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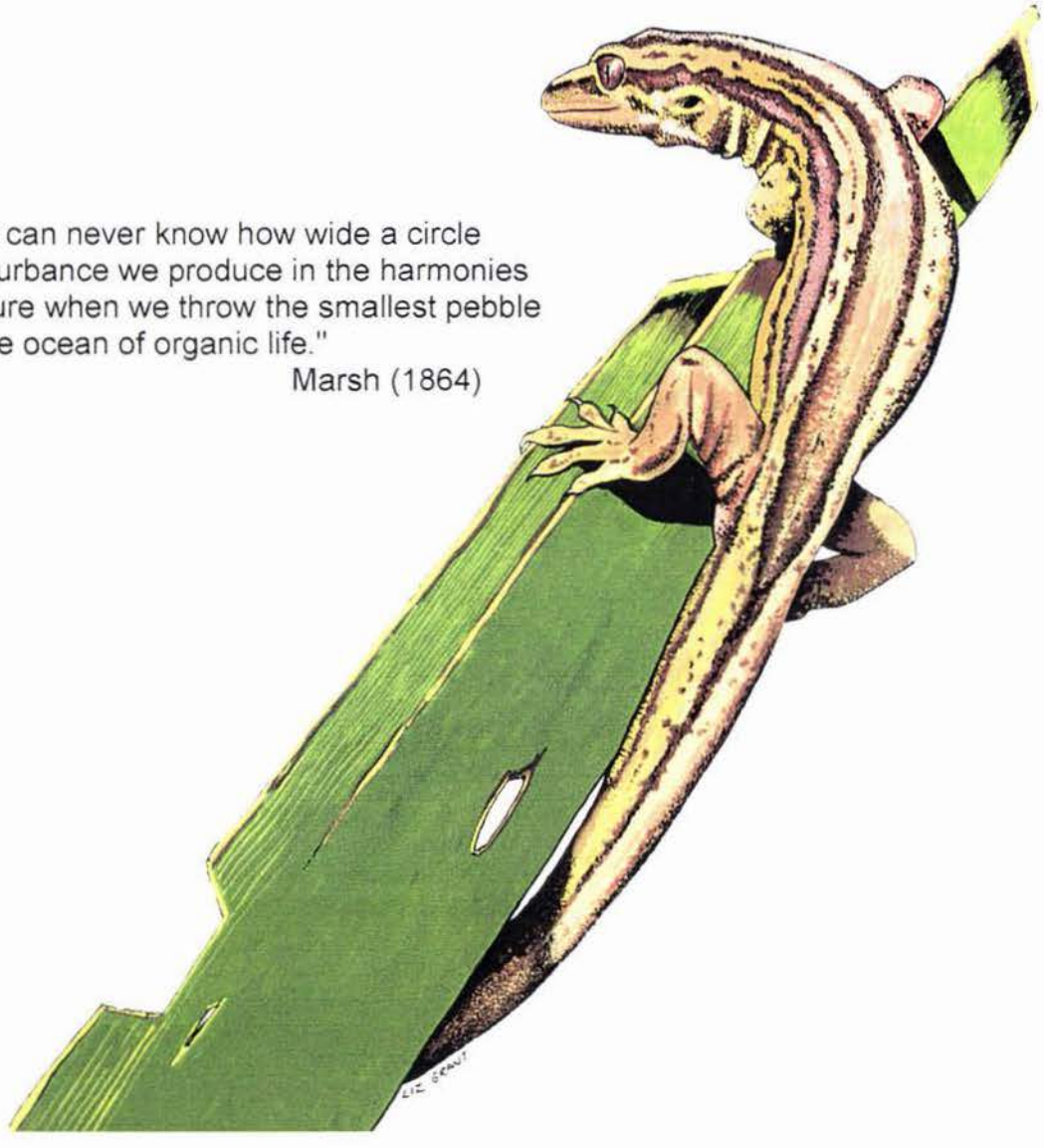
"... we can never know how wide a circle
of disturbance we produce in the harmonies
of nature when we throw the smallest pebble
into the ocean of organic life."

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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Finally, I should thank the beautiful goldstripe geckos for letting me watch them in their world.

Dedicated to my best friend and companion

Krissy ??.09.1992 - 29.12.1999

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

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