Beddomeia waterhouseae

Hydrobiid Snail (Claytons Rivulet)

TASMANIAN THREATENED SPECIES LISTING STATEMENT

Beddomeia sp. image © Karen Richards

Common name: Hydrobiid Snail (Claytons Rivulet)

Scientific name: ***Beddomeia waterhouseae*** (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**

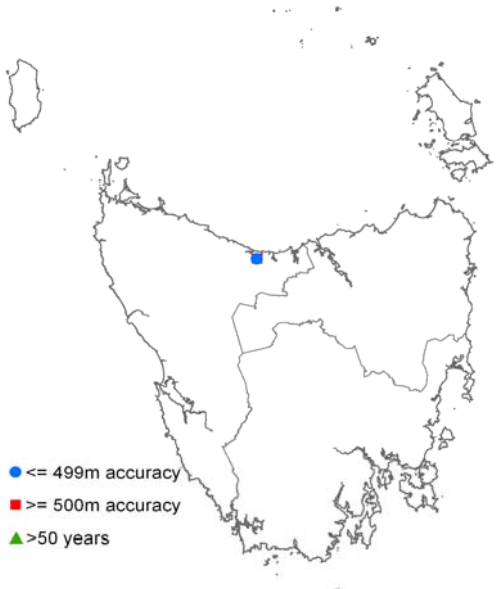

Figure 1. The distribution of *Beddomeia waterhouseae*, showing NRM regions

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

SUMMARY

Beddomeia waterhouseae is a freshwater snail occurring in tributaries of Little Claytons Rivulet, near Kindred, in central northern Tasmania. The species has a very narrow range, known only from three streams, with a maximum 0.5 km separation between the known sites.

The threats to *B. waterhouseae* are associated with domestic and agricultural practices, resulting in habitat modification or degradation. *B. waterhouseae* is also impacted by competition with and displacement by the exotic species *Potamopyrgus antipodarum* (New Zealand hydrobiid).

The principal management objectives for *B. waterhouseae* 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

B. waterhouseae 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. waterhouseae* 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 (Plate 1). Their shells can be opaque to dark brown in colour, often depending on the age of the individual. The shells are most often smooth, but may possess faint sculpturing. Like a number of other *Beddomeia* species, *B. waterhouseae* has an ovate-conic shape. This shell is 2.74-3.30 mm long; 2.07-2.37 mm wide, and has a protoconch of about 2.0 whorls with a smooth microsculpture. The umbilicus is small, 0.11-0.27 mm wide. The species is sexually dimorphic in length (Ponder et al. 1993).

The principal characters used to separate species of *Beddomeia* are the male and female reproductive systems.

Information on the breeding habits of *B. waterhouseae* is limited. *Beddomeia* reproduce sexually, laying single eggs, contained within a capsule formed of sand grains secreted together (Plate 2). The egg capsules of *B. waterhouseae* are undescribed; however, generally *Beddomeia* 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 emergence from capsules. 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. waterhouseae is known from headwater tributaries of Little Claytons Rivulet, where they are located on submerged allochthonous material (leaves) and rocks, 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.

While no specific life history information is available for *B. waterhouseae*, it is presumed to be similar to other headwater stream-inhabiting *Beddomeia* species. Species of *Beddomeia* are capable of breeding throughout the year, with no evidence of a seasonal reproductive peak observed (Richards 2010). Some *Beddomeia* species are known to live for over 5 years and develop slowly, reaching sexual maturity only after 2-3 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.

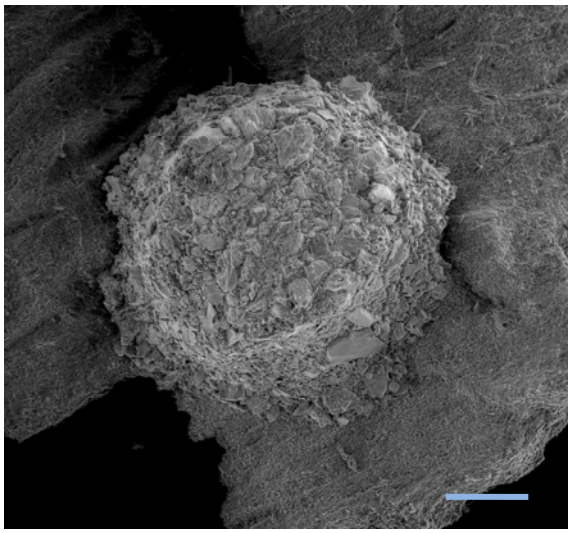

Plate 2. Egg capsule of *Beddomeia sp.,* scale 200 µm (image © Karen Richards)

Survey techniques

B. waterhouseae is a small, cryptic species that can be difficult to tell apart from other species of *Beddomeia,* and identification to species-level 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*.

Confusing species

B. waterhouseae co-occurs with two species of *Austropyrgus* and *Potamopyrgus antipodarum*; however, it can be readily distinguished from *Austropyrgus* in its markedly broader, larger shell and lack of operculum peg, a feature not possessed by any *Beddomeia* species. Due to their diminutive size and distinguishing characters, *Beddomeia* and *Phrantela* species cannot easily be identified in the field; however, they are readily distinguishable from most of the native freshwater genera. *B. waterhouseae* may be confused with other species of *Beddomeia* of similar external appearance *(B. hermansi, B. camensis, B. turnerae, B. hallae, B. fallax, B. lodderae, B. averni, B. forthensis*) (Ponder et al. 1993), but identification requires microscopic dissection, and the ranges of these species are geographically separated. Confusion between the more conical of *Beddomeia* species and the exotic species *Potamopyrgus antipodarum* may also occur where these species co-occur.

Plate 3. Habitat of *Beddomeia waterhouseae* (image by Karen Richards)

DISTRIBUTION AND HABITAT

B. waterhouseae occurs in tributaries of Little Claytons Rivulet, near Kindred, in central northern Tasmania (Figure 1, Table 1). The species has a very narrow range, known only from three streams, with a maximum 0.5 km separation between the known sites (Plate 3). The total length of stream in which the species occurs is unknown. Subpopulations occurring in the three streams are separated by topography and inhospitable environments (large stream, cleared land and domestic residence).

POPULATION PARAMETERS

Population estimates are not available. No comprehensive surveys have as yet been undertaken to estimate the population size at the known localities, although snail densities are known to differ between locations.

RESERVATION STATUS

The known records for *B. waterhouseae* occur in streams on private property.

CONSERVATION STATUS

B. waterhouseae 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. waterhouseae,* the limiting factors are associated with domestic and agricultural land management practices, resulting in habitat modification or degradation. This species is confined to small order streams subject to agricultural and residential land use and consequently are at higher risk of being impacted by habitat degradation and modification (Richards 2010). The two known sites occur in remnant native riparian vegetation in cleared agricultural land.

Habitat modification and destruction: *B. waterhouseae* occurs in areas previously subjected to anthropogenic disturbance brought about by agricultural practices; 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. waterhouseae.*

Interspecific competition from introduced hydrobiids: An additional threat is interspecific competition and displacement from the exotic New Zealand species, *P. antipodarum* in degraded waterways on the margins of forested areas (K. Richards unpubl. data). *P. antipodarum* has been observed to co-occur in one of the two streams from which *B. waterhouseae* is known. (Ponder et al. 1993). Owing to the restricted subpopulations of *B. waterhouseae*, they are considered vulnerable to interspecific competition and displacement from *P. antipodarum*, particularly as they occur in areas already subjected 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. waterhouseae* by reducing stream flow and modification of riparian vegetation communities.

Stochastic risk: The fragmented distribution of the subpopulations of *B. waterhouseae* offer no opportunity for genetic exchange between subpopulations, thus exposing the species to a risk of extinction.

MANAGEMENT STRATEGY

Management objectives

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

- 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.

Table 1. Population summary for *Beddomeia waterhouseae*

	Location	Tenure	NRM region*	1:25 000 mapsheet	Year last (first) recorded	Extent of subpopulation (ha)	Abundance
1	Tributary of Little Claytons Rivulet, Kindred	Private Property	Cradle Coast	Kindred	(1989) 2003	Unknown	Low
2	Tributary of Little Claytons Rivulet, Kindred	Private Property	Cradle Coast	Kindred	1995	Unknown	Low
3	Tributary of Little Claytons Rivulet, Kindred	Private Property	Cradle Coast	Kindred	2003	Unknown	Low

*NRM region = Natural Resource Management region

What has been done?

Targeted surveys & monitoring: The type locality was re-surveyed in 2003, when specimens were obtained for DNA analysis (Richards 2010). To date no subsequent surveys for the species have been conducted.

Forestry management: *B. waterhouseae* 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), and areas subject to landuse changes e.g. plantation establishment.

What is needed?

- 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.
- To improve protection of the species - undertake extension surveys outside the known range in potential habitat to locate any additional subpopulations.
- To increase understanding of the ecology of the species - conduct more precise assessment of population size, distribution, ecological requirements and the relative impacts of threatening processes.

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View:

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

Contact details: Threatened Species & Marine Section, Department of Primary Industries, Parks, Water and Environment, GPO Box 44, Hobart, Tasmania, Australia, 7001.

Ph. (03) 6165 4340; fax (03) 6233 3477; threatenedspecies.enquiries@dpipwe.tas.gov.au

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.