Beddomeia camensis

Hydrobiid Snail (Cam River)

TASMANIAN THREATENED SPECIES LISTING STATEMENT

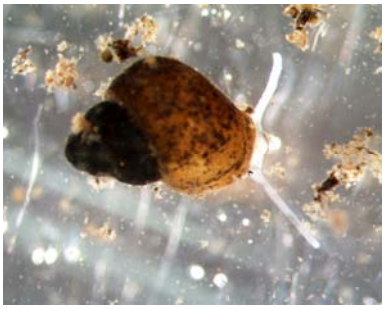

Image © Karen Richards

Common name: Hydrobiid Snail (Cam River)

Scientific name: ***Beddomeia camensis*** (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**

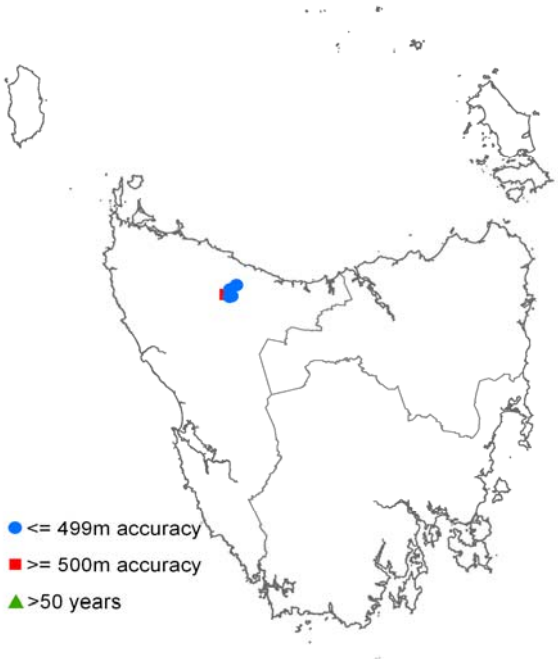

Figure 1. The distribution of *Beddomeia camensis,* showing NRM regions

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

SUMMARY

Beddomeia camensis is a freshwater snail occurring near the Cam River, on Oonah Road, northwest Tasmania. The species has a very narrow range, known only from five streams, with a maximum 7 km separation between the known sites.
The principal threats to *B. camensis* are agricultural clearing, forestry, mining and impoundment construction, all of which can result in habitat modification or degradation. *B. camensis* may also be vulnerable to competition with the exotic species *Potamopyrgus antipodarum* (New Zealand hydrobiid). The principal management objectives for *B. camensis* 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 camensis 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. camensis* 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. camensis* has a broadly conic shape. This shell is 2.93-3.68 mm long, 2.15-2.51 mm wide, with a protoconch of about 1.75 whorls. The microsculpture is uniform, of slight to intermediate pustules and the umbilicus is small or closed and represented by chink, is 0.14-0.28 mm wide. The species is not sexually dimorphic in length, width or shape (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. camensis* 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. camensis* range in size from 0.87-1.03 mm long, which is approximately 30% of adult body size. Individual egg capsules have broad attachment bases and are attached to the underside of submerged stable rocks. 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. camensis is known from small and middle order streams in the Cam River catchment, where they are located on submerged allochthonous material (wood, leaves), weed, moss and stable rocks, where they feed 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. camensis*, it is presumed to be similar to other 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. Live specimen of *Beddomeia camensis* (image © Karen Richards)

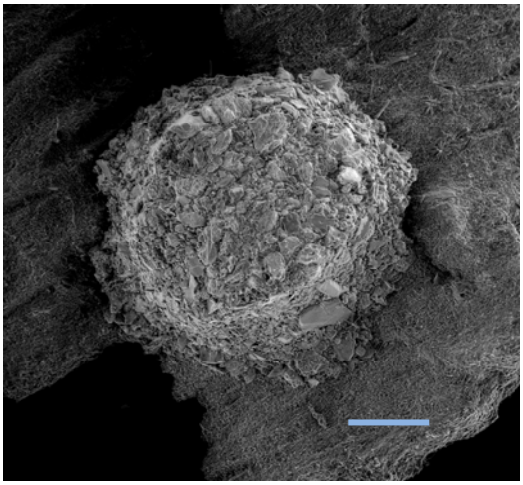

Plate 3. Egg capsule of *Beddomeia* sp., scale 200 µm. (image © Karen Richards)

Survey techniques

B. camensis 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

B. camensis co-occurs with two species of *Austropyrgus*; however, it can be readily distinguished from that taxon in its markedly broader, larger shell. Due to their diminutive size and distinguishing characters, *Beddomeia* and *Phrantela* (genera containing threatened species) species cannot easily be identified in the field; however, they are readily distinguishable from most of the native freshwater genera.

B. camensis may be confused with other species of *Beddomeia* (*B. hermansi, B. waterhouseae, B. turnerae, B. hallae, B. fallax, B. lodderae, B. averni, B. forthensis*), although there is no geographical overlap between the range of these species and *B. camensis*. The 'plasticity' of shell shape within some individual species may also lead to incorrect identification. The colour of individual shells is not a taxonomically useful character. 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. camensis occurs in tributaries of the Cam River, near Oonah and Tewksbury in northwest Tasmania (Figure 1, Table 1). The species has a very narrow range, known only from five streams, with a maximum 7 km separation between the known sites. The total length of stream in which the species occurs is unknown. Subpopulations occurring in the streams are separated by topography and inhospitable environments (including softwood plantation lacking riparian vegetation).

POPULATION PARAMETERS

Population estimates are currently unknown. 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 sites and streams (K. Richards pers. comm.).

RESERVATION STATUS

Three of the known records for *B. camensis* 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 remaining two sites are on private property, one of which is in a privately owned reserve.

Table 1. Population summary for *Beddomeia camensis*

	Location	Tenure	NRM region*	1:25 000 mapsheet	Year last (first) recorded	Extent of subpopulation (ha)	Abundance
1	Douglas Brook, Oonah Road	Private Property	Cradle Coast	Tewkesbury	1989	Unknown	Low
2	Tributary of St Josephs River, Talunah Road	State Forest	Cradle Coast	Tewkesbury	(1982)	Unknown	Low
3	East Cam River, Lockwood Creek Road	State Forest	Cradle Coast	Tewkesbury	1989	Unknown	Low
4	Tributary of Sandersons Creek, West Ridgley	State Forest	Cradle Coast	Tewkesbury	2011	Unknown	Low
5	Tributary of Trout Rivulet, Tewkesbury	Private property	Cradle Coast	Tewkesbury	2011	Unknown	Low

*NRM region = Natural Resource Management region

CONSERVATION STATUS

B. camensis 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. camensis*, the limiting factors are associated with forestry practices, resulting in habitat modification or degradation. This species is confined to small and medium order streams subject to forest harvesting and agricultural practices and consequently are at higher risk of being impacted by habitat degradation and modification (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.

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

Interspecific competition from introduced hydrobiids: Owing to the restricted subpopulations of *B. camensis*, they are 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 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. camensis* by reducing stream flow and modification of riparian vegetation communities.

Stochastic risk: The fragmented distribution of the subpopulations of *B. camensis* 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. camensis* 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 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. camensis* 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 assessment 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.

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Prepared in July 2010 by Karen Richards under the provisions of the *Tasmanian Threatened Species Protection Act 1995*. Approved by the Secretary and published in November 2013.

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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.