A. Mills, P. Shaw, and C. Roderick (Wildlife Service) and R. Willett (formerly of Takaro Lodge, Te Anau). General assistance: G. Asher, G. Voss, H. Robertson, and D. Pearce. We are greatly indebted to M. G. Efford, who undertook with skill and perception almost all the statistical analyses for the whole series, and wrote a report on which papers II-VI are based. Our thanks also to J. E. Berney for typing services, to A. Pritchard for editorial comment on the draft MSS., and to the cartographers of Science Information Division, DSIR, for converting sketchy drafts into crisp line figures.

REFERENCES

Child, P. 1981: Birdlife of Mount Aspiring National Park. National Parks scientific series no. 4.

Cobb, L.; Duncan, J. 1980: New Zealand's National Parks. Auckland, Paul Hamlyn Ltd.

Druce, A. P. 1977: Egmont botanical studies. In: Seminar on science in National Parks. Wellington, National Parks Authority. p. 53-57.

Fitzgerald, B. M. 1978: Population ecology of mice in New Zealand. In: Dingwall, P.; Atkinson, I. A. E.; Hay, C. eds The ecology and control of rodents in New Zealand Nature Reserves. Information series no. 4. Wellington, Department of Lands and Survey. p. 163-173.

Gibb, J. A.; Flux, J. E. C. 1973: Mammals. In: Williams, G. R. ed. The natural history of New Zealand. Wellington, A. H. and A. W. Reed. p. 334-371.

Kikkawa, J. 1966: Population distribution of land birds in temperate rainforest in southern New Zealand. Transactions of the Royal Society of New Zealand 7: 215-277.

King, C. M. 1981: Studies on the control of stoats (*Mustela erminea*) in the National Parks of New Zealand. P. 1862-1874 in: Chapman, J. A.; Pursley, D. ed. Proceedings, Worldwide Furbearer Conference, Frostburg, Maryland, U.S.A.

King, C. M.; Edgar, R. L. 1977: Techniques for trapping and tracking stoats (*Mustela erminea*): a review, and a new system. New Zealand journal of zoology 4: 193-212.

King, C. M.; Moors, P. J. 1979: On co-existence, foraging strategy and the biogeography of weasels and stoats (*Mustela nivalis* and *M. erminea*) in Britain. Oecologia 39: 129-150.

Mark, A. F. 1977: Vegetation of Mount Aspiring National Park, New Zealand. National Parks scientific series no. 2. Wellington, National Parks Authority.

Mark, A. F.; Sanderson, F. R. 1962: The altitudinal gradient in forest composition, structure and regeneration in the Hollyford Valley, Fiordland. Proceedings of the New Zealand Ecological Society 9: 17-26.

Mills, J. A.; Williams, G. R. 1979: The status of endangered New Zealand birds. In: Tyler, M. J. ed. The status of endangered Australasian wildlife. Adelaide, Royal Zoological Society of South Australia. p. 147-168.

Wardle, P. 1973: Native vegetation. In: Williams, G. R. ed. The natural history of New Zealand. Wellington, A. H. and A. W. Reed. p. 155-169.

——— 1979: Plants and landscape in Westland National Park. National Parks scientific series no. 3. Wellington, National Parks Authority.

Wilson, H. 1976: Vegetation of Mount Cook National Park, New Zealand. National Parks scientific series no. 1. Wellington, National Parks Authority.