Phylum Platyhelminthes

(Gr. *platys*, flat + *helmins*, worm)

Common name: **Flatworms, flukes, tapeworms**

Characteristics: Mouth is the only opening into the digestive tract. Digestive tract absent in tapeworms.

Class: Turbellaria (L. *turbellae*, disturbance)

Common name: **Free-living flatworms**

Characteristics: Mostly free-living flatworms with the body covered by cilia.

Order: Tricladida (Gr. *treis*, three + *klados*, branch)

Common name: **Planarians (for freshwater and terrestrial species)**

Characteristics: Mouth and pharynx located in the middle of the body.

FLATWORMS

Tricladida

Planarians

Order: Tricladida

Family: Geoplanidae

Taxonomic Name: *Artioposthia mariae* (Dendy, 1895)

Common Names: -

Synonyms: *Geoplana mariae* (Fyffe 1947)

M&D Category: I

Conservancy Office: NM

Area Office: Golden Bay, Motueka, St Arnaud

Description: A flatworm, very pale brownish-yellow, thickly marbled with dark brown speckles on its back. It has a rather narrow paler band with less marbling in the middle of its back, and this is edged on either side with an ill defined darker band. The front tip of the body is pink. The underneath surface is pale yellow sprinkled with brown (Fyffe 1947). The body is thick and strap-like, flattened top and bottom (Dendy 1895), and is about 97 mm long, and 5 mm wide, when crawling. The mouth is found two-thirds of the length from the front end (Fyffe 1947).

Type Locality: Jackson's, on the Taremakau River, west of Otira Gorge (Dendy 1895).

Specimen Holdings: NHML (Fyffe 1947).

Distribution: North-west Nelson, and on the West Coast as far south as Arthurs Pass. Very common (P. Johns pers. comm. 1999).

Habitat: Usually found under logs and stones in fairly moist situations (Dendy 1895).

Threats: Not known.

Body length: 97 mm

Work Undertaken to Date: Likely to be assigned to a new genus, *Australopacifica* (P. Johns pers. comm. 1999).

Priority Research, Survey, and Monitoring: -

Management Needs: 1) Recommend that this species is removed from the list based on current available information.

Contacts: Peter Johns.

Phylum Nemertea

(Gr. *Némertés*, a nereid)

Common name: **Ribbon worms, nemertines, nemerteans**

Characteristics: Possess a long evertible proboscis. Dorsoventrally flattened and covered by a ciliated epidermis.

Class: Enopla (Gr. *enoplos*, armed)

Order: Hoplonemertea

Family: Prosorhochmidae

Taxonomic Name: *Antiponemertes allisonae* (Moore, 1973)

Common Names: -

Synonyms: *Geonemertes allisonae* (Gibson & Moore 1981)

M&D Category: I High Priority

Conservancy Office: CA

Area Office: North Canterbury

Description: A terrestrial nemertine worm with a mottled brown back. It has a large proboscis with a clear stripe over it, and two relatively large eyes. The body is 10 mm long, 0.5 - 1 mm wide, and ciliated (having hair-like processes) (Moore 1973; Gibson & Moore 1981; Wells et al. 1983). It leaves behind a slimy trail and can glide forwards or backwards. In living specimens, the eversion of a proboscis is the only certain diagnosis of a nemertine (Moore 1989).

Body length: 10 mm

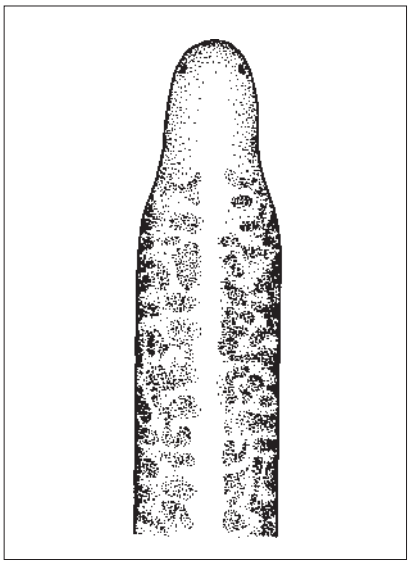
Type Locality: Under fallen logs in valley at edge of bush, Menzies Bay, Banks Peninsula (Moore 1989).

Specimen Holdings: NHML (Pantin Collection) (Moore 1973).

Distribution: Open bush near Menzies Bay, Banks Peninsula (Moore 1973).

Habitat: Found in open bush (Wells et al. 1983) under rotten logs, tree ferns, or rarely under stones. Logs must not be too wet (i.e. sodden with fungi), or too dry (i.e. running with ants), and they must be sited on leaf litter on fairly level ground, not too close to a water course. They only survive in cool, damp conditions, sheltered from direct sunlight (Moore 1989).

Threats: Habitat has largely been destroyed by shrub clearance (Wells et al. 1983). The Menzies Bay valley has been intensively grazed by sheep and deer (Moore 1989).



Dorsal view of anterior end.
Permission: Academic Press Ltd. Moore 1973, p 302, Fig. 5.

Work Undertaken to Date: A search in 1988 failed to find any specimens, it may be extinct (Moore 1989).

Priority Research, Survey, and Monitoring: 1) Search suitable sites on Banks Peninsula in an effort to locate this species. These are a cryptic species and failure to locate them does not necessarily mean they are not present.

Management Needs: -

Contacts: Peter Johns.

Phylum Annelida

(L. *annulus*, ring + Gr. *eidos*, form)

Characteristics: Segmented worms, possessing a linear segmented body.

Class: Polychaeta (Gr. *polys*, many + *chaite*, hair)

Common name: **Polychaete worms**

Characteristics: Have paired segmented appendages (parapodia). Head is usually highly developed, bearing sensory or feeding structures.

Order: Phyllodocida

Family: Nereididae

Taxonomic Name: *Namanereis tiriteae* (Winterbourn, 1969)

Common Names: -

Synonyms: *Namalycastis tiriteae, Namalyclastis vuwaensis* (Glasby 1999)

M&D Category: I

Conservancy Office: WG, WL

Area Office: Palmerston North, Wairarapa

Description: A worm, up to 21 mm long, and with a maximum width of 0.8 mm (without parapodia). It has 61 - 80 segments, narrows posteriorly, and has no eyes (Winterbourn 1969). This worm is pale pink throughout when alive (Glasby 1999), but in alcohol is white, and semi-transparent, with the dorsal and ventral longitudinal blood vessels red and prominent (Winterbourn 1969).

Body length: 21 mm

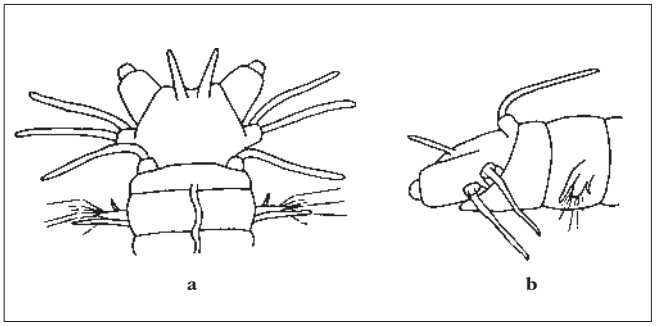
Type Locality: Tiritea [= Turitea] Stream (Glasby 1999).

Specimen Holdings: MONZ.

Distribution: Tiritea (now Turitea) Stream, near Massey University, Palmerston North (Collier 1992b, Glasby 1999); Ngawapurua, Mangatainoka River, just above confluence with the Manawatu River (Henderson 1995, Glasby 1999), in the Manawatu mainstream and tributaries upstream of the Manawatu Gorge (Fowler & Henderson 1999, 2000) and in lowland streams in the Hawkes Bay region (Glasby 1999), including Tukituki, Ongaonga, and Mangatewainui Streams (Fowler pers comm. 2000). The Fijian species *Namalycastis vuwaensis* has recently been declared a junior synonym of *Namanereis tiritea*, and has been collected from Wainsavulevu Creek above Vuwu Falls, Viti Levu (Glasby 1999).

Habitat: At Tiritea (now Turitea) Stream it is found in a stream bed of large stable stones embedded in smaller gravel and mud. Silting occurs in extensive stretches of dead water overlying silt and present at the stream margins. A bacterial and algal scum covered much of the substratum (Winterbourn 1969). At the Mangatainoka River it was found in a riffle composed of gravel and cobble. May occupy a specialised habitat, possibly the hyporheos (Henderson 1995; Fowler 2000).

Threats: Was though to be quite rare in New Zealand, but has now been found at several sites in the North Island.



a – dorsal view of anterior end.
b – lateral view of anterior end.
Permission: SIR Publishing. Winterbourn 1969, p 283, Figs. 1,2.

Work Undertaken to Date: -

Priority Research, Survey, and Monitoring:

Management Needs: 1) Likely that this species is fairly secure, and may end up being removed from the list at the next re-ranking.

Contacts: Reece Fowler, Ian Henderson, Mike Winterbourn.

Class Oligochaeta (Gr. *oligos*, few + *chaite*, hair)

Common name: **Terrestrial and freshwater annelids**

Characteristics: No parapodia, but do have setae present.

Order: Opisthopora (Gr. *opisthe*, behind + *poros*, channel)

Family: Megascolecidae

Common name: **Giant worms**

Order: Opisthopora

Family: Megascolecidae

Taxonomic Name: *Octochaetus antarcticus* (Beddard, 1889)

Common Names: -

Synonyms: *Acanthodrilus antarcticus* (Smith 1893)

M&D Category: I

Conservancy Office: CA

Area Office: Raukapuka

Description: A large pale pink worm, with a red clitellum (the 'saddle-like' portion on the worm). The body is up to about 250 mm long, 7mm in diameter (Lee 1959a), and comprises 176 segments (Lee 1959b).

Type Locality: Ashburton (Lee 1959b).

Specimen Holdings: NHML (slide only).

Distribution: Found in the Ashburton district (Lee 1959a). It has been collected from the edge of an old swamp on the south bank of the Ashburton River (Smith 1893).

Habitat: Lowland species.

Threats: Not known.

Work Undertaken to Date:

Priority Research, Survey, and Monitoring: 1) Survey wetlands near original collection site at the Ashburton River.

2) Clarify distribution (E. Kennedy pers. comm. 2000).

Management Needs: -

Contacts: -

Body length: 250 mm

Order: Opisthopora

Family: Megascolecidae

Taxonomic Name: *Octochaetus michaelseni* Benham, 1904

Common Names: -

Synonyms: -

M&D Category: I

Conservancy Office: WL

Area Office: Poneke, Wairarapa

Description: A large pink (unpigmented) worm, with a purplish red clitellum (the 'saddle-like' portion on the worm). The body is up to about 250 mm in length, 8 mm in diameter (Lee 1959a), and comprises c. 200 segments (Lee 1959b).

Type Locality: Wellington (Benham 1905), type material not located (Lee 1959b).

Specimen Holdings: -

Distribution: Wellington and Wairarapa districts including Tinui; Wairongomai; Miramar; and Taita (Lee 1959a).

Habitat: Found in subsoil and occasionally in topsoil, under forest and occasionally under pasture (Lee 1959a).

Threats: Not known.

Work Undertaken to Date: -

Priority Research, Survey, and Monitoring: 1) Survey to obtain an estimate of distribution and abundance, and determine whether this species is of conservation concern.

Management Needs: -

Contacts: -

Body length: 250 mm

Order: Opisthopora

Family: Megascolecidae

Taxonomic Name: *Octochaetus multiporus* (Beddard, 1885)

Common Names: Milkworm, Maori worm (Foord 1990)

Synonyms: *Acanthodrilus multiporus* (Springett et al. 1998)

M&D Category: I

Conservancy Office: WL, NM, CA, OT, SL

Area Office: Poneke, Wairarapa, Nelson, South Marlborough, North Canterbury, Raukapuka, Coastal Otago, Southern

Description: A large unpigmented, pale pink earthworm, with a darker pink clitellum (the 'saddle-like' portion on the worm) (Springett et al. 1998), often mottled white or grey. A narrow streak of purple runs along the mid-line. The body is 180 - 300 mm long, 8 - 10 mm in diameter (Lee 1959a), and comprises 200 segments (Lee 1959b). (Foord (1990) puts the body length at 1400 mm long, but states that this may relate to *Spenceriella gigantea*, and not *Octochaetus multiporus*). This species is bioluminescent, expelling a thick, slimy fluid giving a bright orange-yellow light (Springett et al. 1998).

Type Locality: Canterbury Plains (Lee 1959b).

Specimen Holdings: NHML.

Distribution: Very widely distributed in the southern end of the North Island districts, east of the main divide, Nelson, Stewart Island and a number of small off-shore islands (Lee 1959a). It has been found recently at AgResearch's Hill Country Research station, Ballantrae (Springett et al. 1998).

Habitat: Usually found in the subsoil, sometimes in topsoil, under forest, scrub, tussock grassland and pasture (Lee 1959a). Lee (1959b) described it as being numerous in yellow-grey, yellow-brown, and brown-grey earth soils. Most numerous in soils of low to moderate fertility, and those that slope away from the sun. High fertility soils had a similar density to adjacent areas of native forest, indicating that exotic pasture environments can favour this worm in some circumstances. A deeper burrowing species (Springett et al. 1998), which creates a network of burrows that do not open to the surface. The burrows have a diameter of about 10 mm. Several chambers 15 - 20 mm wide are usually within the burrow network, and worms may be found curled up in these (Springett & Gray 1998).

Sign of Presence: Dull white cocoons, which are very smooth and flaccid. They vary considerably in colour passing through several shades of yellow and brown, and finally to dark red as they mature (Smith 1893).

Threats: Not known. Competition with lumbricid earthworms or landuse change through pasture production could be affecting populations (Springett et al. 1998).

Work Undertaken to Date: No work has been done on the distribution of this species since Lee (1959a,b).

Priority Research, Survey, and Monitoring: 1) Survey to obtain an estimate of distribution and abundance, and determine whether this species is of conservation concern.

Management Needs: -

Contacts: -

Class: Hirudinea (L. *hirudo*, leech)

Common name: **Leeches**

Characteristics: No parapodia or setae. Small head with a sucker around the mouth-parts. Posterior segments form a large sucker behind the anus. 'Looping' surface mode of locomotion.

Order: Arhynchobdellida

Family: Hirudinidae

Taxonomic Name: *Hirudobdella antipodum* (Benham, 1904)

Common Names: Open Bay Island leech

Synonyms: *Hirudo antipodium* (Benham 1904)

M&D Category: A

Conservancy Office: WC

Area Office: South Westland

Description: A large coffee-brown terrestrial leech, with darker stripes on the back (C. Miller pers. comm. 1999). The body is a tapered club shape, and approximately 50 - 70 mm when extended (Miller 1997). Specimens in formol appear pale coffee-brown, faintly tinged with reddish underneath (Benham 1904).

Type Locality: Open Bay Island, off the west coast of the South Island, in amongst the wet roots of grasses, and at the bottom of nests of *Puffinus* sp. (Benham 1904).

Specimen Holdings: -

Distribution: Found on Taumaka Island in the Open Bay Islands group. Presently restricted to a single population under a glacial boulder, an area of approximately 5 m by 2 m (Miller 1999a).

Body length: 70 mm

Habitat: Live in damp or wet habitats, generally with a gently sloping floor and free from standing water (Miller 1997). They have been found amongst the wet roots of grasses, at the bottom of *Puffinus* sp. (sooty shearwater) burrows (Benham 1904), and in penguin nests in mud and on the underside of dead sticks (Miller 1999a). In dry conditions they have been found sheltering several inches below the surface in a mass of sticks and mud (Miller 1997, 1999a). Feed on the blood of birds, but may feed opportunistically on other animal groups possibly including fur seals, worms, or frogs (Miller 1999a).

Threats: Weka probably prey upon the leeches (Miller 1997, 1999a).

Work Undertaken to Date: Thought to have been eradicated by weka until rediscovered in 1987 (Miller 1997, 1999b). Population resurveyed in March 1988, January 1992, November 1994, January 1995, and June 1995. No leeches found during the November 1994 survey, four found in January 1995, and one in June 1995. Additional populations were searched for in 1994-1995 without success (Miller 1999a).

Photo: Craig Miller.

Priority Research, Survey, and Monitoring: 1) Regularly monitor the known population, preferably every 2 years, during January or early February (Miller 1997).

2) Survey Taumaka Island and mainland sites, focusing on the nesting colonies of Fiordland crested penguins between Haast and Fiordland, including Caswell Sound where a similar leech has been found (Miller 1997), in an attempt to locate additional populations .

3) Establish an ex situ population (Miller 1999a) to act as an insurance population.

Management Needs: 1) Liaise with the owners of Popotai and Taumaka Islands, and invite discussion on ways of preserving the indigenous biodiversity of these islands (Miller 1997).

Contacts: Craig Miller.

Phylum Onychophora

(Gr. *onychos*, claw + *pherein*, to bear)

Common name:	**Peripatus, ngaokeoke, insect-worms, velvet worms**
Characteristics:	Numerous pairs of short peg-like legs. Pair of antennae.
Family:	Peripatopsidae
Common name:	**Southern velvet worms**

Order: Onychophora

Family: Peripatopsidae

Taxonomic Name: *Ooperipatellus insignis* (Dendy, 1890)

Common Names: -

Synonyms: *Peripatus viridimaculatus, Ooperipatellus viridimaculatus* (Gleeson 1996), *Ooperipatus viridimaculatus, Ooperipatus insignis* (Tait & Briscoe 1995)

M&D Category: I

Conservancy Office: NM, WC

Area Office: Golden Bay, Motueka, Greymouth, South Westland

Description: A velvety, caterpillar-like animal with 14 pairs of legs. It is dark grey, mottled with orange, and has a distinctive double row of green spots along the back. The papillae are cream and the female has an obvious yellowish ovipositor (Hudson 1974) (based on synonym O. *viridimaculatus*, which is likely to be reinstated as a separate species). The body is about 30-50 mm long.

Type Locality: O. insignis was originally described from Mt Macedon, Victoria, Australia. The New Zealand species was initially described from the headwaters of Lake Te Anau (Tait & Briscoe 1995).

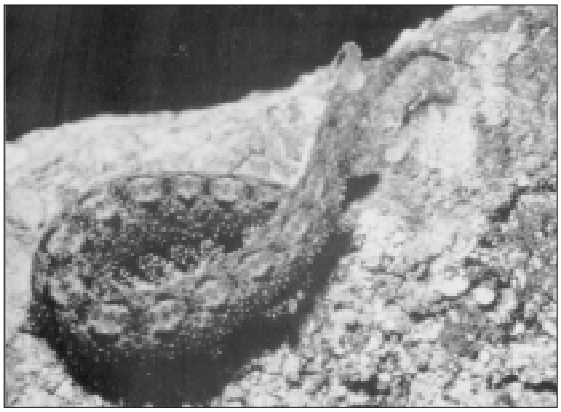
Body length: 50 mm

Specimen Holdings: -

Distribution: Found over most of the South Island alpine zone including Haast; Arthurs Pass; Lewis Pass; Te Anau (D. Gleeson pers. comm. 1999); Fox Glacier (Hudson 1974); Shenandoah Saddle, near Murchison; north branch of Temple Creek near Lake Ohau; headwaters of Lake Te Anau (Tait 1992). Has not been found in south-west Fiordland (D. Gleeson pers. comm. 1999).

Habitat: Found in beech forests in damp environments, such as under stones, decaying logs, or leaf litter (Hudson 1974). Has been recorded between 300-1650 m (D. Gleeson pers. comm. 2000).

Threats: Microhabitat especially important, stock a problem through trampling and destroying habitat, and the collection of fallen logs for firewood etc. is also a concern (D.Gleeson pers. comm. 1999).



Ooperipatellus insignis *(NZ specimen, originally* O. viridimaculatus*) Photo: Rubberg/Bosch. Permission: D Gleeson, Landcare Research (NZ) Ltd.*

Work Undertaken to Date: *O. viridimaculatus* synonymised with the Australian species *O. insignis* based on morphology. However, on the basis of a limited data set comparing allozyme mobility states, New Zealand *O. insignis* are not conspecific with *O. insignis* from the Australian type locality (Tait & Briscoe 1995). The New Zealand individuals currently assigned to *O. insignis,* will end up being *O. viridimaculatus,* as it is certainly not conspecific with *O. insignis* (H. Ruhberg pers. comm.) Surveys are ongoing (D.Gleeson pers. comm. 1999).

Priority Research, Survey, and Monitoring: 1) Clarify taxonomy of the New Zealand specimens originally assigned to *Ooperipatellus viridimaculatus*, to confirm whether they are the same as *O. insignis* or a separate species.

Management Needs: -

Contacts: Dianne Gleeson.

See Plate 3, No. 19.

Phylum Mollusca

(L. *molluscus*, soft)

Common name: **Molluscs**

Characteristics: Body usually covered by a shell. Most have a ventral muscular foot for locomotion.

Class: Gastropoda (Gr. *gaster*, belly + *pous*, foot)

Common names: **Snails, whelks, limpets, conchs, sea slugs**

Characteristics: Shell typically spiralled. Entire body can be withdrawn into shell. Broad, flat ventral foot for locomotion. The head of most bears two tentacles. Mantle cavity and anus located at anterior end of body.

Order: Architaenioglossa (Gr. *archi*, first + *taenia*, ribbon + *glossa*, tongue)

Common name: **Land operculate snails**

Order: Architaenioglossa

Family: Liareidae

Taxonomic Name: *Cytora hirsutissima* (Powell, 1951)

Common Names: -

Synonyms: *Murdochia hirsutissima* (Climo 1973)

M&D Category: X

Conservancy Office: NL

Area Office: Kaitaia

Description: A small, golden-brown snail, with the shell whorls having rows of long, dark-brown hair processes. The shell is 5.6 - 7 mm high, and 6 - 7 mm wide. The animal is blind, having no eyes, and the long hairs on the shell may act as receptors (information from Climo 1973; Powell 1979; Brook 1999c).

Shell width: 7 mm

Type Locality: Great Island, South West coast, c. 213 m, under *Streblus* (name changed from *Paratrophis*) and *Brachyglottis* (Powell 1951a).

Specimen Holdings: AMNZ (type), MONZ.

Distribution: Restricted to the type locality at c. 240 m elevation, west of the trig station, north-western end of Great Island (Brook 1999c).

Habitat: Terrestrial, under stones and rotting wood, beneath broadleaf and kanuka/ broadleaf forest. In 1970 this species was 'restricted to an area of about 2 m^2, of rock and rubble under a milk tree (*Streblus* sp.) living under a few large rocks covered by the jointed fern (*Arthopteris tenella*), but not under bare rocks in close proximity' (Climo 1973). By 1996 *C.hirsutissima* occupied an area of c. 200 m^2, at the foot of a boulder scree and extending onto an adjoining rocky terrace (F. Brook unpub. data).

Threats: None known at present. Not presumed extinct as indicated in Molloy & Davis (1994). Potential risk of habitat modification through fire, exotic plant introduction, herbivores or plant pathogens (Brook 1999c).

Work Undertaken to Date: Goats introduced to Great Island 1889. Goats eradicated from Great Island in 1946 (Turbott 1948). Distribution surveyed in 1970 (Climo 1973), and 1996 (F. Brook unpub. data).

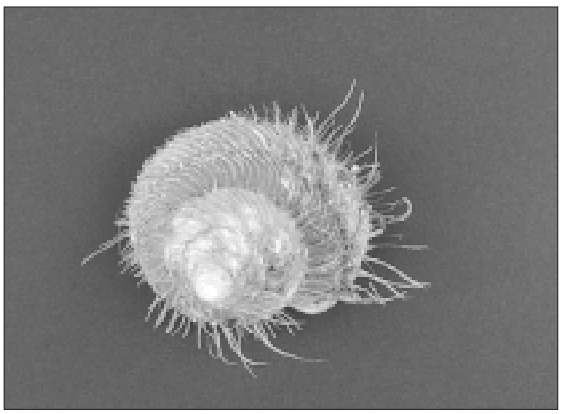
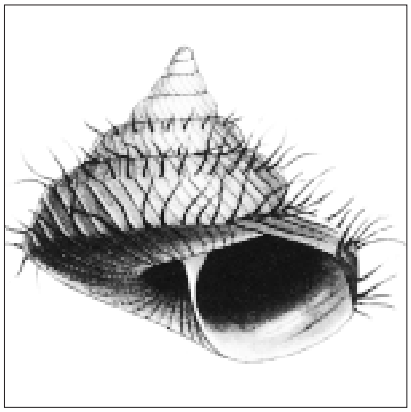


Photo: Andrew Townsend.



Permission: Harper Collins Publishers (NZ) Ltd. Powell 1979, Plate 23, Fig. 4.

Priority Research, Survey and Monitoring: 1) Complete the report on landsnail fauna of Great Island (Brook 1999c).

Management Needs: 1) Maintain island security (Brook 1999c).

Contacts: Fred Brook.

See Plate 3, No. 20.

Order: Basommatophora (Gr. *basis*, base + *omma*, eye + *pherein*, to bear)

Family: Latiidae

Characteristics: A bioluminescent, freshwater, limpet-like genus.

Order: Basommatophora

Family: Latiidae

Taxonomic Name: *Latia climoi* Starobogatov, 1986

Common Names: -

Synonyms: -

M&D Category: I

Conservancy Office: WL

Area Office: Poneke

Description: A freshwater species, with a limpet-like, half-egg shaped shell. It has a narrow top, which is nearly in line with the back edge of the shell, and displaced to the left of centre. The shell is 5.5 - 10.1 mm long, 3.9 - 7.5 mm wide, and 1.8 - 3.6 mm high (Starobogatov 1986).

Body length: 10.1 mm

Type Locality: Hutt River, Wellington (Starobogatov 1986).

Specimen Holdings: -

Distribution: Hutt River, Wellington (Starobogatov 1986).

Habitat: *Latia* is a freshwater genus, generally found attached to stones and rocks, mostly in running streams and rivers (Powell 1979).

Threats: Not known.

Work Undertaken to Date: -

Priority Research, Survey, and Monitoring: 1) Survey the Hutt River and other possible sites in the Wellington region, to obtain an estimate of distribution and abundance. Type specimen and paratypes are currently held offshore and need to be returned to confirm identification.

Management Needs: -

Contacts: Kevin Collier.

Order: Stylommatophora (Gr. *stylos*, pillar + *omma*, eye + *pherein*, to bear)

Family:	Bulimulidae
Common name:	**Large terrestrial snails**
Genus:	*Placostylus*
Common name:	**Flax snails**

Order: Stylommatophora

Family: Bulimulidae

Taxonomic Name: *Placostylus (Basileostylus) bollonsi* "West"

Common Names: King Island turrett snail (Foord 1990)

Synonyms: -

M&D Category: B

Conservancy Office: NL

Area Office: Kaitaia

Description: A large snail with a tall spired shell, up to c. 90 mm high. The shell is chalky white, with a red-coloured aperture, and brown periostracum (outermost covering of shell) (Parrish et al. 1995; F. Brook pers. comm. 2000).

Type Locality: Not described.

Specimen Holdings: AMNZ.

Distribution: Restricted to West Island in the Three Kings Islands group, patchily distributed across the upper western part of the island (Brook 1999a). Has been found at c. 100 m elevation on the ridge crest at the south-eastern end of West Island, in a terraced area; above c. 80 m on the steep south-west facing slope above the Elingamite wreck site. It is estimated that there were at least 100 individuals in 1982 (Brook & Laurenson 1992).

Shell height: 90 mm

Habitat: Terrestrial, found in litter, and under groundcover plants and stones, under broadleaf forest and flax (*Phormium* spp.)/broadleaf shrubland (Brook 1999a). The snails are herbivorous feeding on the fallen leaves of broadleaf trees and shrubs (F. Brook pers. comm. 2000). Live snails have been found under a 3 m high canopy of pukanui, karaka (*Corynocarpus laevigatus*) and Three Kings rangiora (*Brachyglottis arborescens*), under carex sedges in areas with deep moist broadleaf litter, and in ponded accumulations of broadleaf litter beneath a low mixed broadleaf canopy (Brook & Laurenson 1992).

Sign of Presence: Empty shells. Oval eggs, buff in colour, up to 18 mm long (Brook & Laurenson 1992).

Threats: None known at present. There is a potential risk of introduction of mammalian predators, or loss of habitat through introduction of invasive exotic plants, mammalian herbivores, or plant pathogens (Brook & Laurenson 1992; Brook 1999c).

Work Undertaken to Date: Brook and Laurenson (1992) and Brook (1999a) described distribution and habitat. Shell morphology described by Brook and Laurenson (1992) and Sherley (1996).

Priority Research, Survey and Monitoring: 1) Monitor status of subpopulation at 5-10 yearly intervals (Parrish et al. 1995; Brook 1999c).

Management Needs: 1) Maintain island security.

Contacts: Fred Brook, Richard Parrish, Andrea Booth.

Order: Stylommatophora

Family: Bulimulidae

Taxonomic Name: *Placostylus (Basileostylus) bollonsi arbutus* Powell, 1948

Common Names: King Island turrett snail (Foord 1990)

Synonyms: -

M&D Category: B

Conservancy Office: NL

Area Office: Kaitaia

Description: A large snail with a tall spired shell, up to c. 115 mm high. The shell is chalky white, with a red-coloured aperture, and brown periostracum (outermost covering of shell) (Parrish et al. 1995; F. Brook pers. comm. 2000). Powell (1948) recorded shell measurements of 93.5 - 113.4 mm high, and 35 - 44 mm wide.

Type Locality: Three Kings Islands, Great Island, in a small hanging valley near the foot of a boulder scree at about 213 m elevation, on the seaward slope of the western side of the island, just south of Crater Head, in forest (Powell 1948, Climo 1973).

Specimen Holdings: -

Distribution: Restricted to the vicinity of the trig station on Great Island (Brook & Laurenson 1992, fig 11). This population has increased in size since goats were eradicated from Great Island in 1946. In 1945, 25 snails were counted (Powell 1948), in 1970 there were c. 100 individuals (Climo 1973), and in 1991 c. 360 individuals over an area of about 2.7 ha (Brook & Laurenson 1992). Records include on the south-western seaward slope just south of Crater Head at about 213 m; several hundred yards east of Hapuku Point at about 193 m (extinct) (Powell 1948); west of trig station at c. 240 m elevation 1982; ridge north-west of trig station at c. 260 m 1982 (Brook & Laurenson 1992).

Shell height: 115 mm

Habitat: Terrestrial, found in litter, and under groundcover plants and stones, in broadleaf and karaka (*Corynocarpus laevigatus*) forest (Brook & Laurenson 1992). The snails are herbivorous, feeding on the fallen leaves of broadleaf trees and shrubs (F. Brook pers. comm. 2000). They are usually sparsely and randomly distributed in areas with extensive stable broadleaf litter, where they can be found clustered in pockets on steep slopes, and in areas where broadleaf plants are sparsely or patchily distributed. Broadleaf plants and microhabitat availability, are likely to be the principle factors determining distribution (Brook & Laurenson 1992).

Sign of Presence: Empty shells. Oval eggs, buff in colour, up to 18 mm long (Brook & Laurenson 1992).

Threats: None known at present. Historically Great Island was under intense cultivation (Powell 1979). There is a potential risk of introduction of mammalian predators, or loss of habitat through introduction of invasive exotic plants, mammalian herbivores, or plant pathogens (Brook & Laurenson 1992; Brook 1999c).

Work Undertaken to Date: Goats introduced to Great Island 1889. Goats eradicated from Great Island in 1946 (Turbott 1948). Distribution and ecology work undertaken (Powell 1948; Climo 1973; Brook and Laurenson 1992). Shell morphology studied (Brook & Laurenson 1992; Sherley 1996), and genetic variation compared (Triggs & Sherley 1993).

Priority Research, Survey, and Monitoring: 1) Monitor status of subpopulation at 5 - 10 yearly intervals (Parrish et al. 1995; Brook 1999c).

Management Needs: 1) Maintain island security.

Contacts: Fred Brook, Richard Parrish, Andrea Booth.

See Plate 5, No. 1.

Order: Stylommatophora

Family: Bulimulidae

Taxonomic Name: *Placostylus (Basileostylus) bollonsi bollonsi* Suter, 1908

Common Names: King Island turrett snail (Foord 1990)

Synonyms: *Placostylus bollonsi, Basileostylus bollonsi* (Powell 1979)

M&D Category: B

Conservancy Office: NL

Area Office: Kaitaia

Shell height: 100 mm

Description: A large snail with a tall spired shell, up to c. 100 mm high. The shell is chalky white, with a red-coloured aperture, and brown periostracum (outermost covering of shell) (F. Brook pers. comm. 2000). Powell (1979) recorded shell measurements of 87 - 100 mm high, and 36 - 39 mm wide. The animal is black, and irregularly and coarsely granular (Suter 1908).

Type Locality: Three Kings Islands, Great Island, S.E. landing slope below the provision depot. Now extinct at that site (Powell 1948).

Specimen Holdings: AMNZ.

Distribution: East of isthmus on Great Island (Brook & Laurenson 1992, fig 10). This population has increased in size since goats were eradicated in 1946. In 1945, 11 snails were counted (Powell 1948), in 1970 there were c. 30 individuals (Climo 1973), and in 1991 c. 210 individuals covering an area of about 1.697 ha (Brook & Laurenson 1992). Records include: on Great Island at South East Bay and landing slope below the provision depot (now extinct there), about 800 m north-east of the provision depot, at about 152 m (Powell 1948, 1951a); 152 m in valley of South East landing; north side of South East Bay at c.100 m elevation 1982 (Brook & Laurenson 1992). Powell (1948) included *P. bollonsi* from North East Island in this subspecies (Brook & Laurenson 1992; Sherley 1996).

Habitat: Terrestrial, found in litter, and under groundcover plants and stones, in broadleaf and kanuka (*Kunzea ericoides*) forest (Brook & Laurenson 1992; Brook 1999a). The snails are herbivorous, feeding on the fallen leaves of broadleaf trees and shrubs (F. Brook pers. comm. 2000). They are usually sparsely and randomly distributed in areas with extensive stable broadleaf litter, where they can be found clustered in pockets on steep slopes, and in areas where broadleaf plants are sparsely or patchily distributed. Broadleaf plants and microhabitat availability are likely to be the principle factors determining distribution (Brook & Laurenson 1992).

Sign of Presence: Empty shells. Oval eggs, buff in colour, up to 18 mm long (Brook & Laurenson 1992).

Threats: None known at present. Historically Great Island was under intense cultivation (Powell 1979). There is a potential risk of introduction of mammalian predators, or loss of habitat through introduction of invasive exotic plants, mammalian herbivores, or plant pathogens (Brook & Laurenson 1992; Brook 1999c).

Work Undertaken to Date: Goats introduced to Great Island 1889. Goats eradicated from Great Island in 1946 (Turbott 1948). Distribution and ecology studied (Powell 1948; Climo 1973; Brook & Laurenson 1992; Brook 1999a). Shell morphology studied

(Brook & Laurenson 1992; Sherley 1996), and genetic variation compared (Triggs & Sherley 1993).

Priority Research, Survey and Monitoring: 1) Monitor status of subpopulation at 5 - 10 yearly intervals (Parrish et al. 1995; Brook 1999c).

Management Needs: 1) Maintain island security.

Contacts: Fred Brook, Richard Parrish, Andrea Booth.

See Plate 5, No. 2.

Order: Stylommatophora

Family: Bulimulidae

Taxonomic Name: *Placostylus (Basileostylus) bollonsi caperatus* Powell, 1948

Common Names: King Island turrett snail (Foord 1990)

Synonyms: -

M&D Category: B

Conservancy Office: NL

Area Office: Kaitaia

Shell height: 95 mm

Description: A large snail with a tall spired shell, up to c. 95 mm high. The shell is chalky white, with a red-coloured aperture, and brown periostracum (outermost covering of shell) (F. Brook pers. comm. 2000). Powell (1979) recorded shell measurements of 84 - 97 mm high, and 33.5 - 36 mm wide (Powell 1979).

Type Locality: Great Island, North West landing slope in stunted ngaio scrub at c. 152 m (Powell 1948).

Specimen Holdings: AMNZ (type), MONZ.

Distribution: Restricted to an area of c. 0.5 ha above North West Bay, west of the isthmus on Great Island (Brook & Laurenson 1992, fig 10). This population has increased in size since goats were eradicated from Great Island in 1946. In 1946 about 40 snails were seen (Powell 1948), in 1970 there were more than 60 individuals (Climo 1973), and in 1991 c. 130 individuals covering an area of about 0.5 ha (Brook & Laurenson 1992). Records include the North West landing slope c. 152 m, (Powell 1948, 1979) (c. 375 m stated in Brook & Laurenson 1992); cliffs above North West Bay at c. 130 m elevation (Brook & Laurenson 1992).

Habitat: Terrestrial, found in litter, and under groundcover plants and stones, in broadleaf and kanuka (*Kunzea ericoides*) forest (Brook & Laurenson 1992). In 1946 this population was restricted to ngaio (*Myoporum laetum*) shrubland (Powell 1948). The snails are herbivorous, feeding on the fallen leaves of broadleaf trees and shrubs (F. Brook pers. comm. 2000). They are usually sparsely and randomly distributed in areas with extensive stable broadleaf litter, where they can be found clustered in pockets on steep slopes, and in areas where broadleaf plants are sparsely or patchily distributed. Broadleaf plants and microhabitat availability, are likely to be the principle factors determining distribution (Brook & Laurenson 1992).

Sign of Presence: Empty shells. Oval eggs, buff in colour, up to 18 mm long (Brook & Laurenson 1992).

Threats: None known at present. Historically Great Island was under intense cultivation (Powell 1979). There is a potential risk of introduction of mammalian predators, or loss of habitat through introduction of invasive exotic plants, mammalian herbivores, or plant pathogens (Brook & Laurenson 1992; Brook 1999c).

Work Undertaken to Date: Goats introduced to Great Island 1889. Goats eradicated from Great Island in 1946 (Turbott 1948). Distribution and ecology studied (Powell 1948; Climo 1973; Brook & Laurenson 1992). Shell morphology studied (Brook & Laurenson 1992; Sherley 1996), and genetic variation compared (Triggs & Sherley 1993).

Priority Research, Survey, and Monitoring: 1) Monitor status of subpopulation at 5 - 10 yearly intervals (Parrish et al. 1995; Brook 1999c).

Management Needs: 1) Maintain island security.

Contacts: Fred Brook, Richard Parrish, Andrea Booth.

See Plate 5, No. 3.

Order: Stylommatophora

Family: Bulimulidae

Taxonomic Name: *Placostylus (Maoristylus) ambagiosus ambagiosus* Suter, 1906

Common Names: -

Synonyms: *Placostylus hongii ambagiosus, P. ambagiosus* (Powell 1979)

M&D Category: A

Conservancy Office: NL

Area Office: Kaitaia

Description: A large land snail with a tall spired shell, up to c. 80 mm. The shell is chalky white with a salmon-orange aperture (shell opening), and chestnut-brown periostracum (outermost covering of shell) (Powell 1979; F. Brook pers. comm. 2000). Powell (1979) records shell measurements of 68.5 - 77.75 mm high and 32.5 - 34.65 mm wide.

Type Locality: Motuopao Island, Cape Maria van Diemen (Suter 1906; Powell 1979).

Specimen Holdings: MONZ (type), AMNZ.

Distribution: Restricted to Motuopao Island (Powell 1979).

Habitat: Terrestrial in flax (*Phormium* spp.)/broadleaf shrubland (F. Brook pers. comm. 2000). Powell (1979) recorded it from around the roots of flax bushes (*Phormium* spp.), mainly on the southern slopes (Powell 1979).

Shell height: 80 mm

Sign of Presence: Empty shells. Thin calcium shelled oval eggs, 6 mm long, laid in depressions in the soil under 10 to 15 mm of humus and leaf litter. Communal nests may comprise 20 to 30 eggs (Veitch 1991).

Threats: Kiore was the primary predator prior to its removal (Sherley & Parrish 1989). Habitat modification and loss through invasion of introduced buffalo grass (*Stenotaphrum secundatum*) (Sherley & Parrish 1989) is a concern.

Work Undertaken to Date: The effect of rat predation was studied by Sherley & Parrish 1989, and kiore (*Rattus exultans*) were eradicated from Motuopao Island in 1992 (Parrish et al. 1995). Thirteen individuals have been found since kiore removal (R. Parrish pers. comm. 2000).

Priority Research, Survey, and Monitoring: 1) Follow-up surveys urgently required (R. Parrish pers. comm. 2000).

Management Needs: 1) Maintain effective animal pest monitoring programme and contingency plan to prevent arrival and establishment of exotic snail predators on Motuopao.

2) Investigate the appropriateness of improving snail habitat on Motuopao by planting of broadleaf shrub species (Sherley & Parrish 1989; Brook 1999c).

Contacts: Fred Brook, Richard Parrish, Andrea Booth.

See Plate 5, No. 4.

Order: Stylommatophora

Family: Bulimulidae

Taxonomic Name: *Placostylus (Maoristylus) ambagiosus annectens* Powell, 1938

Common Names: -

Synonyms: *Placostylus ambagiosus hancoxi* (Powell 1979), *P. hongii ambagiosus* (Powell 1938)

M&D Category: A

Conservancy Office: NL

Area Office: Kaitaia

Description: A flax snail with a dark chocolate shell, and a very narrow white line just below the junction of the whorls. The peristome (edge of shell opening) is orange, and the inside of the aperture (shell opening) brownish-red. The shell is 79 - 94 mm high, and 34.5 - 40 mm wide (Powell 1979).

Type Locality: Unuwhao, 274 m, on track between Spirits Bay and Tom Bowling Bay, under leaf mould in coastal rain forest, about 1.6 km from coast (Powell 1938).

Specimen Holdings: AMNZ (type), MONZ.

Distribution: A series of small, disjunct populations at Unuwhao, Matirarau Bay, Ngaruariki Stream, Te Huka, Poroiki, Taumataroa, Haupatoto and Maukins Nook have all been attributed to this subspecies (Powell 1979; Parrish et al. 1995). Records include, Unuwhao, 274 m, between Spirits Bay and the Huka, towards Tom Bowling Bay along the ridges; south-east of Unuwhao, on two ridges running down to Parengarenga Harbour; at low levels near the mouth of the Huka Stream (Powell 1979); at Te Paki Farm Park in the far north of the North Island (Sherley 1994b). Shells have been found in sub-Recent sand-dunes along the full length of Tom Bowling Bay, Waikuku Beach, Spirits Bay, and Cape Maria van Diemen (Powell 1938).

Shell height: 94 mm

Habitat: Terrestrial in litter and under groundcover plants in forest and shrubland (Powell 1938; F. Brook pers. comm. 2000).

Sign of Presence: Empty shells. Thin calcium shelled oval eggs, 6 mm long, laid in depressions in the soil under 10 to 15 mm of humus and leaf litter. Communal nests may comprise 20 to 30 eggs (Veitch 1991).

Threats: All of the populations are very small and threatened by habitat modification and loss, from damage by pigs, cattle, and horses, and predation by introduced species such as pigs, rodents, thrushes, and probably possums and hedgehogs (Brook 1999c). Shell collecting may also have been a factor in this species decline in the past (Veitch 1991).

Work Undertaken to Date: Translocated to Te Paki Farm Park, October 1990 (62 adult 15 juvenile) (Sherley 1994b), uncertain as to success or otherwise. The effects of rat predation have been studied by Sherley and Parrish (1989). Triggs and Sherley (1993) have compared genetic variation using allozyme electrophoresis. Monitoring has been carried out (Parrish et al. 1995), and is still continuing. Fenced enclosures built at Te Huka and Haupatoto Bush. Rodent control work proceeding (R. Parrish pers. comm. 2000).

Priority Research, Survey and Monitoring: 1) Survey populations to determine distribution and abundance (Brook 1999c).

2) Continue to research rodent control regimes, to determine whether continual or pulse baiting is most effective for control.

3) Research pig control to determine whether poisoning or hunting is the most effective method of control.

4) Perform population viability analysis to determine the minimum population size required to survive in areas with controlled rodent populations present. (Parrish et al. 1995).

Management Needs: 1) Maintain existing predator control measures and exclosure fences at the translocated Te Huka population (Brook 1999c).

Contacts: Fred Brook, Richard Parrish, Andrea Booth.

See Plate 5, No. 5.

Order: Stylommatophora

Family: Bulimulidae

Taxonomic Name: *Placostylus (Maoristylus) ambagiosus consobrinus* Powell, 1938

Common Names: -

Synonyms: -

M&D Category: A

Conservancy Office: NL

Area Office: Kaitaia

Description: A flax snail with a reddish brown shell and a relatively small aperture (shell opening) (Veitch 1991). The shell is 70.5 - 86 mm high, and 30.5 - 37 mm wide (Powell 1979).

Type Locality: In Recent loose sand-dunes on the north-eastern side of the extreme north-western Cape Maria van Diemen mainland (Powell 1947).

Specimen Holdings: AMNZ (type), MONZ.

Distribution: Restricted to Cape Maria van Diemen headland (Powell 1979).

Habitat: Terrestrial in flax (*Phormium* spp.)/broadleaf shrubland on lower slopes of headland (F. Brook pers. comm. 2000).

Shell height: 86 mm

Sign of Presence: Empty shells. Thin calcium shelled oval eggs, 6 mm long, laid in depressions in the soil under 10 to 15 mm of humus and leaf litter. Communal nests may comprise 20 to 30 eggs (Veitch 1991).

Threats: Cape Maria van Diemen has a very small population threatened by continuing predation (rats) and periodic habitat disturbance (Brook 1999c). Habitat modification by the invasion of kikuyu grass (*Pennisetum clandestinum*) is a possible threat. Shell collecting may also have been a factor in this species' decline (Veitch 1991).

Work Undertaken to Date: The effects of rat predation have been studied by Sherley and Parrish (1989). Triggs and Sherley (1993) have compared genetic variation using allozyme electrophoresis.

Priority Research, Survey, and Monitoring: 1) Research rodent control regimes, to determine whether continual or pulse baiting is most effective for control.

2) Perform population viability analysis to determine the minimum population size required to survive in areas with controlled rodent populations present. (Parrish et al. 1995).

Management Needs: 1) Evaluate existing conservation management measures and determine requirements and priorities (Brook 1999c).

Contacts: Fred Brook, Richard Parrish, Andrea Booth.

Order: Stylommatophora

Family: Bulimulidae

Taxonomic Name: *Placostylus (Maoristylus) ambagiosus keenorum* Powell, 1947

Common Names: -

Synonyms: -

M&D Category: A

Conservancy Office: NL

Area Office: Kaitaia

Shell height: 84 mm

Description: A flax snail with a dark chocolate shell (Veitch 1991). The aperture (shell opening) is a deep red-brown within, and light ochraceous-salmon on reflected edge of the peristome (edge of shell opening). The shell is 70.25 - 84 mm high, and 28 - 35 mm wide (Powell 1947).

Type Locality: Maungapiko, Kapowairua, eastern end of Spirits Bay at 15 - 45 m, eastern side (Powell 1947).

Specimen Holdings: AMNZ (type), MONZ.

Distribution: Restricted to Maungapiko Hill, with colonies at the eastern end of Spirits Bay at 15 - 45 m, and one on the western slopes (Powell 1979). Both colonies still exist (R. Parrish pers. comm. 2000).

Habitat: Terrestrial in flax (*Phormium* spp.)/broadleaf shrubland and remnant broadleaf forest groves (F. Brook pers. comm. 2000).

Sign of Presence: Empty shells. Thin calcium shelled oval eggs, 6 mm long, laid in depressions in the soil under 10 to 15 mm of humus and leaf litter. Communal nests may comprise 20 to 30 eggs (Veitch 1991).

Threats: An extensive scrub fire in 1946 severely affected the population, destroying hundreds of snails (Veitch 1991). The Maungapiko, Spirits Bay, population is dependent on continued habitat protection and predator control (Brook 1999c). Shell collecting may also have been a factor in this species decline (Veitch 1991).

Work Undertaken to Date: The effects of rat predation have been studied by Sherley and Parrish (1989). Triggs and Sherley (1993) have compared genetic variation using allozyme electrophoresis. Regular rat poisonings have been undertaken (Veitch 1991). Monitoring has been carried out (Parrish et al. 1995). Fence constructed around the western colony in 1989 (R. Parrish pers. comm. 2000).

Priority Research, Survey, and Monitoring: 1) Research rodent control regimes to determine whether continual or pulse baiting is most effective for control.

2) Perform population viability analysis to determine the minimum population size required to survive in areas with controlled rodent populations present (Parrish et al. 1995).

Management Needs: 1) Maintain existing predator control measures and exclosure fences (Brook 1999c).

Contacts: Fred Brook, Richard Parrish, Andrea Booth.

Order: Stylommatophora

Family: Bulimulidae

Taxonomic Name: *Placostylus (Maoristylus) ambagiosus lesleyae* Powell, 1947

Common Names: -

Synonyms: -

M&D Category: A

Conservancy Office: NL

Area Office: Kaitaia

Description: A flax snail with a dark warm brown shell, reddish-brown within the aperture (shell opening) (Veitch 1991). The shell is 72 - 83 mm high, and 31 - 36 mm wide (Powell 1979).

Type Locality: Tapotupotu Bay, just east of Cape Reinga, subfossil, weathering out of consolidated dunes along the sea-front (Powell 1947).

Specimen Holdings: AMNZ (type).

Distribution: Originally described from a prehistoric fossil population at Tapotupotu Bay (Powell 1979), but expanded to include extant populations at Darkies Ridge in the upper northern catchment of Tapotupotu Stream, near Cape Reinga (Veitch 1991); and at Te Paki trig (Sherley & Parrish 1989).

Shell height: 83 mm

Habitat: Terrestrial in litter and under groundcover plants, beneath broadleaf forest and shrubland (F. Brook pers. comm. 2000).

Sign of Presence: Empty shells. Thin calcium shelled oval eggs, 6 mm long, laid in depressions in the soil under 10 to 15 mm of humus and leaf litter. Communal nests may comprise 20 to 30 eggs (Veitch 1991).

Threats: Habitat modification and loss, from damage by pigs, cattle, and horses, and predation by introduced species such as pigs, rodents, thrushes, and probably possums and hedgehogs (Brook 1999c) is a problem. Shell collecting may also have been a factor in this species decline (Veitch 1991).

Work Undertaken to Date: The effects of rat predation have been studied by Sherley and Parrish (1989). Triggs and Sherley (1993) have compared genetic variation using allozyme electrophoresis.

Priority Research, Survey, and Monitoring: 1) Research rodent control regimes to determine whether continual or pulse baiting is most effective for control.

2) Research pig control to determine whether poisoning or hunting is the most effective method of control.

3) Perform population viability analysis to determine the minimum population size required to survive in areas with controlled rodent populations present. (Parrish et al. 1995).

Management Needs: -

Contacts: Fred Brook, Richard Parrish, Andrea Booth.

See Plate 5, No. 6.

Order: Stylommatophora

Family: Bulimulidae

Taxonomic Name: *Placostylus (Maoristylus) ambagiosus michiei* Powell, 1951

Common Names: -

Synonyms: -

M&D Category: B

Conservancy Office: NL

Area Office: Kaitaia

Description: A flax snail with a chestnut brown shell, orange peristome (edge of shell opening), and bluish grey within the aperture (shell opening). The shell is 70 - 74.5 mm high, and 31 - 32.5 mm wide (Powell 1979).

Type Locality: Kerr Point herbfield, North Cape block, under the matted aprons of stunted flax (*Phormium* spp.) near the eastern margin of the herbfield, and only along the coastal ridge (Powell 1951b).

Specimen Holdings: AMNZ (type), MONZ.

Distribution: Restricted to herbfield along the cliff edge at Surville Cliffs, North Cape headland (F. Brook pers. comm. 2000).

Shell height: 74.5 mm

Habitat: Occurs in broadleaf forest and shrubland (Brook 1999c) in litter, and has been associated with *Hebe speciosa brevifolia, Cassina amoena*, and *Leucopogon richei* (Powell 1951b). Most snails are found beneath hangehange (*Geniostoma ligustrifolium*) and skirts of the sedge *Moreolotia affinis* (R. Parrish pers. comm. 2000). They have also been found in the litter under the matted aprons of stunted flax (*Phormium* spp.), along the coastal ridge of Kerr Point herbfield, which occurs on a hard pan (Veitch 1991).

Sign of Presence: Empty shells. Thin calcium shelled oval eggs, 6 mm long, laid in depressions in the soil under 10 to 15 mm of humus and leaf litter. Communal nests may comprise 20 to 30 eggs (Veitch 1991).

Threats: The Surville Cliffs population is small and subjected to moderate predation. Habitat modification and loss, from damage by pigs, cattle, and horses, and predation by introduced species such as pigs, rodents, thrushes, and probably possums and hedgehogs (Brook 1999c) is a problem. The presence of a road acts as a trap for dispersing snails, which get caught out in daytime and die of desiccation. Shell collecting may also have been a factor in this species' decline (Veitch 1991).

Work Undertaken to Date: The effects of rat predation have been studied by Sherley and Parrish (1989). Triggs and Sherley have compared genetic variation using allozyme electrophoresis (Parrish et al. 1995). Extensive monitoring has been done. An electric fence is currently being constructed across the neck of North Cape headland to eliminate cattle, horses, possums, and pigs (R. Parrish pers. comm. 2000).

Priority Research, Survey and Monitoring: 1) Research rodent control regimes to determine whether continual or pulse baiting is most effective for control.

2) Research pig control to determine whether poisoning or hunting is the most effective method of control.

3) Perform population viability analysis to determine the minimum population size required to survive in areas with controlled rodent populations present. (Parrish et al. 1995).

Management Needs: 1) Maintain fenced exclusion of cattle and horses from North Cape headland.

2) Undertake effective pig control at North Cape headland.

3) Undertake effective rodent control at snail population sites (Brook 1999c).

Contacts: Fred Brook, Richard Parrish, Andrea Booth.

Order: Stylommatophora

Family: Bulimulidae

Taxonomic Name: *Placostylus (Maoristylus) ambagiosus pandora* Powell, 1951

Common Names: -

Synonyms: -

M&D Category: A

Conservancy Office: NL

Area Office: Kaitaia

Shell height: 71 mm

Description: A flax snail with a very dark reddish brown shell, an ochraceous-salmon rounded lip, and deep reddish within the aperture (shell opening). The shell is 61.5 - 71 mm high, and 29 - 31 mm wide (Powell 1979).

Type Locality: Cliff face, 1.2 km west of Pandora, Spirits Bay, on rocky scree under cover of *Muehlenbeckia* and *Phormium* (flax), in a small forest remnant containing *Corynocarpus* (karaka) (Powell 1979).

Specimen Holdings: AMNZ (type), MONZ.

Distribution: Restricted to the type locality, a cliff face, 1.2 km west of Pandora, Spirits Bay, Northland (Powell 1979). Translocated to Motutakapu Island in the early 1980s (Parrish et al. 1995). A subfossil has been found on the first coastal dune 1.6 km west of Kapowairua, Spirits Bay (Powell 1951b).

Habitat: Terrestrial in litter and under stones and groundcover plants (F. Brook pers. comm. 2000), in a small remnant of karaka (*Corynocarpus laevigatus*) and tawapou (R. Parrish pers. comm. 2000).

Sign of Presence: Empty shells. Thin calcium shelled oval eggs, 6 mm long, laid in depressions in the soil under 10 to 15 mm of humus and leaf litter. Communal nests may comprise 20 to 30 eggs (Veitch 1991).

Threats: The Pandora population is dependent on continued habitat protection and predator control (Brook 1999c). Habitat modification and loss, from damage by pigs, cattle, and horses, and predation by introduced species such as pigs, rodents, thrushes, and probably possums and hedgehogs (Brook 1999c) is a problem. Habitat modification due to invasion of kikuyu grass (*Pennisetum clandestinum*) also poses a threat. Shell collecting may also have been a factor in this species decline (Veitch 1991).

Work Undertaken to Date: Translocated to Motutakapu Island in the early 1980s (Parrish et al. 1995), only low numbers present when last checked (R. Parrish pers. comm. 2000). The effects of rat predation have been studied by Sherley and Parrish (1989). Triggs and Sherley (1993) have compared genetic variation using allozyme electrophoresis. The Pandora colony is fenced and rodent free. Plantings have been done, but more are required (R. Parrish pers. comm. 2000).

Priority Research, Survey and Monitoring: 1) Research rodent control regimes to determine whether continual or pulse baiting is most effective for control.

2) Perform population viability analysis to determine the minimum population size required to survive in areas with controlled rodent populations present. (Parrish et al. 1995).

Management Needs: 1) Maintain existing predator control measures and exclosure fences (Brook 1999c).

2) Enhance habitat through the planting of suitable species, possibly hangehange (*Geniostoma ligustrifolium*), *Coprosma macrocarpa*, *C. grandifolia* and kohekohe (*Dysoxylum spectabile*) (Veitch 1991).

Contacts: Fred Brook, Richard Parrish, Andrea Booth.

Order: Stylommatophora

Family: Bulimulidae

Taxonomic Name: *Placostylus (Maoristylus) ambagiosus paraspiritus* Powell, 1951

Common Names: -

Synonyms: -

M&D Category: B

Conservancy Office: NL

Area Office: Kaitaia

Shell height: 72.25 mm

Description: A flax snail with a dark warm-brown shell, reddish-brown within the aperture (shell opening). The shell is 70.5 - 72.25 mm high, and 30.5 - 32 mm wide (Powell 1979).

Type Locality: On steep seaward face of small rounded headland, about 1.6 km south of Cape Maria van Diemen. Under flax, small karaka and other stunted coastal scrub (Powell 1951b).

Specimen Holdings: AMNZ (type), MONZ.

Distribution: Has been found on a steep seaward face of small rounded headland, about 1.6 km south of Cape Maria van Diemen (Sherley & Parrish 1989);Te Paki Farm Park in the far north of the North Island (Sherley 1994b); western slope of the lighthouse ridge, Cape Reinga (Powell 1979). Contemporary populations occur on the headland south-east of Cape Maria van Diemen, and there is a translocated population near Maungatiketike Point (Brook 1999c).

Habitat: Terrestrial in flax (*Phormium* spp.)/broadleaf shrubland (F. Brook pers. comm. 2000; R. Parrish pers. comm. 2000). At Cape Reinga they were found in a small patch of scrub (Powell 1979).

Sign of Presence: Empty shells. Thin calcium shelled oval eggs, 6 mm long, laid in depressions in the soil under 10 to 15 mm of humus and leaf litter. Communal nests may comprise 20 to 30 eggs (Veitch 1991).

Threats: Mice now appear to be the major threat to this colony (R. Parrish pers. comm. 2000). Habitat modification through the introduction of buffalo grass (*Stenotaphrum secundatum*) is a problem (Sherley & Parrish 1989). Rats are presumed to prey upon these snails and pigs are potential predators (Sherley & Parrish 1989), along with thrushes, possums and hedgehogs (Brook 1999c). The headland south-east of Cape Maria van Diemen is dependent on continued predator control (Brook 1999c).

Work Undertaken to Date: Between 1990 and 1995, successful local translocations have been undertaken (Parrish et al. 1995). Translocated to two sites in May 1990 (Sherley 1994b). The effects of rat predation have been studied by Sherley and Parrish (1989). Triggs and Sherley (1993) have compared genetic variation using allozyme electrophoresis. Monitoring at Cape Maria van Diemen has been carried out since 1988 (Parrish et al. 1995). Monitoring still continuing. Plantings done in the late 1980s and early 1990s (R. Parrish pers. comm. 2000).

Priority Research, Survey and Monitoring: 1) Research rodent control regimes to determine whether continual or pulse baiting is most effective for control.

2) Perform population viability analysis to determine the minimum population size required to survive in areas with controlled rodent populations present. (Parrish et al. 1995).

Management Needs: 1) Maintain existing predator control measures (Brook 1999c). Restock poison stations every 3 months. Remove pigs found foraging close to the site.

2) Plant shrub species which are used by snails as a food source (Sherley & Parrish 1989).

Contacts: Fred Brook, Richard Parrish, Andrea Booth.

Order: Stylommatophora

Family: Bulimulidae

Taxonomic Name: *Placostylus (Maoristylus) ambagiosus watti* Powell, 1947

Common Names: -

Synonyms: -

M&D Category: A

Conservancy Office: NL

Area Office: Kaitaia

Description: A flax snail with a very dark chocolate-brown shell, and an obscurely malleated, or indistinctly spirally ridged, surface (Powell 1979). The aperture (shell opening) is orange to brown within, tinged with deep red-brown near the outer edge, and light ochraceous salmon on the reflected edge of the peristome (edge of shell opening) (Powell 1947). The shell is 76 - 86 mm high and 34 - 39 mm wide (Powell 1979).

Type Locality: Mid-way between Waikuku Beach and North Cape lighthouse, at 3 - 8 m above sea-level and from 7 - 55 m back from boulder strewn beach (Powell 1947), under cover of coastal forest on cliffs (Powell 1979). The type locality has since been destroyed by fire (Powell 1951b).

Specimen Holdings: AMNZ (type), MONZ.

Shell height: 86 mm

Distribution: Restricted to North Cape headland, along the southern side between Whiriwhiri Stream and Titirangi Point (Powell 1951b; Sherley & Parrish 1989; F. Brook pers. comm. 2000).

Habitat: Terrestrial in litter and under groundcover plants in broadleaf forest remnants and flax (*Phormium* spp.)/broadleaf shrubland (F. Brook pers. comm. 2000).

Sign of Presence: Empty shells. Thin calcium shelled oval eggs, 6 mm long, laid in depressions in the soil under 10 to 15 mm of humus and leaf litter. Communal nests may comprise 20 to 30 eggs (Veitch 1991).

Threats: The North Cape headland has small fragmented populations threatened by high levels of habitat disturbance and predation (Brook 1999a). Habitat modification and loss from damage by pigs, and predation by introduced species such as pigs, rodents, thrushes, and probably possums and hedgehogs (Brook 1999a). Shell collecting may also have been a factor in this species' decline (Veitch 1991).

Work Undertaken to Date: The effects of rat predation have been studied by Sherley and Parrish (1989). Triggs and Sherley (1993) have compared genetic variation using allozyme electrophoresis. Electric fence currently being constructed across the neck of North Cape headland to eliminate cattle, horses, possums, and pigs (R. Parrish pers. comm. 2000).

Priority Research, Survey, and Monitoring: 1) Research rodent control regimes to determine whether continual or pulse baiting is most effective for control.

2) Research pig control to determine whether poisoning or hunting is the most effective method of control.

3) Perform population viability analysis to determine the minimum population size required to survive in areas with controlled rodent populations present.(Parrish et al. 1995).

Management Needs: 1) Maintain fenced exclusion of cattle and horses from North Cape headland.

2) Undertake effective pig control at North Cape headland.

3) Undertake effective rodent control at snail population sites (Brook 1999a).

Contacts: Fred Brook, Richard Parrish,Andrea Booth.

Order: Stylommatophora

Family: Bulimulidae

Taxonomic Name: *Placostylus (Maoristylus) ambagiosus whareana* Powell, 1951

Common Names: -

Synonyms: -

M&D Category: A

Conservancy Office: NL

Area Office: Kaitaia

Description: A flax snail with a dark chocolate shell and a narrow white line just below the junction of the whorls. The peristome (edge of shell opening) is orange, and the interior of the aperture (shell opening) is a dark red-brown. The shell is 79.5 - 83 mm high, and 35 - 36.5 mm wide (Powell 1951b, 1979).

Type Locality: Found in the North Cape area at Whareana, between Waikuku Beach and Parengarenga Heads, in steep valley to the north of Whareana Stream, in mixed forest (Powell 1979).

Specimen Holdings: AMNZ (type), MONZ.

Distribution: Restricted to the type locality in steep valley to the north of Whareana Stream, between Waikuku Beach and Parengarenga Heads (Powell 1979). Sixty nine individuals have been found since 1989 (R. Parrish pers. comm. 2000).

Shell height: 83 mm

Habitat: Terrestrial, in litter and under groundcover plants in broadleaf forest (F. Brook pers. comm. 2000). It appears to have a preference for forests containing karaka (*Corynocarpus laevigatus*), taraire (*Beilschmiedia tarairi*), puriri (*Vitex lucens*) (Veitch 1991), kohekohe (*Dysoxylum spectabile*) (Powell 1951b), and occasionally pohutukawa (Metrosideros excelsa) (Veitch 1991).

Sign of Presence: Empty shells. Thin calcium shelled oval eggs, 6 mm long, laid in depressions in the soil under 10 to 15 mm of humus and leaf litter. Communal nests may comprise 20 to 30 eggs (Veitch 1991).

Threats: Whareana has a very small population threatened by habitat deterioration and predation. Habitat modification and loss, from damage by pigs, cattle, and horses, and predation by introduced species such as pigs, rodents, thrushes, and probably possums and hedgehogs (Brook 1999a) is a problem. Shell collecting may also have been a factor in this species' decline (Veitch 1991).

Work Undertaken to Date: Thirteen adults, and five juvenile snails were translocated to Te Paki Farm Park in October 1990, and released in 50 by 100 m enclosures (Sherley 1994b). The effects of rat predation have been studied by Sherley and Parrish (1989). Triggs and Sherley (1993) have compared genetic variation using allozyme electrophoresis.

Priority Research, Survey and Monitoring: 1) Research rodent control regimes to determine whether continual or pulse baiting is most effective for control.

2) Research pig control to determine whether poisoning or hunting is the most effective method of control.

3) Perform population viability analysis to determine the minimum population size required to survive in areas with controlled rodent populations present. (Parrish et al. 1995).

Management Needs: 1) Evaluate existing conservation management measures and determine requirements and priorities (Brook 1999a).

Contacts: Fred Brook, Richard Parrish, Andrea Booth.

See Plate 5, No. 7.

Order: Stylommatophora

Family: Bulimulidae

Taxonomic Name: *Placostylus (Maoristylus) hongii* (Lesson, 1830)

Common Names: Pupu harakeke, Hongi's turret snail (Foord 1990)

Synonyms: *Bulimus shongii, B. novoseelandicus* (albino form), *B. hongii* (amended), *B. bovinus, Maoristylus hongii, Placostylus novoseelandicus, P. bovinus, P. shongii* (information from Powell 1938, 1979)

M&D Category: C

Conservancy Office: NL, AU

Area Office: Kerikeri, Whangarei, Great Barrier, Auckland

Shell height: 85 mm

Description: A large snail with a tall-spired shell, up to c. 85 mm high. The shell is chalky white with a red to cream aperture, and brown periostracum (outermost covering of shell) (Hayward & Brook 1981; F. Brook pers. comm. 2000). Powell (1979) records shell measurements of 62 - 85 mm high, and 27 - 37 mm wide. The animal is dark slate-grey (Parrish et al. 1995)

Type Locality: At the cascade of Keri Keri, Bay of Islands, under the trees bordering the river of that name (Powell 1938).

Specimen Holdings: AMNZ, MONZ.

Distribution: Historic records from mainland Northland between Whangaroa and Whangarei Heads, as well as the Poor Knights, Chicken, Mokohinau and Great Barrier Islands. Sites where populations are believed to be extinct include; Mokau headland and south end of Mokau beach, Whangaruru; Whangamumu; at the cascade of Kerikeri, Bay of Islands; Kororareka; Akau Bay; bleached shells near Russell; Whangaroa; bleached shells in consolidated dune Tauranga Bay, Whangaroa; northern end of Mimiwhangata Beach, Paparahi, south of Helena Bay on headland; island off Rockells Bay; Whananaki; bleached specimens from dunes at Matapouri Bay; Goat Island, about 2 miles south of Ngunguru; Whangarei Heads; Smugglers Bay, Reotahi and Parua Bay, Whangarei Heads; Aorangi; Great Barrier Island on old pa site midway around Tryphena Bay; Maori Bay; headland at northern end of Schooner Bay; Fanal Island, Mokohinau group. Suter lists Kaitaia and Mangonui, but Powell unable to locate specimens from these localities; Lady Alice Island; Ngahau Bay (information from Powell 1938, 1979; Brook 1999a; Brook & Goulstone 1999; Brook & McArdle 1999).

Current populations found at island off Purerua Peninsula (= unnamed island near Cape Wiwiki (Parrish et al. 1995)) >100 individuals 1999 (R. Parrish pers. comm. 2000); Orokawa Peninsula, >100 individuals estimated 1999 (R. Parrish pers. comm. 2000); Whangaruru North Head, hundreds of individuals 1995; Tauranga Kawau; Peach Cove, Bream Head, hundreds of individuals 1995; Motuhoropapa Island, Noises Islands; Poor Knights Islands at Tawhiti Rahi Island, Motu Kapiti Island, Stacks A, B, C, D, Aorangi Island, Aorangaia Island, Archway Island, and Ngaio Rock, thousands of individuals 1995; Coppermine Island, Chicken Islands (Brook 1999c); Te Ruatahi Island, less than 10 individuals 1995; Gut Rock (0.25 ha), off the eastern side of Fanal Island, Mokohinau Islands, at least 120 individuals but not more than 200 (Brook & McFadden 1998). Population estimates have been taken from Parrish et al. (1995) unless otherwise stated.

The populations at Fanal Island (Browne 1980) and Motuhoropapa Island (Brook & McFadden 1998) are believed to be introduced.

Habitat: Found in coastal broadleaf forest and shrubland (Brook 1999b), and have never been located more than 1 km inland. On a small island near Cape Wiwiki the snails are found in an area of flax (*Phormium* spp.) and broadleaf shrubs, and were absent or rare in adjacent tawapou (*Pouteria costata*) dominated forest (Parrish et al. 1995), but have spread into the forest since the removal of rodents and possums (R. Parrish pers. comm. 2000). The snails are herbivores, feeding on the leaves of broadleaf trees and shrubs. Adults are terrestrial, but juveniles can be arboreal (F. Brook pers. comm. 2000).

Sign of Presence: Empty shells. Approximately oval, buff eggs, laid in 'nests' in the ground. The 'nests' are depressions in the soil, 10 - 20 mm wide and of a similar depth, usually covered by leaf litter (Penniket 1981).

Threats: Modification or loss of habitat from land clearance and damage by stock, and predation by rodents, pigs, and probably possums and hedgehogs, are the major threats. Many mainland and at least four island subpopulations have already gone extinct (Brook 1999c). Kiore probably eradicated these snails from Lady Alice Island (Brook 1999a), and rats might have caused the extinction of the Fanal Island population. The Helena Bay population was eradicated in the space of 2 months following the introduction of domestic pigs (Penniket 1981), and a population near Whangaruru went extinct after the covering forest was felled (A.W.B. Powell pers. comm. cited in Penniket 1981). Of the extant populations, those at Tauranga Kawau are the most threatened (Brook 1999c).

Work Undertaken to Date: Pigs eradicated from Aorangi in 1936. Norway rats eradicated on Motuhoropapa Island, and ship rats and possums have been eradicated from the unnamed island near Cape Wiwiki. Monitoring of the site at Whangaruru has been carried out since 1988 (Parrish et al. 1995). Genetic variation compared by Triggs and Sherley (1993) using allozyme electrophoresis. One hundred snails liberated on Motuhurakia (= Motuhoropapa?) Islet, Noises Islands Group, in 1934 (Powell 1938).

Priority Research, Survey, and Monitoring: 1) Carry out genetic analysis to determine taxonomic status of subpopulations (Brook 1999c). The Gut Rock population may be genetically distinct. It has a small shell size and is exclusively cream coloured in the aperture (shell opening), other populations also have this colouring, but not exclusively (Brook & McFadden 1998).

2) Continue research on rodent control regimes to determine whether continual or pulse baiting is most effective for control. Research pig control to determine whether poisoning or hunting is the most effective method of control. Perform population viability analysis to determine the minimum population size required to survive in areas with controlled rodent populations present. (Parrish et al. 1995).

3) Resurvey distribution and abundance on Coppermine Island (Brook 1999c).

Management Needs: 1) Undertake effective animal pest control at selected sites.

2) Maintain habitat at selected sites.

Contacts: Fred Brook, Richard Parrish, Andrea Booth.

See Plate 5, No. 8.

Family: Rhytididae

Characteristics: Thin-shelled land snails

Genus: *Delos*

Order: Stylommatophora

Family: Rhytididae

Taxonomic Name: *Delos regia* Climo, 1973

Common Names: -

Synonyms: -

M&D Category: I

Conservancy Office: NL

Area Office: Kaitaia

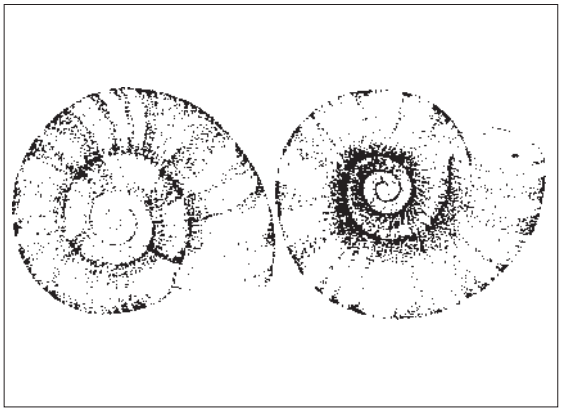
Description: A small snail with the shell up to 4.2 mm in diameter, and spiralled but lacking spiral sculpture (Climo 1973; Powell 1979). The shell is either uniformly yellowish-straw coloured, or with irregularly spaced, radial brown streaks (Climo 1973).

Shell width: 4.2 mm

Type Locality: Upper reaches, unnamed stream near Tasman Stream, Great Island, in kanuka forest (Climo 1973).

Specimen Holdings: AMNZ, MONZ.

Distribution: Restricted to South West Island (Brook 1999a) and Great Island (Climo 1973) in the Three Kings Islands Group. On Great Island it has been found in the upper Tasman Stream valley (Powell 1979); top edge of *Brachyglottis* terrace, below Castaway Valley camp; kanuka (*Kunzea ericoides*) forest below Castaway Valley camp; upper slopes of track from Castaway Valley camp to loghouse; upper reaches, unnamed stream near Tasman Stream; broadleaf forest, near *Tecomanthe* vine, Tasman Valley (Climo 1973).



Permission SIR Publishing. Climo 1973, p 610, Fig. 10 C, D.

Habitat: Terrestrial under stones, rotten wood and groundcover vegetation in kanuka (*Kunzea ericoides*) and broadleaf forest (F. Brook pers. comm. 2000). Climo (1973) recorded it as abundant under stones in remnant broadleaf forest, except at the type locality where it occurs in deep kanuka (*Kunzea ericoides*) litter under logs of that tree.

Sign of Presence: Empty shells.

Threats: None known at present. Potential risk of modification through fire, introduction of exotic invasive plants, mammals or plant pathogens (Brook 1999c).

Photo: Andrew Townsend.

Work Undertaken to Date: Goats introduced to Great Island 1889. Goats eradicated from Great Island in 1946 (Turbott 1948). Distribution and abundance surveyed in 1996 and 1999 (F. Brook unpub. data).

Priority Research, Survey, and Monitoring: 1) Complete the report on landsnail fauna of Great Island (Brook 1999c).

Management Needs: 1) Maintain island security (Brook 1999c).

Contacts: Fred Brook.

See Plate 4, No. 1.

Order: Stylommatophora

Family: Rhytididae

Taxonomic Name: *Delos striata* Climo, 1973

Common Names: -

Synonyms: -

M&D Category: I

Conservancy Office: NL

Area Office: Kaitaia

Description: A small snail with a uniformly yellowish-straw shell, occasionally with faint, slightly darker, radial smudges (Climo 1973). The shell is very flattened, 4 mm wide and 1.5 mm high (Climo 1973; Powell 1979), loosely coiled, with strong radial rib lines (Powell 1979).

Shell width: 4 mm

Type Locality: *Placostylus bollonsi* colony in a remnant broadleaf grove, Great Island, Three Kings Island Group (Climo 1973).

Specimen Holdings: AMNZ, MONZ.

Distribution: Great Island, in the Three Kings Islands Group. Restricted to the western part of the island, between Tasman Valley and the type locality (Climo 1973; F. Brook unpub. data). Has been recorded from: site of *Placostylus bollonsi arbutus* colony; c. 200 m below *Tecomanthe* vine in Tasman Valley (Climo 1973); western end of Great Island, in Tasman Valley and vicinity of trig; west of trig station at north-western end of Great Island, c. 240 m; c. 30 m north-east of *Pennantia* tree, above North West Bay (Brook 1999c).

Habitat: Terrestrial in leaf litter, under stones, and in rotten wood beneath kanuka (*Kunzea ericoides*) and broadleaf forest (Climo 1973; Powell 1979; F. Brook pers. comm. 2000).

Sign of Presence: Empty shells.

Threats: No threats known at present. Potential risk of modification through fire, introduction of exotic invasive plants, mammals or plant pathogens (Brook 1999c). Climo (1973) suggested that depredation of vegetation through early agricultural activities, and later by goats, has restricted *D. striata*.

Work Undertaken to Date: Goats introduced to Great Island 1889. Goats eradicated from Great Island in 1946 (Turbott 1948). Distribution and abundance surveyed in 1996 and 1999 (F. Brook unpub. data).

Priority Research, Survey, and Monitoring: 1) Complete the report on landsnail fauna of Great Island (Brook 1999c).

Management Needs: 1) Maintain island security (Brook 1999c).

Contacts: Fred Brook.

See Plate 4, No. 2, No. 3.

Photos: Andrew Townsend.

Genus: *Delouagapia*

Order: Stylommatophora

Family: Rhytididae

Taxonomic Name: *Delouagapia cordelia* (Hutton, 1883)

Common Names: -

Synonyms: *Gerontia cordelia* (Powell 1952), *Delos (Delouagapia) cordelia* (Powell 1979)

M&D Category: I

Conservancy Office: NL

Area Office: Kaitaia, Kerikeri, Whangarei

Description: A snail with a flattish, circular shell, sculptured with crowded axial growth lines. The top of the shell has meandering, radial, reddish-brown streaks upon a yellowish background. On the base the streaks tend to link up as a network, leaving oval patches of ground colour. The shell is 7 - 8 mm wide, and 3.75 - 4.5 mm high (Powell 1979). The animal is slate-grey, except for the sole which is white. The surface being reticulate veined, and scarcely warty (Powell 1952).

Shell width: 8 mm

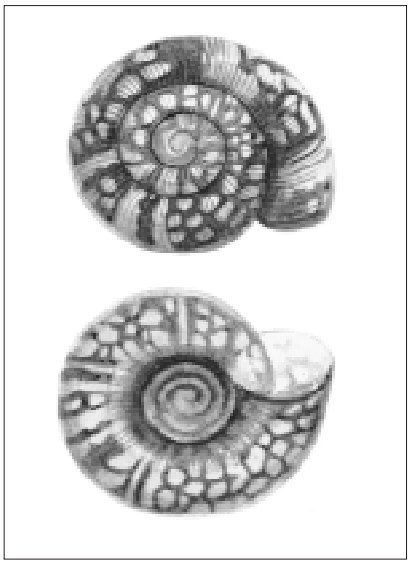
Type Locality: Titirangi, near Auckland (Powell 1952, 1979).

Specimen Holdings: AMNZ.

Distribution: Northern and eastern Northland from Cape Maria van Diemen and North Cape south to the Tangihua Range (Powell 1952, 1979; Brook & Goulstone 1999; F. Brook unpub. data). Originally described from Titirangi, near Auckland, but no other records from there, so probably an incorrect location (F. Brook pers. comm. 2000). Locality records include: Maungakaramea near Whangarei; the northern headland block at Whangaruru; Kapo Wairua; Spirits Bay (Powell 1952); Kerr Point (Powell 1979).

Habitat: Terrestrial in litter and under groundcover plants, arboreal within *Collospermum* and *Astelia* epiphytes (Powell 1952, 1979; F. Brook pers. comm. 2000).

Sign of Presence: Empty shells.



Threats: Distribution previously reduced as a result of forest clearance. Probably preyed on by rats and mice, but remains common to abundant locally (F. Brook pers. comm. 2000).

Work Undertaken to Date: Taxonomic studies by Powell (1952), Climo (1977), and Goulstone and Brook (1999). Distribution records in Powell (1952, 1979), Brook (1999e), and Brook and Goulstone (1999).

Priority Research, Survey, and Monitoring: 1) None required at present.

Management Needs: 1) None required at present.

Contacts: Fred Brook.

See Plate 4, No. 4.

Powell 1979, Plate 65, Figs. 12, 13.

Genus: *Paryphanta*

Common name: **Kauri snails**

Order: Stylommatophora

Family: Rhytididae

Taxonomic Name: *Paryphanta busbyi busbyi* (Gray, 1840)

Common Names: Kauri snail, pupurangi, whistling snail (Judd 1990), pupu whakarongo taua (Scott & Emberson 1999)

Synonyms: *Helix busbyii* (Gray 1840), *Nanina busbyi* (Climo 1977)

M&D Category: C

Conservancy Office: NL, AU, BP

Area Office: Kaitaia, Kerikeri, Whangarei, Warkworth, Auckland, Tauranga

Description: A large snail with a thick, shining dark green shell, bluish within the aperture (shell opening). The shell is 60 - 79 mm wide, and 33 - 44 mm high (Powell 1979). The animal is slate grey, extends a long way out of the shell when travelling and has a prominent "skirt" to the foot (Parrish et al. 1995).

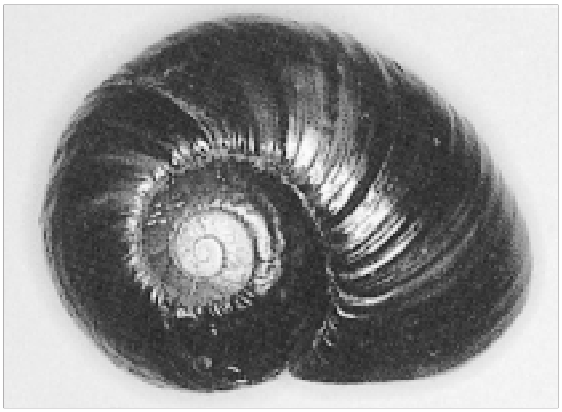
Shell width: 79 mm

Type Locality: New Zealand (Gray 1840).

Specimen Holdings: NHML (type), AMNZ, MONZ.

Distribution: Widely distributed in Northland between Kaitaia and the Brynderwyn Range with outlier populations at Hen (Taranga) Island, and Woodcocks, near Warkworth (Powell 1979; Parrish et al. 1995). There are also introduced populations at Little Huia, Waitakere Ranges; Waiuku, Awhitu Peninsula (B. Hayward pers. comm. in Parrish et al. 1995), and Kaimai Ranges (P. Mayhill pers. comm. cited in Parrish et al. 1995). The natural distribution probably had its southern limit at Warkworth (Chris Green pers. comm. 1999). Snails are still present at all of the mentioned sites.

Habitat: Terrestrial in litter and under logs and groundcover plants, beneath native forest and shrubland. Also present in *Pinus radiata* plantations, rank exotic grassland adjacent to forests and shrublands, and areas of scrub dominated by introduced species including wild ginger (*Hedychium* spp.) (information from Ohms 1948; Balance 1986; Parrish et al. 1995; Coad 1998). They probably feed primarily on earthworms, insect larvae and insects. They also feed on *Rhytida* snails, and are cannibalistic (Parrish et al. 1995). They are inactive in dry conditions, preferring cool wet conditions (Coad 1998).



Permission: Manaaki Whenua Press. Meads 1990a, p. 72.

Sign of Presence: Empty shells. Four to six limy-shelled, oval eggs, laid in depressions in the soil under a thick covering of leaf litter (Veitch 1991). The eggs are 12-12.5 mm long, and 9.5 - 10 mm wide (Powell 1979).

Threats: This species is still widely distributed and can be locally common, but the population has been subjected to fragmentation due to land clearance and habitat modification (Brook 1999c). Most of the existing subpopulations are heavily preyed on by introduced mammals (Brook 1999c). Wild pigs ravage the colonies and destroy the habitat, eggs, and snails of all sizes, whilst rats and birds eat smaller snails (Veitch 1991; K. Walker pers. comm. 2000). Possums and hedgehogs are also predators of this snail (Coad 1998).

Work Undertaken to Date: Ecological studies have been undertaken by Ohms (1948), Ballance (1986), Montefiore (1995), and Coad (1998).

Priority Research, Survey, and Monitoring: 1) Monitor for changes in abundance and predation at selected sites throughout Northland (Brook 1999c).

2) Research rodent control regimes and pig poisoning regimes (Parrish et al. 1995).

Management Needs: 1) Maintain habitat at selected sites (C. Green pers. comm. 1999).

2) Undertake effective predator control at selected sites.

Contacts: Richard Parrish, Fred Brook.

See Plate 4, No. 5.

Order: Stylommatophora

Family: Rhytididae

Taxonomic Name: *Paryphanta busbyi watti* Powell, 1946

Common Names: Kauri snail, pupu whakarongo taua (Scott & Emberson 1999)

Synonyms: *Paryphanta watti* (Powell 1946)

M&D Category: A

Conservancy Office: NL

Area Office: Kaitaia

Description: A large snail with a tawny olive to warm black shell, never greenish. The shell is 53 - 62 mm wide, and 22 - 23.5 mm high (Powell 1979). The animal is slate grey, extends a long way out of the shell when travelling and has a prominent "skirt" to the foot (Parrish et al. 1995).

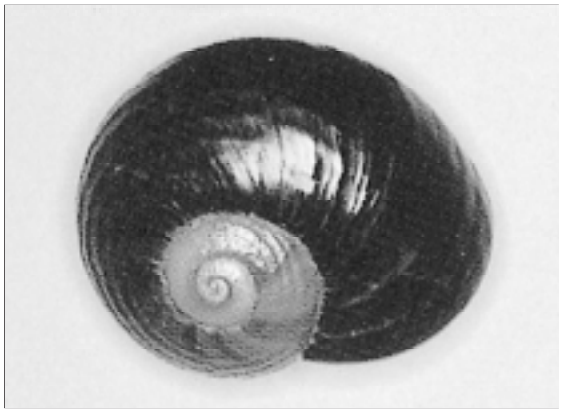
Shell width: 62 mm

Type Locality: Unuwhao 259-274 m, between Spirits Bay and Tom Bowling Bay (Powell 1979).

Specimen Holdings: AMNZ (type), MONZ.

Distribution: Prehistoric distribution extending from Cape Maria van Diemen to Tom Bowling Bay. Extant populations are restricted to the vicinity of Unuwhao (between Spirits Bay and Tom Bowling Bay), Kahuronaki (south of Spirits Bay), and Te Paki trig (Powell 1979; Millener 1981; Parrish et al. 1995; Stringer & Montefiore 1997). Recorded sites include: Unuwhao 259-274 m, between Spirits Bay and Tom Bowling Bay (Powell 1979); Kahuronaki between Te Paki and the Kapo Wairua Rd (Powell 1946); Radar Bush; Pandora Rd; Unuwhao, south side of summit; Muriwhenua (Goulstone et al. 1993); The Pinnacle; Tarure Hill (Parrish et al. 1995); and one sighting near Taumataroa Flat (G. Carlin pers. comm. cited in Parrish et al. 1995). Fossil shells occur in post-Pleistocene consolidated dunes at Cape Maria van Diemen (Powell 1979). The extant population around Te Paki trig occupies an area of c. 10.5 km^2 and comprises c. 5500 individuals; the population around Kohuronaki occupies an area of c. 5 km^2 and c. 5000 individuals; and the population around Unuwhao is of unknown size and extent (Stringer & Montefiore 1997).

Habitat: Terrestrial in litter and under groundcover plants on forest and shrubland. Presently restricted to hill country above 100 m (Stringer & Montefiore 1997), but extended down to the coast before human settlement (Powell 1946; Millener 1981; Brook 1999e). They probably feed primarily on earthworms, insect larvae and insects. They also feed on *Rhytida* snails, and are cannibalistic (Parrish et al. 1995).



Permission: Manaaki Whenua Press. Meads 1990a, p. 72.

Sign of Presence: Empty shells. Four to six limy-shelled, oval eggs, laid in depressions in the soil under a thick covering of leaf litter (Veitch 1991). The eggs are 14 mm long, and 11 mm wide (Powell 1979).

Threats: Habitat modification through damage caused by pigs, cattle, horses, and predation by introduced mammals such as pigs, rats and probably possums (Brook 1999c). Goulstone et

al. (1993) noted that predation by rats and pigs was severe. The distribution has been markedly reduced over the last few centuries as a result of land clearance (Brook 1999c), such as the large scale clearance of kauri (*Agathis australis*) forests. The Unuwhao population is evidently presently highly threatened by habitat deterioration and predation by pigs (Stringer & Montefiore cited in Brook 1999c).

Work Undertaken to Date: Te Paki Farm park purchase and reservation (Parrish et al. 1995). Two sites have been fenced to protect both *Paryphanta busbyi watti* and *Placostylus ambagiosus lesleyae* (R. Parrish pers. comm. 2000).

Priority Research, Survey, and Monitoring: 1) Further survey of Unuwhao locality to determine the distribution and abundance (Brook 1999c).

2) Research rodent control regimes and pig poisoning regimes (Parrish et al. 1995).

Management Needs: 1) Remeasure snail monitoring plots to determine if there has been a decline (K. Walker pers. comm. 2000).

2) Maintain habitat and undertake effective animal pest control at selected sites.

Contacts: Richard Parrish, Fred Brook, Ian Stringer.

See Plate 4, No. 6.

Genus: *Powelliphanta*

Common name: **Carnivorous land snails, giant land snails**

Order: Stylommatophora

Family: Rhytididae

Taxonomic Name: *Powelliphanta* "Buller River"

Common Names: -

Synonyms: -

M&D Category: B

Conservancy Office: WC

Area Office: Buller

Description: A plain yellowish-brown snail. The parietal callus (the thickened calcareous deposit on the upper part of the inside wall of the aperture) is smooth, and dark brown. The shell is 40 mm wide, and 20 mm high. This snail is similar in colour to *P. lignaria unicolorata*, but differs in having a high peaked shell top, as opposed to depressed (Walker 1999 unpub).

Shell width: 40 mm

Type Locality: Not described. Originally discovered at Whitecliffs Bluff, middle Buller River Gorge, south of Inangahua Junction (Walker 1999 unpub).

Specimen Holdings: -

Distribution: Whitecliffs Bluff, middle Buller River Gorge, south of Inangahua Junction; near the mouth of Ten Mile Stream, lower Buller Gorge (Climo 1978).

Habitat: A lowland species, found between 50 and 100 m altitude on alluvial soils. The main colony occurs on mudstone/siltstone soils overlain with limestone talus (Walker 1999 unpub).

Sign of Presence: Empty Shells.

Threats: Destruction of habitat through the deforestation of the river terraces and replacement with pasture, is believed to have reduced the range of the Whitecliffs population. The existing population's habitat was also logged but left to regenerate. 'Lifestyle block' clearance, logging, and coal mining activities are currently threatening the Whitecliffs population. Rat predation is significant, and thrushes and hedgehogs are also likely to be a concern. Feral pigs are a concern at Whitecliffs (Walker 1999 unpub).

Work Undertaken to Date: A plot has been established at Whitecliffs to monitor snail density. Brief surveys have been carried out at Whitecliffs. Possum control has been carried out at Whitecliffs (Walker 1999 unpub).

Priority Research, Survey, and Monitoring: 1) Review historical information on snail presence, vegetation changes, and river flooding levels on the flats opposite the Whitecliffs snail colony (Walker 1999 unpub).

2) Survey the wider Ten Mile Stream area to determine the distribution and abundance of the population there (Walker 1999 unpub).

3) Search likely habitat in the Buller Gorge and Orikaka Forest (Walker 1999 unpub).

4) Increase the number of snail plots and remeasure at 5 yearly intervals to determine population trends (K. Walker pers. comm. 2000).

Management Needs: 1) Maintain habitat at selected sites.

2) Undertake rat control at selected sites.

Contacts: Kath Walker.

Order: Stylommatophora

Family: Rhytididae

Taxonomic Name: *Powelliphanta* "Egmont"

Common Names: -

Synonyms: -

M&D Category: B

Conservancy Office: WG

Area Office: Stratford

Description: A large snail, 68 mm wide, 27 mm high, with a plain olive green shell. There are a few faint narrow reddish-brown spiral lines at, and just above, the periphery of the shell (K. Walker pers. comm. 2000).

Shell width: 68 mm

Type Locality: Not described.

Specimen Holdings: Empty shells.

Distribution: Near Holly Hut, Mt Taranaki, Egmont National Park (K. Walker pers. comm. 2000). Historically a population attributed to this group occurred at the Makakaho Stream, a few kilometers upstream from its junction with the Waitotara River and at the Makowai Stream Ngamatapouri, a tributary of the Waitotara River (T. Holmes pers. comm. 2001).

Habitat: High altitude scrub (K. Walker pers. comm. 2000).

Sign of Presence: Empty shells.

Threats: Thrush predation and potential predation by possums (K. Walker pers. comm. 2000).

Work Undertaken to Date: Two surveys of distribution, outwards from the single originally known site, have been carried out (K. Walker pers. comm. 2000). Population has been monitored for consecutive years from 1996-1999 (T. Holmes pers. comm. 2000).

Priority Research, Survey, and Monitoring: 1) Survey to better define the range of this snail on Mt Taranaki.

2) Survey Waitotara River headwaters (K. Walker pers. comm. 2000).

Management Needs: 1) As a precaution, keep possum numbers low in the north east corner of Mt Taranaki (K. Walker pers. comm. 2000).

Contacts: Kath Walker.

Order: Stylommatophora

Family: Rhytididae

Taxonomic Name: *Powelliphanta* "Wolf River"

Common Names: -

Synonyms: -

M&D Category: B

Conservancy Office: WC, SL

Area Office: South Westland, Te Anau

Description: A snail with an olive-yellow shell base colour, but with irregular black axial stripes covering much of it. The dorsal surface is finely sculptured with red spiral lines, giving a matt appearance to the top half of the shell (K. Walker pers. comm. 2000).

Type Locality: Not described.

Specimen Holdings: -

Distribution: Has been found at Wolf River north of Milford Sound (Climo 1978); McKenzie Range, north Fiordland; Cascade Plateau and Haast Range in south Westland (K. Walker pers. comm. 2000).

Habitat: Forest.

Sign of Presence: Empty shells.

Threats: Rats, thrushes, and possibly possums (K. Walker pers. comm. 2000).

Work Undertaken to Date: Possum control is being undertaken in Pembroke, which is near Wolf River and may have an overlap effect (E. Edwards pers. comm. 1999).

Priority Research, Survey, and Monitoring: 1) Investigate the impact that predators are having on these individuals. (refer to draft *Powelliphanta* land snail recovery plan, (Walker 2000)).

Management Needs: -

Contacts: Kath Walker.

Order: Stylommatophora

Family: Rhytididae

Taxonomic Name: *Powelliphanta annectens* (Powell, 1936)

Common Names: Oparara land snail (Meads 1990a)

Synonyms: *Paryphanta annectens* (Powell 1979)

M&D Category: B

Conservancy Office: WC

Area Office: Buller

Description: A snail with a reddish brown shell, axially striped with close narrow streaks of claret-brown, sepia and black. The parietal callus (the thickened calcareous deposit on the upper part of the inside wall of the aperture) is granulated. The shell is 63.5 - 69 mm wide, and 34 - 38 mm high (Powell 1979).

Shell width: 69 mm

Type Locality: From Oparara near Karamea to Gunner Downs, 609-762 m, south of the Heaphy River (Powell 1979).

Specimen Holdings: -

Distribution: Found north-east of Karamea, in the Fenian and Oparara catchments from Kohaihai River to Bellbird Ridge, Kahurangi National Park (Walker 1982a; K.Walker pers. comm. 2000).

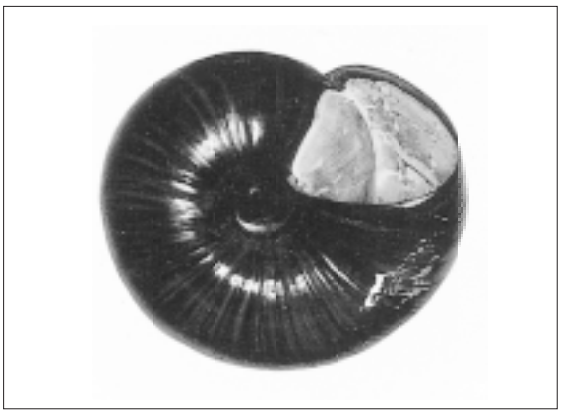
Habitat: A mid to high altitude species (609-762 m), that descends to low levels at the Oparara quarry (Powell 1979), and at the Swanburn and Heaphy rivermouths (K.Walker pers. comm. 2000). High densities of snails were found to occur in silver beech (*Nothofagus menziesii*)/ rata (*Metrosideros* spp.) forest at the Gunner Downs region, and in silver beech forest in the Oparara River area. Specimens have been collected between 15-762 m (Walker 1982a).

Sign of Presence: Empty shells.

Threats: Possums and rats (Walker 1996).

Work Undertaken to Date: -

Priority Research, Survey, and Monitoring: 1) Monitor the snail populations annually. (refer to draft *Powelliphanta* land snail recovery plan,(Walker 2000)).



Permission: Manaaki Whenua Press. Meads 1990a, p. 80.

Management Needs: 1) Undertake possum control at sites where these snails occur (J. Lyall pers. comm. 2000 (refer to draft *Powelliphanta* land snail recovery plan, (Walker 2000)).

Contacts: Kath Walker.

See Plate 4, No. 7.

Order: Stylommatophora

Family: Rhytididae

Taxonomic Name: *Powelliphanta fiordlandica* (Climo, 1971)

Common Names: -

Synonyms: -

M&D Category: B

Conservancy Office: SL

Area Office: Te Anau

Description: A snail with a rich brown shell, and having radial bands of paler colour present. The base is a darker brown, and highly glossy. The shell is thin and weakly calcareous. It has a low profile, deeply incised suture (Powell 1979), and an umbilicus (the depression or cavity at the base of body whorl) that is wider than that of all other *Powelliphanta* (K. Walker pers. comm. 2000). The shell is 32 mm wide, and 16 mm high (Powell 1979).

Shell width: 32 mm

Type Locality: Five Fingers Point, Five Fingers Peninsula, Resolution Island, Dusky Sound, Fiordland (Climo 1971).

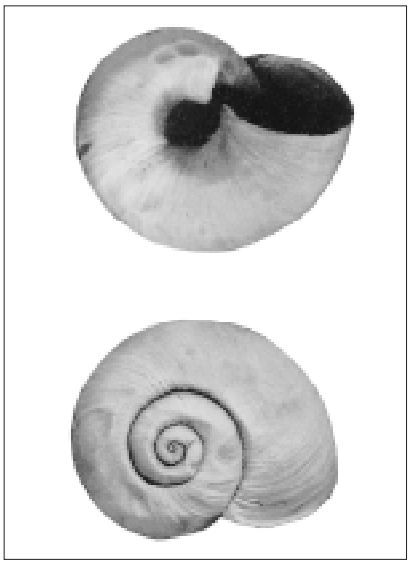
Specimen Holdings: OMNZ.

Distribution: Five Fingers Point, Five Fingers Peninsula, Resolution Island, Dusky Sound, Fiordland (Climo 1971). Also on the mainland between Dusky Sound and Chalky Inlet (K. Walker pers. comm. 2000).

Habitat: Found in open beech forest, at or below 800 m on Resolution Island (Climo 1971), and also at the bush line (1000 m) in alpine scrub on the Fiordland mainland (K. Walker pers. comm. 2000).

Sign of Presence: Empty shells.

Threats: Thrushes are apparently causing a greatly enhanced mortality (K. Walker pers. comm. 2000).



Permission: Harper Collins Publishers (NZ) Ltd. Powell 1979, Plate 62, Figs. 12, 13.

Work Undertaken to Date: Recovery plan in progress.

Priority Research, Survey, and Monitoring: 1) Investigate the impacts that thrushes are having on the populations (refer to draft *Powelliphanta* land snail recovery plan, (Walker 2000)).

Management Needs: -

Contacts: Kath Walker.

Order: Stylommatophora

Family: Rhytididae

Taxonomic Name: *Powelliphanta gilliesi* "Heaphy"

Common Names: Gillies' land snail (Meads 1990a)

Synonyms: -

M&D Category: B

Conservancy Office: WC

Area Office: Buller

Description: A snail with a medium size shell, 47 mm wide, 22 mm high, with a purplish-brown, smooth callus. The dorsal surface is finely spirally lined with dark brown to almost black bands. The ventral surface is a rich dark reddish-brown, with two thick black spiral bands near the periphery (K. Walker pers. comm. 2000).

Shell width: 47 mm

Type Locality: Not described.

Specimen Holdings: -

Distribution: Between the mid-reaches of the Heaphy River and the Gunner River, in Kahurangi National Park (K. Walker pers. comm. 2000).

Habitat: Under litter in beech, quintinia, kamahi (*Weinmannia racemosa*), and northern rata (*Metrosideros robusta*) forest on limestone (K. Walker pers. comm. 2000).

Sign of Presence: Empty shells.

Threats: Possums and rats (Walker 1996).

Work Undertaken to Date: Possum control operation in 1998 over the entire known range of this snail. A 500 m^2 snail density monitoring plot was established in 1995 (K. Walker pers. comm. 2000).

Priority Research, Survey, and Monitoring: 1) Survey the northern and eastern boundaries to more accurately identify the range of this species.

2) Increase the number and spread of snail monitoring plots to detect population trends (K. Walker pers. comm. 2000).

Management Needs: 1) Maintain possums at very low levels (<3% RTC), using poisons which also control rats (K. Walker pers. comm. 2000).

Contacts: Kath Walker.

Order: Stylommatophora

Family: Rhytididae

Taxonomic Name: *Powelliphanta gilliesi aurea* (Powell, 1946)

Common Names: Gillies' land snail (Meads 1990a)

Synonyms: *Paryphanta gilliesi aurea* (Powell 1979)

M&D Category: B

Conservancy Office: NM

Area Office: Golden Bay

Description: A snail with an olive-brown shell, spirally lined in dark chestnut and with a few dark green lines. The base of the shell is golden to olive, with a small area of reddish-brown about the umbilicus (the depression or cavity at the base of body whorl). The parietal callus (the thickened calcareous deposit on the upper part of the inside wall of the aperture) is dark Indian-red, and densely granulated. The shell is 47 - 50.5 mm wide, and 28 - 30.75 mm high (Powell 1979).

Shell width: 50.5 mm

Type Locality: Mangarakau, 183 m, north of Paturau River, West Nelson (Powell 1979), in a small area of coastal forest (Powell 1946).

Specimen Holdings: AMNZ.

Distribution: Mangarakau, West Nelson (Powell 1979).

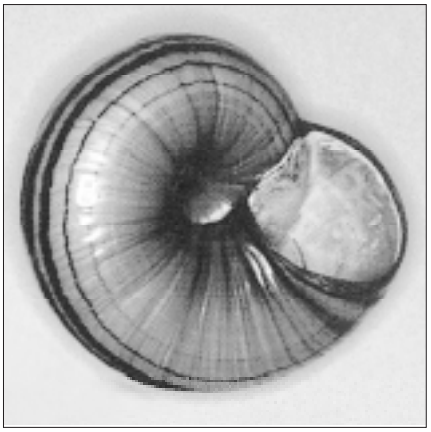
Habitat: Lives in dense mixed forest on steep limestone bluffs, these have large patches of kiekie (*Freycinetia banksii*) and supplejack (*Ripogonum scandens*), and a deep litter layer (Meads et al. 1984). At Mangarakau it was found in a small forest remnant, above the coal mine, about a mile east of the *brunnea* colony, and separated from it by a massive and precipitous escarpment (Powell 1979).

Sign of Presence: Empty shells.

Threats: Pigs and rats are a problem (Meads et al. 1984).

Work Undertaken to Date: -

Priority Research, Survey, and Monitoring: 1) Establish snail density monitoring plots to determine population trends (K. Walker pers. comm. 2000).



Permission: Manaaki Whenua Press.
Meads 1990a, p. 78, Fig. 2.

Management Needs: 1) Maintain stock proof fence around the scenic reserve.

2) Control pig numbers (K. Walker pers. comm. 2000).

Contacts: Kath Walker, Ian Millar, Simon Walls.

See Plate 4, No. 8.

Order: Stylommatophora

Family: Rhytididae

Taxonomic Name: *Powelliphanta gilliesi brunnea* (Powell, 1938)

Common Names: Gillies' land snail (Meads 1990a)

Synonyms: *Paryphanta gilliesi brunnea* (Powell 1979)

M&D Category: A

Conservancy Office: NM

Area Office: Golden Bay

Description: A snail with a bright reddish-brown shell, the base is plain (Powell 1979), and the upper surface circled with fine dark brown lines (Walker 1999 unpub.). The parietal callus (the thickened calcareous deposit on the upper part of the inside wall of the aperture) is dark brown to black, and crowded with fine granules. The shell is 53 - 56 mm wide, and 30 - 32 mm high (Powell 1979).

Shell width: 56 mm

Type Locality: Just north of the Paturau River, on the sea coast, 6-15 m altitude, in a small remnant of original coastal forest (Powell 1979).

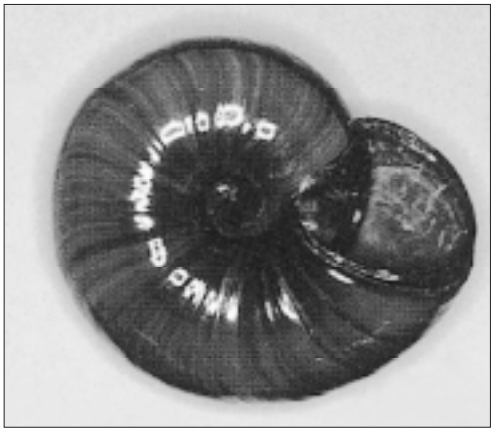
Specimen Holdings: AMNZ.

Distribution: Formerly found just north of the Paturau River, on the sea coast, and evidence that it once extended to at least 8 km up the coast (Powell 1979). Now confined to a 0.2 ha patch of remnant forest, near the mouth of the Paturau River (Walker 1999 unpub.).

Habitat: Found under litter in coastal lowland forests (Walker 1999 unpub.) of mahoe (*Melicytus ramiflorus*), kawakawa (*Macropiper excelsum*), pigeonwood (*Hedycarya arborea*), cabbage tree (*Cordyline* spp.), kiekie (*Freycinetia banksii*), flax (*Phormium* spp.) (Meads et al. 1984), and nikau (*Rhopalostylis sapida*), on sandy soils with limestone outcrops (Walker 1999 unpub.).

Sign of Presence: Empty shells.

Threats: Clearance of almost the entire forest habitat for farmland, and degradation of the remaining fragment through cattle trampling and grazing (Walker 1999 unpub.), has been the main cause of the decline of the species. Predation by rats, hedgehogs and thrushes is also a problem (Walker 1999 unpub.) This subspecies is particularly threatened as it is confined to a single small forest remnant (Meads et al. 1984).



Permission: Manaaki Whenua Press. Meads 1990a, p. 78, Fig. 1.

Work Undertaken to Date: Habitat was fenced to exclude cattle and sheep in 1980 (Meads et al. 1984). In 1985, plantings of flax (*Phormium* spp.) were transferred from the beach edge, several hundred metres away, to the area between the fence and the bush. This was done to increase the available snail cover, protect the bush from wind damage, and eliminate the rank growth of grass which resulted from fencing (Walker 1999 unpub.). Until at least 1985 the owner regularly put stock inside the fence to reduce the fire risk the rank grass created (Walker 1999 unpub.) In 1991 two plots were established, and the number of live snails counted. The plots were

resurveyed in 1998 (Walker 1999 unpub.). Poison rat bait left in bait stations sporadically in 1991. Bait stations regularly refilled about every 6 weeks, from 1999 (Walker 1999 unpub.). Several unsuccessful attempts have been made since 1985 to legally protect the site (Walker 1999 unpub.) Considering options for translocation to two sites near the remaining site (I. Millar pers. comm. 1999).

Priority Research, Survey, and Monitoring: –

Management Needs: 1) Maintain bait stations, refilling every 6 - 8 weeks (Walker 1999 unpub.).

2) Investigate the feasibility of erecting a rodent and hedgehog proof fence around the colony, and install a number of possum traps in the forest (Walker 1999 unpub.).

3) Once snail numbers have increased, consider translocation to a new site (Walker 1999 unpub.).

Contacts: Kath Walker, Ian Millar, Simon Walls.

See Plate 4, No. 9.

Order: Stylommatophora

Family: Rhytididae

Taxonomic Name: *Powelliphanta gilliesi compta* (Powell, 1930)

Common Names: Gillies' land snail (Meads 1990a)

Synonyms: *Paryphanta compta* (Powell 1979)

M&D Category: B

Conservancy Office: NM

Area Office: Golden Bay

Description: A snail with a golden to sienna-brown shell, with the dorsal surface and periphery spirally lined in dark brown, and with a secondary series in light green. The shell base is largely plain, but with a slight deepening of tone, accompanied by crowded faint lines around the umbilicus (the depression or cavity at the base of body whorl). The parietal callus (the thickened calcareous deposit on the upper part of the inside wall of the aperture) is dark pinkish-grey, with a few scattered granulations. The shell is 47 - 48 mm wide, and 25 - 25.5 mm high (Powell 1979).

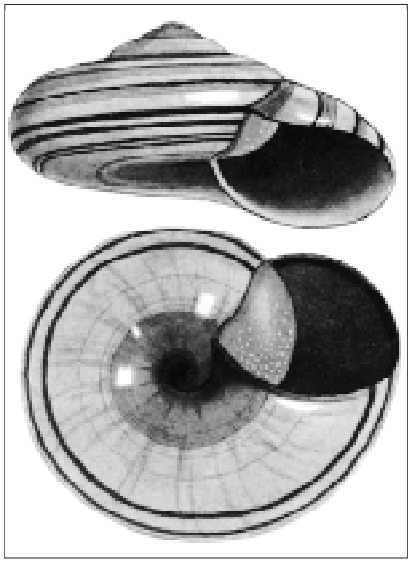
Shell width: 48 mm

Type Locality: Between the Castles and Beetham's Clearing at about 609 m, Brown Cow Ridge, eastern side of Aorere Valley, West Nelson (Powell 1930).

Specimen Holdings: AMNZ.

Distribution: Eastern side of the Aorere Valley, West Nelson, between The Castles and Beetham's clearing, Brown Cow Ridge, 609 m (Powell 1979).

Habitat: Seems to be restricted to a mixed beech/broadleaf forest, on an outcrop of limestone on the western edge of the sloping peneplain which dominates the eastern Aorere Valley. This area is known as 'The Castles' and is at an altitude of 600 m (Meads et al. 1984). Powell (1930) records it from under decaying leaves around the base of crown fern (*Blechnum discolor*) in mixed forest (Powell 1930).



Permission: Harper Collins Publishers (NZ) Ltd.
Powell 1979, Plate 61, Figs. 15, 16.

Sign of Presence: Empty shells.

Threats: Rats and possums (K. Walker pers. comm. 2000).

Work Undertaken to Date: Possum control is being undertaken over the range of the snail, and snails are being monitored as part of this (I. Millar pers. comm. 1999).

Priority Research, Survey, and Monitoring: 1) Monitor snail plots to determine population trends (K. Walker pers. comm. 2000).

Management Needs: 1) Control possum numbers, using techniques which also control rats (K. Walker pers. comm. 2000).

Contacts: Kath Walker.

Order: Stylommatophora

Family: Rhytididae

Taxonomic Name: *Powelliphanta gilliesi fallax* (Powell, 1930)

Common Names: Gillies' land snail (Meads 1990a)

Synonyms: *Paryphanta fallax* (Powell 1979)

M&D Category: B

Conservancy Office: NM

Area Office: Golden Bay

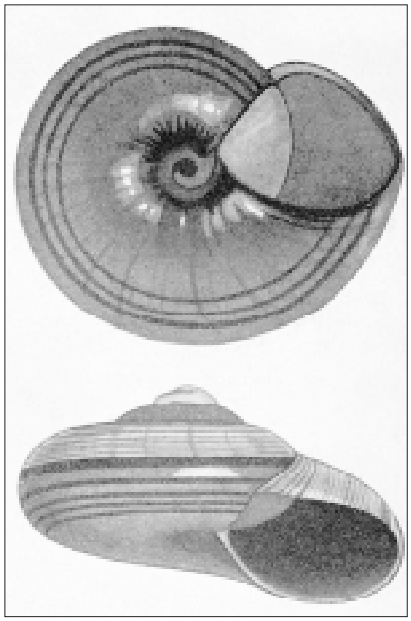
Description: A snail with a sombre greenish-brown to chocolate shell. The top surface and periphery are narrowly spirally lined in dark brown and greenish. The parietal callus (the thickened calcareous deposit on the upper part of the inside wall of the aperture) is dark purplish-brown, and not granulated (Powell 1979; Walker 1999 unpub.). The shell is 41 - 48 mm wide, and 24 - 25.5 mm high (Powell 1979).

Shell width: 48 mm

Type Locality: Hidden Treasure Track, 701 m, Ironstone Creek watershed, between Parapara Inlet and Takaka, West Nelson (Powell 1930, 1979).

Specimen Holdings: -

Distribution: Found in the Parapara Valley, and on the northern and eastern slopes of Parapara Peak (Meads et al. 1984), from the Parapara River to the Anatoki River (Walker 1999 unpub.). Specimens have been collected from Hidden Treasure Track, 701 m, Ironstone Creek watershed, between Parapara Inlet and Takaka, West Nelson; Onekaka Hill, on track to old ironworks quarry, 274 m (Powell 1979); Pariwhakaoho (Walker 1999 unpub.). Snails at higher altitudes have recently been found to belong to a cryptic species *Powelliphanta* "Parapara" (K. Walker pers. comm. 2000).



Permission: Auckland Museum. Powell 1930, Plate 6, Figs. 2, 3.

Habitat: Essentially a lowland species, but occurring from sea-level through to about 900 m. A litter dweller found associated with calcium rich soils on limestone and siltstones, under forests of northern rata (*Metrosideros robusta*) and pukatea (*Laurelia novae-zelandiae*), with dense nikau (*Rhopalostylis sapida*) understorey. Also found on relatively infertile soils under beech (*Nothofagus* sp.) and rimu (*Dacrydium cupressinum*) forests (Walker 1999 unpub.) and in manuka (*Leptospermum scoparium*), gorse (*Ulex europaeus*), or bracken scrub (Meads et al. 1984).

Sign of Presence: Empty shells.

Threats: Predation by rats, thrushes, hedgehogs, and in some populations pigs and possums, are a problem (Walker 1999 unpub.). Lowland colonies are suffering from destruction or modification of the habitat (Meads et al. 1984).

Work Undertaken to Date: Survey of the Parapara area undertaken by the NZFS in 1986, and distribution maps drafted (Walker 1999 unpub.). Monitoring plot set up in 1995 in the Pariwhakaoho area (Walker 1999 unpub.). Possum control through an aerial 1080 drop was undertaken in 1995 over the northeastern flanks of the Parapara catchment (Walker 1999 unpub.)

Priority Research, Survey, and Monitoring: -

Management Needs: 1) Undertake effective predator control (refer to draft *Powelliphanta* land snail recovery plan (Walker 2000).).

Contacts: Kath Walker.

Order: Stylommatophora

Family: Rhytididae

Taxonomic Name: *Powelliphanta gilliesi gilliesi* (Smith, 1880)

Common Names: Gillies' land snail (Meads 1990a).

Synonyms: *Paryphanta gilliesi* (Powell 1979).

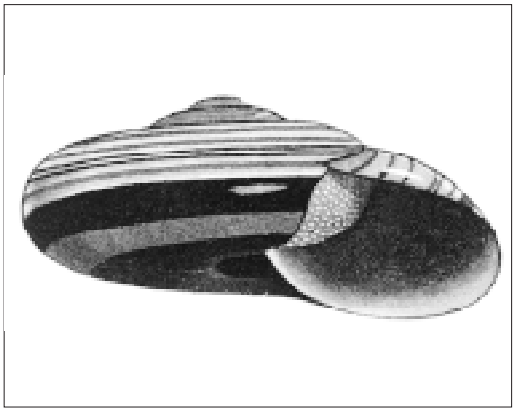
M&D Category: B

Conservancy Office: NM

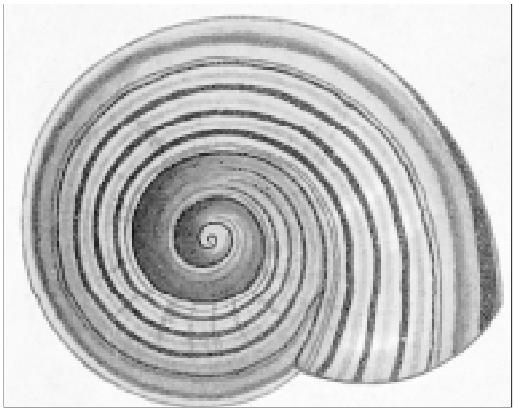
Area Office: Golden Bay

Description: A snail with a dull brownish shell, crossed by numerous darker brown and reddish-brown spiral lines. The under surface is glossy, outwardly bright red-brown like rosewood, but most of the base is occupied by a dark brown almost black central zone with a clearly defined outer edge (Powell 1979). The parietal callus (the thickened calcareous deposit on the upper part of the inside wall of the aperture) is distinctly granulated (Walker 1999 unpub.).The shell is 35 - 48.5 mm wide, and 20 - 24 mm high (Powell 1979).

Shell width: 48.5 mm



Permission: Harper Collins Publishers (NZ) Ltd. Powell 1979, Plate 61, Fig. 13.



Permission: Auckland Museum. Powell 1930, Plate 6, Fig. 1.

Type Locality: Type in British Museum, labelled "Whakamarama Mountain" interpreted by Powell as Mt Burnett, Collingwood, near the northern extremity of the Wakamarama Range (Powell 1946).

Specimen Holdings: AMNZ.

Distribution: Found from Mt Waters to Trig 536 on the northern Wakamarama Range, north-west Golden Bay, Nelson (Walker 1999 unpub.). They occur from sea-level to the summit at 640 m (Walker 1999 unpub.).

Habitat: A litter dweller, found mostly on calcium rich soils on a dolomite substrate (Walker 1999 unpub.), in high rainfall mixed podocarp/broadleaf/beech forest, tangled with supplejack (*Ripogonum scandens*) and kiekie (*Freycinetia banksii*) (Meads et al. 1984). The forest is dominated at low altitudes by emergent northern rata (*Metrosideros robusta*) and pukatea (*Laurelia novae-zelandiae*), and at high altitudes by silver beech (*Nothofagus menziesii*), quintinia, kamahi (*Weinmannia racemosa*), and totara (*Podocarpus totara*) (Walker 1999 unpub.).

Sign of Presence: Empty shells.

Threats: Predation by possums since at least the early 1990s, is a severe threat, with predation by rats, thrushes, hedgehogs and pigs, also a problem (Walker 1999 unpub.). Stock, feral pigs and goats have degraded the understorey and forest floor at Mt Burnett (Meads et al. 1984). Some habitat loss through farmland conversion in lowland areas, and open cast Dolomite quarrying in upland forest is contributing to the decline of the taxon (Walker 1999 unpub.).

Work Undertaken to Date: Possum control undertaken in 1994, through an aerial drop of 1080. Limited ground control of possum

at the base of Mt Burnett has also been carried out. A monitoring plot was set up in 1994 near the summit of Mt Burnett, and remeasured in 1996 and 1998 (Walker 1999 unpub.).

Priority Research, Survey, and Monitoring: 1) Continue monitoring existing plot biennially (Walker 1999 unpub.).

Management Needs: 1) Keep possum numbers at very low levels (< 3% residual trap catch). If practicable utilise possum control methods that are also effective in controlling rats.

2) Maintain habitat at selected sites.

3) Keep goat and pig numbers low in snail habitat, through regular hunting programmes (information from Walker 1999 unpub.).

Contacts: Kath Walker.

Order: Stylommatophora

Family Rhytididae

Taxonomic Name: *Powelliphanta gilliesi jamesoni* (Powell, 1936)

Common Names: Gillies' land snail (Meads 1990a)

Synonyms: *Paryphanta jamesoni* (Powell 1979)

M&D Category: B

Conservancy Office: NM, WC

Area Office: Golden Bay, Buller

Description: A snail with a russet shell, spirally lined and radially streaked with darker brown. The parietal callus (the thickened calcareous deposit on the upper part of the inside wall of the aperture) is dark grey and smooth. The shell is 45 mm wide, and 24 mm high (Powell 1979).

Shell width: 45 mm

Type Locality: Blue Duck Creek, near hut, 630 m, Gouland Downs, West Nelson (Powell 1979).

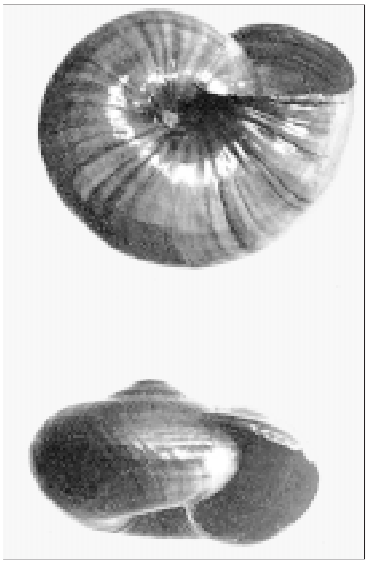
Specimen Holdings: AMNZ.

Distribution: Found in the Gouland Downs area and in the headwaters of the Saxon River (Meads et al. 1984), at Blue Duck Creek, near hut, 630 m, Gouland Downs; 5 miles further along track from Blue Duck Creek towards Heaphy River (Powell 1979); Saxon Creek (Powell 1946).

Habitat: A montane form found in pockets of beech forest, at and above 600 m (Meads et al. 1984).

Sign of Presence: Empty shells.

Threats: Predation by possums is apparently causing a terminal decline (K. Walker pers. comm. 2000).



Permission: Auckland Museum.
Powell 1936, Plate 8, Figs. 3, 4.

Work Undertaken to Date: Monitoring and possum control (I. Millar pers. comm. 1999).

Priority Research, Survey, and Monitoring: -

Management Needs: 1) Control possums to very low densities, for the foreseeable future (K. Walker pers. comm. 2000).

Contacts: Kath Walker.

Order: Stylommatophora

Family: Rhytididae

Taxonomic Name: *Powelliphanta gilliesi kahurangica* (Powell, 1936)

Common Names: Gillies' land snail (Meads 1990a).

Synonyms: *Paryphanta gilliesi* "variety A" (Powell 1930), P. *gilliesi kahurangica* (Powell 1979).

M&D Category: B

Conservancy Office: NM, WC

Area Office: Golden Bay, Buller

Description: A snail with a dull brownish shell (Powell 1979). The base is dark reddish, and there are strong, narrow spirals on the upper surface(Walker 1999 unpub.). The parietal callus (the thickened calcareous deposit on the upper part of the inside wall of the aperture) is purple, and heavily granulated (Walker 1999 unpub.). The shell is 48 - 54 mm wide, and 25 - 27.5 mm high (Powell 1979).

Shell width: 54 mm

Type Locality: Kahurangi Point, west Nelson, in coastal scrub (Powell 1979).

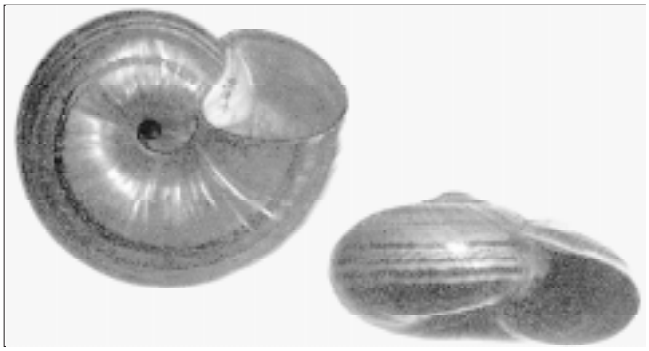
Specimen Holdings: -

Distribution: Confined to about 400 ha at Kahurangi Point, north-west Nelson, from just south of the Kahurangi River mouth to Lagoon Creek, and from the coastline inland to about 300 m altitude. Found in high numbers in fragments of original forest on the Camp Creek dunelands. Moderate to low numbers in surrounding regenerating shrublands (Walker 1999 unpub.).

Habitat: Sandy free draining soils under primary forests of hard beech (*Nothofagus truncata*), northern rata (*Metrosideros robusta*), and pukatea (*Laurelia novae-zelandiae*). Also under regenerating forest of manuka (*Leptospermum scoparium*), kanuka (*Kunzea ericoides*), and nikau (*Rhopalostylis sapida*). All sites have a ground cover of scrambling rata, carex, and bush rice grass (*Microlaena avenacea*) (Walker 1999 unpub.).

Sign of Presence: Empty shells.

Threats: Clearance of the forest habitat for farmland, and degradation of the remaining habitat through cattle trampling (Walker 1999 unpub.), has contributed to the decline of the species. Predation by rats, pigs, possums, hedgehogs and thrushes is also a problem (Walker 1999 unpub.).



Permission: Auckland Museum. Powell 1936, Plate 8, Figs. 1, 2.

Work Undertaken to Date: Aerial 1080 drop conducted in 1997, some ground control had been carried out previously. Monitoring plot established in 1996, remeasured in 1999. Three additional snail monitoring plots established in 1999.

Priority Research, Survey, and Monitoring: 1) Annually check snail plots in Camp Creek for sign of fresh possum predation upon shells. Do not disturb litter, just check the surface.

2) Roughly quantify the number of hedgehogs present at Kahurangi Point. Hedgehogs are likely to affect snail recruitment through predation, but the scale of any problem they pose is currently unknown (Walker 1999 unpub.).

Management Needs: 1) Maintain habitat at selected sites.

2) Repeat possum control when signs of predation on shells in monitoring plots is detected (K. Walker pers. comm. 2000).

Contacts: Kath Walker.

Order: Stylommatophora

Family: Rhytididae

Taxonomic Name: *Powelliphanta gilliesi montana* (Powell, 1936)

Common Names: Gillies' land snail (Meads 1990a).

Synonyms: *Paryphanta gilliesi montana* (Powell 1979).

M&D Category: B

Conservancy Office: NM

Area Office: Golden Bay

Description: A snail with a dull brownish shell, crossed by numerous darker brown and reddish-brown spiral lines. Almost the whole of the base is dark and the parietal callus (the thickened calcareous deposit on the upper part of the inside wall of the aperture) is finely granulated. The shell is 46 - 52 mm wide, and 23 - 28 mm high (Powell 1979).

Shell width: 52 mm

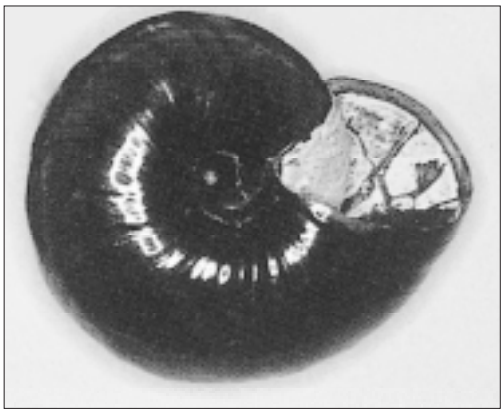
Type Locality: Bock Peak, 915 m (not Mt Stevens 1158 m as originally stated), Wakamarama Range, West Nelson, around tussock clumps (Powell 1979).

Specimen Holdings: -

Distribution: Found on the upper slopes of the Wakamarama Range (Walker 1999 unpub.). They are found along the summit of the range over about 2 km both north and south of Bock Peak (no longer named on topographical maps) just north of Mt Stevens (Walker 1999 unpub.).

Habitat: Appears to be strictly montane, occurring at altitudes between 830-1100 m (Meads et al. 1984, Walker 1999 unpub.), on relatively infertile soils (Walker 1999 unpub.). They live in mixed beech/broadleaf/podocarp forest, comprising silver beech (*Nothofagus menziesii*), southern rata (*Metrosideros umbellata*), quintinia, kamahi (*Weinmannia racemosa*) and toro (probably *Myrsine salicina*) (Meads et al. 1984; Walker 1999 unpub.), and in high altitude muttonbird scrub (probably *Brachyglottis rotundiflora* or *Olearia angustifolia*) (Walker 1999 unpub.). Powell (1979) recorded them from around tussock clumps (Powell 1979).

Sign of Presence: Empty shells.



Permission: Manaaki Whenua Press.
Meads 1990a, p. 78, Fig. 4.

Threats: Intensive possum predation since at least the 1970s. Habitat degradation by goats, and predation by thrushes are problems also (Walker 1999 unpub.).

Work Undertaken to Date: Possum control undertaken in May 1999 over the entire range of this snail (Walker 1999 unpub.)

Priority Research, Survey, and Monitoring: 1) Establish a minimum of five (preferably 10), 100 m^2 plots in the best snail habitat on and to the north and south of Bock Peak, and monitor snail numbers within these plots biennially (Walker 1999 unpub.).

2) Determine natural rates of recruitment, productivity and survival when exotic predators are absent (Walker 1999 unpub.).

Management Needs: 1) Maintain possum numbers at very low levels (< 3% RTC), over the range of the snail (Walker 1999 unpub.).

2) Artificially increase snail numbers in several snail-proof enclosures at either end of the snail's range, by placing either surrounding snails or captive reared snails into the enclosure (Walker 1999 unpub.).

3) Regularly control goats and deer in the area to allow improvement of snail habitat (Walker 1999 unpub.).

Contacts: Kath Walker.

See Plate 4, No. 10.