

# Surveys for *Hoplodactylus* aff. *granulatus*, Roys Peak and Mt Alpha, Wanaka

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# 1. Introduction and background

Recent evidence shows the forest gecko *Hoplodactylus granulatus* (*sensu* Thomas 1981) comprises at least two species (Hitchmough 1997). Based on allozyme data, Hitchmough (1997) has reinstated the cloudy gecko *H. nebulosus* from synonymy with *H. granulatus*. Furthermore, Hitchmough (1997) suggests there may be further undescribed species within the *H. granulatus* complex, but the small number of samples available for analyses prevents further subdivision. In particular, forest geckos from the North Island differ genetically from forest geckos of the South Island West Coast. In addition, forest geckos from Nelson/Marlborough are genetically similar to forest geckos from the South Island West Coast, but their life history traits are more similar to forest geckos from the North Island.

Hitchmough (1997) also refers to other geckos that are likely to represent further undescribed species of *H. granulatus* type geckos. A small juvenile gecko from the Esperance Valley in Fiordland superficially resembles *Hoplodactylus rakiurae*, although it is thought to be morphologically quite distinct. Gecko specimens from Open Bay Island off the coast of Westland are soon to be described as a new species (A. Whitaker, pers. comm. 2000). Open Bay Island *H. aff. granulatus* have a distinct form, but share some characteristics of both *H. nebulosus* and *H. granulatus* (*sensu stricto* Hitchmough 1997).

More recently, geckos collected from the Catlins, Otago, are distinct from both *H. nebulosus* and forest geckos found in Westland and the Esperance Valley (Tocher et al. 2000). A gecko found in the Takitimu Mountains in Southland appears closely affiliated with *H. nebulosus* (R. Hitchmough pers. comm. 2000). Finally, a distinct gecko was collected from the Denniston Plateau in Westland in early 1999. The identity of this animal still remains unknown (A. Whitaker, pers. comm. 2000).

In February 1998, LM and RossThompson discovered a gecko under a rock on the summit of Roys Peak (1580 m a.s.l.), during a day tramp from Wanaka. The gecko was discovered on land leased from the Crown by the Police Department. The gecko was small (80 mm snout to vent length) and had brick red coloured markings on its back (Figure 1). Of particular significance, the gecko's mouth lining was bright orange, suggesting the specimen was a type of forest gecko rather than a common gecko of the *Hoplodactylus maculatus* complex (Hitchmough 1997). LM photographed the gecko and replaced it at the point of capture. After examining the photograph, MT organised the first of three expeditions to Roys Peak in March 1998 with the objectives:

1. To collect 1-2 specimens for genetic analyses in order to elucidate the taxonomy of the Roys Peak gecko.
2. To attempt to estimate the abundance, distribution and habitat preferences of geckos from Roys Peak.

Inclement weather resulted in no geckos being found during the first visit to Roys Peak. A second visit later in March 1998 also failed to find the elusive

Roys Peak gecko. During a third visit that was carried out during exceptional weather in January 1999, six Roys Peak geckos were found. The aim of this report is to document the two unsuccessful surveys to Roys Peak, and detail the third successful survey. We also discuss the taxonomy of the Roys Peak gecko.

## 2. Site description of Roys Peak and Mt Alpha

Roys Peak and Mt Alpha are located south-west of the Wanaka township, and both overlook Lake Wanaka and the Mototapu Valley (Figure 2). The Roys Peak-Mt Alpha ridge forms part of a property boundary between the Alphaburn and Hillend pastoral leases (Figure 3). The ridge itself is on the Hillend property. The Crown leases the summit of Roys Peak to the Police Department, and communication towers on the peak are prominent landmarks of the Wanaka Area.

The upper slopes of Roys Peak/Mt Alpha are steep and relatively unmodified, and have a snow cover for 3-4 months of the year. On the north-west slopes, tall and moderately dense *Chionochloa rigida* is prevalent, and there is a dense tussock litter layer. False spaniard *Celmisia lyallii* is the dominant tall inter-tussock species; while true spear grass (*Aciphylla aurea*) is sparsely scattered. At ground level, areas not covered in tussock litter have *Pimelea oreophila*, *Leucopogon fraseri*, *Raoulia subsericea*, and *Lycopodium fastigiatum*. Weeds are sparse. *Dracophyllum pronum* is the most common shrub and can be locally abundant (Barkla pers. comm.).

Small rock outcrops and bluffs have shrubs of *Helichrysum intermedium*, *Gaultheria crassa* and *Carmichaelia petrei*. Other species include *Pentachondra pumila*, *Raoulia australis*, *Wahlenbergia albomarginata*, *Celmisia gracilentia*, *Geranium sessiliflorum*, *Epilobium* sp., *Rytidosperma setifolia* and *Colobanthus buchananii* (Barkla pers. comm.).

Below 1000 m, most of the land has been oversown and top-dressed and is much modified from its original tussock and native scrub or forest cover. Some beech forest remnants persist in the lower-altitude valleys.

Much exposed rock is present in the vicinity of Roys Peak and Mt Alpha, but the rock shows evidence of recent disturbance by snow melt or freeze/thaw processes. The Roys Peak/Mt Alpha ridge has many large rock outcrops (Figure 3) which are not well fissured, and provide no obvious retreat sites for lizards. Boulder fields are common on less steep slopes, but the boulders are usually wet underneath and thus unsuitable for gecko occupation. Small non-moving boulder piles are also present, in particular near the summit of Roys Peak.

On the north-east slopes of Mt Alpha, a 0.25 ha area of large (>5 m x 5 m) boulders have fallen from the rock castles on the ridge of Mt Alpha and accu-

mulated in a depression. It was at this site that the majority of the Roys Peak geckos were located (Figure 3 and 4). This was the only area of this habitat type located during surveys. Sign of the Roys Peak gecko (sloughed skin remains) was also found in two very localised areas of rock slabs/boulder stacks (approx. 50 m x 80 m). In these areas, rocks mounted on rocks partially embedded into the ground provided deep and dry retreats for the Roys Peak gecko.

## 3. Surveys for Roys Peak geckos

Both day and night surveys were carried out during all three surveys of Roys Peak. Day searches involved lifting rocks to search for geckos or their sign. Night searches were made using lights mounted on binoculars to detect gecko eye shine (see Whitaker 1994 for a full description of this method).

For this report, grid references (expressed in New Zealand metric grid, NZMG) and altitude (m) are derived from the 1:50 000 topographical map series (NZMS) 260 sheet F40 (Wanaka).

All lizards captured were sexed and checked for mites, bites and scars. Four of the six Roys Peak geckos that were found on the third survey were released at the exact point of capture following their measurement. The capture site was temporarily marked with reflective tape and also by rock cairns. Two geckos were taken from the field and sent to Rod Hitchmough, Victoria University of Wellington, for him to determine their taxonomy.

Prior to their release, four Roys Peak geckos were toe-clipped to obtain a genetic sample. Toes were removed using nail scissors sterilised between the clipping of different animals by wetting and flaming with ethanol. Toes were placed in 100% ethanol, and were also sent to Rod Hitchmough.

Body measurements were made in the field on all animals caught. Snout-vent length (SVL) and vent-tail length (VTL) were measured using a ruler to the nearest 1 mm; weight was measured to the nearest 0.1 g using a Pesola™ spring balance.

### 3.1 SEARCH 1

#### **8-9 March 1998**

Survey members: Leigh Marshall, Mandy Tocher and David McFarlane. This first search for the Roys Peak gecko was severely hampered by bitterly cold and wet weather. Nevertheless, a brief period of day searching was carried out by lifting rocks in the vicinity of the original capture site (F40 969 051) on 8 March during wet, cold and windy weather. A night search in the same area was also attempted on the cold evening of 8 March. This search primarily had the goal of familiarising all party members with the technique of

searching for gecko eye reflections (Whitaker 1994). We used Pentax™ 12 x 50 mm binoculars with a mounted Winchester™ head lamp, attempting to get the light beam as close as possible to the line of sight of the binoculars (one set of spotlighting equipment). The night was thick with cloud and visibility was less than 5 m. The air temperature was approximately 4°C as we left camp to begin the search, and it progressively dropped throughout the search.

Day searching was continued on the morning of 9 March. The weather was cloudy during the morning search and visibility was low. The search concentrated on the north-east face of Roys Peak and was continued at random stop-points near the track during our descent to the car park. Three sloughed gecko skins were found, two at F40 969 051, and one at F40 975 056 (200 m from the summit facing Wanaka). Only one of the skins was in good enough condition to collect from the field (one of the skins from F40 969 051); this skin was subsequently sent to Rod Hitchmough, Victoria University of Wellington. The skin was clearly marked with two wide longitudinal dorsal stripes, identical to markings found on the gecko found by LM in February 1998 (Figure 1).

*Oligosoma maccanni* were common both on the summit of Roys Peak, and at sites we searched on our descent to the car park on 9 March. During the worst of the weather, *O. maccanni* were observed sheltering beneath rocks. In total, approximately 40 ha were covered during Search i (Figure 5).

### 3.2 SEARCH 2

#### **21-22 March 1998**

Survey members: Leigh Marshall, Mandy Tocher, Steve Broni, Katie James. Cold and windy weather resulted in no geckos being found during this survey. On this occasion the survey team flew to the top of Roys Peak by helicopter and scoped available habitat for 2 hours prior to nightfall. Habitat suitable for spotlighting was identified, in particular the large castle-like rock tors on the Roys Peak/Mt Alpha ridge (Figure 3). Two teams began searching for eye reflections around 7:00 pm (temperature at beginning of search was 7 °C). Soon after dark the temperature dropped below 5 °C and became windy and cold. Very few invertebrates and no geckos were observed. In total 6 hours were spent searching (12 person hours). We covered large bluffs and rock fields, but no geckos or their sign were found. A further 5 person hours were spent day-searching the south-western face of Roys Peak on 22 March, and in total, approximately 100 ha of habitat was surveyed (Figure 5).

### 3.3 SEARCH 3

#### **25-27 January 1999**

Survey members: Leigh Marshall, Mandy Tocher, Michael George, Clayton Hessel, Mathew Lark, Julia Brooke-White. The summer of 1998/99 was characterised by severe drought conditions, and as such the weather during this survey was

ideal. Day temperatures soared to early-mid 30°C and temperatures stayed above 10°C well into the night.

### **Field log for Search 3**

January 25. After setting up camp 100 m from the summit, the entire party ascended to the summit at 4:00 pm. The temperature was approximately 25 °C at the time of ascent. Suitable sites for spotlighting were identified on the eastern slopes of Roys Peak, in particular the area within which all the sloughs had been found during Search 1, and including the summit. The habitat appeared marginal and was very sparse throughout this area (Figure 6). What appeared to be suitable habitat was sighted on the north-eastern face of Mt Alpha (Figure 3). After locating potential spotlighting sites, we returned to camp and prepared for the evening's spotlighting.

Two teams were formed for spotlighting. Team 1= MT, MG, ML and JB-W surveyed the area where the previous sightings of Roys Peak geckos and their sloughs were found. One and a half hours were spent searching the face below the summit of Roys Peak. The team reached the summit at 1:45 am after searching unsuitable habitat for one hour. The second team of LM and CH searched the boulder field on the northern flanks of Mt Alpha (Figure 3). The evening was warm and still (13.8°C at 10:00 pm).

A single gecko was found on the summit of Roys Peak, and three geckos were located in the boulder field underneath the summit of Mt Alpha (Table 1). Geckos were captured as they foraged on rocks and were transported back to the camp for measuring and photographing (Appendix 1).

January 26. Two geckos (gecko 2 and 4; Table 1) were released at the point of capture prior to the beginning of the night's search. MT, LM, CH, and MG conducted a second night search of the boulder field below Mt Alpha (Figure 3). Another 3 geckos were found, including a recapture of a gecko caught on January 25.

January 27. We moved camp downhill and MT, CH, and MG conducted a night search of rock fields and bluffs at the lower altitude. Six *Hoplodactylus* 'Southern Alps' were found, four of which were collected and measured (Table 1). Toe-clips taken from the *H.* 'Southern Alps' geckos were sent to Rod Hitchmough, with photographs, to confirm their identity.

## **4. Taxonomy of Roys Peak gecko**

The single slough that was collected in March 1998 and sent to Rod Hitchmough (Victoria University of Wellington) was of insufficient quality to enable DNA extraction. However, DNA analysis of the toe-clip material taken from all six Roys Peak geckos (Rod Hitchmough took toe-clips from the two

live geckos sent to him), and morphological examination of the two live specimens convincingly show that geckos from Roys Peak and the Catlins/Southland together represent a distinct species (also see Tocher et al. 1999). The Roys Peak gecko is also likely to be distinct from the Catlins/Southland gecko. More widespread sampling of the Catlins/Southland gecko populations is needed to determine whether the variation within the Catlins/Southland gecko is less than that between the Catlins/Southland gecko and the Roys Peak geckos (R. Hitchmough pers. comm. 2000).

## 5. Discussion

The conservation status of the Roys Peak gecko is presently unable to be determined because of insufficient information. Until further information on the genetic variation within the Catlins/Southland gecko is gathered, the specific status of the Roys Peak gecko is questionable. In addition, there is insufficient information on the area of occupancy, total population size, degree of human induced fragmentation, and threats concerning Roys Peak geckos to allow a threat of extinction rating to be assigned (Molloy et al. 2000).

The data collected during the three surveys of Roys Peak and outlined in this report provide only limited data on distribution. However, it appears Roys Peak geckos are an alpine gecko, as all specimens were found above 1000 m, and below this altitude common geckos *Hoplodactylus* 'Southern Alps' (Hitchmough 1997) were numerous. The lack of common geckos above 1000 m indicates that both Roys Peak and common geckos have different habitat preferences or that they are subject to competitive exclusion. Both geckos share similar life history traits in that they are similar in body size and are nocturnal.

Results obtained from Rod Hitchmough indicate Roys Peak forest geckos have many morphological similarities to the Catlins/Southland forest gecko type. If Roys Peak and Catlins/Southland geckos share a similar evolutionary history, it is evidence that forest geckos were once widespread throughout Otago and now only persist at high altitudes where predation threats are minimal, or in areas where large tracts of forest remain, e.g. the Catlins district. Furthermore, it suggests that forest geckos similar to the Roys Peak gecko and the Catlins/Southland gecko may form relict populations throughout suitable habitat over other parts of the South Island. A case in point, a Department of Conservation staff member recently discovered a gecko on a roadside on Banks Peninsula, near the largest remaining podocarp forest fragment (C. Ricard pers. comm. April 2000). The gecko was markedly different in behaviour to geckos from the *H. maculatus* complex (Ricard pers. comm. 2000). Apart from this sighting, forest geckos are not known from the Banks Peninsula.

Continued habitat clearance, fire, and the suite of introduced predators are constant threats to the remaining populations of forest geckos and related species, especially in lower-altitude sites. It is becoming clear that other species of gecko remain in the South Island of New Zealand awaiting discovery.



## 6. Priorities for future work

1. Determine genetic and morphological variation within Catlins/Southland gecko to determine the specific status of Roys Peak geckos.
2. Examine the distribution of Roys Peak geckos over suitable terrain adjacent to Roys Peak, and in particular gather required data to assign a 'threat of extinction ranking' (Molloy et al. 2000).
3. Explore the ecophysiology of Roys Peak gecko in order to determine its degree of alpine specialisation.

## 7. Acknowledgements

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## 8. References

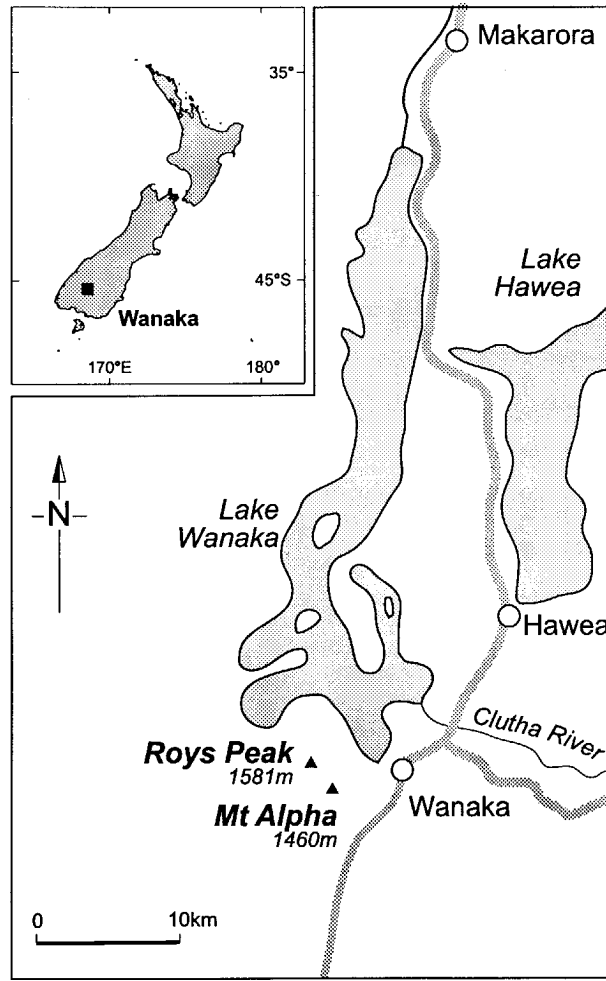
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Table 1. Summary table listing all geckos caught during Search 3 to Roys Peak.

Date	Roys Peak geckos	Toeclip	<i>Hoplodactylus</i> 'Southern Alps'	Search area	Search time	Grid reference	SVL	VTL	Weight	Sex	mites	regeneration
26/1/99	Gecko 1	Collected		Roys Peak	1:55am	F40 9695 0515	80	70	12	M	N	
25/1/99	Gecko 2	1004		Mt Alpha	11.35pm	F40 975 032	75	19	7.5	M	Y	19
25/1/99	Gecko 3	Collected		Mt Alpha	1.15am	F40 975 032	73	60	8.5	M	Y	
26/1/99	Gecko 4	2004		Mt Alpha	1.45am	F40 975 032	78	81	12.5	M	Y	
26/1/99	Gecko 5	3004		Mt Alpha	11.30pm	F40 975 032	78	63	11	M	Y	
26/1/99	Gecko 6	4004		Mt Alpha	12.00pm	F40 975 032	70	72	8	F	Y	
27/1/99		1004	Gecko 1	Roys Peak		F40 986 058	61	70	6.1	F	Y	
27/1/99		2004	Gecko 2	Roys Peak		F40 986 058	72	74	8	M	Y	
27/1/99		3003	Gecko 3	Roys Peak		F40 986 058	65	65	5	M	Y	
27/1/99		4004	Gecko 4	Roys Peak		F40 986 058	72	71	8.5	F	Y	



**Figure 1:** The original gecko collected and photographed by Leigh Marshall in February 1998. This individual was recaptured in January 1999 and retained as a voucher specimen.



**Figure 2:** Location of Roys Peak and Mr Alpha overlooking Wanaka township in Otago, New Zealand.



**Figure 3:** Roys Peak -Mt Alpha ridge. Photograph taken from Roys Peak looking towards Mt Alpha on the skyline. The arrow (top left) indicates the location of the boulder field where the majority of the Roys Peak geckos were found.

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