

# *Placostylus hongii* at the Mokohinau Islands

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# Abstract

An extant population of the large, north-eastern New Zealand endemic landsnail *Placostylus hongii* is recorded here from a small islet (0.25 ha) 50 m offshore from Fanal Island in the Mokohinau group. The only previous records of *P. hongii* from the Mokohinaus were of old empty shells from Fanal Island, where the species evidently became extinct at some time prior to the 1930s.

The extant Mokohinau population is relatively small and is dominated by adults. In November 1996 it comprised at least 120 but probably not more than 200 individuals. Shells are among the smallest known for the species, with adult shell heights ranging from 53.8 to 71.3 mm. Further, the population is unique in that apertures of adult shells are exclusively cream-coloured rather than the red-orange colour which is more typical of the species.

There are no known direct threats to the survival of the Mokohinau population at present, but the potential for catastrophic changes in habitat structure, or invasion of kiore (*Rattus exulans*) from Fanal Island, are of concern, given the existing small size and restricted distribution area of the snail population.

## 1. Introduction

On 21 March 1995 an extant population of the large landsnail *Placostylus hongii* was discovered on an un-named island (hereafter referred to as Gut Rock), off the eastern side of Fanal Island in the Mokohinau Group. This paper reports the results of a survey of the distribution and abundance of *P. hongii* snails on Gut Rock carried out at that time, and subsequently on 14 November 1996.

The only previous records of *P. hongii* from the Mokohinau Islands were of old, corroded, empty shells from Fanal Island, where the species had evidently become extinct at some time prior to the 1930s (Powell 1938; Browne 1980). The Gut Rock population is significant in that it is at the present eastern distribution limit of the species, given that populations previously recorded from Great Barrier Island (e.g. Powell 1938) are now thought to be extinct. The sole extant population further south, namely that at Motuhoropapa Island in the Noises Group, originated from translocations of Poor Knights Islands snails by AWB Powell in 1934 (Powell 1938).

## 2. Geomorphology and vegetation of Gut Rock

Gut Rock is a steep-sided, elongate, ENE-trending islet c. 0.25 ha in area, 80 m long by 40 m wide, located 50 m offshore from the larger, cliff-girt Fanal Island (at NZMS 260 series grid reference S07/048822). The eastern two thirds of Gut Rock has a summit ridge at c. 45 - 50 m elevation that is bounded by near-vertical cliffs cut by small ledges and steep gullies. The western end of the island is less precipitous, with a moderately sloping rocky area at between c. 25 m and 35 m elevation that is separated from the summit ridge by cliffs and rocky knolls.

Gut Rock, like much of Fanal Island, is formed of flow-banded rhyolite cut by metre-spaced vertical and high-angle joint sets. Preferential erosion along joint planes has given rise to a series of rounded rock outcrops along the top of the islet, separated by hollows, gullies and locally chimneys. A small area of boulder talus is present on upper slopes at the eastern end.

Shallow pockets of soil are present along the summit ridge, on ledges downslope, and down to c.25m elevation on the more gently sloping, western end of the islet. The soil is friable, granular, humic-rich and typically contains common weathered, angular rock fragments.

The vegetation cover on the upper part of the Gut Rock includes low thickets of common pohutukawa (*Metrosideros excelsa*), karo (*Pittosporum crassifolium*), houpara (*Pseudopanax lessonii*) and less common ngaio (*Myoporum laetum*), mostly with canopy heights of 1-2 m but locally up to 3 m high. The shrubby thickets are interspersed with open areas of common flax (*Phormium tenax*), coastal tussock (*Chionochloa bromoides*), knobby clubrush (*Isolepis nodosa*), native iceplant (*Disphyma australe*), locally common toetoe (*Cortaderia splendens*), *Cyperus ustulatus*, *Asplenium baurakiense*, and scattered pohutukawa, karo, houpara and ngaio shrubs. Also present in open areas are rare taupata (*Coprosma repens*), *Coprosma macrocarpa* and *Cassinia leptophylla* shrubs along with *Dichondra* aff. *brevifolia*, *Parietaria debilis*, *Pimelea* cf. *urvilleana*, *Pseudognaphalium* sp., *Sarcocornia quinqueflora*, *Senecio lautus*, *Tetragonia trigyna*, *Thelymitra longifolia* and *Wahlenbergia litticola*.

There were accumulations of twiggy leaf litter under pohutukawa, and leaf litter under karo, houpara and ngaio shrubs in thickets, but soil pockets in open areas, had generally only a thin, sparse litter cover, particularly in areas where seabird burrows were present.

### 3. The *P. Hongii* population on Gut Rock

Live *P. hongii* snails were restricted to the vegetated upper part of Gut Rock, occurring in soil and leaf litter on ledges and in hollows under shrub thickets, under flax, coastal tussock and knobby clubrush on margins of thickets, and under flax, toetoe and scattered shrubs in open areas. There were two main areas in which live snails were concentrated; under and on the margins of mixed species shrub thickets at the western end of the summit ridge, and around the eastern margin of a pohutukawa-dominated thicket below the rock scarp immediately to the west of that. Live snails were also present under flax, toetoe, scattered shrubs and a pohutukawa thicket on the eastern part of the summit ridge, and on ledges downslope on the southern side of the islet.

Densities of live snails were not determined quantitatively, but qualitative observations indicated that they had highly patchy distribution at a metre scale, with clumped densities of up to c. 5-10 snails/m<sup>2</sup> at some sites. Live snails were least common in open vegetation (particularly areas with seabird burrows) and under pure pohutukawa canopy, and occurred at highest densities under and immediately adjacent to houpara, karo and ngaio shrubs. The two last-named species are probably the main food plants for the Gut Rock population. Microhabitat structure was also an important determinant of snail distribution, with virtually all live snails being found buried in soil and litter beneath shrubs, or under flax, coastal tussock and toetoe plants. There had apparently not been any significant rainfall for the few days prior to the November 1996 visit; surface litter and soil were dry, but visible moisture was present in subsurface layers where most snails were found.

Approximately 80 live *P. hongii* snails were found on Gut Rock in November 1996 during a rapid search of about two thirds of the suitable habitat present. From extrapolation assuming an equal density of snails in the unsearched third, it is probable that the total *P. hongii* population there numbered at least 120 snails but is unlikely to have been more than 200.

Size frequency data for the first 60 snails found in November 1996 (Appendix 1) are shown in Figure 1. Adult snails (i.e. with thickened outer lips) predominated, comprising 75% of the sample. Many had much of their periostracum worn off and were thus presumably fairly old. juveniles with shells in the size range 39-69 mm were reasonably common (22% of sample). Smaller juveniles were probably under-represented in the sample as they are cryptic and hard to find without intensive searching. No hatchlings were found, the two smallest snails seen having shell heights of 13.8 mm and 17.8 mm respectively.

No attempt was made to quantitatively survey the size frequency distribution of collections of empty shells, but it was apparent that adults and the hatchling size class (i.e. <5 mm shell height) predominated, with only very rare larger juvenile shells. None of the empty shells found in 1995 and 1996 had been damaged by predators.

A number of fresh *P. hongii* eggs were seen in November 1996 buried in soil and leaf litter under mixed-species broadleaf thickets, and in soil under coastal tussock and flax roots on the margins of thickets. In most cases the eggs were dispersed but one clutch containing at least 18 eggs was found. Five eggs measured had maximum diameters ranging from 5.6 mm to 6.3 mm with a mean of 6.0 mm.

## 4. Shell characters of Mokohinau *P. hongii*

The Gut Rock *P. hongii* population is unique in that apertures of adult shells are exclusively cream-coloured rather than the red-orange colour which is more typical for the species. Shells with similar "albino" apertural colouring are also known from the Poor Knights Islands, Whangamumu, Whangaruru and Mokau (Powell 1938; pers. observ.), but in those populations they co-occur with shells with red-orange apertures.

Shells of the Gut Rock *P. hongii* are also among the smallest known for the species, with adult shell heights ranging from 53.8 to 71.3 mm. A sample of 22 empty adult shells had a mean height of 62.9 mm  $\pm$  3.9 SD (Appendix 2). Comparison of shell height data for live adult snails from the western end of the summit ridge and the foot of the scarp immediately to the west of that (Appendix 1) indicates slight microgeographic differentiation with respect to shell size. Summarised data and the result of a t-test presented in Table 1 show that there is a statistically significant difference in variance at  $\alpha=0.05$  (two-tailed test) between shell heights of the two samples.

Comparison of shell and aperture height data for samples of empty shells from Fanal Island and Gut Rock indicates substantial morphologic differentiation between the two adjacent island populations (Figure 2, Appendix 3), with shells from Fanal Island being consistently larger. The original apertural colouring of the Fanal Island shells is unknown.

## 5. Conservation status

At present there are no known direct threats to the future survival of *P. hongii* on Gut Rock in that mammalian predators are apparently absent, there is no evidence of bird predation of snails, and the vegetation types in which the snails occur appear to be healthy and regenerating. However, the snail population size and distribution area are very small, being constrained by the small area of suitable habitat present and probably also by the exposed nature and aridity of Gut Rock. Further, kiore (*Rattus exulans*) occur on adjacent Fanal Island and could conceivably spread from there across the narrow water gap (c. 50 m) to Gut Rock (see McCallum 1980). Kiore are known to prey on

Placostylus snails (e.g Parrish and Sherley 1993, unpub. data) and would undoubtedly have a devastating effect on the Gut Island population should they ever get ashore there.

Although the Gut Rock *P. hongii* population is distinctive in terms of apertural colouring and small shell size, its genetic relationships with other extant *P. hongii* populations are unknown. Given the very small total population size and restricted geographic distribution, assessment of the degree of genetic distinctiveness should clearly be a priority. If the population did prove to be genetically distinct, then management options such as captive rearing and/or translocations would need to be considered as precautionary conservation measures (along with the eradication of kiore from Fanal Island, which is planned for late 1997).

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## 7. References

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### Appendix 1

Shell heights (in mm) of the first 60 live *P. hongii* snails found on Gut Rock in November 1996.

- A. Western end of summit ridge, under and on margins of mixed-species broadleaf thickets (n=25).  
 Juveniles: 68.6, 59.7, 44.8, 65.7, 60.6, 49.6  
 Adults: 65.5, 67.1, 64.8, 57.1, 65.7, 68.2, 63.8, 64.2, 63.3, 65.3, 62.1, 65.0, 68.8, 63.0, 62.5, 66.2, 57.0, 64.9, 67.0
- B. Western end of island below rock scarp, on the margins of a pohutukawa-dominated thicket (n=35).  
 Juveniles: 58.9, 52.1, 39.8, 43.2, 17.1, 13.8, 40.2, 39.4, 58.3,  
 Adults: 63.9, 64.7, 62.9, 54.6, 58.7, 61.2, 58.6, 57.9, 60.1, 59.5, 62.0, 65.1, 56.2, 66.6, 55.6, 60.9, 62.7, 61.4, 62.8, 63.5, 67.2, 56.7, 61.9, 59.4, 55.0, 62.5

### Appendix 2

Shell height/aperture height (in mm) of empty adult *P. hongii* shells from Gut Rock.

- A. March 1995 collection (n = 9)  
 62.1/30.7, 63.5/30.9, 65.2/31.3, 62.4/31.1, 57.9/29.1, 53.8/28.2, 60.8/30.8, 59.0/29.4, 66.3/32.7
- B. November 1996 collection (n=13)  
 59.8/30.7, 60.4/28.6, 66.5/31.2, 66.0/29.4, 65.7/32.4, 62.2/29.6, 57.0/29.1, 67.5/32.9, 63.0/31.0, 71.3/33.5, 65.6/30.2, 62.9/30.2, 64.2/29.9

### Appendix 3

Shell height/aperture heights (in mm) of empty adult *P. hongii* shells from Fanal Island.

- A. Browne (1980) collection (n=5).  
 79/37, 80/40, 88/40, 81/41, 85/39.

Table 1: Range, mean and standard deviation of shell heights of adult *P. hongii* snails in samples from the western end of the summit ridge (A) and foot of the scarp immediately to the west (b) on Gut Rock, Mokohinau Group.

|        | Range of Shell Heights (mm) | Mean Shell Height $\pm$ SD (mm) | Number of Individuals per Sample | t value at $\alpha=0.05$ and 43 degrees of freedom. 'D' = difference of pop. means |
|--------|-----------------------------|---------------------------------|----------------------------------|--|
| Site A | 57.0 - 68.8                 | 64.3 $\pm$ 3.1                  | 19                               | t <sub>0.025, 43</sub> = -1.96 to 1.96<br>'D'=3.5                                  |
| Site B | 54.6 - 67.2                 | 60.8 $\pm$ 3.5                  | 26                               |  |



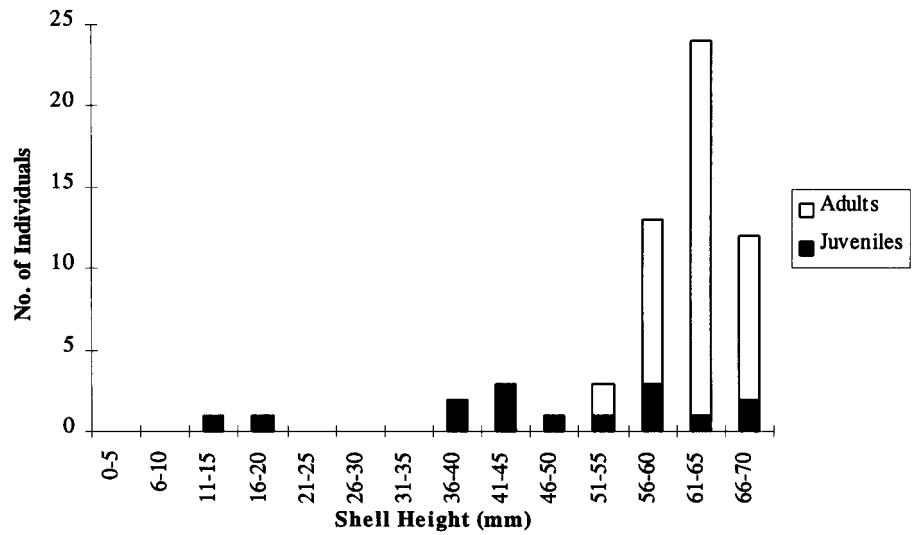


Figure 1. Size frequency distribution of shells of the first 60 live *P. hongii* snails found on Gut Rock in November 1996. Shaded and unshaded bars denote numbers of individuals with unthickened and thickened lips respectively.

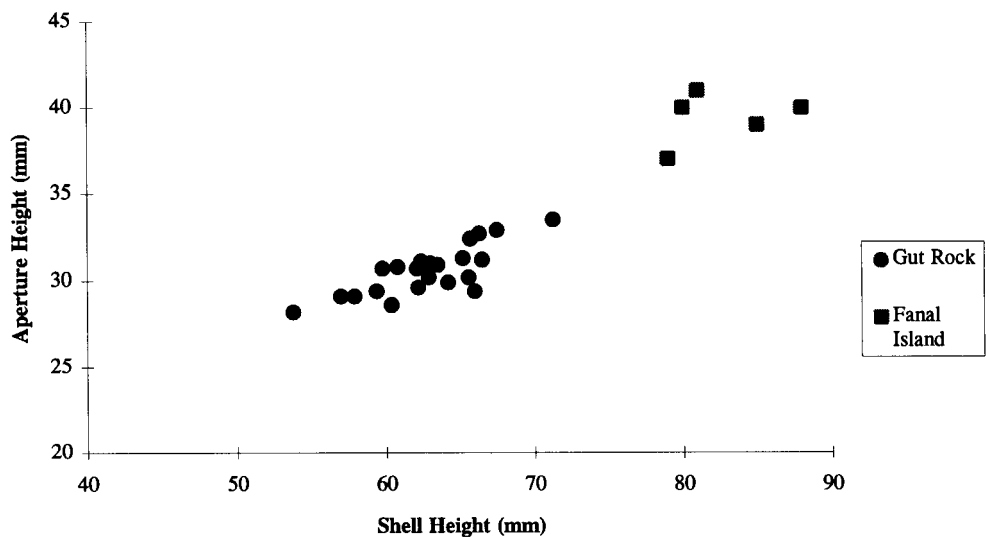


Figure 2. Plot of shell height and apertural height dimensions for collections of empty adult *P. hongii* shells from Fanal Island (Browne 1980) and Gut Rock.