Non-Detriment Finding (NDF) of Mobulid Rays *Mobula* spp. in Bangladesh

Bangladesh Forest Department
Ministry of Environment, Forest and Climate Change

Non-Detriment Finding:

This Non-Detriment Finding (NDF) was prepared at two workshops held in Chattogram and Dhaka in February 2022. It is based on the guidance developed by Mundy-Taylor et al. (2014)[1] and was compiled by the Bangladesh Forest Department (BFD), as the designated CITES Management Authority, in consultation with the Department of Fisheries (DoF), the Bangladesh Fisheries Research Institute, and Fisheries experts from national public universities and the Wildlife Conservation Society (WCS).

Valid until new or different information is available and this NDF is revised or updated.

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[1] 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.

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Summary of Non-Detriment Finding of Mobulid Rays in Bangladesh

Mobulid rays are protected under Schedule I of the Bangladesh Wildlife (Conservation and Security) Act, 2012. Mobulid rays are listed under CITES Appendix II and CMS Appendix I. IOTC has a CMM (Res. 19/03) in place that prohibits capture and take of mobulid rays in the Indian Ocean. All of the included species are assessed as Endangered on the Global IUCN Red List.

Most mobulid rays occur in temperate and tropical waters throughout all oceans, but a few are restricted to the Indo-Pacific. Neonates and young juveniles live in coastal waters before moving further offshore as sub-adults. They mature at the age of about 5-10 years and grow to a length of over 200 cm. Females give birth to single pups every few years. The landing records from Bangladesh are mostly of immature specimens, with a maximum of 178 cm recorded from *M. mobular*.

Mobulid rays are caught in targeted fisheries as well as incidental catch throughout their range in a variety of gear types, including harpooning, netting, trawling, purse seine, gillnets and longlines. In Bangladesh, mobulid rays are taken as bycatch in artisanal (gillnet, setbag net, longlines) and industrial (trawl net) fisheries. The status of the stock is highly uncertain in the Indian Ocean, but the threat level to rays is disproportionately high in the tropics and subtropics, including the northern Indian Ocean, where more than three-quarters of all shark and ray species are threatened with extinction from overfishing.

Gill plates of filter-feeding mobulid rays are highly valued in international trade, incentivizing retention and landing of all mobulid rays caught in Bangladesh. Mobulid rays are landed whole and utilised fully in Bangladesh. Available landing data for mobulid rays in Bangladesh indicates that relatively low numbers are being captured by Bangladeshi fishing vessels. However, considering the stock across the Indian Ocean, fishing pressure is likely to be high. The volume of mobulid rays in trade from Bangladesh cannot be quantified due to a lack of species-specifics in official landing and trade statistics.

Considering the full protection of mobulid rays under national law in Bangladesh and their global conservation status, a Negative NDF is recommended. The NDF outcome will remain in place unless the species is removed or moved to a different Schedule under the Bangladesh Wildlife (Conservation and Security) Act, 2012.

Mitigation measures and recommendations to improve the conservation status of this species at a national and regional level include:

- Improve species-specific monitoring and information gathering (e.g., prioritise mobulid rays in national data collection initiatives, including through observers at landing sites and on industrial trawl vessels, and harmonizing data sources),
- Strengthening enforcement of existing fishery management regulations, including gear restrictions, marine protected area regulations, and legal operating depths for trawl fisheries, through systematically planned and recorded interagency patrols (e.g. SMART patrols),
- Train fishers on best handling and release practices for protected species, including mobulid rays,
- Mandate species/product specific HS codes and consider designated ports of entry/exit for shark/ray products,
- Support research aiming to -
    - Identify feasible measures to avoid and reduce bycatch and post-release mortalities,
    - Monitor population through genetic studies in the Indian Ocean,
    - Determine spatial distribution of mobulid rays in Bangladesh waters and identify habitats used during critical stages of their life history (e.g., mating, pupping, nursery grounds),
    - Conduct socio-economic studies on shark fisheries, trade, and alternative livelihoods, with a focus on mobulid rays,
    - Support investigations into key biological and ecological parameters, life-history, and behavioural traits, discard survival,
- Engage with the IOTC to advocate developing regional NDFs to better address conservation concerns of shared stocks, including of mobulid rays,
- Address shortcomings in Wildlife Act and align species protection and trade regulations in the Fisheries Rules.

Step 1: Preliminary Considerations

a) CITES Party	**BANGLADESH**
b) Management Authority (name, address, contact details)	Bangladesh Forest Department Ministry of Environment, Forests and Climate Change Telephone +880 (2) 818 17 37; Mobile +880 1712 195946 Fax +880 (2) 818 17 41 Websites http://www.bforest.gov.bd
c) Scientific Authority (name, address, contact details)	Scientific Committee of Wildlife Management in Bangladesh Bangladesh Forest Department, Ban Bhaban, Agargaon, Dhaka-1207 (Conservator of Forests, Wildlife Management and Nature Conservation Circle, Dhaka. Email: cf-wildlife@bforest.gov.bd; cfwildlifefd@gmail.com)

1.1a) Is the specimen subject to CITES controls?

a) Species	***Other***
b) Will species be exported?	Yes
Comments/ Source(s) of information	Spinetail devil ray (Giant devil ray): *Mobula mobular*; also locally known as 'Boro Shingchowain/ Deumach'. FAO Code: RMM Shortfin (Kuhl's) Pygmy devilray: *Mobula kuhlii*; also locally known as 'Kuhlii Shingchowain/ Deumach'. FAO Code: RMK Sicklefin (Chilean) devilray: *Mobula tarapacana*; also locally known as 'Chili Shingchowain/ Deumach'. FAO Code: RMT Bentfin devilray: *Mobula thurstoni*; also locally known as 'Bakapakh Shingchowain/ Deumach'. FAO Code: RMO Longhorned Pygmy Devil Ray: *Mobula eregoodoo*; also locally known as 'Lombakaina Bamon Shingchowain/ Deumach'. FAO Code: RME Giant (oceanic) manta ray: *Mobula birostris*; also locally known as 'Deu Shingchowain/ Deumach'. FAO Code: RMB
c) In what form is the product?	Mixed
Comments/ Source(s) of information	In Bangladesh, mobulids are widely used for their meat and gill plates. The gill plates fetch high prices in Asia and are used for Chinese health tonics. The meat from mobulids is consumed domestically or exported (fresh or dried). There are no reports of aquaria trade for these species from Bangladesh. **Sources:** BFD, 2021; Fernando and Stevens, 2011; Heinrichs *et al.,* 2011; Couturier *et al.,* 2012; Ender and Fernando, 2014; Croll *et al.,* 2016; O'Malley *et al.,* 2017
d) Is the fishery domestic or high seas, or both?	Domestic
Is the fishery artisanal, large scale, or both?	Both

Comments/ Source(s) of information	Mobulid rays are taken in Bangladesh as bycatch in artisanal (gillnet ("shark net"), setbag net, longlines with baited and unbaited hooks) and industrial (trawl net) fisheries. **Sources:** BFD, 2021; Haque et al., 2020
f) Source of identification	Other
Comments/ Source(s) of information	Mobulid rays are landed at the coastal landing sites of Bangladesh, which is where they are identified visually. However, these species are not recorded at a species level but are included as "other fish" by BFDC and “sharks/skates/rays” in national data collection. The Fish Inspection and Quality Control (FIQC) wing of the DoF asssist in the validation of the species and provide approval for export to take place. There are no identifcation procedures in place at the point of export, however Customs may request identification support from the DoF, BFRI, academia, or BFD/WCCU to confirm an export taking place. **Sources:** DoF, 2021
How likely is the product to be correctly identified:	**UNLIKELY**
Question 1.1(a): Is the specimen subject to CITES controls?	**YES**

1.1b) From which stock will the specimen be taken/was the specimen taken?

a) Ocean Basin	Indian Ocean
Comments/ Source(s) of information	*Mobula mobular*, *Mobula tarapacana*, *Mobula thurstoni*, and *Mobula birostris* have circumglobal distribution; *Mobula kuhlii* and *Mobula eregoodoo* have Indo-West Pacific distribution. The distribution of these six mobulid rays includes Bay of Bengal. There is limited information available on the stock structure of these species in the Indian Ocean. There is some data available suggested that *Mobula kuhlii* may have two separate stocks; East Indian Ocean and West Indian Ocean. **Sources:** Rigby et al., 2020; Marshall et al., 2020; Marshall et al., 2019; Liu et al., 2019; www.iucnredlist.org
b) Is this a shared stock (i.e. occurring in more than one EEZ and/or the high seas)?	Yes
Comments/ Source(s) of information	Yes, based on the geographical distribution, four of the mobulid rays have circumglobal distribution, while two have patchy distribution across the Indian Ocean. Based on catch data and other scientific information (e.g., globally available tagging studies of some mobulid species demonstrating their capability to travel several hundred or thousands of kilometers), the range includes the Bangladesh EEZ, the high seas, and otherIndian Ocean littoral state EEZs. **Sources:** www.iucnredlist.org
c) If the stock occurs in more than one EEZ, which other Parties share this stock? (If unknown, type "Unknown")	Yes
Comments/ Source(s) of information	Yes, based on the geographical distribution of these species, other Indian Ocean littoral states share the stock. In the case of the circumglobal species, other countries in the Indo-Pacific region may also share the same stock. Sources: www.iucnredlist.org

d) If a high seas stock, which other Parties fish this stock? (If unknown, type "Unknown")	Indian Ocean EEZ's and other countries
Comments/ Source(s) of information	Most other Indian Ocean littoral states. Bangladesh does not have a high seas fishery in place. **Sources:** www.iucnredlist.org
e) Which, if any, RFB(s) cover(s) the range of this stock? (If unknown, type "Unknown")	**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). *The Bay of Bengal Large Marine Ecosystem (BOBLME). *IORA, SAWEN - Both the Indian Ocean Rim Association (IORA) and the South Asian Wildlife Enforcement Network (SAWEN) have relevant mandates but no current marine policies.
Comments/ Source(s) of information	**Sources:** 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
f) Are all Parties listed above (which fish or share the stock concerned) members of the relevant RFB(s)?	Yes
Source(s) of information	Yes. They are Members or Cooperating Non-Contracting Parties of IOTC. Most are CITES and/or CMS Parties, and some are also Signatories of the CMS Sharks MoU. CITES controls trade for manta rays since 2014 and since 2017 for devil rays.

	Sources: https://cites.org/eng/disc/parties/ chronolo.php http://www.cms.int/sharks/en/ signatories-range-states
g) Are there geographical management gaps? If so, list in comments	Yes
Source(s) of information	**Regional management:** Resolution 19/03 on the *Conservation of Mobulid Rays Caught in Association with Fisheries in the IOTC Area of Competence*, however information on implementation and compliance is still lacking. **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 Bangladesh:** All mobulid rays are currently listed on Schedule I of the Bangladesh Wildlife (Conservation and Security) Act, 2012. While the Act lacks legal definitions for the respective schedules and guidance on penalties resulting from infractions, the listing on Schedule I is interpreted as full protection of the species. There is a need to improve conformity between the Fisheries Act and Rules and the Wildlife Act. **Sources:** CITES listing proposal, CoP 17 Proposal 42. http://www.wcpfc.int/sharks BFD, 2021
h) How reliable is the information on origin?	Very reliable
Comments/ Source(s) of information	
Question 1.1(b): Can origin and stock be *confidently* identified?	**YES**

1.2) Was (will) the specimen (be) legally obtained and is export allowed?

a) Strictly protected under wildlife legislation, a regional biodiversity Agreement, or (for a CMS Party) listed in CMS Appendix I?	Yes
Comments/ Source(s) of information	Strictly protected in the Bangladesh Wildlife (Conservation and Security) Act, 2012; placed in Schedule I which provides complete protection from exploitation, capturing, killing, trading, or displaying as of September 2021. Mobulid rays are listed on CMS Appendix I ("no take"); Bangladesh is a CMS Party since 2005. IOTC has a CMM (Res. 19/03) in place that prohibits capture and take of mobulid rays. **Sources:** BFD, 2021; http://www.cms.int/en/page/appendix- i-ii-cms http://www.cms.int/en/parties-range- states https://www.iotc.org/cmm/resolution-1903-conservation-mobulid-rays-caught-association-fisheries-iotc-area-competence
b) Sourced from illegal fishing activities (e.g. in contravention of finning regulations, or where a TAC is zero or exceeded)?	Yes
Comments/ Source(s) of information	There are no TACs in place for sharks and rays in Bangladesh. While there is no finning prohibition in place, all of the sharks and rays captured are fully utilised and therefore landed whole. However, these species are fully protected since September 2021 (see above) and some are still being landed.
c) Taken from a no-take marine protected area or during a closed season?	No

Comments/ Source(s) of information	Bangladesh has two ban periods; 65 days (20 May to 23 July) for all marine fishing, and 22 days (depends on lunar months) for Hilsha management (this management impacts all fisheries) (DoF, 2021). No take zones are recommended within the MPAs, but it is unknown whether mobulid rays are taken from no-take zones. **Sources:** DoF, 2021
d) Taken in contravention of RFB recommendations, if any?	Yes
Comments/ Source(s) of information	IOTC has a CMM (Res. 19/03) in place that prohibits capture and take of mobulid rays. **Sources:** https://www.iotc.org/cmm/resolution-1903-conservation-mobulid-rays-caught-association-fisheries-iotc-area-competence
e) Listed as a species whose export is prohibited?	Yes
Comments/ Source(s) of information	This species is listed on Schedule I of the Bangladesh Wildlife (Conservation and Security) Act, 2012.
f) Of concern for any other reason?	No
Comments/ Source(s) of information	
Question 1.2: Were specimens legally obtained?	**NO**

1.3) What does the available management information tell us?

1.3a) Global information

a) Reported global catch	In 2016, 5,436 mt of mobulid rays were reported caught globally. FAO reported landings of "Mantas, devil rays nei" have almost doubled over the past decade. Catches in the Eastern Indian Ocean rose from 136 mt in 2008 to 2,647 mt in 2016. Catches for this category have increased over the period 2008–2017, with an average catch of 4,462 mt per year. Capture production by species and groups of species (Mantas, devil rays nei) in mt, 2008–2017: 4,309; 2,414; 2,447; 3,731; 5,935; 6,318; 4,651; 4,803; 8,083 and 1,932 respectively; and 44, 623 mt in total. Global tuna purse seine fishery: 13,000 individuals annually: 7,817 Western Central Pacific and 1,936 Indian Ocean. Data from Sri Lanka (at present the largest global recorded mobulid catcher) suggests that between 2011 and 2019, catches for *Mobula birostris* ranged from 1,025 to 7,961 specimens annually; *Mobula mobular* ranged from 11,284 to 98,059 specimens annually; *Mobula tarapacana* ranged from 4,867 to 13,966 specimens annually; and *Mobula thurstoni* ranged from 495 to 2,915 specimens annually.
Comments/ Source(s) of information	**Sources:** Traffic, 2019; FAO, 2019 FishStat; http://www.fao.org/fishery/area/search/en; Croll et al., 2016; http://www.iotc.org/data/datasets; Fernando & Stewart 2021
b) Species distribution	*Mobula mobular, Mobula tarapacana, Mobula thurstoni, and Mobula birostris* have circumglobal distribution; *Mobula kuhlii* and *Mobula eregoodoo* have Indo-West Pacific distribution. All the six mentioned mobulid rays distribution includes Bay of Bengal or Indian Ocean.
Comments/ Source(s) of information	**Sources:** www.iucnredlist.org
c) Known stocks/populations	No stock specific studies from the Indian Ocean region. Presumed to be a single stock. Genetic population studies: ***M. mobular:*** Little genetic substructure throughout the north-west Pacific, north-east Pacific, Indian and east Atlantic Oceans. However, significant differences in maximum size suggest geographically isolated populations in north-east and south-west Pacific.

	M. tarapacana: Little genetic substructure throughout the central-east pacific, central-west pacific and Indian Oceans. ***M. thurstoni:*** Little genetic substructure throughout north-east pacific, south-east Pacific and Indian Oceans. ***M. kuhlii:*** Little genetic substructure through the central-west Pacific and Indian Oceans. Possibly and eastern and western population in the Indian Ocean.
Comments/ Source(s) of information	**Sources:** www.iucnredlist.org; Notarbartolo di Sciara et al., 2015; Poortvliet et al., 2015; Pardo et al. 2016a; Last et al., 2016; Hosegood et al., 2020
d) Main catching countries	The majority of catches in recent years were from the Western Central Pacific, landed by Indonesia; and the Eastern Indian Ocean, landed by Indonesia and Sri Lanka. Sri Lanka, Indonesia, India in the Indian Ocean region while in other parts of the world, Peru, China, Philippines, West Africa, Mozambique, Mexico etc. contribute to global catches. While not among the main catching countries, WCS recorded mobulid catches at landing sites in the coastal areas of Bangladesh. BFRI have also recorded "devil rays/bat rays" at landing sites in Bangladesh (0.85 tonnes with a mean length of 38.2 cm).
Comments/ Source(s) of information	**Sources:** Traffic, 2019; https://www.iucnredlist.org/; BFD, 2021; WCS Bangladesh unpublished data, 2021
e) Main gear types by which the species is taken	Mobulid rays are caught in targeted fisheries as well as incidental catch in a variety of gear types, including harpooning, netting, trawling, purse seine, gillnets and longlines. In Bangladesh mobulid rays are taken as bycatch in artisanal (gillnet, setbag net, baited and unbaited hooks) and industrial (trawl net) fisheries.
Comments/ Source(s) of information	**Sources:** Traffic, 2019; https://www.iucnredlist.org/
f) Global conservation status	Current global IUCN status: *M. mobular*: Endangered (2018) *M. kuhlii*: Endangered (2020) *M. tarapacana*: Endangered (2018) *M. thurstoni*: Endangered (2018) *M. eregoodoo*: Endangered (2020)

	M. birostris: Endangered (2019)
Comments/ Source(s) of information	**Sources:** https://www.iucnredlist.org/
g) Multilateral environmental agreements	Mobulid rays are listed on the CITES Appendix II, Convention on Migratory Species (CMS) Appendix I, and CMS Sharks MoU Annex 1.
Comments/ Source(s) of information	**Sources:** https://cites.org/eng/app/appendices.php; Convention on Migratory Species http://www.cms.int/en/species http://www.cms.int/sharks/en/mos2

1.3b) Stock/context-specific information

a) Stock assessments	No stock assessments have been conducted for the genera Mobula. There are no current or historical estimates of the global abundance of the devil rays, but based on limited information from other catching nations, it is suspected that global populations of all six mobulid ray have undergone a reduction of 50–79% over the past three generation lengths (38 years) (more detailed information on the declines is available at: https://www.iucnredlist.org/). Dramatic declines have been reported in other regions of the world for Mobula spp: >50% in India; 78-89% in Pacific Ocean (Peru,Costa Rica); 61% in Atlantic Ocean (Guinea).
Comments/ Source(s) of information	**Sources:** https://www.iucnredlist.org/; CITES, 2016
b) Main management bodies	Bangladesh Forest Department, Department of Fisheries, Ministry of Fisheries and Livestock, Ministry of Environment, Forest and Climate Change; Scientific Committee. CITES, CMS, CBD, IOTC, and FAO – IPOA.
c) Cooperative management arrangements	IOTC, the Regional Plan of Action for Sharks and Rays (developed by BOBP).
Comments/ Source(s) of information	**Sources:** http://www.iotc.org/; https://www.bobpigo.org/
d) Non-membership of RFBs	None
e) Nature of harvest	Mobulid rays are taken in Bangladesh as bycatch in artisanal (gillnet, setbag net, baited and unbaited hooks) and industrial (trawl net) fisheries. Pelagic longlines, purse seine, drift gillnets inshore artisanal fisheries (gillnets, handlines, drumlines, possibly seine nets, hand spears, spear guns, gaff hooks, harpoons), trawl.
Comments/ Source(s) of information	**Sources:** BFD, 2021; Haque et al., 2020; White et al., 2006a; Couturier et al., 2012; Pardo et al., 2016a; Lawson et al., 2017
f) Fishery types	Traditional/artisanal, small scale to commercial, and some industrial; caught in variety of gears.
Comments/ Source(s) of information	**Sources:** BFD, 2021

g) Management units	Department of Fisheries (IOTC); Bangladesh Forest Department (CITES; Bangladesh Wildlife (Conservation and Security) Act, 2012); Ministry of Environment, Forests, and Climate Change (CMS)
Comments/ Source(s) of information	http://www.iotc.org; BFD, 2021
h) Products in trade	In Bangladesh, mobulids are widely used for their meat and gill plates. The gill plates fetch high prices in Asia and are used for Chinese health tonics. The meat from mobulids is consumed domestically or exported (fresh or dried). There are no reports of aquaria trade for these species from Bangladesh.
Comments/ Source(s) of information	BFD, 2021; Haque et al., 2020, Fernando and Stevens, 2011; Heinrichs *et al.,* 2011; Couturier *et al.,* 2012; Ender and Fernando, 2014; Croll *et al.,* 2016; O'Malley *et al.,* 2017

1.3c) Data and data sharing

a) Reported national catch(es)	Bangladesh ranked among the top twenty shark fin exporting countries according to 2000-2011 FAO trade data, but the country was not among the top twenty shark catching nations. Official statistics report gradual declines in shark and ray landings from 6,234 metric tons of in 2001-2002 to 3,373 metric tons in 2019-2020. WCS unpublished data shows that 23.4 tons of mobulid rays (749 individuals) were recorded in Bangladesh between Dec 2016 to Jan 2019 (*Mobula mobular* 15 mt; *Mobula tarapacana* 0.5 mt; Mobula thurstoni 0.4 mt; and *Mobula birostris* 0.9 mt; *Mobula kuhlii* 1.5 mt; and unidentified *Mobula sp*., 5 mt).
Comments/ Source(s) of information	BFD, 2021; DoF, 2018 and 2019; Barua, 2020; WCS Bangladesh unpublished data, 2021; Mundy-Taylor and Crook, 2013; Dent and Clarke, 2015
b) Are catch and/or trade data available from other States fishing this stock?	Catches for Mobulid Rays have increased over the period 2008–2017, with an average catch of 4,462 mt per year. The majority of catches in recent years were from the Western Central Pacific, landed by Indonesia; and the Eastern Indian Ocean, landed by Indonesia and Sri Lanka. Catches in the Eastern Indian Ocean rose from 136 mt in 2008 to 2,647 mt in 2016, and peaked in the Western Central Pacific at 5,436 mt in 2016. The majority of landings in these ocean regions were reported by Indonesia, followed by Sri Lanka. Data from Sri Lanka (at present the largest global recorded mobulid catcher) suggests that between 2011 and 2019, catches for *Mobula birostris* ranged from 1,025 to 7,961 specimens annually; *Mobula mobular* ranged from 11,284 to 98,059 specimens annually; *Mobula tarapacana* ranged from 4,867 to 13,966 specimens annually; and *Mobula thurstoni* ranged from 495 to 2,915 specimens annually. From Pardo et al. 2016b: Devil rays (labelled as manta rays) were noted as one of the common elasmobranch species identified by observers in purse seine fisheries in the Pacific Island countries and territories. In the Western and Central Pacific tuna purse seine fisheries, mobulids were found in 7.4% of sets observed between 1994 and 2004.

	WCPFC Regional Observer Program, Secretariat Pacific Community data only showed Giant Manta Ray (may include mobulids) 2010-2014: 301 (longline) and 1149 purse seine (number of individuals) (Simpfendorfer and Rigby 2016). Reef Mantas (may include mobulids) are reported to be caught in purse seine Flag States: China, El Salvador, French Polynesia, PNG, Solomon Islands and caught in EEZ of PNG and Solomon Islands. Trade data- FAO does not report trade data in the category of 'gill plates' and only reported trade category for rays (excl. Rajidae rays and skates) with no sharks included is -'rays, chimaeras meat, frozen'. A search of the FAO statistics reported zero trade in this category of product from 2009-2013 (most recent 5 year period). There are many other product categories that include rays, but they also include sharks. No tracking of mobulid trade data is reported by O'Malley et al. (2016). Some mobulid trade data from other States sourced from market surveys; most recent articles are CITES 2016, O'Malley et al. 2016. Estimated global market 60.5- 120.5 mt dried gill plates (2011-2013) which represents 130,000 individual mobulids: 96% devil rays - 109,000 *M. japanica* and other black gill mobula spp, 17, 000 *M. tarapacana* and 5, 000 *Manta spp*.
Comments/ Source(s) of information	Traffic, 2019; Fernando & Stewart, 2021; Pardo et al., 2016; Lack and Meere 2009; Molony, 2005; Clarke et al., 2014; O'Malley et al., 2016; CITES, 2016
c) Reported catches by other States	Catches for this category have increased over the period 2008–2017, with an average catch of 4,462 mt per year. Catches in the Eastern Indian Ocean rose from 136 mt in 2008 to 2,647 mt in 2016, and peaked in the Western Central Pacific at 5,436 mt in 2016. Data from Sri Lanka suggests that between 2011 and 2019, catches for *Mobula birostris* ranged from 1,025 to 7,961 specimens annually; *Mobula mobular* ranged from 11,284 to 98,059 specimens annually; *Mobula tarapacana* ranged from 4,867 to 13,966 specimens annually; and *Mobula thurstoni* ranged from 495 to 2,915 specimens annually. In the Western and Central Pacific tuna purse seine fisheries, mobulids were found in 7.4% of sets observed between 1994 and 2004.

Comments/ Source(s) of information	Traffic, 2019; Fernando & Stewart, 2021; Pardo et al., 2016; Lack and Meere 2009; Molony, 2005; Clarke et al., 2014; O'Malley et al., 2016; CITES, 2016
d) Catch trends and values	There is no quantitative stock assessment or basic fishery indicators currently available for mobulid rays in the Indian Ocean, and therefore the stock status is uncertain. Despite the lack of sufficient data, based on actual levels of exploitation, steep declining population trends, a conservative life history, and the increasing trade demand, a global population reduction of 50–79% over the past three generation lengths (38 years) is suspected (https://www.iucnredlist.org/). Catches for this category have increased over the period 2008–2017, with an average catch of 4,462 mt per year. Catches in the Eastern Indian Ocean rose from 136 mt in 2008 to 2,647 mt in 2016, and peaked in the Western Central Pacific at 5,436 mt in 2016. Data from Sri Lanka suggests that between 2011 and 2019, catches for *Mobula birostris* ranged from 1,025 to 7,961 specimens annually; *Mobula mobular* ranged from 11,284 to 98,059 specimens annually; *Mobula tarapacana* ranged from 4,867 to 13,966 specimens annually; and *Mobula thurstoni* ranged from 495 to 2,915 specimens annually. Trade data- FAO does not report trade data in the category of 'gill plates' and only reported trade category for rays (excl. Rajidae rays and skates) with no sharks included is -'rays, chimaeras meat, frozen'. A search of the FAO statistics reported zero trade in this category of product from 2009-2013 (most recent 5 year period). There are many other product categories that include rays, but they also include shark. No tracking of mobulid trade data is reported by O'Malley et al. (2016). Some mobulid trade data from other States sourced from market surveys; most recent articles are CITES 2016, O'Malley et al. 2016. Estimated global market 60.5- 120.5 tons dried gill plates (2011-2013). Represents 130,000 individual mobulids: 96% devil rays - 109,000 *M. japanica* and other black gill *mobula spp*, 17, 000 *M. tarapacana* and 5, 000 Manta spp.
Comments/ Source(s) of information	Traffic, 2019; Fernando & Stewart, 2021; Pardo et al., 2016; Lack and Meere 2009; Molony, 2005; Clarke et al., 2014; O'Malley et al., 2016; CITES, 2016
e) Have RFBs and/or other States fishing this stock been consulted	No, but 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.

during or contributed data during this process?	
Comments/ Source(s) of information	https://cites.org/eng/prog/shark/resource_Parties_stakeholders#NDFs%20and%20NDF%20guidance

Step 2: Biological and conservation concerns

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

a) Median age at maturity	5-15 years
Comments/Source(s) of information	*M. mobular*: Female age-at-maturity is estimated as 5–6 years and maximum age estimated as 20 years (Cuevas-Zimbrón et al. 2013, Pardo et al. 2016). *M. kuhlii*: Unknown, they are inferred from the congener *M. mobular* *M. tarapacana*: Unknown, they are inferred from the congener *M. mobular* *M. thurstoni*: Unknown, they are inferred from the congener *M. mobular* *M. eregoodoo*: Unknown, they are inferred from the congener *M. mobular* *M. birostris*: Female age-at-maturity is estimated as 8.6 years of age but first pregnancy may be delayed by up to 4 years (making first age of pregnancy 12 years) depending upon food availability (Rambahiniarison et al., 2018). 15-20 years (Manta Trust, 2016)
b) Median size at maturity	over 200 cm TL
Comments/Source(s) of information	*M. mobular*: 210 cm DW (male)/~207 cm DW (female) Notarbartolo-di-Sciara 1987, Gulf of California). 198-205 cm DW (male)/ ~236 cm (female) (White et al. 2006a, Indonesia) *M. kuhlii*: 115-119 cm DW (male)/female unknown (White et al. 2006a, Indonesia) *M. tarapacana*: 234-252 cm DW (male)/ female unknown, likely >270 cm DW (White et al. 2006a, CITES 2016) *M. thurstoni*: 150 cm DW (male) (White et al. 2006a, Indonesia)/ 154 cm DW (female) (Couturier et al. 2012, Mexico) *M. eregoodoo*: males and females are mature by 99 cm DW and 92.5 cm DW, respectively (Broadhurst et al. 2018, Notobartolo di Sciara et al. 2020). *M. birostris*: Males mature at 350–400 cm DW and females mature at 380–500 cm DW (White et al. 2006, Last et al. 2016, Stevens et al. 2018). 256 cm (males) CMFRI; 413 cm. (female) DW (Rajapackiam et al. 2007) 400 cm (Marshall, 2009)
c) Maximum age/longevity in an unfished population	10-25 years

Comments/Source(s) of information	*M. mobular*: 19 years (based on 1 band pair per year) (Laglbauer et al. unpublished data). 14 years (Cuevas-Zimbron et al. 2013). 15-20 years (Pardo et al. 2016a). Female age-at-maturity is estimated as 5–6 years and maximum age estimated as 20 years (Cuevas-Zimbrón et al. 2013, Pardo et al. 2016) *M. kuhlii*: maximum age is unknown; they are inferred from the only Mobula spp. with age parameters. *M. tarapacana*: maximum age is unknown; they are inferred from the only Mobula spp. with age parameters. *M. thurstoni*: maximum age is unknown; they are inferred from the only Mobula spp. with age parameters. *M. eregoodoo*: maximum age is unknown; they are inferred from the only Mobula spp. with age parameters. *M. birostris*: Based on current data: >20 years (Couturier et al., 2012). In another study, the maximum age is estimated as 45 years, based on the longevity of the Reef Manta Ray (J. Carlson unpubl. data 2019, following methods in Dulvy et al. 2014).
d) Maximum size	over 300 cm TL
Comments/Source(s) of information	*M. mobular*: 310 cm DW (White et al. 2006b); 310 cm New Zealand, 284 cm Indonesia, 250 cm NE Pacific (Francis and Jones 2017). WCS unpublished data shows length range is 15 - 178.6 from 8 coastal landing sites of Bangladesh. *M. kuhlii*: 120 cm (White et al. 2006a). maximum size of 135 cm disc width (DW) (Last et al. 2016, Stevens et al. 2018). WCS unpublished data shows DW range is 23 - 78.3 cm from 8 coastal landing sites of Bangladesh. *M. tarapacana*: 370 cm DW (Couturier et al. 2012). Maximum size is 370 cm disc width (DW) (White et al. 2017, Last et al. 2016). DW data is not available in WCS Bangladesh unpublished data. *M. thurstoni*: 180 cm DW (Couturier et al. 2012). attains a confirmed maximum size of 197 cm disc width (DW) and possibly reaches 220 cm DW (Jabado and Ebert 2015, Rambahiniarison et al. 2018). WCS unpublished data shows maximum DW range is 86.5 cm from 8 coastal landing sites of Bangladesh. *M. eregoodoo*: maximum size of 130 cm disc width (DW) (Broadhurst et al. 2018, Notobartolo di Sciara et al. 2020). DW data is not available in WCS Bangladesh unpublished data. *M. birostris*: The Giant Manta Ray may be the largest living ray species attaining a maximum size of 700 cm disc width (DW) with anecdotal reports up to 910 cm DW (Compagno 1999, Alava et al. 2002). 910 cm (White et al. 2006) 680 cm, Veraval, Indian waters (Nair et al. 2015). DW data is not available in WCS Bangladesh unpublished data.
e) Natural mortality rate (M)	Lower than 0.17
Comments/Source(s) of information	*M. mobular*: median M = 0.087 year-1 (0.079- 0.097) (Pardo et al. 2016a) *M. kuhlii*, *M. tarapacana*, *M. thurstoni*, and *M. eregoodoo*: Unknown

	M. birostris: 0.012 – 0.04 yr-1 (Dulvy et al., 2014)
f) Maximum annual pup production (per mature female)	Less than 2
Comments/Source(s) of information	*M. mobular*: 1 pup per year (White et al. 2006a, Couturier et al. 2012). *M. kuhlii*, *M. tarapacana*, *M. thurstoni*, and *M. eregoodoo*: 1 pup per year (Couturier et al. 2012) *M. birostris*: 1 (Compagno et al., 1989); (Manta Trust, 2016) Pup data is unavailable from WCS Bangladesh unpublished data.
g) Intrinsic rate of population increase (r)	under 0.15
Comments/Source(s) of information	*M. mobular*: Median = 0.077 year-1 (0.042- 0.108 year-1) 1 band pair per year (Pardo et al. 2016a) *M. kuhlii*, *M. tarapacana*, and *M. eregoodoo*: Unknown *M. thurstoni*: The estimated intrinsic rate of increase of is very low (0.001–0.063) per year (Rambahiniarison et al. 2018). *M. birostris*: 0.042 – 0.05 (Ward-Paige et al. 2013) [0.089–0.139] (Dulvy et al., 2014). Based on this life history, the maximum intrinsic rate of population increase could range between 0.019 and 0.046 per year (median 0.032 per year) (J. Carlson unpubl. data 2019, following methods in Dulvy et al. 2014).
h) Geographic distribution of stock	Ocean basin, unrestricted, limited fragmentation
Comments/Source(s) of information	Mobula mobular, Mobula tarapacana, Mobula thurstoni, and Mobula birostris have circumglobal distribution; Mobula kuhlii and Mobula eregoodoo have Indo-West Pacific distribution. The distributions of all six mentioned mobulid rays includes the Bay of Bengal or Indian Ocean. Few species have patch distribution (https://www.iucnredlist.org/).
i) Current stock size relative to historic abundance	<25% baseline abundance
Comments/Source(s) of information	There are no current or historical estimates of the global abundance of the Devil Rays, but it is suspected that all six mobulid ray global population have undergone a reduction of 50–79% over the past three generation lengths (38 years).

	In India, population reductions are suspected based on declines in devil ray catches, while effort has increased in several regions, including Kerala, along the Tuticorin coast, and Mumbai (Mohanraj et al. 2009, Couturier et al. 2012). In Sri Lanka, fishermen have reported declines in mobulid ray catches over the past 5 to 10 years as targeted fishing pressure has increased (Fernando and Stevens 2011). The scale and effects of devil ray fisheries in Sri Lanka and India suggest considerable population reduction regionally (Heinrichs et al. 2011). Dramatic declines in all species reported in other regions of the world, including Philippines, India, Mozambique, Mexico (CITES 2016, Croll et al. 2016).
j) Behavioural factors	High level of risk incurred through behavioral factors
Comments/Source(s) of information	Devil rays are often easy to target because of their large size, slow swimming speed, tendency to aggregate or predictably use specific habitats, and their general lack of human avoidance (Couturier et al. 2012). The species' preference for coastal waters places it within the range of inshore fisheries, which are known to be intensive in many parts of its range, including Pakistan, India, Bangladesh, and elsewhere (de Young 2006, Flewelling and Hosch 2006, Notobartolo di Sciara et al. 2020). *M. mobular*: Pelagic inshore and offshore (Couturier et al. 2012) Inshore pupping in Banyuwangi, Indonesia (Laglbauer et al. unpublished data). Possibly sparsely distributed and highly fragmented (CITES 2016). *M. kuhlii*: Shelf and pelagic near continental coastal areas (Couturier et al. 2012). *M. tarapacana*: Oceanic and occasionally coastal waters. Possibly sparsely distributed and highly fragmented (Couturier et al. 2012, CITES 2016) *M. thurstoni*: Shallow coastal waters. Above four shows aggregating behaviour and very high at-vessel fishing mortality rates (Lawson et al. 2017, Pardo et al. 2016a, Francis and Jones 2017). *M. eregoodoo*: inshore and offshore species found in continental shelf areas, including coral reef habitats, to 50 m deep (Weigmann 2016, Notobartolo di Sciara et al. 2020). Schooling behaviour is common for this species (Broadhurst et al. 2018, Stevens et al. 2018, Notobartolo di Sciara et al. 2020). *M. birostris*: Generally solitary but tend to aggregate at off-shore pinnacles and sea mounts. They also visit cleaning stations in shallow reefs, and are sighted feeding at the surface inshore and offshore. Possible nursery grounds near the continental shelf edge (e.g. Sri Lanka, Peru and Ecuador). Particularly vulnerable to tuna long line and gill nets (Manta Trust, 2016)

k) Trophic level	Low	
Comments/Source(s) of information	*M. mobular*: 3.43 (Sampson et al. 2010) *M. kuhlii*: 3.4 (Froese and Pauly 2016) *M. tarapacana*: 3.8 (Froese and Pauly 2016) *M. thurstoni*: 3.48 (Sampson et al. 2010) *M. eregoodoo*: Unknown *M. birostris*: 3.5 ± 0.50 Likely low-medium based on feeding ecology	
Overall biological vulnerability:		**HIGH LEVEL OF VULNERABILITY**

2.1) What is the severity and geographic extent of the conservation concern?

Conservation or stock assessment status:

Has a Fisheries stock assessment been conducted?	No
Comments/Source(s) of information	Stock assessments for other fisheries species have been conducted in Bangladesh but are yet to be undertaken for any shark or ray species. No regional stock assessments are available for these species.
Has a National Redlist Assessment been conducted?	No
What is the Regional IUCN Redlist Assessment?	The species, population, or stock has not been assessed (NE or equivalent)
What is the Global IUCN Redlist Assessment?	The species, population, or stock has been assessed and is seriously threatened (CR, EN)
Comments/Source(s) of information	Current global IUCN Status: *M. mobular*: Endangered (2018) *M. kuhlii*: Endangered (2020) *M. tarapacana*: Endangered (2018) *M. thurstoni*: Endangered (2018) *M. eregoodoo*: Endangered (2020) *M. birostris*: Endangered (2019) Sources: https://www.iucnredlist.org/
What are the population trends?	The population trend is unmanaged, decreasing, and stock is below 40% of historic baseline
Comments/Source(s) of information	There are no current or historical estimates of the global abundance of the Devil Rays, but it is suspected that all six mobulid ray global population has undergone a reduction of 50–79% over the past three generation lengths (38 years). Dramatic declines have been reported in other regions of the world for Mobula spp: >50% in India; 78-89% in Pacific Ocean (Peru, Costa Rica; 61% in Atlantic Ocean (Guinea). Sources: https://www.iucnredlist.org/; CITES, 2016

What is the geographic extent/scope of conservation concern?	Identified threats affect the entire global population of the species
Comments/Source(s) of information	The species are affected by fisheries throughout most of their global range. In the Indian Ocean, the few exceptions or refuges are in the Maldives and Chagos MPA, while nationally in Bangladesh it would likely be in the Swatch-of-No-Ground MPA and potentially in the Saint Martin's MPA.
Overall geographic conservation concern:	**HIGH LEVEL OF CONCERN**

Step 3: Pressure on the Species

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

a (i) Magnitude of legal trade	High
ii) What is the level of confidence in the answer?	Medium
Comments/Source(s) of information	Available landings data for mobulid rays in Bangladesh indicates that low numbers are being captured by Bangladesh vessels. This species was recently (in September 2021) included under Schedule I of the Wildlife Act and is therefore prohibited from being captured, landed, or traded. Additional time is needed to determine level of compliance. Considering the potential range of the stock/population, mobulid rays are likely heavily impacted by fishing pressure from multiple Indian Ocean countries and from international fleets fishing in the high seas (e.g., largest mobulid fishing nations in the world are Sri Lanka and Indonesia), where they are being retained for their gill plates that enter the global trade. Though information on exact trade figures is not available from the region, these species are sold/ marketed/ traded if landed and they have multiple uses in both domestic and international markets. Demand for gill plates is high. Meat is utilized as fresh, frozen, or dried and salted for consumption. It is likely that all mobulid ray gill plates and shark fins are traded together, thereby affecting species-specific trade data. **Sources:** BFD, 2021, www.iucnredlist.org
b (i) Magnitude of illegal trade	**High**
ii) What is the level of confidence in the answer?	**High**
Comments/Source(s) of information	Trade of shark and ray products is considerably higher than the volume of documented

	trade based on the import statistics provided by other countries (e.g., Hong Kong). In Bangladesh, the trade of mobulid ray species is prohibited. However, no species-specific information is available on trade from Bangladesh and products such as fins and fish maw are combined in trade reporting. This means that products such as gill plates could be exported unnoticed. There is a lack of traceability in trade of sharks and rays in Bangladesh. There is a lot of information available on potential illegal trade of shark fins, meat, and skins that are exported to Myanmar for re-export to Singapore, Hong Kong, China, and USA. Roy et al. (2015) estimated that only 10-20% of this trade follows proper legal procedures. According to information from an international media survey and interviews with shark traders in Bangladesh, shark fins are transported by boat from Chattogram and Cox's Bazar to Myanmar and then on to Yangon and China. The majority of the dried ray meat is exported to Myanmar along with other elasmobranch products. Other products, such as mobulid gill plates, may be exported via these same trade channels. Some products (fresh and dried) are also transported by truck or bus from Chattogram or Cox's Bazar to Khagrachari, Dhaka, Rangpur and Rajshahi. Due to the high value of gill plates in international trade, there have been documented instances of attempts to illegally export, or import, mobulid gill plates from other countries sharing the same stock in the Indian Ocean. **Sources:** Roy et al., 2007; BFD, 2021; WCS, 2018; Haque et al., 2020.
Overall trade pressure:	**HIGH**
Overall level of confidence:	**HIGH**

3.2) What is the severity of fishing pressure on the stock of the species concerned?

a (i) Fishing mortality (retained catch)	**High**
ii) What is the level of confidence in the answer?	**High**
Comments/Source(s) of information	There are limited discards of mobulid rays in Bangladesh waters (some instances of mobulid rays release have been documented by Haque et al. 2020). In general, any sharks or rays captured are retained and fully utilized. About 68,000 vessels are operating in the Bangladesh EEZ, however they do not all engage in shark and ray fishing. The prohibition on capturing mobulid rays in Bangladesh was introduced in September 2021, and therefore it is too early to tell whether it is being implemented and complied with. The situation is similar for most other fisheries in the region where there is virtually no discard of mobulid rays and therefore, fisheries mortality is likely ~100% for most of this stock. Based on actual levels of exploitation, steep declining population trends, a conservative life history, and the increasing trade demand, a global population reduction of 50–79% over the past three generation lengths (38 years) is suspected, with a further population reduction suspected over the next three generation lengths (https://www.iucnredlist.org/). Fishing mortality (F) and Natural Mortality (M) estimated for M. mobular from small scale artisanal Mexican fishery (Pardo et al. 2016a). F =0.110 year-1. M = 0.077 year-1 (0.042-0.108 year- 1). F=1.4M hence a high proportion of stock is removed by fishing activities. Fishing mortality was estimated as greater than natural mortality for M. mobular which was concluded as “being fished at a rate high enough to lead to eventual depletion” (Pardo et al. 2015). This data is also used to conclude ‘there is the potential to drive mobula rays to extinction under low levels of fishing mortality’ (CITES 2016). This is data for one of the mobulid species for a small scale Mexican artisanal fishery, however as the mobulid species

	have similar life histories it is applicable as a guide for the fishing and natural mortality of the other species. **Sources:** Haque et al., 2020; www.iucnredlist.org; Pardo et al., 2015; Pardo et al., 2016; CITES, 2016
b (i) Discard mortality	**Medium**
ii) What is the level of confidence in the answer?	**Medium**
Comments/Source(s) of information	There are very few discards of mobulid rays from Bangladesh fisheries (complete utilization). This is similar for many other Indian Ocean fishing nations. However, studies of post-release survival rates of M. mobular showed low post-release survival (nine tagged, seven tagged animals reported data and four of the seven animals died within 2-4 days of release even though they appeared in good condition on release) (Francis and Jones 2016). As the mobulid species have similar life histories it is applicable as a guide for the discard mortality of the other three species. There is no information available on the post-release survival from gillnet, longline, or other forms of artisanal fisheries. It is suspected that these species may have low survival if left for many hours in a net (since they need to keep swimming to breathe) and based on handling and release. **Sources:** Francis and Jones, 2016
c (i) Size/age/sex selectivity	**High**
ii) What is the level of confidence in the answer?	**High**
Comments/Source(s) of information	There is limited data available from Bangladesh. Data from WCS of 749 mobulid specimens, recorded size ranges were 14 - 178.6 cm for M. mobular, 23 - 78.3 cm for M. kuhlii, and 86.5

	cm M. thurstoni. Total survey effort was just under 3,000 surveys from 8 landing sites from 2016 to 2019. Haque et al. 2020 reports mean sizes of 133 cm (ranging from 46 - 213 cm) for all devil rays. Both these datasets indicate that extremely small, immature juveniles are being captured by the Bangladesh fishery. There is no targeted or selective fishing for this species in Bangladesh and across most other Indian Ocean countries they are primarily captured incidentally across multiple fishing gears. Data from Sri Lanka suggests that all captured manta rays and a high proportion of devil rays are also immature juveniles. Devil rays are often easy to target because of their large size, slow swimming speed, tendency to aggregate or predictably use specific habitats, and their general lack of human avoidance (Couturier et al. 2012). The species' preference for coastal waters places it within the range of inshore fisheries, which are known to be intensive in many parts of its range, including Pakistan, India, Bangladesh, and elsewhere (de Young 2006, Flewelling and Hosch 2006, Notobartolo di Sciara et al. 2020). **Sources:** WCS Bangladesh, unpub. 2021, 2021; Haque et al., 2020; Couturier et al. 2012; de Young, 2006; Flewelling and Hosch, 2006; Notobartolo di Sciara et al., 2020
d (i) Magnitude of illegal, unreported and unregulated (IUU) fishing	**High**
ii) What is the level of confidence in the answer?	**Medium**
Comments/Source(s) of information	Information about this factor is limited. In Bangladesh there are some reports of IUU fishing, for example the use of illegal nets, most artisanal vessels are lacking fishing permits, mechanized boats are lacking licenses and are using unauthorized vessels, and (trawlers and setbag netters) are violating the depth ranges of their permits. There is also a poor documentation of catches, particularly at a species level. Additionally, the trade chain is not transparent.

	Since September 2021, all mobulid rays are a prohibited species in the Bangladesh EEZ, however it is too early to determine compliance with this measure. Across the Indian Ocean there are other reports of IUU fisheries, such as infringing on fishing grounds of neighboring countries or potentially by international fleets operating illegally in the high seas and EEZs. However, data of shark and ray captures from such IUU fisheries are not available.
Overall severity of fishing mortality:	**HIGH**
Overall level of confidence:	**HIGH**

Step 4: Existing Management Measures

4.1) Are existing management measures apprpriately designed and implemented to mitigate pressures affecting the stock?

Pressure - Magnitude of Legal Trade	
Existing management measure	**CITES**
Is it a Sub-national/National, or Regional/International measure?	Regional/International
Is the measure generic, species-specific or both?	Generic
Relevant monitoring, control, and surveillance (MSC) measure(s)	Regulates international trade and mandates adoption of national legislation to improve the management of threatened wildlife, including sharks and rays. The FD issues CITES exports permits. Customs coordinates with the FD to verify the certification and product prior to export of CITES-listed species.
Overall assessment of compliance regime	Poor (limited relevant compliance measures in place)
Are relevant data collected and analysed to inform management decisions?	Limited relevant data are collected AND analysed to inform management
Is management consistent with expert advice?	Consistent
Is the management measure effective at addressing the pressure?	Partially

Pressure - Magnitude of Legal Trade	
Existing management measure	**Fish Inspection and Quality Control Act of 2020**
Is it a Sub-national/National, or Regional/International measure?	Sub National/National
Is the measure generic, species-specific or both?	Generic
Relevant monitoring, control, and surveillance (MSC) measure(s)	This Act deals with the exports and quality of export products. Deputy Director of Fish Inspection and Quality Control (FIQC) of the DoF provides clearance and certificate for export, following inspections by Fisheries inspectors, for all fish species (there is no particular control on CITES-listed species). It is fully compliant with respect to its current requirements, however there are no measures to regulate products specified in CITES or the Wildlife Act.
Overall assessment of compliance regime	Good (comprehensive relevant compliance measures in place)
Are relevant data collected and analysed to inform management decisions?	Comprehensive data collected AND analysed to inform management
Is management consistent with expert advice?	Consistent
Is the management measure effective at addressing the pressure?	Partially

Pressure - Magnitude of Illegal Trade	
Existing management measure	**Bangladesh Wildlife (Conservation and Security) Act, 2012**
Is it a Sub-national/National, orRegional/International measure?	Sub National/National
Is the measure generic, species-specific or both?	Both
Relevant monitoring, control, and surveillance(MSC) measure(s)	Eight genera and 23 species of sharks and rays are listed under Schedule I, and one genus and 29 species under Schedule II. Species listed in Schedule I and Schedule II of the Wildlife (Conservation and Security) Act, 2012 are protected animals, and require license and/or permit from BFD for commercial farming, capturing, collection, possession, production, rearing, import-export or hunting. Compliance is unknown as the list of sharks and rays was amended in September 2021; however, some prosecutions have taken place over the last few months. The Wildlife Crime Control Unit provides some monitoring. However, their capacity (manpower and resources) is limited. The Coastal Forest Divisions and the Wildlife Management and Nature Conservation Divisions of the BFD also provide some monitoring at landing sites.
Overall assessment of compliance regime	Moderate (some relevant compliance measures in place)
Are relevant data collected and analysed toinform management decisions?	Limited relevant data are collected AND analysed to inform management
Is management consistent with expert advice?	Expert advice partially implemented
Is the management measure effective ataddressing the pressure?	Insufficient information

Pressure - Fishing mortality (retained catch)	
Existing management measure	**Bangladesh Wildlife (Conservation and Security) Act, 2012**
Is it a Sub-national/National, orRegional/International measure?	Sub National/National
Is the measure generic, species-specific or both?	Both
Relevant monitoring, control, and surveillance(MSC) measure(s)	Species listed in Schedule I and Schedule II of the Wildlife (Conservation and Security) Act, 2012 are protected animals, and require license and/or permit from BFD for commercial farming, capturing, collection, possession, production, rearing, import-export or hunting. At present, most MSC is conducted only at the point of landing. Some limited control and surveillance is conducted by the DoF with support from the Navy and Coast Guard (some onboard inspections but mostly over radio). At present compliance is low for sharks and rays since the measure is very new (September 2021).
Overall assessment of compliance regime	Moderate (some relevant compliance measures in place)
Are relevant data collected and analysed toinform management decisions?	Limited relevant data are collected AND analysed to inform management
Is management consistent with expert advice?	Consistent
Is the management measure effective ataddressing the pressure?	Insufficient information

Pressure - Fishing mortality (retained catch)	
Existing management measure	**CMS**
Is it a Sub-national/National, orRegional/International measure?	Regional/International
Is the measure generic, species-specific or both?	Generic
Relevant monitoring, control, and surveillance(MSC) measure(s)	Mobulid rays are included on CMS Appendix I ("no take"). CMS Appendix I species have been included in the national Wildlife Act under Schedule 1. However, as these measures were only introduced in September 2021, it is too early to determine level of compliance.
Overall assessment of compliance regime	Moderate (some relevant compliance measures in place)
Are relevant data collected and analysed toinform management decisions?	Limited relevant data are collected AND analysed to inform management
Is management consistent with expert advice?	Consistent
Is the management measure effective ataddressing the pressure?	Insufficient information

Pressure - Fishing mortality (retained catch)	
Existing management measure	**IOTC Resolution 15/01 on the recording of catch and effort data by fishing vessels in the IOTC area of competence**
Is it a Sub-national/National, orRegional/International measure?	Regional/International
Is the measure generic, species-specific or both?	Generic
Relevant monitoring, control, and surveillance(MSC) measure(s)	Standard reporting to the IOTC is being carried out (see IOTC-2020-SC24-NRBangladesh). However, information on control and surveillance is not available. The Department of Fisheries (DoF) provides a format to collect data for industrial trawling. If trawlers do not provide the data, they are not issued a permit to fish. The data format only requires recording the cumulative catch weight of 'sharks/skates/rays'. Shark and ray landing data from artisanal fisheries are collected by DoF from 2 coastal landing sites in Bangladesh (Chattogram and Cox's Bazar) on 4 days per month, while some fish landing monitoring occurs across 14 other landing sites. Information from industrial and artisanal fleets is therefore very limited.
Overall assessment of compliance regime	Moderate (some relevant compliance measures in place)
Are relevant data collected and analysed toinform management decisions?	Some relevant data are collected AND analysed to inform management
Is management consistent with expert advice?	Expert advice partially implemented
Is the management measure effective ataddressing the pressure?	Partially

Pressure - Fishing mortality (retained catch)	
Existing management measure	**IOTC Resolution 15/02 mandatory statistical reporting requirements for Contracting Parties and Cooperating Non-Contracting Parties CPCs**
Is it a Sub-national/National, orRegional/International measure?	Regional/International
Is the measure generic, species-specific or both?	Generic
Relevant monitoring, control, and surveillance(MSC) measure(s)	Standard reporting to the IOTC is being carried out (see IOTC-2020-SC24-NRBangladesh). Some statistical reporting is available from industrial and artisanal fleets, however it lacks species- specific details.
Overall assessment of compliance regime	Moderate (some relevant compliance measures in place)
Are relevant data collected and analysed toinform management decisions?	Some relevant data are collected AND analysed to inform management
Is management consistent with expert advice?	Expert advice partially implemented
Is the management measure effective ataddressing the pressure?	Partially

Pressure - Fishing mortality (retained catch)	
Existing management measure	**IOTC Resolution 19/03 on the conservation of mobulid rays.**
Is it a Sub-national/National, orRegional/International measure?	Regional/International
Is the measure generic, species-specific or both?	Generic
Relevant monitoring, control, and surveillance(MSC) measure(s)	Mobulid rays are currently strictly protected under Schedule I of the Wildlife Act. A NPOA for sharks and rays is currently under development and would take into consideration IOTC requirements. At present, there is no specific mobulid ray data collection process in place.
Overall assessment of compliance regime	Moderate (some relevant compliance measures in place)
Are relevant data collected and analysed toinform management decisions?	Limited relevant data are collected AND analysed to inform management
Is management consistent with expert advice?	Consistent
Is the management measure effective ataddressing the pressure?	Insufficient information

Pressure - Fishing mortality (retained catch)	
Existing management measure	**Bangladesh Biodiversity Act 2017**
Is it a Sub-national/National, orRegional/International measure?	Sub National/National
Is the measure generic, species-specific or both?	Generic
Relevant monitoring, control, and surveillance(MSC) measure(s)	At present, the agency for the monitoring and control of this Act is not designated.
Overall assessment of compliance regime	Poor (limited relevant compliance measures in place)
Are relevant data collected and analysed toinform management decisions?	No data OR data are of poor quality OR data are not analysed (adequately) to inform management
Is management consistent with expert advice?	Expert advice partially implemented
Is the management measure effective ataddressing the pressure?	Insufficient information

Pressure - Fishing mortality (retained catch)	
Existing management measure	**ECA: ecological critical areas, 2010.**
Is it a Sub-national/National, orRegional/International measure?	Sub National/National
Is the measure generic, species-specific or both?	Generic
Relevant monitoring, control, and surveillance(MSC) measure(s)	At present there are 13 ECAs designated in Bangladesh. Out of the 13 areas, 4 encompass marine areas. Monitoring and control is conducted by the Department of Environment and the BFD. ECAs could be used to positively impact threatened marine species.
Overall assessment of compliance regime	Poor (limited relevant compliance measures in place)
Are relevant data collected and analysed toinform management decisions?	Limited relevant data are collected AND analysed to inform management
Is management consistent with expert advice?	Consistent
Is the management measure effective ataddressing the pressure?	Insufficient information

Pressure - Discard mortality	
Existing management measure	**Bangladesh Wildlife (Conservation and Security) Act, 2012**
Is it a Sub-national/National, orRegional/International measure?	Sub National/National
Is the measure generic, species-specific or both?	Both
Relevant monitoring, control, and surveillance(MSC) measure(s)	No information available with regard to mobulid rays. Until now, fishers have been encouraged to retain all catch (total utilization of catch), however new awareness is being implemented by DoF and BFD emphasizing that protected species must be released safely at sea.
Overall assessment of compliance regime	Poor (limited relevant compliance measures in place)
Are relevant data collected and analysed toinform management decisions?	Limited relevant data are collected AND analysed to inform management
Is management consistent with expert advice?	Consistent
Is the management measure effective ataddressing the pressure?	Insufficient information

Pressure - Discard mortality	
Existing management measure	**IOTC Resolution 11/04 on a regional observer scheme**
Is it a Sub-national/National, orRegional/International measure?	Regional/International
Is the measure generic, species-specific or both?	Generic
Relevant monitoring, control, and surveillance(MSC) measure(s)	Standard reporting to the IOTC is being carried out (see IOTC-2020-SC24-NRBangladesh). There is no regional observer scheme in place. However, there was an initiative (around 2014/2015) to deploy observers in industrial vessels but this was not completed or continued.
Overall assessment of compliance regime	Poor (limited relevant compliance measures in place)
Are relevant data collected and analysed toinform management decisions?	No data OR data are of poor quality OR data are not analysed (adequately) to inform management
Is management consistent with expert advice?	No expert advice on management identified
Is the management measure effective ataddressing the pressure?	No

Pressure - Magnitude of IUU fishing	
Existing management measure	**Bangladesh Wildlife (Conservation and Security) Act, 2012**
Is it a Sub-national/National, orRegional/International measure?	Sub National/National
Is the measure generic, species-specific or both?	Both
Relevant monitoring, control, and surveillance(MSC) measure(s)	Species listed in Schedule I and Schedule II of the Wildlife (Conservation and Security) Act, 2012 are protected animals, and require license and/or permit from BFD for commercial farming, capturing, collection, possession, production, rearing, import-export or hunting. At present, most MSC is conducted only at the point of landing. Some limited control and surveillance is conducted by DoF with support from the Navy and Coast Guard (some onboard inspections but mostly over radio).
Overall assessment of compliance regime	Moderate (some relevant compliance measures in place)
Are relevant data collected and analysed toinform management decisions?	Limited relevant data are collected AND analysed to inform management
Is management consistent with expert advice?	Consistent
Is the management measure effective ataddressing the pressure?	Insufficient information

Pressure - Magnitude of IUU fishing	
Existing management measure	**Marine Fisheries Rules, 1983**
Is it a Sub-national/National, or Regional/International measure?	Sub National/National
Is the measure generic, species-specific or both?	Generic
Relevant monitoring, control, and surveillance(MSC) measure(s)	Gear restriction (minimum mesh size, use of poison, and spatial use of setbag nets). DoF works with Navy and Coast Guard for MSC at sea. DoF have also introduced VMS (since 2014), however it is not presently operational. With support from World Bank, a fisheries monitoring center is being developed (using AIS, GSM (for artisanal), and VMS). A joint monitoring center with Navy, Coastguard, and Customs other relevant agencies is being established. Monitoring (at sea and land) will also be improved through this project. A National Plan of Action for IUU has been prepared and was approved in 2021 by the Ministry of Fisheries and Livestock. A Marine Fisheries Management Plan has also been developed, which includes measures for IUU fishing. The PSMA was signed in 2020. There is a licensing and permitting system in place to cover both industrial and artisanal fleets. It is mandatory to land all their catch at official landing site.
Overall assessment of compliance regime	Good (comprehensive relevant compliance measures in place)
Are relevant data collected and analysed to inform management decisions?	Some relevant data are collected AND analysed to inform management
Is management consistent with expert advice?	Consistent
Is the management measure effective at addressing the pressure?	Yes

Pressure - Magnitude of IUU fishing	
Existing management measure	**Protection and Conservation of Fish Act 1950 and Rules 1985**
Is it a Sub-national/National, orRegional/International measure?	Sub National/National
Is the measure generic, species-specific or both?	Generic
Relevant monitoring, control, and surveillance(MSC) measure(s)	Prohibits use of monofilament gillnet, regulates mesh size of all nets, and deployment depth restriction (up to 10 meters). DoF monitors and jointly enforces with Coast Guard, River Police, in collaboration with local administration. Combing operations are conducted in relation to illegal nets. A national, divisional, district, and sub-district committee was established (Task Force Committee) to control prohibited nets and illegal fishing in rivers and inland areas.
Overall assessment of compliance regime	Good (comprehensive relevant compliance measures in place)
Are relevant data collected and analysed toinform management decisions?	Some relevant data are collected AND analysed to inform management
Is management consistent with expert advice?	Consistent
Is the management measure effective ataddressing the pressure?	Yes

Pressure - Magnitude of IUU fishing	
Existing management measure	**Territorial Waters and Maritime Zones Act 1974**
Is it a Sub-national/National, orRegional/International measure?	Sub National/National
Is the measure generic, species-specific or both?	Generic
Relevant monitoring, control, and surveillance(MSC) measure(s)	To prevent indiscriminate exploitation, depletion and destruction of marine resources. Mandate for implementation is under the Navy and the focus is primarily on incursions by foreign fishing vessels. Navy and Coastguard carry out patrolling.
Overall assessment of compliance regime	Moderate (some relevant compliance measures in place)
Are relevant data collected and analysed toinform management decisions?	Limited relevant data are collected AND analysed to inform management
Is management consistent with expert advice?	Expert advice partially implemented
Is the management measure effective ataddressing the pressure?	Yes

Pressure - Magnitude of IUU fishing	
Existing management measure	**The Marine Fisheries Act 2020**
Is it a Sub-national/National, orRegional/International measure?	Sub National/National
Is the measure generic, species-specific or both?	Generic
Relevant monitoring, control, and surveillance(MSC) measure(s)	Gear restriction and monitoring marine protected area. Coast Guard and Navy monitor illegal vessels and inform DoF about activities.
Overall assessment of compliance regime	Good (comprehensive relevant compliance measures in place)
Are relevant data collected and analysed toinform management decisions?	Some relevant data are collected AND analysed to inform management
Is management consistent with expert advice?	Consistent
Is the management measure effective ataddressing the pressure?	Yes

Pressure - Magnitude of IUU fishing

Existing management measure	IOTC Resolution 15/01 on the recording of catch and effort data by fishing vessels in the IOTC area of competence
Is it a Sub-national/National, orRegional/International measure?	Regional/International
Is the measure generic, species-specific or both?	Generic
Relevant monitoring, control, and surveillance(MSC) measure(s)	DoF is working toward improving the catch reporting for sharks and rays from industrial fisheries.
Overall assessment of compliance regime	Moderate (some relevant compliance measures in place)
Are relevant data collected and analysed toinform management decisions?	Some relevant data are collected AND analysed to inform management
Is management consistent with expert advice?	Expert advice partially implemented
Is the management measure effective ataddressing the pressure?	Partially

Pressure - Magnitude of IUU fishing

Existing management measure	IOTC Resolution 11/04 on a regional observer scheme
Is it a Sub-national/National, orRegional/International measure?	Regional/International
Is the measure generic, species-specific or both?	Generic
Relevant monitoring, control, and surveillance(MSC) measure(s)	Standard reporting to the IOTC is being carried out (see IOTC-2020-SC24-NRBangladesh). There is no regional observer scheme in place.
Overall assessment of compliance regime	Poor (limited relevant compliance measures in place)
Are relevant data collected and analysed toinform management decisions?	No data OR data are of poor quality OR data are not analysed (adequately) to inform management
Is management consistent with expert advice?	No expert advice on management identified
Is the management measure effective ataddressing the pressure?	No

Step 5: Non-Detriment Finding and related advice

5.0	**Non-Detriment Finding and related advice**	
5.1	**Based on the outcomes of the previous sections, is it possible to make a positive NDF (with or without associated conditions)?**	
	STEP 1: Can/should an NDF be made?	
	Section 1.1(a): Is the specimen subject to CITES controls?	Yes
	Section 1.1(b): Can origin and stock be confidently identified?	Yes
	Section 1.2: Were specimens legally obtained?	No
	STEP 2: Intrinsic biological vulnerability and conservation concern	
	Section 2.1: Intrinsic biological vulnerability:	High level of vulnerability
	Section 2.2: Conservation concern:	High level of concern

	STEP 3: Pressure 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?**
	Trade pressures:			
a)	Magnitude of legal trade	High level of risk	Medium level of confidence	Partially
b)	Magnitude of illegal trade	High level of risk	High level of confidence	No
	Fishing pressures:			
a)	Fishing mortality (retained catch)	High level of risk	High level of confidence	No
b)	Discard mortality	Medium level of risk	Medium level of confidence	No
c)	Size/age/ sex selectivity	High level of risk	High level of confidence	No measures in place
d)	Magnitude of illegal, unreported and unregulated (IUU) fishing	High level of risk	Medium level of confidence	Partially

	Automated Recommendation: **0 to 2** - Not recommended **2.1 to 5** - Not recommended unless mitigation measures applied **5.1 to 8** - Possible with conditions **8.1 to 10** - Recommended	Negative NDF required since specimen is not subject to CITES controls AND/OR origin cannot be confidently identified AND/OR **specimen not legally obtained**	**Not recommended unless mitigation measures applied**
	Based on the above information, can a positive NDF be made?	**No**	List mandatory conditions in Section 6 and list recommendations for measures to improve monitoring/management under reasoning/comments below
	Enter any reasoning/comments:		
	A Negative NDF is recommended because specimens of mobulid rays cannot be legally obtained due to the listing under Schedule I of the Bangladesh Wildlife (Conservation and Security) Act, 2012.		
	NDF expiry (recommended validity: 1 or 2 years):	This NDF will remain valid until new or different information is available and this NDF is revised or updated. This Negative NDF outcome will remain in place unless the species is removed or moved to a different Schedule under the Bangladesh Wildlife (Conservation and Security) Act, 2012.	

Step 6: Recommendations

Recommendation	**Population monitoring (fisheries-independent data)**
Is this recommendation applicable	Yes
Aims, objectives, implementation, relevant compliance measures, and other notes/comments	Provide support to existing national and regional initiatives (e.g., encouraging and supporting population stock assessments for mobulid rays at the IOTC), including providing mobulid rays tissue samples for Indian Ocean population genetic studies.
Potential lead agencies	DoF, BFRI, universities (national and international), and NGOs
Timeframe	Ongoing
Recommendation	**Fisheries monitoring (fisheries-dependent data)**
Is this recommendation applicable	Yes
Aims, objectives, implementation, relevant compliance measures, and other notes/comments	Priorities mobulid rays in national data collection initiatives. This includes: a) Improve the skills of fishers, traders and relevant marine fishers associations, government officers, customs, and individuals in observer and landing survey programs to identify mobulid rays. Motivate fishers through training to safely release these species and record and report data from bycaught specimens (including location, gear type, size, sex, and maturity of catches and documenting (any) discards (condition on release)). b) Harmonise data (specifically bycatch information) from different sources (e.g., data reported to the IOTC, FAO, CMS, and CITES). This includes revising current data collection systems (see below, under additional recommendations).

	Research: Support investigations into key biological/ecological parameters, life-history and behavioral traits, discard survival, and the identification of potential mating, pupping, and nursery grounds. Conduct socio-economic studies on shark fisheries, trade, and alternative livelihoods, with a focus on mobulid rays. A current priority is to determine spatial distribution of mobulid rays in Bangladesh waters and identify presence during critical life stages of their life history.
Potential lead agencies	DoF, BFRI, universities (national and international), and NGOs
Timeframe	Within 18 months
Recommendation	**Monitoring of domestic and international trade volumes and characteristics**
Is this recommendation applicable	Yes
Aims, objectives, implementation, relevant compliance measures, and other notes/comments	BFD to request Bangladesh Customs to introduce and mandate HS codes for all shark and ray products (separate codes for fins, meat, cartilage, skin etc.) to improve reporting, surveillance, and data collection on imports and exports. BFD and DoF to identify opportunities (with Bangladesh Customs) to designate particular ports of export/import for shark and ray (and other marine) products. This would ensure better monitoring of exports/imports while reducing the need to enhance identification capacity at all exit/entry points across the country. Ensure that the enforcement authorities are mandated to enforce the Wildlife Act and that awareness is generated on species listed on Schedules I and II. Awareness would be improved through providing posters of species on schedules for each of the exit/entry points. Awareness (posters and training events) would be provided to key shipping, courier services, traders (fisheries stakeholders, domestic traders and international exporters and importers, and domestic consumers), and law enforcement agencies on species protection laws (including CITES).

	FIQC (DoF) to prepare a methodology for the random sampling of shark and ray products for export in conjunction with Bangladesh Customs and BFD. Request training support from NGOs and international bodies (e.g., Interpol, CITES, World Customs Organisation, SAWEN) to identify how and where shark and ray products are being exported (this includes improved training in combatting illegal wildlife trade and sharing intelligence). Require all exporters and importers of shark and ray products to be registered with the DoF and to declare their exports/imports at a species level. Additionally, develop a risk index for exporters/importers to support screening upon receival of export/import permit requests, including black-listing and fining of companies/individuals that have multiple violations. Look into establishing an informal communication group (e.g. WhatsApp, imo) consisting of shark identification experts (both local and international), in order to identify sharks and/or shark products with a camera photo at short notice.
Potential lead agencies	DoF, BFRI, universities (national and international), and NGOs
Deadline	Ongoing
Recommendation	**Export quotas**
Is this recommendation applicable	Yes
Aims, objectives, implementation, relevant compliance measures, and other notes/comments	A zero export quota will be fixed as trade of this specimen is not permitted under Schedule I of the Wildlife Act. The CITES Secretariat will be formally informed of this zero quota and requested to inform all CITES Parties through a notification of this 0 export quota for mobulid rays.
Potential lead agencies	BFD, MOC
Deadline	Within 6 months

Recommendation	**Documentation schemes**
Is this recommendation applicable	Yes
Aims, objectives, implementation, relevant compliance measures, and other notes/comments	Documentation schemes have been addressed above.
Recommendation	**Limited entry**
Is this recommendation applicable	Yes
Aims, objectives, implementation, relevant compliance measures, and other notes/comments	At present there is a limit in place for the number of operational licensed trawlers based on the realization that most stocks are overfished. The current limit is 262 registered vessels, of which 234 are active. There is no limit in place for artisanal fleets. Strengthen Monitoring, Control and Surveillance (MCS) of existing regulations, including spatial regulations related to minimum legal operating depths for trawl fisheries.
Potential lead agencies	DoF, with implementation/inspection support provided by Navy and Coast Guard
Deadline	Ongoing
Recommendation	**Fishing time restrictions**
Is this recommendation applicable	Yes
Aims, objectives, implementation, relevant compliance measures, and other notes/comments	There is a seasonal closure of all fishing grounds implemented in Bangladesh (65 days in marine/coastal and 22 days for all water bodies). Additionally, steel trawlers are required to return to port within 30 days of depature, while wooden trawlers are required to return within 13-14 days.
Potential lead agencies	DoF, with implementation/inspection support provided by Navy and Coast Guard.

Deadline	Ongoing
Recommendation	**Fishing gear restrictions**
Is this recommendation applicable	Yes
Aims, objectives, implementation, relevant compliance measures, and other notes/comments	At present there are prohibitions in place for monofilament gillnets, mesh sizes for gillnets and setbag nets and trawl nets, and there are depth restrictions for trawl fisheries and setbag nets. There is also a prohibition on bottom trawls for steel trawlers. Enforcement of these measures must be strengthened through more systematic, inter-agency patrols (where patrols are recorded and the information is used to plan following patrols - i.e., SMART patrols). Provide training and awareness to fishers on best handling and release practices for ETP (endangered, threatened, and protected) species (particularly undersized and/or gravid specimens).
Potential lead agencies	DoF, with implementation/inspection support provided by Navy, Coast Guard, and BFD. Technical support can be provided by NGOs and universities. The bycatch/post-release research would also include NGOs and universities.
Deadline	SMART/training awareness/change in hooks: implement within 12 months and then ongoing. Research: initiate within 6 months and complete within 36 months.
Recommendation	**Permanent area closures**
Is this recommendation applicable	Yes
Aims, objectives, implementation, relevant compliance measures, and other notes/comments	An area covering 698 sq. km is currently closed as designated Marine Reserve. An expantion of the Swatch-of-No- Ground MPA to incorporate additional critical habitats for many sharks and rays, including mobulid rays) should be considered, and joint monitoring of MPAs facilitated between DoF, BFD, Coast Guard, and Navy.
Potential lead agencies	DoF, FD, with implementation/inspection support provided by Navy and Coast Guard.

Deadline	Within 24 months
Recommendation	**No-take MPAs**
Is this recommendation applicable	Yes
Aims, objectives, implementation, relevant compliance measures, and other notes/comments	See above
Recommendation	**Total allowable catch**
Is this recommendation applicable	Yes
Aims, objectives, implementation, relevant compliance measures, and other notes/comments	A total allowable catch of 0 is in place for the mobulid rays in Bangladesh.
Potential lead agencies	
Deadline	Within 6 months
Recommendation	**Individual quota**
Is this recommendation applicable	No
Aims, objectives, implementation, relevant compliance measures, and other notes/comments	Not applicable to Bangladesh

Recommendation	**Fishing trip limits**
Is this recommendation applicable	Yes
Aims, objectives, implementation, relevant compliance measures, and other notes/comments	Already in place (steel trawlers 30 days and wooden trawlers 13-14 days).
Potential lead agencies	DoF
Deadline	Ongoing
Recommendation	**Prohibited retention**
Is this recommendation applicable	Yes
Aims, objectives, implementation, relevant compliance measures, and other notes/comments	Mobulid rays are fully prohibited (Schedule I species).
Potential lead agencies	DoF, BFD
Deadline	Within 6 months
Recommendation	**Fish size limits**
Is this recommendation applicable	No
Aims, objectives, implementation, relevant compliance measures, and	Mobulid rays are fully prohibited (Schedule I species).

other notes/comments	
Recommendation	**Product form restrictions**
Is this recommendation applicable	Yes
Aims, objectives, implementation, relevant compliance measures, and other notes/comments	All products will be prohibited. To improve surveillance and compliance, opportunities to designate species/product specific HS codes and also designating specific ports of entry/exit will be investigated.
Potential lead agencies	DoF, BFD
Deadline	Within 6 months
Recommendation	**Move-on provisions**
Is this recommendation applicable	No
Aims, objectives, implementation, relevant compliance measures, and other notes/comments	Not applicable to Bangladesh
Recommendation	**Bycatch reduction devices (BRDs)**
Is this recommendation applicable	Yes
Aims, objectives, implementation, relevant compliance measures, and other notes/comments	As mentioned above, research will be encouraged to identify feasible bycatch mitigation options for mobulid rays.

Potential lead agencies	NGOs and universities
Deadline	Within 36 months
Recommendation	**Protection of breeding females**
Is this recommendation applicable	Yes
Aims, objectives, implementation, relevant compliance measures, and other notes/comments	Increase awareness and implement best handling and release practices.
Potential lead agencies	DoF. Technical support by NGOs and universities.
Deadline	Within 12 months

Recommendation	**Participatory management**
Is this recommendation applicable	Yes
Aims, objectives, implementation, relevant compliance measures, and other notes/comments	Improve participatory management through stakeholder consultations at a national level. Utilize community science (trained citizen scientists from fisher communities) for monitoring the impacts/effectiveness of fisheries management regulations
Potential lead agencies	DoF, BFD, and NGOs
Deadline	Within 12 months
Recommendation	**IOTC engagement**
Is this recommendation	Yes

applicable	
Aims, objectives, implementation, relevant compliance measures, and other notes/comments	Bangladesh to strengthen engagement at the IOTC in order to advocate for better regulation of shark and ray fisheries by all IOTC members. This includes regulating the deployment of FADs, with the aim of prohibiting the use of FADs in the Indian Ocean. Request all IOTC members to publish and share their CITES NDFs for pelagic sharks and rays (falling under the IOTC Area of Competence) and encourage the development of regional NDFs through the IOTC to better address the conservation concerns of shared stocks.
Potential lead agencies	DoF, in coordination with BFD
Deadline	Within 12 months
Recommendation	**Revise Wildlife Act**
Is this recommendation applicable	Yes
Aims, objectives, implementation, relevant compliance measures, and other notes/comments	Amend the Wildlife Act to: a) Define Schedule I and II of the Wildlife Act. b) Provide clarification on the fines and prosecutions for violations (i.e., capturing Schedule I species or trading Schedule II parts without a permit). It should be ensured that these suffice to deter illegal wildlife trade and that the fine targets the appropriate violator. c) Provide the mandate to other enforcement authorities to implement the Wildlife Act. d) Enabling prosecution.
Potential lead agencies	BFD
Deadline	Within 24 months
Recommendation	**CMS Sharks MoU**
Is this recommendation applicable	Yes
Aims, objectives,	Bangladesh to establish communications with the CMS Sharks MoU to identify opportunities to become a

implementation, relevant compliance measures, and other notes/comments	Signatory and obtain clarifications on potential obligations. The CMS Sharks MoU is a non-binding convention that provides recommendations on improving shark and ray management and could be a valuable source of knowledge and capacity building.
Potential lead agencies	BFD
Deadline	Within 6 months

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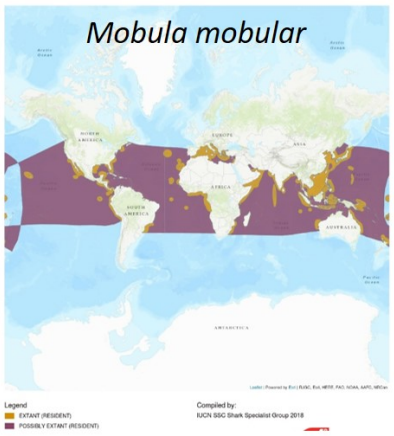
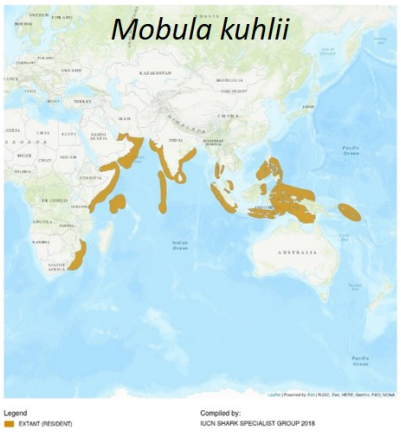
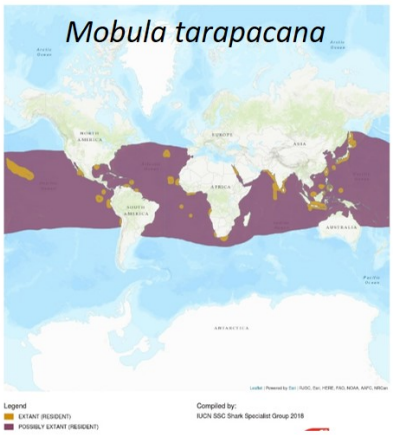
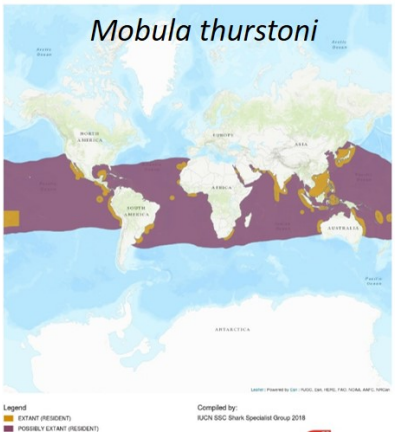
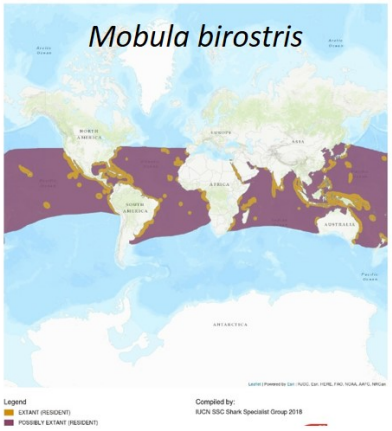
Appendix 1. Global distribution of the mobulid rays.











http://maps.iucnredlist.org/

Appendix 2. List of shark and rays protected under Schedule I and Schedule II of the Bangladesh Wildlife (Conservation and Security) Act, 2012.

Schedule I

ক্রমিক নং	বাংলা নাম	ইংরেজি নাম	বৈজ্ঞানিক নাম
১	২	৩	৪
		বর্গ- কার্চারিনিফর্মিজ (হাঙ্গর) Carcharhiniformes (Sharks)	
		পরিবার-স্ফিরনিডি (Sphyrnidae)	
১.	পাখনাথা হাতুড়ি হাঙ্গর/জুলিয়া মাগর/কাইন্যা/কাউন্যা	Winghead/ Hammerhead shark	*Eusphyra blochii*
২ .	হাতুড়ি হাঙ্গর/ জুলিয়া মাগর/ কাইন্যা/কাউন্যা	Hammerhead sharks	*Sphyrna spp.*
		পরিবার- কার্চারিনিডি (Carcharhinidae)	
৩.	ভোঁতা বলি হাঙ্গর	Pigeye shark	*Carcharhinus amboinensis*
৪.	সাদাগাল হাঙ্গর/ কামোট	Whitecheek shark	*Carcharhinus dussumieri*
৫.	পন্ডিচেরী হাঙ্গর	Pondicherry shark	*Carcharhinus hemiodon*
৬.	ঘ-বলি হাঙ্গর	Bull shark	*Carcharhinus leucas*
৭.	সাদাটুপি হাঙ্গর	Oceanic whitetip shark	*Carcharhinus longimanus*
৮.	গাঙ্গের চিনারি হাঙ্গর	Ganges shark	*Glyphis gangeticus*
৯.	বড়পাখ চিনারি হাঙ্গর/সিনারি হাঙ্গর	Broadfin shark	*Lamiopsis temminckii*
১০.	তীক্ষ্ণদাঁত লেমন হাঙ্গর	Sharptooth lemon shark	*Negaprion acutidens*
		বর্গ- ওরেক্টোলোবিফর্মিজ (Orectolobiformes) পরিবার- স্টেগোস্টোমাটিডি (Stegostomatidae)	
১১.	বাঘা হাঙ্গর/জেব্রা হাঙ্গর	Leopard shark/Zebra shark	*Stegostoma fasciatum*
		পরিবার- রিংকোডনটিডি (Rhincodontidae)	
১২.	তিমি হাঙ্গর	Whale shark	*Rhincodon typus*
		বর্গ-ল্যামনিফর্মিজ (Lamniformes) পরিবার – ওডোন্টাসপিডিডি (Odontaspididae)	
১৩.	ধূসর বাঘা হাঙ্গর	Sand tiger shark	*Carcharias taurus*
		পরিবার - অ্যালোপিডি (Alopiidae)	
১৪.	কান্তে হাঙ্গর	Thresher sharks	*Alopias spp.*
		পরিবার - ল্যামনিডি (Lamnidae)	
১৫.	মাকো হাঙ্গর	Mako sharks	*Isurus spp.*

ক্রমিক নং	বাংলা নাম	ইংরেজি নাম	বৈজ্ঞানিক নাম
১	২	৩	৪
		বর্গ- রাইনোপ্রিস্টিফর্মিজ (রে মাছ) **Rhinopristiformes (Ray fishes)** **পরিবার - প্রিস্টিডি (Pristidae)**	
১৬.	করাত মাছ/খাপ্পা মাগর/খটক/করাতি হাঙ্গর/আইশা	Sawfishes	*Pristis spp.*
১৭.	ছুরি করাত মাছ/ খাপ্পা মাগর/ খটক/আইশা	Pointed sawfish	*Anoxypristis cuspidata*
		পরিবার- রিনিডি (Rhinidae)	
১৮.	ধনুকমুখী পিতাম্বরি/স্যাঙ হাঙ্গর	Bowmouth guitarfish	*Rhina ancylostoma*
১৯.	পিতাম্বরি/ নাঙলা	Guitarfishes/wedgefishes	*Rhynchobatus spp.*
		পরিবার- রাইনোব্যাটিডি (Rhinobatidae)	
২০.	পিতাম্বরি/ নাঙলা	Guitarfishes/wedgefishes	*Rhinobatos spp.*
		পরিবার- গ্লকোস্টেজিডি (Glaucostegidae)	
২১.	পিতাম্বরি/ নাঙলা	Guitarfishes/wedgefishes	*Glaucostegus spp.*
		বর্গ – মাইলোব্যাটিফর্মিজ (Myliobatiformes) **পরিবার – ইটোব্যাটিডি (Aetobatidae)**	
২২.	বড়মাথা ঠোট্টা/টুইটা ঘাপরি	Longhead eagle ray	*Aetobatus flagellum*
		পরিবার - মোবুলিডি (Mobulidae)	
২৩.	শিংচোয়াইন/দেউ মাছ/লুইমনি	Devil rays	*Mobula spp.*
		পরিবার- মাইলিয়োব্যাটিডি (Myliobatidae)	
২৪.	চিত্রা ঠোট্টা/টুইটা ঘাপরি	Mottled eagle ray	*Aetomylaeus maculatus*
২৫.	ফুল ঠোট্টা/টুইটা ঘাপরি	Ocellate eagle ray	*Aetomylaeus milvus*
		পরিবার- রাইনোপটেরিডি (Rhinopteridae)	
২৬.	ভোঁতা ঘাপরি	Javan cownose ray	*Rhinoptera javanica*
২৭.	ছোটলেজী ভোঁতা ঘাপরি	Shorttail cownose Ray	*Rhinopetra jayakari*
		পরিবার - ডাসিয়াটিডি (Dasyatidae)	
২৮.	ফুল শাপলাপাতা/জাতি শাপলাপাতা	White spotted whipray	*Maculabatis gerrardi*
২৯.	রাম্মি/চুনি শাপলাপাতা	Bleeker's whipray	*Pateobatis bleekeri*
৩০.	থ্যাবড়া নাক থাইন/ হাঙরাইল	Roughnose cowtail ray	*Pastinachus solocirostris*
৩১.	মিঠাপানির শাপলাপাতা/পাইন্যা/বাইল্যা	Giant freshwater whipray	*Urogymnus polylepis*

Schedule II

ক্রমিক নং	বাংলা নাম	ইংরেজি নাম	বৈজ্ঞানিক নাম
১	২	৩	৪
		বর্গ- কার্চারিনিফর্মিজ (হাঙ্গর) Carcharhiniformes (Sharks) পরিবার-কার্চারিনিডি (Carcharhinidae)	
২২.	মুইট্যা হাঙ্গর/সাদা লতা বলি/বলি হাঙ্গর	Graceful shark	*Carcharhinus amblyrhynchoides*
২৩.	ঘূর্ণি হাঙ্গর/কালা লতা বলি হাঙ্গর	Spinner shark	*Carcharhinus brevipinna*
২৪.	রেশমি/সিল্কি হাঙ্গর	Silky shark	*Carcharhinus falciformis*
২৫.	ইলিশা বলি/কালা লতা বলি হাঙ্গর	Blacktip shark	*Carcharhinus limbatus*
২৬.	কালাটুপি রিফ হাঙ্গর/কালা লতা বলি হাঙ্গর	Blacktip reef shark	*Carcharhinus melanopterus*
২৭.	ফৌটালেজী/কালা লতা বলি হাঙ্গর	Spottail shark	*Carcharhinus sorrah*
২৮.	বাঘা হাঙ্গর	Tiger shark	*Galeocerdo cuvier*
২৯.	নীল হাঙ্গর	Blue shark	*Prionace glauca*
৩০.	সাদাটুপি রিফ হাঙ্গর/সাদা পাখনা হাঙ্গর	Whitetip reef shark	*Triaenodon obesus*
		পরিবার- হ্যামিগ্যালিডি (Hamigaleidae)	
৩১.	বড়শিদাঁতী হাঙ্গর	Hooktooth shark	*Chaenogaleus macrostoma*
৩২.	শাঁখাদাঁতী/শিয়াল-বলি হাঙ্গর	Snaggletooth shark	*Hemipristis elongata*
		বর্গ-ল্যামনিফর্মিজ (Lamniformes) পরিবার - ল্যামনিডি (Lamnidae)	
		পরিবার-জিংলিমসটোমাটিডি (Ginglymostomatidae)	
৩৪.	টনি নার্স হাঙ্গর	Tawny nurse shark	*Nebrius ferrugineus*

		বর্গ-টর্পেডিনিফর্মিজ (রে মাছ) (Torpediniformes) (Ray fishes) পরিবার- নারসিনিডি (Narcinidae)	
৩৫.	ভোঁতামুখ কারেন্ট মাছ	Shortlip numbfish	*Narcine brevilabiata*
৩৬.	চীনা কারেন্ট মাছ	Chinese numbfish	*Narcine lingula*
৩৭.	বাদামি কারেন্ট মাছ	Brown numbfish	*Narcine timlei*
		বর্গ-মাইলিয়োবেটিফর্মিজ (Myliobatiformes) পরিবার- জিম্নুরিডি (Gymnuridae)	
৩৮.	প্রজাপতি/বাদুড়/পদুনি/পদ্মমামনি	Butterfly rays	*Gymnura spp.*
		পরিবার - ডাসিয়াটিডি (Dasyatidae)	
৩৯.	বাঘা/চিতা শাপলাপাতা	Leopard whipray	*Himantura leoparda*
৪০.	জালি/বাঘা/চিতা শাপলাপাতা	Coach (Reticulated) whipray	*Himantura uarnak*
৪১.	বাঘা/হরিণা/চিতা শাপলাপাতা	Honeycomb whipray	*Himantura undulata*
৪২.	ক্ষুদেচোখা শাপলাপাতা	Smalleye stingray	*Megatrygon microps*
৪৩.	সাদানাক শাপলাপাতা/ হাউশ	Whitenose whipray	*Pateobatis uarnacoides*
৪৪.	জাকিনের ঘণ্টি/ ঘুড়ি শাপলাপাতা	Jenkins´ whipray	*Pateobatis jenkinsii*
৪৫.	কালি/কালাফোটা শাপলাপাতা	Blotched stingray	*Taeniurops meyeni*
৪৬.	সজারু শাপলাপাতা	Porcupine ray	*Urogymnus asperrimus*
৪৭.	গোল শাপলাপাতা	Round whipray	*Maculabatis pastinacoides*
৪৮.	বাদা শাপলাপাতা	Mangrove whipray	*Urogymnus granulatus*
৪৯.	চোঙ্গামুখ/চুনি শাপলাপাতা	Tubemouth whipray	*Urogymnus lobistoma*
		পরিবার – ইটোব্যাটিডি (Ateobatidae)	
৫০.	চিত্রা ঠোট্যা/ফুল টুইটা ঘাপরি	Spotted eagle ray	*Aetobatus ocellatus*
		পরিবার- মাইলিয়োব্যাটিডি (Myliobatidae)	
৫১.	ডোরাকাটা ঠোট্যা/টুইটা ঘাপরি/শঙ্খচিল	Banded eagle ray	*Aetomylaeus nichofii*

Appendix 3. Mobulidae catches reported to the FAO.

Global Reported Mobulidae Catch to the FAO

Country (Name)	[2008]	[2009]	[2010]	[2011]	[2012]	[2013]	[2014]	[2015]	[2016]	[2017]	[2018]	**Totals - Tonnes**
Ecuador	10	0	0	0	0	0	0	0	0	0	0	**10**
Indonesia	4309	2414	2447	3720	5191	5647	3979	4121	7316	5949	6226	**51319**
Liberia	0	0	0	0	0	0	0	0	0	0	0	**0**
Mauritania	0	0	0	11	0	2	64	0	0	0	0	**77**
Pakistan	0	50	52	57	66	87	75	87	101	51	41	**667**
Peru	0	0	0	0	0	0	0	0	0	201	226	**427**
Spain	1	3	4	5	0	1	0	0	0	0	0	**14**
Sri Lanka	0	0	0	0	744	669	608	682	767	1269	991	**5730**
Totals - Tonnes	**4320**	**2467**	**2503**	**3793**	**6001**	**6406**	**4726**	**4890**	**8184**	**7470**	**7484**	***58244***

FAO. 2020. Fishery and Aquaculture Statistics. Global capture production 1950-2018 (FishstatJ). In: FAO Fisheries Division [online]. Rome. Updated 2020. www.fao.org/fishery/statistics/software/fishstatj/en