Fisheries
Scientific
Committee

Final Determination

Short-tail Galaxias
Galaxias brevissimus

Assessment outcome CRITICALLY ENDANGERED
Category B1ab(iii, iv)

The Fisheries Scientific Committee, established under Part 7A of the *Fisheries Management Act 1994* (the Act), has assessed the ***Galaxias brevissimus*** **(Short-tail Galaxias)** under the Common Assessment Method and has determined that it is eligible to be listed as a **CRITICALLY ENDANGERED SPECIES** in Part 1 of Schedule 4 of the Act.

The Fisheries Scientific Committee, with reference to the criteria relevant to this species, prescribed by Part 16 of the Fisheries Management (General) Regulation 2019 (the Regulation) has assessed and determined that:

- The listing of CRITICALLY ENDANGERED is provided for by Part 7A, Division 2 of the FM Act.
- The assessment has been determined in accordance with the national Common Assessment Method (CAM), which provides a nationally consistent approach to the assessing and listing of threatened species in Australia.
- The assessment documentation below indicates the eligibility of the species for listing under both FM Act requirements and IUCN criteria as prescribed by the CAM.
- For more information about the CAM, visit https://www.awe.gov.au/environment/biodiversity/threatened/cam

Species information and status

a) Taxonomy

Galaxias brevissimus Raadik, 2014 (Raadik 2014)– Short-tail Galaxias (family Galaxiidae) is a valid, recognised taxon and is a species as defined in the Fisheries Management Act 1994.

Galaxias brevissimus was initially considered part of *Galaxias olidus* Günther, 1866. Genetic analysis found 15 genetically-defined candidate taxa which were then found to be morphologically discernible from each other (Raadik 2011, Adams *et al.* 2014). Consequently *G. olidus* sensu lato (s.l.) is now known to comprise a hyper-cryptic species complex of distinct species, all valid under multiple species concepts (Raadik 2014). This grouping of species is herein referred to as the '*Galaxias olidus* complex', or 'upland galaxiids'

b) Current conservation status

Jurisdiction	State / Territory in which the species is listed	Date listed or assessed (or N/A)	Listing category known
International (IUCN Red List)	IUCN	2019	Critically Endangered [A3ce, B1ab(i,ii,iii,iv,v)]
National (EPBC Act)	Not listed	Not listed	N/A
National (Australian Society for Fish Biology)	Not listed	2014	Critically Endangered
State / Territory	NSW: not listed	Not listed	N/A

c) Description of species

Galaxias brevissimus belongs to the Galaxiidae family, a widespread freshwater fish family of southern-temperate affinity (McDowall 2006, Raadik 2014). It is morphologically very similar to other species of the *Galaxias olidus* complex.

Galaxias brevissimus has an average length to caudal fork (LCF) of 70–75 mm but can grow to 97 mm, and has the shortest caudal peduncle and caudal fin compared to other members of the *G. olidus* complex (M. Lintermans, University of Canberra, unpublished data; Raadik 2014). The species is predominantly brown on the back and upper sides, overlain by small to moderately large, irregularly shaped, dark brown to black abundant blotches and spots (Raadik 2014).

Figure 1. *Galaxias brevissimus* (Tarmo A. Raadik)

d) Distribution of species

Galaxias brevissimus is known only from the upper reaches of the Tuross River system (above 900m ASL) in southern coastal New South Wales. There are four known localities of *G. brevissimus*. In each of these localities, the species is patchily distributed and known from only a limited number of sites.

The historic distribution of *G. brevissimus* is unknown but the species is considered to have been historically more widespread, extending a considerable distance further downstream in the Tuross River Catchment before predatory trout likely reduced and fragmented its range (Raadik 2014, Lintermans & Raadik 2019)..

Using all available observation records, the Extent of Occurrence (EOO, IUCN Standards and Petitions Committee 2022) of *G. brevissimus* is 29 km^2 and the Area of Occupancy (AOO, IUCN Standards and Petitions Committee 2022) is 24 km^2 (Figure 1), using the recommended 2 x 2 km grid methodology in GeoCAT (Bachman et al. 2011, IUCN Standards and Petitions Committee 2022).

e) Relevant biology/ecology of the species

The biology and ecology of *G. brevissimus* is not well known. However, it is recognised that the species will likely possess characteristics consistent with other species that comprise the *G. olidus* complex. For instance, *G. brevissimus* is a freshwater fish and like all species of the *G. olidus* complex, is not considered to undertake a diadromous migration (Berra 1973; M. Lintermans, University of Canberra, unpublished data). The generation length of the species is estimated at ~3 or 4 years (Lintermans & Raadik 2019) although information on age at maturity and longevity is unknown. Reproduction and spawning is largely unknown, but spawning is thought to occur in late winter or early spring as is documented for other species of the *G. olidus* complex (O'Connor & Koehn 1991, Shirley & Raadik 1997, Dexter et al. 2014, Raadik 2014). In support, spent individuals (indicating recent spawning) were observed during late winter 2021 at one locality (M. Lintermans, University of Canberra, unpublished data). Like other species in the *G. olidus* complex, spawning is suspected to occur on the underside of rocks in riffles where water flow ensures eggs remain clear of sediment and are well oxygenated (O'Connor & Koehn 1991, Raadik et al. 2010, Stoessel et al. 2015, Allan et al. 2021). Similar to *G. olidus,* the upper thermal tolerance (33 °C) anticipated to be impaired by reductions in dissolved oxygen and mild exposure to ash and sediment (Cramp et al. 2021; Mulvey 2021)

The diet of *G. brevissimus* is unknown, but it can confidently be assumed to be a macro-invertivore, as are other species of the *G. olidus* complex (Cadwallader et al. 1980, Closs 1994, Lintermans 2007). Insect fall from riparian vegetation can be an important dietary component for the closely-related *G. olidus* (Cadwallader et al. 1980) and this also may be the case for *G. brevissimus.*

f) Indigenous significance of the species

Galaxias brevissimus occurs within the country of the Ngarigo and Yuin (Walbanga) (AIATSIS 2021), but the cultural significance of the species is undocumented.

Given the acknowledged importance to Aboriginal peoples of Connection to Country and the widespread importance of Caring for Country (which includes biodiversity, ‘place’, custom and totemic elements) it is considered likely that the species has or is associated with some cultural and/or community significance. The significance of the ecological community, particular species, spiritual and other cultural values are diverse and varied for the many Indigenous peoples that live in the area and care for Country. Such knowledge may be only held by Indigenous groups and individuals who are the custodians of this knowledge.

g) Habitat requirements of the species

Galaxias brevissimus have been recorded from two differing stream types. The Jibolaro, Guinea and Lantooley creeks are generally narrow (0.5–3 m, occasionally to 5–6 m in Guinea Creek pools), gently flowing and of moderate turbidity and depths of up to 0.3–1.5 m (Figure 3). The species is predominantly found in pools connected by short sections of shallow riffles, the substrate is generally clay overlain by fine and coarse sand and sediment. Habitat at these localities has been highly modified through clearing for grazing and agriculture, which may influence instream habitat by reducing stream shading and increased sedimentation. Riparian vegetation at all three localities has been cleared and consists of pasture and tussock grass, with occasional patches of native Eucalypt forest. By comparison, Bumberry Creek is a narrow, moderate velocity stream flowing through a deeply-incised valley in a steep gradient native Eucalypt forest in Wadbilliga National Park. Here the stream substrate is dominated by bedrock/boulder/cobble with fine and coarse sand in shallow pools. Stream width and depth is 1–3.5 m and 0.15–0.75 m, respectively (M. Lintermans, University of Canberra, unpublished data). The preferred spawning habitat for this species is unknown.

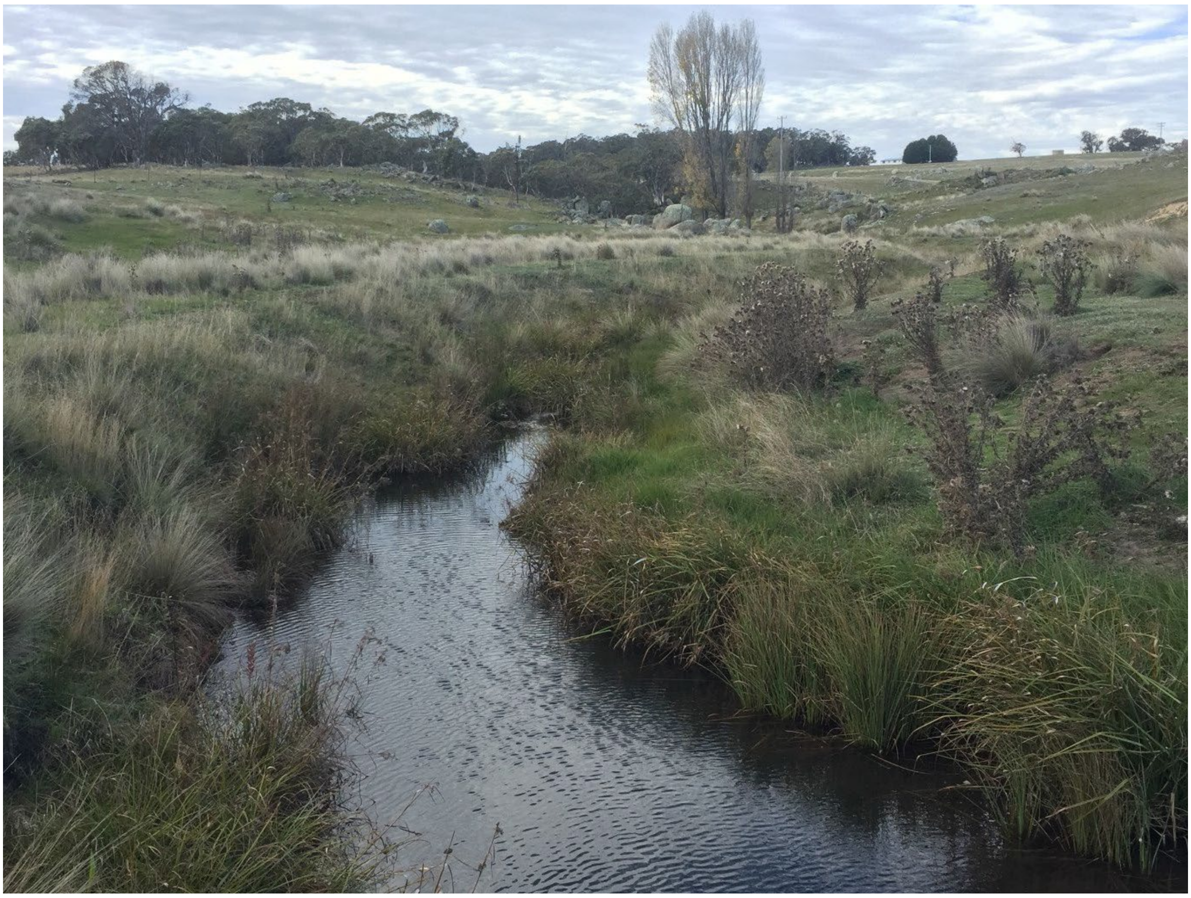

Figure 3. Representative habitat for *Galaxias brevissimus* © Copyright, Mark Lintermans.

h) Threats and level of risk to the species including assessment of threatening processes (under clause 238 of the Fisheries Management (General) Regulation 2019)

Galaxias brevissimus faces similar threats to other species in the mountain galaxias complex (Raadik 2014, Lintermans & Raadik 2019, Lintermans et al. 2020). Climate change induced intensification of bushfires, changes to water availability and extreme weather events represent emerging threats. The introduction and establishment of invasive salmonid fishes, particularly the Brown Trout (*Salmo trutta*) and Rainbow Trout (*Oncorhynchus mykiss*), into waterways that support the species, poses serious threat.

Threats		
Threat	Extent	Impact
Climate change		
Increased intensity and frequency of bushfires	**Status**: Current/Future **Confidence**: High **Consequence**: Severe **Trend**: Increasing **Extent**: Across entire range	The frequency and magnitude of bushfires is predicted to increase under climate change scenarios ((Di Virgilio et al. 2019). For the South East and Tableland region of NSW, average fire weather and severe fire weather days are projected to increase during summer and spring (NSW OEH 2014). Bushfires pose potentially devastating consequences for aquatic ecosystems and species (Gomez Isaza et al. 2022, Legge et al. 2022). Aquatic habitats within the fire footprint can alter the physiochemical properties of the water, including causing extreme temperature of the water in the small streams that these fish inhabit, leading to mortality of fish (Raadik et al. 2010). Storm events following fire usually result in significant inputs of ash and sediment to streams which severely impact aquatic habitats (Ward et al. unpublished data). Post-fire sedimentation can impact waterways 50–80 km downstream of the burnt area (Lyon & O'Connor 2008, Silva et al. 2020) and have severe effects on water quality and aquatic fauna including threatened fish and crayfish (Cramp et al. 2021, Legge et al. 2021, Gomez Isaza et al. 2022, Ward et al. unpub data). Ash and sediment inputs smother stream substrates, alter water chemistry, alters riparian shading and organic inputs. Post-fire rainfall impacts on aquatic habitats from

		high severity fire can significantly alter fish habitat and severely reduce local fish populations within a single generation. The spatial extent of the threat from fires is not fixed for any one fire, and will vary with ignition point, fuel loads, antecedent climatic conditions (e.g. rainfall/drought) and weather variables. The 2019-20 bushfires impacted the species, with Ward et al. (unpub data) predicting increased sedimentation over almost half of the range of *G. brevissimus*, and onground impacts were noted (M. Lintermans, University of Canberra, unpublished data) and emergency rescues were undertaken in some cases (Shelley et al. 2021) A single bushfire has the capacity to impact the entire population of this restricted range species, potentially leading to a population decline across the species' range, or extirpation of the species.
Increased and more severe droughts decrease habitat quality and availability	**Status**: Current/Future **Confidence**: Inferred **Consequence**: Severe **Trend**: Increasing **Extent**: Across entire range	For the South East and Tableland region of NSW, maximum annual temperature is expected to increase by 0.7°C in the near future (2020-39) and 2.1°C longer term (2060-79) (NSW OEH 2014). Furthermore, there will be more hot spells, severe weather and reduced rainfall in areas of the region (NSW OEH 2014). It is anticipated that this will result in increased and more severe droughts which will decrease the availability and quality of surface water. This will result in loss of instream refuge habitats and increased water temperatures (Raadik et al. 2010). Physiologically, species of the mountain galaxias complex are highly susceptible to such changes in water quality, with an upper thermal tolerance of approximately 33 °C (which declines with reductions in dissolved oxygen) (Mulvey 2021). It is anticipated that

		this will impose thermal stress on the species as well as impacting key life history processes, particularly when other threats are impacting (such as bushfires).
Invasive species		
Introduced salmonids (trout)	**Status**: Historical and Future **Confidence**: Inferred, but high confidence. Consequence: Severe **Trend**: Increasing **Extent**: Across all of the range	The introduction of predatory trout species is known to have significantly impacted galaxiid populations generally (see McDowall 2006) and is believed to have historically reduced the range of *G. brevissimus* (Adams et al. 2014, Lintermans & Raadik 2019). Trout species are known to prey upon on Galaxias species (Vidal et al. 2020). These impacts are anticipated to lead to rapid local extirpation with previous documented declines in galaxiid populations in montane areas following salmonid invasion occurring rapidly, with complete extirpation of *G. olidus* within 3 years of salmonid invasion (Tilzey 1976). Whilst trout species do not presently coexist with *G. brevissimus*, they have been recorded downstream of at least one known locality (H. Allan & M. Lintermans, University of Canberra, unpublished data; Lintermans & Raadik 2019). While there are some partial barriers to the upstream movement of trout species in the range of *G. brevissimus* (see Allan & Lintermans 2021) their behaviour under high flows remain unknown. Trout species continue to be stocked into areas within the same catchment where *G. brevissimus* occurs (NSW DPI Fisheries, stocking database). It is plausible that trout may be illegally stocked into or invade localities of the Tuross River Catchment that support *G.*

		brevissimus, If this occurred, population decline is anticipated to be rapid with local extirpation projected.
Habitat loss and modification		
Impacts of land clearing for agricultureon riparian vegetation and water quality.	**Status**: Historical and Future **Confidence**: Known **Consequence**: Moderate **Trend**: Unknown **Extent**: Most of the range.	Land clearing for agricultural grazing can result in the degradation and removal of stream habitat and vegetation utilised *by G. brevissimus*. Earthworks associated with these land use practices can include soil disturbance and removal or disturbance aquatic and overhanging vegetation. This can potentially lead to erosion, with increased sedimentation and, effluent runoff into waterways containing the species. Rainfall can exacerbate sedimentation and effluent runoff as less canopy and ground vegetation cover is available to capture/intercept rain. Declines in water quality via land clearing can have the similar impacts as that of bushfires (see that threat).

i) Eligibility against criteria

Assessment of the species reduction in abundance, geographic distribution or genetic diversity (under clause 271 of the Fisheries Management (General) Regulation 2019)

In 2015 the NSW Government signed an Intergovernmental Memorandum of Understanding on the Agreement on a Common Assessment Method for listing of threatened species and threatened ecological communities (the CAM). The CAM provides a nationally consistent approach to assessing and listing threatened species in Australia, using the IUCN Redlist Categories and Criteria (Version 3.1). To ensure that this Proposed Determination meets the requirements under the CAM, an assessment against the IUCN Redlist Categories and Criteria (Version 3.1) has been included. This assessment also reflects the requirements for listing species provided under clause 271 of the Fisheries Management (General) Regulation 2019. For more information on the CAM please visit
http://www.environment.gov.au/biodiversity/threatened/cam

<table>
<tr><th colspan="3">FSC assessment of eligibility against the criteria:</th></tr>
<tr><td>A</td><td>Population size reduction</td><td>
<table>
<tr><th colspan="4">Criterion 1. Population size reduction (reduction in total numbers)
Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4</th></tr>
<tr><td></td><td>Critically Endangered
Very severe reduction</td><td>Endangered
Severe reduction</td><td>Vulnerable
Substantial reduction</td></tr>
<tr><td>A1</td><td>≥ 90%</td><td>≥ 70%</td><td>≥ 50%</td></tr>
<tr><td>A2, A3, A4</td><td>≥ 80%</td><td>≥ 50%</td><td>≥ 30%</td></tr>
</table>

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.
ba se
(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

Category and criteria (or Data Deficient): Insufficient data.

Eligibility against the criteria: There is insufficient data to determine eligibility of *G. brevissimus* for listing under Criterion A.

There is some survey data that suggest population reduction in the species. For instance, at one site in Jibolaro Creek (Tuross Road Bridge), relative abundance was demonstrated to reduce by 100% between 2015 (50 individuals per seine haul) and 2021 (zero individuals) (M. Lintermans, University of Canberra, unpublished data). Similarly in Guinea Creek, relative abundance has also declined over time (M Lintermans, University of Canberra, unpublished data). Further survey effort is required to confirm these temporal trends.
In terms of subcriterion A3, it is projected that there will be a population reduction in the future due to the threat imposed on the species. Namely, a decline in AOO, EOO and quality of habitat
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is anticipated due to climate change as increasing temperatures and reduced moisture availability, as well as increased frequency and intensity of bushfires (NSW OEH 2014). Declines in habitat quality are projected, similar to those observed in Jibolaro and Guinea creeks between 2016–17 and 2020 as a result of drought and bushfire and subsequent rain events washing organic material into these streams (M. Lintermans, University of Canberra, unpublished data). Introduced trout species remain a threat, particularly as they continue to be stocked in the vicinity of localities that support *G. brevissimus* (NSW DPI Fisheries, stocking database).

A report by the National Environmental Science Programme (NESP) Threatened Species Recovery (TSR) Hub (Legge et al. 2021) estimated a future population decline of 41 percent in the *G. brevissimus* over the next three generations, within an estimated range of 21 to 76% (bound of 80 percent confidence limit). This was done using a structured expert elicitation process.

The observations of decline from field surveys and the results of the expert elicitation suggest the population is declining at a rate exceeding 30% in 10 years/three generations. However, the estimates of decline have high uncertainty, and it is concluded that there are insufficient data to assess changes in population size under the IUCN criteria

B

Geographic range

Criterion 2. Geographic distribution as indicators for either extent of occurrence AND/OR 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 indicating distribution is precarious for survival:			
(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			

Category and criteria (or Data Deficient): Critically Endangered B1ab(iii, iv).

Eligibility against the criteria: *Galaxias brevissimus* occurs across a restricted range in the Tuross River Catchment in New South Wales. The EOO was estimated at 29 km² and AOO at 24km² using the recommended 2 x 2 km grid methodology in GeoCAT (Bachman et al. 2011, IUCN Standards and Petitions Committee 2022). The EOO meets the threshold for Critically Endangered listing under B1 whereas the AOO of 24km² satisfies Endangered under criterion B2.

The species is only known from four localities across two, isolated subpopulations that are considered a single location.

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The species’ highly restricted distribution at one location leaves it highly vulnerable to extinction following a single stochastic event, with the most plausible threat being a severe bushfire. A single bushfire event has the potential to rapidly affect the entire population of this restricted range species, potentially leading to extinction of the species (IUCN 2019). Accordingly, the species satisfies subcriterion (a) for Critically Endangered listing.
This isolation increases the risk of extirpation of an individual subpopulation through environmental and demographic stochasticity (De Castro & Bolker 2005). Therefore, established, emergent, and future threats (consistent across species that once formed part of the G. olidus complex: TSSC 2021) could all potentially rapidly eliminate all specimens in the taxon. In particular, it is inferred that there will be a decline in area, extent and/or quality of habitat due to impacts of climate change (principally more frequent and intense bushfires and extreme weather events, increasing temperature, and trout inclusion) (NSW OEH 2014), which will result in declines in the number of mature individuals, thus satisfying subcriterion (b)(iii, iv).
The data presented above demonstrate that G. brevissimus meets the relevant elements of Criterion B to make it eligible for listing as Critically Endangered (B1ab(iii, iv)) under this criterion.
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<td>C</td>
<td>Small population size and decline</td>
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<table>
<tr><th colspan="4">Criterion 3. Population size and decline</th></tr>
<tr><td></td><td>Critically Endangered
Very low</td><td>Endangered
Low</td><td>Vulnerable
Limited</td></tr>
<tr><td>Estimated number of mature individuals</td><td>< 250</td><td>< 2,500</td><td>< 10,000</td></tr>
<tr><td colspan="4">AND either (C1) or (C2) is true</td></tr>
<tr><td>C1 An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future)</td><td>Very high rate
25% in 3 years or 1 generation
(whichever is longer)</td><td>High rate
20% in 5 years or 2 generation
(whichever is longer)</td><td>Substantial rate
10% in 10 years or 3 generations
(whichever is longer)</td></tr>
<tr><td>C2 An observed, estimated, projected or inferred continuing decline AND its geographic distribution is precarious for its survival based on at least 1 of the following 3 conditions:</td><td></td><td></td><td></td></tr>
<tr><td>(a) (i) Number of mature individuals in each subpopulation</td><td>≤ 50</td><td>≤ 250</td><td>≤ 1,000</td></tr>
<tr><td>(a) (ii) % of mature individuals in one subpopulation =</td><td>90 – 100%</td><td>95 – 100%</td><td>100%</td></tr>
<tr><td>(b) Extreme fluctuations in the number of mature individuals</td><td></td><td></td><td></td></tr>
</table>
Category and criteria (or Data Deficient): Insufficient data.
Eligibility against the criteria: There is insufficient information about the total number of mature individuals of this species or any data on the decline in the total number of mature individuals that will allow assessment of G. brevissimus for eligibility for listing under Criterion C.
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<td>DD</td>
<td>Very small or restricted population</td>
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<table>
<tr><th colspan="4">D. Very small or restricted population</th></tr>
<tr><th></th><th>Critically Endangered</th><th>Endangered</th><th>Vulnerable</th></tr>
<tr><td>D. Number of mature individuals</td><td>< 50</td><td>< 250</td><td>D1. < 1,000</td></tr>
<tr><td>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.</td><td>-</td><td>-</td><td>D2. typically:
AOO < 20 km² or
number of locations ≤ 5</td></tr>
</table>
Category and criteria (or Data Deficient): Insufficient data.

Eligibility against the criteria: The number of mature individuals of G. brevissimus is presently unknown, making assessment against Criterion D1 not possible.

The species occurs across a single location, and although AOO is (marginally) greater than 24 km², it is plausible that future threats could drive the species to Critically Endangered or Extinct in a very short time, and would satisfy the elements of Criterion D2 to make it eligible for listing as D2 Vulnerable.
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<td>E</td>
<td>Quantitative analysis</td>
<td>
<table>
<tr><th colspan="4">Criterion 5. Quantitative Analysis</th></tr>
<tr><th></th><th>Critically Endangered
Immediate future</th><th>Endangered
Near future</th><th>Vulnerable
Medium-term future</th></tr>
<tr><td>Indicating the probability of extinction in the wild to be:</td><td>≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)</td><td>≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)</td><td>≥ 10% in 100 years</td></tr>
</table>
Category and criteria (or Data Deficient): Insufficient data.

Eligibility against the criteria: A quantitative analysis of extinction risk has not been undertaken for the species. Therefore, there are insufficient data to demonstrate if G. brevissimus is eligible for listing in any category under this criterion.
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j) Fisheries Scientific Committee conclusion pursuant to Section 220F of the NSW Fisheries Management Act 1994:

It is the opinion of the NSW Fisheries Scientific Committee that *Galaxias brevissimus* is facing an extremely high extinction risk in New South Wales in the immediate future, as determined in accordance with criteria prescribed by the regulations.

237 Criteria—reduction in abundance, geographic distribution or genetic diversity

(1) It is observed, estimated, inferred or reasonably suspected that the species has undergone, or is likely to undergo, within a time frame appropriate to the life cycle and habitat characteristics of the taxon—

(a) for critically endangered species—an extremely large reduction in 1 or more of the following—

(i) an index of abundance appropriate to the taxon,

(ii) geographic distribution,

(iii) genetic diversity

The species is eligible to be listed as a CRITICALLY ENDANGERED SPECIES

k) Additional information

i Fisheries Scientific Committee Management Recommendations for *G. brevissimus*

Recommended management and research actions that will benefit the conservation of the species:

- Following fires, implement management responses where possible to prevent/reduce ash and sediment deposition into streams with post-fire rainfall.

- Consider physiological tolerances to post-fire changes in water temperature and water oxygen saturation as triggers for emergency extraction/relocation of fire-affected subpopulations.

- Carry out surveys to identify new populations of the species (to determine contemporary geographic range), to identify sites suitable for future translocations (predator-free or suitable if predators removed), and potential sites for trout barrier installation.

- Establish monitoring to track the trajectory of known populations.

- Extract a portion of each remaining population into ex situ captive management as an insurance against the extinction of the species in the wild.

- Population genetic analysis of current and new subpopulations, to inform genetic management of subpopulations and guide captive breeding and translocation plans.

- Evaluate trout stocking practices to lessen threat in relation to known subpopulations and potential translocation sites. Undertake predator (trout) removal, if present, from potential translocation sites.

- Assessment of all populations for security from trout incursion: implement annual predator detection and removal for less secure sites, and every 5 years (or following 1: 50-year rainfall events) at other locations.

- Development of a detailed captive breeding plan and undertake breeding.

- Development of a detailed translocation plan and undertake translocations to establish additional, viable populations to spread extinction risk (reintroduction or assisted colonisation) or to bolster populations (reinforcement).

- Study into the species’ ecology (reproduction, growth, longevity, habitat use, age, movement).

ii Priorities Action Statement

The NSW Department of Primary Industries Priorities Action Statement (PAS) is a statutory, non-regulatory document addressing each threatened species, population, ecological community and key threatening process (KTP) listed on the schedules of the *Fisheries Management Act 1994*. The PAS provides an agreed list of strategies and actions that will assist to down-grade or de-list species, populations and ecological communities from the threatened species schedules of the *Fisheries Management Act 1994*, as well as actions that will assist to abate or eliminate the impacts of KTPs.

The draft Priorities Action Statement for the *Galaxias brevissimus* is available on the NSW DPI Website at www.dpi.nsw.gov.au/fishing/threatened-species/priorities-action-statement

l) Statement on the standard of scientific evidence and adequacy of survey

This assessment has been prepared by the Fisheries Scientific Committee in good faith using the highest possible standard of scientific evidence and adequacy of survey.
As prescribed under Section 4 of the Intergovernmental MOU on the CAM, in preparing this documentation the Committee gave consideration to:
(i) the nature of the data, including adequacy of survey (occurrences) and monitoring (to detect change), including factors such as sampling design, effort applied, number of variables considered, proportion of a species' range covered, time period covered etc.;
(ii) the number of data sets relevant to the conclusion;
(iii) the range of uncertainty in the data and degree of consistency between different data sets;
(iv) the source of the data and its credibility; and
(v) the relevance of the data to the particular assessment criterion.

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