Maccullochella mariensis

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Taxonomy

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Actinopterygii	Perciformes	Percichthyidae

Taxon Name: *Maccullochella mariensis* Rowland, 1993

Synonym(s):

- *Maccullochella peelii ssp. mariensis* Rowland, 1993

Taxonomic Source(s):

Eschmeyer, W.N., Fricke, R., and Ven der Laan, R. (eds.). 2017. Catalog of Fishes: genera, species, references. Updated 01 November 2017. Available at: <http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp>.

Assessment Information

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

Year Published: 2019

Date Assessed: February 13, 2019

Justification:

Listed as Endangered because its Extent of Occurrence is 3,570 km², its Area of Occupancy is 284 km², it is known from only two locations when considering the impact of invasive species, and there is a continuing decline in the extent and quality of the species' habitat due to threats including invasive species, agriculture and dams.

Geographic Range

Range Description:

This Australian species is endemic to southeast Queensland. The Mary River Cod occurs naturally only in the Mary River system including Tinana, Wide Bay, Widgee, Glastonbury, Amamoor, Kandanga, Six Mile, Yabba and Obi Obi creeks (DNRM 2016). Although a freshwater cod species was once widespread throughout the Brisbane-Stanley, Albert-Logan and Coomera catchments (Simpson and Jackson 2000), stocking of Mary River Cod since 1983 has re-established and maintained a cod population in southeast Queensland. No data currently exist to determine whether the stocked population is self-sustaining though it is currently not considered a functional population (S. Brooks and T. Espinoza pers. comm. 2018). Tinana, Obi Obi and Six Mile creeks are still considered the three strongholds for this species, as first postulated by Simpson and Jackson (2000). Tinana Creek has also been established as a genetically unique sub-population (Huey *et al.* 2013, Schmidt *et al.* 2018).

Country Occurrence:

Native: Australia (Queensland)

Distribution Map

Maccullochella mariensis

Range
Extant (resident)

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

Population

The populations of this species are stable at present and recruitment has been observed.

Qualitative estimates of Mary River Cod sub-populations were made in Simpson and Jackson (2000) as follows: Tinana Creek (250), Six Mile Creek (250), Obi Obi Creek (70). These estimates resulted in an estimate of less than 600 individuals in the three strongholds, with insufficient data to assess the rest of the Mary catchment. Simpson and Jackson (2000) also highlighted a decline in distribution for the species compared to anecdotal evidence acquired for their study, including an absence of large cod (>10 kg) and scarcity of medium cod (5-6 kg). DNRM (2016) reaffirmed the stronghold status of Tinana, Six Mile and Obi Obi creeks; identified sites re-established by Mary River Cod (Conondale and Kenilworth); identified sites not previously recorded (Traveston); and identified resident populations in the Brisbane, Logan, Albert, Stanley and Coomera catchments. Sampling conducted between 2009 and 2013 across 38 sites collected 115 individuals (DNRM 2016). 88% of sampled individuals were from the Mary River catchment, and 87% of those were from the Obi Obi and Tinana sub-catchments. Overall catch per unit effort was ~1 cod per 2 hrs of electrofishing. Sizes ranged from 115-880 mm with 52% of the population within the 400-670 mm range. Large cod (>10 kg) were recorded from the Mary River, Brisbane River, Yabba Creek, Obi Obi Creek and Six Mile Creek. Finally, larval Mary River Cod have been recently sampled from Six Mile Creek, Tinana Creek, Obi Obi Creek and the Brisbane River in between 2013 and 2015 (Dunlop 2016, T. Espinoza pers. comm.)

Current Population Trend: Stable

Habitat and Ecology (see Appendix for additional information)

Simpson (1994) stated that preferred habitat for the Mary River Cod is relatively large, deep, shaded pools with abundant instream cover. Logs and log jams were also highlighted as providing suitable habitat for cod. DNRM (2016) summarised critical habitat for Mary River Cod as best represented by (1) structural woody habitat (SWH), (2) shade – including undercut banks, (3) depth, (4) riffles/controls, and (5) food availability. Connectivity for movement opportunities was also highlighted as a critical ecological requirement, particularly during the breeding season (August to December), for locating partners, locating nesting habitat and genetic dispersion. More recent work by Espinoza *et al.* (in review) has highlighted the importance of water temperature (~19°C), large hollow logs in deep water, and complex littoral habitat in shallow water, for nesting Mary River cod. In terms of larval Mary River Cod, Dunlop (2016) indicated preference for woody debris and leaf litter over finer grained substrates (sand and mud) in Obi Obi and Six Mile creeks, in contrast to Tinana Creek where submerged marginal vegetation over muddy substrates were preferred.

Systems: Freshwater

Use and Trade

This species is a targeted fishing species.

Threats (see Appendix for additional information)

Historic threats: Habitat degradation, water resource development and overfishing were identified as the major threats to Mary River Cod leading to large declines in abundance and fragmentation of

remaining populations (Simpson 1994, Simpson and Jackson 2000, TSSC 2016). Extensive land clearing was attributed as a driver for exacerbated erosion and in-filling of pools. Removal of native riparian vegetation led to reduced shading of watercourses, and reduced instream wood. Overfishing and the impoundment and regulation of water resources were also listed as key threats, leading to recommendations for the protection and rehabilitation of Mary River included through prohibition of capture, protection of key habitat areas, re-stocking of juveniles, and reclamation of degraded stream habitats. The current conservation advice for Mary River Cod lists impoundment and flow regime changes, loss of riparian vegetation and instream structures, grazing and disturbance by cattle, introduced fishes and overfishing; as the major threats to the species. Current threats: DNRM (2016) listed contemporary threats to Mary River Cod populations including low general abundance, fragmented populations, low recruitment, habitat degradation, water regulation, low genetic diversity and a lack of information on population structure. The authors suggested ongoing research and monitoring should inform management strategies across natural resource sectors such as water use, land use and fisheries. An additional threat is the impact of technology and social media on the species. Technological advance such as smart phones with Google Earth and GPS make formerly remote areas much more accessible (e.g. forestry areas around Tinana Creek). In turn, social media forums such as Facebook are becoming increasingly popular for glorification of recreational fishing exploits, particularly with iconic and charismatic species such as Mary River Cod. This has resulted in a significant increase in targeting of Mary River Cod as demonstrated on social media and Infofish fish tagging records. From 2011 to 2013, the increase in cod tagged from the Mary system and submitted to the Infofish database was 28, 44 and 171, respectively. This included 139 fish tagged during the reported breeding season (Aug-Dec) of 2013 within a 40 km stretch of Tinana Creek alone.

There is a potential risk of hybridisation with other members of the genus, and/or loss of genetic diversity due to poor hatchery practices.

Conservation Actions (see Appendix for additional information)

This species is listed as endangered under the EPBC Act 1999. The Mary River Cod Research and Recovery Plan (Simpson and Jackson 1996) has been developed. Conservation actions in place: Ecological outcomes and associated environmental management strategies including environmental flow releases (Obi Obi and Six Mile creeks) for Mary River Cod have been enacted into the Mary water plan 2016. The local catchment management group (MRCCC) continues to improve riparian habitat through the catchment, ongoing education program and manages a community based hatchery to provide fingerlings for conservation stocking.

Conservation actions required:

- Comprehensive population assessment including distribution, abundance and genetic diversity
- Comprehensive revision of conservation and recreational stocking targets including genetic protocols
- Comprehensive assessment of critical habitat for Mary River cod including current spatial availability and prioritization of future habitat restoration activities

More comprehensive compliance against illegal fishing, particularly in the three cod strongholds of Tinana, Obi Obi and Six Mile creeks.

Credits

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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

Threats

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

Threat	Timing	Scope	Severity	Impact Score
2. Agriculture & aquaculture -> 2.3. Livestock farming & ranching -> 2.3.3. Agro-industry grazing, ranching or farming	Ongoing	Majority (50-90%)	Unknown	Unknown
2. Agriculture & aquaculture -> 2.4. Marine & freshwater aquaculture -> 2.4.3. Scale Unknown/Unrecorded	Ongoing	Majority (50-90%)	Unknown	Unknown
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.1. Intentional use: (subsistence/small scale) [harvest]	Ongoing	Whole (>90%)	Slow, significant declines	Medium impact: 7
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.3. Unintentional effects: (subsistence/small scale) [harvest]	Ongoing	Whole (>90%)	Causing/could cause fluctuations	Medium impact: 7
7. Natural system modifications -> 7.2. Dams & water management/use -> 7.2.11. Dams (size unknown)	Ongoing	Minority (50%)	Causing/could cause fluctuations	Low impact: 5
7. Natural system modifications -> 7.2. Dams & water management/use -> 7.2.3. Abstraction of surface water (agricultural use)	Ongoing	Minority (50%)	Causing/could cause fluctuations	Low impact: 5
8. Invasive and other problematic species, genes & diseases -> 8.1. Invasive non-native/alien species/diseases -> 8.1.2. Named species (Oreochromis mossambicus)	Ongoing	Majority (50-90%)	Causing/could cause fluctuations	Medium impact: 6
8. Invasive and other problematic species, genes & diseases -> 8.2. Problematic native species/diseases -> 8.2.2. Named species (Hephaestus fuliginosus)	Ongoing	Majority (50-90%)	Causing/could cause fluctuations	Medium impact: 6
8. Invasive and other problematic species, genes & diseases -> 8.2. Problematic native species/diseases -> 8.2.2. Named species (Macquaria ambigua)	Ongoing	Majority (50-90%)	Causing/could cause fluctuations	Medium impact: 6
9. Pollution -> 9.3. Agricultural & forestry effluents -> 9.3.1. Nutrient loads	Ongoing	Majority (50-90%)	Causing/could cause fluctuations	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

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: Yes
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
Invasive species control or prevention: No
In-Place Species Management
Harvest management plan: Yes
Successfully reintroduced or introduced benignly: Yes
In-Place Education
Subject to recent education and awareness programmes: Yes

Conservation Actions Needed

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

Conservation Actions Needed
2. Land/water management -> 2.3. Habitat & natural process restoration
3. Species management -> 3.1. Species management -> 3.1.1. Harvest management
3. Species management -> 3.3. Species re-introduction -> 3.3.1. Reintroduction
3. Species management -> 3.4. Ex-situ conservation -> 3.4.1. Captive breeding/artificial propagation

Research Needed

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

Research Needed
1. Research -> 1.2. Population size, distribution & trends
2. Conservation Planning -> 2.1. Species Action/Recovery Plan

Research Needed
3. Monitoring -> 3.1. Population trends
3. Monitoring -> 3.2. Harvest level trends
3. Monitoring -> 3.4. Habitat trends

Additional Data Fields

Distribution
Estimated area of occupancy (AOO) (km ²): 284
Continuing decline in area of occupancy (AOO): Unknown
Extreme fluctuations in area of occupancy (AOO): Unknown
Estimated extent of occurrence (EOO) (km ²): 3570
Continuing decline in extent of occurrence (EOO): Unknown
Number of Locations: 2
Continuing decline in number of locations: Unknown
Population
Continuing decline of mature individuals: Yes
Population severely fragmented: Yes
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): 13
Movement patterns: Not a Migrant

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