Beddomeia capensis

Hydrobiid Snail (Table Cape)

TASMANIAN THREATENED SPECIES LISTING STATEMENT

Image © Karen Richards

Common name: Hydrobiid Snail (Table Cape)

Scientific name: ***Beddomeia capensis*** (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**

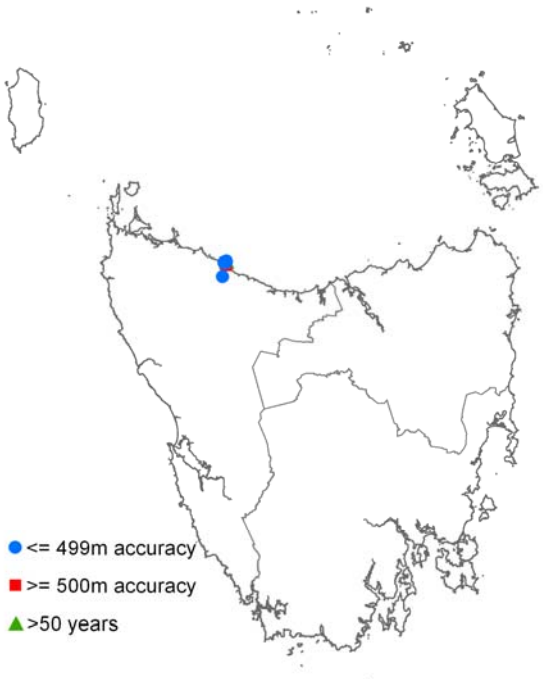

Figure 1. The distribution of *Beddomeia capensis,* showing NRM regions

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

SUMMARY

Beddomeia capensis is a freshwater snail now known to occur in two small streams on Table Cape, northwest Tasmania. The species previously occurred at five localities, but subsequent surveys have failed to relocate the species at three of these sites. The total length of occupied stream is < 80 m, with a maximum 0.3 km separation between the known sites. Subpopulations occurring in the two streams are separated by topography and inhospitable environments.

B. capensis may also be vulnerable to competition with the exotic species *Potamopyrgus antipodarum* (New Zealand hydrobiid).

The principal threats to *B. capensis* are associated with agricultural land usage, resulting in habitat modification or degradation. The principal management objectives for *B. capensis* 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 capensis 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. capensis* 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. capensis* has a conical shape. The shell is 2.21-2.71 mm long, 1.38-1.71 mm wide, with a protoconch of about 1.67 whorls. The microsculpture is smooth. The umbilicus is small or closed and represented by chink, 0.08-0.24 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. capensis* 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. capensis* are typical of *Beddomeia* and are 0.71-0.77 mm in maximum length (Figure 46C Ponder et al. 1993). Egg capsules of *Beddomeia* spp. 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. capensis is known from two small streams on Table Cape (Plate 4), where they are located on and under stones and allochthonous material (leaves, wood), 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. capensis*, 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. Shell of *Beddomeia capensis* (image © Karen Richards)

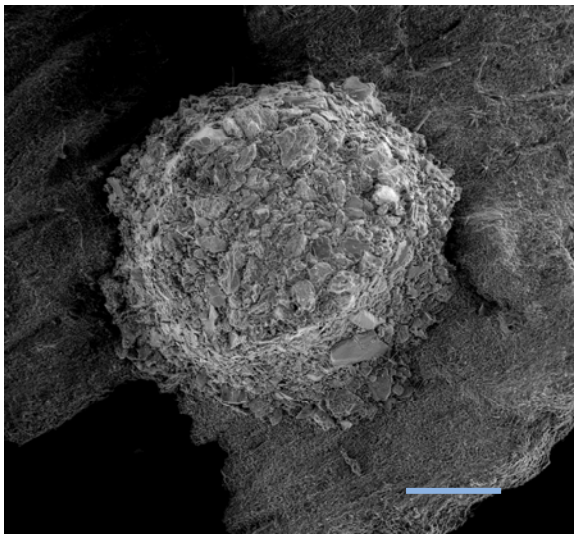

Plate 3. Egg capsule of *Beddomeia* sp., scale 200 µm. (image © Karen Richards)

Survey techniques

B. capensis 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. capensis co-occurs with two species of *Austropyrgus*; however, it can be distinguished from *Austropyrgus* by its broader shell, shorter spire, and lack of operculum peg, a feature not possessed by any *Beddomeia* species. *B. capensis* may be confused with other species of *Beddomeia* of similar external appearance (*B. hulli, B. bowryensis, B. zeehanensis* and *B. wiseae*); however, the ranges of these species do not overlap. The 'plasticity' of shell shape within some individual species may also lead to incorrect identification. The colour of individual uncleaned shells is not a taxonomically useful character. Reproductive characteristics are used to separate species, but this requires microscopic dissection. *Potamopyrgus antipodarum* is known to occur upstream of the known locality of this species. Confusion between *B. capensis,* the two *Austropyrgus* species and *P. antipodarum* may occur if specimens are not examined under magnification.

DISTRIBUTION AND HABITAT

B. capensis previously had a greater range, recorded from five sites (Table 1), but subsequent surveys have failed to relocate the species at three of these sites. It is now known to occur in two small streams on Table Cape, northwest Tasmania, with a maximum 0.3 km separation between the known sites (Figure 1, Table 1). The total length of stream in which the species occurs is less than 80 m. Subpopulations occurring in the two streams are separated by topography and inhospitable environments (intensive agriculture).

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 streams (K. Richards pers. comm.).

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

RESERVATION STATUS

The known localities of *B. capensis* occur on Crown reserve and private property.

CONSERVATION STATUS

B. capensis 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. capensis*, the limiting factors are associated with agricultural land practices, resulting in habitat modification or degradation. This species is confined to small order streams subject to agricultural 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. The species is now thought to be absent from three previously recorded sites, due likely to intensively modified stream channels resulting in loss of habitat and competition with introduced hydrobiid snails.

Habitat modification and destruction: *B. capensis* occurs in areas previously subjected to anthropogenic disturbance brought about by agricultural land use (including impoundment construction); 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. capensis*.

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

Stochastic risk: The fragmented distribution of the subpopulations of *B. capensis* 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. capensis* 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;

Table 1. Population summary for *Beddomeia capensis*

	Location	Tenure	NRM region*	1:25 000 mapsheet	Year last (first) recorded	Extent of subpopulation (ha)	Abundance
1	Unnamed stream, near Table Cape lighthouse	Crown land/Private Property	Cradle Coast	Wynyard	(1989), 2005, 2011	< 0.001	Moderate to high
2	Small stream on cliff face, below and slightly west of site 1	Crown land/Private Property	Cradle Coast	Wynyard	1995, 2004	< 0.001	Moderate to high
3	Murdering Gully, Table Cape	Private property	Cradle Coast	Wynyard	1989	Unknown	Unknown
4	Unnamed small stream east of Table Cape	Private property	Cradle Coast	Wynyard	1989	Unknown	Unknown
5	Tributary of Big Creek	State Forest	Cradle Coast	Calder	1989	Unknown	Unknown

*NRM region = Natural Resource Management region

- 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) and a targeted survey of the known localities was undertaken in 2004 and 2011. To date no additional surveys for the species have been conducted.

Forestry management: *B. capensis* 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.

BIBLIOGRAPHY

Bryant, S.L. & Jackson, J. (1999). *Tasmania's Threatened Fauna Handbook: What, Where and How to Protect Tasmania's Threatened Animals*. Threatened Species Unit, Parks & Wildlife Service, Hobart.

Forest Practices Board (2000). *Forest Practices Code*. Forest Practices Board, Hobart, Tasmania.

Forest Practices Board (2001). *Threatened Fauna Adviser. Expert System program*, Forest Practices Authority and Department of Primary Industries, Water and Environment, Hobart.

Ponder, W.F & Walker, K.F. (2003). From mound springs to mighty rivers: the conservation status of freshwater mollusks in Australia. *Aquatic Ecosystem Health and Management* 6: 19–28.

Ponder, W.F. & Colgan, D.J. (2002). What makes a narrow-range taxon? Insights from Australian freshwater snails. *Invertebrate Systematics* 16: 571–582.

Ponder, W. F, Clark, G. A., Miller, A. C. and Toluzzi, A. (1993). On a major radiation of freshwater snails in Tasmania and eastern Victoria: a preliminary overview of the *Beddomeia* group (Mollusca: Gastropoda: Hydrobiidae). *Invertebrate Taxonomy,* 7**,** 501-750.

Richards, K. (2010). An Ecological, Morphological and Molecular Investigation of *Beddomeia* Species (Gastropoda: Hydrobiidae) in Tasmania. PhD Dissertation, School of Zoology, University of Tasmania, Hobart.

Schreiber, E.S.G., Quinn, G.P. & Lake, P.S. (2003). Distribution of an alien aquatic snail in relation to flow variability, human activities and water quality. *Freshwater Biology* 48: 951–961.

Strong, E.E., Gargominy, O., Ponder, W.F. & Bouchet, P. (2008). Global diversity of gastropods (Gastropoda: Mollusca) in freshwater. *Hydrobiologia* 597: 149–166.

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

Cite as: Threatened Species & Marine Section (2013). *Listing Statement for* Beddomeia capensis *(Hydrobiidae* s.l.*) (Hydrobiid Snail (Table Cape)).* Department of Primary Industries, Parks, Water and Environment, Tasmania.

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.