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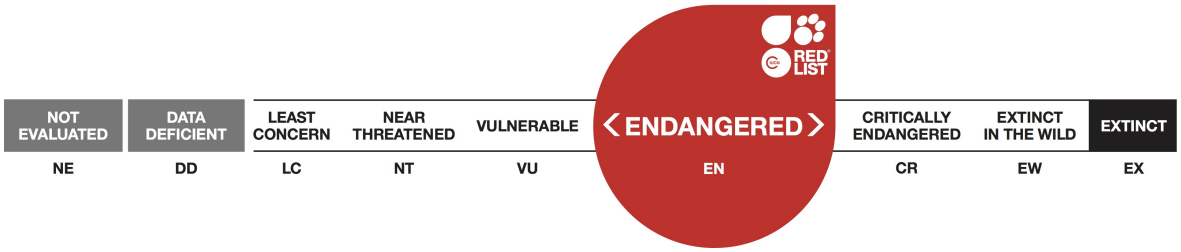
Nannoperca pygmaea, Little Pygmy Perch

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



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Taxonomy

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Actinopterygii	Perciformes	Percichthyidae

Taxon Name: *Nannoperca pygmaea* Morgan, Beatty & Adams, 2013

Common Name(s):

- English: Little Pygmy Perch

Taxonomic Source(s):

Morgan, D.L., Beatty, S.J., Klunzinger, M.W., Allen, M.G. and Burnham, Q.F. 2011. *A Field Guide to Freshwater Fishes, Crayfishes & Mussels of South-western Australia*. SERCUL & Freshwater Fish Group & Fish Health Unit, Murdoch University, Perth.

Identification Information:

From Morgan *et al*. (2013):

Diagnosis. A species of *Nannoperca* in having a small mouth, a deeply notched dorsal fin, a poorly developedtwo-part and interrupted lateral line. It is distinguished from the congeneric *N. australis*, *N. oxleyana* and *N.variegata* in possessing an exposed and serrated preorbital bone and the jaws may just reach to below the anteriormargin of the eye, versus possessing a smooth and hidden preorbital and the jaws reaching to at least the pupil. It isdistinguished from *N. vittata* by: the possession of 5–10 thin lateral stripes most obvious below lateral line; poorlydeveloped tube scales versus well developed in *N. vittata*; a more distinct haloed blackish spot resembling anocellus at the base of the caudal fin; the hind margin of the scales on the caudal peduncle are without distinctpigment as in *N. vittata*; and the belly is without a colour pattern. It is distinguished from *N. obscura* in possessinga distinct ocellus at the base of caudal fin versus an indistinct barring, as well as a dark spot behind operculum andlack of dusky scale margins. It is distinguished from the other sympatric pygmy-perch species in the region, N.balstoni, in possessing an exposed rear edge of the preorbital (compared to being hidden under the skin in N.balstoni), has fewer transverse scale rows (13 vs. 15–16), a smaller mouth (rarely reaching eye vs. reaching wellbeyond the eye), ctenoid body scales (vs. cycloid), generally fewer pectoral rays and a smaller maximum size.

Description. Dorsal-fin rays holotype VIII, 8 (paratypes VII–IX, 8 or 9); anal-fin rays III, 6 (paratypes III, 6 or7); pectoral-fin rays 11 (paratypes 10 or 11); body scales ctenoid; lateral-line scales with marginally developedtubes; lateral line scales 18+13; horizontal scale rows at level of anal fin origin 13–15; gill rakers on first arch 3+7(2–3 + 5–7); jaw just reaching to below anterior part of eye. Body relatively slender, laterally compressed, greatestbody depth 3.0 (2.7–3.4) in SL. Head relatively short with pointed snout, its length 3.3 (2.9–3.6) in SL. Followingproportions are in head length: snout length 4.7 (3.9–6.2), exposed maxilla length 4.9 (4.3–6.2), eye width 3.5 (3.3–3.9), interorbital width 3.6 (3.1–4.0), caudal peduncle depth 1.7 (1.5–2.1), caudal peduncle length 1.2 (1.1–1.4),caudal fin length 1.3 (1.2–1.6), pectoral fin length 1.7 (1.4–2.1), pelvic fin length 1.7 (1.5–1.9), first dorsal spinelength 3.3 (2.8–4.2), first anal spine length 5.5 (4.7–8.0), second anal spine length 2.7 (2.3–3.1), third anal spinelength 3.0 (2.5–3.9). Longest dorsal spine 2nd, longest soft dorsal ray 3rd or 4th, longest soft anal ray 2nd or 3rd, pelvic andpectoral fins usually equal in length. Reduced blackish spot behind edge of gill cover, coloration on ventral surfaceanterior to anus limited to one or two dark melanophores, a distinct ocellus

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at base of caudal fin, fins often orange,large brownish dorso-lateral blotches often merging, series of brownish mid-lateral blotches commencing behindoperculum, terminating on caudal peduncle; hind margin of scales on caudal peduncle without distinct pigment;two spines on hind margin of operculum, almost equal; 5–10 thin lateral stripes most obvious below lateral line,tube scales poorly developed.

Assessment Information

Red List Category & Criteria: Endangered B1ab(i,ii,iii,v)+2ab(i,ii,iii,v) ver 3.1

Year Published: 2019

Date Assessed: January 9, 2019

Justification:

As *Nannorperca pygmaea* was only recently described (Morgan *et al*. 2013), the species had not been previously assessed. Comprehensive surveys since that period have allowed a detailed assessment of the AOO (40 km^2) and EOO (<5000 km^2) as well as estimates of population abundance in the type locality and it is found from 4 sites/locations (Beatty *et al*. 2015). Other biological traits have also recently been assessed (Allen 2016). The species is threatened by the invasive and aggressive *Gambusia holbrooki*, is only ever found in very low numbers and secondary salinisation has appeared to have reduced two populations; our assumption is that the species was once more widespread.

Geographic Range

Range Description:

Comprehensive survey of >150 sites were specifically sampled for this species between 2010-2015 around its type locality (Morgan *et al.* 2010, 2013; Beatty *et al*. 2011, 2015). This species is currently known from four catchments:

• Mitchell River (~1 rkm) which is a tributary of the Hay River (found in that system over ~ 0.8 rkm).

• One site in the Denmark River in an unnamed eastern–flowing tributary that meets the Denmark River ~1 km upstream of its site of occupancy at Powley Rd crossing on the main channel.

• The forested middle reaches of the Kent River (and probably its tributaries) between Moombaki Creek (Kentdale area) and Basin Rd.

• It is also found in Lake Smith (one site only).

Country Occurrence:

Native: Australia (Western Australia)

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Population

Information on populations is based on comprehensive survey of >150 sites which were specifically surveyed for this species between 2013-2015 around its type locality (Beatty *et al*. 2015). A total of 750 Little Pygmy Perch were captured and the species represented only 2.2% of the total fish catch during this study. Population estimates by Allen (2016) for the Hay River population based on mark recapture in two main refuge pools calculated the number of mature (markable) individual *N. pygmaea* was 90 (±15.5 SE) *cf.* 8117 (95% 2289-13944) *N. vittata* and 26 (±11.7 SE) *N. balstoni* (Beatty *et al*. 2015, Allen 2016).

Current Population Trend: Decreasing

Habitat and Ecology **(see Appendix for additional information)**

Habitat associations qualitative based on Beatty *et al*. (2015), Allen (2016). The annual spawning season peaks in July-August. It is potamodromous (migrates within river systems for breeding) and moves upstream into tributaries when they begin flowing (June) (unpubl. data). Although the early life-history (egg deposition, hatching times, ontogeny) has not been fully determined, the species is a serial batch-spawner (similar to *Nannoperca vittata*) with females releasing multiple batches of eggs, most likely amongst inundated vegetation. By October, the majority of mature fish have completed their breeding (based on external examination of female). This species is probably less long-lived than the Western Pygmy Perch (based on length-frequency distributions) with a maximum age of <3 years, although specimens captured in artificial water points are larger on average and probably live longer than 3 years.

Dietary analysis has not yet been completed but based on gut content analysis of a limited number of individuals, it appears to be carnivorous, similar to the sympatric *N. vittata*, consuming aquatic macroinvertebrates (terrestrial insect larvae, copepods, ostracods). Decline in quality or amount of riparian vegetation or further decline in water quality may reduce the abundance and/or diversity of macroinvertebrates available to the species. Nothing is known of its parasites/diseases or physicochemical tolerances. The salinity tolerance is likely to be similar to the sympatric pygmy perches *N. balstoni* and *N. vittata* which have acute tolerances of 8.2 and 14.6 $g.L^{-1}$, respectively with capture sites suggesting it can tolerate a salinity of at least ~6.5 ppt. Mean winter temperatures in the Hay River sites of occupation are ~12^{o}C with summer means of ~23^{o}C.This potamodromous species moves from baseflow refuge pools (two known from the Hay River, five from the Kent River, two from a tributary of the Denmark River, and Lake Smith) to other habitats (likely to be tributaries for most populations) during winter. By October, all mature fish have completed their breeding (based on external examination of females). Breeding habitats in the Mitchell River dry to a series of small pools, however, the species has not been detected in them. Their only known baseflow refuges in this system are downstream in the Hay River main channel (two pools). In the Denmark River, the species is known from the main channel (one site) and an east flowing seasonal tributary where it is found year-round in two artificial pools. During the dry season it occupies the pools and moves into the adjoining flooded streamline during the breeding period. In the Kent River, it occurs in relatively large numbers in two (and present in a further three) known baseflow refuge pools, but the precise breeding habitats remain unknown. Nothing is known of the movement of the Lake Smith population which was only discovered in November 2014.

Systems: Freshwater

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Use and Trade

This species is a potential target for the aquarium trade.

Threats (see Appendix for additional information)

The threats to this species are inferred but are based on information the comprehensive survey of >150 sites were specifically surveyed for this species between 2013-2015 around its type locality (Beatty *et al*. 2015) and by the study by Allen (2016) for the Hay River population. It is also inferred by studies into the threats on sympatric species. The major threats are secondary salinisation, flow reductions due to ongoing climate change and potential extraction for agriculture, nutrient and sediment inputs from agriculture and forestry, and alien fishes.

Summary of key threats:
The water quality and riparian condition in the Kent and Hay Rivers has declined due to land clearing and associated salinisation in the upper catchments (Evans *et al*. 1995, Mayer *et al*. 2005). The Kent ranges from brackish (Styx River junction) to moderately saline in the upper catchment (Rocky Glen), however, the increasing trend has slowed since the 1990s. The key spawning habitats of *N. pygmaea* in the Kent (likely to be tributaries) have not yet been identified but several baseflow refuge pools are moderately saline (up to 6 ppt, unpubl. data). The Hay River (52% catchment cleared) is also moderately saline, with salinity increasing from the mid-1980s to the 1990s. The key baseflow refuge pools are moderately saline (~6ppt), with the seasonal Mitchell River (breeding habitat) fresh. The Denmark River (31% cleared) ranges from marginal downstream to brackish upstream. However, the key known breeding tributary for the *N. pygmaea* remains fresh. The trend is a reduction in the salinity in the Denmark River so we see the threat of salinisation reducing EOO/AOO from salinity being limited in this catchment, however, projected flow declines due to rainfall reductions (Barron *et al*. 2013) will impact the amount and quality of both peak flow (breeding) habitat and baseflow (refuge) habitat. The impact of climate change on the spawning migrations of sympatric species has recently been demonstrated (Beatty *et al*. 2014).

Conservation Actions (see Appendix for additional information)

No conservation action has been identified for this species.

Required monitoring and research:
Ongoing monitoring of all subpopulations required (particularly those recently discovered in the Denmark, Kent, and Lake Smith) to determine seasonal fluctuations in distribution/abundance, and to determine key refuge and spawning sites for priority conservation management. This should involve seasonal sampling for movements and population / reproductive biology during winter and spring, coupled with distributional surveys during baseflow (including aerial mapping and ground-truthing of potential refuge pool habitats).
Research priorities include physiological tolerances to project future population viabilities under increased salinity scenarios, its diet, microhabitat requirements, ontogeny, aspects of its reproductive biology (length at maturity, fecundity, partially known), age and growth (partially known), predators, swimming ability, diseases/parasites, phylogenetics (of Lake Smith sub-population).

Interim management recommendations:
Address secondary salinisation in all catchments that house *N. pygmaea.*

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Protection of existing refuge and spawning habitats in all systems.
Implement appropriate management arrangements for the artificial refuge habitat in the tributary of the Denmark catchment (i.e. fire-fighting waterpoints) and Kent River (Moombarki Creek Dam).
A captive breeding program should be instigated for the species (possibly at the population level) to help mitigate potential loss.
Ongoing regional education program on the impacts of introduced aquatic species to prevent incursions

Credits

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Bibliography

Allen, M.G. 2016. Barriers to fish migration in drying climates: contributions from south-western Australia. PhD thesis, Murdoch University.

Barron, O., Silberstein, R., Ali, R., Donohue, R., McFarlane, D., Davies, P., Hodgson, G., Smart, N. and Donn, M. 2012. Climate change effects on water-dependent ecosystems in south-western Australia. *Journal of Hydrology* 434-435: 95-109.

Beatty, S., Allen, M., Morgan, D., Strehlow, K., and Janicke, G. 2011. Ecological significance of the fish, macroinvertebrates and riparian vegetation in the Mitchell River catchment. . Murdoch University, Perth.

Beatty, S., Close, P., Morgan, D., Allen, M. and Lawrence, C. 2015. Conserving freshwater fish in south-west Western Australia: A summary of distribution, migration, critical habitats and threats to the region's most endangered freshwater fishes. Report to the State Natural Resource Management Office, Western Australia. Murdoch University, Murdoch.

Beatty, S.J., Morgan, D.L. and Lymbery, A.J. 2014. Implications of climate change for potamodromous fishes. *Global Change Biology* 20: 1794-1807.

Beatty, S.J., Morgan, D.L., Rashnavidi, M. and Lymbery, A.J. 2011. Salinity tolerances of endemic freshwater fishes of south-western Australia: implications for conservation in a biodiversity hotspot. . *Marine & Freshwater Research* 62: 91-100.

Evans, F.H., Caccetta, A., Ferdowsian, R., Kiiveri, H.T., and Campbell N.A. 1995. Predicting Salinity in the Upper Kent River Catchment. . Integrating Remotely Sensed Data With Other Spatial Data Sets to Predict Areas at Risk from Salinity. CSIRO, Curtin University, Department of Agriculture and Food, Western Australia, Perth.

IUCN. 2019. The IUCN Red List of Threatened Species. Version 2019-3. Available at: www.iucnredlist.org. (Accessed: 10 December 2019).

Mayer, X., Ruprecht, J. and Bari, M. 2005. Stream salinity status and trends in southwest Western Australia. *Salinity and Land Use Impacts.* , Department of Environment Perth, Western Australia.

Morgan, D., Beatty, S., Lymbery, A., Adams, M., Murphy, J. and Keleher, J. 2010. Aquatic fauna values of the Mitchell and Quickup Rivers. Murdoch University, Perth.

Morgan, D.L., Beatty, S.J. and M. Adams. 2013. Nannoperca pygmaea, a new species of pygmy perch (Teleostei: Percichthyidae) from Western Australia . *Zootaxa* 3637(4): 401-411.

Nannoperca pygmaea in Fishes of Australia, Available at: http://fishesofaustralia.net.au/home/species/4864. (Accessed: 27/07/2018).

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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)	Resident	Suitable	Yes
5. Wetlands (inland) -> 5.2. Wetlands (inland) - Seasonal/Intermittent/Irregular Rivers/Streams/Creeks	-	Suitable	-
5. Wetlands (inland) -> 5.7. Wetlands (inland) - Permanent Freshwater Marshes/Pools (under 8ha)	-	Suitable	-

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
2. Agriculture & aquaculture -> 2.1. Annual & perennial non-timber crops -> 2.1.3. Agro-industry farming	Ongoing	Minority (50%)	Causing/could cause fluctuations	Low impact: 5
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
2. Agriculture & aquaculture -> 2.2. Wood & pulp plantations -> 2.2.2. Agro-industry plantations	Ongoing	Minority (50%)	Causing/could cause fluctuations	Low impact: 5
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation 1. Ecosystem stresses -> 1.3. Indirect ecosystem effects		
2. Agriculture & aquaculture -> 2.3. Livestock farming & ranching -> 2.3.3. Agro-industry grazing, ranching or farming	Past, unlikely to return	Minority (50%)	Negligible declines	Past impact
7. Natural system modifications -> 7.1. Fire & fire suppression -> 7.1.1. Increase in fire frequency/intensity	Ongoing	Whole (>90%)	Rapid declines	High impact: 8
7. Natural system modifications -> 7.2. Dams & water management/use -> 7.2.3. Abstraction of surface water (agricultural use)	Ongoing	Minority (50%)	Negligible declines	Low impact: 4
7. Natural system modifications -> 7.2. Dams & water management/use -> 7.2.9. Small dams	Ongoing	Minority (50%)	Negligible declines	Low impact: 4
9. Pollution -> 9.3. Agricultural & forestry effluents -> 9.3.1. Nutrient loads	Ongoing	Majority (50-90%)	Slow, significant declines	Medium impact: 6
9. Pollution -> 9.3. Agricultural & forestry effluents -> 9.3.2. Soil erosion, sedimentation	Ongoing	Majority (50-90%)	Causing/could cause fluctuations	Medium impact: 6

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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: No
Occur in at least one PA: Yes
Percentage of population protected by PAs (0-100): 91-100
Area based regional management plan: Unknown
Invasive species control or prevention: No
In-Place Species Management
Harvest management plan: No
Successfully reintroduced or introduced beningly: 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
1. Land/water protection -> 1.2. Resource & habitat protection
2. Land/water management -> 2.1. Site/area management
2. Land/water management -> 2.2. Invasive/problematic species control

Research Needed

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

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Research Needed
1. Research -> 1.2. Population size, distribution & trends
1. Research -> 1.3. Life history & ecology
1. Research -> 1.5. Threats
3. Monitoring -> 3.1. Population trends

Additional Data Fields

Distribution
Estimated area of occupancy (AOO) (km²): 40
Continuing decline in area of occupancy (AOO): Yes
Extreme fluctuations in area of occupancy (AOO): No
Estimated extent of occurrence (EOO) (km²): 3420
Continuing decline in extent of occurrence (EOO): Yes
Extreme fluctuations in extent of occurrence (EOO): No
Number of Locations: 4
Continuing decline in number of locations: No
Extreme fluctuations in the number of locations: No
Lower elevation limit (m): 30
Upper elevation limit (m): 200
Population
Continuing decline of mature individuals: Yes
Extreme fluctuations: No
Population severely fragmented: Yes
No. of subpopulations: 4
Continuing decline in subpopulations: Unknown
Extreme fluctuations in subpopulations: Unknown
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: Unknown

The IUCN Red List Partnership

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