Threatened Species Assessment

Macquaria australasica
Macquarie Perch

Taxonomy

Macquaria australasica Cuvier, 1830

Current conservation status

Listed as Endangered 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 Victoria

Criteria A2abcde+3cde+4acde

Species Information

Description and Life History

The Macquarie Perch is a moderate-sized fish with a deep, laterally compressed body. Their maximum recorded length is 465 mm and maximum weight is 3.5 kg; but are usually less than 350 mm and 1 kg (Lintermans 2007). The body colour is generally black-grey or bluish grey, and some individuals are distinctly mottled, particularly small juveniles. The tail is rounded, the eye is large and white, and there are conspicuous pores around the eyes and on the snout. Adults have a pronounced lateral line down the side of their body. The diet predominantly consists of benthic aquatic insects and insect larvae, particularly beetles, mayflies, caddis flies and midges. Decapod crustaceans (shrimp and crayfish) are also an important food source with other known prey including dragonfly larvae, molluscs and small fish (Cadwallader and Eden 1979; Lintermans 2006). In lakes and impoundments cladocerans (water flea crustaceans) can also be a significant dietary item (Cadwallader and Douglas 1986; Norris et al., 2012). Macquarie perch spawn during spring and early summer (from September through to mid-January) when water temperatures range between 16-20 ° C (Koehn and O'Connor 1990). Fish in lakes or impoundments tend to aggregate at the mouths of suitable feeder streams awaiting appropriate water temperatures (>16.5° C). When the water reaches the required temperature, the fish move to appropriate riffle habitat to spawn and then return to the lake or impoundment upon completion of spawning activities or when water temperatures fall below 16.5 ° C (Cadwallader and Rogan 1977). Size at first sexual maturity varies between lake and river populations. Males are reported to mature at two years of age and at 210 mm and females at three years of age and 300 mm. However, it has become evident through later research that size is not a reliable indication of age because local conditions may induce the species to breed at smaller or larger sizes. Fecundity is estimated at 32 000 eggs per kilogram of fish (Wharton 1973) hence a large (3.5 kg) female may produce up to 110 000 eggs. Eggs are cream coloured, approximately 1-2 mm in size and adhesive, and are usually found amongst gravel and stones in riffle areas approximately 50-75 cm deep with a flow rate of less than 1 m/s. Hatching usually occurs after 10-11 days at water temperatures ranging from 15-17° C (Lintermans 2007). Newly hatched yolk sac larvae shelter amongst pebbles (Cadwallader and Rogan 1977). The maximum age potential for Macquarie perch is at least 30 years (Tonkin et al. 2018) and could potentially be older. The species is relatively long-lived, recent reports of fish from Victoria aged up to 28 and 30 years for males and females respectively (Tonkin/Vic DELWP unpub. data, cited in ARI pers. comm., 2017).

Generation Length

The generation length of the Macquarie Perch is inferred to be 15 to 25 years. The age of first breeding is at about three years, and the longevity is about 30 years. Older fish are more successful recruiters than younger ones, so generation length is based on the 15 to 25-year-old cohort.

Distribution

The natural, historical geographical distribution of Macquarie Perch include all major river systems in the southeastern part of the Murray-Darling Basin in New South Wales, the Australian Capital Territory and Victoria and the two eastern draining systems, the Hawkesbury-Nepean and the Shoalhaven, in southeastern New South Wales. In Victoria, eleven populations remain in the upper reaches of the Mitta Mitta (including Lake Dartmouth), Ovens, Broken, Campaspe and Goulburn rivers (and tributaries) in northern Victoria. The majority of these are considered small, discrete and fragmented populations. A self-sustaining translocated population also exists in the Yarra River.

Habitat

Macquarie Perch occupy a range of habitats including deep pools with undercut banks, large woody debris, rocky substrates (i.e. boulders) and native vegetation as cover (DoEE 2018).

Threats

Threats include river siltation and/or sand slugs, caused by removal of riparian vegetation, land use changes and construction activities; river regulation and degradation, caused by instream barriers such as dams, weirs and road crossings; altered flow regimes as a result of large dams and reservoirs; habitat degradation (removal of instream habitat) and fish kills caused by bushfires and drought; recreational fishing; competition and predation from species such as European Carp *(Cyprinus carpio),* Redfin Perch *(Perca fluviatilis),* Rainbow Trout (*Oncorhynchus mykiss*), and Brown Trout *(Salmo trutta);* and parasites and disease (Epizootic Haematopoietic Necrosis Virus) (DoEE 2018).

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 Endangered

The population reduction over the past 45 to 75 years is inferred to be 40 to 60%, based on (a), (b), (c), (d) and (e) above.

Past reduction from the twentieth century is based on grey literature and anecdotal information that suggested declining populations. Recent monitoring and mark-recapture data show a clear decline. In particular, the Millennium Drought caused a significant population decline. Although the taxon has shown a partial recovery up to 2019, the numbers continue to decline, and this may have been exacerbated by the 2019/20 fires.

The causes of the reduction may not have ceased, be understood or be reversible.

Eligible under Criterion A3 as Endangered

The population reduction over the next 45 to 75 years is projected to be 50 to 80% (midpoint 65%), based on (c), (d) and (e) above.

Most subpopulations are in small, unregulated tributaries, so with the likelihood of more extreme droughts, the majority of these small, tributary-isolated populations could be lost. On the basis of current threats and population trends, it is likely that 9 of the 11 known subpopulations may be lost in the next 75 years.

Eligible under Criterion A4 as Endangered

The population reduction over any 45 to 75 year period, including both past and future, is estimated to be 50 to 70%, based on past documented declines and the likelihood of further extreme droughts that affect small tributaries. The causes of reduction may not have ceased, be understood or be reversible.

Past reduction is based on coarse survey data, and reduction in water level and fish abundance. Future decline is based on the likelihood that the known threats will continue to impact the taxon.

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 B as Vulnerable

The Area of Occupancy (AoO) is estimated to be 648 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the Victorian Biodiversity Atlas (VBA).

The taxon is estimated to be severely fragmented. There are multiple, small isolated subpopulations that are all at risk from m the identified threats, such that there is increased extinction risk and little or no probability of recolonisation should subpopulations become extinct.

There is estimated to be three locations. Subpopulations in the Yarra and Dartmouth rivers are in large regulated rivers so are unlikely to be lost. All the others are small and at risk from the identified threats, particularly drought and loss of water flows. These threats are likely to intensify within one or two generations, such that most of the fish within these small subpopulations will be severely affected.

It has a continuing decline in (i), (ii), (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 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 inadequate information 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 as Data Deficient

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.

References

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