Threatened Species Assessment

Hypseleotris compressa
Empire Gudgeon

Taxonomy

Hypseleotris compressa (Krefft, 1864)

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 1994).

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

Proposed conservation status

Critically Endangered in Victoria

Criterion D

The Empire Gudgeon occurs in freshwater and estuarine habitats. It is on the edge of its range in eastern Victoria. Climate change/warming sea levels may help it spread further in Victoria. It is hardy and not threatened elsewhere, just apparently rare in abundance and restricted in distribution in Victoria. It may be Critically Endangered under Criterion D, on account of the likely small population size, or Data Deficient.

Species Information

Description and Life History

The Empire Gudgeon is a small and estuarine fish, growing to around 12 cm SL, with males slightly larger than females. The head and body are distinctly compressed, the body relatively deep, with a depth at pelvic fin origin 4.2-5.9 in SL. Adult males have a prominent forehead hump from above upper end of opercular margin to snout. The mouth is small, very oblique, reaching to about middle of eye; both jaws have small teeth in several rows. There are two dorsal fins; males usually have more elongate posterior second dorsal and anal fin rays, a higher first dorsal fin, and dorsal fins closer together (Gomon and Bray 2019).

The sides of the body often have about 7-8 brown vertical bars, forming X-shaped marks on the midside; the base of the caudal fin has vertically elongate dark brown spot just below the midside. Dorsal fins have two black stripes, and the second dorsal has with round white spots posteriorly, surrounded by black (Gomon and Bray 2019).

Individuals mature within one year, at lengths of 5.5-7.5 cm. Males establish breeding territories and display bright colours to attract a mate during the warmer months. Spawning occurs every 2-7 days over several weeks from January to March. Females deposit adhesive eggs (0.26-0.28 mm x 0.30-0.32 mm) onto rocks, sand or weeds where they are guarded and fanned by the male. Larvae hatch at around 1.0 mm TL after 10-14 days and commence swimming at, or soon after hatching. Spawning occurs in freshwater, and the larvae are carried downstream to estuaries where they develop before migrating back to freshwater (Gomon and Bray 2019).

Generation Length

The generation length of the Empire Gudgeon is inferred to be 2 years. This is based on data on reproduction compiled in Pusey et al. (2004), particularly the suspected age at first maturity and suspected longevity.

Distribution

To date, the taxon is only found in the Wallagaraugh River in East Gippsland at the upper end of Mallacoota Inlet; it has been recorded there on four occasions since 1980. It is very abundant in coastal streams of NSW and Queensland, Northern Territory and northern Western Australia. The Victorian populations of the taxon are on the edge of its range. It is difficult to know whether Victorian populations have been established for centuries, or are recently (decades) established due to random drift by larvae in ocean currents, or due to sea temperature rise due to climate change.

Habitat

Empire Gudgeons are found in the lower reaches of slow-flowing coastal rivers and streams, swamps, lagoons, including the upper parts of estuaries. They prefer flowing waters, and often shelter around aquatic plants and woody debris. Juveniles frequently occur in swift-flowing waters or estuaries. They are tolerant of high salinities, of water temperatures up to 35 degrees C and somewhat acidic to alkaline waters with a pH of 5.0-9.1. The fish forage amongst detritus, leaf litter and aquatic vegetation, feeding mostly on microcrustaceans, small aquatic insects, insect larvae and algae (Gomon and Bray 2019).

Threats

There appear to be no current threats to the taxon, but it may be threatened by activities which pollute or degrade the habitat, or by siltation causing blanketing of the substrate within the waterway and may affect spawning success by smothering the eggs.

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:

Ineligible under Criterion A as Data Deficient

There is insufficient evidence to determine whether there has been or will be a reduction in population sufficient to meet any threshold for Criterion A.

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:

Ineligible under Criterion B

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 8 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA). The Area of Occupancy (AoO) across the taxon's range is also estimated to be 8 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA, but other thresholds under these criteria have not been met.

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

The taxon is estimated to have 2 to 10 mature individuals, but other thresholds under this criterion have not been met.

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 2 to 10 mature individuals. It is very rare and restricted in Victoria, rarely caught, and no population monitoring has been undertaken since its discovery in the 1980s, though it has been randomly recollected since. Only a total of three or four have been caught at a time, and they have been caught three times over a long timeframe, so numbers could be as low as two or three mature individuals. It is extremely likely that there are fewer than 50 individuals.

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

References

Auty, E.H. (1978). Reproductive behaviour and early development of the Empire fish *Hypseleotris compressus* (Eleotridae). *Australian Journal of Marine and Freshwater Research* 29: 585-597.

DSE (2013). *Advisory List of Threatened Vertebrate Fauna in Victoria - 2013.* Department of Sustainability and Environment, Melbourne

Gomon, M.F. and Bray, D.J. (2019), *Hypseleotris compressa* in Fishes of Australia, accessed 17 Sep 2019, http://fishesofaustralia.net.au/home/species/4145.

Pusey, B., Kennard, M., and Arthington, A. (2004). *Freshwater fishes of north-eastern Australia.* CSIRO Publishing, Collingwood. 684 pp.

SAC (1994). Flora and Fauna Guarantee Scientific Advisory Committee: Final Recommendation on a Nomination for Listing. Nomination No. 319 *Hypseleotris compressus*