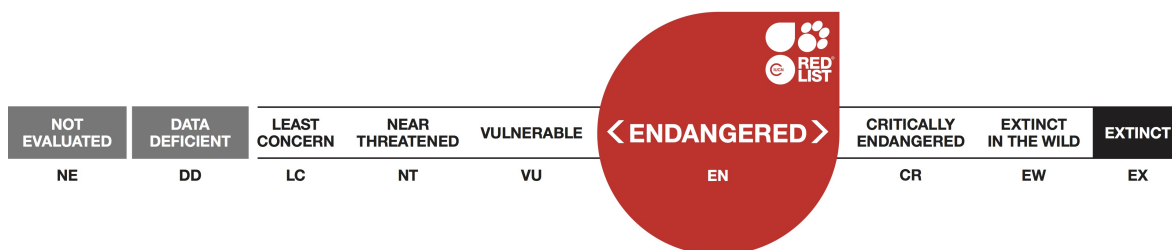


Lepidogalaxias salamandroides, Salamanderfish

Assessment by: Morgan, D.L. & Beatty, S.



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Taxonomy

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Actinopterygii	Osmeriformes	Lepidogalaxiidae

Taxon Name: *Lepidogalaxias salamandroides* Mees, 1961

Common Name(s):

- English: Salamanderfish

Taxonomic Source(s):

Allen, G. R., Midgley, S. H. and Allen, M. 2002. *Field guide to the freshwater fishes of Australia*. Western Australia Museum, Perth, Western Australia.

Identification Information:

Lepidogalaxias salamandroides is a distinctive fish with and has a number of unique morphological features, such as immovable eyes but the ability to bend its neck at right angles (Berra and Allen 1989), has an anal fin which in the adult male becomes greatly modified into a scaled sheath to facilitate the transfer of atypical sperm (Leung 1988) to the female during mating (Pusey and Stewart 1989) as well as a unique series of fin development during the larval stages (Gill and Morgan 1999). The aestivation period can last many months and it is aided by the secretion of mucous around the body, cutaneous respiration and a robust wedge-shaped skull (Berra and Allen 1989, Pusey 1989, Morgan *et al.* 2000). Possesses 5-8 pigmented dorsal rays; 13-15 anal rays; 12-14 caudal rays; 4 pelvic rays; 10-12 pectoral rays; thin embedded scales on sides, about 65 in mid-lateral series; scales absent from back and head (Mees 1961, Allen *et al.* 2002).

Assessment Information

Red List Category & Criteria: Endangered B1ab(i,ii,iii,iv)+2ab(i,ii,iii,iv) [ver 3.1](#)

Year Published: 2019

Date Assessed: January 9, 2019

Justification:

This species was previously assessed as Near Threatened (Wager 1996) but limited information was available at that time, with distribution studies commencing around that time and recent evidence demonstrating serious declines in the populations (see Morgan *et al.* 1998, 2000; Ogston *et al.* 2016). This species is now assessed as Endangered due to its limited distribution, the fact that it is only found at one location, and the fact that it is undergoing continuing declines in distribution and habitat extent.

Previously Published Red List Assessments

1996 – Lower Risk/near threatened (LR/nt)

<http://dx.doi.org/10.2305/IUCN.UK.1996.RLTS.T11575A3295465.en>

1994 – Rare (R)

Geographic Range

Range Description:

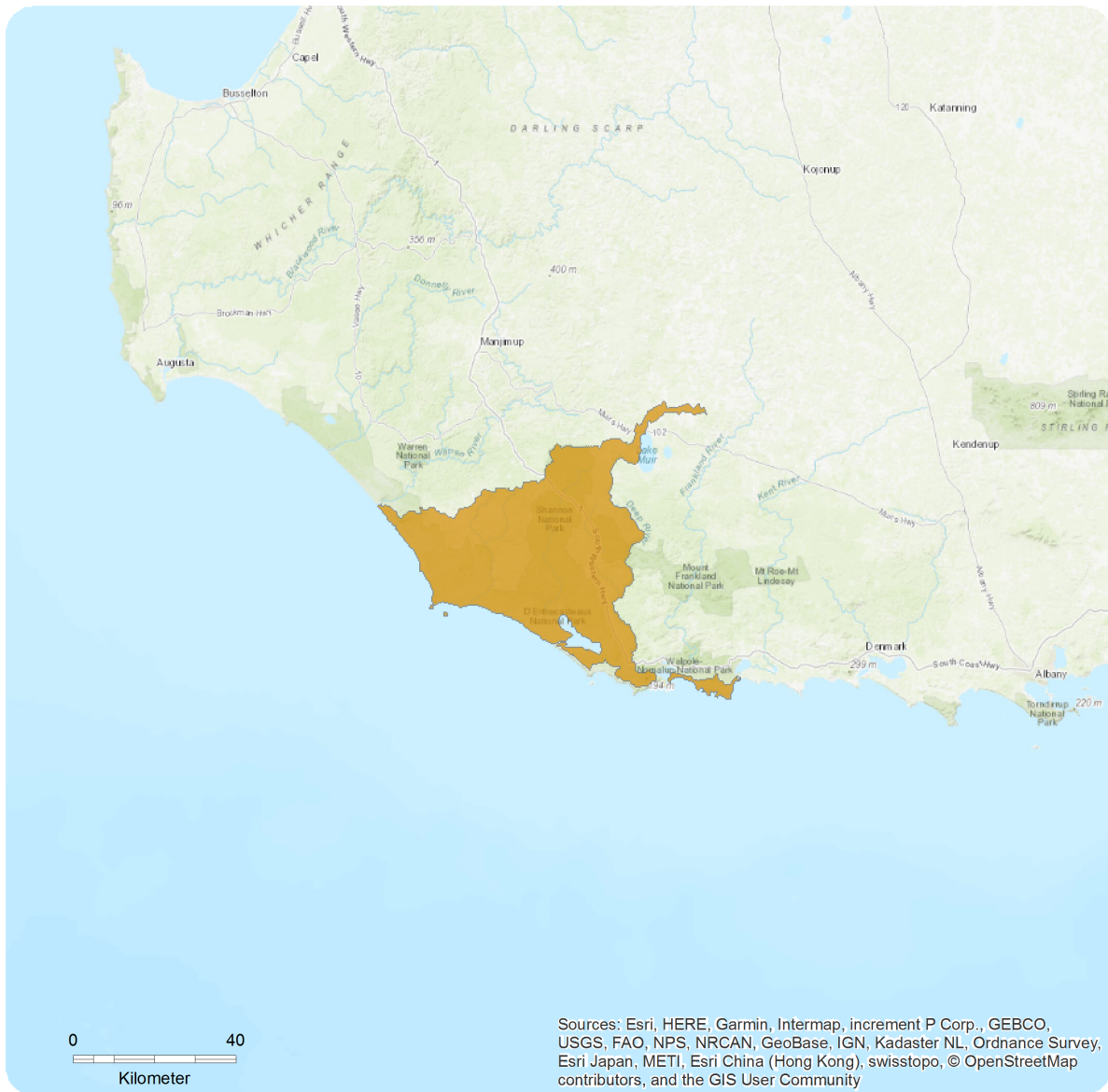
Lepidogalaxias salamandroides is distributed along coastal wetlands between Augusta and Albany in the Southwestern Province of Western Australia, where it is endemic (Morgan *et al.* 1998, 2011; Allen *et al.* 2002; Ogston *et al.* 2016). The EOO has declined since the turn of the century by ~79% (Ogston *et al.* 2016).

Country Occurrence:

Native: Australia (Western Australia)

Distribution Map

Lepidogalaxias salamandroides



Range

Extant (resident)

Compiled by:

Lintermans, M. and colleagues 2019 IUCN Red List assessment for Australian freshwater fish.



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.



Population

A targeted survey of the known 39 sites that the species was previously recorded in show a loss of 9 locations for the species since the 1990s (Ogston *et al.* 2016).

Current Population Trend: Decreasing

Habitat and Ecology (see Appendix for additional information)

This species occurs in shallow ephemeral pools in generally acidic tannin-stained shallow water around pH 4 and undergo an annual aestivation period (Pusey 1989; Morgan *et al.* 1998, 2011). Fertilisation is internal and spawning commences in late autumn and concludes in spring (Morgan *et al.* 2000). Mean fecundity is 82 with gestation being approximately three weeks and hatchlings being well-developed (Gill and Morgan 1999, Morgan *et al.* 2000). The breeding season coincides with heavy rains and inundation of their ephemeral habitats between late May and July. The lifespan typically lasts three years, but some fish persist for up to five years, with females attaining lengths up to 8 cm, while males never exceed 5 cm (Morgan *et al.* 2000). This species' distribution closely follows non-forested areas of low open woodland, herbland, scrubland and heaths. Bushfires typically occur in this area during the dry season. This habitat forms a relatively narrow belt, approximately 20-40 km wide which is sandwiched between coastal dune systems and karri (*Eucalyptus diversiflora*) forests (Allen and Berra 1989).

Systems: Freshwater

Use and Trade

There is no information available relating to the use or trade of this species.

Threats (see Appendix for additional information)

The major threat to the species is loss of habitat due to climate change induced rainfall reduction (Ogston *et al.* 2016), as well as wild fires, habitat clearing (when dry) and water extraction (Morgan *et al.* 1998). Increasing water temperature and declining rainfall, features of the climatic shift in south-western Australia over the last 40 years, have been the major drivers of the observed declines in range. As climate models have projected both a continued rainfall reduction within the species' distributional ranges and that water tables may decrease by up to 4 m by 2030, further population losses are expected (Ogston *et al.* 2016).

Conservation Actions (see Appendix for additional information)

This species is listed as Endangered in Western Australia under the Wildlife Conservation Act 1950 (Specially Protected Fauna Notice 2017, Dawson 2017) and it is protected under the Fish Resources Management Act 1994. Much of the remaining habitat lies with the D'Entrecasteaux National Park and Shannon National Park. There is a need to monitor the remaining populations and perhaps intervene with a captive breeding program or translocation to more suitable habitats, or re-introduction to areas where the species has been lost.

Credits

Assessor(s): Morgan, D.L. & Beatty, S.

Reviewer(s): Brown, C. & Moore, G.

**Facilitators(s) and
Compiler(s):** Tallant, J.

Bibliography

- Allen, G.R. and Berra, T.M. 1989. Life history aspects of the West Australian Salamanderfish, *Lepidogalaxias salamandroides* Mees. *Records of the Western Australian Museum* 14: 253-267.
- Allen, G. R., Midgley, S. H. and Allen, M. 2002. *Field guide to the freshwater fishes of Australia*. Western Australia Museum, Perth, WA.
- Beatty, S.J., Morgan, D.L. and Lymbery, A.J. 2014. Implications of climate change for potamodromous fishes. *Global Change Biology* 20: 1794-1807.
- Berra, T.M. and Allen, G.R. 1989. Burrowing, emergence, behaviour, and functional morphology of the Australian salamanderfish, *Lepidogalaxias salamandroides*. *Fisheries* 14: 2-10.
- Dawson, S. 2017. Wildlife Conservation (Specially Protected Fauna) Notice 2017.
- Gill, H.S. and Morgan, D.L. 1999. Larval development of the salamanderfish, *Lepidogalaxias salamandroides* Mees (Lepidogalaxiidae). *Copeia* 1999: 219-224.
- Groombridge, B. (ed.). 1994. *1994 IUCN Red List of Threatened Animals*. IUCN, Gland, Switzerland and Cambridge, UK.
- IUCN. 2019. The IUCN Red List of Threatened Species. Version 2019-3. Available at: www.iucnredlist.org. (Accessed: 10 December 2019).
- Leung, L. K. -P. 1988. Ultrastructure of the spermatozoan of *Lepidogalaxias salamandroides* and its phylogenetic significance. *Gamete Research* 19: 41-49.
- Morgan, D.L., Gill, H.S. and Potter, I C. 2000. Age composition, growth and reproductive biology of the salamanderfish *Lepidogalaxias salamandroides*: a re-examination. *Environmental Biology of Fishes* 57: 191-204.
- Morgan, D.L., Gill, H.S. & Potter, I.C. 1998. Distribution, identification and biology of freshwater fishes in south-western Australia. *Records of the Western Australian Museum* Supplement Number 56: 1-96.
- Ogston, G., Beatty, S.J., Morgan, D.L., Pusey, B.J. and Lymbery, A.J. 2016. Living on burrowed time: Aestivating fishes in south-western Australia face extinction due to climate change. *Biological Conservation* 195: 235-244.
- Pusey, B.J. 1989. Aestivation in the teleost fish *Lepidogalaxias salamandroides* (Mees). *Comparative Biochemistry and Physiology Part A: Physiology* 92(1): 137-138.
- Pusey, B.J. and Stewart, T. 1989. Internal fertilization in *Lepidogalaxias salamandroides* Mees (Pisces: Lepidogalaxiidae). *Zoological Journal of the Linnean Society* 97(1): 69-79.

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External Resources

For [Images and External Links to Additional Information](#), please see the Red List website.

Appendix

Habitats

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Habitat	Season	Suitability	Major Importance?
5. Wetlands (inland) -> 5.1. Wetlands (inland) - Permanent Rivers/Streams/Creeks (includes waterfalls)	-	Suitable	-
5. Wetlands (inland) -> 5.2. Wetlands (inland) - Seasonal/Intermittent/Irregular Rivers/Streams/Creeks	-	Suitable	-
5. Wetlands (inland) -> 5.8. Wetlands (inland) - Seasonal/Intermittent Freshwater Marshes/Pools (under 8ha)	Resident	Suitable	Yes

Threats

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Threat	Timing	Scope	Severity	Impact Score
11. Climate change & severe weather -> 11.1. Habitat shifting & alteration	Ongoing	Whole (>90%)	Rapid declines	High impact: 8
11. Climate change & severe weather -> 11.2. Droughts	Ongoing	Whole (>90%)	Rapid declines	High impact: 8
7. Natural system modifications -> 7.1. Fire & fire suppression -> 7.1.1. Increase in fire frequency/intensity	Ongoing	Whole (>90%)	Causing/could cause fluctuations	Medium impact: 7

Conservation Actions in Place

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Conservation Actions in Place
In-Place Research, Monitoring and Planning
Action Recovery plan: No
Systematic monitoring scheme: No
In-Place Land/Water Protection and Management
Conservation sites identified: Yes, over part of range
Occur in at least one PA: Yes
Percentage of population protected by PAs (0-100): 81-90
Invasive species control or prevention: No
In-Place Species Management

Conservation Actions in Place
Harvest management plan: No
Successfully reintroduced or introduced benignly: No
Subject to ex-situ conservation: No
In-Place Education
Subject to recent education and awareness programmes: Yes
Included in international legislation: No
Subject to any international management/trade controls: No

Conservation Actions Needed

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Conservation Actions Needed
1. Land/water protection -> 1.1. Site/area protection
3. Species management -> 3.2. Species recovery
3. Species management -> 3.4. Ex-situ conservation -> 3.4.1. Captive breeding/artificial propagation
4. Education & awareness -> 4.3. Awareness & communications

Research Needed

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Research Needed
1. Research -> 1.2. Population size, distribution & trends
1. Research -> 1.5. Threats
2. Conservation Planning -> 2.1. Species Action/Recovery Plan
3. Monitoring -> 3.1. Population trends
3. Monitoring -> 3.4. Habitat trends

Additional Data Fields

Distribution
Estimated area of occupancy (AOO) (km ²): 84
Continuing decline in area of occupancy (AOO): Yes
Extreme fluctuations in area of occupancy (AOO): No
Estimated extent of occurrence (EOO) (km ²): 2636

Distribution
Continuing decline in extent of occurrence (EOO): Yes
Extreme fluctuations in extent of occurrence (EOO): Unknown
Number of Locations: 1
Continuing decline in number of locations: No
Extreme fluctuations in the number of locations: No
Population
Continuing decline of mature individuals: No
Extreme fluctuations: Unknown
Population severely fragmented: Yes
No. of subpopulations: 5
Continuing decline in subpopulations: Yes
Extreme fluctuations in subpopulations: No
All individuals in one subpopulation: No
Habitats and Ecology
Continuing decline in area, extent and/or quality of habitat: Yes
Generation Length (years): 2
Movement patterns: Not a Migrant
Congregatory: Congregatory (year-round)

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