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Conservation Biology of the goldstripe gecko
(*Hoplodactylus chrysosireticus*)
and interactions with Duvaucel's gecko
(*Hoplodactylus duvaucelii*) on Mana Island, Cook Strait,
New Zealand.

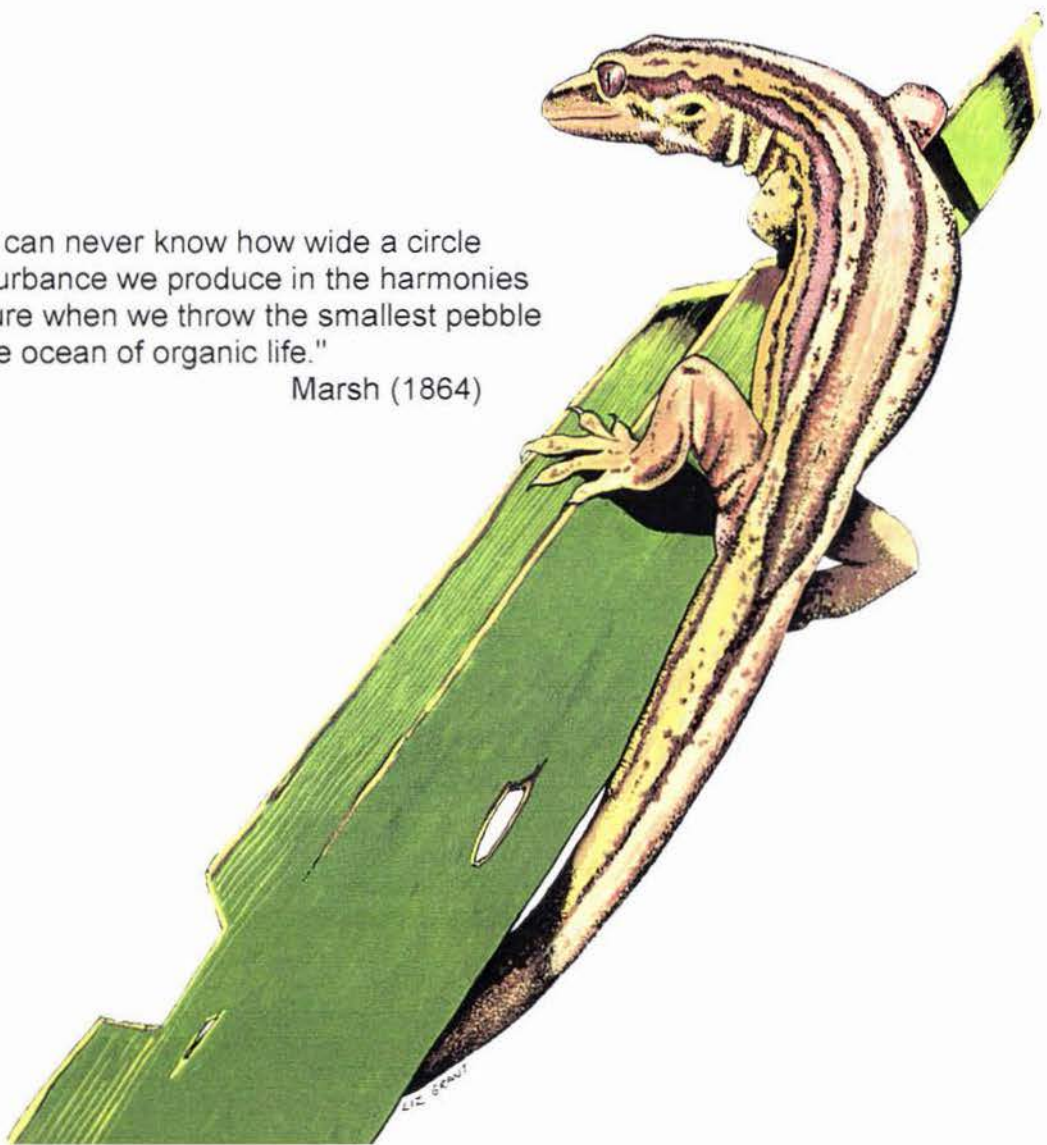
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"... we can never know how wide a circle of disturbance we produce in the harmonies of nature when we throw the smallest pebble into the ocean of organic life."

Marsh (1864)



Abstract

The conservation biology of goldstripe geckos (*Hoplodactylus chrysosireticus*) on Mana Island was considered in two ways. First, by studying the ecology, behaviour and population dynamics of *H. chrysosireticus* on Mana Island and in Taranaki and second, by assessing their behaviour in the presence of newly introduced Duvaucel's geckos (*Hoplodactylus duvaucelii*) on Mana Island.

The activity patterns of *H. chrysosireticus* were observed at night and during the day on Mana Island between November 1996 and October 1997. *H. chrysosireticus* were found to exhibit higher levels of diurnal behaviour than previously thought, with over two-thirds of all animals caught during daylight hours (170 out of 257 individuals; mean catch rate = 2.59 per person hour), a behaviour uncharacteristic of the genus. A female-biased sex ratio (0.53:1 male: female) was found among adult *H. chrysosireticus* on Mana Island but a male bias (1:0.5 male: female) was observed in the Taranaki population. This could be due either to a female-specific behaviour making them more catchable and hence taken more frequently by predators on the mainland, or to the effect of stochastic processes working on a small population. Growth curve estimations showed *H. chrysosireticus* is slow growing and long-lived, reaching breeding age at around five years. Population size estimates for the main sub-population on Mana Island generated an estimate of 90 (95% C.I. 70-136) animals, less than half (200-300) that arising from a survey of the same area in 1993 (200-300) using different survey and calculation methods. Juvenile mortality was high (63% estimate) in the first year and overall population growth slow. The geckos showed high site fidelity with over 90% moving less than 5m from their original point of capture. Population growth on Mana Island is slow despite the absence of mammalian predators, raising serious questions about the security of the remaining mainland populations.

Two sets of simultaneous cage and enclosure experiments, designed to observe interactions between *H. chrysosireticus* and *H. duvaucelii* were conducted on Mana

Island between December 1997 and February 1998. *H. chrysosireticus* were observed to increase their activity during the day in flax ($F_{2,13}$ $P=0.0040$) and climb more in manuka ($F_{2,5}$ $P=0.0450$) when in the presence of *H. duvaucelii*. *H. duvaucelii* also appear to have preyed upon young *H. chrysosireticus* when in close contact. The implications of introducing *H. duvaucelii* to Mana Island and future conservation measures for *H. chrysosireticus* are discussed.

Preamble

Thesis organisation

This research was designed primarily to provide essential base-line data on the behaviour and activity of the threatened *H. chrysosireticus* to aid in the successful conservation of the species on Mana Island. This involved first identifying aspects of the basic ecology of *H. chrysosireticus* through comparisons with another population of the species on the mainland and then estimating the status and potential growth of the main Mana Island population through growth models and population estimates. Following from this, a significant component of this work was to investigate the potential for competitive interactions between *H. chrysosireticus* and *H. duvaucelii* on Mana Island and included carrying out a translocation of *H. duvaucelii* from North Brother Island to Mana Island.

This thesis has a general introduction and discussion with three separate ‘data’ chapters in-between. References have been collated at the end to reduce replication. Two appendices containing data on permanently marked *H. chrysosireticus* from Mana Island and all *H. duvaucelii* caught on North Brother Island, are included at the back. The general organisation of this thesis and an outline of each chapter is provided below:

A general introduction with background information on *H. chrysosireticus* and the situation on Mana Island is given in **Chapter 1**. **Chapter 2** deals with the temporal and spatial behaviour of *H. chrysosireticus* on Mana Island, including a comparison with gecko behaviour from a Taranaki population. **Chapter 3** covers the general ecology of *H. chrysosireticus* on Mana Island in terms of population structure and density. The transfer of *H. duvaucelii* from North Brother Island to Mana Island forms part of **Chapter 4** along with the experimental investigation of interactions between *H. chrysosireticus* and *H. duvaucelii* on Mana Island. **Chapter 5** provides a general discussion and recommendations concerning the continued conservation of *H. chrysosireticus* on Mana Island, given the island’s current restoration focus.

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Dedicated to my best friend and companion

Krissy ??.09.1992 - 29.12.1999

Contents

Frontispiece	ii
Abstract	iii
Preamble: Thesis organisation	v
Acknowledgments	vi
Contents	viii
List of Figures	xii
List of Tables	ixv
List of Plates	xvi

Chapter one: Introduction

1.1 Translocations for ecosystem restoration	1
1.2 Thesis aims and organisation	4
1.3 Mana Island	4
1.4 The goldstripe gecko <i>Hoplodactylus chrysosireticus</i>	8
1.4.1 Distribution, history and conservation status of <i>H. chrysosireticus</i>	8
1.4.2 Behaviour and ecology of <i>H. chrysosireticus</i>	9
1.5 <i>H. duvaucelii</i> and its introduction to Mana Island	10
1.6 North Brother Island	11

Chapter two: Activity and movements of *H.chrysosireticus*

2.1 Introduction	14
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2.2 Methods	15
2.2.1 Study sites	15
2.2.2 Activity	16
2.2.3 Movements	18
2.2.4 Sexing and aging	18
2.3 Results	19
2.3.1 Activity	20
2.3.2 Comparisons with Taranaki <i>H. chrysosireticus</i> and Mana Island <i>H. maculatus</i>	24
2.3.3 Influence of weather variables	26
2.3.4 Climbing	26
2.3.5 Movements	26
2.4 Discussion	29
2.4.1 Activity	29
2.4.2 Movements	32
2.4.3 Conclusions	33

Chapter three: Age structure and population biology of *H. chrysosireticus* on Mana Island

3.1 Introduction	34
3.2 Methods	35
3.2.1 Study sites	35
3.2.2 Capture and marking methods	36
3.2.3 Reproduction and growth rates	37
3.2.4 Population structure and size estimates	38
3.3 Results	39
3.3.1 Sloughing and temporary mark retention	39
3.3.2 Growth rates and age estimation	38
3.3.3 Reproduction and birthing times	41
3.3.4 Population size estimates	42
3.3.5 Mortality and population growth	44
3.4 Discussion	45
3.4.1 Conclusion	47

Chapter four: Restoring a component of Mana Island's reptile fauna: Will the introduction of *H. duvaucelii* compromise the resident *H. chrysosireticus* population?

4.1 Introduction	48
4.2 Methods	50
4.2.1 <i>H. duvaucelii</i> transfer	50
4.2.2 Experimental design	51
4.2.2.1 Large enclosure design	51
4.2.2.2 Small cage experiment	53
4.3 Results	55
4.3.1 Transfer of <i>H. duvaucelii</i>	55
4.3.2 Cage and enclosure experiments	56
4.3.2.1 Temporal activity	56
4.3.2.2 Spatial distribution and climbing behaviour	59
4.3.2.3 Use of flax inflorescences	60
4.3.2.4 Small cages	60
4.3.3 Condition of geckos after the experiments	62
4.3.4 Release of <i>H. duvaucelii</i> on Mana Island	62
4.4 Discussion	63
4.4.1 Comparison of small cage and large enclosure	66
4.4.3 Future encounters between <i>H. duvaucelii</i> and <i>H. chrysosireticus</i>	66
4.4.4 Conclusion	68

Chapter five: Conservation of *H. chrysosireticus*: summary and recommendations

5.1 Ecology and population status of <i>H. chrysosireticus</i>	69
5.2 Future conservation of <i>H. chrysosireticus</i>	70
5.3 Interactions with <i>H. duvaucelii</i>	71
5.4 Recommendations	72

References	74
Appendix one:	
Records of toeclipped <i>H. chrysosireticus</i> on Mana Island	86
Appendix two:	
<i>H. duvaucelii</i> data, North Brother Island	90

List of Figures

1.1 Approximate known distribution of <i>H. chrysosireticus</i> and locations mentioned in the text.	5
1.2 Map of Mana Island showing study sites.	6
2.1 Correlation between catch rates and encounter rates of <i>H. chrysosireticus</i> on Mana Island between July 1996 and October 1997.	19
2.2 Mean monthly catch rates (+ SE) of <i>H. chrysosireticus</i> in flax on Mana Island.	20
2.3 Overall catch rates for <i>H. chrysosireticus</i> in flax on Mana Island in relation to time of day (No searches took place between 0300 and 0600).	22
2.4 Monthly catch rate (mean \pm SE) of <i>H. chrysosireticus</i> during the day and at night on Mana Island (November 1996 – October 1997).	24
2.5 Percentage of re-caught <i>H. chrysosireticus</i> on Mana Island in relation to the number of flax bushes moved between captures.	27
2.6 Distance travelled (m) by <i>H. chrysosireticus</i> on Mana Island in relation to the number of days between capture.	28
2.7 Distance travelled (m) by <i>H. chrysosireticus</i> on Mana Island in relation to the number of times caught.	29
3.1 Age estimation and SVL frequencies for <i>H. chrysosireticus</i> on Mana Island caught between May 1997 and October 1997.	42

4.1 Proportion of observation times where <i>H. chrysosireticus</i> were seen active during day and night in manuka enclosures.	57
4.2 Proportion of observation times where <i>H. chrysosireticus</i> were seen active during day and night in flax enclosures.	57
4.3 Proportion of observation times where <i>H. duvaucelii</i> were seen active during day and night in manuka enclosures.	58
4.4 Proportion of observation times where <i>H. duvaucelii</i> were seen active during day and night in flax enclosures.	58
4.5 Proportion of encounters in which <i>H. chrysosireticus</i> and <i>H. duvaucelii</i> were observed climbing on vegetation in flax enclosures.	59
4.6 Proportion of encounters in which <i>H. chrysosireticus</i> and <i>H. duvaucelii</i> were observed climbing on/or amongst vegetation in manuka enclosures.	60
4.7 Proportion of nights (mean \pm SE) where geckos emerged from cover in single species and mixed species cages.	62

List of Tables

2.1 Comparison of mean (\pm SE) catch rate and encounter rate for <i>H. chrysosireticus</i> during day and night searches in flax on Mana Island.	23
2.2 Comparison of catch rate (mean \pm SE) for each age/sex class for <i>H. chrysosireticus</i> during day and night searches in flax on Mana Island.	23
2.3 Comparison of day and night catch rates (mean \pm SE) between Mana Island <i>H. chrysosireticus</i> , Taranaki <i>H. chrysosireticus</i> , and Mana Island <i>H. maculatus</i> in flax.	25
2.4 Number of flax bushes and distance (m) travelled by <i>H. chrysosireticus</i> between captures.	28
3.1 Residual mean square estimates and fitted values for asymptotic length (a) and intrinsic growth rate (r) for Von Bertalanffy, Logistic-by-length and Logistic-by-weight growth models.	40
3.2 Comparison of age estimates in relation to SVL for <i>H. chrysosireticus</i> on Mana Island and <i>H. maculatus</i> on Motunau Island (Bannock <i>et al</i> 1999).	41
3.3 Population estimates for <i>H. chrysosireticus</i> in areas A and G on Mana Island, and Matekai Park in Taranaki, October 1997, generated using CAPTURE.	44
3.4 Life table for <i>H. chrysosireticus</i> up to four years of age at area A, Mana Island.	44
4.1 Distribution of geckos in large enclosures.	52
4.2 Age/size pairings of <i>H. duvaucelii</i> and <i>H. chrysosireticus</i> in small cages.	54

5.1 Comparison of behavioural traits of <i>H. chrysosireticus</i> and <i>H. duvaucelii</i> from Mana Island experiments.	72
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List of Plates

1.1 Goldstripe gecko <i>Hoplodactylus chrysosireticus</i> .	12
1.2 Typical flax habitat of <i>H. chrysosireticus</i> on Mana Island.	12
1.3 Duvaucel's gecko <i>Hoplodactylus duvaucelii</i> .	13
1.4 North Brother Island.	13
2.1 Taranaki study site for <i>H. chrysosireticus</i> activity, Matekai Park, Oakura, New Plymouth.	21
2.2 <i>H. chrysosireticus</i> as found in flax during the day.	21
4.1 Large enclosure design (Flax B), Waikoko flat, Mana Island (Photo R.A. Fordham).	54
4.2 Small cage design.	55
