

Threatened Species Assessment

Galaxiella toourtkoourt Little Galaxias

Taxonomy

Galaxiella toourtkoourt Coleman & Raadik, 2015

A review of the Dwarf Galaxias (*Galaxiella pusilla*) in 2015 resulted in the description of two distinct species across what was previously considered one species. The revised distribution of *G. pusilla* s.s. has reduced its range by approximately 60% (Coleman et al. 2015). *G. pusilla* is now only known from the Mitchell River Basin near Bairnsdale, west to Dandenong Creek near Melbourne in Victoria, Flinders Island in Bass Strait and north-eastern and north-western Tasmania.

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* as *G. pusilla* (SAC 1991).

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

Proposed conservation status

Endangered in Victoria

Criteria A3bce+4bce; B2ab(i,iii,iv,v)

Species Information

Description and Life History

The taxon is a very small, scaleless and elongated native freshwater fish. Similar to other Galaxiids, the Dwarf Galaxias has a single dorsal fin situated well back commencing behind anal fin, distinguishing features include rounded caudal fin with fleshy flanges extending from the tail which almost join with the anal and dorsal fins. There are three black longitudinal stripes on each side of the body. In the spawning season males have a bright orange stripe between the middle and lower black stripes and females have a silvery-white stripe between the middle and lower dark stripes. Males range from 29-34mm whereas females range between 39-48mm.

The entire life cycle of the Little Galaxias is completed in freshwater. The spawning period is possibly during late autumn to spring, but may be variable (Beck 1985, Romanowski 2004) and where present, it can occur in high densities, although there may be substantial seasonal and inter-annual variability in population abundances (Romanowski 2004, Coleman et al. 2017). The female lays (singly) between 65-250 eggs. Spawning extends over several days with approximately 10 eggs laid per day. The female attaches the eggs usually to the underside of vegetation or hard surfaces like a leaf or stone. After the female has laid the eggs two or three males fertilise them and then search for more ripe females. The larvae take between two-three weeks to hatch and are approximately 2-4 mm in length. Adults are thought to die after spawning.

Although many of the floodplain habitats and small streams where this taxon is present undergo large seasonal and inter-annual fluctuation in water levels (e.g. droughts and severe floods) that can dramatically alter available habitat (Coleman 2014), large fluctuations in population densities associated with dynamic wetting and drying regimes, along with dispersal in floods, short lifespan and semelparity suggest a continual process of local extinction and recolonisation and a metapopulation structure (Coleman et al. 2017).

It has developed adaptations to surviving extended seasonal periods of habitat drying, aided via a capacity for air-breathing and the use of moisture retaining habitat features such as vegetation cover and crayfish burrows (Beck

1985, Romanowski 2004, Coleman et al. 2017). It is likely to exist within a metapopulation structure or a 'population of subpopulations', where persistence of the population as a whole is facilitated by multiple interconnected subpopulations. Wetting and drying cycles are also likely to be important for enhancing food resources and reducing competition and predation pressures (Romanowski 2004, Coleman et al. 2017).

Generation Length

The generation length of the Little Galaxias is inferred to be 1 year. This is based on the closely related *Galaxiella pusilla*.

Distribution

This recently-described Australian endemic species is known from freshwater systems in coastal south-eastern mainland Australia, from the upper Barwon River system near Barwon Downs, Victoria, west to the Cortina Lakes, upper south-east South Australia (Coleman et al. 2015).

Habitat

As detailed in Coleman et al. (2015), this is a freshwater taxon (occasionally found in inland slightly saline waters) that is generally found in swamps, wetlands, shallow lakes, billabongs, small creeks and artificial earthen drains at low elevation (mean 100 m asl, typically 22-176 m asl). Habitats are mostly shallow (mean maximum depth 1.1 m, typically 0.5-2.0 m), with still to low water velocities (or often backwaters in faster flowing conditions) and partial shading. The substrate tends to be dominated by fine clay and silt and occasionally coarser (particularly sand) with deposits of coarse particulate organic matter. Frequently captured where the vegetation cover is dense and consists primarily of emergent and submerged (mean 17 %, typically 0-23 % cover) aquatic species.

Measurements of water quality at the time of collection suggest that the taxon can withstand a broad range of conditions, being recorded at water temperatures of 5.2-26.9 degrees C, dissolved oxygen levels of 20-263 % saturation, pH of 5.3-9.3, and turbidity of 1-96 NTU.

Threats

The extent and quality of habitat for this taxon is expected to have been substantially reduced by widespread human activities across its range, such as wetland drainage, water extraction, construction of dams, levees, artificial channels, underground pipes, pollution, channel incision and widening (Saddler et al. 2010, Coleman 2014, Coleman et al. 2017). Conversely, too much hydrologic connectivity that permanently inundates habitats (such as from altered water drainage paths) may increase the rate and extent of predator and competitor dispersal and reduce productivity of habitats (Coleman 2014, Coleman et al. 2017). It is also likely that a warmer and drier future climate predicted for south-eastern Australia over the next few decades (CSIRO 2007), will reduce the extent and quality of habitat.

Habitat loss and fragmentation, drought, climate change and negative interactions with invasive fishes (particularly the Eastern Gambusia, *Gambusia holbrooki*), are considered major threats to the long-term survival of this taxon (Koster 2003, Saddler et al. 2010, Coleman et al. 2015, Coleman et al. 2017). The broad presence of Eastern Gambusia is also expected to have reduced the extent of occurrence and area of occupancy of the taxon.

The Little Galaxias is thought to be an annual taxon, where adults die after spawning. Therefore it is vital to have successful recruitment each year, or severe declines in populations will occur, potentially leading to the extinction in certain areas.

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. <i>based on any of the following:</i> (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 A3 as Endangered

The population reduction over the next 10 years is projected to be 30 to 50%, based on (b), (c) and (e) above.

This based on continuing impacts from climate change (drought, increased fire and sedimentation post-fire, and degradation and loss of habitat through agricultural development.

Eligible under Criterion A4 as Endangered

The population reduction over any 10 year period, including both past and future (up to 100 years in the future), is inferred to be 15 to 50%, based on (b), (c) and (e) above. The causes of 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 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 B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 436 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the Victorian Biodiversity Atlas. Records are also based on historical survey records from 2008 onwards e.g. Coleman et al. (2013); Bachmann et al. (2014).

It is projected to have 2 locations. It has a continuing decline in (i), (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 <u>C1</u> or <u>C2</u>				
<u>C1</u>	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)
<u>C2</u>	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

There is insufficient evidence to determine the number of mature individuals.

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 ^b 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: ^b AoO < 20 km ² or number of locations ≤ 5 ^a

Evidence:

Ineligible under Criterion D

There is insufficient evidence to determine the number of mature individuals.

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

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