

Galaxias lanceolatus Tapered Galaxias

Taxonomy

Galaxias lanceolatus Raadik, 2014

Current conservation status

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

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

Proposed conservation status

Critically Endangered in Australia

Criteria A2abc+3ce+4ce; B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v)

Species Information

Description and Life History

The taxon is confined to freshwater and considered not to undertake diadromous migrations. Recorded at densities of 0.01-0.9 fish/m² and collected with the native species Broad-finned Galaxias, Short-finned Eel, Central Highlands Spiny Crayfish, Gippsland Spiny Crayfish and Common Freshwater Shrimp. The spawning period is unknown, though possibly late winter to spring: the majority of fish collected in early May were at a mature stage of gonad development (gonads filling nearly entire body cavity) with some males running ripe (Raadik and Nicol 2013). The smallest presumed 0+ age fish recorded in early November 1998 was 23 mm LCF (9 fish in length range 23-26 mm LCF), and the smallest fish collected in late February 2002 was 43.0 mm LCF (NMV A.30552-1).

Generation Length

The generation length of Tapered Galaxias is estimated to be 3 to 4 years. This estimate is based on data for *Galaxias olidus*, a closely related species.

Distribution

The taxon is only known from the headwater reaches of Stoney Creek, a tributary of the Thompson River in west Gippsland, Victoria (Raadik & Nicol 2013), at an elevational range of 340-545 m asl, upstream of a waterfall with trout below. It is confined to a 10 km reach of stream (~0.75 m average width) commencing about 1.5 km (river distance) downstream from the source, which is at 690 m asl, draining a catchment area of approximately 26 km².

Habitat

The taxon was recorded from a cool, small (0.5-1.5 m), shallow (0.1-0.5 m), clear and slow-flowing, partly shaded freshwater creek in a forested catchment. The substrate consisted predominantly of cobbles, with some gravel, bedrock and sand, and instream cover was provided mostly by rock, and by small amounts of undercut banks, timber debris and vegetation overhang.

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.

Forestry operations continue in parts of the range of this taxon. Spatial analysis of catchments occupied by the Tapered Galaxias across all land tenures indicates that 8% occurs within the Comprehensive, Adequate and Representative (CAR) reserve system, including parks and reserves and special protection zones in State forest. Further areas are excluded from harvesting by prescription under the Victorian Code of Practice for Timber Production 2014 (the Code). No species-specific protections for the Tapered Galaxias are included in the Code. However, other more general prescriptions such as protection and buffering of waterways provide protection from forestry operations. In recent years, modified harvesting and forest regeneration practices have been implemented in native forest that are designed to further mitigate the potential threat from forestry operations to threatened species and their habitats.

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%

<p>A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.</p> <p>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.</p> <p>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]</p> <p>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.</p>	<p>based on any of the following:</p>	<p>(a) direct observation [except A3]</p> <p>(b) an index of abundance appropriate to the taxon</p> <p>(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat</p> <p>(d) actual or potential levels of exploitation</p> <p>(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites</p>
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Evidence:

Eligible under Criterion A2 as Critically Endangered

The population reduction over the past 10 to 12 years is estimated to be 85 to 95%, based on (a), (b) and (c) above.

This is based on coarse survey data, and reductions in water level and surveys of fish abundance.

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

Eligible under Criterion A3 as Critically Endangered

The population reduction over the next 10 to 12 years is projected to be greater than 95%, based on (c) and (e) above.

Extinction is likely, based on the assumption that the known threats will continue to impact the taxon.

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 (c) and (e) above. The causes of reduction may not have ceased, be understood or be reversible.

Past reduction is based on coarse 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.

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 km ²	< 5,000 km ²	< 20,000 km ²
B2. Area of occupancy (AOO)	< 10 km ²	< 500 km ²	< 2,000 km ²
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 8 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA). The EoO has been made equal to the AoO to ensure consistency with the definition of AoO as an area within the EoO.

It is estimated to have one location. The main threats to the taxon (i.e. trout predation, extreme events such as fire, flood and drought, increased sedimentation) have a non-reversible impact on the individuals of the taxon and have the potential over time to threaten most individuals. Both subpopulations are geographically very close and the main threats are expected to impact both.

Galaxias aequipinnis

East Gippsland Galaxias

It has a continuing decline in (i), (ii), (iii), (iv) and (v) above, based on the assumption that the known threats will continue to impact the taxon over the current ten year period, and may intensify in the longer term.

Eligible under Criterion B2 as Critically Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 8 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA, an also an extrapolation based on repeated field sampling. As above, it is estimated to have 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 Endangered

It is estimated that there are 400 to 800 (midpoint 600) mature individuals. This is based on extrapolation from annual monitoring point data.

There is estimated to be a continuing decline of 80% within two generations.

Eligible under Criterion C2 as Endangered

It is estimated that there are 400 to 800 (midpoint 600) mature individuals. There is a projected continuing decline, and all of the mature individuals (100%) are in the one subpopulation.

Criterion D. Very small or restricted population ^a		Critically Endangered ^a	Endangered ^a	Vulnerable ^a
Number of mature individuals (observed or estimated) ^a		< 50 ^a	< 250 ^a	< 1,000 ^a
D2. Only applies to the VU category ^f 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. ^a		- ^a	- ^a	D2. Typically: ^f AoO < 20 km ² or number of locations ≤ 5 ^a

Evidence:

Eligible under criterion D as Vulnerable

It is estimated that there are 400 to 800 (midpoint 600) individuals, and 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

- 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. (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.
- Raadik, T.A. (2016). Galaxias species complex in eastern Victoria (east of the Hume Highway) - information and advice to the Forest Industry Taskforce. Unpublished client report, Arthur Rylah Institute for Environmental Research, Department of Environment, Land, Water and Planning, Heidelberg, Victoria. 35 pp.
- Raadik, T.A. and Nicol, M.D. (2013). Searching for threatened upland galaxiids (Teleostei, Galaxiidae) in the Thomson and La Trobe river catchments, West Gippsland, Victoria. *Arthur Rylah Institute for Environmental Research Technical Report* 248. Department of Environment and Natural Resources, Heidelberg, Victoria.
- SAC (2014). Flora and Fauna Guarantee Scientific Advisory Committee Final recommendation on a nomination for listing. Nomination No. 835 Tapered Galaxias - *Galaxias lanceolatus*.