Beddomeia averni

Hydrobiid Snail (West Gawler)

TASMANIAN THREATENED SPECIES LISTING STATEMENT

Image © Karen Richards

Common name: Hydrobiid Snail (West Gawler)

Scientific name: ***Beddomeia averni*** Ponder & Clark, 1993

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 to Tasmania**
Tasmanian NRM Regions: **Cradle Coast**

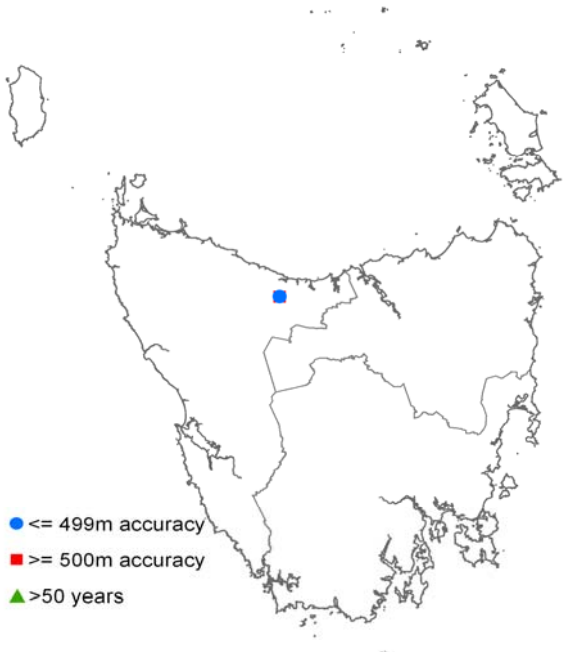

Figure 1. The distribution of *Beddomeia averni,* showing NRM regions

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

SUMMARY

Beddomeia averni is a freshwater snail known from only three small headwater streams in close proximity (within 0. 5 km) near Preston in central north Tasmania. The total length of stream known to support this species is 1100 m.

The principal threats to *B. averni* are agricultural and forestry practices which result in habitat modification or degradation. The species is confined to small headwater streams which are afforded the least protection in areas subject to forest harvesting, and two of the known locations occur in *Pinus radiata* plantations. *B. averni* may also be impacted by competition with and displacement by the exotic species *Potamopyrgus antipodarum* (New Zealand hydrobiid).

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

IDENTIFICATION AND ECOLOGY

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

Hydrobiid snails are small, (1-7 mm), often cryptic species that are difficult to identify to species level in the field. 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, 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. averni* has an ovate-conic shape. The shell is 2.90-3.32 mm long, 1.89-2.22 mm wide, and has a protoconch of about 1.75 whorls. The microsculpture is uniform, of weak pitting, with spirally arranged weak wrinkles. The umbilicus is small, 0.15-0.28 mm wide. 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. averni* is limited. *Beddomeia* reproduce sexually, laying single eggs, approximately 20% of adult body size, over which is constructed a capsule formed of sand grains or wood fragments (Plate 3). Individual egg capsules have broad attachment bases and are attached to the underside of stable pebbles, rocks, wood and other stream debris. 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. averni is a headwater stream specialist, located on submerged allochthonous material (wood, leaves), roots, moss and liverworts, where it feeds actively, grazing on periphyton. Field observations indicate these snails have a preference for the underside and lower margins of stream debris.

While no specific life history information is available for *B. averni*, 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 (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. *Beddomeia averni* (broad species) and *Austropyrgus* sp. (narrow) scale bar 1 mm (image © Karen Richards)

Plate 3. Egg capsule of *Beddomeia averni;* scale bar 200 µm (image © Karen Richards)

Survey techniques

B. averni is a small, cryptic species that 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.*

Confusing species

Species of *Beddomeia* and *Phrantela* (threatened hydrobiid snails) are difficult to identify in the field; however, they are distinguishable from most of the native freshwater genera. *B. averni* co-occurs with at least two species of *Austropyrgus* (K. Richards, unpubl. data); however, it can be readily distinguished from *Austropyrgus* by its markedly broader, larger shell and lack of operculum peg, a feature not possessed by any *Beddomeia* species. Shells of *B. averni* may be confused with other species of *Beddomeia* (*B. hermansi, B. waterhouseae, B. turnerae, B. camensis, B. forthensis*), although there is no geographical range overlap with these species. The 'plasticity' of shell shape and variation in the colour of uncleaned shells also makes identification using these characters problematic. Reproductive characteristics are used to separate species, but this requires microscopic dissection. Confusion between the more conical of *Beddomeia* species and the exotic species *Potamopyrgus antipodarum* may also occur where these species co-occur.

DISTRIBUTION AND HABITAT

B. averni occurs near Preston, in central north Tasmania (Figure 1, Table 1). The species has a very narrow range, known only from three headwater streams in close proximity (Plate 4). The total length of stream known to possess this species is 1100 m. Although flow occurs upstream in two catchments, the section of each stream containing snails is approximately 350 m in length. The upstream sections of two of the streams have been cleared for agriculture and only exotic species have been recorded. The subpopulations occurring in the three streams are separated from each other by topography and inhospitable environments (large stream and cleared land).

POPULATION PARAMETERS

B. averni is known from three locations with a maximum separation of 0.5 km. The total length of stream known to possess this species is 1100 m, ~350 m per stream. The total area of inhabited stream is 1100 x 1.5 m (1650 m^2). Population estimates are not available.

Densities of *Beddomeia* decline in a downstream direction at each site and relative abundance of snails also varies between streams (K. Richards unpubl. data). No comprehensive surveys have as yet been undertaken to estimate the population size at the known localities.

Plate 4. Habitat of *Beddomeia averni* (location 2, Table 1) (image by Karen Richards)

RESERVATION STATUS

Two of the three known records for *B. averni* occur on State forest outside of formal reserves. These sites are within informal reserves (streamside reserves) managed by Forestry Tasmania's Management Decision Classification system (Orr & Gerrand 1998). The third site occurs on private property.

CONSERVATION STATUS

B. averni was listed in 1995 as rare on the Tasmanian *Threatened Species Protection Act 1995*. The species was uplisted to endangered in 2009 under 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 threats to freshwater molluscs are agricultural clearing, forestry, mining and impoundment construction (Ponder & Colgan 2002, Ponder & Walker 2003, Strong et al. 2008). For *B. averni*, the limiting factors are associated with agricultural and forestry practices, resulting in habitat modification or degradation. This species is confined to small headwater streams which are afforded the least protection in areas subject to forest harvesting and consequently are at higher risk of being impacted (Richards 2010). Two of the known locations occur in *Pinus radiata* plantation, established prior to the current forest practices system and therefore streams were not afforded riparian buffers. Population densities in these streams are lower than in the third stream which occurs in native forest (Table 1).

Habitat modification and destruction: *B. averni* occurs in areas previously subjected to anthropogenic disturbance brought about by forestry and 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. averni*.

Interspecific competition from introduced hydrobiids: *B. averni* is considered vulnerable to interspecific competition and displacement from the exotic species *P. antipodarum*, particularly as they occur in areas already subjected to water quality degradation which favours the exotic species (Schreiber et al. 2003). *P. antipodarum* has been observed in the headwaters of the two plantation streams, and a single specimen was recorded co-occurring with *B. averni* at location 2 (Table 1).

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

Stochastic risk of extinction: The likely small size of the subpopulations of *B. averni* and the fragmented distribution (with no opportunity for genetic exchange between subpopulations) exposes the species to a high risk of extinction.

Table 1. Population summary for *Beddomeia averni*

	Location	Tenure	NRM region*	1:25 000 mapsheet	Year last (first) recorded	Extent of subpopulation (ha)	Abundance
1	Native forest, 3 km E of Preston	Private Property	Cradle Coast	Castra	(1989) 2009	Unknown	Moderate
2	Pine plantation 3 km E of Preston	State Forest	Cradle Coast	Castra	2009	Unknown	Low
3	Pine plantation 3 km E of Preston	State Forest	Cradle Coast	Castra	2009	Unknown	Low

*NRM region = Natural Resource Management region

MANAGEMENT STRATEGY

Management objectives

The main objective for the management of the *B. averni* is to decrease the risk of extinction by maintaining the integrity of habitat at known sites through appropriate land management. To achieve this, 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 private landowners to minimise the degradation of subpopulations.

What has been done?

Targeted surveys & monitoring: The type locality was re-surveyed in 2007, when specimens were obtained for DNA analysis (Richards 2010). Further range extension surveys were conducted by Forest Practices Authority ecologists in the vicinity of the original collection site in 2009. *B. averni* is the target of a monitoring program initiated in 2010 by Natural Resource Management North (for NRM Cradle Coast region) and the Forest Practices Authority.

Forestry management: *B. averni* 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* (Forest Practices Board 2000, 2001).

Assessment of effect of vegetation removal: In 2002, the native forest cover above the third stream was cleared to reduce the chance of road closure due to tree fall. The stream was assessed immediately following this event to establish snail presence. So far no information is available on the effect of the vegetation clearing.

What is needed?

- To improve protection of the species - conduct surveys of known populations followed up by periodic monitoring in order to establish population trends.
- To improve habitat protection - encourage fencing of habitat to exclude stock from the stream and the riparian zone.
- To improve protection of the species - continue the current monitoring program by the Cradle Coast Natural Resource Management region and the Forest Practices Authority.
- To increase understanding of the ecology of the species - conduct research on assessment of population size, distribution, ecological requirements, and the relative impacts of threatening processes.
- To increase understanding of the ecology 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.

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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.