Threatened Species Assessment

Galaxias terenasus
Roundsnout Galaxias

Taxonomy

Galaxias terenasus Raadik, 2014

Recent ongoing work (Raadik unpublished) has indicated that the populations of this taxon in the Cann River system are genetically very divergent to those in the Genoa River and may be a separate but undescribed species. More genetic and morphological taxonomic work is required to resolve this, and until then, the Cann River populations are considered be *Galaxias terenasus*.

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 2014).

Categorised as Endangered in the 2013 Advisory list of threatened vertebrate fauna in Victoria (DSE 2013).

Proposed conservation status

Critically Endangered in Victoria

Criteria A2ace+3ce+4ace; B1ab(i,ii,iii,iv,v)

Species Information

Description and Life History

The taxon is confined to freshwater and is considered not to undertake diadromous migrations. It has been collected at densities ranging from < 0.1-1.5 fish/m^2 and found with the native fish species Short-finned Eel, Long-finned Eel (*Anguilla reinhardtii*), Eastern Smelt *(Retropinna* sp.), and River Blackfish, the native decapod crustaceans Common Freshwater Shrimp (*Paratya australiensis)*, East Gippsland Spiny Crayfish (*Euastacus bidawalus*) and Variable Spiny Crayfish (*E. yanga*), and a native bivalve mollusc *(Hyridella* sp.). It is also occasionally recorded with the alien species Brown Trout, though probably occupies a discrete micro-habitat in these situations: usually, in smaller systems, Roundsnout Galaxias cannot coexist with trout.

The spawning period is unknown, though possibly spring to early summer, or earlier in the Snowy River catchment. An adult female collected in mid-September from Back Creek was gravid and close to spawning (i.e. a swollen vent), and fish from White Rock River were spawning in the middle of December, though both sexes from the Delegate River system were well developed to ripe in June. Fish were at an early stage of gonad development during January-February. The smallest presumed 0+ age fish recorded (16.7 mm LCF) was collected from Back Creek in mid-December; and juvenile fish 20.2-24.7 mm LCF were recorded from Church Creek in November; 23.7 mm LCF from White Rock River in mid-January, and 26.4 mm LCF from Maclaughlin River in February. Fish in the length range 16.7-24.8 had a keel present on the ventral midline, extending from the pectoral fin based posteriorly to anus. The smallest fish which could be reliably sexed were a female at 35.1 mm LCF (White Rock River, Genoa catchment) and a male at 42.4 mm LCF (Little River, Goulburn River system), though males, as in other species of Galaxias, are considered to mature at a smaller size than females. Roundsnout Galaxias is therefore considered to become sexually mature at about 30-35 mm LCF. Fecundity is low; gravid females (52-63 mm LCF) were recorded with 220-240, relatively small (1.2 mm average diameter), unshed eggs.

Generation Length

The generation length of the Roundsnout Galaxias is estimated to be 3 to 4 years. This is based on data from *Galaxias olidus,* a closely related species (Raadik 2011).

Distribution

The taxon is found in the very south-east corner of south-east mainland Australia. In NSW it is restricted to the Bombala/Delegate River system and the upper Genoa/White Rock river system. In Victoria, it is restricted to the Genoa River just downstream of the Victoria/NSW border, and in the mid to upper Cann River system.

As trout are abundant in the stream reaches between the two Cann River system sites for this taxon, it is considered that it is highly unlikely that there is any movement of galaxiids between them. Further, the Genoa River site is in a separate stream system which has no freshwater connection with the Cann River.

There has been a major recent (2015-2017) loss of the taxon from Buldah Creek (second largest known population), due to trout predation. Other previous populations in the Cann River and lower Buldah Creek near Buldah are also extinct.

Habitat

The taxon is typically recorded from clear water in slow to moderately flowing creeks to large rivers (1.0-12.0 m average width and 0.1-0.6 m average depth), flowing through light to heavily forested (and shaded) catchments, consisting predominantly of pools, glides and riffles with smaller areas of still backwaters. It is also recorded from modified streams in areas almost completely cleared for grazing. Substrate usually consists of bedrock, boulder, cobble and coarse sand with smaller amounts of pebble, gravel and silt. Instream cover is typically provided predominantly by rock, timber debris, and smaller amounts of aquatic vegetation, leaf litter and bank and vegetation overhang. Average pool depth ranged from 0.2 to 1.8 m.

Threats

This taxon is one of a group of endemic galaxiids occurring in Victoria's eastern foothills and mountains. These taxa share ecological and habitat similarities that lead to a common suite of actual or potential threats. These taxa occur typically in small, isolated populations with limited geneflow. This may limit their adaptability to changing conditions associated with climate change.

The main threat to this taxon is invasion by Brown Trout (*Salmo trutta*) and Rainbow Trout (*Oncorhynchus mykiss*). Trout predation and competition are extreme risks and are likely to rapidly extirpate the entire population.

Other threats include fire (sedimentation, post-fire debris flow during high intensity rainfall events), severe weather events (droughts, floods), fire suppression impacts such as the use of fire retardant and increased sedimentation following disturbance from machinery, climate change and reduced water flows, and other forest management operations including road and firebreak construction and maintenance, especially at stream crossings. It is estimated that 98% of the catchments occupied by the Roundsnout Galaxias was impacted by the 2019-20 bushfires (DELWP 2020). The full impacts of the bushfires are yet to be established. All subpopulations are very small, and therefore vulnerable to stochastic events.

Spatial analysis of catchments occupied by the Roundsnout Galaxias across all land tenures indicates that 100% occurs within the Comprehensive, Adequate and Representative (CAR) reserve system, including parks and reserves and special protection zones in State forest.

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:

Eligible under Criterion A2 as Critically Endangered

The population reduction over the past 10 to 12 years is estimated to be 75 to 95%, based on (a), (c) and (e) above.

The reduction is based on coarse survey data and reduction in water level and fish abundance.

Eligible under Criterion A3 as Critically Endangered

The population reduction over the next 10 to 12 years is projected to be 100%, based on (c) and (e) above.

Future population decline to extinction is based on limited recruitment, low genetic variability, the continuing threat of trout invasion and continuing impacts from fire and drought on the extremely small remaining population.

Eligible under Criterion A4 as Critically Endangered

The population reduction over any 10 to 12 year period, including both past and future, is estimated to be greater than 95%, based on (a), (c) and (e) above.

Past reduction is based on intensive survey data and reduction in water level and fish abundance. Future decline is based on the likelihood that the known threats will continue to impact the taxon to the point of extinction.

The causes of the reduction may not have ceased, be understood or be reversible.

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 83 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA).

The taxon is estimated to be severely fragmented. All subpopulations are relatively small and at risk from ongoing alien predator invasion, climate change and reduced stream flow, increased bushfire and instream sedimentation, such that there is increased extinction risk and little or no probability of recolonisation should they become extinct.

It is estimated to have one location, as all key identified threats apply across its range and can rapidly affect all individuals of the taxon present.

It has a continuing decline in (i), (ii), (iii), (iv) and (v) above. There has been a major recent (2015-2017) loss of the taxon from Buldah Creek (second largest known population) due to trout predation. Other previous populations in the Cann River and lower Buldah Creek near Buldah are also extinct.

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 12 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA, and intensive field sampling. As above, it has one location and has a continuing decline in (i), (ii), (iii), (iv) and (v) above.

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:

Eligible under Criterion C1 as Vulnerable

It is estimated that there are 2,520 to 3,500 (midpoint 2,935) mature individuals. This is based on extrapolation from annual monitoring point data.

There is estimated to be a continuing decline of 100% within three generations.

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

DELWP (2020) *Victoria's bushfire emergency: biodiversity response and recovery.* Preliminary report - Version 2. Department of Environment, Land, Water and Planning. East Melbourne.

DSE (2013) *Advisory List of Threatened Vertebrate Fauna in Victoria 2013.* Department of Sustainability and Environment, East Melbourne. (Retrieved from https://www.environment.vic.gov.au/__data/assets/pdf_file/0014/50450/Advisory-List-of-Threatened-Vertebrate-Fauna_FINAL-2013.pdf)

Raadik, T.A. (2011). Systematic revision of the Mountain Galaxias *Galaxias olidus* Günther, 1866 species complex (Teleostei: Galaxiidae) in eastern Australia. PhD Thesis, University of Canberra, Canberra.

Raadik, T.A. Unpublished survey data from 2002-2018.

Raadik, T.A. (2014). Fifteen from one: a revision of the *Galaxias olidus* Günther, 1866 complex (Teleostei, Galaxiidae) in south-eastern Australia recognises three previously described taxa and describes 12 new species. *Zootaxa* 3898 (1), 1-198.

SAC (2014). Flora and Fauna Guarantee Scientific Advisory Committee Final recommendation on a nomination for listing. Nomination No. 848 Roundsnout Galaxias *Galaxias terenasus*.