Beddomeia hallae

Hydrobiid Snail (Buttons Rivulet)

TASMANIAN THREATENED SPECIES LISTING STATEMENT

Beddomeia sp. © Karen Richards

Common name: Hydrobiid Snail (Buttons Rivulet)

Scientific name: ***Beddomeia hallae*** (Ponder & Clark)

Group: Invertebrate, Mollusca, Gastropoda, Sorbeoconcha, Hydrobiidae *s.l.*

Status: *Threatened Species Protection Act 1995*: **endangered**
Environment Protection and Biodiversity Conservation Act 1999: **Not listed**
IUCN Red List: **Vulnerable**

Distribution: Endemic status: **Endemic**
Tasmanian NRM Regions: **Cradle Coast**

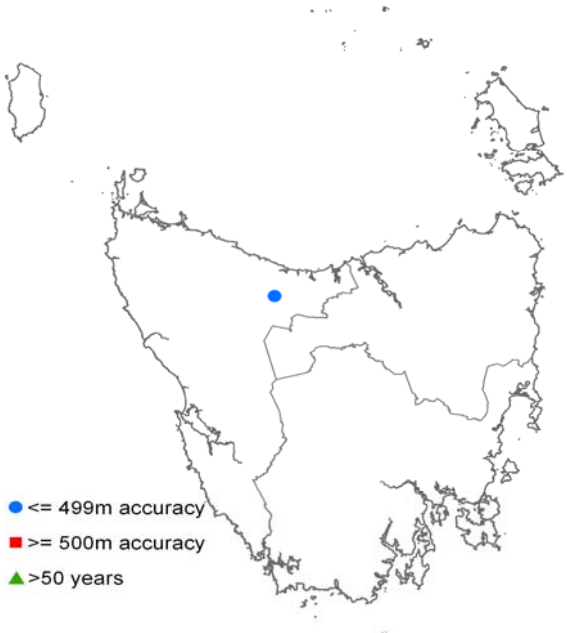

Figure 1. The distribution of *Beddomeia hallae,* showing NRM regions

Plate 1. Specimen of *Beddomeia hallae* (image by Stephanie Clark for Winston Ponder) Scale = 1 mm

SUMMARY

Beddomeia hallae is a freshwater snail occurring in tributaries of Buttons Rivulet on South Preston Rd, Nietta and headwater streams of the Castra Rivulet (including Deep Gully Creek), in central northern Tasmania. The species has a relatively narrow range, known only from a small number of streams, across an area of 20 km^2.

The principal threats to *B. hallae* are associated with agricultural land usage, resulting in habitat modification or degradation and production forestry. *B. hallae* may also be vulnerable to competition with the exotic species *Potamopyrgus antipodarum* (New Zealand hydrobiid).

The principal management objectives for *B. hallae* include preventing the loss or degradation of habitat supporting known populations, identification of new subpopulations, increasing public awareness of the species, and improving its reservation status.

IDENTIFICATION AND ECOLOGY

Beddomeia hallae is a member of the Hydrobiidae *s.l.*, a family of freshwater snails with cosmopolitan distribution (*sensu lato* (*s.l.*) = in the broad sense; placement of *Beddomeia* with this family is currently under review). *B. hallae* is one of 37 *Beddomeia* species listed as threatened on the Tasmanian *Threatened Species Protection Act 1995*.

Hydrobiid snails are small (1.0-7.0 mm), often cryptic species that are difficult to identify to species level in the field, being distinguished by a number of shell and anatomical characters. They possess conical to compressed trochiform shells of between 4 and 8 whorls (Plates 1 & 2). Their shells can be opaque to dark brown in colour. The shells are most often smooth, but may possess faint sculpturing. Like a number of other *Beddomeia* species, *B. hallae* is conical in shape, with a shell length of 3.09-3.47 mm, width of 1.96-2.37 mm and a protoconch of about 2.0 whorls. The microsculpture is smooth. The umbilicus is closed, represented by a chink 0.09-0.35 mm wide (Ponder et al 1993).

The principal characters used to separate species of *Beddomeia* are the male and female reproductive systems, which require microscopic dissection of specimens.

Information on the breeding habits of *B. hallae* is limited. *Beddomeia* reproduce sexually, laying single eggs, contained within a capsule formed of sand grains secreted together (Plate 3). The egg capsules of *B. hallae* are undescribed; however, *Beddomeia* spp. egg capsules are approximately 30% of adult body size. Individual egg capsules have broad attachment bases and are attached to the underside of submerged stable rocks or allochthonous material. The period of egg incubation is unknown; however, eggs develop into fully formed juvenile snails prior to emerging from the capsule. There is currently no available information on the fecundity of these species, although it is thought to be low, based on the proportions of egg capsules to snail abundance recorded at many sites (K. Richards, unpubl. data).

B. hallae is known from the headwaters of Buttons Rivulet, Nietta and tributary streams of Castra Rivulet, including from Deep Gully Creek. They are located on submerged allochthonous material (leaves, wood), weed, and under stones, where it feeds actively, grazing on periphyton. Field observations indicate these snails have a preference for the underside and lower margins of rocks and stream debris.

Some information is available on the life-history of *B. hallae* (Richards 2010). This species of *Beddomeia* is capable of breeding throughout the year, with no evidence of a seasonal reproductive peak observed. *B. hallae* are thought to live for at least 5 years, developing slowly and reaching sexual maturity only after 2-3 years. The longevity of another species of *Beddomeia* has been observed to exceed 5 years (K. Richards unpubl. data).

Due to the method of reproduction, limited fecundity and specific habitat requirements species of *Beddomeia* are unable to disperse widely, unlike other aquatic molluscs with a free-swimming larval stage (Bryant & Jackson 1999). This apparent inability to disperse into new habitat renders these species vulnerable to several threatening processes.

Survey techniques

B. hallae is a small, cryptic species which can be difficult to tell apart from other species of *Beddomeia,* and identification to species normally requires a specialist. A survey protocol guiding collection methods has been developed by DPIPWE and is available to ecological consultants via the DPIPWE website; however, only suitably qualified people capable of field identification of hydrobiids to genus-level should undertake surveys for *Beddomeia.*

Plate 2. Shell of *Beddomeia hallae* (image © Karen Richards)

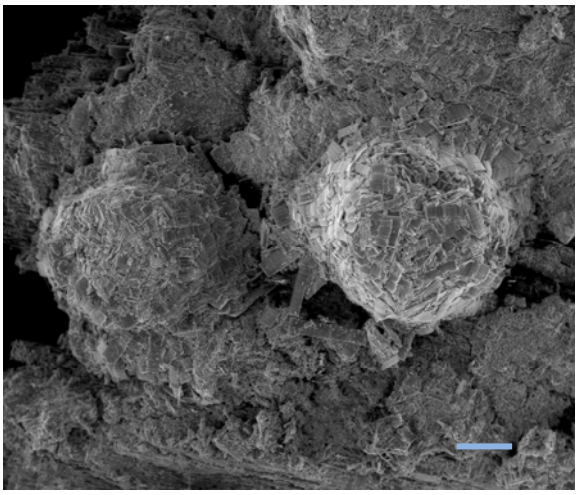

Plate 3. Egg capsule of *Beddomeia hallae.* Scale 200 μm (image © Karen Richards)

Confusing species

B. hallae co-occurs with a species of *Austropyrgus* and *Potamopyrgus antipodarum* (in some streams); however, it can be readily distinguished from *Austropyrgus* by its broader, larger shell. *B. hallae* may be confused with other species of *Beddomeia* of similar external appearance (*B. hermansi, B. waterhouseae, B. turnerae, B. fallax, B. lodderae, B. camensis, B. averni, B. forthensis*), although is more narrowly conical. The 'plasticity' of shell shape within some individual species may also lead to incorrect identification. The colour of uncleaned individual shells is not a taxonomically useful character. Reproductive characteristics are used to separate species (Ponder et al. 1993), but this requires microscopic dissection. Confusion might occur between the more conical of *Beddomeia* species and the exotic species *Potamopyrgus antipodarum* where these species are found together, although the latter has a faster, more direct manner of movement, and gives live birth.

Plate 4. Habitat of *Beddomeia hallae* (image by Karen Richards)

DISTRIBUTION AND HABITAT

B. hallae occurs in tributaries of Buttons Rivulet on South Preston Road, Nietta and headwater streams of the Castra Rivulet (including Deep Gully Creek), in central northern Tasmania (Figure 1, Table 1, Plate 4). The species has a relatively narrow range, known only from streams, within an area of 20 km^2. The total length of stream in which the species occurs is unknown. Subpopulations occurring in the streams are separated by topography and inhospitable environments (large streams, *Eucalyptus nitens* and *Pinus radiata* plantations and cleared agricultural land).

Table 1. Population summary for *Beddomeia hallae*

	Location	Tenure	NRM region*	1:25 000 mapsheet	Year last (first) seen	Extent of subpopulation (ha)	Abundance
1	Buttons Rivulet	Private Property	Cradle Coast	Castra	(1982), 2005, 2011	-	Low
2	Tributary of Castra Rivulet	State forest	Cradle Coast	Castra	(2001)-2004	-	Medium
3	Tributary of Castra Rivulet	State forest	Cradle Coast	Castra	(2001)-2004, 2012	-	High
4	Tributary of Deep Gully Creek	State forest	Cradle Coast	Castra	(2001)-2004	-	Medium

*NRM region = Natural Resource Management region

POPULATION PARAMETERS

Population estimates are not available, but densities are known to vary considerably between streams (K. Richards unpubl. data). Apart from Richards (2010), no comprehensive surveys have been undertaken to estimate the population size at the known localities.

RESERVATION STATUS

The type locality and all other known locations of *B. hallae* occur on private property, or State forest, outside of formal reserves.

CONSERVATION STATUS

B. hallae was listed in 1995 as rare on the Tasmanian *Threatened Species Protection Act 1995*. The species was uplisted to endangered in 2009, following a review of available information, meeting the criteria for listing criterion B, specifically B1 (severely fragmented or known to exist at no more than 5 locations) and B2 (continuing decline inferred, observed or projected, in extent of occurrence (estimated to be less than 0.1 km^2) and quality of habitat.

THREATS, LIMITING FACTORS & MANAGEMENT ISSUES

The principal identified threats to freshwater molluscs are agricultural clearing, forestry, mining and impoundment construction (Ponder & Colgan 2002, Ponder & Walker 2003, Strong et al. 2008). For *B. hallae*, the limiting factors are associated with agricultural land practices, resulting in habitat modification or degradation and production forestry. This species is confined to small order streams in unreserved environments and consequently are at higher risk of being impacted by habitat degradation and modification (Richards 2010). The type locality occurs in remnant native riparian vegetation in cleared agricultural land heavily impacted by domestic stock access.

Habitat modification and destruction: *B. hallae* occurs in areas subject to anthropogenic disturbance brought about by agricultural land use and production forestry; consequently it is highly vulnerable to habitat destruction and modification. Permanent removal of riparian vegetation increases stream temperatures and siltation, thus reducing habitat suitability for *B. hallae*.

Interspecific competition from introduced hydrobiids: Owing to the restricted subpopulations of *B. hallae*, they are considered vulnerable to interspecific competition and displacement from the exotic species *Potamopyrgus antipodarum* (New Zealand hydrobiid), particularly as they occur in areas already subject to water quality degradation which is favoured by the exotic species (Schreiber et al. 2003).

Climate change: The trend towards a warmer climate and fluctuations in precipitation may impact on the habitat availability for *B. hallae* by reducing stream flow and modification of riparian vegetation communities.

Stochastic risk: The fragmented distribution of the subpopulations of *B. hallae* offer limited opportunity for genetic exchange between some subpopulations, thus exposing the species to a risk of extinction.

MANAGEMENT STRATEGY

Management objectives

The main objective for the management of the *B. hallae* is to decrease the risk of extinction by maintaining the integrity of habitat at known sites through appropriate land management.

- Prevent the loss or degradation of habitat supporting known populations.
- Identify new subpopulations of the species.
- Increase the level of information and data available on the location, size and condition of known subpopulations.
- Improve the understanding of the ecological requirements of the species.
- Improve reservation status and/or develop management agreements with land managers to minimise the degradation of subpopulations.

What has been done?

Targeted surveys & monitoring: The type locality was re-surveyed in 2005, when specimens were obtained for DNA analysis (Richards 2010). To date no subsequent surveys for the species have been conducted.

Forestry management: *B. hallae* is included in the *Threatened Fauna Adviser*, a decision-support system used by forest industry to take account of threatened fauna in wood production forests managed under the Tasmanian *Forest Practices Code* (FPB 2000, 2001).

What is needed?

- To increase understanding of the ecology of the species - conduct more precise assessments of population size, distribution, ecological requirements and the relative impacts of threatening processes.
- To improve protection of the species - undertake extension surveys outside the known range in potential habitat to locate any additional subpopulations.
- To improve protection of the species - provide information and extension support to relevant Natural Resource Management committees, local councils, government agencies, the local community and development proponents on the locality, significance and management of hydrobiid species and potential habitat.
- To improve protection of the species - raise awareness of *Beddomeia* spp. within local communities and promote good hygiene practices for equipment used in and around waterways to reduce translocation of exotic snail species. Seek advice from DPIPWE.
- To improve protection of the species – promote the benefits of weed management and stock exclusion (e.g. fencing) to minimise degradation of streams known to contain subpopulations of the snail.

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View:

http://www.dpipwe.tas.gov.au/threatenedspecieslists

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Permit: A permit is required under the *Tasmanian Threatened Species Protection Act 1995* to knowingly "take" (which includes kill, injure, catch, damage, destroy and collect), keep, trade in or process any specimen of a listed species.