

# Survey for forest geckos (*Hoplodactylus* aff. *granulatus*) in the Catlins/Southland district

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# 1. Introduction and background

The forest gecko *Hoplodactylus granulatus* (*sensu* Bauer 1990) is a medium-sized, normally grey or brown, but sometimes brightly-coloured lizard which is regarded as one of New Zealand's most common and widely distributed species (Robb 1986, Gill & Whitaker 1996). Forest geckos are nocturnal and cryptic both in coloration and behaviour, but are relatively easy to find by experienced observers in areas where they are common (e.g. Maud Island). The species was first described by Gray (1843) and Hitchmough (1997) provides the most recent synonymy.

Forest geckos are present throughout the North Island, and the South Island except for the rain shadow areas of the main dividing ranges (Hitchmough 1997). The conspicuous absence of forest geckos from most of Otago and Canterbury is presumably because of the long history of land clearance for farming, or perhaps because they cannot compete with other *Hoplodactylus* spp in dryer habitats.

Dr Rod Hitchmough, and Dr Charles Daugherty, Victoria University of Wellington, have recently conducted genetic and morphological analyses of the New Zealand Gekkonidae. Results suggest that *Hoplodactylus granulatus* as presently defined, comprises several similar, yet distinct species (Daugherty et al. 1994, Hitchmough 1997); namely *Hoplodactylus* aff. *granulatus* from the North Island, Westland, Nelson/Marlborough, and Catlins/Southland. Photographs and live specimens of the Catlins/Southland forest gecko (captured during this survey; see Results below) suggest they are the fourth type' of forest gecko.

As well as the four types of forest gecko listed above, a second group of geckos is present in the South Island. To avoid confusion, we call them here the 'new forest geckos' (in that they have been distinguished from typical forest geckos in recent time). A 'new forest gecko' is known from a single specimen collected from the Esperance Valley in Fiordland (photographed in Hitchmough 1997). This gecko superficially resembles *Hoplodactylus rakiurae*, although quite distinct. New forest gecko specimens from Open Bay Island off the coast of Westland probably represent another distinct form, having some characteristics of *H. nebulosus* (Hitchmough 1997) and *H. granulatus* (*sensu stricto*). More recently, new forest geckos have been collected from the Takitimu Mountains in Southland which also appear closely affiliated with *H. nebulosus*, and new forest geckos from Mt Roy in Otago have only been discovered in January 1998.

A photograph from the Catlins/Southland region showing a forest gecko with blue eyes provided the impetus to conduct this survey in the Catlins/Southland, where there had been no confirmed sightings for several decades. Forest geckos with blue eyes have also been noted in Westland and North-west

' We have decided to use the term 'type' throughout this report to describe the four forms of forest geckos that are likely to be named new species in the near future (Hitchmough 1997).

Nelson (A. Whitaker pers. comm. and B. Goetz pers. comm.). From examining the photograph in Appendix 9, it seemed likely that forest geckos from the Catlins/Southland represented a new type of forest gecko (Hitchmough pers. comm. 1997, TJ pers. obs.).

Museum specimens lodged in the Otago Museum are mostly inadequately labelled, but specimens of forest geckos have been collected from the general localities of Glenomaru, "Catlins", Catlins River, and Riverton. All specimens differ markedly in morphology from Westland forest geckos (TJ pers. obs.).

Most information about Catlins/Southland forest geckos has come from the late Mrs P. Soderstrom of Progress Valley. She had a large collection of live forest geckos (B. Thomas pers. comm.) which her grandson (also of Progress Valley) said were bred from specimens loggers brought her when they encountered them from large rimu, and sometimes rata. He said the geckos "bred like wildfire", suggesting that should management be required for this species, a captive propagation programme might prove effective.

In 1972 Mrs Soderstrom published an account of the food preferences of her captive specimens (Soderstrom 1972). The nocturnal owl moths were the favourite food of the captive geckos, suggesting *Hoplodactylus* aff. *granulatus* from Catlins/Southland are also nocturnal.

Thomas (1982) listed a number of localities in the Catlins area from which Mrs Soderstrom felt certain her geckos had originated: Haldane, Progress Valley, Long Beach, Chaslands, Tautuku, and Catlins River. Several people visited or contacted Mrs Soderstrom regarding her lizards (including A. Whitaker, B. Thomas, G. Loh, D.G. Quin, D. Keal and D. C. Waddington) and at least some photographs of her specimens were taken (see Appendix 9). Mrs Soderstrom sent photos of geckos from Chaslands and from Progress Valley to Tony Whitaker in 1971 (Appendix 9).

In light of continued development in the Catlins/Southland and Southland, selective logging, and high possum numbers, determination of the status of the Catlins/Southland geckos is imperative. Also, if Catlins/Southland geckos are found to be a distinct type, the survey will increase knowledge of New Zealand's biodiversity.

We had three major objectives in conducting our survey:

1. To collect 1-2 specimens for genetic analyses to elucidate the taxonomy of the type.
2. To estimate the abundance and distribution of forest geckos in the Catlins/Southland, and if possible determine their habitat preferences.
3. To make a preliminary assessment of threats to Catlins/Southland forest geckos.

## 2. Methods

A week was spent searching for forest geckos in January 1997. The surveys were concentrated in coastal Catlins but ranged up to 25-30 km inland (see Table 1). Rata/kamaha forests are predominant in the district, and we timed our survey to coincide with rata (*Metrosideros umbellata*) flowering (1997 season did not produce significant flowering; Mark Townsend pers. comm. 1997). Most areas surveyed had been selectively logged and contained few large podocarps, although some survey areas still had old podocarps intact. We also surveyed an extensive area of regenerating forest.

Searches were made by night and day for forest geckos, and on three occasions searches were made for other lizard species within the Owaka Field Centre boundaries (Coastal Otago Area Office).

Daytime searches for forest geckos consisted of searching under bark and other loose tree coverings, under fronds of tree ferns, and among foliage of trees and shrubs, for sign (faecal pellets, sloughed skin) or forest geckos themselves. We also listened during such surveys for the distinctive rustling sound of lizards escaping when disturbed. Patches of sunlight on tree trunks were searched for basking geckos. Logs and other ground cover capable of harbouring inactive geckos were searched.

For night searches for forest geckos, binoculars with headlights attached above and in the line of sight, were used to scan vegetation in search of the distinctive red/pink eye reflections of geckos. Two of us used 12 x 50 mm binoculars, and the third used 7 x 50 mm.

Night searches began as soon as practical after dark (usually around 22:30 hr). For each search (both day and night) the time spent searching was recorded. Air temperature at the beginning and end of the search was also recorded using a temperature thermocouple ( $\pm 1$  °C). General weather conditions were noted.

For each gecko found, more detailed information on weather conditions, activity/behaviour of the gecko at the time of capture, and description of the vegetation at the site of collection were noted. Geckos caught were weighed, sexed, measured and kept in cloth bags until they were transferred into plastic vivaria.

Geckos were housed in vivaria until they were sent live to Rod Hitchmough at Victoria University of Wellington. One specimen was transferred to the care of an experienced captive keeper (the Long Beach specimen is now in the care of TD).

For both day and night searches, existing trails were utilised wherever possible, with the exception of a night search into unlogged forest at the east end of Long Beach.

## 3. Results

### 3.1 LIZARD FAUNA - GENERAL

Six species of lizards were found during the survey. Five were found on a half-day survey of the Department of Conservation red tussock reserve in the Kaihuki Ranges: *Hoplodactylus* aff. *maculatus* (*H.* 'Otago'; Hitchmough 1997), *Oligosoma chloronotum*, *O. inconspicuum*, *O. nigriplantare polychrome* and *O. maccanni*. All five species were found within 1 hour of searching by the authors and Mark Townsend (FCS Owaka), and are assumed to be present in good numbers at the site. The weather was sunny and warm, which aided greatly our survey at this site. The *O.n. polychrome* and *O. inconspicuum* records from this site represent a range extension to the south-east, and both species were previously unknown from the Catlins area.

Of concern, we visited two sites (Mt Samson and Rocky Knob/Craggy Tor) which had what appeared to be suitable rocky habitat for *H. aff. maculatus*, but no geckos or their sign were found. According to a local farmer, Mt Samson did have 'greenish grey lizards' less than 10 years before our survey.

The sixth species encountered on this survey was *Hoplodactylus* aff. *granulatus* (see next section).

### 3.2 CATLINS/SOUTHLAND FOREST GECKOS

Two specimens of *Hoplodactylus* aff. *granulatus* (called here 'Catlins/Southland forest geckos') were found during our survey. The first specimen was found during a day search of a deserted forestry track near Long Beach (see Table 1 and below for a full site description). We revisited a site previously visited by Tony Jewell (during summer 1994; NZMS 260-G47 231 924). During Tony's first visit he heard 'rustlings' which were likely made by escaping lizards, one of which was sighted (a dark grey-brown gecko) among *Blechnum discolor* ferns at the side of the track. We revisited the site during this survey and heard a similar rustling from a *Blechnum discolor*, approximately 50 cm above the ground. We waited, but the animal failed to re-appear. We removed fronds until the gecko dropped to the ground (approximately 2:30 p.m.; Figure 1).

The *Blechnum discolor* was growing on a north-facing bank above an abandoned road (5-10 m wide; Figure 1). The road was very damp underfoot and fell to a steep gully with a stream. Unlogged podocarp forest was present less than 0.5 km from the collection site. A single specimen of whistling frog (*Litoria ewingii*) was found in the same fern which harboured the Catlins/Southland forest gecko.

A second specimen (Figure 2) was located by spotlight, at night, within minutes of arriving at the Hukihuki Road site (NZMS 260-G47 305 944) at a distance of 10 m from the track (see Table 1 and below for a full site description;

also Figure 2). The gecko was approximately 20 cm from the ground, head facing up, on the trunk of a manuka bush (*Leptospermum scoparium*). The diameter of the trunk was 15 cm. Two cockroaches (not identified) were observed on the same trunk, close to the gecko.

### 3.3 MORPHOLOGY OF FOREST GECKOS FROM THE CATLINS/SOUTHLAND

Geographically, the closest forest geckos to the Catlins/Southland geckos, are populations from Westland. In general, Catlins/Southland forest geckos are more solid bodied, less active and have a subdued stance, compared to the alert stance of Westland forest geckos.

Catlins/Southland geckos have a very pale belly colour, ranging from lightly mottled to being plain with a few dark specks, compared to Westland forest geckos, which have boldly mottled bellies.

### 3.4 GENETIC ANALYSES

Based on the results of DNA sequence comparisons from the mitochondrial 16sRNA gene conducted on both the forest geckos from Long Beach and Hukihuki Road, Rod Hitchmough believes forest geckos from the Catlins/Southland are a distinct type. More specimens are required to confirm this result, as only two specimens were used. Forest geckos from the Catlins/Southland share characteristics of *Hoplodactylus granulatus (sensu stricto)*, and *H. nebulosus*, a species found only on Stewart Island outliers (although the Takitimu gecko is likely to be synonymous with *H. nebulosus*; Hitchmough pers. comm. 1999).

### 3.5 OTHER POSSIBLE SIGHTINGS OF CATLINS/SOUTHLAND FOREST GECKOS

During the course of the survey we endeavoured to speak with local people, show them photographs of forest geckos, and ask them to mark on our maps the location of any Catlins/Southland forest geckos they had seen.

Discussions with John Gutsel and Dean Shute at Papatowai identified 3-4 sites where forest geckos had possibly been seen. The first was at NZMS 260-G47 217 045. In about 1987, a "brightly coloured gecko" was found basking on a metal grill of a fireplace in an abandoned campsite. Both Dean and John remember seeing "many geckos 25 years ago" in the vicinity of Hukihuki Road. Following their advice, we visited the area and found our second specimen of Catlins/Southland forest gecko. John and Dean also remember releasing many geckos into the trees of Chaslands School (NZMS 260-G47 282-962). At NZMS 260-G47 242 945, John remembers seeing geckos whilst logging. A gecko was also found at Wallace Head during logging.

Of these sites, only the Hukihuki Road site was surveyed for this report. Other locals we interviewed reported "having shoe-boxes filled with them", more than 10 years ago, and many report their fathers bringing geckos home from logging sites.

Although these reports of Catlins/Southland forest geckos are worthy of further investigation, it is of note that there is evidence of a second *Hoplodactylus* species in the area akin to *H. aff. maculatus*. This gecko is similar in size and colour (although not as bright), and may have easily been confused for the Catlins/Southland forest gecko in some of the reports above.

### 3.6 SITE DESCRIPTIONS OF CATLINS/SOUTHLAND FOREST GECKO COLLECTION SITES

Specimen 1 - Long Beach forestry track, Long Beach Road, Progress Valley

see Figure 1.

Low altitude, regenerating mixed podocarp/hardwood rain forest. Previously heavily logged. Rata heavily browsed by possums.

Flora List:

Canopy:

*Weinmannia racemosa*

*Dacrydium cupressinum*

*Metrosideros umbellata*

Subcanopy/shrub layer:

*Carpodetus serratus*

*Aristotelia serrata*

*Gaultberia* sp.

*Pteridium esculentum*

*Coprosma* spp.

Tree fern species

Vegetation in the immediate vicinity of the gecko capture site:

*Blechnum discolor*

*Coprosma robusta*

*Aristotelia serrata*

*Weinmannia racemosa*

*Metrosideros diffusa*

*Coprosma rhamnoides*

*Coprosma areolata*

*Neomyrtus pedunculata*

*Pteridium esculentum*

*Leucopodium* sp.

*Histiopteris incisa*

*Dicksonia* sp.



Other flora (1-2 metres from capture site):

*Carpodetus serratus*  
*Pittosporum eugenioides*  
Tree fern species  
Exotic grass species  
*Dacrydium cupressinum*  
*Coprosma ciliata*  
*Gaultheria* sp.  
*Blechnum discolor*  
*Leucopodium* sp.  
Fern species  
*Pteridium esculentum*  
*Aristotelia serrata*

## Specimen 2: Hukihuki Road, Chaslands

see Figure 2.

Low altitude, regenerating mixed podocarp/hardwood rain forest. Divaricating and small-leafed shrubs prominent.

Flora List:

Canopy:

*Weinmannia racemosa*  
*Dacrydium cupressinum*

Subcanopy:

*Leptospermum scoparium*  
*Pittosporum eugenioides*  
*Coprosma* spp.  
*Schefflera digitata*  
*Fuchsia excorticata*  
*Pseudowintera colorata*  
*Pseudopanax* sp.  
*Aristotelia serrata*  
*Carmichaelia* sp.  
*Carpodetus serratus*  
*Pennantia corymbosa*  
*Olearia* sp.  
*Hebe salicifolia*  
*Olearia lineata*

Vegetation in the immediate vicinity of the gecko site:

*Leptospermum scoparium*  
*Pittosporum eugenioides*  
*Coprosma foetidissima*  
*Weinmannia racemosa*  
*Schefflera digitata*  
*Fuchsia excorticata*  
*Coprosma areolata*  
*Coprosma ciliata*  
*Coprosma rubra*  
*Asplenium* sp.

*Ripogonum scandens*  
*Hebe salicifolia*

Other flora (5 metres from site):

*Dacrydium cupressinum*  
*Pseudopanax* sp.  
*Coprosma robusta*  
*Pseudowintera colorata*  
*Griselinia littoralis*  
*Carex* sp.  
Exotic grasses and weeds  
*Poa* sp.  
*Rubus* spp.  
*Coprosma* spp.  
*Blechnum discolor* and other fern species.  
*Hebe salicifolia*  
*Coprosma rotundifolia*  
*Coprosma areolata*

## 4. Discussion and conclusions

Extensive areas of various forest types (except beech forest) were surveyed for *Hoplodactylus* aff. *granulatus*. Only two specimens were located despite many hours of searching, yielding little information on the abundance and distribution of geckos in the Catlins/Southland district. However, it is possible that a similar search effort in other parts of the country where forest geckos are thought to be numerous (repeated sightings in recent time) would yield a similar number of specimens (Hitchmough pers. comm. 1997, Whitaker pers. comm. 1998). However, it must be kept in mind that Catlins/Southland geckos are a distinct species of which virtually nothing is known of its niche requirements, and as such abundance data of other *H. aff. granulatus* do not necessarily reflect the abundance of the Catlins/Southland forest gecko. Although data are limited, our surveys did confirm that forest geckos are extant at two sites, and that at these sites, they are not overly abundant.

Both gecko specimens were found in relatively disturbed forest areas - one beside an abandoned road-side in open habitat (although adjacent to unlogged podocarp forest) and the other in tall regenerating scrub. From this is it evident that Catlins/Southland forest geckos are not restricted to unlogged podocarp forest, but can persist, in semi-disturbed habitat. Again, due to the limited data collected during this survey, we cannot be sure if geckos found in the disturbed forest have survived the original deforestation event, or have recolonised the area once regenerating scrub has become suitable, i.e. we do not know just how much disturbance Catlins/Southland forest geckos can tolerate.

During the course of the night surveys we noticed many possums (*Trichosurus vulpecula*) congregated around flowering rata trees. Although neither of our

two specimens were collected from rata, forest geckos have been reported feeding from rata flowers in other parts of the country (Whitaker 1987). Possums are omnivorous, and are known to take chicks and eggs from nests (Brown et al. 1993). Thus, it is likely possum predation on geckos does occur where their ranges overlap, and in particular where an attractive food source is present. Possums, in high densities, also compete with the geckos for this food resource and are known to kill rata (M. Meads pers. comm.). Management of possum numbers through poisoning will benefit geckos by reducing possible predation and competition, and also by enhancing their food supply by releasing rata from browsing pressure.

Results from morphological examination of forest geckos collected during this survey, and the subsequent genetic analyses indicate Catlins/South land geckos are a distinct type of forest gecko, sharing characteristics of *Hoplodactylus granulatus (sensu stricto)* and *H. nebulosus* (Thomas 1981, 1982; Hitchmough 1997). Of relevance, green geckos of the genus *Naultinus* are regarded as different species throughout the South Island, even though they have limited range overlap, very similar ecology, behaviour and morphology (Hitchmough 1997). Forest geckos from the Catlins/Southland are as different genetically and morphologically from their nearest neighbours, forest geckos from Westland, as different species of green geckos are from each other (Hitchmough 1997).

To provide a more definitive taxonomic status of this new type of forest gecko from the Catlins/Southland, more genetic material is required (Hitchmough pers. comm. 1998). Until greater clarification of the taxonomic status is given, the conservation status cannot be determined. Based on the ranking of native and endemic species in Molloy & Davis (1994), forest geckos from the Catlins/Southland are ranked "Category I", i.e. not enough information is available to reliably allocate a category. However, based on the little information provided here, Catlins/Southland forest geckos are still present in detectable numbers, and although a variety of threats are present, including further habitat destruction, predation and competition for food, it is too early to "raise the alarm bells" on this gecko. To determine the conservation status of this new form of gecko, more information is required on the following (from Molloy & Davis 1994):

- taxonomic distinctiveness
- definition of a population and the total number of populations existing
- mean population size
- number of individuals in the largest population
- geographic distribution
- condition of the largest population
- population decline rate

- threats - inventory of habitat legally protected
  - habitat loss rate
  - predator impacts
  - competition
  - other factors affecting survival
- vulnerability - details of habitat and/or diet specificity
  - details of reproductive and/or behavioural specialisations
  - cultivation/captive breeding potential
- Maori/pakeha cultural values

## 5. Recommendations

- Possum control is continued throughout the Catlins/Southland area.
- Surveys for Catlins/Southland geckos should continue in Otago and in particular, Southland including southern Fiordland, the Longwoods, and mainland Stewart Island.
- Any gecko report should be marked on to a map, and archived with detailed notes and photographs (archived within the appropriate Area and Conservancy office). All records must be entered into ARDS (BIOSITE); send a copy of record to MandyTocher.
- Geckos that are collected from the field by Department of Conservation Staff or by the public from Southland, Otago or Canterbury can be identified as either *Hoplodactylus* aff. *maculatus* or *Hoplodactylus* aff. *granulatus* using Appendix 10. For forest geckos, individuals should be toeclipped (1-2 toes removed; see Appendix 11), and re-released at the point of capture. Measurements of snout-vent length, weight and a determination of the sex should be recorded (see Appendix 11). Photos should also be taken.
- Geckos that are collected from the wild from Southland, Otago or Canterbury that cannot be returned to the point of capture should be sent to MandyTocher, Department of Conservation, Otago Conservancy. They will be distributed to an experienced keeper so that a captive breeding programme can be established and useful research undertaken.

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## Appendix 1

### Flora of Tautuku track

Low-altitude, coastal, mixed podocarp/hardwood rainforest. Dominated by kamahi, broadleaf, rimu and totara. Rata present near coast.

#### Plant List:

##### Canopy:

*Wienmannia racemosa*  
*Dacrydium cupressinum*  
*Podocarpus hallii*  
*Metrosideros umbellata*  
*Griselinia lucida*

##### Subcanopy/shrub layer:

*Coprosma foetidissima*  
*Coprosma areolata*  
*Coprosma rotundifolia*  
*Pseudopanax* sp.  
*Carpodetus serratus*  
Tree fern species  
*Rubus* sp.  
*Pseudowintera crassifolia*  
*Fuchsia excorticata*  
*Melicytus ramiflorus*

## Appendix 2

### Flora of Lake Wilkie

Low-altitude, coastal, mixed podocarp/hardwood rainforest. Dominated by kamahi, large rata also prominent (flowering and heavily browsed by possums). Podocarps common, particularly totara and rimu.

#### Plant List:

##### Canopy:

*Weinmannia racemosa*  
*Metrosideros umbellata*  
*Podocarpus ballii*  
*Dacrydium cupressinum*

##### Subcanopy:

*Pseudopanax* spp.  
*Pseudowintera colorata*  
*Leptospermum scoparium*  
*Pittosporum eugenioides*  
*Carpodetus serratus*  
*Fuchsia excorticata*  
Tree fern species

##### Shrub layer:

*Coprosma* spp.  
*Coprosma foetidissima*  
*Aristotelia serrata*  
*Hebe* sp.  
*Rubus* sp.  
Climbing rata

## Appendix 3

### Flora of Mt Samson

Inland, low-altitude, mixed podocarp/hardwood rainforest, dominated by kamahi. Heavily browsed by possum. A few large rats also present.

#### Plant List:

##### Canopy:

*Weinmannia racemosa*  
*Metrosideros umbellata*

##### Shrub layer:

*Coprosma rotundifolia*  
*Cassinia leptophylla*  
*Fuchsia excorticata*  
Fern species  
*Rubus* sp.  
*Coprosma* spp.



## Appendix 4

### Flora of forestry track off Waikawa Valley Road

Inland, low-altitude, mixed podocarp/hardwood rainforest. Regenerating forest dominated by kamahi and rata. Large prominent rimu trees.

#### Plant List:

*Weinmannia racemosa*  
*Metrosideros umbellata*  
*Dacrydium cupressinum*

#### Subcanopy/shrub layer:

*Cassinia leptophylla*  
*Olearia ilicifolia*  
*Leptospermum scoparium*  
*Coprosma* spp.  
*Ulex europaeus*  
*Blechnum* sp.

## Appendix 5

### Flora of Rocky Knob

Inland site, regenerating scrub. Rocky outcrops surrounded by *Pinus radiata*.

#### Plant List:

*Myrsine divaricata*

*Rubus* sp.

*Blechnum* sp.

*Myrsine australis*

*Coprosma* spp.

*Olearia* sp.

## Appendix 6

### Flora of Pounaweia

Low-altitude, coastal, mixed podocarp/hardwood rainforest.

#### Plant List:

##### Canopy:

*Weinmannia racemosa*  
*Dacrydium cupressinum*  
*Dacrycarpus dacrydioides*

##### Subcanopy:

*Myrsine australis*  
*Carpodetus serratus*  
*Coprosma grandifolia*  
*Pseudowintera colorata*  
*Pseudopanax* sp.  
*Pittosporum eugenioides*  
*Fuchsia excorticata*

##### Shrub layer:

*Coprosma robusta*  
*Coprosma foetidissima*  
Tree fern species  
*Rubus* sp.  
*Myrsine divaricata*  
*Streblus heterophyllus*  
*Coprosma* spp.

## Appendix 7

### Flora of Long Beach - East end

Low-altitude, coastal/swamp mixed virgin podocarp/hardwood rainforest.  
Large podocarps and rata dominant.

#### Plant List:

*Metrosideros umbellata*

*Coprosma* spp.

*Dacrydium cupressinum*

*Podocarpus ballii*

*Dacrycarpus dacrydioides*

## Appendix 8

### Common names of plants at sites surveyed

<i>Weinmannia racemosa</i>	kamahi
<i>Metrosideros umbellata</i>	southern rata
<i>Podocarpus hallii</i>	montane totara, Halls totara
<i>Dacrydium cupressinum</i>	rimu
<i>Pseudowintera colorata</i>	pepper tree
<i>Leptospermum scoparium</i>	manuka
<i>Pittosporum eugenoides</i>	lemonwood, tarata
<i>Carpodetus serratus</i>	putaputaweta
<i>Fuchsia excorticata</i>	tree fuchsia
<i>Coprosma foetidissima</i>	stinkwood, hupiro
<i>Rubus</i> sp.	bush lawyer
<i>Pinus radiata</i>	radiata pine, monterey pine
<i>Griselinia lucida</i>	broadleaf, puka
<i>Cassinia leptophylla</i>	cassinia, tauhinu, cottonwood
<i>Olearia ilicifolia</i>	mountain holly, hakeke
<i>Ulex europaeus</i>	gorse
<i>Dacrycarpus dacrydioides</i>	kahikatea, white pine
<i>Melicytus ramiflorus</i>	mahoe, whiteywood
<i>Coprosma robusta</i>	karamu
<i>Pteridium esculentum</i>	bracken, rarahu
<i>Isoetes macrospora</i>	crowfoot fern, piupiu
<i>Metrosideros diffusa</i>	white climbing rata, akatea
<i>Neomyrtus pedunculata</i>	rohutu, native myrtle
<i>Schefflera digitata</i>	pate
<i>Pennantia corymbosa</i>	kaikomako
<i>Histiopteris incisa</i>	water fern, matata
<i>Dicksonia</i> sp.	tree fern
<i>Hebe salicifolia</i>	koromiko
<i>Pseudopanax crassifolius</i>	lancewood
<i>Myrsine divaricata</i>	weeping mapou, weeping matipou
<i>Streblus heterophyllus</i>	small leaved milk tree, turepo
<i>Myrsine australis</i>	mapou
<i>Coprosma grandifolia</i>	kanono

## Appendix 9

Key features for the identification of *Hoplodactylus* aff. *granulatus*, *H. nebulosus*, and 'new forest geckos'; also see Gill and Whitaker 1996. This key is designed to help field workers determine if they have a gecko from the *Hoplodactylus granulatus* complex, the *Hoplodactylus maculatus* complex, *H. nebulosus* or *Naultinus* spp. (Hitchmough 1997).

Mouth lining orange/orange-yellow, **not** pink, blue or purple.

May be active by day and night

Underside usually heavily blotched

Identification of *Hoplodactylus maculatus*

Gecko drab grey/olive; mouth lining pink. Active at night.

Identification of *Naultinus gemmeus*

Gecko bright lime green, or leafy green colour with variable colour patterns on back - can have yellow, white, or black markings on the lime green. Blue/purple mouth lining. Active by day.



Catlins/Southland blue-eyed gecko from the late Mrs P Soderstrom's collection. Photo: G. Loh.

## Appendix 10

### **Live specimens handed in by the public or field workers**

Captured lizards should be placed into cloth bags, labelled with the site locality, and stored in a rigid plastic box, containing moistened tissue, for transportation out of the field. Lizards may be kept in temporary ventilated vivaria until they are ready to be shipped to MandyTocher in Dunedin. Animals to be shipped live should be stored in ventilated icecream containers (no more than 5 lizards per container), with moistened paper towels and couriered to Dunedin.

### **Toeclipping lizards in the field**

Samples of toes are incredibly valuable, please send geckos to MandyTocher for toeclipping, if necessary.

Amount of DNA/tissue: one toe is usually enough, but two allows for repeated attempts to extract DNA if something goes wrong with the first extraction.

Contamination: please wipe with ethanol any instruments used and clean tissues before toeclipping each animal, handle the toeclips only with clean forceps, and put them straight into 70-100% ethanol in individual tubes. Label well.

To toeclip, hold gecko firmly and isolate the toe to be clipped. Cut straight in a definite movement from below. Take approximately a third of each of two toes.

Send toes to: Mandy Tocher  
Department of Conservation  
Otago Conservancy  
PO Box 5244  
Dunedin

### **Measurements**

Geckos can easily be sexed as adults: males have a distinctive swelling at the base of the tail, females do not (if unsure, take a photograph). Using a ruler, measure from tip of snout to vent (cloacal opening at base of tail). Also measure vent to tip of tail and measure any portion of the tail that is regenerating/has regenerated as a separate measurement (regenerated tail has a different pattern to the body and any portion of the tail remaining). If possible weigh gecko. Note the presence of orange/red mites in arm pits/ears/eyes.



Figure 1. Catlins/Southland forest gecko from Long Beach (above) and habitat at the collection site at Long Beach (the *Blechnum discolor* plant that harboured the gecko is to the left of the figure, behind the pile of litter spilling on to the track).