# Significance of gecko populations on islands in Lakes Wanaka and Hawea

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# 1. Introduction

Stevensons and Silver Islands in Lakes Wanaka and Hawea, respectively, have been proposed as sites for release of Buff weka, now extinct on the mainland. Weka are known lizard predators. Their impact on lizard populations is poorly understood, as on most islands where they have been introduced, introduced mammalian predators are also present. However, on Kundy Island near Stewart Island and Open Bay Island off Westland, introduced wekas alone appear to have had serious impacts on native lizard populations.

RA Hitchmough's (1997) unpublished PhD research has distinguished 10 gecko species within *Haplodactylus maculatus* as redescribed by Robb & Rowlands (1977). The Wanaka area was not surveyed during Hitchmough's (1997) research, but is close to areas of high species diversity within the *H. maculatus* complex - four species are found within 50 km of Wanaka.

# 2. Aims

This project aimed to identify and assess the conservation significance of populations of the *H. maculatus* complex of geckos found on islands in Lakes Wanaka and Hawea.

The specific information requested was:

1) What is the identity of the gecko specimens supplied?

2) What is the conservation significance of this species?

3) Anything else relevant to this issue.

# 3. Samples

Samples were provided from islands in Lakes Wanaka and Hawea and (for comparison) adjacent mainland sites (Table 1; Figure 1).

# 4. Morphology

Morphology of the specimens separates them into 3 groups, with only a few, mainly immature specimens being difficult to assign to one or other group.

These groups are:

1) Silver Island,West Hawea, Peninsula, Stevensons Island, Bull Island, Mou Waho, Mou Tapu, Beacon Point, Alberttown, Waterfall Creek

2) Mount Iron, Luggate, Ruby Island, Diamond Lake turnoff

3) Pisa Range

Group 1 corresponds to Hitchmough's (1997) *H.* "Southern Alps".

Group 2 corresponds to Hitchmough's (1997) *H.* "Cromwell Gorge".

Group 3 (Pisa Range) specimens showed morphological similarities to both *H.* "Cromwell Gorge" and *H.* "Otago".

Principle features by which *H.* "Southern Alps" and *H.* "Cromwell Gorge" can be distinguished are:

The distal phalange (narrow portion of the toe between the expanded digital pad and the claw) occupies about a quarter of the length of the toe, and tends to taper from the expanded pad to the tip in *H.* "Southern Alps". In *H.* "Cromwell Gorge" it narrows more abruptly from the expanded pad, and occupies about a third of the total length of the toe.

*H.* "Southern Alps" has the rostral scale (the scale at the tip of the snout) just touching the nostril at its corner, or more rarely just excluded. In *H.* "Cromwell Gorge" the degree of contact between the rostral and the nostril is very variable, ranging from the rostral broadly contacting the nostril as in *H. pacificus* to being totally excluded as in northern *H. maculatus*. A few specimens resemble *H.* "Southern Alps" in the degree of contact, but these are uncommon.

In overall build, *H.* "Southern Alps" are shorter and more stocky than *H.* "Cromwell Gorge" of similar size, sex and age. *H.* "Cromwell Gorge" in this area grow slightly larger (up to 70 mm snout-vent) than *H.* "Southern Alps" (up to 66 mm snout-vent) but there is a great deal of overlap in adult size ranges.

*H.* "Southern Alps" tend to be greyer and less boldly patterned than *H.* "Cromwell Gorge", which are more brownish, but there is considerable variation in colour and pattern in both species. *H.* "Southern Alps" usually have a pale stripe from above and in front of the eye, down the sides of the upper surface of the snout, to the nose. The edges of the eye are green or bluish in *H.* "Southern Alps", and gold or grey in *H.* "Cromwell Gorge" in the Wanaka area (although they are green in Cromwell Gorge specimens).

The patch of preanal pores in mature males is 18-22 pores across in *H.* "Southern Alps" and 19-27 pores across in *H.* "Cromwell Gorge".

The Pisa Range animals resembled western populations of H. "Otago" in their large size (up to 75 mm snout-vent) and robust build, and in the colour pattern of regular transverse bands, which showed less variability among individuals than the colour patterns of other populations sampled. However, in foot shape and scale features they resembled *H.* "Cromwell Gorge".

# 5. Allozymes

Allozyme methods were those developed by Hitchmough in his PhD research. Results were obtained from 22 allozyme loci. These results (Figure 2) confirmed the identities of the first two groups derived from morphological examination (*H.* "Southern Alps" and *H.* "Cromwell Gorge"). Two fixed allozyme differences and three frequency differences were found between these groups.

The Pisa Range sample is not genetically distinct from the *H.* "Cromwell Gorge" populations, despite the larger size and distinct colour pattern of the Pisa Range animals, and we conclude that they represent a population of *H.* "Cromwell Gorge".

# 6. Discussion

Technical problems meant that we were unable to resolve some loci, including three which had previously been found to be important in distinguishing populations in this geographic area. This means that divergence (e.g., of the Pisa Range sample from other *H.* "Cromwell Gorge") may have been underesti mated.

Only one species was identified from each site. However, individual samples from the mainland near Wanaka, where the distributions of the two species overlapped, were so small (1-2 animals) that sympatry could have been widespread but escaped detection.

The specific information requested was:

1) What is the identity of the gecko specimens supplied?

Five populations were *H.* "Cromwell Gorge", and 10 were *H.* "Southern Alps" (Table 1). All the island populations apart from Ruby Island are *H.* "Southern Alps". The Ruby Island samples are *H.* "Cromwell Gorge". On the mainland, more northern sites are occupied by *H.* "Southern Alps" and more southern

ones by *H.* "Cromwell Gorge", but there is considerable overlap of their ranges near Wanaka township (Figure 1).

2) What is the conservation significance of this species?

*H.* "Cromwell Gorge" has a very restricted distribution; it was previously known only from the Cromwell and Kawarau Gorges, and from an old museum specimen from the Shotover River area. Population densities at the sites where it had been found previously were fairly low. These records considerably extend the known range of this species. Of the 2 population groups previously sampled, the Wanaka populations appear to be more similar to the Nevis Bluff (Kawarau Gorge) than the Cromwell Gorge populations. Ruby Island is important because it is the only known island population of *H.* "Cromwell Gorge".

*H.* "Southern Alps" is a widespread, common species in northern Otago, Canterbury, and southern Marlborough. The island populations are not distinguishable (morphologically or in allozyme genotypes) from adjacent mainland populations, and therefore are not of great conservation significance.

3) Anything else relevant to this issue.

Apart from the *H.* "Cromwell Gorge" population on Ruby Island (which is not one of the islands for which weka release is proposed), we believe our results provide no reason to oppose weka release because of gecko values. However, if weka are released, we strongly support monitoring of their impact on gecko numbers and habitat use.

The geckos on Silver and Stevensons Islands are found in standing kanuka, or in crevices in rock outcrops rather than under loose rocks on the ground (Tony Jewell, pers. comm.). This should lessen their vulnerability to weka predation, as should their nocturnal habits. The population densities on Stevensons and Silver islands are already low (Tony Jewell, pers. comm.), perhaps because the islands are within swimming range of the mainland for mammalian predators.

# 7. References

Hitchmough, R.A. 1997:A systematic review of the New Zealand Gekkonidae. Unpublished PhD thesis, Victoria University of Wellington. 371 p.

RobbJ; Rowlands, R. P V 1977: Reinstatement of *Hoplodactylus maculatus* (Boulenger) with redescription of *H. pacificus* (Gray) (Reptilia: Squamata: Gekkonidae). *Records of the Auckland Institute and Museum 14:* 133-142.

Table 1. Locations from which geckos were sampled, sample sizes, and specific identities of these samples.

| Sample | Locality | Grid reference | Sample size | Identity |
|---|---|---|---|---|
| sa1 | Silver Island | G39 199 335 | 1 | *H.* "Southern Alps" |
| sa2 | West Hawea | G40 22122 56174 | 1 | *H.* "Southern Alps" |
| sa3 | Peninsula | F40 22025 56148 | 2 | *H.* "Southern Alps" |
| sa4 | Stevensons Island | F40 22634 56159 | 3 | *H.* "Southern Alps" |
| sa5 | Bull Island | F40 22032.5 56104 | 2 | *H.* "Southern Alps" |
| sa6 | Mou Waho | F39 21994 56210 | 2 | *H.* "Southern Alps" |
| sa7 | Mou Tapu | F40 21968 56143 | 1 | *H.* "Southern Alps" |
| sa8 | Beacon Point | F40 22029 56092 | 1 | *H.* "Southern Alps" |
| sa9 | Alberttown | F40 22089 56082 | 1 | *H.* "Southern Alps" |
| sa10 | Waterfall Creek | F40 22004.5 56062 | 2 | *H.* "Southern Alps" |
| cg1 | Mount Iron | F40 22058 56056 | 2 | *H.* "Cromwell Gorge" |
| cg2 | Luggate | G40 22177 55996.5 | 5 | *H.* "Cromwell Gorge" |
| cg3 | Ruby Island | G40 22012 56068 | 3 | *H.* "Cromwell Gorge" |
| cg4 | Diamond Lake turnoff | F40 21897 56095 | 2 | *H.* "Cromwell Gorge" |
| cg?5 | Pisa Range | F41 21992 55857 | 2 | *H.* "Cromwell Gorge"? |
| | | Total | 30 | |

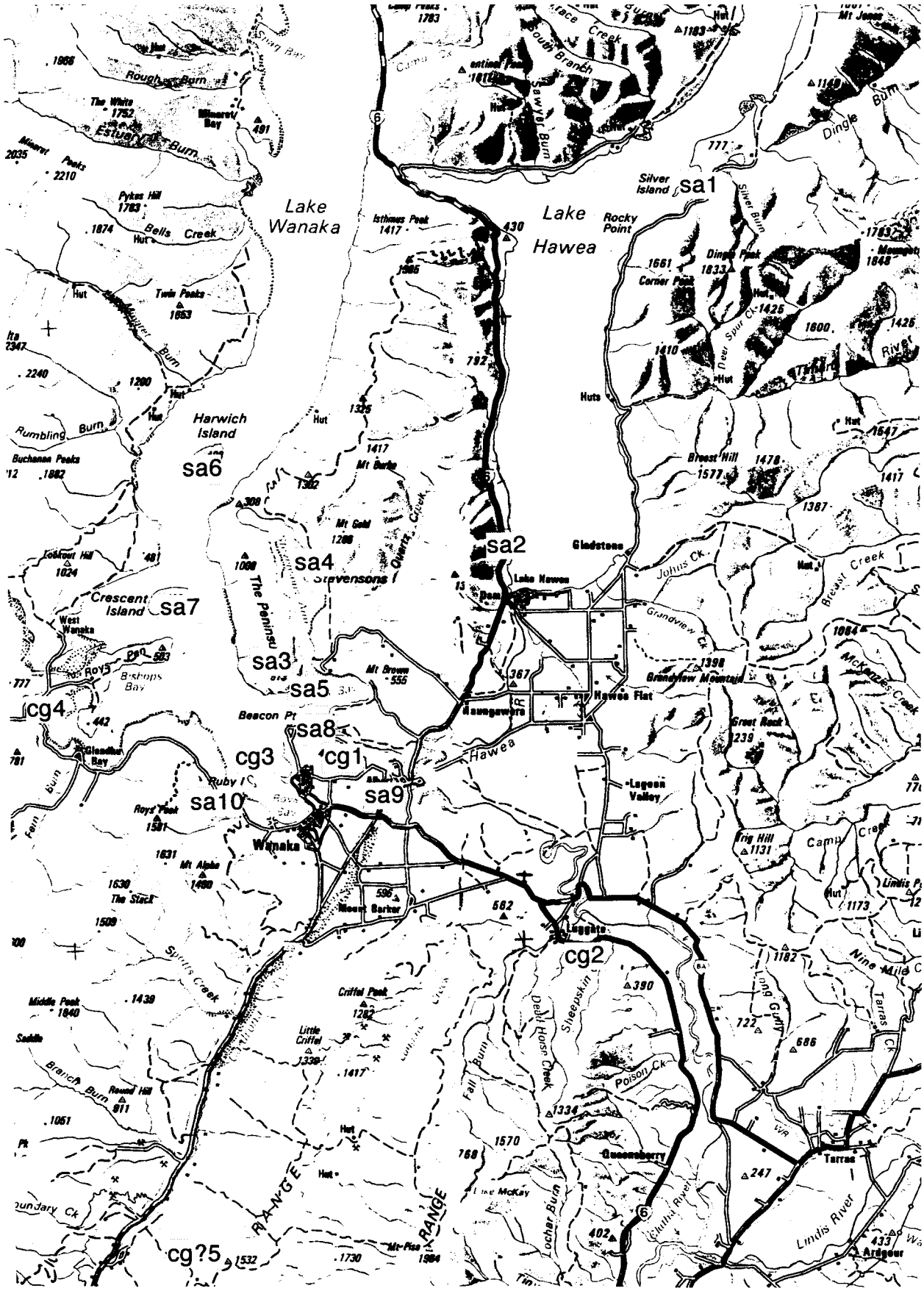


Figure 1: Collection localities of gecko samples, identified to species. sa, *H.* "Southern Alps"; cg, *H.* "Cromwell Gorge". For locality names see Table 1.

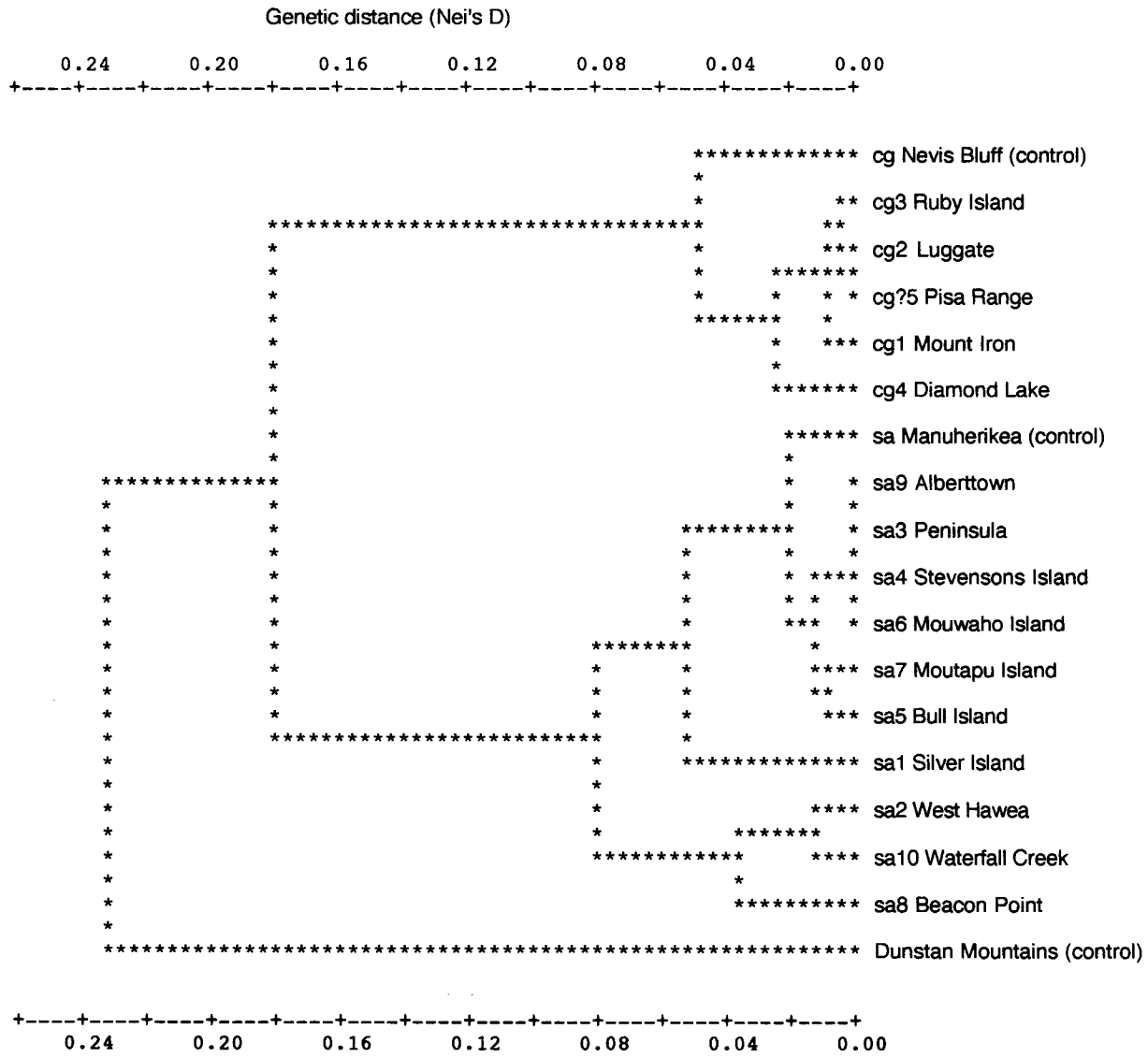


Figure 2: WPGMA tree of populations from the Wanaka area and control samples from adjacent areas. Nevis bluff control represents *H.* "Cromwell Gorge", Manuherikea control represents *H.* "Southern Alps", and Dunstan Mountains control represents *H.* "Otago"