Threatened Species Assessment

Austropyrgus grampianensis
Dairy Creek Austropyrgus Snail

Taxonomy

Austropyrgus grampianensis (Gabriel, 1939)

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988*. (SAC 2005).

Categorised as Critically endangered in the 2009 Advisory list of threatened invertebrate fauna in Victoria (DSE 2009).

Proposed conservation status

Critically Endangered in Australia

Criterion B1ab(iii)

Species Information

Description and Life History

The Dairy Creek Austropyrgus Snail differs from other members in its group (Hydrobiid snails) in the following combination of characters: the shell is small (2.2 - 2.5mm in height) with a convex spire outline and convex whorls; the aperture is slightly disjunct; the seminal receptacle is at the anterior edge of bursa copulatrix and its duct long. Smith and Kershaw (1979) also note that the operculum of the species has a prominent three-pronged peg-like process on one side. Gabriel (1939) described the shell colour of the species as brown and provided an image (as *Bythinella grampianensis*). A detailed description of this species is provided by Clark et. al. (2003).

No detailed studies on the biology of these animals have been undertaken to date. However, casual observation by mollusc observers suggests that at least some species of *Austropyrgus* may breed throughout much of the year (due to the presence of egg capsules and juveniles of various sizes at different times of the year) and because their reproductive systems usually appear to be mature irrespective of the season (Clark et al. 2003). Freshwater Hydrobiidae species feed mainly on Cyanobacteria (blue-green algae) and other bacteria. Typically the sexes of Hydrobiidae species are separate and egg capsules are laid. Hydrobiid females lay small bundles of eggs, sometimes in mucus and sand grain capsules. Capsules are laid throughout the year. Adult size is reached only three to four months after hatching but may take up to one year when the temperature is low, e.g. highland areas. Development, growth rate and egg production increase with rising temperature so hydrobiid snails live longer at low temperatures (MDFRC 2018). All species have an operculum as a means of protection against desiccation and defence; however, individuals do not survive long out of water, often dying within an hour.

Generation Length

The generation length of *A. grampianensis* is estimated to be 1 to 3 years. Hyrodbiid snails mature in a few months in ideal conditions, but take longer in cooler weather and unsuitable conditions. Some hyrobiid species are known to take up to 3 years to mature and may live up to 5 years in the wild. Adult snails are defined as those described as at 'terminal growth' (Ponder and Clark 1990).

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Distribution

A. grampianensis is currently known only from two small creeks (Dairy and Jimmy Creeks near Silverband Falls) in the Grampians, where it typically occurs on leaves, weeds, roots and stones (Clark et. al. 2003). Smith (1992) describes the distribution of the taxon as 'south-east coastal, Murray-Darling basin'.

Habitat

Smith (1992) describes the taxon as lotic freshwater. Smith and Kershaw (1979) described the habitat (for *Pupiphryx grampianensis*) as under stones in fast flowing freshwater creeks and rivers.

Threats

All localities where the taxon has been recorded appear to be within or close to the boundary of a conservation reserve (Grampians National Park). No specific threats on the taxon have been formally identified but the extremely localised distribution to a handful of freshwater streams over a limited area in the Grampians means the taxon is potentially threatened by stochastic events. Any change in water quality (turbidity, temperature, pollution etc) could be to the detriment of the species. Long-term permanency of habitat is critical, and the existence of many taxa of freshwater hydrobiid snails is highly dependent on local hydrological conditions and/or rainfall, water chemistry, geology and the structure of the non-aquatic environment. (Ponder & Colgan 2002).

Narrow-range hydrobiid diversity is concentrated in parts of south-eastern Australia (including Tasmania, and in artesian springs associated with the Great Artesian Basin). These areas of high diversity unfortunately largely coincide with some of the least protected areas. Human-induced changes to habitat will undoubtedly threaten the viability of highly localised taxa or populations. The loss or fragmentation of suitable habitat may have caused the extinction of some taxa or may be contributing to the accelerated differentiation of some populations (Ponder and Colgan 2002).The taxon may also be vulnerable from interspecific competition and displacement by other species.

A. grampianensis is potentially vulnerable to population decline resulting from activities which lead to an alteration in habitat water quality. The rarity of the taxon over a small area also makes it prone to the impacts of man-made and stochastic events. Additional possible threats are reduction in flows of stream habitat, impairment to habitat, population pressures and the impacts of climate change.

IUCN Criteria

Criterion A. Population size reduction.
Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4

	Critically Endangered	Endangered	Vulnerable
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3, A4	≥ 80%	≥ 50%	≥ 30%

A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.

A2 Population reduction observed, estimated, inferred or suspected in the past where the causes of the reduction may not have ceased OR may not be understood OR may not be reversible.

A3 Population reduction, projected or suspected to be met in the future (up to a maximum of 100 years) [(*a*) *cannot be used for A3*]

A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

based on any of the following:

(a) direct observation [*except A3*]

(b) an index of abundance appropriate to the taxon

(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat

(d) actual or potential levels of exploitation

(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites

Evidence:

Ineligible under Criterion A

There is insufficient evidence to determine whether there has been or will be a reduction in population sufficient to meet any threshold for Criterion A.

Criterion B. Geographic range in the form of either B1 (extent of occurrence) and/or B2 (area of occupancy			
	Critically Endangered Very restricted	Endangered Restricted	Vulnerable Limited
B1. Extent of occurrence (EOO)	< 100 km²	< 5,000 km²	< 20,000 km²
B2. Area of occupancy (AOO)	< 10 km²	< 500 km²	< 2,000 km²
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented OR Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals			
(c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals			

Evidence:

Eligible under Criterion B1 as Critically Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 38 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas.

The taxon is estimated to be severely fragmented. Freshwater hydrobiid snails have little intrinsic ability to disperse outside their immediate habitat and opportunities for accidental dispersal are limited (Ponder & Colgan 2002). Dispersal success is apparently related to habitat, including factors such as size and riparian vegetation and canopy, as well as proximity to other populations and the intrinsic behaviour of the snails' (Ponder and Colgan 2002).

It is inferred to have a continuing decline in (iii) above. Despite the two known subpopulations being within the Grampians National Park, the habitat highly dependent on local hydrological conditions and/or rainfall, water chemistry, geology and the structure of the non-aquatic environment. Sympathetic management cannot be guaranteed in terms of appropriate water regimes and riparian habitats as well as water quality.

Criterion C. Small Population size and decline				
		Critically Endangered	Endangered	Vulnerable
Number of mature individuals		< 250	< 2,500	< 10,000
AND at least one of C1 or C2				
C1	An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
C2	An observed, estimated, projected or inferred continuing decline AND least 1 of the following 3 conditions:			
(a)	(i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
	(ii) % of mature individuals in one subpopulation =	90 – 100%	95 – 100%	100%
(b) Extreme fluctuations in the number of mature individuals				

Evidence:

Ineligible under Criterion C as Data Deficient

As the species lives in stream habitat and no taxon-specific surveys have been undertaken, the number of mature individuals in the population is unknown (though it is thought to be locally common).

Criterion D. Very small or restricted population			
	Critically Endangered	Endangered	Vulnerable
Number of mature individuals (observed or estimated)	<·50	<·250	<·1,000
D2 Only applies to the VU category Restricted area of occupancy or number of locations with a plausible future threat that could drive the species to critically endangered or Extinct in a very short time.	-	-	D2. Typically: AoO <·20 km2 or number of locations ≤·5

Evidence:

Eligible under criterion D2 as Vulnerable

The taxon is estimated to be very restricted.

Criterion E (Quantitative Analysis) was not addressed as the taxon does not have a detailed Population Viability Analysis.

References

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