Threatened Species Assessment

Galaxiella pusilla
Dwarf Galaxias

Taxonomy

Galaxiella pusilla (Mack, 1936)

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).

Current conservation status

Listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999*.

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

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

Proposed conservation status

Endangered in Australia

Criteria B2ab(i,ii,iii,iv,v)

Species Information

Description and Life History

The Dwarf Galaxias is a mid-water, free-swimming taxon. (McDowall 1978). The diet consists primarily of aquatic invertebrates including chironomid larvae, copepods, cladocerans, ostracods as well as terrestrial insects that fall on the water surface (Humphries 1986). The fish spawn in pairs, females laying 65-250 adhesive eggs, over a period of 7-14 days in late winter-spring (Massola 1938; Andrews 1976; Humphries 1986). Eggs (0.6-1.3 mm) are attached on the underside of leaves or stems of submerged and emergent aquatic vegetation (e.g. underside of *Persecaria* and *Crassula* spp. leaves, stems of *Myriophyllum* (Coleman pers comm. 2014) or on a hard surface such as rock or timber (Backhouse and Vanner 1978; Humphries 1986). Larvae hatch after 2-3 weeks and are about 4.5 mm in length (Bakehouse and Vanner 1978). The taxon is suggested to be predominantly annual, with adults dying soon after spawning (Humphries 1983; Humphries 1986).

Generation Length

The generation length of Dwarf Galaxias is suspected to be 12 months. The taxon is suggested to be predominantly annual, with adults dying soon after spawning (Humphries 1983; Humphries 1986).

Distribution

The taxon is endemic to temperate freshwaters of coastal south-eastern Australia, including Tasmania, from the Mitchell River Basin near Bairnsdale in eastern Victoria, westwards to south-east Melbourne, and Flinders Island in Bass Strait, and north-eastern and north-western Tasmania (Bray 2017).

Habitat

The Dwarf Galaxias typically occurs in well vegetated slow flowing, still, shallow temporary or permanent freshwater habitats including swamps, drains and backwaters of streams and creeks (Backhouse and Vanner 1978; McDowall and Frankenberg 1981). In larger pools, the taxon is commonly found amongst marginal

vegetation (Backhouse and Vanner 1978). Some wetlands may partially or completely dry during summer (Humphries 1986). For population replenishment, seasonal flooding and linkages to source sites where the species occurs with some permanency is often required. Dwarf galaxias are often found in association with burrowing freshwater crayfish *(Geocharax* sp.), the burrows of which are suggested to provide refuge in dry conditions (Beck 1985; McDowall 1996). It appears likely the Dwarf Galaxias in addition is capable of a form of aestivation (McDowall and Frankenberg 1981; Humphries 1983; Beck 1985; McDowall 1996; Littlejohn 2001, Romanowski 2004).

The natural degree of wetland connectivity to a more permanent waterbody (such as river, creek or deep wetland) is likely to be important to population persistence, particularly during extended dry conditions where such areas act as refuge.

Threats

It is estimated that 26.8%, or 191,000 hectares of Victorian wetlands have been lost due to drainage and modification of waterways (DCE 1992, Spiers 1999). The loss of the habitat has resulted in substantial fragmentation, isolation and depletion of Dwarf Galaxias populations. Remnant populations are as a result vulnerable to local threatening processes, particularly as reduced flooding and loss of habitat has reduced the taxon's ability to recolonise 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%

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 Vulnerable

The population reduction over the past 10 years is estimated to be 15 to 30%, based on (c) and (e) above.

Given that ~30%, or 191,000 hectares of Victorian wetlands have been lost due to drainage and modification (DCE 1992, Spiers 1999) it is reasonable to assume that, due to wetlands being core habitat for Dwarf Galaxias, that numbers have suffered a similar decline. The decline has also likely been exacerbated by the Millennium Drought, and ongoing climate change.

Eligible under Criterion A3 as Vulnerable

The population reduction over the next 10 years is projected to be 20 to 40 %, based on (c) and (e) above.

Future reduction of the taxon's population is based on recent surveys which suggest that the taxon may not persist at all sites at which it was historically recorded (Coleman et al. 2010, 2013; Stoessel et al. 2007; Stoessel 2008, 2009, 2010, 2011, 2012).

Eligible under Criterion A4 as Vulnerable

The population reduction over any 10 year period, including both past and future, is projected to be 20 to 40 %, based on (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 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 Vulnerable

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 19,490 km², based on accepted, post-1970 records in the Victorian Biodiversity Atlas (VBA).

The taxon is estimated to be severely fragmented. Populations generally (although not always) persist in off-channel wetlands which are highly fragmented and geographically isolated, such that there is increased extinction risk and little or no probability of recolonisation should subpopulations become extinct.

It is estimated to have 2 locations. All threats identified are generic and apply consistently across the ecological and geographic range of the taxon, though there is a split between populations west and east of Wilson's Promontory.

It has a continuing decline in (i), (ii), (iii), (iv) and (v) above. The area of wetlands, the taxon's primary habitat, continues to decline, as a result of drainage and modification. Climate change projections for warmer and drier climate are also likely to reduce the extent and quality of habitat.

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 368 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. Aa above, it is severely fragmented. has 2 locations and has a continuing decline in (i), (ii), (iii), (iv) and (v).

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:

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			
	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:

Ineligible under Criterion D

No reliable estimate of the total population size for the taxon is available.

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

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