Beddomeia tumida

Hydrobiid Snail (Great Lake)

TASMANIAN THREATENED SPECIES LISTING STATEMENT

Beddomeia sp. © Karen Richards

Common name: Hydrobiid Snail (Great Lake)

Scientific name: ***Beddomeia tumida*** (Petterd)

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: **Extinct**

Distribution: Endemic status: **Endemic**
Tasmanian NRM Regions: **South**

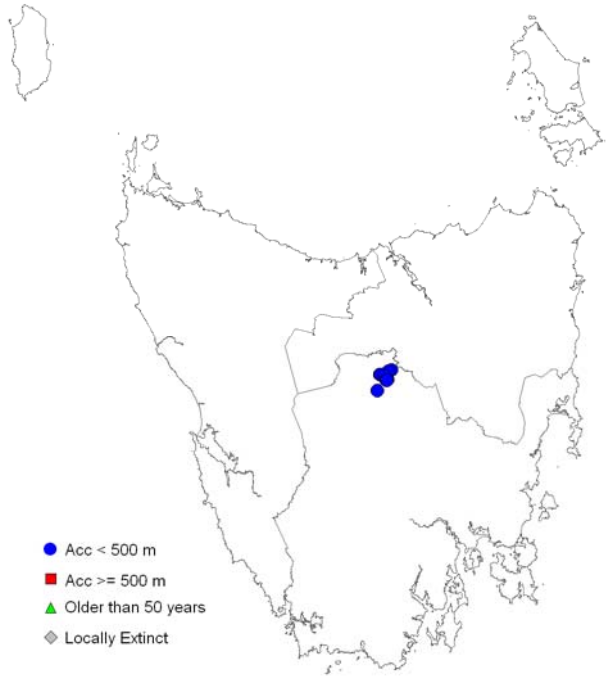

Figure 1. The distribution of *Beddomeia tumida.*

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

SUMMARY

Beddomeia tumida is a freshwater snail known to occur only in the Great Lake, in north-central Tasmania. The species has a very restricted range, but is known from six areas across the lake. The total area of lake bed in which the species occurs is unknown.

The principal threats to *B. tumida* are associated with impoundment management, agricultural clearing and forestry. *B. tumida* may also be impacted by competition with and displacement by the exotic species *Potamopyrgus antipodarum* (New Zealand hydrobiid).

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

IDENTIFICATION AND ECOLOGY

Beddomeia tumida 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. tumida* 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. tumida* is ovate in shape. This species is 3.77-4.17 mm long; 3.33-3.56 mm wide, with a shell width/shell length ratio is 0.85-0.92 and aperture length/shell length ratio is 0.54-0.58. The periostracum of the shell is yellow. The protoconch of the shell is of about 1.5-1.7 whorls, with a uniform microsculpture possessing fine, spirally arranged wrinkles and weak, variable axial wrinkles. The umbilicus is medium-sized, 0.28-0.40 mm wide. No information is available on sexual dimorphism in this species (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. tumida* 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. tumida* are unknown; *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 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. tumida is known only from Great Lake (Ponder et al 1993); surveys of the feeding tributaries have not recorded the species presence (Hydro Tasmania and K. Richards unpublished data, W. Ponder pers comm). Like all *Beddomeia*, it is thought that this species feeds actively, grazing on periphyton on substrate in deep water.

B. tumida is unique in that it is the only recorded lake-dwelling species in the genus. While no specific information is available for this species, it is presumed to be similar to other *Beddomeia* species. *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.

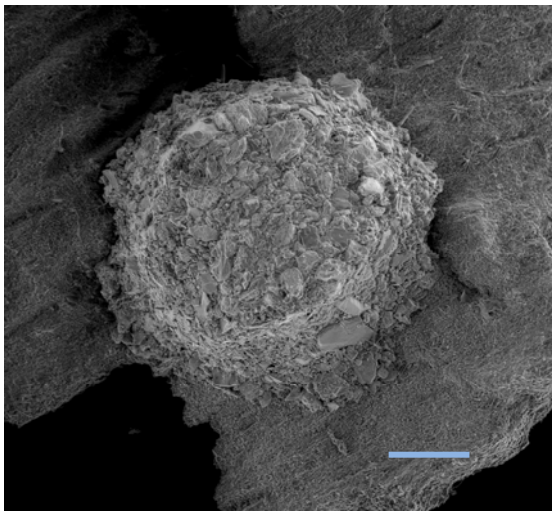

Plate 2. Egg capsule of *Beddomeia sp.,* scale 200 µm (image © Karen Richards)

Survey techniques

B. tumida is a small, cryptic species which 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

No information is available about other hydrobiid species occurring with *B. tumida*, although two species of *Austropyrgus* have been recorded in tributaries feeding into Great Lake (K. Richards unpubl. data). *B. tumida* 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. While the shell of *B. tumida* may be confused with other species of *Beddomeia* of similar external appearance (*B. launcestonensis, B. krybetes, B. kershawi, B. wilmotensis, B. inflata*), the ranges of these species are geographically separate.

DISTRIBUTION AND HABITAT

B. tumida is only known to occur in the Great Lake, in north-central Tasmania (Figure 1, Table 1). The species has a very restricted range, but has been recorded from six areas across the lake. The total area of lake bed in which the species occurs is unknown.

POPULATION PARAMETERS

B. tumida is known from five general locations, occurring within Great Lake. The total area of lake bed in which the species occurs is unknown. Population estimates are not available. No comprehensive surveys have recovered additional specimens to allow for estimates of the population size at any site.

RESERVATION STATUS

B. tumida occur in Great Lake, which is managed by Hydro Tasmania.

CONSERVATION STATUS

B. tumida was listed in 1995 as vulnerable on the Tasmanian *Threatened Species Protection Act 1995*. Prior to its reported rediscovery in 2010, 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). The rediscovery of *B. tumida* remains to be confirmed.

THREATS, LIMITING FACTORS & MANAGEMENT ISSUES

The principal identified threats to freshwater molluscs include: agricultural clearing, forestry, mining and impoundment construction (Ponder & Colgan 2002, Ponder & Walker 2003, Strong et al. 2008). The continued presence of *B. tumida* in Great Lake (artificial impoundment) suggests that the species may be more tolerant of this type of disturbance;

Table 1. Population summary for *Beddomeia tumida*

	Subpopulation	Tenure	NRM region*	1:25 000 mapsheet	Year last (first) recorded	Extent of population (ha)	Abundance
1	Great Lake	HEC	South	-	Unknown[1]	Unknown	9
2	Elizabeth Bay, Great Lake	HEC	South	Bradys L O	2007/08	Unknown	Low
3	Reynolds Bay, Great Lake	HEC	South	Split Rock	2007/08	Unknown	Low
4	Sandbanks, Great Lake	HEC	South	Bradys L O	2007/08	Unknown	Low
5	North Basin, Great Lake	HEC	South	Split Rock	2007/08	Unknown	Low
6	Christmas Bay, Great Lake	HEC	South	Miena	2007/08	Unknown	Low

*NRM region = Natural Resource Management region; [1] Details not recorded, held at AMS & SAM, May collection

however, lack of population abundance data collected prior to the dam construction limits our ability to adequately assess the threat of this activity, and indeed the population may have significantly declined as a consequence of dam construction. The impact of agricultural practices and upstream forest harvesting on *B. tumida* are unknown. This species is confined to a single lake which is managed as part of the hydroelectric scheme and thus subject to dramatic changes in water level; subsequently it is at a higher risk of being impacted upon by habitat degradation. The known sites occur in a modified environment.

Habitat modification and destruction: *B. tumida* occurs in areas subject to anthropogenic disturbance brought about by agricultural practices, water storage management and upstream forestry activity; consequently it is highly vulnerable to habitat destruction and modification. Permanent removal of riparian vegetation increases water temperatures and siltation, thus reducing habitat quality for *B. tumida.*

Interspecific competition from introduced hydrobiids: An additional threat is interspecific competition and displacement from the exotic New Zealand species, *Potamopyrgus antipodarum* in degraded waterways on the margins of forested areas (K. Richards unpubl. data). The presence of *Potamopyrgus antipodarum* in Great Lake is undocumented; however, owing to the restricted population of *B. tumida*, they are considered vulnerable to interspecific competition and displacement from this species, particularly as they occur in an area already subjected to water quality fluctuations, which is favoured by the exotic species(Schreiber et al. 2003).

Predation: Hydrobiid snails are often prey to native and exotic fish in Tasmania. The introduction of trout into Great Lake is likely to have negatively impacted upon the population of *B. tumida*, however, this remains to be determined given the lack of population abundance data.

Climate change: The trend towards a warmer climate and fluctuations in precipitation may impact on the habitat quality and availability for *B. tumida* by altering stream flow and the modification of riparian vegetation communities. Water allocation out of the Arthurs Lake – Great Lake system for the midland irrigation scheme might also impact on the species through increased demands on the water resource.

MANAGEMENT STRATEGY

Management objectives

The main objective for the management of the *B. tumida* is to decrease the risk of extinction by maintaining the integrity of habitat at the known locality through appropriate land management, specifically by:

- Prevention of loss or degradation of habitat supporting known populations;
- Increase the level of information and data

available on the location, size and condition of known population;

- 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 the population.

What has been done?

Targeted surveys & monitoring: Several sites within Great Lake were surveyed in 2007/8 by Hydro Tasmania and specimens were collected; however these were poorly preserved and identification could not be confirmed. Two additional surveys were conducted by Entura and Hydro Tasmania in 2012-13 but no additional specimens were recovered.

Forestry management: *B. tumida* 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?

Recent studies have improved knowledge of the ecology of several headwater stream-inhabiting *Beddomeia* species (Richards 2010); however, a complete understanding of the life-history of *Beddomeia* spp. remains limited, particularly for riverine and lake-inhabiting species. The following actions are also recommended:

- 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 - provided 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.