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BIOLOGY AND ECOLOGY OF THE SHIP RAT  
RATTUS RATTUS RATTUS (L.) IN  
MANAWATU (N.Z.) FORESTS

A thesis presented in partial  
fulfilment of the requirements for  
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Ship rat, "frugivorus" morph  
(Half natural size)

ABSTRACT

Ship rats in Manawatu lowland forest were studied by snap and cage trapping for one year, and by tracking. The results are very similar to those of previous New Zealand studies. Rat density was low. Only 3.9 rats per 100 trap nights were trapped at Tiritea and the estimated mean density at Keeble's Bush was 2.8 rats per hectare. Although males with mature sperm were trapped all year round, pregnant females were trapped from mid-September to mid-April, except for one in June. The mean number of embryos per female was 4.95 and females produced up to four litters each. Annual mortality calculated from cage grid disappearances was 96% for both sexes combined, although the factors causing mortality were unknown. Four ectoparasite species and two stomach nematode species were identified. Large numbers of nematodes (up to 84) per stomach did not significantly reduce the weight of rats of a given length.

The stomach analysis of 178 ship rats showed that arthropods (mostly wetas) occurred in 88% of stomachs. Predominantly animal foods were eaten overall, but plant foods predominated in autumn and winter. Feathers were in few stomachs (5%) but their appearance in rats trapped only during the nesting season suggests that rat predation could be strategically severe at this time. Kiekie and kawakawa fruits were the commonest plant diet items. Rat damage to fruits and leaves of species found in the study areas is described in the thesis, and an index of palatability is given. An enclosure study in Keeble's Bush suggested that rats did not remove significant numbers of fallen titoki and tawa fruits. No plant species seems likely to have its regeneration endangered directly because of ship rat damage to its seeds. Some seeds are dispersed by rats.

A technique for tracking rats is described. Five toe-clipped ship rats were tracked for seven months on smoked kymograph paper inserted in special tunnels. Twenty tunnels, of which ten were on sloping branches in trees, were used in the .22 ha study area. Smoked paper was an ideal tracking surface, and rats were tracked at up to 16 locations in one night. Baiting the platforms significantly increased the rate of tracking and did not cause rats to leave their home ranges. Concurrent cage trapping produced inadequate data for home range determination and was insensitive in detecting changes in home range areas. All five rats were to some extent trap shy. Cage trapping is considered to be an inadequate technique for determining rat movement and perhaps population density. Tracking-

revealed home ranges were stable, and one was seemingly exclusive to the ranges of other rats. Smoked paper tracking has considerable promise as a technique in population ecology.

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TABLE OF CONTENTS

	<u>Page</u>
ABSTRACT	iii
ACKNOWLEDGEMENTS	v
LIST OF FIGURES	ix
LIST OF TABLES	x
LIST OF PLATES	xi
SECTION 1 INTRODUCTION AND METHODS	1
CHAPTER 1	1
1.1 Introductory description	1
1.2 Spread and distribution	2
CHAPTER 2 Description of Study Areas	4
2.1 Tiritea (snap trapping)	4
2.2 Keeble's Bush (cage trapping)	6
2.3 Greenwood's Bush (tracking)	8
CHAPTER 3 Methods	9
3.1 Snap trapping	9
3.2 Live trapping	9
3.3 Tracking	11
3.4 Autopsy	14
SECTION 2 RESULTS	16
CHAPTER 4 Snap Trapping	16
4.1 Trap success	16
4.2 Weight, size and condition of rats	21
4.3 Sex ratio	23
4.4 Occurrence of pelage forms	23
CHAPTER 5 Breeding and Mortality	27
5.1 Duration of breeding season	27
5.1.1 Males	27
5.1.2 Females	27
5.2 Female productivity	29
5.2.1 Litter size	29
5.2.2 Fertility	29
5.2.3 Uterine scars	30

	<u>Page</u>
5.3 Mortality	31
CHAPTER 6 Live Trapping	33
6.1 Numbers caught and retrappability	33
6.2 Distances moved	36
6.3 Population estimation	36
6.3.1 Methods	36
6.3.2 Results and discussion	37
6.4 Behaviour on release	40
CHAPTER 7 Smoked Paper Tracking	41
7.1 Introduction	41
7.2 The smoked paper tracking technique	41
7.3 Rat response and the effect of bait	43
7.4 Home ranges revealed by tracking	46
7.4.1 Criteria of "home range"	46
7.4.2 Results and discussion	49
7.5 Cage trapping and tracking compared	57
7.6 Ship rat activity	63
CHAPTER 8 Arboreal Nests	70
8.1 Nest structure	70
8.2 Feeding platforms	73
CHAPTER 9 Parasites and Diseases	75
9.1 Ectoparasites	75
9.2 Endoparasites	75
9.3 Diseases	76
CHAPTER 10 Food and Feeding	77
10.1 Introduction	77
10.2 Feeding trials	79
10.3 Collected food remains	84
10.4 Stomach analysis	84
10.4.1 Methods	84
10.4.2 Results	88
10.5 Granivore exclusion trials	92
10.5.1 Introduction and methods	92
10.5.2 Results	94

	<u>Page</u>
SECTION 3      DISCUSSION AND CONCLUSIONS	97
CHAPTER 11	97
REFERENCES	103
Appendix 1	110
Appendix 2	111
Appendix 3	112

LIST OF FIGURES

<u>Figure</u>		<u>Page</u>
1	Location of study areas	3
2	Tracking platform	12
3	Devices in Greenwood's Bush	14
4	Snap trap return through the year	17
5	Removal method population estimation	19
6	The sex ratio (% female)	24
7	% scrotal males and pregnant females per month	28
8	Population density at Keeble's Bush	39
9	The prints of ♂ 30 before and after toe-clipping	42
10	Baited and unbaited home ranges prior to 22/12/76 compared	45
11a	The effect of altering the number of trackings per location which I accept as indicating the home range boundary, for ♂ 30 from 22/12/76 to 23/1/77	47
11b	Tracking-revealed home range of ♂ 30 from 22/12/76 to 23/1/77, i.e. showing 1-capture and 2-capture ranges	47
12a	Tracking-revealed home ranges from 23/8/76 to 18/12/76 incl.	50
12b	Tracking-revealed home ranges from 22/12/76 to 22/1/77 incl. i.e. after the expansion of ♂ 30's range but before rat removal began	50
13a	Tracking-revealed home ranges of ♂ 30 and ♀s 42 and 49, 16/2/77 to 25/2/77 incl., i.e. after ♀s 47 and 29 killed	51
13b	Tracking-revealed home ranges of ♀s 42 and 49, 4/3/77 to 12/3/77 incl., i.e. after ♂ 30 killed	51
14a	Tracking-revealed home ranges of ♀ 49 and untagged male from 16/3/77 to 18/3/77, i.e. after ♀ 42 killed	52
14b	Tracking-revealed home range of ♀ 49 alone, from 23/3/77 to 1/4/77 i.e. after untagged male killed	52
15	Tracking-revealed home ranges calculated by joining adjacent points of capture, 23/8/76 to 18/12/76 incl.	55
16a	Tracking-revealed home ranges from 23/8/76 to 23/1/77	59
16b	Cage trapping-revealed home ranges from 11/5/76 to 23/1/77	59
17	New live trap	62
18	Intensity of use of areas within the home ranges, revealed by tracking; 16/2/77 to 12/3/77 (12 baited nights)	66
19	Nightly tracking of ♀ 49	68
20	Frequency of occurrence of ship rat diet items	91

LIST OF TABLES

<u>Table</u>		<u>Page</u>
1	Percentage catch for each trapline taken in first three nights of trapping	20
2	Ship rat weights	22
3	Ship rat measurements	22
4	Tail: Head + body ratio	22
5	Morph ratios	25
6	Frequency of recapture of ship rats at Keeble's Bush	34
7	Time between ship rat recaptures	34
8	Sample trappability of the cage trapped population	35
9	Population density	38
10	Area of 1-capture ranges prior to 23/1/77	60
11	Plant feeding trial results	80
12	Animal feeding trial results	83
13	The number of stomachs containing a majority of animal or plant matter for each season	89
14	The seasonal frequency of occurrence of major ship rat diet items	89
15	Results of granivore exclusion trials	95

LIST OF PLATES

<u>Plate</u>		<u>Page</u>
Frontispiece*	<u>Rattus rattus rattus</u> (morph 'frugivorus')	ii
1	Tiritea, a ridge top	5
2	Tiritea, side of ridge	5
3	Keeble's Bush, interior	7
4	Greenwood's Bush from the south	7
5	Snap trap	10
6	Cage trap	10
7	Rat-built nest, in red beech	72
8	Large rat nest containing three nesting cavities	72
9	Feeding platform	74
10*	Rat damage to unripe tawa berries	82
11*	Rat damage to ripe tawa berries	82
12*	Rat opened titoki capsules	85
13*	Naturally opened titoki capsules	85
14	Rat damage to passion-flower fruits	86
15*	Rat-nibbled tarata (above) and hange hange leaves	86
16	Exclosure permitting the entry of mice only	93
17	Device to record prints of mammals visiting an exclosure	93

\* Taken by Massey Central Photographic Unit.