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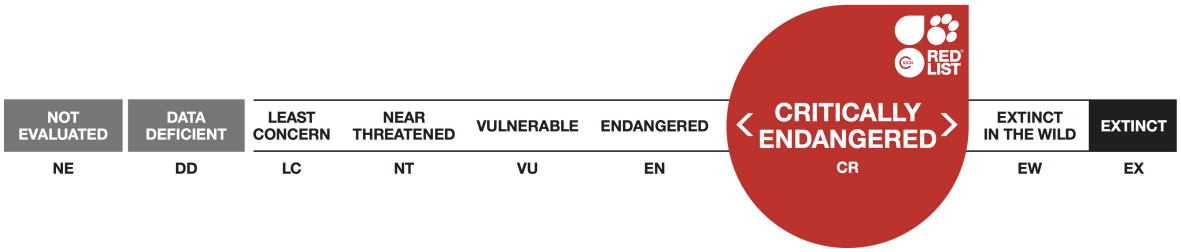
Scope: Global
Language: English

Tor remadevii, Hump-backed Mahseer

Assessment by: Pinder, A., Katwate, U., Dahanukar, N. & Harrison, A.



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Taxonomy

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Actinopterygii	Cypriniformes	Cyprinidae

Taxon Name: *Tor remadevii* Madhusoodana Kurup & Radhakrishnan, 2011

Common Name(s):

- English: Hump-backed Mahseer

Taxonomic Source(s):

Eschmeyer, W.N. 2014. Catalog of Fishes. Updated 3 January 2014. Available at: http://research.calacademy.org/research/ichthyology/catalog/fishcatmain.asp. (Accessed: 3 Jan 2014).

Taxonomic Notes:

Kurup and Radhakrishnan (2007) described *Tor remadevii* from the Pambar, the southern-most tributary of the River Cauvery in Kerala. A re-description was subsequently published in 2010 (Kurup and Radhakrishnan 2010). While this update usefully included a line drawing of the fish, the authors still failed to include photographs, molecular evidence or congeneric morphological comparisons (using specimens). Despite these descriptive details being limited, recent research has confirmed *T. remadevii* to be conspecific with the Hump-backed Mahseer of the wider Cauvery catchment (Pinder *et al.* 2018).

The name 'Humpbacked Mahseer' was wrongly applied to *Hypselobarbus mussullah*, another endemic species of the Western Ghats, until Knight *et al.* (2013, 2014) and Pinder *et al.* (2018) clarified the identity and nomenclature of the Hump-backed Mahseer. The common name, 'Hump Backed Mahseer' previously available on the IUCN Red List account of *Hypselobarbus mussullah* is therefore incorrect.

Assessment Information

Red List Category & Criteria: Critically Endangered A2abce ver 3.1

Year Published: 2018

Date Assessed: April 19, 2018

Justification:

Tor remadevii, endemic to the River Cauvery and its tributaries in the Western Ghats Biodiversity Hotspot of peninsular India has been assessed as Critically Endangered as its populations is estimated to have been reduced by > 90% over three generations due to combined effects of illegal and unsustainable exploitation, effects of introduced taxa and decline in critical habitats. Historic records dating pre-1950s suggest these declines to be even more significant, with the species now absent from the majority of previously known sites.

Geographic Range

Range Description:

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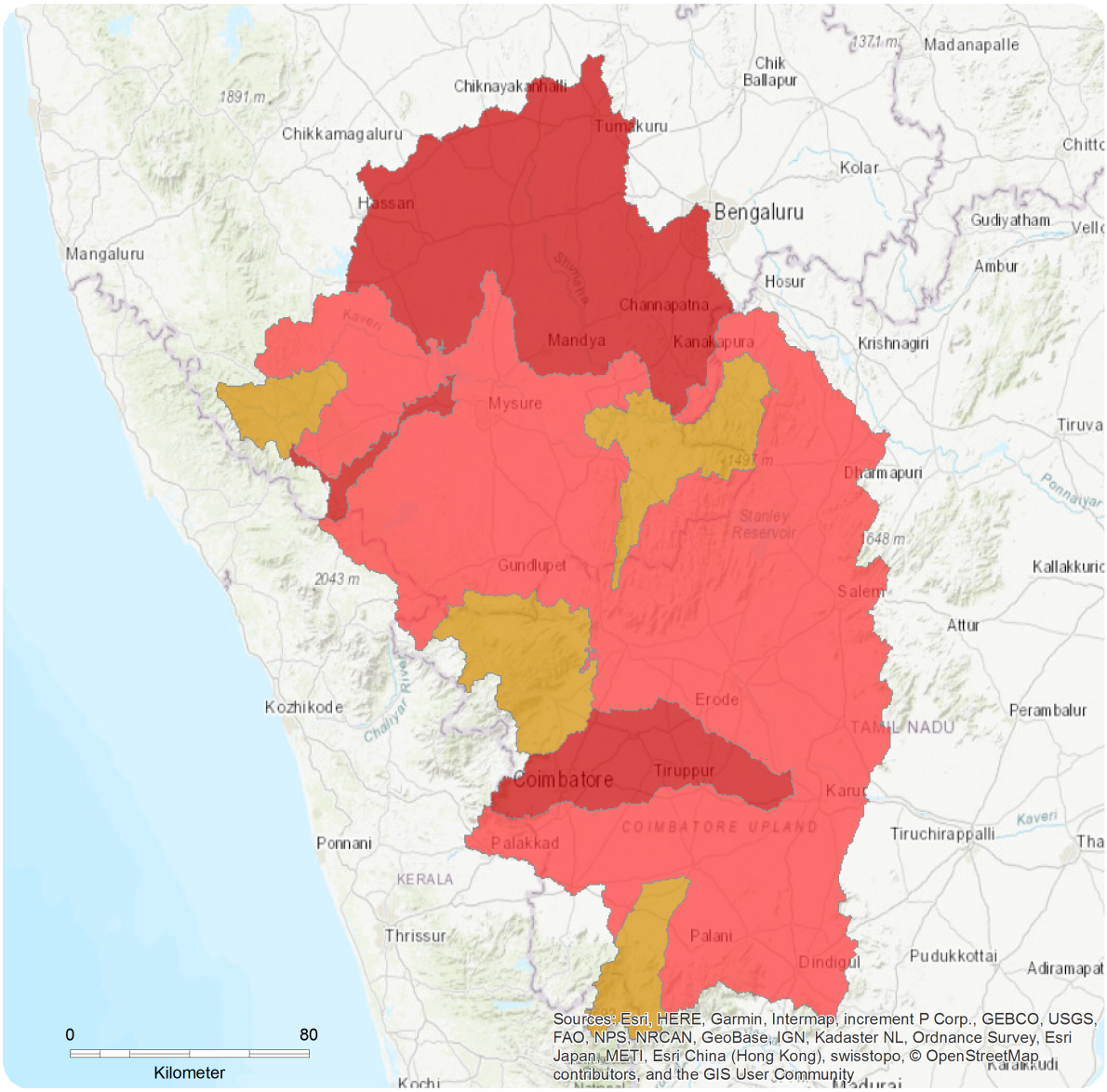
Endemic and exclusively restricted to the River Cauvery catchment in South India (Pinder *et al*. 2018), this species is thought to have been once widespread throughout much of the River Cauvery and its major tributaries (Thomas 1873). Following a collapse in recruitment in the main river population during the mid-2000s (see Pinder *et al.* 2015a,b), the only recent records are restricted to small pockets in the Moyar tributary in Tamil Nadu (Pinder em style="color: rgb(0, 0, 0); font-family: Times New Roman; font-size: 16px; font-style: italic; font-variant: normal; font-weight: 400; letter-spacing: normal; orphans: 2; text-align: left; text-decoration: none; text-indent: 0px; text-transform: none; -webkit-text-stroke-width: 0px; white-space: normal; word-spacing: 0px;">et al. 2018), Pambar tributary in Kerala (Kurup and Radhakrishnan 2007), main Cauvery River in Coorg (from Dubare to Valnur) (Coorg Wildlife Society pers. comm.), and in the Cauvery Wildlife Sanctuary (from Shivasamudram to Mekadattu) (Wildlife Association of South India pers. comm.), and a small reach of the stream and reservoir between Pillur and Athikadavu regions of the Bhavani tributary (A.J.T John Singh pers. comm.). The Extent of Occurrence (EOO) has been estimated at 19744 km^2 and the Area of Occupancy (AOO) at 64 km^2. Based on the availability of suitable habitat throughout the Cauvery River System, the distribution range is known to have dramatically reduced by around 90%. Due to the intensely controlled and regulated research access to the upper reaches of the Moyar, Bhavani and Kabini tributaries, which lie within the protected area network, it is uncertain whether populations are still extant in these areas.

Country Occurrence:

Native: India (Karnataka, Kerala, Tamil Nadu)

Distribution Map

Tor remadevii



Range

- Extant (resident)
- Extinct
- Possibly Extinct

Compiled by:

Bournemouth University

NE DD LC NT VU EN **CR** CRITICALLY ENDANGERED EW EX

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

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Population

No scientific studies have been undertaken to assess population status or trends across the entire range of this species. Analysis based on catch-and-release fisheries in the main stem of the River Cauvery suggested declines greater than 90% due to lack of recruitment (Pinder*et al*. 2015 a, b). In the years 2003 and 2004 combined, a total of 174 fish were caught and released from a single fishing camp in the middle reaches of the Cauvery (currently inside the Cauvery Wildlife Sanctuary), which declined to a total of 26 fish between the years 2006 and 2012. In accounting for numbers of hours fished, the catch per unit effort (CPUE) declined from 0.038 fish/hr to 0.002 fish/hr over this period. In 2012, only two individuals were captured from this camp, after which the fishery was closed (Pinder *et al*. 2015 a, b). In the upper reaches of the River Cauvery at Coorg/Kodagu, *T. remadevii* was abundant until 2000, but since 2012 only three individuals have been recorded. In the remainder of the River Cauvery where *T. remadevii* was once abundant, the species is now absent, representing a 100% decline in population. Anecdotal information and local knowledge of fishers in the three major tributaries (Pambar, Bhavani and Moyar) suggest steady declines in catches over the last two decades (Mahseer Trust pers. obs.). In the River Pambar, targeted surveys have recorded 13 individuals in 2007, reducing to the capture of a single individual in 2017. In the River Bhavani where the species was reported to be abundant by Thomas (1873), only a single specimen has been recorded in the past 10 years. In the River Moyar, multiple surveys conducted since 2015 have recorded nine individuals from a 'single pool'. Despite evidence of strong recruitment in the main stem of the River Cauvery until 2004 (Pinder *et al*. 2015 a, b), recruitment is now limited entirely to the Moyar and Pambar tributaries, where immature specimens (n = 9) have been recorded (<40 cm TL) since 2015. Across the entire distribution range, these combined information sources suggest a minimum population decline of 90% in the last ten years. Historic records dating pre-1950s suggest these declines to be more significant, with *T. remadevii* now absent from the majority of previously known sites. Population growth and mortality parameters for *T. remadevii* are not available. However, Raghavan *et al*. (2011) provided these parameters for six south Indian populations of *T. khudree*. Assuming that two species of the same genus will have similar life-history associated demographic parameters, the average generation time of the species will be approximately 7 years (mean 7.06, sd 1.85). The CPUE data provided by Pinder et al. (2015b) for *T. remadevii* (as Humpback mahseer) suggests that there is a decline in the CPUE since 1998, which can be explained by an exponential function $y = 0.0618*Exp(-0.265*x)$, $R^2 = 0.5638$, $P < 0.001$, where x is the number of years since 1998. The projected CPUE after 3 generations or 21 years since 1998 is 0.00024 fish/hr which is 99% decline from 0.02414 fish/hr in 1998. Thus, for the study area of Pinder *et al*. (2015a) in the middle reaches of the Cauvery, there is projected decline of 99% in three generations. There is no quantitative data available for the species from other parts of its distribution. However, given that the threats to the species are widespread, other known population of the species are also likely under similar stress. As a conservative estimate, it can be proposed that there could be more than 90% decline in three generations of *T. remadevii* throughout its range.

Current Population Trend: Decreasing

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

This species is known to occur in fast flowing rivers and demonstrated adaptations to adjoining lacustrine habitats. In rivers, adult fish have been shown to utilise foraging habitats ranging from deep slow flowing pools with a mixed substrate of sand and rock, through to high energy rapids flowing over bedrock and boulders (Pinder *et al*. 2018). Temporal and spatial information pertaining to functional

habitats are still lacking, yet it seems highly probable that a lack of observed spawning is explained by these activities occurring during the monsoon period (June – October) (Pinder *et al*. 2018). Insight into the diet of these fish is restricted to the baits used by anglers confirming an omnivorous dietary spectrum, with fish being captured on live/dead fishes, lures and cereal derived pastes (Boote and Wade 1992).

Systems: Freshwater

Use and Trade

It was one of the world's most popular and iconic freshwater sport fish known from the 19th century (Thomas 1873) until the closure of the premier recreational fisheries in the middle River Cauvery in the year 2012 (Pinder *et al*. 2015a,b). Recreational angling activity is currently restricted to non protected areas of around 10 km river reach in Coorg/Kodagu (Karnataka) region. Subsistence fisheries occur in many of the currently known localities, and threatens populations through the use of unsustainable capture techniques (dynamiting, small-meshed nets, plant-based poisons) (Mahseer Trust pers. comm.).

Threats (see Appendix for additional information)

This species is threatened by a range of anthropogenic stressors including habitat degradation and destruction as a result of river engineering projects, sand and boulder mining, domestic, industrial and agro-based pollution, water abstraction and unsustainable methods of harvest such as dynamiting, use of fine-meshed gears and plant-based poisons (Pinder *et al*. 2018). In addition, *T. remadevii* has been threatened by the introduction of the non-indigenous *T. khudree*, a species which has been demonstrated to have rapidly dispersed throughout the Cauvery catchment and has been implicated as a contributing factor in the collapse of the *T. remadevii* population in recent years (Pinder *et al*. 2015a,b).

Conservation Actions (see Appendix for additional information)

No conservation actions are currently in place. However, 70% of the currently known distribution range falls inside protected areas (Wildife Sanctuaries and National Parks). However, illegal fishing often using unsustainable gears, proliferation of invasive species, and a combination of other anthropogenic threats (e.g. river fragmentation, abstraction, pollution) are known from both inside, as well as areas upstream and downstream of the protected areas, and therefore the protected areas offer no real protection to the species.

Credits

Assessor(s): Pinder, A., Katwate, U., Dahanukar, N. & Harrison, A.

Reviewer(s): Raghavan, R.

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Disclaimer

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
15. Artificial/Aquatic & Marine -> 15.1. Artificial/Aquatic - Water Storage Areas (over 8ha)	Resident	Suitable	Yes

Threats

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

Threat	Timing	Scope	Severity	Impact Score
3. Energy production & mining -> 3.2. Mining & quarrying	Ongoing	Minority (50%)	Slow, significant declines	Low impact: 5
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.1. Intentional use: (subsistence/small scale) [harvest]	Ongoing	Majority (50-90%)	Slow, significant declines	Medium impact: 6
7. Natural system modifications -> 7.2. Dams & water management/use -> 7.2.1. Abstraction of surface water (domestic use)	Ongoing	Majority (50-90%)	Rapid declines	Medium impact: 7
7. Natural system modifications -> 7.2. Dams & water management/use -> 7.2.10. Large dams	Ongoing	Whole (>90%)	Slow, significant declines	Medium impact: 7
7. Natural system modifications -> 7.2. Dams & water management/use -> 7.2.2. Abstraction of surface water (commercial use)	Ongoing	Majority (50-90%)	Rapid declines	Medium impact: 7
7. Natural system modifications -> 7.2. Dams & water management/use -> 7.2.3. Abstraction of surface water (agricultural use)	Ongoing	Majority (50-90%)	Slow, significant declines	Medium impact: 6
8. Invasive and other problematic species, genes & diseases -> 8.1. Invasive non-native/alien species/diseases -> 8.1.2. Named species (Tor khudree)	Ongoing	Majority (50-90%)	Very rapid declines	High impact: 8
9. Pollution -> 9.1. Domestic & urban waste water -> 9.1.1. Sewage	Ongoing	Minority (50%)	Slow, significant declines	Low impact: 5

Conservation Actions in Place

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

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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 entire range
Occur in at least one PA: Yes
Percentage of population protected by PAs (0-100): 71-80
Area based regional management plan: No
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
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
4. Education & awareness -> 4.3. Awareness & communications
5. Law & policy -> 5.2. Policies and regulations

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Conservation Actions Needed
5. Law & policy -> 5.4. Compliance and enforcement -> 5.4.3. Sub-national level
6. Livelihood, economic & other incentives -> 6.1. Linked enterprises & livelihood alternatives

Research Needed

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

Research Needed
1. Research -> 1.2. Population size, distribution & trends
1. Research -> 1.3. Life history & ecology
1. Research -> 1.5. Threats
1. Research -> 1.6. Actions
2. Conservation Planning -> 2.1. Species Action/Recovery Plan
2. Conservation Planning -> 2.2. Area-based Management Plan
2. Conservation Planning -> 2.3. Harvest & Trade Management Plan
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): 64
Continuing decline in area of occupancy (AOO): Yes
Extreme fluctuations in area of occupancy (AOO): No
Estimated extent of occurrence (EOO) (km^2): 19744.415
Continuing decline in extent of occurrence (EOO): Yes
Extreme fluctuations in extent of occurrence (EOO): No
Number of Locations: 5
Continuing decline in number of locations: Yes
Extreme fluctuations in the number of locations: No
Lower elevation limit (m): 300
Upper elevation limit (m): 900

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Population
Continuing decline of mature individuals: Yes
Population severely fragmented: Yes
No. of subpopulations: 5
All individuals in one subpopulation: No
Habitats and Ecology
Continuing decline in area, extent and/or quality of habitat: Yes
Generation Length (years): 7
Movement patterns: Altitudinal Migrant

The IUCN Red List Partnership

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The IUCN Red List Partners are: Arizona State University; BirdLife International; Botanic Gardens Conservation International; Conservation International; NatureServe; Royal Botanic Gardens, Kew; Sapienza University of Rome; Texas A&M University; and Zoological Society of London.