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Improving the success of mouse eradication attempts on islands

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The house mouse is a weed: quick to exploit opportunity, and able to withstand local adversity and extinction without harm to the species. This means it has to be able to breed rapidly, tolerate a wide range of conditions, and quickly adjust to changes in its environment. These traits are responsible for the success of the species in so many parts of the world.

Professor R.J. Berry (1981)

Abstract

The house mouse is a highly commensal rodent species that has been accidentally spread across the world by humans. Mice have significant negative impacts on the ecosystems they invade and mouse eradication is an important conservation tool. A number of mouse eradication attempts have failed for unknown reasons and basic knowledge about mouse populations on New Zealand islands was lacking so this research project was commissioned to investigate mouse biology with the aim of improving eradication attempts. A review of all mouse eradication attempts reported up to May 2007 revealed a failure rate of 38%, far higher than the 5-10% reported for invasive rat species. A series of possible reasons for mouse eradication failure were identified and these formed the basis of the rest of the research. The eradication database was updated in February 2011 and several successful eradication attempts since 2007 lead to a revised failure rate of 33%. Mouse population densities and ranging behaviour on islands were unknown so these were investigated over an 8 month period on 6 ha Saddle Island culminating in mice being successfully eradicated from the island. The worldwide distribution of mice shows they are effectively able to invade new areas but how they behave when they arrive had never been studied. In the first experiment of its kind, I experimentally released pairs of male and female mice onto Saddle Island, simulating a new invasion with each release. The released animals showed dramatic changes in behaviour which are possibly adaptations to avoid mate-finding Allee effects. Anticoagulant resistance and behavioural differences between subspecies were also identified as possible reasons for eradication failure during the database review. A phylogeographic approach was used to identify the source population and subspecies of mice obtained from island and mainland sites in New Zealand with different mouse control regimes, with the aim of identifying links between mtDNA D-loop haplotype and control outcome. Results were inconclusive but several promising avenues for further research were identified. Population genetics and trapping records were used to investigate population structure of mice living on Saddle Island prior to the eradication. Population structure was shown to change through the year and genetic analysis suggested that the population was founded by a small number of individuals. The overall conclusion of this research is that with proper planning it is possible to eradicate mice from islands and to maintain mouse-free sanctuaries. A series of management recommendations drawn from this research are listed.

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Table of Contents

Abstract.....	ii
Acknowledgements	iii
List of Figures	ix
List of Tables	x
Chapter 1. Introduction.....	1
1.1. Invasion biology	1
1.2. The house mouse.....	2
1.2.1. Preamble.....	2
1.2.2. Origins of the species.....	3
1.2.3. Taxonomic status.....	3
1.2.4. Commensal behaviour and distribution.....	4
1.2.5. Social organisation	5
1.2.6. Reproduction	5
1.2.7. Diet.....	6
1.2.8. Impacts.....	6
1.2.9. Population irruptions	9
1.2.10. Control.....	10
1.2.11. Summary	11
1.3. Thesis aims	12
1.3.1. Eradicating mice from islands: successes, failures and the way forward	12
1.3.2. A successful mouse eradication explained by site-specific population data.....	13
1.3.3. See how they run: potential mate-finding Allee effect avoidance in house mice ...	13
1.3.4. Phylogeography of New Zealand house mice in relation to control.....	13
1.3.5. Population structure and colonisation history of house mouse on a small island .	13
Chapter 2. Eradicating mice from islands: successes, failures and the way forward	15
2.1. Abstract.....	15
2.2. Introduction	15
2.3. Island mouse eradications	16
2.3.1. Poisons	17
2.3.2. Bait delivery	18
2.3.3. Other mammal species	19

2.4. Why do mouse eradications fail?.....	20
2.5. Future research.....	21
2.6. Eradication database update February 2011	22
Chapter 3. A successful mouse eradication explained by site-specific population data	25
3.1. Abstract.....	25
3.2. Introduction	25
3.3. Methods.....	26
3.3.1. Study site.....	26
3.3.2. Capture-Mark-Recapture protocol	28
3.3.3. Radio-tracking	28
3.3.4. Eradication	29
3.3.5. Analysis	30
3.4. Results.....	31
3.4.1. Demographics.....	31
3.4.2. Population size	33
3.4.3. Ranging behaviour.....	33
3.4.4. Eradication and monitoring.....	34
3.4.5. Rat incursions	35
3.5. Discussion	35
3.5.1. Demographics.....	35
3.5.2. Ranges, movements, and habitat	36
3.5.3. Lessons learned	37
3.6. Conclusions and recommendations	38
Chapter 4. See how they run: potential mate-finding Allee effect avoidance in house mice ..	39
4.1. Abstract.....	39
4.2. Introduction	39
4.3. Methods.....	41
4.3.1. Study site.....	41
4.3.2. Mouse capture and handling.....	42
4.3.3. Release and tracking	45
4.3.4. Breeding season.....	46
4.3.5. Established population ranging data	46
4.3.6. Statistical analyses.....	47
4.4. Results.....	48

4.4.1. Movements.....	48
4.4.2. Range overlap.....	49
4.4.3. Randomisation test.....	49
4.4.4. Released/Established comparison.....	49
4.5. Discussion.....	51
Chapter 5. Phylogeography of New Zealand house mice in relation to control.....	54
5.1. Abstract.....	54
5.2. Introduction.....	54
5.3. Methods.....	59
5.3.1. Sample Collection.....	59
5.3.2. Molecular methods.....	60
5.4. Results.....	62
5.5. Discussion.....	64
5.5.1. Phylogenies.....	64
5.5.2. Control outcome.....	66
5.5.3. Summary and conclusions.....	68
Chapter 6. Population structure and colonisation history of house mice on a small island....	69
6.1. Abstract.....	69
6.2. Introduction.....	69
6.3. Methods.....	71
6.3.1. Study site and genetic sample collection.....	71
6.3.2. Trapping methods.....	72
6.3.3. Population genetics.....	73
6.4. Results.....	76
6.4.1. Trapping methods.....	76
6.4.2. Population genetics.....	79
6.5. Discussion.....	80
6.5.1. Colonisation history.....	81
6.5.2. Social organisation.....	82
6.5.3. Population structure.....	83
6.5.4. Summary and Conclusions.....	84
Chapter 7. General conclusions.....	85
7.1. Research summary.....	85
7.1.1. Mouse invasion biology.....	85

7.1.2. Eradication	86
7.1.3. Conclusions.....	88
7.2. Mice and rats.....	89
7.3. Management recommendations	89
7.4. Future perspectives.....	91
7.5. Closing thoughts	92
References	93
Appendix 1. House mouse eradications database.....	114
Appendix 2. MARK models	118

List of Figures

Figure 3.1: Location of Saddle Island	27
Figure 3.2: Number of mice caught and estimated population size by session.....	33
Figure 4.1 Location of Saddle Island	42
Figure 4.2 Release 7 tracking data.....	48
Figure 4.3 Mean area covered during tracking.....	50
Figure 4.4: Mean distance moved per night by radio-tracked animals.....	50
Figure 5.1: Mouse sampling locations.....	57
Figure 5.2: Phylogenetic tree for <i>M. m. domesticus</i>	63
Figure 6.1: Location of Saddle Island	71
Figure 6.2: Distribution of between-capture distances	77
Figure 6.3: Pre-eradication MCP ranges	77
Figure 6.4: Deterministic probability analysis and Bayesian clustering results.....	78

List of Tables

Table 2.1 Factors investigated in analysis of eradication attempts	17
Table 3.1 Summary of trapping visits to Saddle Island	27
Table 3.2 Monitoring visits to Saddle Island	30
Table 3.3: Summary of captures and recaptures on Saddle Island	32
Table 3.4: Demographic information for mice captured on Saddle Island	32
Table 3.5: Mouse density calculated for each trapping session on Saddle Island	34
Table 3.6: Summary of movement data obtained in July 2008	34
Table 4.1: Summary information for all released animals.....	44
Table 5.1: House mouse collection locations and control regime summaries	58
Table 5.2: NCBI accession number	61
Table 5.3: <i>domesticus</i> D-loop haplotypes	65
Table 6.1: Models of social organisation in house mouse populations	70
Table 6.2: Summary of trapping visits to Saddle Island	70
Table 6.3: Primer details.....	74
Table 6.4: Genetic characteristics of mice from Saddle Island	80