Beddomeia fultoni

Hydrobiid Snail (Farnhams Creek)

TASMANIAN THREATENED SPECIES LISTING STATEMENT

Beddomeia sp. © Karen Richards

Common name: Hydrobiid Snail (Farnhams Creek)

Scientific name: ***Beddomeia fultoni*** (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**

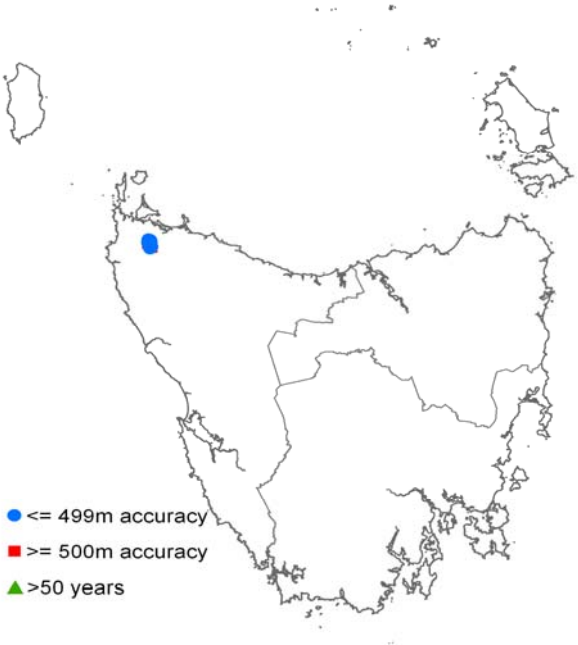

Figure 1. The distribution of *Beddomeia fultoni,* showing NRM regions

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

SUMMARY

Beddomeia fultoni is a freshwater snail occurring in tributaries of Fixters Creek, near Brittons Swamp, and Farnhams Creek, west of Christmas Hills, in north-western Tasmania. The species has a relatively narrow range, known only from six streams, with a maximum 4 km separation between the known sites.

The principal threats to *B. fultoni* are associated with domestic and agricultural land usage, resulting in habitat modification or degradation. *B. fultoni* may also be vulnerable to competition with the exotic species *Potamopyrgus antipodarum* (New Zealand hydrobiid).

The principal management objectives for *B. fultoni* 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 fultoni 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. fultoni* 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. The shells are most often smooth, but may possess faint sculpturing. Like a number of other *Beddomeia* species, *B. fultoni* has a broadly conic shape. The shell is 3.07-3.78 mm long, 2.24-2.78 mm wide, with a protoconch of about 1.5 whorls. The microsculpture is uniform, of weak pitting. The umbilicus is small, or closed and represented by chink, 0.16-0.39 mm wide, and 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. fultoni* 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. fultoni* are 0.81-0.97 mm in length. *Beddomeia* species' 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 develops into fully formed juvenile snails prior to emerging from the capsule. 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. fultoni is known from headwater tributaries of Fixters and Farnhams creeks, where they are located under and on wood, roots and leaves (Fixters Creek) and on roots, wood, leaves and stones (Farnhams Creek), 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. fultoni*, 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. Egg capsule of *Beddomeia fultoni*. Scale 200 µm (image © Karen Richards)

Survey techniques

B. fultoni 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. fultoni co-occurs with two species of *Austropyrgus*; however, in most instances it can be readily distinguished from *Austropyrgus* by its markedly broader shell and lack of operculum peg, a feature not possessed by any *Beddomeia* species. *B. fultoni* may be confused with other species of *Beddomeia* of similar external appearance (*B. salmonis, B. gibba* and to lesser extent *B. mesibovi*), although there is currently no known geographical overlap between *B. fultoni* and these species. 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. Confusion between the more conical of *Beddomeia* species and the exotic species *Potamopyrgus antipodarum* may arise where these species co-occur; however, the exotic species is currently not known from Fixters or Farnhams Creeks.

DISTRIBUTION AND HABITAT

B. fultoni occurs in tributaries of Fixters Creek, near Brittons Swamp, and Farnhams Creek, west of Christmas Hills, in north-western Tasmania (Figure 1, Table 1). The species has a relatively narrow range, known only from six streams, with a maximum 4 km separation between the known sites (Plate 3). The total length of stream in which the species occurs is currently unknown; however, in each catchment where the species occurs, downstream radiation is limited by an inhospitable environment, e.g. intensive dairy production. Subpopulations occurring in the catchments are separated by topography and inhospitable environments (large streams, intensive agricultural development, domestic residences and production forestry).

Plate 3. *Beddomeia fultoni* habitat (image by Karen Richards)

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 streams.

RESERVATION STATUS

Two of the known locations of *B. fultoni* occur within an informal reserve (for *Eucalyptus brookeriana*). The remaining sites are either on

private property or within State forest, outside formal reserves.

CONSERVATION STATUS

B. fultoni 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. fultoni,* the limiting factors are associated with domestic and agricultural land practices, resulting in habitat modification or degradation. This species is confined to small order streams subject to agricultural and production forest use and consequently are at higher risk of being impacted by habitat degradation and modification (Richards 2010). Three of the six known sites occur in remnant native riparian vegetation in either cleared agricultural land or production forest. The remaining sites are protected within an informal reserve.

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 unpublished data). To date, *Potamopyrgus antipodarum* has not been observed to co-occur with *B. fultoni* (Ponder et al. 1993).

Habitat modification and destruction: *B. fultoni* occurs in areas subject to anthropogenic disturbance brought about by agricultural practices and production forestry, both historically and currently; 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. fultoni.*

Interspecific competition from introduced hydrobiids: Owing to the restricted subpopulations of *B. fultoni*, they are considered vulnerable to interspecific competition and displacement from the exotic species *Potamopyrgus antipodarum* (New Zealand hydrobiid), 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. fultoni* by reducing stream flow and modification of riparian vegetation communities.

Stochastic risk: The fragmented distribution of the subpopulations of *B. fultoni* offer little 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. fultoni* 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

Table 1. Population summary for *Beddomeia fultoni*

	Location	Tenure	NRM region*	1:25 000 mapsheet	Year last (first) seen	Extent of subpopulation (ha)	Abundance
1	Farnhams Creek, on the Bass Highway, west of Christmas Hills	Private Property	Cradle Coast	Togari	1989	Unknown	Low
2	Tributary of Fixters Creek, north end of Brittons Swamp	State Forest	Cradle Coast	Togari	1989	Unknown	Low
3	Tributary of Fixters Creek, southern end of Brittons Swamp	State Forest	Cradle Coast	Togari	2006	Unknown	Low
4	Tributary of Fixters Creek, central Brittons Swamp (informal reserve)	State Forest	Cradle Coast	Togari	2010	Unknown	Moderate
5	Tributary of Fixters Creek, central Brittons Swamp (informal reserve)	State Forest	Cradle Coast	Togari	2010	Unknown	High
6	Tributary of Farnhams Creek, off Riseborough Road, Togari State Forest	State Forest	Cradle Coast	Mella	2010	Unknown	Low

*NRM region = Natural Resource Management region

What has been done?

Targeted surveys & monitoring: The type locality was re-surveyed in 2005, when specimens were obtained for DNA analysis (Richards 2010). *B. fultoni* is the target of a monitoring program established by Natural Resource Management (NRM North) and Forest Practices Authority initiated in 2010.

Forestry management: *B. fultoni* is included in the *Threatened Fauna Adviser*, a decision-support system used by forest industry to take account of threatened fauna in forests managed under the *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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View:

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

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