FLORA & FAUNA
GUARANTEE

Nomination No. 892
Taxon ID 903498

FLORA AND FAUNA GUARANTEE - SCIENTIFIC ADVISORY COMMITTEE

FINAL RECOMMENDATION ON A NOMINATION FOR LISTING

***Galaxias* sp. nov. 'Yalmy' -** Yalmy Galaxias

DOCID107-417469679-742

Date of receipt of nomination: 27 September 2020

Date of preliminary recommendation: 20 October 2021

Date of final recommendation: 21 January 2022

Validity: The nomination is for a valid item.

Prescribed Information: The prescribed information was provided.

Name of the Nominator is adequately provided.

Name of the Item is adequately provided.

The nominated taxon is accepted by the Scientific Advisory Committee (SAC) as a valid taxon. The taxon is accepted by Dr T.A. Raadik (Research Associate, Museum Victoria, taxonomist and expert in Australian Galaxiidae taxonomy) and Dr Martin Gomon, (Curator, Fishes, Museum Victoria). Voucher specimens have been lodged at Museum Victoria (NMV A 30569-002 Galaxias sp. nov. 'Yalmy')."

This taxon is a recently identified putative new species within the *Galaxias olidus* species complex (sensu Raadik 2014). Allozyme genetic results (2017) now support this taxon as a new species, with morphological analysis underway, to be followed by formal description as a new taxon (Raadik unpublished data, Raadik 2014).

Current conservation status

The nominated taxon is not currently listed as threatened in Victoria.

The nominated taxon was listed as 'Critically Endangered' in Australia by the International Union for Conservation of Nature (IUCN) in 2019 (Raadik 2019).

Eligibility for listing as a taxon under the Flora and Fauna Guarantee Act 1988

The Scientific Advisory Committee has assessed the eligibility of this nomination based on its extinction risk within Australia (as the species is endemic to Victoria) in accordance with Section 16C(4)(c) of the *Flora and Fauna Guarantee Act 1988* (the FFG Act) and the criteria for determining eligibility for listing prescribed in the Flora and Fauna Guarantee Regulations 2020. In its application of the relevant eligibility criteria, the SAC has, as required by the nationally adopted Common Assessment Method, had regard to the *IUCN Red List Categories and Criteria (Version 3.1)* and the *Guidelines for Using the IUCN Red List Categories and Criteria (version14, 2019).*

Species information

Description, Life History, Generation Length

The Yalmy Galaxias is a small (to 80mm total length), scaleless fusiform freshwater fish. The taxon is genetically (fixed allozyme differences), phenotypically and ecologically distinct from the closely related Mountain Galaxias (*Galaxias olidus*) and McDowall's Galaxias (*Galaxias mcdowalli*) (Raadik 2014). This species is distinguished from McDowall's Galaxias and other species in the *Galaxias olidus* species complex, by multiple characters: a distinctive orange-brown body colouration with

brown to dark grey blotches/bands on the dorsal and lateral surfaces, a degree of setback of the origin of the anal fin from that of the dorsal fin, large eyes, seven pelvic fin rays (eight rays in *G. mcdowalli*), a long caudal peduncle and the unique shape of the snout and jaws, including thick fleshy lips. Further, the species has a unique swimming style, usually laying on the substrate then darting very rapidly through the water column. The spawning period is unknown, though possibly late spring to summer: as fish collected in late February/early March were at an early stage of gonad development, though a male (74.2 mm LCF) appeared to be almost ripe (NMV A.30572-2), and the smallest presumed 0+ age fish recorded (33.9 mm LCF) was collected in early March (NMV A.30574-1).

The generation length for this taxon is unknown but is assumed to be 3 years based on data for *Galaxias olidus*, a closely related and sympatric species (Raadik 2019).

Distribution

This species is only known from the mid-reaches of the Yalmy River and Serpentine Creek, and the lower Rodger River, partly within the Snowy River National Park, Victoria, at an elevational range of 140–250 m asl. It is known from a 9.0 km reach of stream (~3.0 m average width). This species is restricted to a very short section of foothill stream in one system (single small population), and therefore has a small Extent of Occurrence (EoO) (Raadik 2019, Raadik and Nicol 2015, Raadik 2016). Most recent survey data indicates a further reduction in distribution (relative to prior distribution estimates undertaken in the 1990s) due to post-fire sedimentation leading to fragmentation and severe habitat reduction (Raadik 2021 unpublished data).

Habitat

The Yalmy Galaxias has been recorded from cool to warm streams (2.0-5.5 m wide) in a forested catchment which are shallow, clear and flowing, and partly shaded. The substrate consists predominantly of cobbles (Raadik 2019). The species appears to be a habitat specialist, as juveniles and adults are found among the substrate on the stream bed. They favour very fast flowing areas and are absent from deeper pools or seemingly suitable habitat in areas of slower flowing water. Where streams are impacted by sediment and instream cover is minimal, the species can be very low in abundance and restricted to the few small patches of fast flowing riffle habitat in which the stream bed is not infilled with sediment. In these areas one, occasionally two, individuals are found in each patch, with this being considered a response to a decrease in overall suitable habitat due to sedimentation leading to a reduction in fish abundance. Young fish (age 0+) are present, swimming mid-water or near the surface and occasionally schooling. Adults are solitary and cryptic during the day and located on the stream bed among rocks (Raadik 2019).

Threats

The Yalmy Galaxias is also closely related to the FFG Act listed Barred Galaxias (*Galaxias fuscus*) (Raadik 2014) and faces similar threats. The primary threats to the Yalmy Galaxias are stochastic processes that cause instream sedimentation, reduced stream flow and reductions in habitat quality and quantity. Elevated stream sedimentation can be attributed to soil disturbance in the headwaters of the catchment, particularly due to post-fire rainfall events and potentially to timber harvesting operations. Predicted increasing fire frequency and severity (leading to occurrences of debris flow during high intensity post-fire rainfall events, rapid rise in water temperature and increased fish mortality due to lower water levels), and fire suppression activities (i.e., toxic retardants and sediment mobilization causing fish mortality) are escalating threats (Raadik 2019, Raadik & Nicol 2015, Raadik unpublished data). In January 2020, extensive bushfires burnt through the entire known distribution of the Yalmy Galaxias. Heavy rains following these fires have further threatened this species by washing ash, sediment and toxic chemicals into rivers and streams, and exacerbated additional habitat loss or degradation. These multiple threats cumulatively reduce habitat availability and structure and may see long-term changes imposed on stream geomorphology that precludes demographic recovery of the species.

Other potential threats include predation by alien trout (currently Brown Trout, but possibly also Rainbow Trout). Yalmy Galaxias are found only in reaches of streams at lower elevations and downstream of populations of trout. They do not persist in the presence of trout (Raadik unpublished data). There is a high risk of impact on the population from trout moving downstream during cooler periods and floods, particularly as the preferred habitat has been reduced by sedimentation, reducing the ability for Yalmy Galaxias to find shelter from predation (Raadik unpublished data).

Climate Change is predicted to lead to increased severity and frequency of drought (leading to a decrease in surface and groundwater quality and quantity/availability, loss of instream refuge habitats, increased water temperatures) and severe storms and flooding (leading to increased erosion, ecosystem disturbance and sediment input into streams, including opportunities for predator invasion through barrier down-out and new, temporary pathways) (Raadik 2019, Raadik and Nicol 2015, Raadik unpublished data).

Decision by the Scientific Advisory Committee

The eligibility of the nominated taxon (including the extinction risk and the category of threat that applies to the taxon) to be specified in the Threatened List must be determined in accordance with the eligibility criteria prescribed for the purposes of Division 2 of Part 3 of the FFG Act.

The relevant eligibility criteria are prescribed in Schedule 1 of the Flora and Fauna Guarantee Regulations 2020, which provides that a taxon is at risk of extinction in a particular category of threat if a primary criterion is met, and is therefore eligible to be specified in the Threatened List.

As required under the Intergovernmental Memorandum of Understanding - Agreement on a Common Assessment Method for Listing of Threatened Species (to which Victoria is a signatory), eligibility has also been assessed in accordance with the IUCN Red List Categories and Criteria (Version 3.1) and Guidelines for Using the IUCN Red List Categories and Criteria.

For details of the IUCN criteria see Appendix 1.

Criterion A – Population Size Reduction

Eligible as Critically Endangered under IUCN Criteria A2bce+3ce+4bce (FFG Primary Criterion 3.1 - Subcriterion 3.1.1)

Evidence:
Recent surveys since 2014 have identified a significant reduction in Yalmy Galaxias population size, of over 95% from 8.8 individuals/m^2 in 2015 to 0.07 and 0 individuals in 2020 and 2021 (Raadik unpublished data 2021). This is also consistent with a major reduction in the quantity and quality of habitat due to threats such as post-fire sedimentation and the effects of drought (Raadik pers. comm. 2021). The Threatened Species Recovery Hub (2021) estimate that the 2019-20 bushfires (and associated sedimentation) overlapped with approximately 92% of the Yalmy galaxias' distribution. The taxon is considered to have been historically more widespread in the Snowy River system, and the catchment has been significantly impacted over the past 20 years from recurring drought and fire (Raadik 2019).

Over the next 10 years, the population is projected to be further reduced by up to 95%. The population reduction over *any* 10-year period (including both past and future) is estimated to be 95% (DELWP unpublished). This is based on limited recruitment, low genetic variability and ongoing threats from sedimentation induced habitat loss, trout predation and climate change related impacts on the extremely small remaining population. These ongoing threats are likely to drive the taxon to extinction in the absence of appropriate, targeted management (DELWP unpublished, Raadik pers. comm 2021).

Criterion B – Geographic Range (Extent of Occurrence and Area of Occupancy)

Eligible as Critically Endangered under IUCN Criterion B1ab (i, ii, iii, iv, v) (FFG Primary Criterion 3.1 - Subcriterion 3.1.2 (a), (b) (i, ii, iii, iv, v))
Eligible as Endangered under IUCN Criterion B2ab (i, ii, iii, iv, v) (FFG Primary Criterion 4.1 - Subcriterion 4.1.2 (a), (b) (i, ii, iii, iv, v))

Evidence:

The Yalmy Galaxias is an extremely range restricted species and has been recorded only from the mid-reaches of the Yalmy River and Serpentine Creek, and the lower Rodger River (partly within the Snowy River National Park). Within this area, there is a single small population known from a 9.0 km reach of stream. It is therefore determined to have only one threat-based location, as all sites are very close to each other in the same stream system and would be impacted at the same time by the identified threats.

Raadik (2019) estimated the Extent of Occurrence (EoO) to be 16.6km^2 but this has been adjusted to match the Area of Occupancy (AoO) which is estimated to be 36km^2. Both the EoO and AoO are predicted to continue to decline into the future due to the ongoing (and in some cases, escalating) threats outlined above, and the habitat degradation that occurred after the Eastern Victorian fires in 2019–20.

The taxon appears to be a habitat specialist, found as juveniles and adults among substrate on the stream bed (cobbles), particularly in very fast flowing areas. It avoids deeper pools or habitat in areas of slow flow. This habitat preference is restricted within the range of the species and, as such, there is little flexibility for the species to utilise other areas if its

preferred habitat is impacted by threats such as sedimentation, trout invasion or reduced water flow during periods of drought. The area and quality of suitable habitat are predicted to decline due to the ongoing threats in the absence of appropriate, targeted management.

Criterion C – Small Population Size and Decline

Eligible as Critically Endangered under IUCN Criteria C1+2a (ii) (FFG Primary Criterion 3.1 - Subcriterion 3.1.3 (a), (b) (ii))

Evidence:
Raadik (2019) estimated the population size to be 1000 to 2000 mature individuals prior to the 2019-20 bushfires, based on extrapolation from annual monitoring point data, with all individuals in one subpopulation. The population has dramatically declined following the eastern Victorian fires in early 2020 with no evidence of recovery. Fish density within areas of suitable habitat is very low (Raadik and Nicol 2015) and no individuals were detected in the most recent 2021 survey (Raadik unpublished data). The number of mature individuals is predicted to continue to decline in the absence of targeted conservation actions or threat management. The projected continuing decline exceeds the Criterion C1 threshold of 25% within one generation (DELWP unpublished).

Criterion D – Very Small or Restricted Population
Eligible as Endangered under IUCN Criterion D (FFG Primary Criterion 4.1 - Subcriterion 4.1.4)

Evidence:
The Yalmy Galaxias is considered a single declining population. The most recent population estimates indicate the number of mature individuals is likely to be <200 (Threatened Species Recovery Hub 2021). It is known to only occupy specific habitat within a 9.0 km reach of stream and is estimated to have only one threat-based location.

Criterion E – Quantitative Analysis

Evidence: Insufficient data to determine eligibility.
Population viability analysis has not been undertaken. Therefore, there is insufficient information to determine the eligibility of the species for listing in any category under this criterion.

Documentation

The published information provided to and sourced by the SAC has been assessed. To the best of their knowledge, the SAC believes that the data presented are not the subject of scientific dispute and the inferences drawn are reasonable and well supported.

Advertisement for public comment
In accordance with the requirements of Section 16D of the FFG Act, the preliminary recommendation (PRR) was advertised for a period of at least 30 days.
The preliminary recommendation was advertised in:

- Victorian Government Gazette on 28 October 2021
- DELWP website
- DELWP social media

Public submissions closed on 28 November 2021

Additional Information considered by the Scientific Advisory Committee
Following publication of the PRR, the SAC received one submission, which supported the recommendation. In formulating its Final Recommendation on this item, the SAC has considered the submission and is not aware of any compelling evidence to warrant a change to the preliminary recommendation that the nominated taxon is eligible for listing.

Final Recommendation of the Scientific Advisory Committee

As outlined above, the nominated taxon satisfies at least one criterion of the set of criteria prepared and maintained under Division 2 of Part 3 of the FFG Act and stated in Schedule 1 of the Flora and Fauna Guarantee Regulations 2020.

The SAC concludes that on the evidence available, the nominated taxon is eligible for listing as Critically Endangered in Australia because Primary Criterion 3.1 – Subcriteria 3.1.1, 3.1.2 (a), (b) (i, ii, iii, iv, v) and 3.1.3 (a), (b) (ii) of the FFG Regulations 2020 have been satisfied (IUCN criteria A2bce+3ce+4bce, B1ab (i, ii, iii, iv, v) and C1+2a (ii)).

Critically Endangered, in relation to a taxon of flora or fauna, means that the taxon is facing an extremely high risk of extinction in the wild in the immediate future.

The Scientific Advisory Committee therefore makes a final recommendation that the nominated taxon be supported for listing as Critically Endangered in Australia under the Flora and Fauna Guarantee Act 1988.

Endorsement by the Convenor of the Scientific Advisory Committee **Date**

Dr. Michelle T. Casanova **21 January 2022**
Convenor

References:

DELWP (unpublished) RAMAS expert assessment of Yalmy Galaxias.

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): 001–198.

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.

Raadik, T.A. Unpublished survey data from 2002–2021.

Raadik, T.A. (2019) Galaxias sp. nov. 'Yalmy'. The IUCN Red List of Threatened Species 2019: e.T128972900A128972908. http://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T128972900A128972908.en

Raadik, T.A. and Nicol, M.D. (2015) Post-fire recovery of McDowall's Galaxias, and additional aquatic fauna, in East Gippsland 2014-2015. Client Report to Gippsland Region, DELWP. Arthur Rylah Institute for Environmental Research, Department of Environment, Land, Water and Planning, Heidelberg, 48 pp.

Threatened Species Recovery Hub (2021) Estimation of population declines caused by the 2019-20 fires, for conservation status assessment. Appendix 1. Unpublished report by Threatened Species Recovery Hub, Queensland.

In person communications

Raadik, T.A – Senior Research Scientist, aquatic fauna/native fish biologist, DELWP – ARI, Heidelberg.

Appendix 1: IUCN Red List Categories and Criteria

SUMMARY OF THE FIVE CRITERIA (A-E) USED TO EVALUATE IF A TAXON BELONGS IN AN IUCN RED LIST THREATENED CATEGORY (CRITICALLY ENDANGERED, ENDANGERED OR VULNERABLE).[1]

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 where the causes of the reduction are clearly reversible AND understood AND have ceased.

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

A3 Population reduction projected, inferred 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 (AOO), extent of occurrence (EOO) and/or habitat quality
(d) actual or potential levels of exploitation
(e) effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.

B. Geographic range in the form of either B1 (extent of occurrence) AND/OR B2 (area of occupancy)

	Critically Endangered	Endangered	Vulnerable
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			

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 at 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			

D. Very small or restricted population

	Critically Endangered	Endangered	Vulnerable
D. Number of mature individuals	< 50	< 250	**D1.** < 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 taxon to CR or EX in a very short time.	-	-	**D2.** typically: AOO < 20 km² or number of locations ≤ 5

E. Quantitative Analysis

	Critically Endangered	Endangered	Vulnerable
Indicating the probability of extinction in the wild to be:	≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)	≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥ 10% in 100 years

1 Use of this summary sheet requires full understanding of the *IUCN Red List Categories and Criteria* and *Guidelines for Using the IUCN Red List Categories and Criteria*. Please refer to both documents for explanations of terms and concepts used here.