Threatened Species Assessment

Mogurnda adspersa
Southern Purple-spotted Gudgeon

Taxonomy

Mogurnda adspersa (Castelnau, 1878)

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 1993).

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

Proposed conservation status

Critically Endangered in Victoria

Criteria A3ce+4ce; B1ab(i,ii,iv,v)+2ab(i,ii,iv,v); C2a(ii); D

The taxon was previously regarded as regionally extinct (DSE 2013), not having been seen for over 50 years, but was re-discovered in 2019. However its numbers and range in Victoria are tiny. In the absence of an active recovery program it may decline back to regional extinction, or a recovery program may lead to an increase. It is too early to say whether active management will be undertaken, or what form it might take, so this assessment assumes no active management.

Species Information

Description and Life History

Southern Purple Spotted Gudgeon are small and robust with a rounded head, a relatively small mouth and a rounded tail. They are generally dark chocolate in colour along the back, fading to pale fawn on the belly, with a number of distinguishing markings. These include black to grey patches on the sides, which are surrounded by numerous white and red spots that brighten during breeding. The fins are yellow in colour, darkening towards the extremities.

They are non-migratory, found in freshwater, and exhibit a cryptic, demersal behaviour. This taxon spawns in summer when water temperature is greater than 20 degrees C (Lintermans 2007). Timing of spawning is speculated to be influenced by increasing water temperatures and day length, abundance of food and availability of spawning sites (Hansen 1988). Females may produce 7-10 succession broods in one season, where clusters of eggs are deposited on firm substrates and guarded by the male. Total fecundity (which is significantly related to fish size) is estimated at 267-727 eggs in south-east Queensland and 66-1,778 eggs in northern Queensland (Pusey et al. 2004) and 284-1,300 in the Murray-Darling Basin (Llewellyn 2006).

Generation Length

The generation length of the Southern Purple-spotted Gudgeon is inferred to be 4 years. The fish can live for up to perhaps 9 years, the generation length is likely to be approximately half its longevity.

Distribution

The taxon was historically recorded from Benalla, near Bendigo, Dinner Creek near Stawell and at Wangaratta. The fish have been presumed extinct in Victoria since 1997-98, when a population at Cardross Lakes died out (Raadik 1996, Raadik and Harrington 1996, Raadik and O'Connor 1996, Raadik and Fairbrother 1997, 1999,

Raadik et al. 1999ab, Raadik 2000, 2001). In late October 2019 two fish were found at Third Reedy Lake near Kerang.

Habitat

This taxon has been found in slow moving or still waters of small streams, rainforest streams, large rivers and dune lake systems, as well as slow-flowing weedy pools (Pusey et al. 2004). It is commonly collected over mud and sand, close to cover. In the lower Murray-Darling Basin, the species is known from wetlands, or backwater areas next to rivers, in still or low flowing areas, amongst dense aquatic vegetation and timber debris, and over mud or coarse sand, and gravel (Raadik 2001).

Threats

Threats include habitat degradation (loss of aquatic plants), water regulation/fluctuations impacting reproduction and recruitment, degraded water quality due to agriculture and livestock access, and the presence of alien Common Carp (*Cyprinus carpio*), Eastern Gambusia (*Gambusia holbrooki*) and Redfin Perch (*Perca fluviatilis)* for the Murray-Darling Basin populations (NSW Department of Primary Industries 2017), cited in Bice et al. (2019).

At the only known site in Victoria, Third Reedy Lake, the most pressing threat is the loss of water due to the revitalisation of the irrigation system, including the subsequent loss of dense edge habitat and hard substrates for spawning, such as rocks and timber debris.

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 A3 as Critically Endangered

The population reduction over the next 12 years is projected to be between 0 and 100%, based on (c) and (e) above.

The taxon has been successfully bred in captivity elsewhere (e.g. Hammer et al 2015), so if an active recovery program is embarked upon numbers may increase. However the taxon is yet to have been successfully translocated, and it is too early to say whether active management will be undertaken, or what form it might take, as nothing is known of their distribution, abundance, population trend, population genetics, etc. Work such as artificial breeding, translocation etc. may be possible, but this is still some time off. Currently, all that can be said is that this population is under threat, since Third Reedy Lake is proposed to be converted from a permanently wet system to one that is wetted about every one year out of five. So the potential population trend over the next year, if this project goes ahead and management is unsuccessful, is a decline and possibly to return to regionally extinct.

Eligible under Criterion A4 as Critically Endangered

The population reduction over any 12 year period, including both past and future, is projected to be 0 to 100%, based on (c) and (e) above. The causes of reduction may not have ceased, be understood or be reversible.

The future decline depends on whether the works at Third Reedy Lake progress, and whether an active recovery program is undertaken and if it is successful.

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 Critically Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 4 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA) and on recent survey work

It is estimated to have one location, as the single threat can severely impact all individuals. It has a continuing decline in (i), (ii), (iv) and (v) above.

Eligible under Criterion B2 as Critically Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 4 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA and on recent survey work. As above, it is observed to have 1 location. It has a continuing decline in (i), (ii), (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 C2 as Critically Endangered

It is estimated that there are 8 to 40 mature individuals. As of 12 December 2019, a total of eight fish were collected after extensive sampling effort, but they are demersal, cryptic and very difficult to catch. Due to there being a few size classes, it appears to be a breeding population. However exact numbers are unknown as the catch to date does not inform this due to sampling inefficiencies, plus no mark recapture has yet been undertaken.

The number of mature individuals is projected to continue to decline, and the percentage of mature individuals in one subpopulation is 90-100 %.

A continuing decline from the current small numbers is almost certain unless an active and successful recovery program is undertaken.

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:

Eligible under Criterion D as Critically Endangered

The taxon is estimated to have 8 to 40 mature individuals.

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

References

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