Preliminary report on the native land snail fauna of Chatham Islands – composition and species distributions

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This report provides a preliminary review of information on the native land snail fauna of Chatham Islands, based on taxonomic publications, unpublished reports, records from collections at Auckland War Memorial Museum (AIM) and Museum of New Zealand Te Papa Tongarewa (NMNZ), surveys carried out on Chatham Island/Rēkohu/Wharekauri by the first author between 1999 and 2011, and by the first four authors in December 2021, and preliminary molecular analyses by the last author.

The threat status of endemic species of leaf vein slugs, family Athoracophoridae, from Chatham Islands, was reviewed by Barker et al. (2021). The aims of the current project are to collate and review existing taxonomic and distribution information on native snail species in families Achatinellidae, Assimineidae, Charopidae and Punctidae on Chatham Islands, and to carry out surveys of the distribution and abundance of these taxa on the four largest islands in the archipelago, namely, Chatham Island/Rēkohu/Wharekauri, Mangere Island, Pitt Island/Rangiauria and South East Island/Rangatira. The main purpose of this work is to provide a basis for assessing the threat status of species in the New Zealand Threat Classification System (NZTCS) as a first step towards identifying the conservation management requirements of Chatham Islands land snails.

Snail survey on Chatham Island/Rēkohu/Wharekauri in 2021

In December 2021 land snails were surveyed at a series of sites in native vegetation on Chatham Island/Rēkohu/Wharekauri, including dune habitats at Henga Scenic Reserve (fig. 1), Manauwea (Ocean Mail) Scenic Reserve, Te One and Waitangi West; lowland forest remnants at Nikau Bush Conservation Area, Henga (fig. 2), Plum Tree Bay and Te Awatea Scenic Reserve (fig. 3); and shrubland and forest on the southern uplands at Awatotara Creek, Thomas Mohi Tuuta (Rangaika) Scenic Reserve (figs. 4, 5), Tuku Nature Reserve (fig. 6) and the vicinity of the Taiko Camp. At each site snails were searched for by eye, and at most sites samples of soil/leaf litter were collected for later examination under a binocular microscope. At forested sites snails were also searched for by beating ground ferns and understorey shrubs and saplings. Site details and faunal lists are given in Appendix 2.

During the survey, a total of 21 native land snail species in families Achatinellidae, Assimineidae, Charopidae and Punctidae was found on Chatham Island/Rēkohu/Wharekauri, including six species that are endemic to this island group, and two species that may or may not be local endemics. One of the endemic species was not known previously.

Composition of Chatham Islands native land snail fauna

Thirty-eight species of native land snails are known from Chatham Islands. An annotated list of species is given in Appendix 1. The majority of these species belong to the punctoid families Charopidae and Punctidae, along with four species of Athoracophoridae, and one

species each in families Achatinellidae and Assimineidae. Many of these species have wide distributions in the New Zealand region, but three species of Athoracophoridae, five of Charopidae and six of Punctidae, comprising a total of 14 species and 37 % of the Chatham native land snail fauna, are endemic to one or more islands in the archipelago. The fauna also includes two other species of Charopidae and one of Punctidae whose taxonomic status has not been resolved, and which may be endemic to Chatham Islands. Compared to the mainland New Zealand land snail fauna, the Chatham Island fauna is depauperate at the family level, lacking species in Bothriembryontidae, Pupinidae, Rhytididae and Succineidae.

A list of punctoid land snail taxa that are known to be endemic to the Chatham Islands, and three species whose taxonomic status has not been resolved and that may be endemic to Chatham Islands, is given below. More detailed information on these species is given in Appendix 1.

Allodiscus morioria Marshall & Barker, 2008
Endemic to Chatham Island/Rekohu/Wharekauri, with historical records from native forest in western and southwestern parts of the island. No live snails or fresh empty shells of *Allodiscus morioria* were found at any of the sites surveyed on this island in December 2021.

Allodiscus pygmaeus Marshall & Barker, 2008
Endemic to Chatham Island/Rekohu/Wharekauri, with historical records from native forest in the southern part of the island. No live snails or fresh empty shells of *Allodiscus pygmaeus* were found at any of the sites surveyed on this island in December 2021.

Calymna sp. 'Chatham Islands'/Charopidae sp. 154 (M.052076)
Endemic to Chatham Islands. There is one historical record of a single individual of this species from forest on South East Island/Rangatira. *Calymna* sp. 'Chatham Islands' is otherwise known only from fossil shells on Chatham Island/Rekohu/Wharekauri, where it appears to have gone extinct.

Charopa sp. 'Chatham Islands'/Charopidae sp. 190 (M.075490)
Endemic to Chatham Islands. There are a few historical records of this species from native shrubland and forest on Chatham Island/Rekohu/Wharekauri and South East Island/Rangatira, and fossil shells are known from Mangere Island and Pitt Island/Rangiauria. No live snails or fresh empty shells of *Charopa* sp. 'Chatham Islands' were found at any of the sites surveyed on Chatham Island/Rekohu/Wharekauri in December 2021.

Charopidae sp. 193 (M.073285)
Possibly endemic to Chatham Islands. There are two historical records of this taxon, one from southwestern Chatham Island/Rekohu/Wharekauri and the other from Pitt Island/Rangiauria, each consisting of a tiny juvenile shell. No live snails or fresh empty shells of Charopidae sp. 193 were found at any of the sites surveyed on Chatham Island/Rekohu/Wharekauri in December 2021.

Climocella sp. aff. *maculata* 'Chatham'
Possibly endemic to Chatham Islands. There are historical records of this species from native shrubland and forest on Chatham Island/Rekohu/Wharekauri and Pitt Island/Rangiauria. In December 2021, it appeared to be very scarce in native forest on southern Chatham Island/Rekohu/Wharekauri.

'*Paralaoma*' *lateumbilicata* (Suter, 1890) 'Chatham'
Possibly endemic to Chatham Islands. There are historical records of this species from Chatham Island/Rekohu/Wharekauri, Pitt Island/Rangiauria and South East Island/Rangatira, and fossil shells are known from Mangere Island. In December 2021, '*Paralaoma*' *lateumbilicata* 'Chatham' was widespread and locally common in native shrubland and forest on Chatham Island/Rekohu/Wharekauri.

Phrixgnathus sp. aff. *phrynia* 'Chatham'/Punctidae sp. 105 (M.062094)
Endemic to Chatham Islands. There are historical records of this species from native shrubland and forest on Chatham Island/Rekohu/Wharekauri and Pitt Island/Rangiauria. In December 2021, it was frequent and locally common in native shrubland and forest on Chatham Island/Rekohu/Wharekauri.

'*Phrixgnathus*' sp. aff. *viridulus* 'Chatham'
Endemic to Chatham Island/Rekohu/Wharekauri, with historical records from native forest in the southern part of the island. In December 2021 this species appeared to be widely distributed but uncommon in native forest on southern Chatham Island/Rekohu/Wharekauri.

Punctidae sp. 36 (M.088229)
Endemic to Chatham Islands. There are two historical records of this species from Pitt Island/Rangiauria and a single historical record from Chatham Island/Rekohu/Wharekauri. No live snails or fresh empty shells of Punctidae sp. 36 were found at any of the sites surveyed on the latter island in December 2021.

Punctidae sp. 244 (M.075477)
Endemic to Chatham Island/Rekohu/Wharekauri, with a few historical records from native forest in the southern part of the island. No live snails or fresh empty shells of Punctidae sp. 244 were found at any of the sites surveyed on this island in December 2021.

Punctidae sp. 'Awatotara'
This previously unknown endemic species was discovered during the last day of the survey in December 2021. It is presently known from a single locality, in Awatotara Creek, southwestern Chatham Island/Rekohu/Wharekauri. Whether it has a wider distribution on Chatham Island/Rekohu/Wharekauri, and/or is present on other islands in the archipelago, remains to be determined.

'*Thalassohelix*' *chathamensis* (Suter, 1909)
Endemic to Chatham Islands. There are historical records of this species from northern Chatham Island/Rekohu/Wharekauri, and fossil shells are known from Pitt Island/Rangiauria. In December 2021, '*Thalassohelix*' *chathamensis* had a very sparse distribution but was locally common in native shrubland and scrub-forest at coastal sites on northern Chatham Island/Rekohu/Wharekauri.

Therasia sp. 'Chatham Islands'/Charopidae sp. 249 (NMNZ M.038462) (figs. 7, 8)
Endemic to Chatham Islands. There are historical records of this species from Chatham Island/Rekohu/Wharekauri, Mangere Island and South East Island/Rangatira, and fossil shells are known from Pitt Island/Rangiauria. In December 2021, *Therasia* sp. 'Chatham Islands' was sparsely distributed but locally common in native shrubland and forest on Chatham Island/Rekohu/Wharekauri.

Discussion

The most exciting find during the 2021 survey was the discovery of a new endemic land snail species, Punctidae sp. 'Awatotara', on southwestern Chatham Island/Rekohu/Wharekauri. Also of particular interest was a modern record from this island of the supralittoral species *Suterilla neozelanica*, which had previously been recorded from fossil shells in middens on the southwestern coast (Wallace 1977, 1979; Fukuda et al. 2006).

Information from the survey, and from fossil and historical records, indicates that most if not all the extant native land snail species on Chatham Island/Rekohu/Wharekauri exist as a series of isolated local populations as a result of extensive anthropogenic clearance and disturbance of native vegetation. The endemic species *Phrixgnathus* sp. aff. *phrynia* 'Chatham' and *Therasia* sp. 'Chatham Islands', and two species that may or may not be local endemics, *Climocella* sp. aff. *maculata* 'Chatham' and *'Paralaoma' lateumbilicata* 'Chatham', appear to be fairly widely distributed across Chatham Island/Rekohu/Wharekauri, and occupy a variety of habitat types. The endemic species *Charopa* sp. 'Chatham Islands' was originally widely distributed across Chatham Island/Rekohu/Wharekauri, but historically appears to have had a much narrower distribution. Modern populations of some other endemic species, including *Allodiscus morioria*, *A. pygmaeus*, '*Phrixgnathus*' sp. aff. *viridulus* and Punctidae sp. 244, along with Charopidae sp. 193, which may or may not be endemic to Chatham Islands, appear to have, or have had, distributions restricted to forest remnants in southern and western parts of the island. The endemic species '*Thalassohelix*' *chathamensis* is presently known only from coastal fringe habitats on the northern part of the island; the newly discovered endemic species Punctidae sp. 'Awatotara' is known only from forest in Awatotara Creek, on the southwestern coast; and the only modern record of Punctidae sp. 36 from Chatham Island/Rekohu/Wharekauri is of a single specimen collected on the southwestern coast in 1988.

Fossil evidence and museum records suggest that populations of some if not all the endemic land snail species on Chatham Island/Rekohu/Wharekauri underwent substantial declines in the last c. 150 years, primarily because of loss and degradation of native vegetation, and at least one species, *Calymna* sp. 'Chatham Islands', appears to have gone extinct on this island. By contrast, protection and restoration of habitats over the last several decades has probably reversed this trend for local populations of some endemic species, including in particular *Phrixgnathus* sp. aff. *phrynia* 'Chatham', '*Thalassohelix*' *chathamensis* and *Therasia* sp. 'Chatham Islands', all of which were common locally on Chatham Island/Rekohu/Wharekauri in December 2021.

Several endemic species that are known to have been extant on southern Chatham Island/Rekohu/Wharekauri up until the 1980s, including *Allodiscus morioria*, *A. pygmaeus*, *Charopa* sp. 'Chatham Islands', Punctidae sp. 36 and Punctidae sp. 244, were not found during the 2021 survey. This may in part be owing to the fact that few sites were sampled in the southern part of the island in 2021 because of time and logistic constraints, but it also indicates that these six species are all quite rare.

Priorities for further survey work

On Chatham Island/Rekohu/Wharekauri, most of the uplands and coastal habitats in the southern part of the island have never been searched for snails, and this area should be a priority for future survey work on this island. In particular, targeted surveys should be undertaken to assess the distribution and population status of the newly discovered endemic species Punctidae sp. 'Awatotara', the extremely rare endemic species Punctidae sp. 36, and

the rare endemic species *Allodiscus morioria*, *A. pygmaeus*, *Charopa* sp. 'Chatham Islands' and Punctidae sp. 244.

Snail surveys have never been undertaken on Mangere Island and Pitt Island/Rangiauria, and very little is known about the land snail faunas of these two islands. On the latter island, a survey is required to determine the distribution and population status of the endemic species *Charopa* sp. 'Chatham Islands', *Phrixgnathus* sp. aff. *phrynia* 'Chatham', Punctidae sp. 36, '*Thalassohelix*' *chathamensis* and *Therasia* sp. 'Chatham Islands'.

The land snail fauna of South East Island/Rangatira was surveyed by Parrish (2000), who recorded finding a single live individual of *Calymna* sp. 'Chatham Islands', which is otherwise known only from fossil shells on Chatham Island/Rekohu/Wharekauri. A further survey of South East Island/Rangatira is required to determine the distribution, population status and management requirements of this extremely rare endemic species, as well as the endemics *Charopa* sp. 'Chatham Islands' and *Therasia* sp. 'Chatham Islands'.

In addition to the survey requirements mentioned above, taxonomic research is necessary to determine whether or not Charopidae sp. 193, *Climocella* aff. *maculata* 'Chatham' and '*Paralaoma*' *lateumbilicata* 'Chatham' are endemic to Chatham Islands, or conspecific with mainland New Zealand populations.

During the survey in December 2021, an unidentified species of flatworm (Platyhelminthes) was observed to be common in broadleaved forest remnants on northern Chatham Island/Rekohu/Wharekauri. Whether this species is native or has been introduced to Chatham Islands is not known. During daytime, the flatworms were typically found sheltering on the undersides of fallen branches and tree trunks in contact with soil, and under peeling bark on rotten logs. In mainland New Zealand, many species of punctoid microsnails in *Allodiscus*, *Cavellia*, *Charopa* and other genera occupy the same types of niches, but snails were conspicuously absent on fallen and rotting wood at the forest sites visited on northern Chatham Island/Rekohu/Wharekauri. Some species of flatworm prey on land snails; whether the particular species seen on Chatham Island/Rekohu/Wharekauri does so as well is not known, but this should be investigated to determine if this species of flatworm poses a threat to populations of endemic land snails.

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References

Barker, G.M.; Brook, F.J.; Mahlfeld, K.; Walker, K.; Roscoe, D.J.; Hitchmough, R.A.; Edwards, E.; Rolfe J.R. & Michel, P. 2021: Conservation status of New Zealand indigenous terrestrial Gastropoda (slugs and snails), 2020. Part 1. Athoracophoridae (leaf-veined slugs) and Succineidae (amber snails). *New Zealand Threat Classification Series* 32: 1-15.

Brook, F.J., Kennedy, M., King, T.M., Ridden, J., Shaw, M.D. & Spencer, H.G. 2020: Catalogue of New Zealand land, freshwater and estuarine molluscan taxa named by Frederick Wollaston Hutton between 1879 and 1904. *Zootaxa* 4865: 1–73.

Burton, D.W. 1963: A revision of the New Zealand and Subantarctic Athoracophoridae. *Transactions of the Royal Society of New Zealand*, Zoology, 3 (6), 47–75.

Climo, F.M. 1989: The panbiogeography of New Zealand as illuminated by the genus *Fectola* Iredale, 1915 and subfamily Rotadiscinae Pilsbry, 1927 (Mollusca: Pulmonata: Punctoidea: Charopidae), *New Zealand Journal of Zoology* 16: 587-649.

Climo, F.M. 2000: Snails collected from Rangatira Id., Chatham Islands, by Richard Parrish, May 2000. Unpublished, privately circulated report. 10 pp.

Dell, R.K. 1954: The land Mollusca of Stewart and Solander Islands. *Transactions of the Royal Society of New Zealand* 82: 137-156.

Fukuda, H.; Ponder, W. F.; Marshall, B. A. 2006: Anatomy and relationships of *Suterilla* Thiele (Caenogastropoda: Assimineidae) with descriptions of four new species. *Molluscan Research.* 26(3): 141-168.

Goulstone, J.F. 1996: Five new species of *Climocella* N. Gen. (Punctoidea: Charopidae). *Records of the Auckland Institute and Museum*, 32, 63–90.

Iredale, T. 1913: The land Mollusca of the Kermadec Islands. *Proceedings of the Malacological Society of London 10*: 364-388.

Mahlfeld, K.; Brook, F.J.; Roscoe, D.J.; Hitchmough, R.A.; Stringer, I.A.N. 2012: The conservation status of New Zealand terrestrial Gastropoda excluding *Powelliphanta*. *New Zealand Entomologist* 35: 103-109.

Marshall, B.A. and Barker, G.M. 2008: A revision of the New Zealand landsnails referred to *Allodiscus* Pilsbry, 1892 and *Pseudallodiscus* Climo, 1971, with the introduction of three new genera (Mollusca: Gastropoda: Charopidae). *Tuhinga* 19: 57–167.

Millener, P.R. 1999: The history of the Chatham Islands' bird fauna of the last 7000 years – a chronicle of change and extinction. *Smithsonian Contributions to Paleobiology* 89: 85-109.

Morton, J.E. & Miller, M.C. 1973: *The New Zealand Sea Shore*. William Collins Sons & Co. Ltd., Glasgow. 653 pp.

Parrish, G.R. 2000: Snail report – Rangatira (South East) Island, May-June 2000. Unpublished report to Department of Conservation, 5 pp.

Spencer, H.G.; Marshall, B.A. and Willan, R.C. 2009: Checklist of New Zealand living Mollusca. Pp. 196-219. *In*: D. P. Gordon ed. *New Zealand Inventory of Biodiversity, Volume 1, Kingdom Animalia*. Canterbury University Press.

Stanisic, J., Shea, M., Potter, D. & Griffiths, O. (2018) *Australian Land Snails Volume 2. A Field Guide to Southern, Central and Western Species*. Bioculture Press, Mauritius, 594 pp.

Wallace, R. 1977: The land and freshwater Mollusca of the Chatham Islands. *Working Papers in Chatham Islands Archaeology* 15. Anthropology Department, University of Otago, Dunedin.

Wallace, R. 1979: Land snails and paleobotanical reconstruction: a study of Chatham Island archaeological assemblages. Unpublished MA thesis, University of Otago library, Dunedin.

Appendix 1. Working list of native land snail species from Chatham Islands – June 2022

The following preliminary list of land snail species from Chatham Islands has been compiled from examination of land snail collections at Auckland War Memorial Museum (AIM) and Museum of New Zealand Te Papa Tongarewa (NMNZ), from taxonomic publications and unpublished reports, which are listed in the References, and from surveys carried out on Chatham Island/Rekohu/Wharekauri in 1999, 2000, 2011 and 2021. Specimen lots referred to below from the AIM and NMNZ collections have MA and M. prefixes respectively.

Family ASSIMINEIDAE

***Suterilla neozelanica* (Murdoch, 1899)**
Suterilla neozelanica is endemic to New Zealand; it is a supralittoral coastal species with a sparse distribution in North Island and Chatham Islands. In North Island it lives in salt marsh, tussockland, flax-shrubland, and under stones and driftwood (Morton & Miller 1973: 100, 103; Fukuda et al. 2006). In Chatham Islands this species is known only from the southwestern coast of Chatham Island/Rekohu/Wharekauri. It has been recorded from a few archaeological sites between Point Durham and Waitangi (Wallace 1977, 1979; Fukuda et al. 2006: 153), but some of the material from these sites, which is now in the NMNZ collection, contains fresh shells that appear to be modern rather than fossil (e.g., M.052440, M. 126921). During the land snail survey in 2021, a single fresh empty shell of *S. neozelanica* was found at the back of a boulder beach at the mouth of Awatotara Creek. Further surveys are required to map the distribution and assess the population status of *S. neozelanica* on Chatham Island/Rekohu/Wharekauri, and determine if this species is present elsewhere in the Chathams archipelago.

Family ATHORACOPHORIDAE [Leaf-vein slugs]

***Athoracophorus bitentaculatus* (Quoy & Gaimard, 1832)**
Endemic to New Zealand, with a wide distribution in North Island, South Island, Rakiura/Stewart Island, and Chatham Islands, including Chatham Island/Rekohu/Wharekauri and Pitt Island/Rangiauria (Burton 1963; NMNZ collection; G. Barker unpub. data).

***Pseudaneitea* sp. 1 (M.151420)**
Endemic to Chatham Islands; present on Mangere Island, Pitt Island/Rangiauria and South East Island/Rangatira (Barker et al. 2021; NMNZ collection; G. Barker unpub. data).

***Pseudaneitea* sp. 6 (M.151425)**
Endemic to Chatham Islands; present on Chatham Island/Rekohu/Wharekauri and Hauruakopara Island (Barker et al. 2021; NMNZ collection; G. Barker unpub. data). *Pseudaneitea* sp. 6 was incorrectly recorded from Pitt Island/Rangiauria by Barker et al. (2021).

***Pseudaneitea* sp. 7 (M.151426)**
Endemic to Chatham Islands; present on Chatham Island/Rekohu/Wharekauri and Pitt Island/Rangiauria (Barker et al. 2021; NMNZ collection; G. Barker unpub. data).

Family ACHATINELLIDAE

***Lamellidea novoseelandica* (Küster, 1852)**

This native New Zealand species has a wide distribution that includes Eastern Australia, Lord Howe Island, Norfolk Island, Kermadec Islands, Three Kings Islands, North Island, northern South Island and Chatham Islands (T. Goulding unpub. data). It lives on the ground and on vegetation in native forest, shrubland, coastal tussock-prostrate shrubland and coastal tussock grassland. Shells of *Lamellidea novoseelandica* are frequent in fossil land snail assemblages of mid-late Holocene age on Chatham Island/Rekohu/Wharekauri (Wallace 1977, 1979; F. Brook et al. unpub. data). Historical records suggest that *L. novoseelandica* had a sparse distribution in native vegetation on Chatham Island/Rekohu/Wharekauri in 1982-2011 (Wallace 1977, 1979; AIM and NMNZ collections; F. Brook unpub. data), and it also appeared to have a sparse distribution on this island in 2021. *Lamellidea novoseelandica* has not been recorded from, but may be present, on other islands in the Chatham archipelago.

Family CHAROPIDAE

***Allodiscus morioria* Marshall & Barker, 2008**
A Chatham Islands endemic known from Chatham Island/Rekohu/Wharekauri only (Marshall & Barker 2008; NMNZ collection records). It lives on the ground in leaf litter and under fallen wood, in native forest. *Allodiscus moriora* has a very sparse Holocene fossil distribution on western Chatham Island/Rekohu/Wharekauri (Wallace 1977, 1979 – as *Allodiscus* sp.; NMNZ collection records). Historical records indicate that this species was extant in karaka forest at Te Roto in 1933, and suggest that it had a sparse distribution in broadleaved forest and tarahinau-broadleaved forest on southwestern Chatham Island/Rekohu/Wharekauri in 1980-1989 (Parrish 2000 – as *Allodiscus* cf. *tessellatus*; NMNZ collection), but no snails or empty shells of *A. morioria* were found at any of the sites that were surveyed on this island in 2021.

***Allodiscus pygmaeus* Marshall & Barker, 2008**
A Chatham Islands endemic known from Chatham Island/Rekohu/Wharekauri only (Marshall & Barker 2008; AIM and NMNZ collection records). It lives on the ground in leaf litter and under fallen wood, in native forest. *Allodiscus pygmaeus* has a very sparse Holocene fossil distribution on Chatham Island/Rekohu/Wharekauri (NMNZ collection records; F. Brook unpub. data). Historical records from the AIM and NMNZ collections suggest that this species had a sparse distribution in broadleaved forest and tarahinau-broadleaved forest on southern Chatham Island/Rekohu/Wharekauri in 1976-1989, but no snails or empty shells of *A. pygmaeus* were found at any of the sites that were surveyed on this island in 2021.

***Calymna* sp. 'Chatham Islands'/Charopidae sp. 154 (NMNZ M.052076)**
This unnamed species is endemic to Chatham Islands. Shells of *Calymna* sp. 'Chatham Islands' are infrequent in fossil land snail assemblages of mid-late Holocene age on Chatham Island/Rekohu/Wharekauri (Wallace 1977, 1979 – as *Flammocharopa* n. sp.; NMNZ collection records; F. Brook unpub. data), but there are no known historical records of live snails or fresh empty shells of this species from this island, and it appears to have died out there. There is a single historical record of a live individual of *Calymna* sp. 'Chatham Islands' that was found under a log in forest on South East Island/Rangatira in 2000 (Climo 2000; Parrish 2000); the current status of the population on this island is not known.

***Cavellia brouni* (Suter, 1891)**
This endemic New Zealand species is present in South Island, southern North Island and Chatham Islands (AIM and NMNZ collection records). It lives on the ground in leaf litter, and under fallen bark and wood, in native forest and shrubland. There are no records of fossil

shells of *Cavellia brouni* from Chatham Islands. Historical records suggest that this species had a sparse distribution in native vegetation on southwestern Chatham Island/Rekohu/Wharekauri in 1979-1988 (NMNZ collection), and it also appeared to be very sparse in 2021, with one individual only found. There is a single historical record of *C. brouni* from Pitt Island/Rangiauria from 1982 (M.073283); the current status of the population on this island is not known.

***Cavellia buccinella* (Reeve, 1852)**
This endemic New Zealand species is present in North Island, northern South Island and Chatham Islands (AIM and NMNZ collection records). Preliminary molecular analyses indicate that the Chatham Islands population falls within the range of variation of populations from North Island and South Island (M. Kennedy unpub. data). *Cavellia buccinella* lives on the ground in leaf litter, and under stones and fallen bark and wood, in native forest and shrubland. Charopidae sp. 92 (M.127830) of Spencer et al. (2009: 216) and Mahlfeld et al. (2012: Appendix 1), which is based on modern shells from Pitt Island/Rangiauria, is indistinguishable from *C. buccinella* elsewhere on Chatham Islands, and is here considered to be conspecific with the latter species. Shells of *C. buccinella* are frequent in fossil land snail assemblages of mid-late Holocene age on Chatham Island/Rekohu/Wharekauri, and Holocene fossil shells are also known from Mangere Island and Pitt Island/Rangiauria (Wallace 1977, 1979; NMNZ collection records; F. Brook unpub. data). Historical records suggest that this species had a sparse distribution in native vegetation on Chatham Island/Rekohu/Wharekauri in 1976-2011 (Wallace 1977, 1979; AIM and NMNZ collection records; F. Brook unpub. data), and it also appeared to have a sparse distribution on this island in 2021. Preliminary evidence suggests that *C. buccinella* has undergone a substantial decline on Chatham Island/Rekohu/Wharekauri over the last c. 150 years. There is a single historical record of *C. buccinella* from Pitt Island/Rangiauria from 1982 (M.127830); the current status of populations on Mangere Island and Pitt Island/Rangiauria is not known.

***Charopa* sp. 'Chatham Islands'/Charopidae sp. 190 (M.075490)**
This unnamed species is endemic to Chatham Islands. Shells of *Charopa* sp. 'Chatham Islands' are frequent and locally abundant in fossil land snail assemblages of mid-late Holocene age on Chatham Island/Rekohu/Wharekauri, and Holocene fossil shells are also known from Mangere Island and Pitt Island/Rangiauria (Wallace 1977, 1979 – as *Charopa coma*; AIM and NMNZ collection records; F. Brook unpub. data). By contrast, historical records suggest that this species had a very sparse distribution and was very scarce in forest and shrubland on Chatham Island/Rekohu/Wharekauri in 1976-2011 (AIM and NMNZ collections; F. Brook unpub. data), and in forest on South East Island/Rangatira in 2000 (Parrish 2000). No live individuals or fresh empty shells of *Charopa* sp. 'Chatham Islands' were found during the 2021 survey on Chatham Island/Rekohu/Wharekauri. Preliminary evidence suggests that this species has undergone a substantial decline on this island over the last c. 150 years. There are no historical records of *Charopa* sp. 'Chatham Islands' from Mangere Island and Pitt Island/Rangiauria; the status of populations on these two islands, and on South East Island/Rangatira, is not known.

***Climocella* sp. aff. *maculata* (Suter, 1891)**
Climocella maculata is endemic to and has a wide distribution in the South Island (Goulstone 1996; AIM and NMNZ distribution records), and it has been recorded also from southeastern North Island and Chatham Islands (e.g., Goulstone 1996; Millener 1999). However, the Chatham Islands taxon differs genetically (M. Kennedy unpub. data) and morphologically from typical *maculata*, and is here considered to be a separate species. Whether the North

Island and Chatham Island populations are the same or separate species remains to be determined. Shells of *Climocella* sp. aff. *maculata* are infrequent but locally common in fossil land snail assemblages of mid-late Holocene age on Chatham Island/Rekohu/Wharekauri, and Holocene fossil shells are also known from Pitt Island/Rangiauria (Wallace 1977, 1979; Millener 1999; F. Brook unpub. data). Historical records suggest that this species had a very sparse distribution in native vegetation on Chatham Island/Rekohu/Wharekauri in 1976-2011 (Wallace 1977, 1979; AIM and NMNZ collection records; F. Brook unpub. data), and it also appeared to be very sparse on this island in 2021. Preliminary evidence suggests that *Climocella* sp. aff. *maculata* has undergone a substantial decline on Chatham Island/Rekohu/Wharekauri over the last c. 150 years. There is a single historical record of this species from Pitt Island/Rangiauria from 2007 (M.306451); the current status of the population on this island is not known.

***Dendropa pilsbryi* (Suter, 1894)**
This species is endemic to the New Zealand region and has a wide distribution that includes Kermadec Islands, North Island, South Island, Stewart Island/Rakiura and Chatham Islands (AIM and NMNZ collection records). Preliminary molecular analyses indicate that the Chatham Islands population falls within the range of variation of populations from North Island and South Island (M. Kennedy unpub. data). *Dendropa pilsbryi* lives on vegetation and on the ground in native forest and shrubland. Shells of *D. pilsbryi* are frequent in fossil land snail assemblages of mid-late Holocene age on Chatham Island/Rekohu/Wharekauri (Wallace 1977, 1979 – as *Flammocharopa parva*; Millener 1999; F. Brook unpub. data). Historical records suggest that this species had a sparse distribution in in native vegetation on this island in 1976-2011 (Wallace 1977, 1979; AIM and NMNZ collection records; F. Brook unpub. data), and it was sparse also in 2021. There is a single historical record of this species from Pitt Island/Rangiauria from 1970 (M.038911); the current status of the population on this island is not known.

***Dendropa* sp./Charopidae sp. 37 (M.075855)**
This endemic New Zealand species is present in North Island, South Island, Rakiura/Stewart Island and Chatham Islands (AIM and NMNZ collection records). It lives on the ground in leaf litter, and under fallen wood and bark, in native forest and shrubland. There are no records of fossil shells of *Dendropa* sp. from Chatham Islands. Historical records suggest that this species was scarce in native vegetation on southern Chatham Island/Rekohu/Wharekauri in 1982-1988 (NMNZ collection), and it was scarce also in 2021. *Dendropa* sp. has not been recorded from the northern part of this island or from other islands in the Chatham archipelago.

***Huonodon hectori* (Suter, 1890)**
This endemic New Zealand species has a wide distribution that includes North Island, South Island, Rakiura/Stewart Island and Chatham Islands (AIM and NMNZ collection records). Preliminary molecular analyses indicate that the Chatham Islands population falls within the range of variation of populations from North Island and South Island (M. Kennedy unpub. data). *Huonodon hectori* lives in leaf litter on the ground and perched in vegetation, in native forest and shrubland. Shells of *H. hectori* are infrequent in fossil land snail assemblages of mid-late Holocene age on Chatham Island/Rekohu/Wharekauri (Wallace 1977, 1979; Millener 1999; F. Brook unpub. data). Historical records suggest that this species had a sparse distribution in native vegetation on the northern part of the island in 1989-2011, and was more widespread in shrubland and forest on the southern part of this island in 1967-2011 (Wallace 1977, 1979; AIM and NMNZ collections; F. Brook unpub. data). In 2021 it

appeared to have a fairly sparse distribution in the southern part of the island. There are two historical records of *H. hectori* from Pitt Island/Rangiauria, from 1967 and 1982 respectively (M.038915, M.073279); the current status of the population on this island is not known.

***Kessneropa mimosa* (Petterd, 1879)**
This species is native to the New Zealand region and has a trans-Tasman distribution including Tasmania, Kermadec Islands, North Island, South Island, Stewart Island/Rakiura, Auckland Islands and Chatham Islands (Stanisic et al. 2018; AIM and NMNZ collection records). New Zealand populations had been attributed to *Phenacharopa pseudanguicula* (Iredale, 1913), originally described from Kermadec Islands, but shell characters and preliminary molecular analyses (M. Kennedy unpub. data) indicate that the latter species is a junior synonym of *Kessneropsa mimosa* (Petterd, 1879), originally described from Tasmania. Shells of *K. mimosa* are moderately frequent in fossil land snail assemblages of mid-late Holocene age on Chatham Island/Rekohu/Wharekauri (Wallace 1977, 1979 – as *Charopa anguicula*; Millener 1999; F. Brook unpub. data). Historical records suggest that this species had a sparse distribution in native vegetation on this island in 1982-2011 (AIM and NMNZ collections; F. Brook unpub. data), and it appeared to be sparse also in 2021. *Kessneropa mimosa* has not been recorded from but may be present on other islands in the Chatham archipelago.

***Mitodon wairarapa* (Suter, 1890)**
This endemic New Zealand species has a wide distribution that includes North Island, South Island, Rakiura/Stewart Island, Motu Ihupuku/Campbell Island and Chatham Islands (Climo 1989: fig. 24; AIM and NMNZ collection records). It lives on the ground in leaf litter and under fallen wood, in native forest and shrubland. Shells of *Mitodon wairarapa* are infrequent in fossil land snail assemblages of mid-late Holocene age on Chatham Island/Rekohu/Wharekauri (Wallace 1977, 1979; Millener 1999; F. Brook unpub. data). Historical records suggest that this species had a very sparse distribution in native forest on this island in 1976-2011 (Wallace 1977, 1979; AIM and NMNZ collections; F. Brook unpub. data), and it appeared to be sparse also in 2021. There is a single historical record of *M. wairarapa* from Pitt Island/Rangiauria from 1982 (M.073280); the current status of the population on this island is not known.

***Mocella eta* (Pfeiffer, 1853)**
This endemic New Zealand species is widely distributed in North Island, northern South Island and Chatham Islands (AIM and NMNZ collection records). Preliminary molecular analyses indicate that the Chatham Islands population falls within the range of variation of populations from North Island and South Island (M. Kennedy unpub. data). *Mocella eta* lives on the ground in leaf litter, and under stones and fallen wood, in native forest and shrubland. Shells of *M. eta* are infrequent in fossil land snail assemblages of mid-late Holocene age on Chatham Island/Rekohu/Wharekauri (Wallace 1977, 1979 – as *Charopa caputspinulae*; Millener 1999; F. Brook unpub. data). Historical records suggest that this species was fairly widespread in shrubland and forest remnants on the northern part of the island in 1976-2011, but had a sparse distribution in forest in the southwestern part of this island in 1967-1982 (Wallace 1977, 1979; AIM and NMNZ collections; F. Brook unpub. data). It was also sparse on southern Chatham Island/Rekohu/Wharekauri in 2021. There are historical records of *M. eta* from Pitt Island/Rangiauria in 1967 and 1982 respectively, and from South East Island/Rangatira between 1970 and 2000 (Parrish 2000; NMNZ collection). The current status of the populations on these two islands is not known.

***Paracharopa bianca* (Hutton, 1883)**
This endemic New Zealand species has a wide distribution that includes North Island, South Island, Rakiura/Stewart Island, Antipodes Islands and Chatham Islands (Brook et al. 2020; AIM and NMNZ collection records). It lives on vegetation, and on the ground in leaf litter, and under fallen bark and wood, in native forest and shrubland. Shells of *Paracharopa bianca* are very infrequent in fossil land snail assemblages of mid-late Holocene age on Chatham Island/Rekohu/Wharekauri (Wallace 1977, 1979; F. Brook unpub. data). Historical records suggest that this species was extremely sparse in native vegetation on this island in 1967-2011 (Wallace 1977, 1979; AIM and NMNZ collections; F. Brook unpub. data). It was not found at any sites during the 2021 survey.

***Therasia* sp. 'Chatham Islands'/Charopidae sp. 249 (M.038462)**
This unnamed species is endemic to Chatham Islands. It lives on vegetation, and on the ground in leaf litter, in native forest, flax-shrubland and sand tussock-prostrate shrubland. Shells of *Therasia* sp. 'Chatham Islands' are frequent and locally common in fossil land snail assemblages of mid-late Holocene age on Chatham Island/Rekohu/Wharekauri, and Holocene fossil shells of this species are also known from Pitt Island/Rangiauria (Wallace 1977, 1979 – as *Therasia* sp. cf. *traversi*; Millener 1999; F. Brook unpub. data). Historical records suggest that *Therasia* sp. 'Chatham Islands' had a sparse distribution in native vegetation on Chatham Island/Rekohu/Wharekauri in 1976-2011 (AIM and NMNZ collections; F. Brook unpub. data), and it had a similarly sparse distribution on this island in 2021. There are also historical records of *Therasia* sp. 'Chatham Islands' from Mangere Island in 1974, and from South East Island/Rangatira in 2000 and 2007 (Parrish 2000; NMNZ collection). The current status of the populations on these two islands, and on Pitt Island/Rangiauria, is not known.

Charopidae sp. 193 (M.073285)
This unnamed flammulinid taxon is based on two tiny juvenile shells from Chatham Islands, one of which had been collected from forest on southwestern Chatham Island/Rekohu/Wharekauri in 1982 (M.075487), and the other collected in Northern Glory Nature Reserve on Pitt Island/Rangiauria in 1982 (M.073285). This species is evidently very scarce on Chatham Islands. There are no fossil records of it, and no other historical records are known. The two juvenile shells of Charopidae sp. 193 are very similar morphologically to another undescribed New Zealand species, Charopidae sp. 44 (NMNZ M.23304), which is present in South Island and southern North Island (NMNZ collection records). Until live individuals or adult shells of Charopidae sp. 193 are found it will not be possible to reliably determine its taxonomic status, and whether it is endemic to Chatham Islands, or has a wider distribution in New Zealand.

Family PUNCTIDAE

***Obanella rimutaka* Dell, 1952**
This endemic New Zealand species has a wide distribution in North Island and South Island, and was formerly present also on Chatham Island/Rekohu/Wharekauri (AIM and NMNZ collection records). In mainland New Zealand it lives in native forest and shrubland, in leaf litter on the ground and perched in vegetation. In Chatham Islands, *Obanella rimutaka* is known only from a few shells in Holocene fossil assemblages from a small area of limestone karst north of Te One, Chatham Island/Rekohu/Wharekauri (e.g., M.113868, M.113889). The lack of other fossil records of this species from this island, and the absence of historical records, suggests that *O. rimutaka* formerly had a very limited geographic distribution on

Chatham Island/Rekohu/Wharekauri, and that the population was ephemeral and has since died out.

***Paralaoma caputspinulae* (Reeve, 1852)**
This species is native to New Zealand, being present on Three Kings Islands, North Island, South Island, Rakiura/Stewart Island and Chatham Islands (AIM and NMNZ collection records). Whether it is endemic to this region, or conspecific with similar species elsewhere that have been lumped together in the putative cosmopolitan taxon *Paralaoma servilis* (Shuttleworth, 1852), has yet to be determined. *Paralaoma caputspinulae* lives on the ground in leaf litter, and under stones and fallen wood, typically in open habitats with low-growing vegetation. Shells of this species are frequent in fossil land snail assemblages of mid-late Holocene age on Chatham Island/Rekohu/Wharekauri, and Holocene fossil shells are also known from Pitt Island/Rangiauria (Wallace 1977, 1979 – as *Paralaoma pumila*; NMNZ collection; F. Brook unpub. data). Historical records indicate that *P. caputspinulae* was widely distributed in coastal tussock-prostrate shrubland and flax-broadleaved shrubland on northern Chatham Island/Rekohu/Wharekauri in 1999-2011 (F. Brook unpub. data), and it was similarly widespread in coastal habitats on the northern half of this island in 2021. There is a single historical record of *P. caputspinulae* from South East/Rangatira Island from 1970 (M.038872); the status of the populations on this island and Pitt Island/Rangiauria is not known.

'*Paralaoma*' *lateumbilicata* (Suter, 1890) 'Chatham'
'Paralaoma' lateumbilicata (Suter, 1890) is an endemic New Zealand species that has a wide distribution in the North Island and northern South Island (AIM and NMNZ collection records). The Chatham Islands land snail fauna includes a species that has similar shell shape to *'P.*' *lateumbilicata* but different colouring; whether this species is endemic to Chatham Islands, or conspecific with mainland New Zealand populations, has not yet been resolved. It lives on the ground in leaf litter in native shrubland and forest. *'P.*' *lateumbilicata* 'Chatham' is frequent in fossil land snail assemblages of mid-late Holocene age on Chatham Island/Rekohu/Wharekauri (Wallace 1977, 1979; Millener 1999; F. Brook unpub. data), and Holocene fossil shells are also known from Mangere Island (NMNZ collection). Historical records suggest that *'P.*' *lateumbilicata* 'Chatham' was widely distributed in native shrubland and forest on Chatham Island/Rekohu/Wharekauri in 1976-2011 (Wallace 1977, 1979; AIM and NMNZ collection; F. Brook unpub. data), and it was widespread and locally common on this island in 2021. There are also historical records of *'P.*' *lateumbilicata* 'Chatham' from forest on Pitt Island/Rangiauria and South East Island/Rangatira (Parrish 2000; NMNZ collection). The current status of populations on these two islands, and on Mangere Island, is not known.

'*Paralaoma*' *serratocostata* (Webster, 1906)
This endemic New Zealand species has a wide distribution that includes North Island, South Island, Rakiura/Stewart Island, Auckland Islands, Campbell Island/Motu Ihupuku and Chatham Islands (AIM and NMNZ collection records). It lives on the ground in leaf litter in native shrubland and forest. Shells of *'Paralaoma*' *serratocostata* are infrequent in fossil land snail assemblages of mid-late Holocene age on Chatham Island/Rekohu/Wharekauri (Wallace 1977, 1979; Millener 1999; F. Brook unpub. data), and historical records suggest that it had a very sparse distribution in native shrubland and forest on this island in 1976-2011 (Wallace 1977, 1979; AIM and NMNZ collections F. Brook unpub. data). It was not found at any of the sites on Chatham Island/Rekohu/Wharekauri that were surveyed in 2021. There is a single

historical record of *'P.' serratocostata* from Pitt Island/Rangiauria from 1982 (M.073276); the current status of the population on this island is not known.

'*Phrixgnathus*' *major* (Suter, 1897)
This endemic New Zealand species is present in southern South Island, Rakiura/Stewart Island, Hautere/Solander Island and Chatham Islands (AIM and NMNZ collection records). It is a coastal-restricted species that lives in leaf litter and under vegetation and driftwood in sand tussock grassland and flax-broadleaved shrubland. *Phrixgnathus flemingi stewartensis* Dell, 1954 is a junior synonym of '*Phrixgnathus*' *major* (Suter, 1897), based on examination of type material. Punctidae sp. 8 (NMNZ M.089805), which comprises fossil shells of late Holocene age from Mangere Island, appears to be conspecific with '*P.*' *major*. Shells of the latter species are infrequent in fossil land snail assemblages of mid-late Holocene age on Chatham Island/Rekohu/Wharekauri (Wallace 1977, 1979 - as *Laoma flemingi*; F. Brook unpub. data), and Holocene fossil shells are also known from Pitt Island/Rangiauria (NMNZ collection). There are historical records of '*P.*' *major* from a few coastal localities on Chatham Island/Rekohu/Wharekauri in 1976-2011, and from The Sisters/Rangitatahi in 1974 (Wallace 1977, 1979 - as *Laoma flemingi*; AIM and NMNZ collections; F. Brook unpub. data). During the 2021 survey this species was found at one site only on Chatham Island/Rekohu/Wharekauri, under flax on a rocky headland at Kaingaroa. The status of populations on The Sisters, Mangere Island and Pitt Island/Rangiauria is not known.

***Phrixgnathus* sp. aff. *phrynia* 'Chatham'/Punctidae sp. 105 (M.062094)**
This unnamed species is endemic to Chatham Islands. It is a close relative of *Phrixgnathus phrynia* Hutton, 1883, from southern North Island and Marlborough Sounds. *Phrixgnathus* sp. aff. *phrynia* 'Chatham' lives in native forest and shrubland, predominantly on vegetation. Shells of this species are frequent in fossil land snail assemblages of mid-late Holocene age on Chatham Island/Rekohu/Wharekauri (Wallace 1977, 1979 – as *Laoma* sp. cf. *phrynia*; Millener 1999 – as *Pryhina chathamensis* [nomen nudum]; F. Brook unpub. data), and Holocene fossil shells are also known from Pitt Island/Rangiauria (NMNZ collection). Historical records suggest that *P.* sp. aff. *phrynia* 'Chatham' was sparsely distributed but locally common in shrubland and forest on Chatham Island/Rekohu/Wharekauri in 1976-2011 (Wallace 1977, 1979; AIM and NMNZ collections; F. Brook unpub. data). During the 2021 survey it was found to be fairly widely distributed and locally common in shrubland and forest throughout this island. There is a single historical record of *P.* sp. aff. *phrynia* 'Chatham' from Pitt Island/Rangiauria in 1944 (MA88302); the current status of the population on this island is not known.

'*Phrixgnathus*' *rakiura* Dell, 1954
This endemic New Zealand species is present in southern South Island, Rakiura/Stewart Island, Hautere/Solander Island and Chatham Islands (AIM and NMNZ collection records). It is a coastal-restricted species that lives in leaf litter and under vegetation and driftwood in sand tussock grassland, sand tussock-prostrate shrubland, flax-broadleaved shrubland, and coastal broadleaved forest. Dell (1954) described a subspecies, '*Phrixgnathus*' *rakiura solanderi*, from Hautere/Solander Island, the shells of which reportedly differed from typical *rakiura* in having a proportionately taller spire and narrower umbilicus. However, examination of collections of '*P.*' *rakiura* at AIM and NMNZ indicates that spire elevation and umbilical width relative to shell diameter are highly variable between populations, and also within some populations, and '*P.*' *r. solanderi* is here considered to be a synonym of '*P.*' *rakiura*. Punctidae sp. 257 (NMNZ M.089799), which comprises Holocene fossil shells from Mangere Island, appears to be conspecific with '*P.*' *rakiura*. Shells of the latter species

are frequent in fossil land snail assemblages of mid-late Holocene age on Chatham Island/Rekohu/Wharekauri (Wallace 1977, 1979 – as *Paralaoma hamiltoni*; Millener 1999; F. Brook unpub. data), and Holocene fossil shells of '*P.*' *rakiura* are also known from Pitt Island/Rangiauria (NMNZ collection). Historical records suggest that '*P.*' *rakiura* was widely distributed and locally common in sand tussock-prostrate shrubland, flax-broadleaved shrubland, and coastal broadleaved forest on Chatham Island/Rekohu/Wharekauri in 1976-2011 (Wallace 1977, 1979; AIM and NMNZ collections; F. Brook unpub. data), and this species was also common at some coastal sites on this island that were surveyed in 2021. There are also historical records of '*P.*' *rakiura* from South East Island/Rangatira in 1970 and 1989, from The Sisters in 1974, and from Star Keys in 1982 (Parrish 2000; NMNZ collection); the current status of these populations, and the populations on Mangere Island and Pitt Island/Rangiauria, is not known.

'*Phrixgnathus*' sp. aff. *viridulus* 'Chatham'

This species shows some morphological similarities with '*Phrixgnathus*' *viridulus* (Suter, 1909) from South Island, but it differs substantially genetically, and appears to be endemic to Chatham Islands. It lives on vegetation, and on the ground in leaf litter, in native forest and shrubland. Historical records suggest that '*P.*' sp. aff. *viridulus* 'Chatham'was widely distributed but scarce in forest and shrubland on southern Chatham Island/Rekohu/Wharekauri in 1982-1989 (AIM and NMNZ collection records), and it was found to be widely distributed but scarce on the southern part of this island during the 2021 survey. There are no fossil records of '*P.*' sp. aff. *viridulus* 'Chatham' from Chatham Islands. It is currently known from Chatham Island/Rekohu/Wharekauri only, but it may be present on other islands in the archipelago.

'*Thalassohelix*' *chathamensis* (Suter, 1909)

This species is endemic to Chatham Islands. It is restricted to coastal habitats, living on the ground in leaf litter and under vegetation in sand tussock-prostrate shrubland, flax-broadleaved shrubland and coastal broadleaved scrub-forest. Shells of '*Thalassohelix*' *chathamensis* are moderately frequent in fossil land snail assemblages of mid-late Holocene age on Chatham Island/Rekohu/Wharekauri (Wallace 1977, 1979; F. Brook unpub. data), and Holocene fossil shells are known also from Pitt Island/Rangiauria (NMNZ collection). Historical records indicate that '*T.*' *chathamensis* had a very sparse distribution but was common locally on northern Chatham Island/Rekohu/Wharekauri in 1999-2011 (F. Brook unpub. data), and it had similar distribution and abundance on the northern part of this island in 2021. Whether this species is present at sites around the southern coast of Chatham Island/Rekohu/Wharekauri has not been determined. There are no historical records of '*T.*' *chathamensis* from Pitt Island/Rangiauria; the current status of the population on this island is not known.

Punctidae sp. 36 (M.088229)

This unnamed species is endemic to Chatham Islands. From shell morphology it appears to be a close relative of '*Thalassohelix*' *chathamensis* (Suter, 1909). Shells of Punctidae sp. 36 are infrequent and scarce in fossil land snail assemblages of mid-late Holocene age on Chatham Island/Rekohu/Wharekauri, with records from a total of four localities between Point Durham and Manauwea/Ocean Mail (NMNZ collection; F. Brook unpub. data). There is a single historical record of a fresh empty shell of this species from southwestern Chatham Island/Rekohu/Wharekauri in 1988, and two historical records of live individuals and fresh shells from Pitt Island/Rangiauria in 1944 and 1982 respectively (AIM and NMNZ collections). No snails or empty shells of Punctidae sp. 36 were found on Chatham

Island/Rekohu/Wharekauri during the 2021 survey, and the current status of the populations on this island and Pitt Island/Rangiauria is not known.

Punctidae sp. 56 (M.62133)
This endemic New Zealand species is present in North Island, South Island and Chatham Islands (AIM and NMNZ collection records). It lives in native forest and shrubland, predominantly on vegetation. Shells of Punctidae sp. 56 are frequent in fossil land snail assemblages of mid-late Holocene age on Chatham Island/Rekohu/Wharekauri (Wallace 1977, 1979 – as *Laoma glabriusculus*; F. Brook unpub. data), and Holocene fossil shells are known also from Pitt Island/Rangiauria (NMNZ collection). Historical records suggest that Punctidae sp. 56 was sparsely distributed but locally common in shrubland and forest on Chatham Island/Rekohu/Wharekauri in 1982-2011 (AIM and NMNZ collections; F. Brook unpub. data), and in 2021 it was widely distributed and common in shrubland forest on this island. There are historical records of Punctidae sp. 56 from Mangere Island in 1974 and Pitt Island/Rangiauria in 1982; the current status of the populations on these two islands is not known.

Punctidae sp. 187 (M.069540)
The NMNZ collection contains four lots attributed to this minute unnamed species, comprising two from southwestern Chatham Island/Rekohu/Wharekauri collected in 1981 and 1982 respectively (M.069540, M.084954), one from Pitt Island/Rangiauria collected in 1982 (M.084957), and one from central North Island, containing a single specimen collected in 1980 (M.192776). If the locality details of the last-mentioned specimen are correct, it follows that Punctidae sp. 187 is present in North Island and Chatham Islands. However, the fact that one specimen only is known from North Island casts some doubt on the validity of this locality record and/or the species identification. Punctidae sp. 187 was not found on Chatham Island/Rekohu/Wharekauri during the 2021 survey, and the current status of the populations on this island and Pitt Island/Rangiauria is not known.

Punctidae sp. 243 (M.61602)
This unnamed endemic New Zealand species is present in North Island, South Island and Rakiura/Stewart Island (AIM and NMNZ collections), and it is recorded here also from Chatham Islands, based on a few damaged shells from a leaf litter sample that had been collected in native forest on southern Chatham Island/Rekohu/Wharekauri during the survey in 2021.

Punctidae sp. 244 (M.075477)
This unnamed species is endemic to Chatham Islands. The NMNZ collection contains three lots of empty shells of Punctidae sp. 244, comprising five specimens in total, from leaf litter samples that had been collected on southwestern Chatham Island/Rekohu/Wharekauri in 1982 and 1988 (M.075452, M.075477, M.098774). This species was not found during the 2021 survey on Chatham Island/Rekohu/Wharekauri, and the current status of the population is not known.

Punctidae sp. 'Awatotara'
This previously unknown species, which is endemic to Chatham Islands, was discovered during the survey in December 2021, in forest in Awatotara Creek, southwestern Chatham Island/Rekohu/Wharekauri. It is closely related to '*Thalassohelix*' *chathamensis*, but differs morphologically and genetically from that species. Punctidae sp. 'Awatotara' also appears to be closely related to Punctidae sp. 36; its shell is similar in size, but differs in having a lower

spire, more sharply angled whorls and a wider umbilicus. Punctidae sp. 'Awatotara' is presently known from one location only; whether it has a wider distribution on Chatham Island/Rekohu/Wharekauri, and/or is present on other islands in the archipelago, remains to be determined.

Punctidae sp. 'Glory' (M.073277)
This tag name is used here for a minute unnamed species, specimens of which had been collected at a site on Pitt Island/Rangiauria in 1982 (NMNZ collection). The shells of Punctidae sp. 'Glory' are similar to the voucher material of Punctidae sp. 81 (M.068844) from Bridal Veil Falls, NE of Kawhia, North Island (NMNZ station R157801), but differ in being proportionately narrower with a taller spire, and having more prominent axial sculpture. The NMNZ database lists three lots of Punctidae sp. 81 from southwestern Chatham Island/Rekohu/Wharekauri, all collected in 1982 (M.187401, M.187454, M.187467), but they appear to be missing from the collection, and so could not be compared with the Pitt Island material. Whether or not Punctidae sp. 'Glory' is endemic to Chatham Islands, or has a wider distribution in the New Zealand region, has not been determined.

Unconfirmed records from Chatham Islands

Family HYDROCENIDAE

***Georissa purchasi* (Pfeiffer, 1861)**
This endemic New Zealand species is present in Three Kings Islands, and is widely distributed in North Island and South Island (AIM and NMNZ collection records). It lives in native forest and shrubland, on vegetation, and on the ground in leaf litter. Pauline Mayhill reported finding several specimens of *Georissa purchasi* at a site in Tuku a tamatea valley in 1979 (PC Mayhill snail database records). However, there are no fossil records of this species and no other historical records from Chatham Islands, which suggests that either it had an extremely restricted distribution on Chatham Island/Rekohu/Wharekauri, or that the Tuku a tamatea specimens were mislocalised and not from Chatham Islands.

Family PUNCTIDAE

***Phrixgnathus lucidus* Suter, 1896**
This endemic New Zealand species has a northern North Island distribution (AIM and NMNZ collection records). The NMNZ collection contains a specimen of *Phrixgnathus lucidus* (M.038749) that is labelled as having been collected by AWB Powell in karaka forest at Te Roto, Chatham Island/Rekohu/Wharekauri, in 1933. However, there are no fossil records of this species and no other historical records from Chatham Islands. As with the preceding species, this suggests that either *P. lucidus* had an extremely restricted distribution on Chatham Island/Rekohu/Wharekauri, or that the Te Roto specimen was mislocalised and not from Chatham Islands.

Punctidae sp. 'Rangatira'
This tag name is used here for a punctid species that Climo (2000) and Parrish (2000) recorded from South East Island/Rangatira, and which they described as having strong axial folds. A few specimens had been collected in 2000 at two forested sites on this island: Summit Track, Top Bush; and Near Rangatira Trig. These specimens were to be sent to NMNZ, but a search of the museum's molluscan collection in 2022 failed to find them. The NMNZ database lists one lot of '*Paralaoma thomsoni*' (M.306397) that had been collected

on South East Island/Rangatira in 2000, which may contain the material mentioned by Climo (2000) and Parrish (2000), but this lot appears to be missing from the museum's collection. In the absence of specimens, the identity and taxonomic relationships of Punctidae sp. 'Rangatira' cannot be determined, and whether this taxon is endemic to Chatham Islands, or is a local population of a species with a wider distribution in the New Zealand region, is not known.

Appendix 2. Land snail survey sites on Chatham Island/Rekohu/Wharekauri, December 2021

Six figure grid references below with CH1 and CH2 prefixes refer to Chatham Islands NZMS 260 map coordinates (Edition 1, 1981).

1. Henga, back of foredune, sand tussock-prostrate shrubland, CH1/450655, 6/12/2021. '*Thalassohelix*' *chathamensis*.

2. Henga, base of limestone bluff, sand tussock-prostrate shrubland, CH1/451656, 6/12/2021. *Lamellidea novoseelandica*, Charopidae sp. 249, *Paralaoma caputspinulae*, '*Phrixgnathus*' *rakiura*, '*Thalassohelix*' *chathamensis*.

3. Henga, dune hollow, *Myrsine* forest, in leaf litter and on ground ferns and understorey shrubs, CH1/452657, 6/12/2021. *Climocella* sp. aff. *maculata, Dendropa pilsbryi*, Charopidae sp. 249, '*Paralaoma*' sp. aff. *lateumbilicata*, '*Phrixgnathus*' *rakiura*.

4. Henga, secondary broadleaved shrubland/low forest, on ground ferns, CH1/457659, 6/12/2021. Punctidae sp. 105.

5. Nikau Bush, nikau-broadleaved forest, on nikau fronds and understorey shrubs, CH1/440764, 6/12/2021. Punctidae sp. 56, Punctidae sp. 105.

6. Te One, coastal dunes, sand tussock-prostrate shrubland, CH1/474588, 7/12/2021. *Paralaoma caputspinulae*, '*Thalassohelix*' *chathamensis*.

7. Plum Tree Bay, mixed broadleaved forest, on understorey shrubs and saplings, CH1/503598, 7/12/2021. *Lamellidea novoseelandica*, Punctidae sp. 56, Punctidae sp. 105.

8. Manauwea (Ocean Mail) Scenic Reserve, top of dune ridge, windshorn scrub, CH1/580782, 8/12/2021. *Paralaoma caputspinulae*, '*Phrixgnathus*' *rakiura*, '*Thalassohelix*' *chathamensis*.

9. Kaingaroa headland, flax-shrubland, CH1/684799, 8/12/2021. *Paralaoma caputspinulae*, '*Phrixgnathus*' *major*, '*Phrixgnathus*' *rakiura*, '*Thalassohelix*' *chathamensis.*

10. Tuku a Tamatea River below Taiko Camp, secondary tree fern/inaka scrub, in leaf litter, and on ferns and shrubs, CH2/393423, 9/12/2021. *Cavellia buccinella*,

Dendropa pilsbryi, *Huonodon hectori*, '*Phrixgnathus*' sp. aff. *viridulus*, Punctidae sp. 56, Punctidae sp. 105.

11. Taiko Camp, Tarahinau/Coprosma/Myrsine forest, in leaf litter, and on ferns and shrubs, CH2/388416, 10/12/2021. *Cavellia brouni*, *Huonodon hectori*, *Mitodon wairarapa*, *Mocella eta*, '*Paralaoma*' sp. aff. *lateumbilicata*, Punctidae sp. 56, Punctidae sp. 105.

12. Sweetwater Clears Track, 200 m, Myrsine/Pseudopanax/treefern forest, in leaf litter, and on ferns and shrubs, CH2/403396, 10/12/2021. *Huonodon hectori*, Charopidae sp. 37, Charopidae sp. 249, '*Phrixgnathus*' sp. aff. *viridulus*, Punctidae sp. 56, Punctidae sp. 105.

13. Sweetwater Clears, 270 m, forest-shrubland-rushland ecotone, on shrubs at forest edge, CH2/415388, 10/12/2021. '*Phrixgnathus*' sp. aff. *viridulus*, Punctidae sp. 56, Punctidae sp. 105.

14. Rangaika, Gillespie Creek, Tarahinau forest, on ferns and understorey shrubs, CH2/554450, 12/12/2021. Charopidae sp. 249, '*Phrixgnathus*' sp. aff. *viridulus*, Punctidae sp. 56.

15. Rangaika, coastal track, Tarahinau-broadleaved forest., on ferns and understorey shrubs, CH2/547430, 12/12/2021. *Kessneropa mimosa*, Charopidae sp. 249, *Phrixgnathus* sp. aff. *viridulus*, Punctidae sp. 56, Punctidae sp. 105.

16. Plum Tree Bay, coastal scrub on limestone bluff, in leaf litter, CH1/516599, 13/12/2021. *Lamellidea novoseelandica*, '*Phrixgnathus*' *rakiura*, Punctidae sp. 56.

17. Rangaika, coastal bluffs, Tarahinau/Pseudopanax/Olearia semidentata scrub-forest, in leaf litter, and on ferns and shrubs, CH2/533425, 13/12/2021. Charopidae sp. 249, '*Paralaoma*' sp. aff. *lateumbilicata*, *Phrixgnathus* sp. aff. *viridulus*, Punctidae sp. 56, Punctidae sp. 105.

18. Rangaika, coastal track, old Myrsine stand, in leaf litter, and on ferns and shrubs, CH2/540430, 13/12/2021. *Cavellia buccinella*, *Climocella* sp. aff. *maculata*, *Dendropa pilsbryi*, *Huonodon hectori*, '*Paralaoma*' sp. aff. *lateumbilicata*, *Phrixgnathus* sp. aff. *viridulus*, Punctidae sp. 56, Punctidae sp. 243.

19. Rangaika, coastal bluffs, broadleaved shrubland, in leaf litter, and on ferns and shrubs, CH2/545429, 13/12/2021. *Kessneropa mimosa*, *Mitodon wairarapa*, Charopidae sp. 37, '*Paralaoma*' sp. aff. *lateumbilicata*, Punctidae sp. 56, Punctidae sp. 105.

20. Te Awatea Scenic Reserve, broadleaved swamp forest, in suspended litter and on ferns, shrubs and nikau fronds, CH1/493546, 14/12/2021. *Lamellidea novoseelandica*, *Dendropa pilsbryi*, *Huonodon hectori*, Punctidae sp. 56.

21. Waitangi West, coastal dune, sand tussock-prostrate shrubland, CH1/251743, 16/12/2021. *Paralaoma caputspinulae*, '*Thalassohelix*' *chathamensis*.

22. Awatotara Creek, secondary tree fern-broadleaved forest in gully, on ferns and understorey shrubs, CH2/383453, 17/12/2021. *Cavellia buccinella*, Charopidae sp. 249, '*Phrixgnathus*' sp. aff. *viridulus*, Punctidae sp. 56, Punctidae sp. 'Awatotara'.

23. Awatotara Creek mouth, under tussock on coastal rock platform, CH2/374453, 17/12/2021. *Suterilla neozelanica*.

Figure 1. Dune vegetation at Waitangi West, habitat of the endemic land snail species '*Thalassohelix*' *chathamensis*. Photo C Laurenson.

Figure 2. Coastal broadleaved forest at Henga Scenic Reserve. Habitat of the endemic land snail species *Phrixgnathus* aff. *phrynia* and *Therasia* sp. 'Chatham'. Photo C Laurenson.

Figure 3. Swamp forest in Te Awatea Scenic Reserve. Habitat of the native land snail species *Lamellidea novoseelandica*, *Dendropa pilsbryi*, *Huonodon hectori* and Punctidae sp. 56. Photo C Laurenson.

Figure 4. Tarahinau-broadleaved shrubland on coastal cliffs in Thomas Mohi Tuuta (Rangaika) Scenic Reserve. This vegetation type supports moderately diverse land snail assemblages. Photo E Edwards.

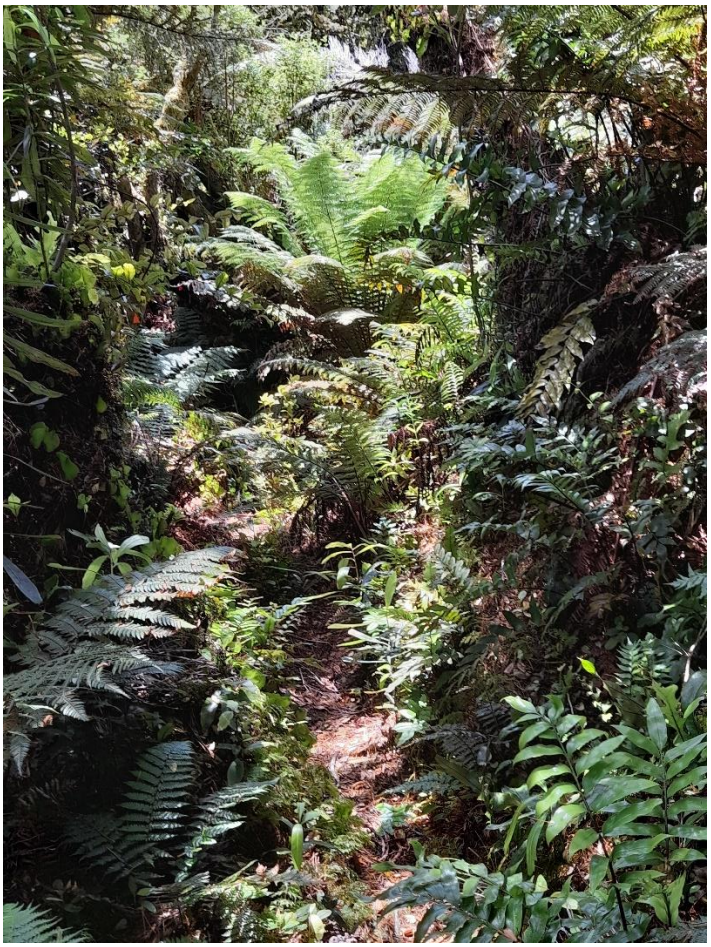

Figure 5A, B. Tarahinau-broadleaved forest in Thomas Mohi Tuuta (Rangaika) Scenic Reserve. Several species of endemic Chatham Islands land snails live in this forest type on southern Chatham Island. Photos W Brockelsby (A), C Laurenson (B).

Figure 6. Edge of clearing in Tarahinau forest, southern Chatham Island. Habitat of the endemic land snail species *Phrixgnathus* aff. *phrynia* and '*Phrixgnathus*' aff. *viridulus*. Photo E Edwards.

Figure 7. Fossil shells of the endemic land snail *Therasia* sp. ‘Chatham’ in a buried sandy soil horizon in mid-late Holocene dunes at Te One. Photo F Brook.

Figure 8. The endemic land snail *Therasia* sp. ‘Chatham’ in Thomas Mohi Tuuta (Rangaika) Scenic Reserve. Photo C Laurenson.