



MIGRATORY SHARKS AND RAYS IN THE INDIAN OCEAN: CHRONOLOGY OF THE WORK OF IOTC, CMS AND THE SHARKS MOU, POTENTIAL SYNERGIES AND EMERGING ISSUES

PAULA ANDREA ACEVEDO-RAMIREZ, JIM R. ELLIS, LAUREN NELSON AND ANDREA PAULY

Purpose, expectation and action intended (select one or more and include corresponding text)

Discussions (for information and open discussion):

The paper is to inform meeting members of the chronology of the shark- and ray-related work of the IOTC, CMS, and the Sharks MOU, and identify potential synergies, as set out in Sections 1-7.

Feedback (to collect input and suggestions)

The paper is to request review and comments on proposed practical cooperation areas (species identification, fisheries/movement data, ecological risk assessment, bycatch mitigation, post-release survival, critical habitats, shared research priorities), as set out in Section 8.

Conclusion (to record a concluded position or summary)

The paper is to seek confirmation that a structured exchange between fisheries and conservation processes will improve evidence available for management, as set out in Section 8.

Recommendation (to ask the meeting to endorse a recommendation)

The paper is to seek endorsement on strengthening synergies between IOTC, CMS, and the Sharks MOU and encouraging broader regional participation in CMS/Sharks MOU, as set out in Section 8.



Abstract

Several shark and ray species relevant to IOTC fisheries are also listed in the Appendices of the Convention on the Conservation of Migratory Species of Wild Animals (CMS) and in Annex 1 of the non-legally binding Sharks MOU. For IOTC members that are also CMS Parties, these listings are relevant to national responsibilities for migratory species, including the prohibition of taking Appendix I species by relevant Range States, subject to the Convention's limited exceptions, and international cooperation for Appendix II species. This paper reviews the shark-related work of IOTC, CMS and the Sharks MOU and proposes practical cooperation on species identification, fisheries and movement data, ecological risk assessment, bycatch mitigation, post-release survival, critical habitats and shared research priorities. A structured exchange between fisheries and conservation processes could improve the evidence available for management while supporting coherent implementation across national and high-seas waters.

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Paula Andrea Acevedo-Ramirez¹, Jim R. Ellis^{2,3}, Lauren Nelson⁴ and Andrea Pauly⁵

SUMMARY

Several shark and ray species relevant to IOTC fisheries are also listed in the Appendices of the Convention on the Conservation of Migratory Species of Wild Animals (CMS) and in Annex 1 of the non-legally binding Sharks MOU. For IOTC members that are also CMS Parties, these listings are relevant to national responsibilities for migratory species, including the prohibition of taking Appendix I species by relevant Range States, subject to the Convention's limited exceptions, and international cooperation for Appendix II species. This paper reviews the shark-related work of IOTC, CMS and the Sharks MOU and proposes practical cooperation on species identification, fisheries and movement data, ecological risk assessment, bycatch mitigation, post-release survival, critical habitats and shared research priorities. A structured exchange between fisheries and conservation processes could improve the evidence available for management while supporting coherent implementation across national and high-seas waters.⁶

KEYWORDS

Biodiversity, bycatch, elasmobranchs, fisheries management, nature conservation, prohibited species, shark fisheries

1. Introduction

As various species and stocks of shark and ray have become more depleted, there has been increasing concern regarding their population status, both from the perspective of fisheries management (e.g. sustainable exploitation) as well as in relation to wider biodiversity and nature conservation concerns. Thus, many shark and ray species are of increased scientific and policy interest, both nationally and internationally, across multiple fora.

One area of overlapping interest is in relation to many of the oceanic sharks and rays that interact with high seas fisheries, including tuna fisheries. Given the migratory nature of many such species, they are of relevance to both those Regional Fisheries Management Organisations (RFMOs) involved in the management of fisheries for tuna and associated pelagic species, as well as the Convention on the Conservation of Migratory Species of Wild Animals (CMS).

¹ Convention on the Conservation of Migratory Species of Wild Animals (CMS), Intern, Aquatic Species Team, United Nations Campus, Platz der Vereinten Nationen 1, 53113 Bonn, Germany.

² Centre for Environment, Fisheries and Aquaculture Science (CEFAS), Pakefield Road, Lowestoft, Suffolk, NR33 0HT, United Kingdom. Email: jim.ellis@cefass.gov.uk

³ Advisory Committee, Memorandum of Understanding on the Conservation of Migratory Sharks (Sharks MOU)

⁴ Indian Ocean Tuna Commission, Mahé, Seychelles.

⁵ Convention on the Conservation of Migratory Species of Wild Animals (CMS), Associate Programme Management Officer, Aquatic Species Team, Coordinator Sharks MOU, United Nations Campus, Platz der Vereinten Nationen 1, 53113 Bonn, Germany.

⁶ The format of the paper adopts that of an earlier document presented to the International Commission for the Conservation of Atlantic Tunas (ICCAT; Ellis and Pauly, 2024).

The aim of this paper is to review the shark- and ray-related work of the Indian Ocean Tuna Commission (IOTC), CMS and the Sharks MOU; explain the practical significance of CMS listings and obligations for IOTC members; identify CMS-listed species likely to interact with fisheries under the competence of IOTC; and propose specific areas for scientific and institutional cooperation.

Its central message to WPEB is that, given the overlapping interest in the status of sharks and rays that are both migratory and oceanic, there are potential synergies between IOTC and CMS. In particular, those states that are members to both IOTC and CMS could usefully consider, through relevant bodies (including IOTC Working Parties), how the expertise of IOTC could support the implementation of conservation obligations (including those of CMS) for migratory sharks and rays. As the competent regional body for the management of those fisheries interacting most with oceanic sharks and rays in the region, IOTC has an important role for coordinating the collection and assessment of relevant fisheries data. Improved engagement between IOTC- and CMS-related work programmes would also be particularly valuable in identifying important data gaps and practical areas for cooperation concerning migratory sharks and rays, thus informing potential options for both fisheries management and conservation.

As such, it is recommended that joint member states of IOTC and CMS consider what fisheries-related data, assessments and management action could usefully be developed through IOTC to support implementation of CMS conservation obligations for migratory sharks and rays.

2. IOTC and shark-related work

The IOTC was established in 1993 at the 105th Session of the Council of the Food and Agriculture Organization of the United Nations (FAO), under Article XIV of the FAO Constitution. The Agreement for the establishment of IOTC was signed on 25 November 1993 and entered into force on 27 March 1996, following the accession of the tenth Contracting Party. The Agreement states that the objective of the Commission is *“to promote cooperation among its members with a view to ensuring, through appropriate management, the conservation and optimum utilization of stocks covered by this Agreement and encouraging sustainable development of fisheries based on such stocks”*. Whilst the Agreement focuses on the 16 tuna and tuna-like species under its mandate, there has been consideration of sharks, rays and other non-target species over time due to their interactions with fisheries managed within the IOTC framework.

The first session of the IOTC Working Party on Bycatch was held in Phuket, Thailand in July 2005. From this initial meeting, sharks and rays were identified among the non-tuna species caught by fleets targeting IOTC species, with sharks described as the major bycatch species group recorded in the IOTC database (IOTC, 2005). However, available data were considered incomplete and species-level data were limited.

The second session further highlighted the difficulties in estimating total shark catches in the Indian Ocean, including incomplete reporting, poor resolution of species and gear reporting, limited observer coverage, and sparse size-frequency and biological data (IOTC, 2006). In response to Resolution 05/05, the Working Party on Bycatch also considered the need for preliminary advice on the stock status of key shark species and a research plan for future assessments, while noting that definitive status indicators would require substantial improvements in data collection and reporting (IOTC, 2006).

The IOTC Working Party on Ecosystems and Bycatch conducted its first quantitative assessment of blue shark *Prionace glauca* in 2015 (IOTC, 2015), with subsequent

assessments undertaken in 2017, 2021 and 2025 (IOTC, 2017, 2021, 2025). Quantitative or data-limited assessment work was also undertaken for silky shark *Carcharhinus falciformis* in 2018 and 2021, shortfin mako *Isurus oxyrinchus* in 2018, 2020 and 2024, and scalloped hammerhead *Sphyrna lewini* in 2022 (IOTC, 2018, 2020, 2021, 2022, 2024). Of these, the accepted blue shark assessments and the 2024 shortfin mako assessment supported quantitative stock-status advice, while the other assessments remained exploratory or were considered too uncertain to be used to determine stock status for management advice.

In terms of the wider shark and ray assemblage interacting with IOTC fisheries, an initial Ecological Risk Assessment (ERA) was developed in 2009, followed by a dedicated shark ERA in 2012 and an updated assessment in 2018 (IOTC, 2009, 2012, 2018; Murua et al., 2009, 2018). The updated ERA evaluated the vulnerability of a broad range of shark and ray species to longline, purse seine and gillnet fisheries, including thresher sharks *Alopias* spp., mako sharks *Isurus* spp., porbeagle *Lamna nasus*, hammerhead sharks, silky shark, oceanic whitetip shark *Carcharhinus longimanus*, blue shark, tiger shark *Galeocerdo cuvier*, crocodile shark *Pseudocarcharias kamoharai* and pelagic stingray *Pteroplatytrygon violacea* (Murua et al., 2018).

The IOTC has also adopted a range of Resolutions (**Table 1**), including retention prohibitions for a number of species listed under CMS (e.g. oceanic whitetip and thresher sharks), and has, since 2018, adopted measures intended to strengthen the conservation and management of the principal commercially retained shark stocks, notably blue shark and, from 2025, mako sharks. The IOTC also adopted prohibitions on intentional purse seine sets around whale shark *Rhincodon typus* in 2013 and prohibitions on the targeted fishing and retention of mobulid rays (*Mobula* spp.) in 2019.

3. Convention on the Conservation of Migratory Species of Wild Animals (CMS)

The treaty text for the Convention on the Conservation of Migratory Species of Wild Animals (CMS) was agreed in June 1979 and came into force in November 1983. CMS is an environmental treaty of the United Nations (UN). In practice, CMS acts as a ‘framework Convention’, including some legally binding agreements for CMS Parties, as well as some other instruments, such as Memoranda of Understanding, that are less formal.

The CMS shall list migratory species that are thought to be threatened with extinction, and CMS Parties that are Range States⁷ to such Appendix I-listed species shall “*prohibit the taking*” of such species, subject to the limited exceptions provided by the Convention. They shall also endeavour to conserve and, where feasible and appropriate, restore important habitats, prevent or mitigate obstacles to migration, and prevent, reduce or control other factors that endanger the species. Taking is defined as meaning “*taking, hunting, fishing, capturing, harassing, deliberate killing, or attempting to engage in any such conduct*”. Appendix II shall list migratory species which have an ‘*unfavourable conservation status*’ and which require international agreements for their conservation, as well as those which have a conservation status that would benefit significantly from the international cooperation that could be achieved by an international agreement. A species may be listed in both Appendices. In terms of the commitment of CMS Parties that are Range States, it should be noted that flag vessels that fish outside national jurisdictional waters but interact with listed migratory species are also considered to be a Range State.

⁷ Under CMS, a “Range State” includes a State that exercises jurisdiction over any part of the range of a migratory species, as well as a State whose flag vessels take that species beyond national jurisdictional limits (CMS, Article I(1)(h)). Thus, for migratory sharks and rays, the term can include both coastal States and flag States whose vessels interact with the species on the high seas.

For the purposes of CMS, 'migratory' is defined as meaning "*the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries*". Jurisdictional boundaries would include crossing neighbouring EEZs or moving between EEZs and high seas.

For CMS Parties that are also IOTC members, these provisions may therefore be relevant to migratory sharks and rays encountered by vessels operating both within and beyond national jurisdiction. CMS listing does not itself establish an IOTC conservation or management measure, but it may create conservation obligations for CMS Parties whose fisheries-related implementation may require action through relevant fisheries management bodies, including IOTC.

The Conference of the Parties (COP) meets on a triennial basis, during which proposals to amend the Appendices are considered. The proposals are reviewed prior to this by the Scientific Council (ScC), including due consideration of whether the proposed species, or regional populations thereof, meet the criteria for listing in the proposed Appendices.

After the CMS came into force, the species accepted for listing in the Appendices of CMS were predominantly mammals, birds and reptiles (including sea turtles), although there has been greater consideration of fish species in recent years. The first shark to be listed under CMS was whale shark (included in Appendix II in 1999), followed by white shark *Carcharodon carcharias* (Appendices I and II in 2002) and basking shark *Cetorhinus maximus* (Appendices I and II in 2005). Since 2008, more species of shark and ray have been added, including some species of current or former importance to commercial fisheries.

4. Sharks MOU

Within the framework of the CMS, there is also a Memorandum of Understanding on the conservation of migratory sharks (henceforth, the Sharks MOU), which is a non-legally binding instrument. The original Sharks MOU text was agreed in February 2010, with 49 nations becoming MOU Signatories since that time.

The overall objective of the Sharks MOU is "*to achieve and maintain a favourable conservation status for migratory sharks based on the best available scientific information, taking into account the socio-economic and other values of these species for the people of the Signatories*".

Signatories to the Sharks MOU should strive for:

- a) *Improving understanding of migratory shark populations through research, monitoring and information exchange;*
- b) *Ensuring that directed and non-directed fisheries for shark are sustainable;*
- c) *Ensuring to the extent practicable the protection of critical habitats and migratory corridors and critical life stages of sharks;*
- d) *Increasing public awareness of threats to sharks and their habitats, and enhance public participation in conservation activities; and*
- e) *Enhancing national, regional and international cooperation.*

Signatories to the Sharks MOU should also support "*measures to improve or restore a favourable conservation status of sharks listed in Annex 1 of the Memorandum of Understanding*".

Under the Sharks MOU there are regular Meetings of the Signatories (MOS), which have been held in 2012 (Sharks MOS1, Germany), 2016 (Sharks MOS2, Costa Rica), 2018 (Sharks MOS3, Monaco) and 2023 (Sharks MOS4, Germany). Each Signatory to the Sharks MOU has a national Focal Point, with the CMS Secretariat providing support, and an Advisory Committee

(AC) tasked with providing scientific advice to the MOS and the Signatories. The AC comprises ten appointed representatives, two from each of Africa, Asia, Europe and 'South, Central America & the Caribbean', and one person from each of North America and Oceania.

The sharks and rays listed in Annex 1 of the Sharks MOU may differ slightly from the species listed in the Appendices of CMS. For example, the Sharks MOU listed two lookalike species (giant guitarfish *Rhynchobatus djiddensis* and smoothnose wedgefish *Rhynchobatus laevis*) when listing white-spotted wedgefish *Rhynchobatus australiae*. Whilst blue shark was considered for listing during MOS3 (given it had been listed in Appendix II of CMS the previous year), it was not listed in Annex 1 of the Sharks MOU at that time, given that the advice provided by the AC was that blue shark did not meet the criterion for being in 'unfavourable conservation status' at that time. Nevertheless, the majority of shark and ray species listed in the Appendices of CMS are listed in Annex 1 of the Sharks MOU, and vice versa.

5. Contracting Parties to IOTC, Parties to CMS, and Signatories to the Sharks MOU

States within or bordering the IOTC Area of Competence have varying obligations through IOTC and/or CMS, with those that are also Signatories to the Sharks MOU also having a rationale for improving knowledge of listed species, and ensuring any exploitation is sustainable.

The IOTC Agreement establishes the Commission within the framework of FAO and defines its Area of Competence as the Indian Ocean, corresponding to FAO Major Fishing Areas 51 (western Indian Ocean, including the Red Sea and the Gulf) and Area 57 (eastern Indian Ocean, including the Bay of Bengal, Andaman Sea and Great Australian Bight), as well as "*adjacent seas north of the Antarctic Convergence insofar as necessary for conserving and managing stocks that migrate into or out of the Indian Ocean*".

The states and territories bordering the IOTC Area of Competence that are involved in each agreement are summarised in [Table 2](#). As of 2026, there were 29 Contracting Parties, or Members, within IOTC, 133 Parties to CMS (worldwide) and 49 Signatories to the Sharks MOU (worldwide).

Engagement across the three instruments is uneven, with substantially fewer regional States participating in the Sharks MOU than in either IOTC or CMS. Among the 36 states bordering the IOTC area (Figure 1) and included in this regional analysis, 23 (63.9%) are Contracting Parties to IOTC, 26 (72.2%) are Parties to CMS Parties, and 14 (38.9%) are Signatories to the Sharks MOU. Just four states (Kuwait, Myanmar, Qatar and Timor-Leste) are not parties or signatories to any of the three fora considered here.

The states that border the IOTC Area of Competence that are Contracting Parties to IOTC, Parties to CMS and Signatories to the Sharks MOU include Australia, Kenya, Madagascar, Somalia, South Africa, Sri Lanka and Yemen.

Of the 29 Contracting Parties to IOTC, 20 (69.0%) are also Parties to CMS, providing a substantial institutional basis for practical cooperation. Priority actions could include: aligning priority species lists and taxonomic standards; developing species-identification guidance and training for observers, enumerators and crews; comparing IOTC catch, effort, observer and electronic-monitoring data with CMS and Sharks MOU information on distribution, migration, critical habitats and national conservation measures; coordinating tagging, telemetry and genetic studies across national and high-seas waters; identifying spatial and seasonal interaction hotspots; and developing shared indicators to evaluate bycatch mitigation, safe release and post-release survival. Such activities could help joint member states make better use of information generated through both fora, improve species-level reporting and risk assessment, and support implementation of their respective fisheries management and conservation commitments.

6. Shark and ray species listed in the Appendices of CMS and in Annex 1 of the Sharks MOU

As of 27 June 2026, there are a total of 42 elasmobranch species (taxa currently considered to be valid taxa) listed in the Appendices of CMS (Table 3). Of these species, 10 do not occur in the IOTC area⁸. A further five species⁹, whilst occurring in the Indian Ocean area, are primarily demersal in nature and thus would not be expected to interact with those fisheries managed under the auspices of the IOTC. Thus, 26 elasmobranch taxa that are listed in the Appendices of CMS may interact, to varying degrees, with relevant fisheries.

Elasmobranch species that are pelagic in nature, occur in the Indian Ocean and are listed in Appendix I of CMS comprise:

- Whale shark *Rhincodon typus*
- Pelagic thresher shark *Alopias pelagicus*
- Bigeye thresher shark *Alopias superciliosus*
- Common thresher shark *Alopias vulpinus*
- Basking shark *Cetorhinus maximus*
- White shark *Carcharodon carcharias*
- Oceanic whitetip *Carcharhinus longimanus*
- Scalloped hammerhead shark *Sphyrna lewini*
- Great hammerhead shark *Sphyrna mokarran*
- Reef manta ray *Mobula alfredi*
- Oceanic manta ray *Mobula birostris*
- Longhorned pygmy devil ray *Mobula eregoodoo*
- Shortfin pygmy devil ray *Mobula kuhlii*
- Giant devil ray *Mobula mobular*
- Sicklefins devil ray *Mobula tarapacana*
- Bentfin devil ray *Mobula thurstoni*

Elasmobranch species that are demersal-pelagic in nature, occur in parts of the Indian Ocean and are listed in Appendix I of CMS comprise:

- Sand tiger shark *Carcharias taurus*

Elasmobranch species that are pelagic in nature, occur in the Indian Ocean and are listed in Appendix II of CMS comprise:

- Shortfin mako *Isurus paucus*
- Longfin mako *Isurus paucus*
- Porbeagle *Lamna nasus*
- Silky shark *Carcharhinus falciformis*
- Blue shark *Prionace glauca*
- Smooth hammerhead *Sphyrna zygaena*

Elasmobranch species that are demersal-pelagic, occur in parts of the Indian Ocean, and are listed in Appendix II of CMS comprise:

- Tope *Galeorhinus galeus*

⁸ Including spiny dogfish *Squalus acanthias*, for which only northern hemisphere populations are listed in CMS.

⁹ Comprising narrow sawfish *Anoxypristis cuspidata*, dwarf sawfish *Pristis clavata*, largetooth sawfish *Pristis pristis*, green sawfish *Pristis zijsron* and whitespotted wedgetfish *Rhynchobatus australiae*.

- Dusky shark *Carcharhinus obscurus*
- Bull ray *Aetomylaeus bovinus*¹⁰

It should be noted that the preceding summary is based on the currently accepted taxonomy, with species names also being standardized earlier according to the taxonomy and nomenclature adopted by CMS at COP14 (CMS, 2024). This is particularly an issue in relation to mobulid rays. Species formerly assigned to the genus *Manta* are now placed within *Mobula*, with *Manta alfredi* and *Manta birostris* recognized as *Mobula alfredi* and *Mobula birostris*, respectively. In addition, *Mobula japanica* has been synonymised with *Mobula mobular*, and *Mobula rochebrunei* with *Mobula hypostoma* (White et al. 2018; Fricke et al., 2026).

Conversely, the former northern-hemisphere listing of *Squalus acanthias* is now represented by *Squalus acanthias* and the population in the Northeast Pacific now reassigned to *Squalus suckleyi*, now that this has been re-recognized as a valid species (Ebert et al., 2010; CMS, 2024).

In terms of some of the species that are primarily shelf-associated, species such as tope *Galeorhinus galeus* (Walker et al., 2020) and dusky shark *Carcharhinus obscurus* (Dicken et al., 2008; Rigby et al., 2019) may have a degree of interaction with fisheries operating under the auspices of IOTC and so are included here. *Galeorhinus galeus* occurs principally over continental shelves and upper slopes but may also occur further offshore and has been reported from pelagic longline fisheries. Similarly, *C. obscurus* is a migratory coastal and shelf-associated species that also uses outer shelf and adjacent oceanic waters. Fisheries interactions with *C. obscurus* have been documented in both the eastern and western Indian Ocean, including gillnet fisheries off Western Australia and South Africa.

IOTC has identified a range of elasmobranch species relevant to IOTC fisheries through WPEB reports, ecological risk assessment, reporting requirements and Conservation and Management Measures. In 2012, WPEB developed management advice for seven shark species commonly caught in IOTC fisheries and identified ten shark species as most vulnerable to longline gear through a Productivity-Susceptibility Analysis (IOTC, 2012). More recent IOTC measures also address sharks generally, shortfin mako, longfin mako, blue shark, whale shark, thresher sharks and mobulid rays (IOTC, 2026).

At least 26 elasmobranch species that are listed in the CMS are known to interact, or may interact, with fisheries managed under the auspices of IOTC. An earlier ecological risk assessment of shark bycatch in the Indian Ocean, based on observer records for longline, purse seine and gillnet fisheries, considered 17 elasmobranch taxa (Murua et al., 2018), which included 14 CMS-listed species as well as pelagic stingray, tiger shark and crocodile shark.

For those species listed in Appendix I of CMS, relevant Parties that are Range States (including where there are flag vessels operating outside jurisdictional waters), shall “*prohibit the taking*” of these species. There are currently prohibitions in place through IOTC for mobulid rays (Resolution 19/03), oceanic whitetip, thresher sharks and whale shark¹¹ (Resolution 25/08). Sharks listed in Appendix I of CMS and that are not listed as prohibited species in current IOTC regulations include sand tiger shark, basking shark, great white shark, scalloped hammerhead and great hammerhead. Reported catches of these species in IOTC fisheries are very low, however, they are mostly not included in the list of species for which reporting catch and effort data is mandatory (hammerheads are included as mandatory for reporting at family level only). Where they interact with IOTC fisheries, these species are still covered by the general provisions of Resolution 25/08 concerning shark finning, full utilization, safe handling and release, and catch reporting, but they do not receive the same species-specific retention prohibitions as oceanic whitetip shark, thresher sharks, whale shark and mobulid rays.

¹⁰ Primarily an Atlantic species, but the distribution extends into the south-western Indian Ocean.

¹¹ But note Paragraph 45 of Resolution 25/08 relating to whale shark.

Other CMS-listed species are covered by additional IOTC management measures, including blue shark (Resolution 25/08; Resolution 18/02 remains binding on India and Somalia) and shortfin and longfin mako shark (Resolution 25/09), which are listed in CMS Appendix II.

7. Fisheries management and conservation: The parallel evolution of IOTC and CMS

Overall, the increased focus on sharks and rays within the fisheries management and conservation fora has followed a relatively parallel pathway (Figure 2; Table 4). CMS first listed a shark species (whale shark) in 1999, whereas dedicated shark related work within IOTC became more evident from 2005, when the Commission adopted its first shark conservation resolution and convened the First Session of the IOTC Working Party on Bycatch.

8. Key data gaps and other emerging issues

IOTC has made considerable progress in assessing some of the shark species most frequently interacting with fisheries under its competence. Blue shark has been subject to repeated quantitative stock assessments, while the first accepted assessment of shortfin mako was undertaken in 2024.

Several other shark and ray species, however, remain data-limited and unassessed. These include several hammerhead sharks and thresher sharks, longfin mako, porbeagle, silky shark, oceanic whitetip shark, and mobulid rays. Preliminary assessment work has been undertaken for some species, including scalloped hammerhead, but uncertainties in catch data and reconstruction, species identification and limited abundance indices continue to constrain robust stock-status determination.

A major underlying limitation is the quality and taxonomic resolution of shark and ray fishery data. IOTC WPEB reports have repeatedly identified incomplete historical catch series, substantial reporting under aggregated shark categories, limited information on discards and post-release mortality, and inconsistent species identification, particularly for hammerheads, threshers and mobulid rays. The 2018 ecological risk assessment therefore remains an important source for identifying species potentially vulnerable to longline, purse seine and gillnet fisheries where sufficient data for conventional assessments are unavailable (Murua et al., 2018). More recent comparisons of IOTC and other RFMO catch data with international trade records similarly demonstrate persistent gaps in species-specific reporting and inconsistencies among datasets (CITES Secretariat, 2024).

Future work should improve data availability while also using existing information to develop and evaluate measures that reduce shark and ray bycatch and associated mortality in IOTC fisheries. Improved identification and reporting at species level remains fundamental, particularly for hammerhead sharks, thresher sharks and mobulid rays, because aggregated catch categories limit the ability to assess species-specific risks and evaluate the effectiveness of management measures. At the same time, greater attention could be given to gear- and species-specific mitigation approaches, including evaluation of spatial or seasonal avoidance measures where predictable areas or periods of elevated interaction can be identified. Such work would be particularly valuable for species for which conventional stock assessments are unlikely to be feasible in the near term.

Whilst RFMOs have made considerable progress in assessing the main commercial stocks of oceanic sharks, such as blue shark and shortfin mako, it is important for relevant data to be collated for other species, including data-limited taxa (e.g. Ellis et al., 2022, 2024, 2025). Better coordination between RFMOs (including IOTC), CMS and the Sharks MOU could also facilitate data collation and strengthen conservation outcomes for migratory sharks and rays in the Indian Ocean.

Membership and participation in these instruments are not fully overlapping across the region, with several IOTC CPCs not currently participating in CMS and/or the Sharks MOU, while some CMS Parties and Sharks MOU Signatories are not directly engaged in IOTC processes. Broader participation in CMS and the Sharks MOU, particularly among important shark-fishing and Range States, could help facilitate exchange of scientific information, improve coordination of management measures across national and high-seas waters, and support more coherent regional approaches to both the conservation and sustainable utilisation of migratory shark and ray species.

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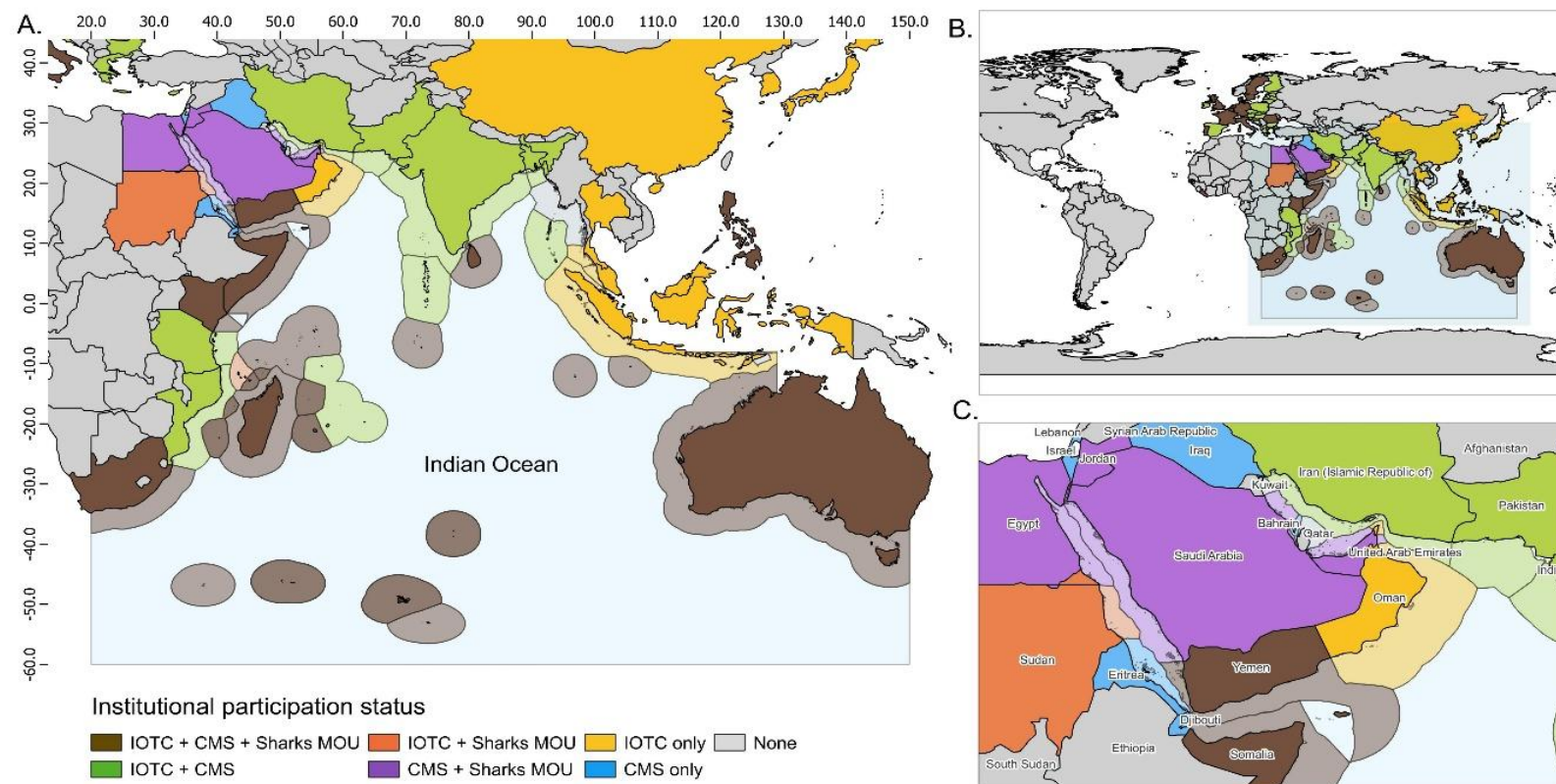


Figure 1. Institutional participation of Indian Ocean coastal States and relevant territories in the Indian Ocean Tuna Commission (IOTC), the Convention on Migratory Species (CMS), and the CMS Memorandum of Understanding on the Conservation of Migratory Sharks (Sharks MOU). A. participation within and around the IOTC Area of Competence; B. provides the global context, including non-coastal IOTC members; C. enlarges the Red Sea and Gulf region. *Source:* IOTC Secretariat (2018), Shapefile for all EEZs/high-seas within the IOTC area of competence (IOTC-2018-TCAC04-DATA05). Note: The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the Convention on the Conservation of Migratory Species of Wild Animals (CMS) or the United Nations Environment Programme (UNEP) concerning the legal status of any country, territory, city or area, or of its authorities, nor concerning the delimitation of its frontiers or boundaries.

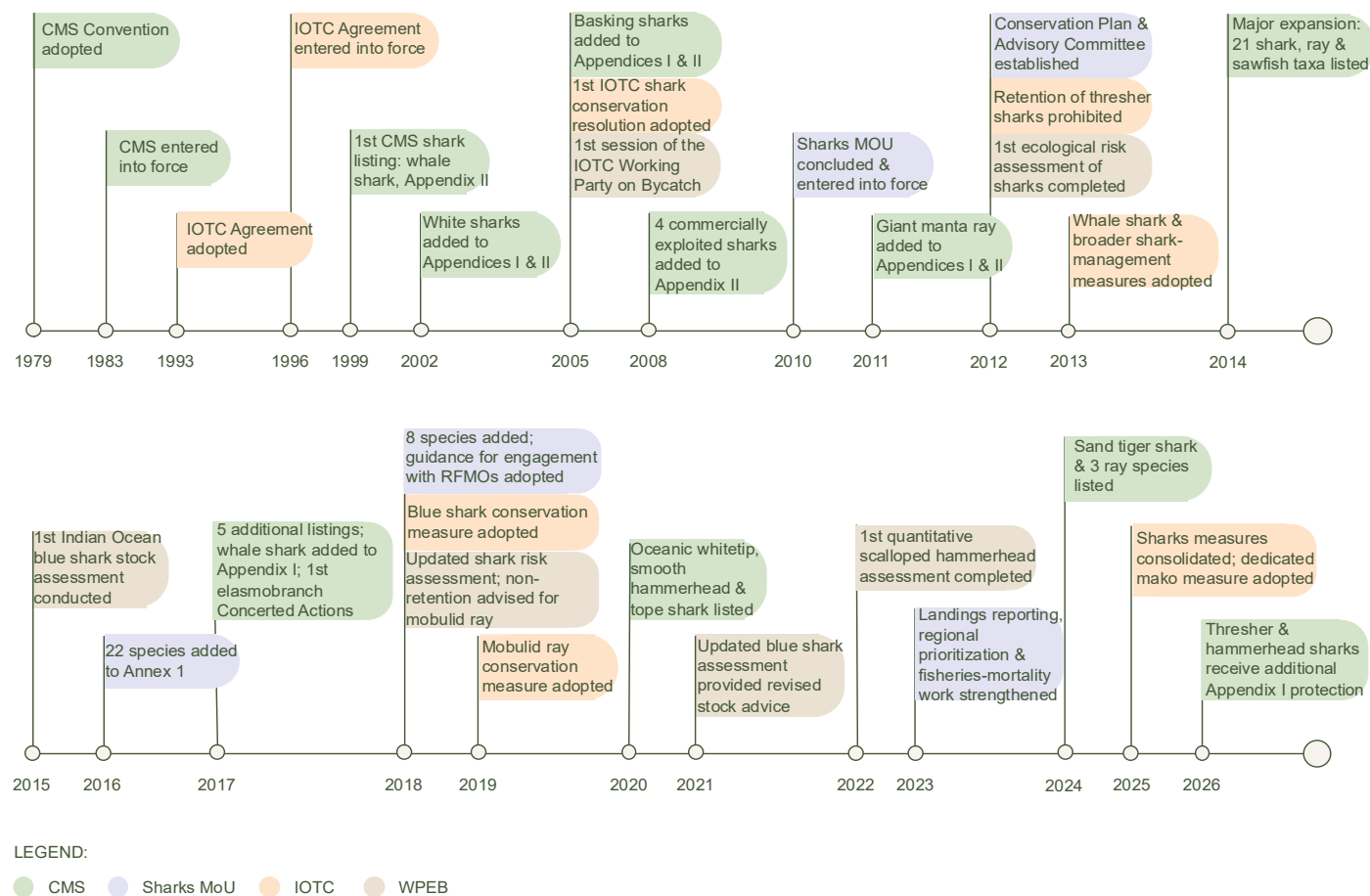


Figure 2. Selected institutional, scientific and fisheries-management milestones concerning sharks and rays under the Convention on Migratory Species (CMS), the CMS Memorandum of Understanding on the Conservation of Migratory Sharks (Sharks MOU), the Indian Ocean Tuna Commission (IOTC), and the IOTC Working Party on Ecosystems and Bycatch (WPEB), 1979–2026.

Table 1. IOTC Conservation and Management Measures relevant to sharks and rays. Shaded cells indicate that the resolution has been superseded so are no longer active. Resolutions in bold are active. Some of the Resolutions that are still listed as active only have this status as some CPCs have objected to Resolutions which supersede them, such Resolutions are marked with a *. Adapted from the IOTC Compendium of Active Conservation and Management Measures for the Indian Ocean Tuna Commission (as updated 22 June 2026)

Year	Resolution	Title
2005	05/05	Resolution by IOTC concerning the conservation of sharks caught in association with fisheries managed by IOTC.
2009	09/05	Resolution by IOTC to prohibit the use of large-scale driftnets on the high seas in the IOTC area
2009	09/12	Resolution by IOTC on the conservation of thresher sharks (Family Alopiidae) caught in association with fisheries in the IOTC area of competence.
2012	12/09*	Resolution by IOTC on the conservation of thresher sharks (Family Alopiidae) caught in association with fisheries in the IOTC area of competence.
2012	12/12 *	Resolution by IOTC to prohibit the use of large-scale driftnets on the high seas in the IOTC area.
2013	13/05 *	Resolution by IOTC on the conservation of whale sharks (Rhincodon typus).
2013	13/06 *	Resolution by IOTC on a scientific and management framework on the conservation of shark species caught in association with IOTC managed fisheries.
2015	15/01	Resolution by IOTC on the recording of catch and effort data by fishing vessels in the IOTC area of competence.
2015	15/02	Resolution by IOTC on mandatory statistical reporting requirements for IOTC Contracting Parties and Cooperating Non-Contracting Parties (CPCs).
2017	17/05 *	Resolution by IOTC on the conservation of sharks caught in association with fisheries managed by IOTC.
2018	18/02 *	Resolution by IOTC on management measures for the conservation of blue shark caught in association with IOTC fisheries.
2019	19/02	Resolution by IOTC on procedures for a Fish Aggregating Devices (FADs) Management Plan.
2019	19/03	Resolution by IOTC on the conservation of mobulid rays caught in association with fisheries in the IOTC area of competence Note: this will soon be superseded by Resolution 26/03
2019	19/05	Resolution by IOTC on a ban on discards of bigeye tuna, skipjack tuna, yellowfin tuna, and non-targeted species caught by purse seine vessels in the IOTC area of competence.
2023	23/01	Resolution by IOTC on the management of Anchored Fish Aggregating Devices (AFADs).
2023	23/08	Resolution by IOTC on electronic monitoring standards for IOTC fisheries.
2024	24/02	Resolution by IOTC on management of drifting Fish Aggregating Devices (FADs) in the IOTC area of competence.
2025	25/05	Resolution by IOTC on establishing a programme for transshipment by large-scale fishing vessels
2025	25/06	Resolution by IOTC on a Regional Observer Scheme.
2025	25/08	Resolution by IOTC on the conservation of sharks caught in association with fisheries managed by IOTC¹²
2025	25/09	Resolution by IOTC on the conservation of shortfin and longfin mako sharks caught in association with IOTC fisheries

Table 2. Parties bordering the IOTC Convention Area and whether they are Contracting Parties (CPs) or Cooperating Non-Contracting Parties (CNCs) to IOTC, a Party or non-Party (NP) to the CMS and a Signatory (Sig.) to the Sharks MOU, as of 2026 ^[d]. RS = Range State, indicating

¹² Objections were received from India and Somalia. Resolution 2025/08 does not apply to India and Somalia, although resolutions 18/02, 17/05, 13/05 and 12/09 remain binding on India and Somalia, and Resolution 13/06 remains binding on Somalia.

that relevant species occur in their waters, but that they are not a Signatory to the Sharks MOU.

State	Code	IOTC Status	CMS Status	Sharks MOU Status
<i>States (and selected territories) bordering the IOTC Area of Competence</i>				
Australia	AUS	CP	Party	Sig.
Bahrain	BHR	—	Party	RS
Bangladesh	BGD	CP	Party	RS
Comoros	COM	CP	NP	Sig.
Djibouti	DJI	—	Party	RS
Egypt	EGY	—	Party	Sig.
Eritrea	ERI	—	Party	RS
France ¹³	FRA	CP	Party	Sig.
India	IND	CP	Party	RS
Indonesia	IDN	CP	NP	RS
Iran, Islamic Republic of	IRN	CP	Party	RS
Iraq	IRQ	—	Party	RS
Israel	ISR	—	Party	RS
Jordan	JOR	—	Party	Sig.
Kenya	KEN	CP	Party	Sig.
Kuwait	KWT	—	NP	RS
Madagascar	MDG	CP	Party	Sig.
Malaysia	MYS	CP	NP	RS
Maldives	MDV	CP	Party	RS
Mauritius	MUS	CP	Party	RS
Mozambique	MOZ	CP	Party	RS
Myanmar	MMR	—	NP	RS
Oman	OMN	CP	NP	RS
Pakistan	PAK	CP	Party	RS
Qatar	QAT	—	NP	RS
Saudi Arabia	SAU	—	Party	Sig.
Seychelles	SYC	CP	Party	RS
Somalia	SOM	CP	Party	Sig.
South Africa	ZAF	CP	Party	Sig.
Sri Lanka	LKA	CP	Party	Sig.
Sudan	SDN	CP	NP	Sig.
Tanzania, United Republic of	TZA	CP	Party	RS
Thailand	THA	CP	NP	RS
Timor-Leste	TLS	—	NP	RS
United Arab Emirates	ARE	—	Party	Sig.
Yemen	YEM	CP	Party	Sig.
<i>Other IOTC Contracting Parties (e.g. those that have, or have had, long-distance fleets)</i>				
China	CHN	CP	NP	RS
European Union	EU	CP	Party	Sig.
Japan	JPN	CP	NP	RS
Philippines	PHL	CP	Party	Sig.
Republic of Korea	KOR	CP	NP	RS
United Kingdom	GBR	CP	Party	Sig.
<i>Cooperating Non-Contracting Parties to IOTC</i>				
Liberia	LBR	CNCP	Party	RS
Panama	PAN	CNCP	Party	RS

¹³ France: including Mayotte and La Réunion, the French Southern and Antarctic Lands (TAAF – Terres australes et antarctiques françaises).

Table 3. Sharks and rays that are listed in Appendices I and/or II of and whether they are included in Annex 1 of the CMS Sharks MOU, whether they occur in the IOTC area and their main habit (Pel = pelagic; Dem. = demersal). Elasmobranch species of current focus in WPEB (<https://iotc.org/science/wp/working-party-ecosystems-and-bycatch-wpeb>) denoted *. Elasmobranchs included in the Ecological Risk Assessment of Murua et al. (2018) denoted #.

	Family	Scientific name	Common name	FAO code	CMS App. I	CMS App. II	Sharks MOU	IOTC area	Habit
1	Rhincodontidae	<i>Rhincodon typus</i>	Whale shark	RHN	2017	1999	2010	Yes#	Pel.
2	Odontaspidae	<i>Carcharias taurus</i>	Sand tiger shark	CCT	2024	2024	[a]	Yes	Dem./Pel.
3	Alopiidae	<i>Alopias pelagicus</i>	Pelagic thresher shark	PTH	2026	2014	2016	Yes**	Pel.
4	Alopiidae	<i>Alopias superciliosus</i>	Bigeye thresher shark	BTH	2026	2014	2016	Yes**	Pel.
5	Alopiidae	<i>Alopias vulpinus</i>	Common thresher shark	ALV	2026	2014	2016	In part#	Pel.
6	Cetorhinidae	<i>Cetorhinus maximus</i>	Basking shark	BSK	2005	2005	2010	In part	Pel.
7	Lamnidae	<i>Carcharodon carcharias</i>	Great white shark	WSH	2002	2002	2010	Yes#	Pel.
8	Lamnidae	<i>Isurus oxyrinchus</i>	Shortfin mako shark	SMA	–	2008	2010	Yes**	Pel.
9	Lamnidae	<i>Isurus paucus</i>	Longfin mako shark	LMA	–	2008	2010	Yes#	Pel.
10	Lamnidae	<i>Lamna nasus</i>	Porbeagle	POR	–	2008	2010	Yes#	Pel.
11	Triakidae	<i>Galeorhinus galeus</i>	Tope shark	GAG	–	2020	2023	In part	Dem./Pel.
12	Triakidae	<i>Mustelus schmitti</i>	Patagonian narrownose smoothhound	SDP	–	2026	[a]	No	Dem.
13	Carcharhinidae	<i>Carcharhinus falciformis</i>	Silky shark	FAL	–	2014	2016	Yes**	Pel.
14	Carcharhinidae	<i>Carcharhinus longimanus</i>	Oceanic white-tip shark	OCS	2020	–	2018	Yes**	Pel.
15	Carcharhinidae	<i>Carcharhinus obscurus</i>	Dusky shark	DUS	–	2017	2018	Yes	Dem./Pel.
16	Carcharhinidae	<i>Prionace glauca</i>	Blue shark	BSH	–	2017	–	Yes**	Pel.
17	Sphyrnidae	<i>Sphyrna lewini</i>	Scalloped hammerhead shark	SPL	2026	2014	2016	Yes**	Pel.
18	Sphyrnidae	<i>Sphyrna mokarran</i>	Great hammerhead shark	SPK	2026	2014	2016	Yes#	Pel.
19	Sphyrnidae	<i>Sphyrna zygaena</i>	Smooth hammerhead shark	SPZ	–	2020	2018	Yes#	Pel.
20	Squalidae	<i>Squalus acanthias</i>	Spiny dogfish	DGS	–	2008 [b]	2010	NA	Dem./Pel.
21	Squalidae	<i>Squalus suckleyi</i>	Pacific spiny dogfish	QYW	–	2024	[a]	No	Dem./Pel.
22	Squatinae	<i>Squatina squatina</i>	Angelshark	AGN	2017	2017	2018	No	Dem.

Notes: [a] Listed on CMS and so will be considered for listing in Annex 1 of the Sharks MOU at the next Meetings of Signatories; [b] northern hemisphere populations only

Table 3 (continued). Sharks and rays that are listed in Appendices I and/or II of and whether they are included in Annex 1 of the CMS Sharks MOU, whether they occur in the IOTC area and their main habit (Pel = pelagic; Dem. = demersal). Elasmobranch species of current focus in WPEB (<https://iotc.org/science/wp/working-party-ecosystems-and-bycatch-wpeb>) denoted *. Elasmobranchs included in the Ecological Risk Assessment of Murua et al. (2018) denoted #.

	Family	Scientific name	Common name	FAO code	CMS App. I	CMS App. II	Sharks MOU	IOTC area	Habit
23	Rhinidae	<i>Rhynchobatus australiae</i>	Whitespotted wedgefish	RCA	–	2017	2018	Yes	Dem.
24	Rhinobatidae	<i>Rhinobatos rhinobatos</i>	Common guitarfish	RBX	2017 [c]	2017	2018	No	Dem.
25	Glaucostegidae	<i>Glaucostegus cemiculus</i>	Blackchin guitarfish	RBC	2024 [c]	2024	[a]	No	Dem.
26	Pristidae	<i>Anoxypristis cuspidata</i>	Narrow sawfish	RPA	2014	2014	2016	Yes	Dem.
27	Pristidae	<i>Pristis clavata</i>	Dwarf sawfish	RPC	2014	2014	2016	Yes	Dem.
28	Pristidae	<i>Pristis pectinata</i>	Smalltooth sawfish	RPP	2014	2014	2016	No	Dem.
29	Pristidae	<i>Pristis pristis</i>	Large-tooth sawfish	RPR	2014	2014	2016	Yes	Dem.
30	Pristidae	<i>Pristis zijsron</i>	Green sawfish	RPZ	2014	2014	2016	Yes	Dem.
31	Myliobatidae	<i>Aetomylaeus bovinus</i>	Bull ray	MPO	2024 [c]	2024	[a]	In part	Dem./Pel.
32	Rhinopteridae	<i>Rhinoptera marginata</i>	Lusitanian cownose ray	MRM	2024 [c]	2024	[a]	No	Dem./Pel.
33	Mobulidae	<i>Mobula alfredi</i>	Reef manta ray	RMA	2014	2014	2016	Yes	Pel.
34	Mobulidae	<i>Mobula birostris</i>	Oceanic manta ray	RMB	2011	2011	2016	Yes	Pel.
35	Mobulidae	<i>Mobula eregoodoo</i> [d]	Longhorned pygmy devil ray	RME	2014	2014	2016	Yes	Pel.
36	Mobulidae	<i>Mobula hypostoma</i> [e]	Atlantic devil ray	RMH	2014	2014	2016	No	Pel.
37	Mobulidae	<i>Mobula kuhlii</i>	Shorthorned pygmy devil ray	RMK	2014	2014	2016	Yes	Pel.
38	Mobulidae	<i>Mobula mobular</i> [f]	Giant devil ray	RMM	2014	2014	2016	Yes	Pel.
39	Mobulidae	<i>Mobula munkiana</i>	Munk's devil ray	RMU	2014	2014	2016	No	Pel.
40	Mobulidae	<i>Mobula tarapacana</i>	Sicklefin devil ray	RMT	2014	2014	2016	Yes	Pel.
41	Mobulidae	<i>Mobula thurstoni</i>	Bentfin devil ray	RMO	2014	2014	2016	Yes	Pel.
42	Mobulidae	<i>Mobula yarae</i>	Atlantic manta ray	–	2026	2026	[a]	No	Pel.

Notes: [a] Listed on CMS and so will be considered for listing in Annex 1 of the Sharks MOU at the next Meetings of Signatories; [b] northern hemisphere populations only; [c] Mediterranean Sea populations listed in Appendix I; [d] sometimes referred to as *Mobula eregoodootenkee*; [e] the lesser Guinean devil ray *Mobula rochebrunei* is currently considered to be a junior synonym of *M. hypostoma*; [f] *Mobula japonica* is currently considered to be a junior synonym of *M. mobular*.

Table 4. Chronology of the work and outcomes of IOTC, CMS and the Sharks MOU, with relevance to sharks and rays.

Year	IOTC	WPEB	CMS	Sharks MOU
1979			CMS Convention text was adopted in Bonn, Germany.	
1983			CMS entered into force.	
1985			First Meeting of the Conference of the Parties to CMS (COP1), Bonn (Germany).	
1988			COP2, Geneva (Switzerland).	
1991			COP3, Geneva (Switzerland).	
1993	IOTC Agreement adopted under Article XIV of the FAO Constitution.			
1994			COP4, Nairobi (Kenya).	
1996	IOTC Agreement entered into force. First Session of the Commission, Rome (Italy).			
1997	Second Session of the Commission, Mahé (Seychelles).		COP5, Geneva (Switzerland)	
1998	Third Session of the Commission, Mahé (Seychelles).			
1999	Fourth Session of the Commission, Kyoto (Japan).		COP6, Cape Town (South Africa). Whale shark listed in Appendix II of CMS.	
2002			COP7, Bonn (Germany). White shark listed in Appendices I and II of CMS.	

Year	IOTC	WPEB	CMS	Sharks MOU
2005	Resolution 05/05 concerning the conservation of sharks caught in association with fisheries managed by IOTC adopted.	First Session of the IOTC Working Party on Bycatch, Phuket (Thailand). Establishment of a dedicated scientific forum for bycatch, including sharks and rays.	COP8, Nairobi (Kenya). Basking shark listed in Appendices I and II of CMS.	
2006		WPEB2 session, Victoria (Seychelles).		
2007		WPEB3 session, Victoria (Seychelles).		
2008	Resolutions 08/01 and 08/04 strengthened statistical and logbook reporting for sharks and other associated species.	WPEB4 session, Bangkok (Thailand).	COP9, Rome (Italy). Four commercial shark species listed in Appendix II of CMS.	
2009		WPEB5 session, Mombasa (Kenya).		
2010		WPEB6 session, Victoria (Seychelles).		Sharks MOU text agreed, Manila (Philippines).
2011		WPEB7 session, Maldives. WPEB work included review of information on non-target species associated with IOTC fisheries, later referenced in IOTC whale shark measures.	COP10, Bergen (Norway). <i>Mobula birostris</i> listed in Appendices I and II of CMS.	

Year	IOTC	WPEB	CMS	Sharks MOU
2012	Resolution 12/09 on the conservation of thresher sharks, Family Alopiidae adopted.	WPEB8 session, South Africa. First comprehensive shark ecological risk assessment/productivity–susceptibility analysis; ranked the ten most vulnerable shark species to longline gear and developed advice for seven key shark species.		First Meeting of the Signatories (MOS1), Bonn (Germany). Adopted the Conservation Plan (Annex 3), established the Advisory Committee and agreed procedures and criteria for amending Annex 1.
2013	Resolution 13/05 on the conservation of whale sharks <i>Rhincodon typus</i> adopted. Resolution 13/06 on a scientific and management framework on the conservation of shark species adopted.	WPEB9 session, La Réunion (France)		
2014		WPEB10 session, Yokohama, Kanagawa (Japan).	COP11, Quito (Ecuador). All species of sawfish and mobulid ray listed in Appendices I and II of CMS, and six shark species added to Appendix II.	
2015	Resolution 15/01 on the recording of catch and effort data by fishing vessels in the IOTC Area of Competence adopted. Resolution 15/02 on mandatory statistical reporting requirements for CPCs adopted, including relevance for shark catch reporting.	WPEB11 session, Olhão (Portugal). First formal Indian Ocean blue shark stock assessment; stock status remained uncertain because of catch-series and data limitations.		

Year	IOTC	WPEB	CMS	Sharks MOU
2016		WPEB12 session, Seychelles.		Second Meeting of the Signatories (MOS2), San Jose (Costa Rica). Added 22 shark and ray species to Annex 1; amended the MOU and Conservation Plan.
2017	Resolution 17/05 on the conservation of sharks caught in association with fisheries managed by IOTC adopted.	WPEB13 session, San Sebastián (Spain). Updated blue shark stock assessment.	COP12, Manila (Philippines). Further five shark and ray species listed. First CMS Concerted Actions for whale shark, mobulid rays and angelshark adopted.	
2018	Resolution 18/02 on management measures for the conservation of blue shark caught in association with IOTC fisheries adopted.	WPEB14 session, Cape Town (South Africa). Updated ecological risk assessment for sharks; recommended urgent management action, including non-retention measures, for mobulid rays.		3rd Meeting of the Signatories (MOS3), Monaco. Added eight species to Annex 1; revised the listing procedure and definition of “migratory”; adopted RFMO-engagement guidance, communication and capacity-building strategies
2019	Resolution 19/03 on the conservation of mobulid rays caught in association with fisheries in the IOTC Area of Competence adopted.	WPEB15 session, La Réunion (France).		
2020		WPEB16 session held online/virtually. First attempt at a shortfin mako assessment and precautionary reduction of fishing mortality was advised.	COP13, Gandhinagar (India). Oceanic whitetip listed in Appendix I of CMS. Tope and smooth hammerhead listed in Appendix II of CMS.	

Year	IOTC	WPEB	CMS	Sharks MOU
2021		WPEB17 held as a Data Preparatory Meeting and an Assessment Meeting.		
2022		WPEB18 held online. Reviewed the first quantitative scalloped hammerhead assessment; prioritized species-specific reporting, research planning and recovery work for scalloped hammerhead.		
2023	Resolution 23/08 on electronic monitoring standards for IOTC fisheries adopted	WPEB19, La Saline-les-Bains, La Réunion (France).		4th Meeting of the Signatories (MOS4), Bonn (Germany). Tope shark added to Annex 1; measures advanced on landings-data reporting, regional prioritization, fisheries-induced mortality
2024		WPEB20 session, Seychelles Shortfin mako assessment was completed and accepted	COP14, Samarkand (Uzbekistan). Sand tiger shark listed in CMS Appendices I and II. Blackchin guitarfish, bull ray, and Lusitanian cownose ray listed in CMS Appendices I (Mediterranean Sea) and II.	
2025	Resolution 25/08 on sharks and Resolution 25/09 on shortfin and longfin mako sharks adopted.	WPEB21 session, Sète (France) Blue shark assessment was completed and accepted		

Year	IOTC	WPEB	CMS	Sharks MOU
2026	Resolution 26/03 on mobulids was adopted	WPEB22 scheduled for La Réunion.	COP15, Campo Grande (Brazil). Three thresher sharks, scalloped and great hammerhead sharks added to Appendix I; narrownose smoothhound added to Appendix II.	