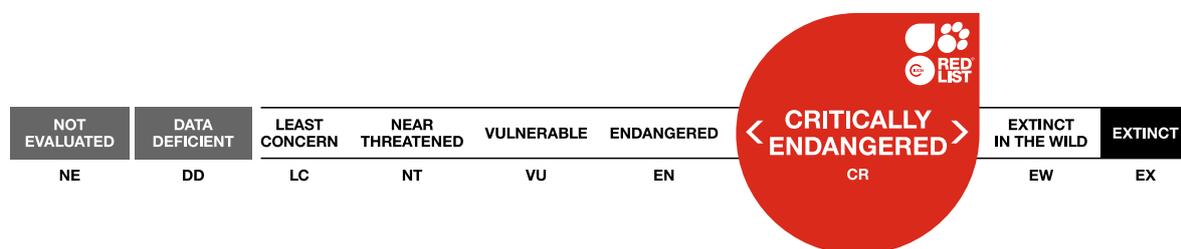


Carcharhinus hemiodon, Pondicherry Shark

Assessment by: Kyne, P.M., Jabado, R.W., Akhilesh, K.V., Bineesh, K.K., Booth, H., Dulvy, N.K., Ebert, D.A., Fernando, D., Khan, M., Tanna, A. & Finucci, B.



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Taxonomy

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Chondrichthyes	Carcharhiniformes	Carcharhinidae

Scientific Name: *Carcharhinus hemiodon* (Müller & Henle, 1839)

Synonym(s):

- *Carcharias hemiodon* Valenciennes, 1839

Common Name(s):

- English: Pondicherry Shark
- Arabic: يريش دنوب شرق

Taxonomic Source(s):

Fricke, R., Eschmeyer, W.N. and Van der Laan, R. (eds). 2019. Eschmeyer's Catalog of Fishes: genera, species, references. Updated 04 February 2019. Available at: <http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp>. (Accessed: 04 February 2019).

Assessment Information

Red List Category & Criteria: Critically Endangered C2a(i) [ver 3.1](#)

Year Published: 2021

Date Assessed: September 28, 2020

Justification:

The Pondicherry Shark (*Carcharhinus hemiodon*) is a small (to 102 cm total length) and very rare Indo-West Pacific whaler shark. It has a wide historic range from Oman to southern China, but known records are scattered, and it has only been reliably verified from a handful of countries. It appears to occur in shallow coastal waters, and has also been reported to enter rivers, although this has not been verified.

The contemporary range of this species is poorly defined and museum specimens were collected pre-1960. There are reports from 1979, the 1990s, and 2000, but none of these could be verified. Its identification is problematic, and it is easily confused with a number of other *Carcharhinus* species (for example, recent putative records from Sri Lanka).

The Framework for using the Threats Model and the Records and Survey Model was applied to the Pondicherry Shark. The probability that the combination of threats (generally unregulated fisheries across its historic range) affecting the species occurred for a sufficient duration and were sufficiently severe that they caused local extinction, and the probability that threats occurred over the entire range of the species, were both very high. As a consequence, the probability that the species is extinct from the Threats Model is 0.81 (minimum = 0.64; maximum = 1.00). Its range has been subject to considerable survey effort directed at sharks and rays in general, and some dedicated searches for this species, all of which have failed to produce a verified record. Given the wide distribution of the species,

these surveys have generally covered a small proportion of the species' range. Furthermore, given the identification issues, the probability that the species could have been reliably identified in the surveys is low. The probability that the species is extinct from the Records and Survey Model is 0.12 (minimum = 0; maximum = 0.31). The weighted average probability of extinction is 0.44–0.45, which is <0.5 and therefore outside the threshold for Critically Endangered (Possibly Extinct).

Given a lack of verifiable records since 1960, it is considered that the major population reduction would have occurred prior to the last three generation period (estimated at 27 years from a congener), therefore an assessment under criterion A is not appropriate. However, given the lack of records, the number of mature individuals is assumed to be <250 with no subpopulation >50 mature individuals, and the species is assessed as Critically Endangered (C2a(i)).

For further information about this species, see [Supplementary Material](#).

Date last seen: 1960

Previously Published Red List Assessments

2003 – Critically Endangered (CR)

<https://dx.doi.org/10.2305/IUCN.UK.2003.RLTS.T39369A10185838.en>

2000 – Vulnerable (VU)

Geographic Range

Range Description:

Historically, the Pondicherry Shark ranged from the Arabian Sea (Oman) to the South China Sea (Garrick 1985). However, it had only been recorded from a limited number of individuals from widely-separated locations in the Indo-West Pacific including Oman (Muscat), Pakistan, India, Borneo, and Java (Garrick 1985). The Pondicherry Shark is represented by fewer than twenty specimens in museum collections, all collected prior to 1960. Historical reports from Sri Lanka have not been verified while recent records (e.g. De Silva 2014) are erroneous.

Country Occurrence:

Native, Possibly Extant (resident): China; India; Indonesia (Jawa, Kalimantan); Malaysia; Oman; Pakistan

FAO Marine Fishing Areas:

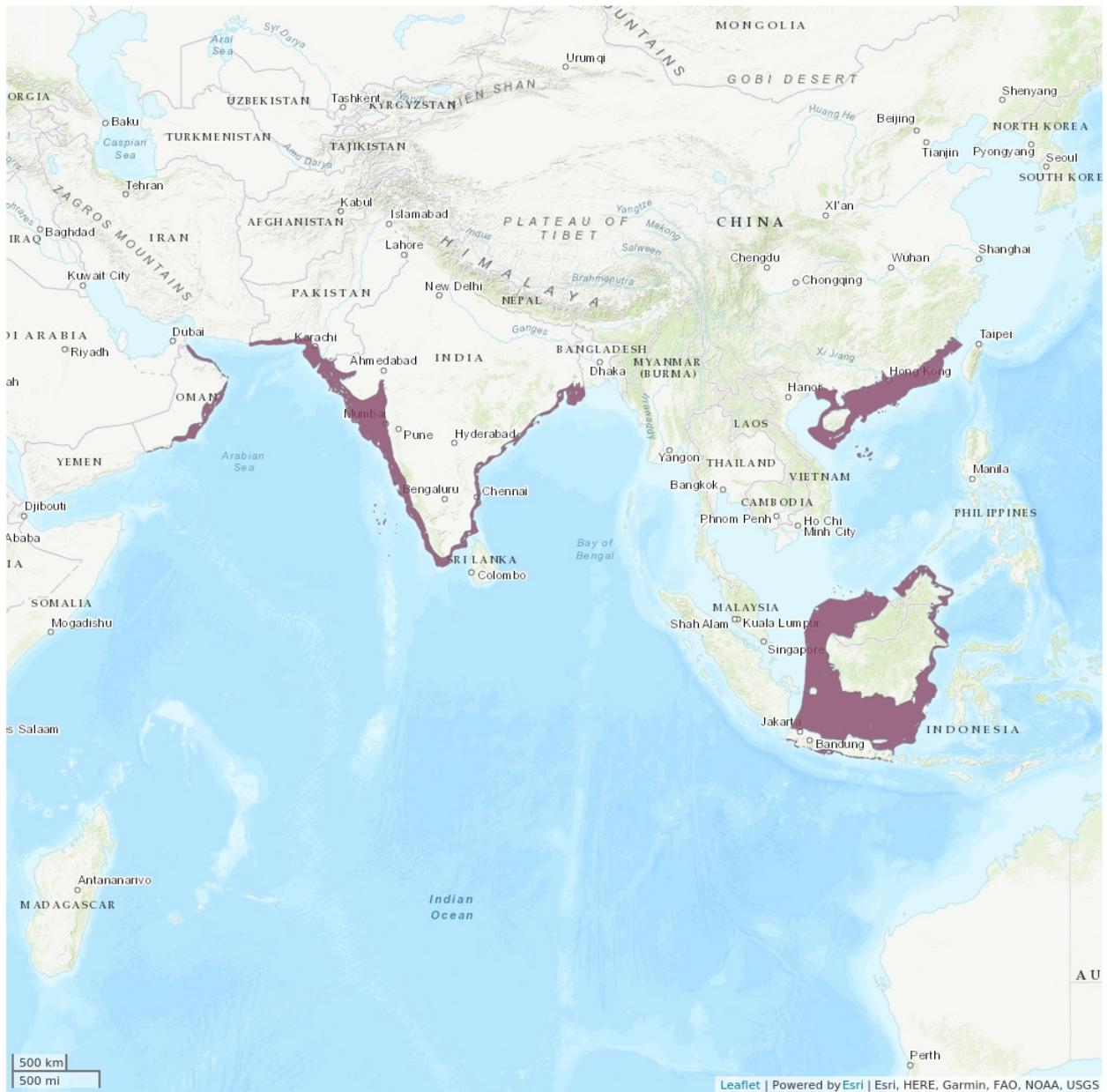
Native: Pacific - northwest

Native: Indian Ocean - western

Native: Pacific - western central

Native: Indian Ocean - eastern

Distribution Map

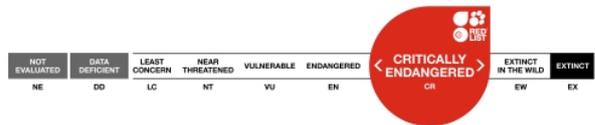


Legend

POSSIBLY EXTANT (RESIDENT)

Compiled by:

IUCN SSC Shark Specialist Group 2020



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



Population

Intensive and largely unregulated coastal fisheries are likely to have driven an historical population reduction in this species. Fisheries across the range of this species have experienced increased demand for sharks since the 1970s due to growing coastal human population densities driving increasing fishing effort in traditional shark fisheries in many areas, and international trade in shark products, including the fin trade (e.g. Henderson *et al.* 2007, Jabado *et al.* 2015). For example, in India during the 1970s, elasmobranch catches doubled due to rapid large-scale mechanization of fishing fleets. Consequently, several small-bodied and relatively resilient whaler sharks, including Spadenose Shark (*Scoliodon laticaudus*) and 'blacktip' sharks (*Carcharhinus* spp.), are either declining or have already collapsed (Mohamed and Veena 2016).

There is only a single known historical record from Oman (Muscat) (Garrick 1985) and on-going fish market surveys in the Gulf and Sea of Oman (e.g. Henderson *et al.* 2007, Moore *et al.* 2012, Moore and Peirce 2013, Jabado *et al.* 2015) have not located any further records.

The Pondicherry Shark historically was present in the 1950–60s in the Indus River area of Pakistan. Given that the species has reportedly been known to enter rivers (although Garrick (1985) suggests these claims have not been verified), this may have been a historically important site for it. Efforts to search for the species in this area since the early 1980s have failed to document it (M. Khan unpubl. data 2017). Furthermore, the catch of Pakistani fishing vessels has been extensively monitored at major landing centres since 1987 but no Pondicherry Shark have been recorded (M. Khan unpubl. data 2017).

There are several historic records in museum collections from India, but reporting of the species in the Indian literature is somewhat confusing, and descriptions and photographs are not available to verify claims of catches. It was certainly present historically on the west coast (Garrick 1985). Compagno *et al.* (2003) stated that the most recent record of the species in India (and indeed anywhere) was from 1979, but the location of any associated specimen could not be determined for this assessment. Raje *et al.* (2007) report an individual of 299 cm total length (TL) from Mumbai, but this is most certainly a misidentification as that far exceeds the expected maximum size of 102 cm TL (Ebert *et al.* 2013); Raje *et al.* (2015) report catches landed at Mumbai up until 2002, but again the sizes presented (including a mature male at 248 cm TL) suggest another larger carcharhinid species; and, Raje *et al.* (2002) report a number of gravid females from the Gulf of Mannar, but this claim cannot be verified. Ongoing landing site surveys across India, including the Andaman and Nicobar Islands, have failed to record this species (e.g. Akhilesh *et al.* 2014, Kumar *et al.* 2018, Tyabji *et al.* 2018).

Extensive surveys of sharks and rays have not recorded this species across the rest of its former range, including around the Bay of Bengal, Indo-Malay Archipelago, and the South China Sea. These surveys include Bangladesh (S. Chakma pers. comm. 10/11/2018), Thailand (e.g. Arunrugstichai *et al.* 2018), Borneo (e.g. Last *et al.* 2010), eastern Indonesia (e.g. >21,000 sharks recorded in over six years of surveys; White 2007), southern China (e.g. Lam and Sadovy de Mitcheson 2011), and the Philippines (e.g. Compagno *et al.* 2005). Photos of a carcharhinid from the Philippines in 2000 'may possibly be this species', but were insufficient to confirm the identification (Compagno *et al.* 2005).

Claims of the species from Sri Lanka (i.e. De Silva 1988, Morón *et al.* 1998) cannot be confirmed. De Silva (2014) reports on the recent occurrence of the Pondicherry Shark from the Menik River in Sri Lanka,

providing two photographs to support this claim. However, the fin colouration, snout length, and second dorsal fin height immediately rule out the Pondicherry Shark, and identify the shark as a juvenile Bull Shark (*Carcharhinus leucas*) (Garrick 1985, Last and Stevens 2009).

Misidentification and misreporting through confusion with other carcharhinids are ongoing issues, although there now exists reasonable capacity and knowledge across its historic range to correctly identify Pondicherry Shark if it persists. The increasing use of genetic barcoding, including for dried fins or other body parts, has also increased the likelihood of detection of rare species. Despite this, no samples that would be attributable to this species have been detected using such barcoding techniques.

The Framework (Akçakaya *et al.* 2017) for using the Threats Model (Keith *et al.* 2017) and the Records and Survey Model (Thompson *et al.* 2017) to list species as EX or CR(PE) was applied to the Pondicherry Shark. Records of the species are patchy and spread widely across the Indo-West Pacific from Oman to China. For the purposes of this assessment, the range was considered – at least historically – to be continuous in coastal areas between those locations and thus surveys that occurred across the region were considered for the Records and Survey Model.

The Threats Model (Keith *et al.* 2017) considered the severity, duration, and scope of threats and their interaction with the life history traits that determine the species' susceptibility to these threats. There is a long history of intensive coastal fisheries throughout the tropical Indo-West Pacific and the region includes many of the world's largest shark fishing nations (including some with Pondicherry Shark records e.g. Indonesia, India, Malaysia, and Pakistan) and global hubs of shark fin trade (e.g. Hong Kong). Intensive and largely unregulated fishing pressure that has driven major declines in sharks across Asia and the Indo-West Pacific more broadly is considered the major threat facing the Pondicherry Shark.

The life history of the Pondicherry Shark is unknown, however the family Carcharhinidae is well-studied. The maximum known size of this species is 102 cm TL and smaller-sized carcharhinids are among some of the faster-growing and biologically productive sharks, although still characterized by low rates of natural mortality and low fecundity. Therefore, the Pondicherry Shark is considered susceptible to population reduction and depletion as a result of threats operating across its range (with little spatial refuge), but not to the degree of many other elasmobranchs. The probability that the combination of threats affecting the species occurred for a sufficient duration and were sufficiently severe that they caused local extinction $P(local)$ was very high (minimum = 0.8; best = 0.9; maximum = 1.0) and the probability that threats occurred over the entire range of the species was similarly high (minimum = 0.8; best = 0.9; maximum = 1.0). As a consequence, the probability that the species is extinct from the Threats Model is 0.81 (minimum = 0.64; maximum = 1.00).

Most records of the species are historic, occurring pre-1960. For existing museum specimens which had been examined by experts, namely Garrick (1985) in the revision of the shark genus *Carcharhinus*, $p(ci)$ was set at 0.95 following the examples in Table 2 in the *Instructions for Using Models to List Species as EX or CR(PE)* (hereafter referred to as the *Instructions*). The probability that the species was correctly identified since 1960 is moderate-to-low and no specimens could be confirmed since that time. Note that misidentification is a major issue with this species and it is easily confused with a number of other *Carcharhinus* species (for example, recent putative records from Sri Lanka).

Although the range of the species is extensively covered by fishers who are fishing daily and landing

catches locally, passive surveys were set at a low level of coverage given the very wide range of the species; it was assumed that the proportion of the species' range covered was 0.2 (lower = 0.1; upper = 0.3). The probability that the species would have been recorded is very low (lower = 0; best = 0.005; upper = 0.01) because the species is rare, small and therefore of little economic value and is more likely to have gone unnoticed in mixed catches. Similarly, given the high diversity of *Carcharhinus* sharks in the Indo-West Pacific together with poor local species-specific separation of catches and identification issues with this species, the probability that the taxon could have been reliably identified is also very low (lower = 0; best = 0.005; upper = 0.01).

Its range has been subject to considerable survey effort directed at sharks and rays in general over the last 30 years, and some dedicated searches for this species, all of which have failed to produce a verified record. Given the wide distribution of the species, these surveys have generally covered a small proportion of the species' range. *Epsilon* was set based on the number of countries in which surveys occurred in a given year, with *best* estimates ranging from 0.05 to 0.3.

The probability that the species would have been recorded in these surveys was set following the suggested default values for rare species (*Instructions* Table 3). The probability that the species could have been reliably identified in the survey if it has been recorded was set very low given that it is particularly difficult to identify or distinguish from other similar species, and that were searched for by seemingly competent surveyors (*Instructions* Table 4). Carcharhinid sharks are highly diverse throughout the Indo-West Pacific, are morphologically-conservative, and this species is prone to misidentification.

The probability that the species is extinct from the Records and Survey Model is 0.12 (minimum = 0; maximum = 0.31). The weighted average probability of extinction is 0.44–0.45, which is <0.5 and therefore outside the threshold for Critically Endangered (Possibly Extinct) (Akçakaya *et al.* 2017). Given a lack of verifiable records since 1960, it is considered that the major population reduction would have occurred prior to the last three generation period (estimated at 27 years from a congener), and an assessment under Criterion A is not appropriate (IUCN Standards and Petitions Committee 2019). However, given the lack of records, the number of mature individuals is assumed to be <250 with no subpopulation >50 mature individuals, and the species is assessed as Critically Endangered C2a(i).

For further information about this species, see [Supplementary Material](#).

Current Population Trend: Unknown

Habitat and Ecology (see Appendix for additional information)

Historically, the Pondicherry Shark was recorded inshore on continental and insular shelves from 10 to 150 m depth. Reports of it entering rivers have not been verified (Garrick 1985). Maximum size was 102 cm total length (TL); size at birth was <32 cm TL (Ebert *et al.* 2013), but its biology remains virtually unknown. Generation length is inferred from another small species of coastal carcharhinid shark, the Smalltail Shark (*Carcharhinus porosus*) which has an age-at-maturity of 6 years and a maximum age of 12 years (Lessa and Santana 1998) resulting in a generation length of 9 years.

Systems: Marine

Use and Trade

This species was probably utilized locally for human consumption.

Threats (see Appendix for additional information)

Shallow-water demersal coastal fisheries resources have been severely depleted across the range of the Pondicherry Shark (e.g. Stobutzki *et al.* 2006), and this species is unlikely to have found any refuge as fishing effort in coastal waters and on the continental shelf has been extensive. Shark fishing (targeted or bycatch) is widespread, intensive, and generally unregulated across its range and practices are well known to be unsustainable (e.g. Lam and Sadovy de Mitcheson 2011, Dharmadi *et al.* 2015, Arunrugstichai *et al.* 2018). Sharks are captured in commercial, artisanal, and subsistence fisheries with multiple fishing gears, including gillnet, trawl, hook and line, trap, and seine net and are generally retained for meat and fins. Other small-bodied resilient whaler sharks that are the mainstay of fisheries elsewhere are declining or have collapsed in India, including Spadenose Shark (*Scoliodon laticaudus*) and 'blacktip' sharks (*Carcharhinus* spp.) (Mohamed and Veena 2016), and this situation is repeated across the region.

The Pondicherry Shark was likely to be taken by inshore gillnet and line fisheries within its range and its small size suggests that like other small carcharhinids, it was susceptible to trawl fisheries. In India, there are over 13,400 gill netters operating along the west coast, with many other types of net gear deployed in coastal areas (CMFRI 2010). Furthermore, there were about 6,600 trawlers operating in the Indian state of Gujarat in the early 2000s (Zynudheen *et al.* 2004). This number almost doubled to 11,582 trawlers in 2010 (CMFRI 2010) and all Indian states have high numbers of trawlers operating. In Pakistan waters, about 14,000 fishing vessels, including about 2,000 shrimp trawlers, operate in shallow coastal and offshore shelf waters (M. Khan unpubl. data 2017). In Oman, almost 19,000 artisanal vessels operate in coastal waters using a variety of net and line gear (Jabado and Spaet 2017). These fishing vessel numbers highlight the intensity of coastal and shelf fisheries across the former range of the Pondicherry Shark.

Conservation Actions (see Appendix for additional information)

India is the only country across the range of this species with specific regulations protecting the Pondicherry Shark under Schedule I of the (Indian) Wildlife (Protection) Act, 1972.

Credits

Assessor(s): Kyne, P.M., Jabado, R.W., Akhilesh, K.V., Bineesh, K.K., Booth, H., Dulvy, N.K., Ebert, D.A., Fernando, D., Khan, M., Tanna, A. & Finucci, B.

Reviewer(s): Carlson, J. & Simpfendorfer, C.

Facilitator(s) and Compiler(s): Kyne, P.M., Jabado, R.W. & Finucci, B.

Authority/Authorities: IUCN SSC Shark Specialist Group (sharks and rays)

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External Resources

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Appendix

Habitats

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

Habitat	Season	Suitability	Major Importance?
9. Marine Neritic -> 9.4. Marine Neritic - Subtidal Sandy	Seasonal occurrence unknown	Unknown	-
9. Marine Neritic -> 9.5. Marine Neritic - Subtidal Sandy-Mud	Seasonal occurrence unknown	Unknown	-
9. Marine Neritic -> 9.6. Marine Neritic - Subtidal Muddy	Seasonal occurrence unknown	Unknown	-
9. Marine Neritic -> 9.10. Marine Neritic - Estuaries	Seasonal occurrence unknown	Unknown	-

Use and Trade

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

End Use	Local	National	International
Food - human	Yes	No	No

Threats

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

Threat	Timing	Scope	Severity	Impact Score
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.1. Intentional use: (subsistence/small scale) [harvest]	Ongoing	Whole (>90%)	Very rapid declines	High impact: 9
	Stresses:	2. Species Stresses -> 2.1. Species mortality		
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.2. Intentional use: (large scale) [harvest]	Ongoing	Whole (>90%)	Very rapid declines	High impact: 9
	Stresses:	2. Species Stresses -> 2.1. Species mortality		
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.3. Unintentional effects: (subsistence/small scale) [harvest]	Ongoing	Whole (>90%)	Very rapid declines	High impact: 9
	Stresses:	2. Species Stresses -> 2.1. Species mortality		

5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.4. Unintentional effects: (large scale) [harvest]	Ongoing	Whole (>90%)	Very rapid declines	High impact: 9
Stresses:		2. Species Stresses -> 2.1. Species mortality		

Conservation Actions in Place

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

Conservation Action in Place
In-place research and monitoring
Action Recovery Plan: No
Systematic monitoring scheme: No
In-place land/water protection
Conservation sites identified: No
Area based regional management plan: No
Occurs in at least one protected area: Unknown
Invasive species control or prevention: Not Applicable
In-place species management
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: No
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 Action Needed
1. Land/water protection -> 1.1. Site/area protection
3. Species management -> 3.2. Species recovery
4. Education & awareness -> 4.1. Formal education
5. Law & policy -> 5.1. Legislation -> 5.1.2. National level
5. Law & policy -> 5.4. Compliance and enforcement -> 5.4.2. National level

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
2. Conservation Planning -> 2.1. Species Action/Recovery Plan
3. Monitoring -> 3.1. Population trends
3. Monitoring -> 3.2. Harvest level trends

Additional Data Fields

Distribution
Lower depth limit (m): 150
Upper depth limit (m): 10
Population
Number of mature individuals: 249
Continuing decline of mature individuals: Yes
Extreme fluctuations: No
Extreme fluctuations in subpopulations: No
All individuals in one subpopulation: Unknown
No. of individuals in largest subpopulation: 49
Habitats and Ecology
Generation Length (years): 9

The IUCN Red List Partnership



The IUCN Red List of Threatened Species™ is produced and managed by the [IUCN Global Species Programme](#), the [IUCN Species Survival Commission \(SSC\)](#) and [The IUCN Red List Partnership](#).

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](#).