India Non-Detriment Finding for bowmouth guitarfish *Rhina ancylostoma* in the Indian Ocean | 2022 to 2026

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Contents

Summary

This document was prepared by a designated Indian CITES Scientific Authority, the Central Marine Fisheries Research Institute (ICAR-CMFRI), and is the result of an online workshop and ensuing discussions of the Demersal Fisheries Division of the Institute that took place during 5-7 August 2021. The following NDF guideline was used:

Mundy-Taylor, V., Crook, V., Foster, S., Fowler, S., Sant, G., and Rice, J. 2014. *CITES Non-detriment findings guidance for shark species. 2nd revised version. A framework to assist Authorities in making Non-detriment Findings (NDFs) for species listed in CITES Appendix II.* Report prepared for the Germany Federal Agency for Nature Conservation (Bundesamt fur Naturschutz, BfN). Available at https://cites.org/eng/prog/shark/Information_resources_from_Parties_and_other_stakeholders.

Contributors

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Acknowledgement

We acknowledge with gratitude the advice given by Daniel Fernando, Co-Founder, Blue Resources Trust, Sri Lanka and Rima Jabado, Chair – IUCN Shark Specialist Group and Advisory Committee Member (Asia) – CMS Sharks MoU, in the course of preparing this document.

Outcome

This bowmouth guitarfish (*Rhina ancylostoma*) NDF for India is "**negative**" and does not support international trade in this species. Additional research is mandatory to assess the status of the species and improvements are made to existing fisheries and trade management and monitoring frameworks as outlined in Section 6.

This NDF will be re-evaluated after 5 years, to gauge progress against the recommendations in Section 6 and updated with newly acquired data, before agreeing to a new NDF for 2027-2031.

Section 1. Preliminary considerations			
1.1 (a) Is the specimen subject to CITES controls?			
Species name	Product form	CITES Appendix	Source of identification
Bowmouth guitarfish (*Rhina ancylostoma*) FAO Code: RRY	Fins (export of fins of all shark species prohibited from India; however, evidence indicates trade of bowmouth guitarfish fins mixed with fins of other species) Meat (fresh and dried salted for human consumption) – *more data is required to confirm international trade of meat.* Cartilage (data lacking). Skin (international trade–leather) – *more data is required.* Liver oil (mixed with oil from other species, but domestic use only). Jaws & teeth (international trade) – more information required.	Appendix II	*Detached fins can be identified using:* FAO shark fin guide or *iSharkFin* software (FAO, 2016) http://www.fao.org/ipoa-sharks/tools/software/isharkfin/en/. *For whole animal identification:* Kizhakudan *et al.*, 2018. FAO Guides and expert identification by ICAR-CMFRI. *Utilisation:* Devadoss and Batcha, 1995. Compagno and Last, 1999. Raje and Joshi, 2003. Raje, 2006. Verlecar *et al.*, 2007 CMFRI, 2018 https://www.thehindu.com/news/cities/Kochi/police-seize-6000-kg-of-suspected-shark-fins/article19392270.ece ICAR- CMFRI, *unpubl. data* Akhilesh K. V.,*pers. obs.*, Kerala, Maharashtra Hong Kong Customs data (Bloom/Stan Shea, *pers. comm.*)
In view of the above, is the specimen subject to CITES controls?	YES	GO TO Question 1.1(b)	
Concerns and uncertainties:	There is a low risk that the species has been incorrectly identified; bowmouth guitarfishes are bycatch species, comprising 10.7% of guitarfishes landed in India during 2007-2020. Species-specific traceability is lacking in respect to bowmouth guitarfish product trade. Lack of sufficient information on the export of meat, jaws, oil, cartilage and hide.		

1.1 (b) From which stock will the specimen be taken/was the specimen taken?		
	Description/comments	Sources of information
Ocean basin	Indian Ocean	Kyne *et al.*, 2019 https://www.iucnredlist.org/species/41848/124421912#geographic-range
Stock location/ distribution/ boundaries	There is some information on distribution and population parameters in the Indian EEZ, but stock parameters and stock structure information are not available. Widely distributed in the Indo-West Pacific; presence from other ocean basins unknown.	Raje, 2006. Compagno and Last, 1999. Last *et al.*, 2016. Kizhakudan *et al.*, 2018. Kyne *et al.*, 2019 https://www.iucnredlist.org/species/ 41848/ 124421912#geographic-range
Is this a shared stock (i.e., occurring in more than one EEZ and/or the high seas)?	Possibility of straddling stock ranging between India's EEZ and likely other Indian Ocean EEZ's (e.g., Sri Lanka, Maldives) which need to be confirmed with genetic and tagging studies. Possibility of multiple stocks (if any) in the Indian Ocean needs to be confirmed with stock identification studies using advanced tools such as molecular analysis and tagging.	Compagno and Last, 1999 Last *et al.*, 2016 https://www.iucnredlist.org/species/41848/ 124421912#geographic-range
If the stock occurs in more than one EEZ, which other Parties share this stock?	The stock occurs in the EEZ of the other littoral states of the Indian Ocean.	https://www.iucnredlist.org/species/41848/ 124421912#geographic-range
If a high seas stock, which other Parties fish this stock?	The species is reported to inhabit areas with depths up to 70 m; only a single report from offshore waters.	Kyne *et al.*, 2019 Forget and Muir, 2021 https://www.iucnredlist.org/species/41848/124421912
Which, if any, RFB(s) cover(s) the range of this stock?	With respect to the Indian Ocean region: * Indian Ocean Tuna Commission (IOTC), *Asia-Pacific Fishery Commission (APFIC), *The Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO), *Commission for the Conservation of Southern Bluefin Tuna (CCSBT), *The Regional Organization for the Conservation of the Environment in the Red Sea and Gulf of Aden (PERSGA), * Regional Commission for Fisheries (RECOFI), * South Indian Ocean Fisheries Agreement (SIOFA), and *Southwest Indian Ocean Fisheries Commission (SWIOFC).	http://iotc.org http://www.apfic.org http://www.bobpigo.org https://www.ccsbt.org/ http://www.persga.org/ http://www.fao.org/fishery/rfb/recofi/en http://www.fao.org/fishery/rfb/siofa/en http://www.fao.org/fishery/rfb/swiofc/en

Are all Parties listed above (which fish or share the stock concerned) Members of the relevant RFB(s)?	Yes. They are Members or Cooperating Non-Contracting Parties of IOTC (except Myanmar). Most are CITES Parties and/or CMS, and some are also Signatories of the CMS Sharks MoU.	https://cites.org/eng/disc/parties/chronolo.php http://www.cms.int/sharks/en/signatories-range-states
Are there geographical management gaps?	Regional management: IOTC Working Party on Ecosystems and Bycatch (WPEB)– To review and analyse matters relevant to bycatch, byproduct and non-target species which are affected by IOTC fisheries for tuna and tuna-like species (i.e. sharks, marine turtles, seabirds, marine mammals and other fishes), as well as the ecosystems in which they operate; and to develop mechanisms which can be used to better integrate ecosystem considerations into the scientific advice provided by the Scientific Committee to the Commission. International measures: The FAO IPOA-Sharks (International Plan of Action-Sharks) underscores the responsibilities of fishing to coastal states for sustaining shark populations, ensuring full utilisation of retained shark species and improving shark data collection and monitoring. The formally adopted FAO Port State Measures Agreement is an agreement to prevent, deter and eliminate Illegal, Unreported and Unregulated (IUU) fishing. This agreement requires that any inspections conducted on fishing vessels entering ports includes verification that all species exploited have been taken in compliance with international law, international conventions and measures of RFMOs. National measures in the Indian Ocean: The management measures currently in place in the Indian Ocean vary across countries and are not implemented uniformly. Management measures in India are more in place for coastal fisheries. Export of shark fins is prohibited in India. Moreover, fins of guitarfishes are not solely traded or exported; however, evidence indicates that they form part of elasmobranch products exported from India. Species-specific information on trade is lacking.	https://www.iotc.org/science/wp/working-party-ecosystems-and-bycatch-wpeb Shinoj and Ramachandran, 2017 Ministry of Environment and Forest (Wildlife Division) F. No.4-36/2013 WL. 21 Aug 2013 Govt. of India. Notification number 110/(RE-2013) 2009-14, dt 6 Feb 2015 and 111/(RE-2013) 2009-14, dt 6 Feb 2015 Hong Kong Customs Data (Bloom/Stan Shea, *pers. comm.*)
How reliable is the information on origin?		High.

1.2 Was (will) the specimen (be) legally obtained and is export allowed?		
Is the species:	Description/comments	Sources of information
Protected under wildlife legislation, a regional biodiversity Agreement, or (for a CMS Party) listed in CMS Appendix I?	Not protected under India's legislation or a regional agreement. Appendix II of CITES (2019).	https://cites.org/eng/cop/18/prop/index.php
Sourced from illegal fishing activities (e.g., in contravention of finning regulations, or where a TAC is zero or exceeded)?	No.	
Taken from a no-take marine protected area or during a closed season?	No.	
Taken in contravention of RFB recommendations, if any?	Not in the Indian Ocean/IOTC.	
Listed as a species whose export is prohibited?	No.	
Of concern for any other reason?	Though the species is part of bycatch and not targeted directly, it is distributed in inshore areas which have high fishing pressure. Also, there is evidence that young ones are landed as bycatch at some locations along the Indian coast (details below).	ICAR-CMFRI, (*unpubl. data*) Purushottama *et al.*, 2022 Najmudeen T. M. (*pers. obs.*, Kerala) ICAR-CMFRI (*unpubl. data*)
In view of the above and the final section of the Worksheet for Question 1.1(b), was the specimen legally acquired and can exports be permitted?	YES	GO TO Question 1.3
Concerns and uncertainties:	Though not targeted, the species is distributed in areas of high fishing pressure where possibilities of its encountering fishing gears are high. Even though it is bycatch, substantial presence of juveniles in fishery landings has been observed at some locations along the Indian coastline. Occurrence of juveniles (mostly in trawl landings) has been observed in January, June, July, September and December at Chennai, north Tamil Nadu (Shoba J. K., *pers. obs.*, Tamil Nadu). The occurrence of juveniles (23-25%) was seen in inshore waters in Karnataka, India and the maximum density of juveniles were recorded from near shore waters during January-May & November (Purushottama *et al.*, 2022). Juvenile landings to the tune of 22% have been observed at Kochi, south-west coast of India (Najmudeen T. M., *pers. obs.*, Kerala).	

1.3 What does the available management information tell us?		
Part 1. Global-level information		
	Description/comments	Sources of information
Reported global catch	Capture fisheries data on "giant guitarfish" and "white spotted wedgefish" is available in the FAO global capture fisheries database; however, species-specific capture fisheries data on bowmouth guitarfish is lacking in the FAO database. Availability of catch/bycatch data from other States is variable across the region. Bowmouth guitarfish contributed 1.8-42.8% of the annual guitarfish landings in India during 2007-2020 (average10.7%).	www.fao.org/fishery/statistics/software/fishstatj/en National Marine Fisheries Data Centre (NMFDC), ICAR-CMFRI
Species distribution	Indo-West Pacific, from Persian Gulf to Australia and Japan. Bowmouth guitarfishes are inshore species, known to inhabit areas up to 70 m depths; usually found close to the bottom substratum.	Last *et al.*, 2016. Kyne *et al.*, 2019. (https://www.iucnredlist.org/species/41848/124421912)
Known stocks/ populations	Population dynamics and stock structure are poorly known. However, anecdotal evidence and historical catch data at various locations across its distribution range indicates localized population depletion. The landings of bowmouth guitarfish have declined by 86% during 2007-2020 in India.	Kyne *et al.*, 2019. (https://www.iucnredlist.org/species/41848/124421912) Jabado *et al.*, 2017.
Main catching countries	Incidental capture of bowmouth guitarfish as bycatch is reported from the following countries: Eastern IO (Area 51): Indonesia, India, Thailand, Bangladesh, Myanmar. Western IO (Area 57): Iran, Pakistan, India, Seychelles.	BOBLME, 2015. Haque *et al.*, 2018. Kyne *et al.*, 2019. Hartoko *et al.*, 2020. D'Alberto *et al.*, 2021 (pre-print) http://firms.fao.org/firms/fishery/363/en#CapturedSpecies NMFDC, ICAR-CMFRI
Main gear types by which the species is taken	The species is caught in gillnet and trawl fisheries across its distribution range in the Indo-West Pacific. In India, this species is caught as bycatch mainly in trawl nets and gillnets; rarely caught as bycatch in hooks and lines.	Jabado *et al.*, 2017. Kyne *et al.*, 2019. Raje, 2006. Kizhakudan *et al.*, 2015. NMFDC, ICAR-CMFRI
Global conservation status	*Current IUCN Status:* Globally: Critically Endangered (December 2018) Western Indian Ocean: Vulnerable (2017) *Previous IUCN Status:* Globally: Vulnerable (2016)	Kyne *et al.*, 2019. (https://www.iucnredlist.org/species/41848/124421912) Jabado *et al.*, 2017. McAuley *et al.*, 2016.
Multilateral Environmental Agreements	None	

Part 2. Stock/context-specific information		
	Description/comments	Sources of information
Stock assessments	No quantitative stock assessment or fishery indicators of status are currently available for bowmouth guitarfish in the Indian Ocean; however, anecdotal evidence and historical catch data at various locations across its distribution range indicates localized population depletion. The landings of bowmouth guitarfish in India has declined by 86% during 2007 to 2020.	Kyne *et al.*, 2019. (https://www.iucnredlist.org/species/41848/124421912) NMFDC, ICAR-CMFRI
Main management bodies	National fisheries management agencies in India: Ministry of Fisheries, Animal Husbandry & Dairying, Ministry of Agriculture, the Ministry of Environment, Forest and Climate Change and the State Departments of Fisheries. IOTC: Working Party on Ecosystems and Bycatch; Scientific Committee; Commission (includes guitarfishes in general), CITES, BOBLME (Phase 2), CBD, and FAO–IPOA.	https://dof.gov.in https://cof.gujarat.gov.in/contact-us.htm https://fisheries.maharashtra.gov.in/ http://fisheries.goa.gov.in/ http://www.karnataka.gov.in/fisheries/Pages/Home.aspx http://www.fisheries.kerala.gov.in/ http://www.fisheries.tn.gov.in/ https://www.py.gov.in/knowpuducherry/dept_fisheries.html http://apfisheries.gov.in/ http://www.odishafisheries.com/ http://www.wbfisheries.gov.in/wbfisheries/do/Forwordlink?val=32 http://agricoop.nic.in/# http://www.moef.nic.in/ http://www.iotc.org
Cooperative management arrangements	In addition to arrangements and support to scientific bodies and expert groups for the implementation of the Common Fisheries Policy (ICES- International Council for Exploration of the Sea, STECF Scientific Technical and Economic Committee for Fisheries, JRC-Joint Research Centre etc.), the European Union supports through voluntary contributions scientific research for sharks and mitigation of bycatch in the RFMOs to which it is Party (e.g., IOTC, WCPFC, IATTC, ICCAT). The Areas Beyond National Jurisdiction Program (ABNJ) aims to improve cooperation between tuna RFMOs. The IOTC and WCPFC are trialling a Bycatch Data Exchange Protocol Template (BDEP) that aims to provide a framework for consistent management of bycatch data within RFMOs. A 2016 IOTC report recommends that this BDEP continue in 2017 for the Indian Ocean (IOTC–2016–WPDCS12–28 Rev_1).	http://www.commonoceans.org/tuna-biodiversity/en/ IOTC–2016–WPDCS12–28 Rev_1. http://www.iotc.org/documents/bycatch-data-exchange-protocol-indian-ocean

Non-membership of RFBs	Most of the countries which catch bowmouth guitarfish as bycatch in their marine fisheries (India, Thailand, Pakistan, Indonesia, Iran I.R) are members of IOTC (except Myanmar).	http://www.iotc.org
Nature of harvest	Bowmouth guitarfishes are taken in Indian waters as a secondary (retained) catch in trawl net and gillnet fisheries; rarely in hook and line fisheries.	NMFDC, ICAR-CMFRI
Fishery types	Trawl fisheries and gillnet fisheries as bycatch in India; rarely in hook and line fisheries.	NMFDC, ICAR-CMFRI Purushottama *et al.*, 2022
Management units	IOTC: Working Party on Ecosystems and Bycatch; Scientific Committee; Commission (includes guitarfishes in general). India manages its marine fish resources through state and national authorities. The generic fisheries management regulations fall under the Marine Fisheries Regulation Acts (MFRA) of States and the National Marine Fisheries Policy of the Govt. of India. State Fisheries Departments (SFDs), Ministry of Fisheries, Animal Husbandry & Dairying, Ministry of Agriculture, Cooperation & Farmers Welfare (MoA), and the Ministry of Environment, Forests and Climate Change (MoEF&CC).	http://www.iotc.org https://dof.gov.in https://dahd.nic.in/news/notification-national-policy-marine-fisheries-2017 https://cof.gujarat.gov.in/contact-us.htm https://fisheries.maharashtra.gov.in/ http://fisheries.goa.gov.in/ http://www.karnataka.gov.in/fisheries/Pages/Home.aspx http://www.fisheries.kerala.gov.in/ http://www.fisheries.tn.gov.in/ https://www.py.gov.in/knowpuducherry/dept_fisheries.html http://apfisheries.gov.in/ http://www.odishafisheries.com/ http://www.wbfisheries.gov.in/wbfisheries/do/Forwordlink?val=32 http://agricoop.nic.in/# http://www.moef.nic.in/
Products in trade	Meat (fresh & dried (mostly)) is utilised domestically for human consumption in India. Extent of international meat trade (if any) is currently unknown. Jaws, teeth, and skin possibly enter international trade. Export of shark fins is prohibited in India. Moreover, fins of guitarfishes are not solely traded or exported; however, anecdotal evidence indicates that they may form part of elasmobranch products exported from India. Species-specific information on trade is lacking. Oil is mixed with the liver oil of other elasmobranchs, but thought to be utilised domestically.	Devadoss and Batcha, 1995 Compagno and Last, 1999. Raje and Joshi, 2003. Raje, 2006. Verlecar *et al.*, 2007 ICAR- CMFRI, *unpubl. data* Hong Kong Customs data (Bloom/Stan Shea, *pers. comm.*)

<table>
<tr><th colspan="3">Part 3. Data and data sharing</th></tr>
<tr><td></td><td>Description/comments</td><td>Sources of information</td></tr>
<tr><td>Reported national catch(es)</td><td>Annual catch:
<table>
<tr><th>Year</th><th>Landings (t)</th><th>Year</th><th>Landings (t)</th></tr>
<tr><td>2007</td><td>620</td><td>2014</td><td>288</td></tr>
<tr><td>2008</td><td>662</td><td>2015</td><td>105</td></tr>
<tr><td>2009</td><td>96</td><td>2016</td><td>106</td></tr>
<tr><td>2010</td><td>247</td><td>2017</td><td>112</td></tr>
<tr><td>2011</td><td>187</td><td>2018</td><td>205</td></tr>
<tr><td>2012</td><td>147</td><td>2019</td><td>78</td></tr>
<tr><td>2013</td><td>207</td><td>2020</td><td>85</td></tr>
</table></td><td>NMFDC, ICAR-CMFRI.</td></tr>
<tr><td>Are catch and/or trade data available from other States fishing this stock?</td><td>Capture fisheries data on “giant guitarfish” and “white spotted wedgefish” are available in the FAO global capture fisheries database; however, species-specific capture fisheries data on bowmouth guitarfish is lacking in the FAO database. Availability of catch/bycatch data from other States is variable across the region.</td><td>www.fao.org/fishery/statistics/software/fishstatj/en</td></tr>
<tr><td>Reported catches by other States</td><td>Catches have been reported by Indonesia, Thailand, Pakistan and Iran for the Indian Ocean.</td><td></td></tr>
<tr><td>Catch trends and values</td><td>Despite the lack of species-specific data, there is some information suggesting that wedgefish and guitarfish population has declined over recent years in the Indian Ocean.
In India, the landings of bowmouth guitarfish have declined by 86% from 2007 to 2020.</td><td>Kyne et al., 2019 (https://www.iucnredlist.org/species/41848/124421912)
Jabado et al., 2017
NMFDC, ICAR-CMFRI</td></tr>
<tr><td>Have RFBs and/or other States fishing this stock been consulted during or contributed data during this process?</td><td>No.
This NDF will be made public in order to enable other range states to make informed decisions for the management of the stock as a whole for the Indian Ocean.</td><td></td></tr>
</table>

Section 2. Intrinsic biological and conservation concerns

2.1 What is the level of intrinsic biological vulnerability of the species?

Intrinsic biological factors	Level of vulnerability	Indicator/metric
Median age at maturity	Low	
	Medium	Age at maturity is 4-6 years in males and females.
	High	
	Unknown	

<table>
<tr><td rowspan="4">Median size at maturity</td><td>Low</td><td></td></tr>
<tr><td>Medium</td><td></td></tr>
<tr><td>High</td><td>Bowmouth guitarfish size at maturity also varies between ocean regions, ranging globally from 157 to 178 cm TL for males (Compagno and Last, 1999) and 150-175 cm (Last et al., 2016). In the Indian Ocean, size at maturity for males and females has been estimated at 164 cm TL and 183 cm (Purushottama et al., 2022) off Karnataka.</td></tr>
<tr><td>Unknown</td><td></td></tr>
<tr><td rowspan="4">Maximum age/ longevity in an unfished population</td><td>Low</td><td></td></tr>
<tr><td>Medium</td><td>In the Western Pacific Ocean, the maximum age recorded for females was 7 years (Last and Stevens, 2009; Michael, 1993) in public aquarium. The longevity of females is estimated as 19 years; (Purushottama et al.,2022).
Longevity has not been reported for males.</td></tr>
<tr><td>High</td><td></td></tr>
<tr><td>Unknown</td><td></td></tr>
<tr><td rowspan="3">Maximum size</td><td>Low</td><td></td></tr>
<tr><td>Medium</td><td>Maximum size of 300 cm was reported from Thailand by Vidthayanon (2005); 295 cm (Purushottama et al.,2022) and 291 cm (Najmudeen T. M. and Livi W., pers. obs., Kerala) from India; 270 cm (Compagno and Last, 1999; Last et al., 2016); 250 cm (White and Dharmadi, 2007) from Eastern Indonesia and 294 cm (Jabado, 2018) from UAE.
Maximum sizes recorded for females and males from different coasts in India are presented in the table below:
<table>
<tr><th>Sex</th><th>Measure (TL cm)</th><th>Location</th><th>References</th></tr>
<tr><td rowspan="10">F</td><td>236</td><td>East coast</td><td>Devadoss and Batcha, 1995, Raje et al., 2007</td></tr>
<tr><td>295</td><td>Off Karnataka</td><td>Purushottama et al., 2022</td></tr>
<tr><td>192</td><td>Off Andhra Pradesh</td><td>Muktha M., pers. obs.</td></tr>
<tr><td>168</td><td>Off Tamil Nadu</td><td>Remya L., pers. obs.</td></tr>
<tr><td>218</td><td>Off Maharashtra</td><td>Purushottama G. B. & Akhilesh, K. V., pers. obs.</td></tr>
<tr><td>291</td><td>Off Kerala</td><td>Najmudeen T. M., pers. obs.</td></tr>
<tr><td>203</td><td>Off West Bengal</td><td>Swatipriyanka S., pers. obs.</td></tr>
<tr><td>162</td><td>Off Odisha</td><td>Subal K. R. pers. obs.</td></tr>
<tr><td>210</td><td>Off Gujarat</td><td>Swatipriyanka Sen, pers. obs.</td></tr>
<tr><td>225</td><td>North Tamil Nadu</td><td>ICAR-CMFRI unpubl. data</td></tr>
</table></td></tr>
</table>

<table>
<tr><td rowspan="12">Maximum size</td><td rowspan="11"></td><td>M</td><td>235</td><td>Off Karnataka</td><td>Purushottama et al., 2022</td></tr>
<tr><td></td><td>175</td><td>Off Andhra Pradesh</td><td>Muktha M., pers. obs.</td></tr>
<tr><td></td><td>152</td><td>Off Tamil Nadu</td><td>Remya L., pers. obs.</td></tr>
<tr><td></td><td>225</td><td>Off Maharashtra</td><td>Purushottama G. B. & Akhilesh K. V., pers. obs.</td></tr>
<tr><td></td><td>110</td><td>Off Odisha</td><td>Subal K. R. pers. obs.</td></tr>
<tr><td></td><td>165</td><td>Off West Bengal</td><td>Swatipriyanka Sen, pers. obs.</td></tr>
<tr><td></td><td>233</td><td>Off Kerala</td><td>Najmudeen T. M., pers. obs.</td></tr>
<tr><td></td><td>190</td><td>North Tamil Nadu</td><td>ICAR-CMFRI unpubl. data</td></tr>
<tr><td>U</td><td>210</td><td>Off Maharashtra</td><td>Raje, 2006</td></tr>
<tr><td></td><td>215</td><td>Off Gujarat</td><td>Borrell et al., 2011</td></tr>
<tr><td>High</td><td colspan="4">Growth parameters estimated from Indian waters tentatively indicates the L_{∞} to be 305 cm TL and K is 0.15^{-yr} (Purushottama G. B., unpubl. data).</td></tr>
<tr><td>Unknown</td><td colspan="4"></td></tr>
<tr><td rowspan="4">Natural mortality rate (M)</td><td>Low</td><td colspan="4"></td></tr>
<tr><td>Medium</td><td colspan="4"></td></tr>
<tr><td>High</td><td colspan="4"></td></tr>
<tr><td>Unknown</td><td colspan="4">No information currently from India. A study is in progress.</td></tr>
<tr><td rowspan="4">Maximum annual pup production (per mature female)</td><td>Low</td><td colspan="4"></td></tr>
<tr><td>Medium</td><td colspan="4">2-11 pups were reported by Last et al., 2016.
Numbers of pups per litter vary between different coasts in India. Raje et al. (2007) also reported litter size of 2-11 off Maharashtra. 2-8 by Devadoss and Batcha (1995) off Tamil Nadu, 2-6 at Chennai, Tamil Nadu (Shoba J. K., pers. obs.) and 2-8 in a recent study off Karnataka (Purushottama et al., 2022). No information is available on gestation period/periodicity of births. Females exhibited a non-seasonal reproductive cycle (Purushottama et al., 2022) in Indian waters. However, pregnant females have been observed in gillnet landings in April, July, August and October in north Tamil Nadu coast of India (ICAR-CMFRI unpubl. data).</td></tr>
<tr><td>High</td><td colspan="4"></td></tr>
<tr><td>Unknown</td><td colspan="4"></td></tr>
<tr><td rowspan="4">Intrinsic rate of population increase (r)</td><td>Low</td><td colspan="4"></td></tr>
<tr><td>Medium</td><td colspan="4"></td></tr>
<tr><td>High</td><td colspan="4">0.319 (ICAR-CMFRI, unpubl. data)</td></tr>
<tr><td>Unknown</td><td colspan="4"></td></tr>
<tr><td rowspan="4">Geographic distribution of stock</td><td>Low</td><td colspan="4">Widespread</td></tr>
<tr><td>Medium</td><td colspan="4"></td></tr>
<tr><td>High</td><td colspan="4"></td></tr>
<tr><td>Unknown</td><td colspan="4"></td></tr>
</table>

Current stock size relative to historic abundance	Low	
	Medium	
	High	
	Unknown	No data available.
Behavioural factors	Low	
	Medium	
	High	Although bowmouth guitarfishes are recorded as deep as 70 m, they generally prefer shallow waters fairly close to shore in or near coral reefs or mangroves at depths of 3-70 m, with a preference for sand and mud bottoms and are also found in the water column but may swim above the bottom (Michael, 1993; Carpenter *et al.*, 1997; Compagno and Last, 1999; Last *et al.*, 2016). Females move inshore for breeding and often use near-shore areas as nurseries, and feeding grounds (Purushottama *et al.*, 2022). The occurrence of juveniles (23-25%) in inshore water fishery in Karnataka, India shows that the females move towards the coast for breeding; the maximum density of juveniles was recorded from nearshore waters during January-May & November (Purushottama *et al.*, 2022). Occurrence of juveniles (mostly in trawl landings) has been observed in January, June, July, September and December along the north Tamil Nadu coast (ICAR-CMFRI *unpubl. data*). Critical habitats are unknown.
	Unknown	
Trophic level	Low	3.18 based on diet studies (Borrell *et al.*, 2011)
	Medium	
	High	
	Unknown	

SUMMARY for Question 2.1 Intrinsic biological vulnerability of species		
High		

The bowmouth guitarfish is a less abundant, widely distributed species in the tropical coastal waters of the western Indo-Pacific. Its critical habitats are unknown.

Bowmouth guitarfish reproduction is poorly understood. Few studies are available on its maturity size, litter size, other aspects of reproductive biology is unknown.

Very little is known about the life history characteristics of this species.

They are relatively long lived (nearly 20 years), expected to be mature relatively late (5-6 years), and have relativity few offspring (<11 pups every one or two years). These life history characteristics make it vulnerable to fishing though it is a bycatch in Indian waters.

Bowmouth guitarfishes are often taken as bycatch in trawls and gillnets in the Indian Ocean.

This conclusion is derived primarily from: Compagno and Last, 1999; Last *et al.*, 2016; Last and Stevens, 2009; Michael, 1993; Jabado, 2018; Devadoss and Batcha, 1995; Raje *et al.*, 2007; Carpenter *et al.*, 1997; Jabado *et al.*, 2017.

2.2 What is the severity and geographic extent of the conservation concern?

Conservation concern factors	Level of severity / scope of concern	Indicator/metric
Conservation or stock assessment status	Low	
	Medium	
	High	Decline in landings, low productivity
	Unknown	

Comments: The ecological risk assessment (ERA) for the Indian Ocean (Murua *et al.*, 2012) was a semi-quantitative risk assessment analysis to evaluate the resilience of shark species to the impact of a given fishery, by combining the biological productivity of the species and its susceptibility to each fishing gear type. ERA has not been done in the Indian waters for bowmouth guitarfishes. But considering the decline in landings and low fecundity and late maturity, the species is considered as highly susceptible to fishing pressure. Since it inhabits the coastal waters where human interference in many ways can lead to habitat degradation, the species faces the added risk of population decline due to habitat loss in Indian waters.

IUCN Red List Status: Globally: Critically Endangered (Kyne *et al.*,2019, December 2018)., https://www.thainationalparks.com/species/rhina-ancylostoma

Population trend	Low	
	Medium	
	High	
	Unknown	Indian Ocean: There are no stock assessment trend data available. Decline in landings is observed in Indian waters (NMFDC, ICAR-CMFRI). The IUCN Red List notes that the status of the stock is declining in the Indian Ocean.

Comments:

IUCN reported that species-specific trawl landings in Indian waters showed a decline of 86% for the bowmouth guitarfish during 2002-2006 (Mohanraj *et al.*, 2009). However, this period is too short to derive equivalent population reduction over three generations. The NMFDC-CMFRI estimates showed a decline of 86% in landings from 2007-2020 in the region.

Indo-West Pacific: Landings data for the 'giant guitarfish' category are available from Iran for 1997–2016 (20 years; FAO, 2018), including *Rhina ancylostoma*, *Rhynchobatus australiae*, *Rhynchobatus djiddensis*, the smoothnose wedgefish (*Rhynchobatus laevis*), the sharpnose guitarfish (*Glaucostegus granulatus*) and *Glaucostegus halavi*. It showed the landings declined by 67% over this period, the equivalent of an 81 and 91% population reduction over the last 3 GL of smaller species (30 years) and larger species (45 years), respectively (Kyne *et al.*, 2019).

Landings data for Rhinopristiformes are available from Pakistan for 1993–2011 (19 years) including *Rhina ancylostoma*, *Rhynchobatus australiae*, *Rhynchobatus laevis*, *Glaucostegus granulatus*, *Glaucostegus halavi*, *Glaucostegus obtusus*, and *Rhinobatos annandalei* showed 98% population reduction over the last 3 GL of smaller species (30 years) and larger species (45 years), respectively (Kyne *et al.*, 2019).

In Indonesia, landings declined by 88% over this period, the equivalent of >99% population reduction over the last 3 GL of both smaller species (30 years) and larger species (45 years) including *Rhina ancylostoma*, *Rhynchobatus australiae*, *Rhynchobatus cooki*, *Rhynchobatus palpebratus*, and *Rhynchobatus springeri*. It may also include giant guitarfishes (Kyne *et al.*, 2019).

In Australian waters, the wedgefish and giant guitarfish populations may be in a better state as fishing effort is relatively low and the use of turtle exclusion devices in trawl fisheries reduces the catch of large rays (Brewer *et al.* (2006) recorded a reduction of 94%, and there are some controls on wedgefish catch and retention. However, the estimates of fishing mortality rates for wedgefish and giant guitarfish species in the Northern Prawn Fishery (the largest Australian fishery to interact with these species) are well below the reference points that would lead to significant population declines (Zhou and Griffiths, 2008).

Geographic extent/ scope of conservation concern	None	
	Low	
	Medium	
	High	
	Unknown	

Comments: Bowmouth guitarfishes are landed as bycatch, usually not targeted. Although at times, trawlers face difficulty due to their heaviness and thorny skin which damage the other catch, they are still retained for sale. By nature,the species dwells in the coastal waters and thus may be subjected to exploitation by multiple gears. It may also be affected by pollution and habitat degradation. The population is at high risk in Indian waters.

SUMMARY for Question 2.2

Severity and geographic extent of conservation concern

Assess the overall severity and geographic extent of the conservation concern for this species or stock (tick appropriate box below). Explain how conclusions were reached and the main sources of information used.

High		

Explanation of conclusion and sources of information used:

Bowmouth guitarfishes are landed as bycatch and they are low fecund, low productivity species. Population trends in the other major ocean basins, combined with limited trend data and information on threats from the Indian Ocean, indicate that the status of the Indian Ocean stock is also of concern. The conservation needs of and threats to this species are therefore high in the Indian Ocean.

Given the importance of this species in various fisheries and the lack of data to evaluate the population trend in the Indian Ocean, the bowmouth guitarfish population should be constantly monitored to assure their conservation and management.

This conclusion is derived primarily from: Zynudheen *et al.*, 2004; CMFRI, 2010; Jabado *et al.*, 2017; White and Dharmadi, 2007; Purushottama *et al.*, 2022.

Section 3. Pressure on Species

3.1 What is the severity of trade pressure on the stock of the species concerned?

Factor	Level of severity of trade pressure	Indicator/metric	
(a) Magnitude of legal trade	Low		
	Medium	Lack of species-specific trade data	
	High		
	Unknown		

Level of confidence:

	Low	Medium	High

Reasoning

Guitarfishes and wedgefishes are of commercial importance and heavily utilized for their meat in India. They are landed whole, with fins attached and utilized fully. They are usually consumed locally and traded for meat. Skin may be utilized. Though their catches are incidental or a bycatch of fisheries mainly trawl, complete utilization for meat is practiced in fresh, dry and salted forms.

Only generic declaration of export is done in India. Information on Hong Kong imports of shark fins from India indicate that the consignments are labelled as "dried shark fins" and there is no species-wise categorisation (Hong Kong Customs data from Bloom, Stan Shea, *pers. comm.*).

While little species-specific information is available, large whole wedgefishes (>200 cm total length; TL) are traded for a high value of up to US$680 each; however, smaller specimens, and even large bowmouth guitarfish (>150 cm TL) can sell for low value (Jabado, 2018). The 'white' fins of shark-like rays (including wedgefishes and giant guitarfishes) are considered the best quality fins for human consumption and are among the highest valued in the international shark fin trade (Suzuki, 2002; Dent and Clarke, 2015; Moore, 2017).

In Thailand, the enlarged thorns of this species are used to make bracelets (https://www.thainationalparks.com/species/rhina-ancylostoma).

(b) Magnitude of illegal trade	Low	
	Medium	
	High	
	Unknown	Shark fin exports from India have been prohibited since 2015. There have been some seizures in Sri Lanka and Hong Kong of smuggled shark fins from India, which may include fins of *Rhina ancylostoma.* Hong Kong Customs records imports by country, including from India; however, species-wise records are not available. There have been known cases where entire consignments of shark products have been confiscated before export or revoked back to India from the destination port and fresh trade permits issued after confirmation of species if the products are found to be non-fin commodities. However, there are no confirmed reports on the presence of *Rhina ancylostoma* commodities in exports from India.

Level of confidence:

	Low	Medium	High

Reasoning*:*

No valid record of export of bowmouth guitarfish fins from India. The Union Ministry of Commerce and Industry prohibited the export of fins of all species of shark, by way of a notification on February 6 2015 (Notification No. 110 (RE-2013)/2009-2014) inserting a new entry in 'Chapter 3 of Schedule 2 of ITC (HS) Classification of Export and Import Items.' The new entry (31 A) resulted in the ban on export of all shark fins. The shark fins, may be applicable to fins of *Rhina ancylostoma*, as well as other species of guitarfishes since there is no exclusive trade of the fins of these fishes; they are usually a part of fin consignments of shark species.

Letter from WWF India to MoEF& CC regarding potential illegal shark fin export- from India to Hong Kong, dated 18th April 2017- reports that from 2015-16, 139,558 kg of dried shark fin with a value of Hong Kong dollar 49,562,000/- was exported from India or via other countries to Hong Kong, and in Jan-Feb 2017about 1,280 kg of suspected scheduled hammerhead sharks and oceanic white tip sharks were seized in four containers, one being from India without any relevant permits attached. The exact species composition of the consignments is unknown, hence the possibility of fins of *Rhina ancylostoma* being a part of the same cannot be ruled out.

Hong Kong Customs trade data for imports from India, 1998-2016, peaked at over 430,000 kg in 2000 and then fell to <100,000 kg in 2007, recovered slightly for a few years and declined again to below 100,000 kg in 2012. By 2015, imports from India were 80,850 kg, and fell after the export ban to 58,708 kg, and further to 12476 kg in 2019 and 2799 kg in 2020 (Hong Kong customs data provided by Bloom/Stan Shea, *pers. comm.*). Steady decline in quantum of fins imported from India from 2015 to 2020 suggest that the consignments could be residual stock existing with the traders before implementation of the shark fin trade ban. It is not clear whether fresh stocks are included in these consignments.

In 2017, a consignment of shark fins was confiscated by JNPT, Mumbai and referred to ICAR-CMFRI for confirming the species, whereupon it was found that fins of *Rhina ancylostoma* were also present in the consignment, along with fins of several other important shark species (Akhilesh K. V., *pers. obs.*).

Forensic identification of shark fin samples seized by the wildlife department, using mitochondrial CO1 sequences at CMFRI Kochi in 2017-18 also indicated the presence of fins of *Rhina ancylostoma* along with fins of other sharks (CMFRI, 2018; https://www.thehindu.com/news/cities/Kochi/police-seize-6000-kg-of-suspected-shark-fins/article19392270.ece).

Samples of shark fins submitted on more than one occasion during 2015-2017 to ICAR-CMFRI by an exporter based in Chennai, to confirm identity of the species at the behest of the Wildlife Crime Control Bureau, indicated the presence of fins of the bowmouth guitarfish along with fins of other sharks (Shoba J. K., *pers. obs.*).

3.2 What is the severity of fishing pressure on the stock of the species concerned?			
Factor	Level of severity of fishing pressure	Indicator/metric	
Fishing mortality (retained catch)	Low		
	Medium		
	High	There is virtually no discard of bowmouth guitarfish from Indian fisheries; fisheries mortality is therefore ~100%.	
	Unknown		
Level of confidence:			
	Low	Medium	High
Reasoning*:* There is no record of bowmouth guitarfishes in discards studied in CMFRI. With both meat and fins (traded as shark fin) entering the trade chain, the whole body is retained and utilized fully. Average reported catch decreased from 620 t in 2007 to 85 t in 2020, indicating possible fishing pressure impacts (NMFDC,ICAR-CMFRI). (CMFRI, 2018; https://www.thehindu.com/news/cities/Kochi/police-seize-6000-kg-of-suspected-shark-fins/article19392270.ece).			
Discard mortality	Low	There are virtually no discards of bowmouth guitarfish from Indian fisheries.	
	Medium		
	High		
	Unknown		
Level of confidence:			
	Low	Medium	High
Reasoning: The discard mortality is low in case of bowmouth guitarfish due to its commercial importance. Trawl discard composition studies from India donot report this species in discards along the coast (Dineshbabu *et al*., 2013; Lobo *et al*., 2010). All guitarfish bycatch in other fisheries is fully utilised (Kizhakudan *et al*., 2015; ICAR-CMFRI *unpubl. data*).			

Factor	Level of severity of fishing pressure	Indicator/metric	
Size/age/ sex selectivity	Low		
	Medium	There is no targeted or selective fishing for the species in India, however due to seasonal aggregations there may be occasional catches in high numbers of juveniles/breeding adults.	
	High		
	Unknown		
Level of confidence:			
	Low	Medium	High
Reasoning: Since the species is not targeted in the commercial fishery, it is landed as bycatch in juvenile and adult forms according to its seasonality of occurrence. Pregnant females have been observed in gillnet landings in April, July, August and October. Occurrence of juveniles and subadults (mostly in trawl landings) has been observed in January, June, July, September and December along north Tamil Nadu coast (ICAR-CMFRI *unpubl. data*). The occurrence of juveniles (23-25%) in inshore water fishery in Karnataka shows that the females move towards the coast for breeding; the maximum density of juveniles was recorded from near shore waters during January-May & November (Purushottama *et al*., 2022). Juveniles and subadults (50-160 cm) were found to form 10 and 5% of the bowmouth guitarfishes in trawl landings along Odisha and West Bengal coast during June-September. However, in gillnets mostly larger sizes (165-203 cm) were landed (Subal K. R. and Swatipriyanka Sen, *per. obs*.). Observations from east and west coasts of India shows that although adults aging 4-10 years are dominant in the fishery (ICAR-CMFRI *unpubl. data*), juveniles are also landed seasonally.			
Magnitude of illegal, unreported and unregulated (IUU) fishing	Low		
	Medium		
	High		
	Unknown	Information about this factor is unavailable.	
Level of confidence:			
	Low	Medium	High
Reasoning: No verifiable records from India on the IUU fishing of this species. Issues of IUU fishing by IOTC's IUU provisions (IOTC-2016-CoC13-CR27 Rev1). The BOBP-IGO organized the 'National Workshop for Preparation of Plan of Action to Prevent Deter and Eliminate Illegal, Unreported and Unregulated Fishing' during 23 – 24 April 2018 in Chennai and the Report of the Workshop was sent to the Ministry of Fisheries, Animal Husbandry and Dairying for further action at their end. Subsequently, the BOBP-IGO in collaboration with the member-countries (Bangladesh, India, Maldives, Sri Lanka) also organized a couple of activities to prepare the draft Regional Plan of Action on IUU Fishing (RPOA-IUU). The RPOA-IUU is now with the Bangkok Office of FAO and will be further taken up once the BOBLME Phase 2 starts (BOBP-IGO, 2021, personal communication).			

Section 4. Existing management measures		
Preliminary compilation of information on existing management measures		
Existing management measures	Is the measure generic or species-specific?	Description/comments/sources of information
(Sub)-National		
Fins-attached policy	Generic	In August 2013, the Ministry of Environment and Forests (Wildlife Division) approved a policy advisory by ICAR-CMFRI on shark finning (vide F. No4-36/2013WL, 21 August 2013), prohibiting the removal of shark fins on board a vessel in the sea, and advocating landing of the whole shark.
Ban on shark fin export – Department of Commerce of Ministry of Commerce and Industry	Generic	The Union Ministry of Commerce and Industry prohibited the export of fins of all species of shark, by way of a notification on February 6 2015 (Notification No. 110 (RE-2013)/2009-2014) inserting a new entry in 'Chapter 3 of Schedule 2 of ITC (HS) Classification of Export and Import Items.' The new entry (31 A) resulted in the ban on export of all shark fins.
Seasonal ban on mechanized fishing	Generic	Closure of mechanized fishing activities for 60 days from 15th April to 15th June along east coast and 1st June to 31st July along west coast (both days inclusive), implemented through State MFRAs.
No take zones	Generic	There are 129 Marine Protected Areas where fishing activities are regulated (Sivakumar, 2013; ENVIS, 2021: Marine Protected Areas (wiienvis.nic.in)).
Fishing effort management; fleet-size optimization; mainstreaming biodiversity conservation in production processes; species-specific and area-specific management plans; protection of iconic and endangered and threatened (ETP) species; spatial and temporal measures for sustainable utilization of resources; and creation of fish refugia	Generic	National Policy on Marine Fisheries – 2017 https://dahd.nic.in/news/notification-national-policy-marine-fisheries-2017

Gear-specific regulations	Generic	Regulation of mesh size, restrictions on operation of certain gears like ring seines, purse seines and pair trawling, implemented through State MFRAs. http://indianfisheries.icsf.net/en/page/827-Indian%20Legal%20Instruments.html http://old.icsf.net/icsf2006/uploads/resources/legalIndia/pdf/english/state/1112187832409***Gujarat_Marine_Fisheries_Rules_2003.PDF http://old.icsf.net/icsf2006/uploads/resources/legalIndia/pdf/english/state/1112240177836***Maharashtra_Marine_Fishing_Regulation_Rules,_1982.PDF http://164.100.150.120/mpeda/pdf/state_mfras/mfra_goa.pdf http://164.100.150.120/mpeda/pdf/state_mfras/mfra_karnataka_1987.pdf http://164.100.150.120/mpeda/pdf/state_mfras/mfra_kerala.pdf http://164.100.150.120/mpeda/pdf/state_mfras/mfra_tamil_nadu.pdf http://old.icsf.net/icsf2006/uploads/resources/legalIndia/pdf/english/state/1165227972133***Andra_Pradesh_Marine_Fishing_Regulation_Rules_1995_Amendment_dated_26th_October_2004.PDF http://164.100.150.120/mpeda/pdf/state_mfras/mfra_orrissa.pdf http://old.icsf.net/icsf2006/uploads/resources/legalIndia/pdf/english/state/1112241236819***West_bengal_Marine_Fishing_Regulation_(Amendment)_Rules,_1998.PDF
Existing management measures	Is the measure generic or species- specific?	Description/comments/sources of information
Regional/International		
CITES	Species-specific	Listing of *Rhina ancylostoma* in Appendix II of CITES in 2019

4.1: Are existing management measures appropriately designed and implemented to mitigate pressures affecting the stock?			
Factor	Existing management measure(s)	Relevant monitoring, control and surveillance (MCS) measure(s)	Overall assessment of compliance regime
Trade Pressure			
Magnitude of legal trade	In 2015, India introduced a ban on the export of all shark fins. All other product trade is legal.	Exports must be declared. Customs inspections of a random selection of containers is undertaken at point of export. Wildlife Crime Control Bureau is responsible for regulation/monitoring of wildlife trade. In many cases, samples from the consignments are referred to ICAR-CMFRI for identification of the species.	Unknown (no information on compliance) Poor (limited relevant compliance measures in place) Moderate (some relevant compliance measures in place) Good (comprehensive relevant compliance measures in place)
	Reasoning/comments: No information from other states fishing in the Indian Ocean. The market demand for both sharks and rays is strong (MRAG, 2012).		
Magnitude of illegal trade		There have been some seizures in Sri Lanka and Hong Kong of smuggled shark fins from India, which may include fins of *Rhina ancylostoma.* Hong Kong Customs records imports by country, including from India; however, species-wise records are not available. There have been known cases where entire consignments of shark products have been confiscated before export or revoked back to India from the destination port and fresh trade permits issued after confirmation of species if the products are found to be non-fin commodities.	Unknown (no information on compliance) Poor (limited relevant compliance measures in place) Moderate (some relevant compliance measures in place) Good (comprehensive relevant compliance measures in place)

	Reasoning/comments: Letter from WWF India to MoEF and CC regarding potential illegal shark fin export- from India to Hong Kong, dated 18th April 2017- reports that from 2015-16, 139,558 kg of dried shark fin with a value of Hong Kong dollar 49,562,000/- was exported from India or via other countries to Hong Kong, and in Jan-Feb 2017about 1,280 kg of suspected scheduled hammerhead sharks and oceanic white tip sharks were seized in four containers, one being from India without any relevant permits attached. The exact species composition of the consignments is unknown, hence the possibility of fins of *Rhina ancylostoma* being a part of the same cannot be ruled out. Hong Kong Customs trade data for imports from India, 1998-2016, peaked at over 430,000 kg in 2000 and then fell to <100,000 kg in 2007, recovered slightly for a few years and declined again to below 100,000 kg in 2012. By 2015, imports from India were 80,850 kg, and fell after the export ban to 58,708 kg, and further to 12476 kg in 2019 and 2799 kg in 2020 *(HK Customs data provided by Bloom).* Steady decline in quantum of fins imported from India from 2015 to 2020 suggest that the consignments could be residual stock existing with the traders before implementation of the shark fin trade ban. It is not clear whether fresh stocks are included in these consignments. In 2017, a consignment of shark fins was confiscated by JNPT, Mumbai and referred to ICAR-CMFRI for confirming the species, whereupon it was found that fins of *Rhina ancylostoma* were also present in the consignment, along with fins of several other important shark species (Akhilesh K. V., *pers. comm.*). Forensic identification of shark fin samples seized by the wildlife department, using mitochondrial CO1 sequences at CMFRI Kochi in 2017-18 also indicated the presence of fins of *Rhina ancylostoma* along with fins of other sharks (CMFRI, 2018; https://www.thehindu.com/news/cities/Kochi/police-seize-6000-kg-of-suspected-shark-fins/article19392270.ece). Samples of shark fins submitted on more than one occasion during 2015-2017 to ICAR-CMFRI by an exporter based in Chennai, to confirm identity of the species at the behest of the Wildlife Crime Control Bureau, indicated the presence of fins of the bowmouth guitarfish along with fins of other sharks (Shoba J. K., *pers. obs.*).		
Fishing Pressure			
Fishing mortality (retained catch)	Closed seasons for all mechanised fisheries. Minimum legal size of capture.	Average reported catch decreased from 620t2007 to 85 tin 2020, possibly indicating impacts of fishing pressure (NMFDC, ICAR-CMFRI). No on-board observer programme. Port monitoring takes place. Logbooks are not maintained properly. Nor are they shared with all management authorities.	Unknown (no information on compliance) Poor (limited relevant compliance measures in place) Moderate (some relevant compliance measures in place) Good (comprehensive relevant compliance measures in place)
	Reasoning/comments: Species-specific bycatch management measures are not in place and hence compliance level is poor.		

Discard mortality	No known discards from fisheries in India	Not applicable.	Unknown (no information on compliance)
			Poor (limited relevant compliance measures in place)
			Moderate (some relevant compliance measures in place)
			Good (comprehensive relevant compliance measures in place)
	Reasoning/comments: It is assumed that all dead guitarfishes caught, except prohibited species, are retained on-board.		
Size/age/ sex selectivity	Minimum Legal Size is yet to be recommended	Monitoring for research purposes is being carried out in some maritime states along Indian coast.	Unknown (no information on compliance)
			Poor (limited relevant compliance measures in place)
			Moderate (some relevant compliance measures in place)
			Good (comprehensive relevant compliance measures in place)
	Reasoning/comments: MLS for *Rhina ancylostoma* has not been proposed or implemented in India. The landings, particularly by trawl nets, in many centres includes a relatively high proportion of juveniles (Purushottama *et al.*, 2022); ICAR-CMFRI, *unpubl. data*). However, since MLS has not been declared yet, regulation of species-specific juvenile fishing is not in place.		
Magnitude of IUU fishing	IUU fishing POA in preparation for Indian waters.		Unknown (no information on compliance)
			Poor (limited relevant compliance measures in place)
			Moderate (some relevant compliance measures in place)
			Good (comprehensive relevant compliance measures in place)
	Reasoning/comments: Issues of IUU fishing by IOTC's IUU provisions (IOTC-2016-CoC13-CR27 Rev1). The BOBP-IGO organized the 'National Workshop for Preparation of Plan of Action to Prevent Deter and Eliminate Illegal, Unreported and Unregulated Fishing' during 23 – 24 April 2018 in Chennai and the Report of the Workshop was sent to the Ministry of Fisheries, Animal Husbandry and Dairying for further action at their end. Subsequently, the BOBP-IGO in collaboration with the member-countries (Bangladesh, India, Maldives, Sri Lanka) also organized a couple of activities to prepare the draft Regional Plan of Action on IUU Fishing (RPOA-IUU). The RPOA-IUU is now with the Bangkok Office of FAO and will be further taken up once the BOBLME Phase 2 starts (BOBP-IGO, 2021, *pers. comm.*).		

4.2: Are existing management measures effective/likely to be effective in mitigating pressures affecting the stock/population?					
Factor	Existing management measure(s)	Are relevant data collected and analysed to inform management decisions? (e.g. landings, effort, fisheries independent data)			Is management consistent with expert advice?
Trade Pressure					
Magnitude of legal trade	Regulations in place and complied with. (Notification No. 110 (RE-2013)/2009-2014)	No data OR data are of poor quality OR data are not analysed (adequately) to inform management			No expert advice on management identified
		Limited relevant data are collected AND analysed to inform management			Not consistent
		Some relevant data are collected AND analysed to inform management			Expert advice partially implemented
		Comprehensive data collected AND analysed to inform management			Consistent
	Management measure(s) effective/likely to be effective?				
	Yes	Partially	No	Insufficient information	
	Reasoning/comments: Only generic declaration of export is done in India. Information on Hong Kong imports of shark fins from India indicate that the consignments are labeled as "dried shark fins" and there is no species-wise categorisation (Hong Kong Customs data from Bloom, Stan Shea, pers. Comm.).				
Magnitude of illegal trade	In general trade is monitored in different levels and actions taken according to national laws by Central Board of Excise and Customs and the Wildlife Crime Control Bureau.	No data OR data are of poor quality OR data are not analysed (adequately) to inform management			No expert advice on management identified
		Limited relevant data are collected AND analysed to inform management			Not consistent
		Some relevant data are collected AND analysed to inform management			Expert advice partially implemented
		Comprehensive data collected AND analysed to inform management			Consistent
	Management measure(s) effective/likely to be effective?				
	Yes	Partially	No	Insufficient information	

<table>
<tr><td></td><td colspan="4">Reasoning/comments:
Hong Kong Customs import data indicate that fin imports from India have declined but not ceased since the fin export prohibition. WWF has described seizure of shark fin exported illegally from India in 2017 without permits. However, there is no species-specific information on dried shark fin consignments, which are likely to contain fins of Rhina ancylostoma.</td></tr>
<tr><td colspan="5">Fishing Pressure</td></tr>
<tr><td rowspan="4">Fishing mortality (retained catch)</td><td rowspan="4">Closed seasons for all mechanised fisheries.
Minimum legal size of capture.
IOTC resolutions.</td><td colspan="2">No data OR data are of poor quality OR data are not analysed (adequately) to inform management</td><td>No expert advice on management identified</td></tr>
<tr><td colspan="2">Limited relevant data are collected AND analysed to inform management</td><td>Not consistent</td></tr>
<tr><td colspan="2">Some relevant data are collected AND analysed to inform management</td><td>Expert advice partially implemented</td></tr>
<tr><td colspan="2">Comprehensive data collected AND analysed to inform management</td><td>Consistent</td></tr>
<tr><td></td><td colspan="4">Management measure(s) effective/likely to be effective?</td></tr>
<tr><td></td><td>Yes</td><td>Partially</td><td>No</td><td>Insufficient information</td></tr>
<tr><td></td><td colspan="4">Reasoning/comments:
Monitoring activities are described in the previous section. There is limited management expert advice on species-specific bycatch management.</td></tr>
<tr><td rowspan="6">Discard mortality</td><td rowspan="4">No tuna FADs used in Indian waters; no discards of Rhina ancylostoma from Indian fisheries and therefore no management measures.</td><td colspan="2">No data OR data are of poor quality OR data are not analysed (adequately) to inform management</td><td>No expert advice on management identified</td></tr>
<tr><td colspan="2">Limited relevant data are collected AND analysed to inform management</td><td>Not consistent</td></tr>
<tr><td colspan="2">Some relevant data are collected AND analysed to inform management</td><td>Expert advice partially implemented</td></tr>
<tr><td colspan="2">Comprehensive data collected AND analysed to inform management</td><td>Consistent</td></tr>
<tr><td></td><td colspan="4">Management measure(s) effective/likely to be effective?</td></tr>
<tr><td></td><td>Yes</td><td>Partially</td><td>No</td><td>Insufficient information</td><td>N/A</td></tr>
<tr><td></td><td colspan="5">Reasoning/comments:
The trawl discard composition study from India doesnot report this species in discard along the coast (Dineshbabu et al., 2013, Lobo et al., 2010). All guitarfish bycatch in other fisheries is fully utilised (Kizhakudan et al., 2015; ICAR-CMFRI unpublished data). There are no management measures for discards of Rhina ancylostoma, because this is not applicable.</td></tr>
</table>

Size/ age/ sex selectivity	No measures adopted in India (no size specific targeted shark fisheries). Procedures proposed in FADs management plan, IOTC resolution 17/08.	No data OR data are of poor quality OR data are not analysed (adequately) to inform management		No expert advice on management identified
		Limited relevant data are collected AND analysed to inform management		Not consistent
		Some relevant data are collected AND analysed to inform management		Expert advice partially implemented
		Comprehensive data collected AND analysed to inform management		Consistent
	Management measure(s) effective/likely to be effective?			
	Yes	Partially	No	Insufficient information
	Reasoning/comments: *NA.*			
Magnitude of IUU fishing	*NA.* No target fishing for *Rhina ancylostoma*; no specific regulation of bycatch shark fisheries; limited monitoring of IUU fishing.	No data OR data are of poor quality OR data are not analysed (adequately) to inform management		No expert advice on management identified
		Limited relevant data are collected AND analysed to inform management		Not consistent
		Some relevant data are collected AND analysed to inform management		Expert advice partially implemented
		Comprehensive data collected AND analysed to inform management		Consistent
	Management measure(s) effective/likely to be effective?			
	Yes	Partially	No	Insufficient information
	Reasoning/comments: Issues of IUU fishing by IOTC's IUU provisions (IOTC-2016-CoC13-CR27 Rev1). The BOBP-IGO organized the 'National Workshop for Preparation of Plan of Action to Prevent Deter and Eliminate Illegal, Unreported and Unregulated Fishing' during 23 – 24 April 2018 in Chennai and the Report of the Workshop was sent to the Ministry of Fisheries, Animal Husbandry and Dairying for further action at their end. Subsequently, the BOBP-IGO in collaboration with the member-countries (Bangladesh, India, Maldives, Sri Lanka) also organized a couple of activities to prepare the draft Regional Plan of Action on IUU Fishing (RPOA-IUU). The RPOA-IUU is now with the Bangkok Office of FAO and will be further taken up once the BOBLME Phase 2 starts (BOBP-IGO, 2021, *pers. comm.*).			

Section 5. Non-Detriment Finding						
Step 2: Intrinsic biological vulnerability and conservation concern						
Intrinsic biological vulnerability (Question 2.1)			High	Medium	Low	Unknown
Conservation concern (Question 2.2)			High	Medium	Low	Unknown
Step 3: Pressures on species			Step 4: Existing management measures			
Pressure	Level of severity (Questions 3.1 and 3.2)	Level of confidence (Questions 3.1 and 3.2)	Are the management measures effective* at addressing the concerns/pressures/impacts identified? (Question 4.2) *taking into account the evaluation of management appropriateness and implementation under Question 4.1			
Trade pressures						
(a) Magnitude of legal trade	High	High	Yes			
	Medium	Medium	Partially			
	Low	Low	No			
	Unknown		Insufficient information			
			Not applicable**			
(b) Magnitude of illegal trade	High	High	Yes			
	Medium	Medium	Partially			
	Low	Low	No			
	Unknown		Insufficient information			
			Not applicable**			
Fishing pressures						
(a) Fishing mortality (retained catch)	High	High	Yes			
	Medium	Medium	Partially			
	Low	Low	No			
	Unknown		Insufficient information, Not applicable**			
(b) Discard mortality	High	High	Yes			
	Medium	Medium	Partially			
	Low	Low	No			
	Unknown		Insufficient information			
			Not applicable**			
(c) Size/age/sex selectivity of fishing	High	High	Yes			
	Medium	Medium	Partially			
	Low	Low	No			
	Unknown		Insufficient information			
			Not applicable**			

(d) Magnitude of IUU fishing	High	High	Yes
	Medium	Medium	Partially
	Low	Low	No
	Unknown		Insufficient information
			Not applicable**

**Only to be used where the fishing pressure severity was assessed as "Low" for any of the Factors in Step 3 and a judgement is made that the impacts on the shark stock/population concerned are so low that mitigation is not required.

A) Can a positive NDF be made?	No
B) Are there any mandatory conditions to the positive NDF?	N/A
C) Are there any other further recommendations?	YES - go to Step 6

Reasoning/comments:

This bowmouth guitarfish (*Rhina ancylostoma*) NDF for India is "**negative**" and does not support international trade in this species. Additional research is mandatory to assess the status of the species and improvements are made to existing fisheries and trade management and monitoring frameworks as outlined in Section 6.

This NDF will be re-evaluated after 5 years, to gauge progress against the recommendations in Section 6 and updated with newly acquired data, before agreeing to a new NDF for 2027-2031.

Section 6. Further measures

6.1: Improvement in monitoring or information is required

Monitoring and data recommendations for bowmouth guitarfish in the Indian Ocean

Generic measures	
Recommendation	**Potential leads**
Fishery-dependent monitoring and research: Fishery monitoring: Improve the existing species-specific landing observation and reporting programme, through awareness generation among stakeholders.	ICAR-CMFRI, NGOs
Build upon the developing programme for introducing vessel monitoring systems. Investigate options for introducing mandatory logbook reporting on species-wise landings by fishers.	State Fisheries Departments, ICAR-CMFRI
Monitoring of domestic and international trade: Improve the level of trade data reporting – data declaration by traders (species, source of obtaining the product, size of fish (length & weight), quantity, product form)	State Fisheries Departments and ICAR-CMFRI in collaboration with and stakeholders (fishers and traders)
Provide international trade data, as relevant, to CITES, FAO, IOTC.	MPEDA &DoF
Undertake market survey, interviews with fishermen & traders, collate information from Customs & other databases, and from trade channels.	ICAR-CMFRI, Universities, NGOs
Recommend to the Marine Products Export Development Authority (Ministry of Commerce and Industry) that species-specific codes be added to the current generic product-specific codes for trade records; offer to collaborate with them to develop codes.	DoF
Promote the use of genetic analysis by CMFRI for ambiguous products in trade and raise awareness with relevant government departments that this service exists.	ICAR-CMFRI
Species-specific measures	
Recommendation	**Potential leads**
Fishery-independent monitoring and research: Tag and release: Develop and submit a proposal to an external funding agency to assess distribution, and movement and migration (if any) of bowmouth guitarfish in the Indian EEZ using electronic tags.	Fishery Survey of India (FSI), possibly in collaboration with other national research institutes and regional bodies IOTC, BOBP-IGO.
Tag and release: Develop and submit a proposal to an external funding agency to assess habitat ecology, critical habitats and post-release mortality of bowmouth guitarfish using electronic tags and assess stock structure using genetic tags.	ICAR-CMFRI, possibly in collaboration with other national research institutes and regional bodies IOTC, BOBP-IGO.
Distribution and Abundance: Undertake resource-specific exploratory surveys to identify spatial and seasonal bowmouth guitarfish breeding and nursery aggregations	FSI

Fishery-dependent monitoring and research: Fishery monitoring: Use interviews with fishers to obtain enquiry-based information on bowmouth guitarfish catch, particularly where access to logbooks is difficult; develop database for records of bowmouth guitarfish catch, date and area of capture (geolocation) and gear types.	ICAR-CMFRI
Identifying area & season breeding and nursery aggregations of the bowmouth guitarfish, using a participatory approach with fishers.	ICAR-CMFRI, Universities
Research: Undertake biological and stock assessment studies on bowmouth guitarfish in Indian waters, utilizing data on sex ratios, size/age structure, annual reproductive output, BRPs, and fishing effort collected at landing sites by CMFRI fisheries officers. Carry out population genetic studies on stock(s) of bowmouth guitarfish in the Indian EEZ.	ICAR-CMFRI, Universities

6.2: Improvement in management is required

Management recommendations for bowmouth guitarfish in the Indian Ocean

Generic measures

Recommendation	**Potential leads**
Strict implementation of each state's Marine Fishery Regulation Act (MFRA) regarding gear, mesh size, operation in no-take zones and closed seasons	State Fishery Department, Coastguard, Marine Enforcement Police
Strengthen Monitoring, Control and Surveillance (MCS)	State Fisheries Departments Coastguard and Marine Enforcement Police
Improve participatory management and inter-departmental coordination through fishery management councils, as developed under the FAO CCRF	National and State Fishery Management Councils
Create awareness through visual, print and electronic media and mass campaigns	ICAR-CMFRI, NETFISH-MPEDA, NGOs
Seasonal closure of fishing in identified breeding/nursery grounds	States, through MFRAs
Improved surveillance to check for IUU fishing by foreign vessels, and develop protocol for identifying species on board	Indian Navy and Coastguard
Continue to monitor and where necessary improve compliance with existing fisheries management regulations (national, regional and international)	Department of Fisheries (DoF)
Adopt and implement the NPOA-Sharks for India with a special focus on plans for shark species listed in CITES and CMS, encourage and take part in regional initiatives to develop a regional shark plan.	DoF
Urge Ministry of Commerce and Industry to introduce HS codes for all shark products to collect improved data on imports and exports.	MPEDA

Increase awareness for elasmobranch processors, traders, and exporters regarding the fin export ban, and CITES requirements for the export of other products derived from CITES listed elasmobranch species (this includes export permits accompanied by the Legal Acquisition Finding and Non-Detriment Findings).	ICAR-CMFRI, MPEDA & NGOs
Species-specific measures	
Recommendation	Potential leads
Develop a fisher awareness programs aimed to: • improve identification of juvenile and pregnant bowmouth guitarfish, their seasonal abundance and techniques to maximize live release • improve logbook data recording. • provide an overview and increase awareness of bowmouthguitafish biology, global status, and management measures in place both locally and internationally.	ICAR-CMFRI, SFDs, Universities, NGOs
Suggest a Minimum Legal Size (MLS) for harvest of bowmouth guitarfish in India	ICAR-CMFRI

Timeline of activities for implementation of NDF Recommendations

Sl. No	Activity	I YEAR	II YEAR	III YEAR	IV YEAR	V YEAR
1	Linkages and coordination with various organizations for implementation of NDF recommendations					
2.	Awareness programs and stakeholder meetings					
3	Fishery independent studies: Tag and release / stock assessment studies/ abundance and distribution studies					
4	Fishery dependent: catch and effort, participatory fishery monitoring					
5.	Trade monitoring and regulations					
6	Capacity building for stakeholders and managers					

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Appendix – 1
Supporting information on bowmouth guitarfish *Rhina ancylostoma*

The bowmouth guitarfish, *Rhina ancylostoma* is distinguished from other wedgefishes by a head broadly rounded and distinctly demarcated from pectoral fins, no spiracular folds, ridges of large thorns on back, and dark bands between eyes. Body greatly thickened above abdomen; tail much longer than disc and broad shaped. Snout broadly rounded; deep notch on anterior profile of body at junction of head and pectoral fins. Spiracles large, without folds of any kind. Eyes rather large. Nostrils elongate and almost transverse; width about equal to internasal space. Lower jaw strongly trilobed, lobes recessing into concavities in upper jaw. Dorsal fins very tall and falcate, first larger than second; first dorsal fin origin over or slightly forward of pelvic fin origin. Caudal fin lunate, very large, with a distinct lower lobe only slightly shorter than upper lobe; its posterior margin deeply concave. Skin uniformly covered with minute denticles. A series of prominent ridges on mid-line of back, above and forward of eye, and on shoulders; ridges with numerous large thorns; thorns broad based, compressed, triangular with very sharp tips. The bowmouth guitarfish has upper surface bluish grey to brownish, covered with large white spots and lines; large white-edged, black pectoral marking in young, often absent in adults; dark transverse bands between eyes and spiracles; margins of pectoral fins and snout paler; dorsal and caudal fins bluish grey to brownish, often with white spots; large adults often brownish with only faint spots and lines.

BIOLOGY

Growth

Rhina ancylostoma is a large shark ray, growing to ~3m in total length (TL). The maximum size reported for the species globally was 270-300 cm TL (Vidthayanon, 2005, Last *et al*., 2016). It has an estimated generation length of 15 years (Kyne *et al*., 2019) and is a late maturing species. Studies from Indian waters are sparse; the size common in the fishery is reported to be 65-145 cm TL (Purushottama G. B., *unpubl. data*). The maximum size reported from India is 295 cm. It is not known how long *R. ancylostoma* live in the wild but in captivity they live around 7 years (Last and Stevens, 2009). The females are expected to mature at 183 cm TL and the longevity is estimated as 19 years (Purushottama, G. B., *unpubl. data*). Table 1 presents a comparison of estimates of maximum size and age and size and age at maturity from different localities. Asymptotic size also varies from region to region. The asymptotic length estimated from Indian waters tentatively indicates the L_∞ to be 305 cm TL and K, 0.15 yr^{-1} (Purushottama G. B., *unpubl. data*).

Length-weight relationship of *R. ancylostoma* in Indian waters (Purushottama *et al*., 2022)
The length weight relationship was calculated as

$W = 0.005467\ L^{3.112696}$ (M) ($r^2 = 0.978$)
$W = 0.009003\ L^{2.960941}$ (F) ($r^2 = 0.982$)
$W = 0.006604\ L^{3.027504}$ (Pooled) ($r^2 = 0.979$)

Table 1. Measures of maximum size, age and size at maturity from different locations for male and females of *Rhina ancylostoma*

Parameter	Sex	Measure (TL cm)	Location	References
Max size	F	236	India -east coast	Devadoss and Batcha: 1995, Raje *et al.*, 2007
		180	Abu Dhabi	Moore *et al.*, 2012
		114.1-223	Oman	Jabado, 2018
		44.0-295	India – west coast, off Karnataka	Purushottama *et al.*, 2022
		192	India – east coast, off Andhra Pradesh	Muktha M., *pers. obs.*
		160	India – east coast, off Tamil Nadu	Remya L., *pers. obs.*
		218	India – west coast, off Maharashtra	Purushottama G. B. & Akhilesh K. V., *pers. obs.*
		90-210	India – west coast, off Kerala	Livi W., *pers. obs.*
		84-291	India – west coast, off Kerala	Najmudeen T. M., *pers. obs.*
		110-203	India – east coast, off West Bengal	Swatipriyanka S., *pers. obs.*
		55-162	India – east coast, off Odisha	Subal K. R. *pers. obs.*
		78-210	India – west coast, off Gujarat	Swatipriyanka S., *pers. obs.*
		63-225	India – east coast, off north Tamil Nadu	ICAR-CMFRI *unpubl. data*
		222	India – west coast, off Malabar, north Kerala	Mahesh V., *pers. obs.*
	M	86.6-294	UAE	Jabado, 2018
		45.0-235	India – west coast, off Karnataka	Purushottama *et al.*, 2022
		67-175	India – east coast, off Andhra Pradesh	Muktha M., *pers. obs.*
		152	India – east coast, off Tamil Nadu	Remya L., *pers. obs.*
		225	India – west coast, off Maharashtra	Purushottama G. B. & Akhilesh K. V., *pers. obs.*
		60-70	India – west coast, off Kerala	Livi W., *pers. obs.*
		36-233	India – west coast, off Kerala	Najmudeen T. M., *pers. obs.*
		50-110	India – east coast, off Odisha	Subal K. R., *pers. obs.*
		60-190	India – east coast, off north Tamil Nadu	ICAR-CMFRI *unpubl. data*
		205	India – west coast, off Malabar, north Kerala	Mahesh V., *pers. obs.*
	U	300	Thailand	Vidthayanon, 2005
		210	Off Mumbai, India	Raje, 2006
		250	Eastern Indonesia	White and Dharmadi, 2007
		200 –215	Off Gujarat, India	Borrell *et al.*, 2011
		270	Global	Compagno and Last, 1999; Last *et al.*, 2016
Size at maturity	F	183	India – west coast, off Karnataka	Purushottama *et al.*, 2022
	M	157 –178	Global	Compagno and Last, 1999
		150 –175	Global	Last *et al.*, 2016
		164	India – west coast, off Karnataka	Purushottama *et al.*, 2022
Max age (years)	F	7	Public Aquarium	Last and Stevens, 2009; Michael, 1993
	M	NA	NA	NA
Age at maturity	M	4.1	India – west coast, off Karnataka	Purushottama *et al.*, *in review*
(years)	F	5.1	India – west coast, off Karnataka	Purushottama *et al.*, *in review*

F-Female, M-Male, U-Unsexed, NA-Not available

Reproduction

The bowmouth guitarfish exhibits ovoviparity (aplacental viviparity) with histotrophy. Functional uteri were observed in specimens of 193.0 to 294.0 cm TL and the species exhibited a non-seasonal reproductive cycle (Purushottama *et al.*, 2022). Size at maturity varies from region to region (Table 1). Females move inshore for breeding and often use nearshore grounds as nurseries and feeding grounds (Purushottama *et al.*, 2022). The litter size is between 2 to 11 pups (Raje *et al.*, 2007; Last *et al.*, 2016). In the Indian waters the breeding season is reported to be during March and September along east and west coasts, respectively (Raje *et al.*, 2007). The size at birth ranges from 45-48 cm (Table 2). Observations along the Karnataka coast of India indicate the size at birth to be 44-50 cm TL (Purushottama *et al.*, 2022). The occurrence of juveniles (23-25%) in inshore water fishery in Karnataka, India shows that the females move towards the coast for breeding; the maximum density of juveniles was recorded from nearshore waters during January-May and November (Purushottama G. B., *unpubl. data*).

Table 2. Reproductive traits of the bowmouth guitarfish *Rhina ancylostoma*

		Location	Reference
Litter Size	2-8 2-11 2-11 2-8 2-6	India – east coast, off Tamil Nadu India – west coast, off Maharashtra Global India – west coast, off Karnataka India – east coast, off north Tamil Nadu	Devadoss and Batcha, 1995 Raje *et al.*, 2007 Last *et al.*, 2016 Purushottama *et al.*, 2022 ICAR-CMFRI *unpubl. data*
Size at birth (cm)	45 46-48 44-50	Global Global India – west coast, off Karnataka	Michael, 1993 Last *et al.*, 2016 Purushottama G. B., *unpubl. data*
Breeding Season	September March Year round (peak in Oct-Dec).	India – west coast, off Maharashtra India – east coast, off Coromandel coast India – west coast, off Karnataka	Raje *et al.*, 2007 Raje *et al.*, 2007 Purushottama G. B., *unpubl. data*

Diet

Rhina ancylostoma occupies the lowest trophic level in the ecosystem. Borrell *et al.* (2011) reported that this species feed at the lowest trophic level (TL=3.18) (bottom crustaceans and molluscs) in north eastern Arabian Sea. This shark ray preys upon a range of food items including bony fishes, shellfishes, cephalopods, molluscs and bivalves (Vidthayanon, 2005; Raje *et al.*, 2007; Last *et al.*, 2016). Diet of the species from Indian waters was observed to include sciaenids, *Harpadon nehereus,* prawns, cephalopods and bivalves (Raje *et al.*, 2007). In a recent study along the west coast of India, the diet of the species was found to consist of *Acetes* spp., *Nematopalemon tenuipes*, *Oratosquilla* spp., *Solenocera* spp., *Parapenaeopsis stylifera*, *Parapenaeopsis sculptilis*, *Loligo* spp., *Johnius* spp., *Johnieops* spp., *Stolephorus* spp., *Cynoglossus* spp., and *Coilia* spp. (Purushottama *et al.*, 2022).

Global Distribution and Habitat

Fig. 1. Global Distribution of *Rhina ancylostoma* (Source: Last and Stevens, 2009).

Rhina ancylostoma is a widespread species in Indo-West Pacific,from South Africa (Natal coast), Mozambique, East Africa, Seychelles, the Red Sea, Arabia, Oman, the Persian Gulf, India, Sri Lanka, Malaysia, Indonesia (Borneo), Philippines, New Guinea, Thailand, Viet Nam, China, Taiwan Province of China, Korea, Japan, and Australia (from Exmouth Gulf, Western Australia, north to Northern Territory, Queensland, and Forster, New South Wales) (Carpenter *et al.*, 1997, Compagno and Last, 1999, Last *et al.*, 2016). Although they have been recorded as deep as 70 m, the bowmouth guitarfish generally prefer shallow water fairly close to shore in or near coral reefs or mangroves at depths of 3-70 m, with a preference for sand and mud bottoms and are also found in the water column but may swim above the bottom (Michael, 1993; Carpenter *et al.*, 1997; Compagno and Last, 1999; Last *et al.*, 2016) (Fig 1).

Distribution in India

Rhina ancylostoma has its distribution along the east and west coast of India with landings common in the major landing centres (Kizhakudan *et al.*, 2018).

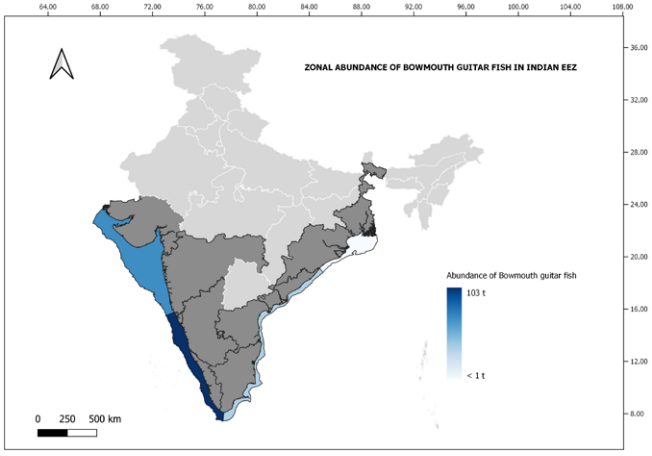

Fig 2. Abundance map of *Rhina ancyclostoma* along Indian coast

Global and Domestic Harvest

Globally, time-series catch data or harvest details are not readily available for this species. The absence of species-specific reporting coupled with taxonomic ambiguities with *Rhynchobatus* species-complex are the main reasons for poor information on global production. However, landing data from Iran, Pakistan and Indonesia are available even though it is not specific to *R. ancylostoma* (include all rhinids and glaucostegids). The catch data from Iran for the period 1997-2016 suggests a decline of 66% over the years with 880 t in 1997 to 295 t in 2016. A similar trend is observed in the fishery data from Pakistan with a landing of 902 t reported in 1999 and the landing observed is 252 t in 2011. In the case of Indonesia, the catch data of guitarfishes reported in 2005 was 28,492 t and 3,540 t in 2015 (Kyne *et al.*, 2019). The harvest details of *R. ancylostoma* suggests a sustainable production from Australian waters primarily due to the introduction of turtle exclusion devices, implementation of shark finning bans and gear restrictions (Zhou and Griffiths, 2008).

Fishery in India

Rhina ancylostoma is caught more on the west coast (76%) than the east coast (24%) and contributed 1.8-42.8% of the annual guitarfish landings in India during 2007-2020 (*Source:* National Marine Fisheries Data Center, ICAR-CMFRI). The estimated average annual landing (2007-2019) of *R. ancylostoma* by shrimp trawlers, gillnetters and artisanal gears together in Karnataka was 81 tonnes, contributing to 61% of the wedgefish and

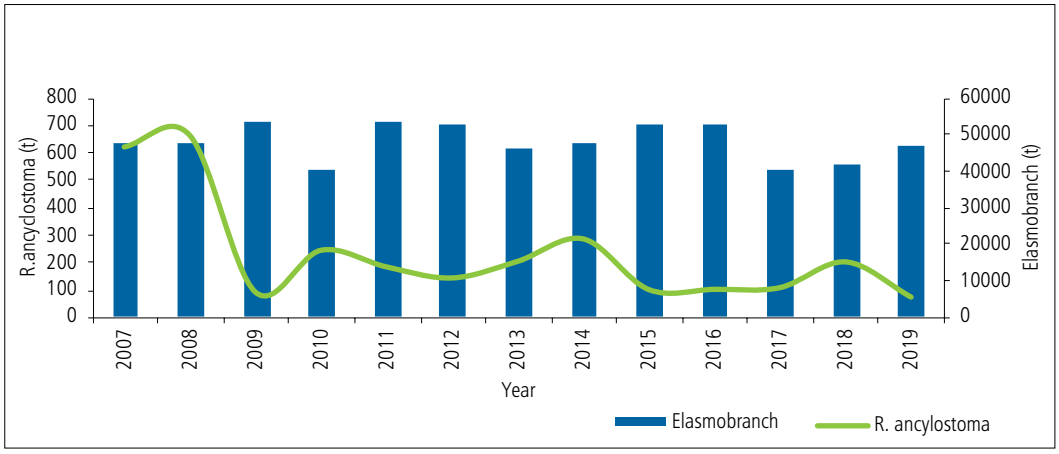

Fig 3. All India landings of elasmobranch and *R. ancylostoma* during 2007-2019

guitarfish landings in the state. The landing was higher in 2010 (228 t) and 2011 (158 t), which decreased drastically to10 t in 2017 and 5 t in 2018 & 2019 (Purushottama *et al.*, 2022) (Fig 3).

Conservation status

Rhina ancylostoma is enlisted as 'Critically Endangered' by the International Union for the Conservation of Nature (IUCN)'s Red List (Kyne *et al.*, 2019). International trade is also monitored and it is listed in Appendix II of CITES.

Threats and mortality

There is a high level of fishing pressure across its range and demersal coastal fisheries resources have been severely depleted in significant areas of the Indo-West Pacific, including India and Southeast Asia (Stobutzki *et al.* 2006, Mohamed and Veena, 2016). Fishing pressure is however considerably lower across northern Australia due to the introduction of turtle exclusion devices. Flesh is sold for human consumption in Asia and the fins from large animals fetch particularly high prices. Furthermore, the extensive loss and degradation of habitats such as coastal mangroves are another key threat to coastal and inshore species that includes the bowmouth guitarfish; Southeast Asia has seen an estimated 30% reduction in mangrove area since 1980 (FAO 2007; Polidoro *et al.*, 2010).

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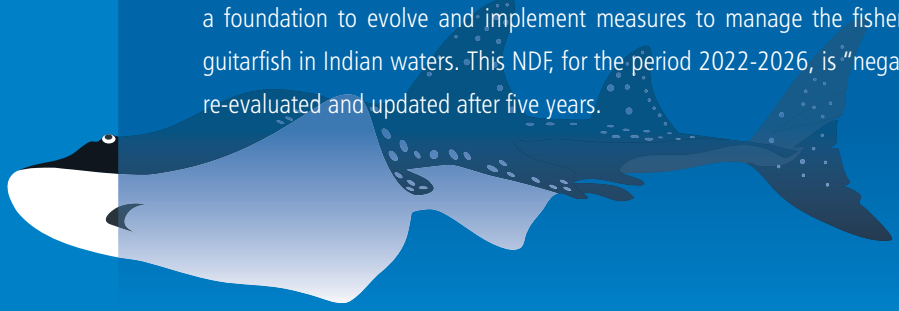
India Non-Detriment Finding for bowmouth guitarfish *Rhina ancylostoma* in the Indian Ocean | 2022 to 2026

The bowmouth guitarfish *Rhina ancylostoma* is a large shark ray with a widespread distribution in the Indo-west Pacific. It contributes significantly to India's guitarfish landings particularly along the west coast. It was included in Appendix II of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) at the 18 th Meeting of the Conference of the Parties (CoP18, Geneva) in 2019. The findings and suggestions presented in this Non-Detriment Finding (NDF) document, while disallowing international trade from/to the country, within the permits of existing national legislations on trade in shark commodities and existing CITES regulations for the species, will be a foundation to evolve and implement measures to manage the fishery of bowmouth guitarfish in Indian waters. This NDF, for the period 2022-2026, is "negative" and will be re-evaluated and updated after five years.



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