Beddomeia kershawi

Hydrobiid Snail (Macquarie River)

TASMANIAN THREATENED SPECIES LISTING STATEMENT

Beddomeia sp. image © Karen Richards

Common name: Hydrobiid Snail (Macquarie River)

Scientific name: ***Beddomeia kershawi*** (Ponder & Clark)

Group: Invertebrate, Mollusca, Gastropoda, Sorbeoconcha, Hydrobiidae *s.l.*

Status: *Threatened Species Protection Act 1995*: **vulnerable**
Environment Protection and Biodiversity Conservation Act 1999: **Not listed**
IUCN Red List: **Vulnerable**

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

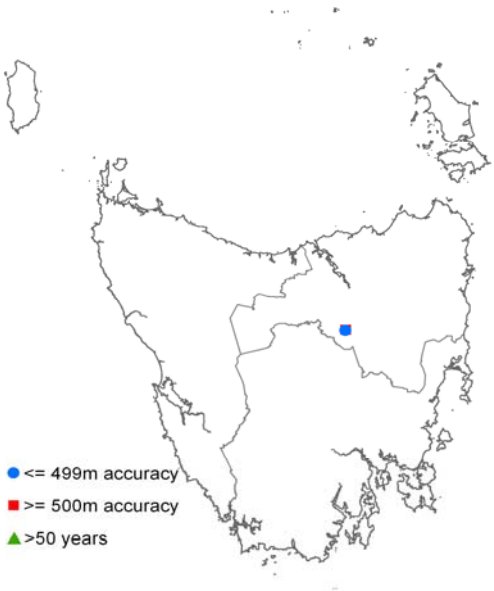

Figure 1. The distribution of *Beddomeia kershawi,* showing NRM regions

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

SUMMARY

Beddomeia kershawi is a freshwater snail known only from the main channel of Lake River, a tributary of the Macquarie River near Macquarie Settlement on Ross-Cressy Road.

The principal threats to *B. kershawi* are associated with agricultural practices and upstream forest harvesting, resulting in habitat modification or degradation.

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

The principal management objectives for *B. kershawi* include preventing the loss or degradation of habitat supporting known subpopulations, identification of new subpopulations, increasing public awareness of the species, and improving its reservation status.

IDENTIFICATION AND ECOLOGY

Beddomeia kershawi 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. kershawi* 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 which 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. The shells are most often smooth, but may possess faint sculpturing. Like a number of other *Beddomeia* species, *B. kershawi* has an ovate shape. This species is 2.31-2.80 mm long; 1.95-2.49 mm wide. The umbilicus is small, 0.2-0.27 mm wide, and is not sexually dimorphic in length, width or shape.

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. kershawi* 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. kershawi* are described as "typical of *Beddomeia*, 0.83-1.00 mm in maximum length" (Ponder et al. 1993); *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 (leaves, bark and wood) material. The period of egg incubation is unknown; however, eggs develop into fully formed juvenile snails prior to emerging from their 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).

While no specific life history information is available for *B. kershawi*, it is presumed to be similar to other species of *Beddomeia* inhabiting riverine environments. 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.

Survey techniques

B. kershawi 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*.

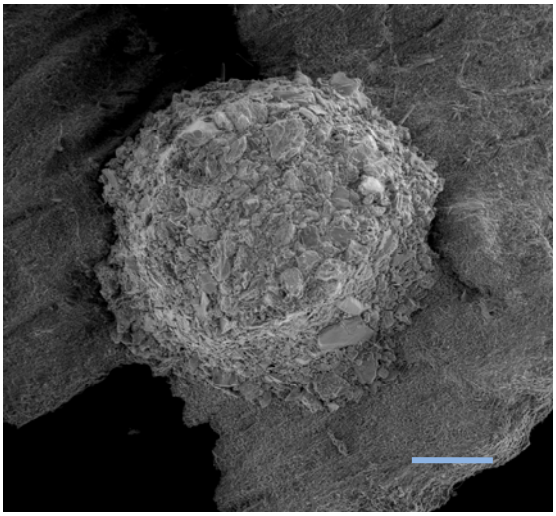

Plate 2. Egg capsule of *Beddomeia* sp., scale 200 µm (image © Karen Richards)

Confusing species

B. kershawi co-occurs with two species of *Austropyrgus*; 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. However, *B. kershawi* may be confused with other species of *Beddomeia* of similar external appearance (*B. launcestonensis, B. krybetes, B. tumida, B. wilmotensis, B. inflata*); although the ranges of these species are widely separated from *B. kershawi*. The 'plasticity' of shell shape within some individual *Beddomeia* 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 (Ponder et al. 1993), but this requires microscopic dissection. Confusion between the more conical of *Beddomeia* species and the exotic species *Potamopyrgus antipodarum* may also arise where these species co-occur.

DISTRIBUTION AND HABITAT

B. kershawi is known to occur in the Lake River, (tributary of the Macquarie River), at and near Macquarie Settlement, in north-central Tasmania (Figure 1, Table 1). However, it has been speculated that the species will eventually be found in other locations in this river. The species has a very narrow range, known only from one locality. The total length of stream in which the species occurs is unknown.

B. kershawi is known from the main channel of Lake River, at a point where the river is a large stream flowing through agricultural land. The species is located under rocks, where, in 1989, it was moderately common (Ponder et al. 1993). Subsequent surveys at this site conducted in 2001 and 2005 located only two individuals approximately 500 m upstream of the known locality.

Like all *Beddomeia*, this species feeds actively, grazing on periphyton.

POPULATION PARAMETERS

Population estimates are not available; however, it was thought to be relatively common in 1975 (Ponder et al. 1993), but more recent surveys have found the species to be extremely rare (K. Richards unpubl. data). No comprehensive surveys have as yet been undertaken to estimate the population size.

RESERVATION STATUS

The known records for *B. kershawi* occur in a slower flowing section of Lake River adjacent to private property. The location is not reserved.

CONSERVATION STATUS

B. kershawi was listed in 1995 as rare on the Tasmanian *Threatened Species Protection Act 1995*. The species was uplisted to vulnerable 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 10 locations) and B2 (continuing decline inferred, observed or projected, in extent of occurrence, area of occupancy, quality of habitat and number of locations or subpopulations).

Table 1. Population summary for *Beddomeia kershawi*

	Location	Tenure	NRM region*	1:25 000 mapsheet	Year last (first) recorded	Extent of population (ha)	Abundance
1	Lake River, tributary of Macquarie River at Macquarie Settlement	Private Property	North	Delmont	(1975)	Unknown	Considered common
2	Lake River, tributary of Macquarie River 500 m upstream of Macquarie Settlement	Private Property	North	Delmont	2001, 2005	Unknown	Unknown

*NRM region = Natural Resource Management region

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. kershawi* the limiting factors are associated with agricultural land usage, and upstream forest harvesting, resulting in habitat modification or degradation. This species is confined to one site on a single river subject to agricultural practices and upstream forestry activity; subsequently it is at a higher risk of being impacted upon by habitat degradation and modification (Richards 2010). The known site occurs in a modified environment containing minimal remnant native riparian vegetation in a cleared agricultural landscape.

Habitat modification and destruction: *B. kershawi* occurs in areas subject to anthropogenic disturbance including agricultural land use, irrigation schemes and upstream forestry activity; 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. kershawi.*

Interspecific competition from introduced hydrobiids: Owing to the restricted population of *B. kershawi*, they are considered vulnerable to interspecific competition and displacement from the exotic species *Potamopyrgus antipodarum* (New Zealand hydrobiid), particularly as they occur in an area 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 quality and availability for *B. kershawi* by altering stream flow and the modification of riparian vegetation communities.

Stochastic risk: The distribution of the population of *B. kershawi* combined with co-existence with other more abundant hydrobiid snail species offers limited opportunity for dispersal, thus exposing the species to a risk of extinction.

MANAGEMENT STRATEGY

Management objectives

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

- 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 2001 and again 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. kershawi* 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, 2002).

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, Clark, G.A., Miller, A.C. & 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.

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.

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. and 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 kershawi* (Hydrobiidae *s.l.*). Department of Primary Industries, Parks, Water and Environment, Tasmania.

View:

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

Contact details: Threatened Species 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.