Report of the 22nd Session of the IOTC Working Party on Ecosystems and Bycatch

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ACRONYMS

ABNJ	Areas Beyond National Jurisdiction
ACAP	Agreement on the Conservation of Albatrosses and Petrels
BPUE	Bycatch Per Unit of Effort
BSH	Blue shark
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CKMR	Close-Kin-Mark-Recapture
CMM	Conservation and Management Measure (of the IOTC; Resolutions and Recommendations)
CMS	Convention on Conservation of Migratory Species of Wild Animals
CPCs	Contracting Parties and Cooperating Non-Contracting Parties
CPUE	Catch per unit of effort
current	Current period/time, i.e. $F_{current}$ means fishing mortality for the current assessment year.
EEZ	Exclusive Economic Zone
EMS	Electronic Monitoring System
ERA	Ecological Risk Assessment
ETP	Endangered, Threatened and Protected Species
EU	European Union
F	Fishing mortality; F_{2015} is the fishing mortality estimated in the year 2015
FAD	Fish Aggregation Device
FAO	Food and Agriculture Organization of the United Nations
FOB	Floating Object
F_{MSY}	Fishing mortality at MSY
GAM	Generalised Additive Model
GLM	Generalised liner model
HBF	Hooks between floats
IO	Indian Ocean
IOTC	Indian Ocean Tuna Commission
IOSEA	Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia
IPOA	International Plan of Action
IUU	Illegal, Unreported and Unregulated, fishing
IWC	International Whaling Commission
LL	Longline
LSTLV	Large-scale tuna longline vessel
MoU	Memorandum of Understanding
MPF	Meeting Participation Fund
MSY	Maximum sustainable yield
n.a.	Not applicable
NDF	Non Detriment Finding
NGO	Non-Governmental Organisation
NOAA	National Oceanic and Atmospheric Administration
NPOA	National Plan of Action
PSA	Productivity Susceptibility Analysis
RPOA	Regional Plan of Action
ROS	Regional Observer Scheme
SC	Scientific Committee of the IOTC
SB	Spawning biomass (sometimes expressed as SSB)
SB_{MSY}	Spawning stock biomass which produces MSY
SMA	Shortfin mako shark
Taiwan,China	Taiwan, Province of China
UN	United Nations
WPDCS	Working Party on Data Collection and Statistics, of the IOTC
WPEB	Working Party on Ecosystems and Bycatch, of the IOTC
WWF	World Wildlife Fund

KEY DEFINITIONS

Bycatch	All species, other than the 16 species listed in Annex B of the IOTC Agreement, caught or interacted with by fisheries for tuna and tuna-like species in the IOTC area of competence.
Discards	Any species, whether an IOTC species or bycatch species, which is not retained onboard for sale or consumption.
Large-scale driftnets	Gillnets or other nets or a combination of nets that are more than 2.5 kilometres in length whose purpose is to enmesh, entrap, or entangle fish by drifting on the surface of, or in, the water column.

STANDARDISATION OF IOTC WORKING PARTY AND SCIENTIFIC COMMITTEE REPORT TERMINOLOGY

SC16.07 (para. 23) The SC **ADOPTED** the reporting terminology contained in Appendix IV and **RECOMMENDED** that the Commission considers adopting the standardised IOTC Report terminology, to further improve the clarity of information sharing from, and among its subsidiary bodies.

HOW TO INTERPRET TERMINOLOGY CONTAINED IN THIS REPORT

Level 1: ***From a subsidiary body of the Commission to the next level in the structure of the Commission:***

RECOMMENDED, RECOMMENDATION: Any conclusion or request for an action to be undertaken, from a subsidiary body of the Commission (Committee or Working Party), which is to be formally provided to the next level in the structure of the Commission for its consideration/endorsement (e.g. from a Working Party to the Scientific Committee; from a Committee to the Commission). The intention is that the higher body will consider the recommended action for endorsement under its own mandate, if the subsidiary body does not already have the required mandate. Ideally this should be task specific and contain a timeframe for completion.

Level 2: ***From a subsidiary body of the Commission to a CPC, the IOTC Secretariat, or other body (not the Commission) to carry out a specified task:***

REQUESTED: This term should only be used by a subsidiary body of the Commission if it does not wish to have the request formally adopted/endorsed by the next level in the structure of the Commission. For example, if a Committee wishes to seek additional input from a CPC on a particular topic, but does not wish to formalise the request beyond the mandate of the Committee, it may request that a set action be undertaken. Ideally this should be task specific and contain a timeframe for the completion.

Level 3: ***General terms to be used for consistency:***

AGREED: Any point of discussion from a meeting which the IOTC body considers to be an agreed course of action covered by its mandate, which has not already been dealt with under Level 1 or level 2 above; a general point of agreement among delegations/participants of a meeting which does not need to be considered/adopted by the next level in the Commission's structure.

NOTED/NOTING: Any point of discussion from a meeting which the IOTC body considers to be important enough to record in a meeting report for future reference.

Any other term: Any other term may be used in addition to the Level 3 terms to highlight to the reader of and IOTC report, the importance of the relevant paragraph. However, other terms used are considered for explanatory/informational purposes only and shall have no higher rating within the reporting terminology hierarchy than Level 3, described above (e.g. **CONSIDERED**; **URGED**; **ACKNOWLEDGED**).

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Executive summary

The 22nd Session of the Indian Ocean Tuna Commission's (IOTC) Working Party on Ecosystems and Bycatch - WPEB was held in La Réunion, France and online via Zoom from 14-18 September 2026. A total of 83 participants (87 in 2025, 92 in 2024, 100 in 2023, and 103 in 2022) attended the Session. The list of participants is provided in Appendix I. The meeting was opened by the Chairperson, Dr Charlene da Silva from DFFE, South Africa, who welcomed participants and formally opened the meeting.

The following are the complete **recommendations** from the WPEB22 to the Scientific Committee which are also provided in Appendix XVVIII:

6.1 Presentation of new information available on sharks

WPEB22(AS).01 (para. 89) The WPEB **NOTED** that the discussion on the status of the whale shark remains broadly similar to the discussion on the same subject of the previous year. The WPEB **DISCUSSED** the practical implications of the provisions of IOTC Resolution 25/08 regarding whale shark conservation, including the retention ban. The WPEB **NOTED** that the adoption of the retention ban is linked to an explicit recommendation from the Scientific Committee. The WPEB **RECOMMENDED** to present this to the Scientific Committee, **AGREEING** that it should explicitly state that a retention ban for whale shark is recommended.

WPEB22(AS).02 (para. 90) The WPEB **NOTED** that available information indicates that whale shark interactions occur in IOTC fisheries, the WPEB **AGREED** that there remains considerable uncertainty as to the magnitude of interactions between IOTC fisheries and whale shark, and that whale sharks are also exposed to other sources of anthropogenic mortality. The WPEB further **RECALLED** IOTC Resolution 12/01 on the Precautionary Principle, and **NOTED** that, in spite of this uncertainty, a full retention ban could still have significant conservation value, given the declining trend in the status of the Indo-Pacific whale shark population, and the high post-release survival rates. The WPEB therefore also **RECOMMENDED** that a retention ban for whale sharks is the most appropriate conservation measure for the species (paragraph 3 of 25/08).

WPEB22(AS).03 (para. 92) The WPEB **NOTED** that Resolution 25/08 currently only permits sampling from animals that are dead at haulback. The WPEB therefore **RECOMMENDED** that the SC advise the Commission to amend the Resolution to clarify that the collection of biological samples from live sharks may also be undertaken for scientific purposes, without constituting a retention of the animal, provided that sampling is undertaken without the animal being removed from the water and in accordance with scientific protocols approved or endorsed by the IOTC Scientific Committee. The WPEB **STRESSED** that the proposed amendment is intended to allow for ongoing research in support of population status monitoring and ensuring that the WPEB can update its advice to the IOTC Scientific Committee, with respect to shark species conservation status in future, as it considers appropriate.

WPEB22(AS).04 (para. 107) The WPEB **NOTED** the threatened conservation status of hammerhead sharks (*Sphyrnidae*) and the limited availability of species-specific biological and fisheries information for hammerhead sharks in the IOTC Area of Competence. The WPEB therefore

RECOMMENDED that the SC advise the Commission to consider implementing management measures for these species.

WPEB22(AS).05 (para. 113-114) **NOTING** that Resolution 15/01 includes a list of species for which reporting catch data is mandatory or optional, and varies by gear and by fishery type (i.e. artisanal vs commercial fisheries), the WPEB **NOTED** that many species of interest to the WPEB are not mandatory for reporting for all gears or fishery types. This recommendation was made in 2025, and is **RECOMMENDED** again in 2026.

The WPEB therefore **RECOMMENDED** that the SC review the list of species that are mandatory for reporting to species level while considering the feasibility of such data collection in artisanal fisheries, and included the following suggested changes:

- Silky sharks to be added also for gillnet fisheries
- Hammerhead sharks to be reported at species level at least for scalloped, smooth and great hammerhead sharks for all gear types (explicitly including purse seine fisheries)
- Mantas and devil rays to be reported at species level differentiating at least between manta rays (giant manta and reef manta) and other devil rays adding them for mandatory reporting at least for purse seine fisheries and for gillnet fisheries instead of optional
- Great white sharks as mandatory for all gear types
- Oceanic whitetip sharks as mandatory for all gear types

WPEB22(AS).06 (para. 155) The WPEB **NOTED** that the list of species for which executive summaries are developed has traditionally been provided by the Commission and **RECOMMENDED** that the SC provide guidance on whether additional species could be added directly through the Working Party. The WPEB **AGREED** that consideration should also be given to identifying additional species for which further work could be undertaken, taking into account the potential value and feasibility of additional species-specific actions.

7.1 Review of indicators

WPEB22(AS).07 (para. 173) The WPEB **AGREED** that the work provides useful findings on the status of those data-limited shark species in the Indian Ocean, and that the approach should be continued, further explored and expanded to additional species where possible. The WPEB further **RECOMMENDED** that the SC support studies to improve region-specific life-history information on pelagic sharks, strengthen size-composition sampling and reporting to IOTC, and improve the quantification of discard rates and post-release mortality, so that a more complete estimate of fishing mortality can be achieved.

7.3 Update on MSE for blue shark

WPEB22(AS).08 (para. 195) **NOTING** that blue sharks are often taken as bycatch and/or as the secondary target and that the management procedure for blue sharks should take into account the impacts to the operations and catch of target species, the WPEB **RECOMMENDED** the SC include other WPs including WPB, WPTmT and WPM in review process of the development of blue shark MSE.

9.1 All bycatch species (all)

WPEB22(AS).09 (para. 257) The WPEB **RECOMMENDED** that the SC **ENDORSE** this best practice handling and release document (found in Appendix XVVII) for consideration by the Commission with the understanding that the master document would be reviewed and updated by the WPEB based on new information. The WPEB further **NOTED** that guidelines

should ensure sufficient flexibility to accommodate different fisheries and operational contexts.

7.4 Revision of the WPEB Program of Work 2027-2031

WPEB22(AS).10 (para. 320) The WPEB **RECOMMENDED** that the SC consider and endorse the WPEB Program of Work (2027–2031), as provided in Appendix XVIV.

11.3 Review of the draft, and adoption of the Report of the 22nd Session of the WPEB

WPEB22(AS).11 (para. 326) The WPEB **RECOMMENDED** that the Scientific Committee consider the consolidated set of recommendations arising from WPEB22, provided at Appendix XVVIII, as well as the management advice provided in the draft resource stock status summary for each of the eight shark species, as well of those for marine turtles, seabirds, cetaceans and mobulids:

Sharks

- Blue shark (*Prionace glauca*) – Appendix VII
- Oceanic whitetip shark (*Carcharhinus longimanus*) – Appendix VIII
- Scalloped hammerhead shark (*Sphyrna lewini*) – Appendix IX
- Shortfin mako shark (*Isurus oxyrinchus*) – Appendix X
- Silky shark (*Carcharhinus falciformis*) – Appendix XI
- Bigeye thresher shark (*Alopias superciliosus*) – Appendix XII
- Pelagic thresher shark (*Alopias pelagicus*) – Appendix XIII
- Porbeagle shark (*Lamna nasus*) - Appendix XIV

Other species/groups

- Marine turtles – Appendix XV
- Seabirds – Appendix XVI
- Marine mammals – Appendix XVII
- Mobulids – Appendix XVIV

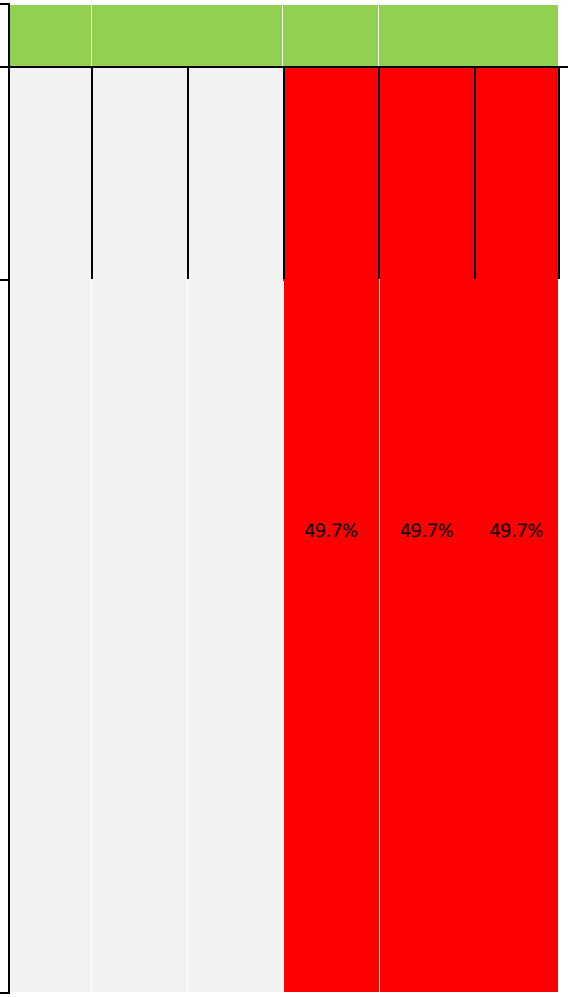
A summary of the stock status for some of the most commonly caught shark species caught in association with IOTC fisheries for tuna and tuna-like species is provided in Table 1.

The following are the **requests** from the WPEB22 to other working parties for their attention:

NOTING that many items on the PoW for the WPEB relate to improving data which are valid for many working parties, the WPEB **REQUESTED** the Secretariat to summarise common issues across Working Parties for discussion during the meeting. The WPEB further **REQUESTED** the WPDCS to ensure that their PoW is harmonised with all the Working Parties then take any common issues to the SC for discussion and endorsement.

Table 1. Status summary for key shark species caught in association with IOTC fisheries for tuna and tuna-like species.

Stock	Indicators	2021	2022	2023	2024	2025	2026	Advice to the Commission
Sharks: Although sharks are not part of the 16 species directly under the IOTC mandate, sharks are frequently caught in association with fisheries targeting IOTC species. Some fleets are known to actively target both sharks and IOTC species simultaneously. As such, IOTC Contracting Parties and Cooperating Non-Contracting Parties are required to report information at the same level of detail as for the 16 IOTC species. The following are the main species caught in IOTC fisheries, although the list is not exhaustive								
Blue shark *Prionace glauca*	Catch (2024) (t) 9,562 Catch of NEI sharks (2024) (t) 15,742 Mean annual catch (2020-2024) (t) 9,463 Mean annual catch of NEI sharks (2020-2024) (t) 24,929	**72.6%**	**99.9%**	**99.9%**	**99.9%**	**100%**	**100%**	Two stock assessments were carried out for blue shark (BSH) in 2025: one using a Bayesian state-space surplus production model (JABBA) and another using an integrated age-structured model (SS3). Both assessments used data (catch and indices of abundance) from 1950 to 2023, although the model structure was inherently different. The SS3 model included annual length composition data where available. Uncertainty in data inputs and model configuration were explored through sensitivity analyses. All models produced similar results. On the weight-of-evidence available in 2025, the stock status is determined to be **not overfished** and **not subject to overfishing**. The SS3 assessment indicates current catches are near MSY, and significant increases could result in decreasing biomass and the stock becoming subject to overfishing in the future. The stock should be closely monitored, especially with respect to overall catch and discard reporting. While mechanisms exist for encouraging CPCs to comply with their recording and reporting requirements (Resolution 16/06), these need to be further implemented by the Commission, so as to better inform scientific advice in the future.Click below for a full stock status summary:
	MSY (1,000 t) (80% CI): 30.81 (21.79 – 39.84) F_{MSY} (80% CI): 0.18 (0.18 - 0.18) SSB_{MSY} (1,000 t) (80% CI): 52.87 (37.38 - 68.37) F_{2024}/F_{MSY} (80% CI): 0.39 (0.21 - 0.57) SSB_{2024}/SSB_{MSY} (80% CI): 2.22 (1.76 - 2.68) SSB_{2024}/SSB_0 (80% CI): 0.73 (0.34 - 1.13)							



- Blue sharks – Appendix VII

	Catch (2024) (t)	1,451
	Catch of NEI sharks (2024) (t)	16,033
	Mean annual catch (2020-2024) (t)	930
	Average catches (SMA, MAK, MSK) 2020-2024 (t)	25,873
	Mean annual catch of NEI sharks (2020-2024) (t)	24,929
Shortfin mako *Isurus oxyrinchus*	MSY (1,000 t) (80% CI)	1.93 (0.985 – 3.313)
	F_{MSY} (80% CI)	0.03 (0.01 – 0.07)
	B_{MSY} (1,000 t) (80% CI)	60.0 (35.7 – 103.8)
	F_{2022}/F_{MSY} (80% CI)	1.53 (0.65 – 3.71)
	B_{2022}/B_{MSY} (80% CI)	0.96 (0.58 – 1.41)
	B_{2022}/B_0 (80% CI)	0.45 (0.27- 0.69)

In 2024 a stock assessment was carried out for the shortfin mako shark in the IOTC area of competence, using data until 2022. The model applied was a population biomass dynamics model using the platform JABBA. The stock status and projections were based on an ensemble grid of 9 models designed to capture the main uncertainties relating to biology (3 options) and the shape of the production curve used in biomass dynamics models (3 options). Considering the characterised uncertainty, and on the weight-of-evidence available in 2024, the shortfin mako shark stock is determined to be **overfished** and **subject to overfishing**.

Current catches are higher than MSY, and the shortfin mako is currently **overfished** (B/Bmsy < 1) and **undergoing overfishing** (F/Fmsy > 1). Under those levels of catches, the biomass will continue to decline, and fishing mortality will continue to increase over time. In order to have a lower than 50% probability of exceeding MSY-reference points in 10 years, i.e., to recover the stock to the green quadrant of the Kobe plot with at least 50% probability in 10 years, future catches should not exceed 40% of current catches. This corresponds to an annual TAC of 1,217.2 t (representing all fishing mortality including retention, dead discards and post-release mortality), noting that this TAC level should include and account for the SMA, MAK and MSK species codes as reported to IOTC.

									The Commission should take a cautious approach by implementing management actions that reduce fishing mortality on shortfin mako sharks, and the stock should be closely monitored. While mechanisms exist for encouraging CPCs to comply with their recording and reporting requirements (Resolution 18/07), these need to be further implemented by the Commission so as to better inform future scientific advice. Click below for a full stock status summary: ● Shortfin mako sharks – Appendix X
Oceanic whitetip shark *Carcharhinus longimanus*	Reported catch 2024 (t) Not elsewhere included (nei) sharks 2024 (t) Average reported catch 2020–2024 (t) Ave. (nei) sharks 2020–2024 (t)	901 15,742 541 24,929							There is a paucity of information available for these species and this situation is not expected to improve in the short to medium term. There is no quantitative stock assessment and limited basic fishery indicators currently available. Therefore, the stock status is highly uncertain. The available evidence indicates considerable risk to the stock status at current effort levels. The primary source of data that drive the assessment (total catches) is highly uncertain and should be investigated further as a priority. Click below for a full stock status summary: ● Oceanic whitetip sharks – Appendix VIII ● Scalloped hammerhead sharks – Appendix IX ● Silky sharks – Appendix XI ● Bigeye thresher sharks – Appendix XII ● Pelagic thresher sharks – Appendix XIII ● Porbeagle sharks – Appendix XIV
Scalloped hammerhead shark *Sphyrna lewini*	Reported catch 2024 (t) Not elsewhere included (nei) sharks 2024 (t) Average reported catch 2020–2024 (t) Ave. (nei) sharks 2020–2024 (t)	1,537 15,694 766 24,976							
Silky shark *Carcharhinus falciformis*	Reported catch 2024 (t) Not elsewhere included (nei) sharks 2024 (t) Average reported catch 2020–2024 (t) Ave. (nei) sharks 2020–2024 (t)	1,591 15,742 2,062 24,929							
Bigeye thresher shark *Alopias superciliosus*	Reported catch 2024 (t) Not elsewhere included (nei) sharks2 2024 (t) Thresher sharks nei 2024 (t) Average reported catch 2020-2024 (t) Av. Not elsewhere included (nei) sharks 2020-2024 (t)	< 1 15,559 <1 <1 24,976							

	Av. Thresher sharks nei 2020-2024 (t)	383						
Pelagic thresher shark *Alopias pelagicus*	Reported catch 2024 (t) Not elsewhere included (nei) sharks 2024 (t) Thresher sharks nei 2024 (t) Average reported catch 2020-2024 (t) Av. Not elsewhere included (nei) sharks2 2020-2024 (t) Av. Thresher sharks nei 2020-2024 (t)	145 15,559 <1 149 24,976 383						
Porbeagle shark *Lamna nasus*	Reported catch 2024 (t) Not elsewhere included (nei) sharks1 2024 (t) Average reported catch 2020-24 (t) Avg. not elsewhere included (nei) sharks1 2020-24 (t)	<1 15,559 <1 24,593						

Colour key for Table 1	Stock overfished (SB_{year}/SB_{MSY}< 1)	Stock not overfished (SB_{year}/SB_{MSY}≥ 1)
Stock subject to overfishing (F_{year}/F_{MSY}> 1)		
Stock not subject to overfishing (F_{year}/F_{MSY}≤ 1)		
Not assessed/Uncertain		

1. Opening of the meeting

1. The 22nd Session of the Indian Ocean Tuna Commission's (IOTC) Working Party on Ecosystems and Bycatch - WPEB was held in La Réunion, France and online via Zoom from 14-18 September 2026. A total of 83 participants (87 in 2025, 92 in 2024, 100 in 2023, and 103 in 2022) attended the Session. The list of participants is provided in Appendix I. The meeting was opened by the Chairperson, Dr Charlene da Silva from DFFE, South Africa, who welcomed participants and formally opened the meeting.

2. Adoption of the Agenda and arrangements for the Session

2. The WPEB **ADOPTED** the Agenda provided in Appendix II. The documents presented to the WPEB are listed in Appendix III.

3. The IOTC process: outcomes, updates and progress

3.1 Outcomes of the 28th Session of the Scientific Committee

3. The WPEB **NOTED** paper IOTC–2026–WPEB22(AS)–03 which outlined the main outcomes of the 28th Session of the Scientific Committee, specifically related to the work of the WPEB.

"At the 28th Session of the SC, the SC noted and considered the recommendations made by the WPEB in 2025 that included:

- *recommendations to include the range of species for which reporting should be mandatory for each gear through revising Resolution 25/01;*
- *a recommendation to adopt a revised set of handling guidelines for mobulids;*
- *a recommendation to eventually adopt a single master handling guidelines document for all taxa;*
- *the encouragement for ongoing trials to better understand the impacts of loop gears on target and bycatch species;*
- *encouragement to improve reporting of interactions with whale sharks; and*
- *the recommendation to include whale sharks as a taxon of greatest biological vulnerability and conservation concern and to take appropriate action.*

Discussions were held regarding the necessary protocols that must be followed when conducting experimental fishing trials relating to branchline materials and shark lines.

Other discussions related to: the low level of observer coverage in many fisheries and the suitability of retention bans as a conservation measure for certain species and so the need to analyse whether these measures are sufficient to aid the efforts needed for population recovery. The SC also noted the management advice arising from the blue shark assessment conducted in 2025.

*Based on the recommendations arising from the WPEB22, the SC28 adopted a set of recommendations, provided in **Appendix A** of this paper. The recommendations contained in **Appendix A** were provided to the Commission for consideration at its 30th Session which was held in May 2025.*

*In addition, the SC28 reviewed and endorsed a Program of Work for the WPEB, including a revised assessment schedule, as detailed in **Appendix B**. A separate paper (IOTC–2026–WPEB22(AS)–09) will outline the review and development process for a Program of Work for the WPEB for the next four years (2027–2031)."*

3.2 Outcomes of the 30th Session of the Commission

4. The WPEB **NOTED** paper IOTC–2026–WPEB22(AS)–04 which outlined the main outcomes of the 30th Session of the Commission, specifically related to the work of the WPEB.

5. The WPEB **NOTED** that the main items of discussion regarding the WPEB by the Commission was the endorsement by the Commission of the SC information on stock status. However, the Commission also **NOTED** the following:

   *"(para. 47) **NOTING** the importance of collecting good quality data for sharks, the Commission **ENCOURAGED** the convening of a small group of interested CPCs to update Resolution 15/01 for potential submission as a proposal for consideration at S31 in 2027.*

   *(para. 48) The Commission **NOTED** that paragraph 7 of Resolution 23/06 requests the SC to develop best practice guidelines for the safe handling and release of cetaceans by 2025, taking into account relevant work undertaken by other RFMOs. The Commission **REQUESTED** the WPDCS, WPEB and the SC to examine the existing recommendations related to this provision and provide an updated recommendation for endorsement by the Commission in 2027, including through intersessional collaboration among interested CPCs.*

   *(para. 49) The Commission **NOTED** that the SC identified whale shark as a "taxon of the greatest biological vulnerability and conservation concern for which there are very few data" and had advised that precautionary measures should be considered.*

   *(para. 50) The Commission **NOTED** that data currently remain insufficient for a full stock assessment for whale shark, but that ongoing efforts to improve data collection and analysis around the status of the stock, including Close-Kin Mark-Recapture (CKMR) studies, would contribute to improved understanding of stock status and population structure. The Commission **NOTED** that the full results of this study will be presented to the WPEB this year. "*

6. The WPEB **NOTED** that a proposal for a Resolution relating to implementing more management measures for mobulids was adopted by the Commission.

7. The WPEB further **NOTED** discussions relating to the running of IOTC Working Parties with new rules and guidelines in place relating to:

   - the registration of participants ahead of meetings;
   - the requirement to submit working documents along with a cover sheet ensuring that the main elements of the document are immediately clear for both the chair and participants;
   - that information papers should not be presented during meetings and should be kept for background information purposes only;
   - strict rules about the deadline for submitting document and how any late documents should be treated.

3.3 Review of Conservation and Management Measures relevant to Ecosystems and Bycatch

8. The WPEB **NOTED** paper IOTC–2026–WPEB22(AS)–05 which aimed to encourage participants to review some of the existing Conservation and Management Measures (CMM) relevant to ecosystems and bycatch.

9. The WPEB **NOTED** that three CMMs relevant to ecosystems and bycatch were adopted by the Commission in 2025:

   - *Resolution 26/03: On the conservation of mobulid rays caught in association with fisheries managed by IOTC*
   - *Resolution 26/06: Mandatory statistical reporting requirements for IOTC Contracting Parties and Cooperating Non-Contracting Parties (CPCs)*

- *Resolution 26/08 On promoting the objectives of IOTC through cooperation with the BBNJ agreement (The agreement under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction)*

10. The WPEB **NOTED** that Resolution 26/03 includes requests for work to be done by the WPEB and SC including:

    - At its 30th Session in 2027, the IOTC Scientific Committee shall review the soundness of the catch monitoring plans submitted by CPCs, as well as the rationale and evidence provided by CPCs that have not submitted such plans.
    - The SC shall review the status of mobulids at its annual session in 2027 including the identification of possible hot-spots for conservation and management within and beyond the EEZs of coastal CPCs.

3.4 Progress on the recommendations of WPEB21

11. The WPEB **NOTED** paper IOTC–2026–WPEB22(AS)–06 which provided an update on the progress made in implementing the recommendations from the previous WPEB meeting WPEB21 which were endorsed by the Scientific Committee (SC27) in 2025.

12. The WPEB **NOTED** that good progress had been made on these Recommendations and Requests but there are still a few ongoing recommendations and requests including:

    - The need to update the list of species to be included as mandatory for reporting in Resolution 15/01
    - The need to identify ways to improve data recording and reporting by many CPCs with artisanal fisheries
    - Finalisation of handling guidelines for cetaceans for eventual adoption by the Commission

13. The WPEB participants were **ENCOURAGED** to review IOTC–2026–WPEB22(AS)–06 during the meeting and report back on any progress in relation to requests or actions by CPCs that have not been captured by the report, and to note any pending actions for attention before the next meeting (WPEB23).

4. Review of data available on ecosystems and bycatch

4.1 Review of the statistical data available for ecosystems and bycatch species

14. The WPEB **NOTED** paper IOTC–2026–WPEB22(AS)–07 which provided an overview of the data managed by the IOTC Secretariat for bycatch species for the period 1950–2024. A summary for shark and ray species is provided in Appendix IV.

15. The WPEB **NOTED** that the reported shark catches fell to around 38,000 tonnes in 2024, with 40 % of the total reported at the species level. The majority of shark catches reported at species level were blue sharks (55 %), followed by silky sharks (around 12 %) and shortfin mako sharks (7 %).

16. The WPEB **NOTED** that although aggregate shark catches still represent around 60% of the total shark catches, some improvements were made in recent years by some coastal CPCs with a breakdown of the catches at species level.

17. The WPEB **NOTED** that Resolution 26/06 was adopted in 2026 and, once in force, will require CPCs to explicitly report catches taken in EEZ and high seas areas. The WPEB **NOTED** that the geo-referenced catch data currently available may provide an indication of the respective contributions of EEZ and high seas fisheries, but the new requirement will improve understanding of the contribution of EEZ and high seas fisheries of shark catches.

18. The WPEB **NOTED** that although gillnet fisheries account for the largest cumulative shark catch of any fishery group in the data time series, 2024 catches declined to around 4000 t.

19. The WPEB **NOTED** that the majority of catches reported at the species level were from longline fisheries, with blue sharks being the dominant species.

20. The WPEB **NOTED** that, for shark catches from line fisheries, the level of species-level disaggregation had declined again over the last two years following previous improvements, with changes also observed in the reported species composition. The WPEB **NOTED** that there could be several possible explanations for these changes. The WPEB **NOTED** that the marked change in the catch series around 2010 was largely influenced by revisions to Indonesia's catch estimates from that year, which affected all species, including bycatch species. The WPEB **NOTED** that, following a request from the WPDCS, Indonesia undertook a revision of its historical shark catch estimates following a review of national data sources and estimation procedures. The revision contributed to changes in the historical blue shark catch series and highlights the importance of maintaining transparent and reproducible catch estimation procedures, and may partly explain the observed changes. The WPEB **NOTED** that catch reconstruction also shows a clear differentiation in the data around 2010.

21. The WPEB **NOTED** that there had been some previous improvements in the reporting of hammerhead sharks, particularly through species-level breakdowns provided by some coastal CPCs that had previously been reported in aggregated categories. The WPEB **NOTED** that significant uncertainties remain in the shark catch data and species composition.

22. The WPEB **NOTED** that the data presented reflects the data as reported by CPCs and may include FAO data to supplement the data series where data have not been provided. The WPEB **NOTED** that the Secretariat will often revise catches after working with CPCs to review their national data collection and reporting systems.

23. The WPEB **NOTED** that the Secretariat does not estimate total catches, and that this task is the responsibility of the CPCs, which must include a description of their estimation methodologies in their national reports provided to the Scientific Committee.

24. The WPEB **NOTED** that the FAO Coordinating Working Party on Fishery Statistics (CWP) is working to compile catch-and-effort data from RFMOs for public dissemination, including efforts to raise catch data to official landings. The WPEB **NOTED** that, while catch data need to be raised to provide a complete picture of catches, consideration should also be given to appropriate approaches for raising effort data.

25. The WPEB **NOTED** that there are currently no specific sampling protocols defining an ideal number of samples required to ensure representative length-frequency data. However, recommended measures for different species and some sampling guidance are provided in the IOTC data reporting guidelines. The WPEB **NOTED** that these are recommendations and that the extent to which they can be implemented depends on the capacity of CPCs to collect the required data. The WPEB **NOTED** that the current requirement is to take at least one size measurement by species for each metric tonne of catch by gear.

26. The WPEB **NOTED** that changes in the reported catches of silky shark and oceanic whitetip shark in recent years were influenced by changes in sampling methodologies adopted by some CPCs, as well as data revisions by Indonesia. The WPEB **NOTED** an increase in species-level reporting for scalloped hammerhead shark, which has contributed to changes in the reported catch series for this species. The WPEB **NOTED** that coastal longline and gillnet fisheries are primarily responsible for the reported retained catches of these three species while purse seine and trawl fisheries also take these species.

27. The WPEB **NOTED** that some preliminary analyses of data reported by CPCs for 2025 show some improvements in the reporting at species level. The WPEB **NOTED** that India reported sharks catches

at species level for the first time and the WPEB **REQUESTED** the Secretariat to work closely with India to review previous catches.

28. The WPEB **NOTED** the evolution of reporting discards for all the concerning groups according to different resolutions, acknowledging that this dataset is still under review and harmonization process.

29. The WPEB **NOTED** that the cross-referencing of the georeferenced catches against the size data collected highlights substantial gaps on the spatial information of some shark species.

30. The WPEB **NOTED** that the blue shark accounts for approximately 82% of all length measurements, followed by silky shark, shortfin mako, mako sharks, and porbeagle.

31. The WPEB **NOTED** that longline fisheries accounts for most size measurements across four of the five species with sufficient coverage and silky shark is the only species with a more mixed gear composition including samples collected from longline, gillnet, line and purse seine.

32. The WPEB **NOTED** that fork length (FL) is the recommended length measurement for sharks, other size measurements (e.g. total length) are also reported for some species. The WPEB **NOTED** that length–length conversion relationships are not available for all shark species and that further work is needed to identify gaps and develop or compile appropriate conversion equations.

33. The WPEB **NOTED** that the reporting of catches of rays has been inconsistent and largely at an aggregate level, averaging 2,000 tonnes in recent years. The WPEB **NOTED** unusually high catches of over 6,000 tonnes recorded last year, mostly due the contribution of Malaysia and Madagascar (reporting ray catches for the first time in 2024). The WPEB **NOTED** that the Secretariat is working with these CPCs to improve their data reporting systems and these data are currently under review.

34. The WPEB **NOTED** that the availability of rays georeferenced catches and length data are very limited and without spatial overlap between the two datasets.

35. The WPEB **NOTED** that pelagic stingray dominates the discards reported by the from 1DI or observer data, with limited information for other rays and mobula species.

4.2 Data re-estimation for bycatch species

36. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-30: Reconstructing Historical Catch Series for Blue Shark (Prionace glauca) and Shortfin Mako (Isurus oxyrinchus) in the Indian Ocean: Methodological Approaches and Uncertainty Quantification, including the following abstract provided by the authors:

"Reliable catch histories are fundamental to stock assessment, yet historical shark catches in the Indian Ocean are affected by changes in taxonomic resolution, species identification, and reporting practices. We developed revised catch reconstructions for blue shark (Prionace glauca, BSH) and shortfin mako (Isurus oxyrinchus, SMA) using IOTC nominal catch data from 1950–2025, supported by geo-referenced catch-and-effort data where available. Rather than treating all missing species-specific catch as a single problem, the reconstruction distinguished among reporting states, including species-specific reporting, reporting to generic taxonomic categories, and complete non-reporting of sharks. Generic shark catches were allocated using a hierarchical species-composition reconstruction (HSCR), while complete non-reporting was addressed using donor-based shark-to-target-catch relationships matched hierarchically across fleets, fisheries, and periods. For SMA, catches reported as mako sharks nei were treated separately and allocated between shortfin and longfin mako using observed mako species composition. Statistical species-composition models using generalized additive models (GAMs) were evaluated as alternative approaches, including leave-one-fleet-out cross-validation and comparisons with catch-area data.

The analyses demonstrated that reconstruction methods should differ between BSH and SMA because the species have different reporting histories and empirical support. For SMA, the empirical hierarchical approach was preferred for both generic shark and mako allocations. The SKH-to-SMA GAM explained substantial in-sample variation but showed modest transferability among fleets and produced substantially greater reconstructed catches than HSCR, particularly through historical backcasting in gillnet fisheries and positive predictions in fisheries and periods with little or no observed SMA composition. The MAK-to-SMA GAM similarly showed poor out-of-fleet predictive performance, whereas observed mako catches were generally strongly dominated by SMA, supporting direct hierarchical allocation based on identified mako composition. GAM results were therefore retained as sensitivity analyses or diagnostics rather than primary SMA reconstructions. The BSH GAM showed stronger overall predictive association than the corresponding SMA model, but predictive support was heterogeneous among fisheries; it was therefore retained as a statistical sensitivity rather than as the preferred reconstruction. The resulting framework explicitly separates taxonomic allocation from complete non-reporting and preserves unsupported catch as unresolved rather than forcing reconstruction. This approach provides a transparent basis for evaluating uncertainty in historical shark catches and for producing species-specific catch histories suitable for subsequent stock assessment."

37. The WPEB **NOTED** that it is important to manage and maintain any changes to the model structure and data inputs of the stock assessments to ensure consistency and continuity between assessments. While maintaining a complete set of assessment inputs (e.g., base line and sensitivities of catch data) would place some additional burden on the modeller (or the Secretariat), this was not expected to be substantial, and how this approach should be implemented efficiently remained open for discussion.

38. The WPEB **NOTED** that the catch reconstructions are still at an early stage and could result in substantial variation in catch estimates, although the extent to which such changes would affect the assessment remains uncertain. The WPEB **AGREED** that it would be beneficial to maintain records of estimated catches and the procedures used to derive them, to ensure transparency and reproducibility, and to facilitate continuity in future assessments.

39. The WPEB **NOTED** that the GAM-based estimates of blue shark catches showed substantial discrepancies compared with historical catch levels, which could have a significant impact on assessment results, particularly on the interpretation of the current status of the stock. The WPEB therefore **SUGGESTED** that the GAM-based estimates be retained as a sensitivity scenario and that an additional model run be conducted to evaluate the extent to which the assessment results are influenced by assumptions about the historical catch period.

40. The WPEB **HIGHLIGHTED** the importance of keeping the code accessible and the methods well documented to ensure the catch estimates are reproducible. The WPEB **NOTED** that, during the previous assessment, the previous estimates for shortfin mako shark could not be reproduced due to a lack of documentation, highlighting the need for a repository of codes and procedures used for shark assessments. The WPEB **NOTED** that the relevant code is available through GitHub repository, which will eventually also be hosted by the Secretariat and used to generate updated estimates with the following year's data.

41. The WPEB **NOTED** that the Secretariat's data team have been working to better manage the scripts used to produce data and to keep a record of which datasets were used for each assessment.

42. The WPEB **NOTED** that from the data reported by CPCs, the Secretariat works to develop the best scientific estimates for the key stocks which form the basis of the data used for stock assessments. However, for sharks this is more complicated and currently a scientific estimate is not used as the basis for assessments which highlights the need for such catch reconstructions. The WPEB further

NOTED that such reconstructions could eventually be integrated into the current procedures conducted by the Secretariat's data team once the underlying methodology is fully evaluated and endorsed.

5. Review of national bycatch issues in IOTC managed fisheries and National Plans of Action

5.1 Updated status of development and implementation of National Plans of Action for seabirds and sharks, and the implementation of the FAO guidelines to reduce marine turtle mortality in fishing operations (CPCs and IOTC Secretariat).

43. The WPEB **NOTED** paper IOTC–2026–WPEB22(AS)–08 which provided the status of development and implementation of National Plans of Action for seabirds and sharks, and implementation of the FAO guidelines to reduce marine turtle mortality in fishing operations.

44. The WPEB **NOTED** that the Secretariat continues to collect information on NPOAs from CPCs and provides links in the NPOA portal on the IOTC website (http://iotc.org/science/status-of-national-plans-of-action-and-fao-guidelines) to the actual plan documents.

45. The WPEB **NOTED** that with the adoption of Resolution 25/08, it is now mandatory for CPCs to submit NPOAs for sharks and that the Secretariat had received several new NPOAs for sharks from CPCs who had not previously submitted these. The WPEB **NOTED** that these had not all just been developed, some had been developed in previous years just not yet shared with the Secretariat.

46. The WPEB **NOTED** small revisions to the previous update on NPOA including the revision of outdated plans and updates to the progress of developing new plans of action for CPCs that do not yet have NPOAs in place.

47. The WPEB **NOTED** newly received NPOAs for sharks from Bangladesh, India, Kenya, Madagascar, Malaysia and Mozambique.

48. The WPEB **NOTED** that Sri Lanka are in the process of reviewing their previous NPOA for sharks and will shortly be reviewed by relevant stakeholders.

49. The WPEB **NOTED** that the Philippines have adopted new regulations to strengthen the conservation and management of sharks. They have also formulated a framework that will help them to prepare an updated NPOA for sharks.

50. The WPEB **NOTED** that South Africa has developed a new NPOA for seabirds and Australia are in the process of reviewing their NPOA for seabirds.

51. The WPEB **NOTED** that Tanzania have developed new NPOAs for sharks and turtles and will shortly finalise a NPOA for seabirds.

52. The WPEB **NOTED** that Seychelles is in the process of reviewing their NPOA for sharks and is developing NPOAs for turtles and seabirds.

5.2 Updated status of national fisheries and bycatch (CPCs)

53. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-13 on Shark Species Composition and Size Distribution in Indonesian Longline Fisheries Operating in the Indian Ocean, including the following abstract provided by the authors:

"Shark bycatch in tuna longline fisheries in the Indian Ocean is a major concern in sustainable fisheries governance. This study aims to identify species composition, analyze co-occurrence associations, and evaluate the length-frequency structure of dominant shark species caught by the Indonesian tuna longline fleet in the Indian Ocean. Data were collected through an onboard commercial vessel observer program from 2005 to 2021. Out of a total of 66,850 caught individuals, the shark group

contributed 7.13% (4,763 individuals across 18 taxa). Shark composition was heavily dominated by the blue shark (Prionace glauca; 55.13%) and crocodile shark (Pseudocarcharias kamoharai; 29.12%), followed by the silky shark (Carcharhinus falciformis; 2.52%), shortfin mako (Isurus oxyrinchus; 2.29%), oceanic whitetip shark (Carcharhinus longimanus; 2.02%), and spinner shark (Carcharhinus brevipinna; 1.64%). Co-occurrence analysis and Spearman rank correlation revealed high epipelagic-mesopelagic habitat overlap between pelagic sharks and albacore (Thunnus alalunga), swordfish (Xiphias gladius), and wahoo (Acanthocybium solandri), whereas a negative correlation between southern bluefin tuna (Thunnus maccoyii) and silky sharks reflected thermal water segregation. The mean total length recorded was 156.9 cm (BSH), 80.0 cm (PSK), 122.6 cm (FAL), 115.8 cm (SMA), 140.1 cm (OCS), and 133.6 cm (CCB). Most size distributions exhibited non-normal patterns (bimodal/multimodal) due to gear selectivity and spatial/depth habitat segregation. Pelagic sharks in the Indian Ocean exhibit consistent size segregation: juveniles utilize coastal waters as nursery grounds for food and protection, while adults inhabit offshore waters, except for the shortfin mako which displays an inverted pattern.These findings are expected to support effective shark bycatch management and elasmobranch conservation in the IOTC area."

54. The WPEB **NOTED** that this study was based on scientific observer data collected during 2005–2021 and examined shark species composition and observed relative occurrence, length-frequency distributions, spatial variation and size segregation of dominant shark species. The WPEB **NOTED** that a total of 4,763 sharks representing 18 taxa were recorded, with blue shark (*Prionace glauca*) and crocodile shark (*Pseudocarcharias kamoharai*) comprising the majority of shark observations. The analysis indicated spatial differences among size classes and identified areas potentially important for different life stages.

55. The WPEB **NOTED** that the author had analysed the length data for sharks caught by Indonesian vessels reported by observers along with the location where these sharks had been caught enabling an assessment of the size distribution of commonly caught species in different regions. The WPEB **NOTED** the importance of such analyses to inform spatial planning.

56. The WPEB **NOTED** that differences in spatial and temporal observer coverage along with potential interannual differences in fishing gear configurations could influence the observed distribution patterns and further **SUGGESTED** that these factors should be considered when interpreting spatial segregation.

57. The WPEB **SUGGESTED** classifying individuals into biologically meaningful life-history categories, such as neonates, young-of-the-year, sub-adults and adults. The WPEB **URGED** caution in the use of the term "nursery area", as the criteria required to identify shark nursery areas could not be adequately evaluated using the available observer data alone.

58. The WPEB **NOTED** the reported presence and high encounter rates of unexpected species including crocodile and spinner shark. The WPEB further **NOTED** that specialists working with observers in the Indonesian longline fishery had confirmed the presence of many of these species.

59. The WPEB **NOTED** species identifications recorded in the observer dataset, including the reported occurrence of *Carcharhinus brevipinna*, and **SUGGESTED** that certain identifications should be verified using photographs, specimens or genetic samples where available. The WPEB further **NOTED** the relatively high occurrence of crocodile shark, and the need to consider possible ecological and fishery-related explanations for this observation.

60. The WPEB **NOTED** that there were several gaps in the observer data received by the Secretariat from Indonesia. The WPEB **NOTED** the Secretariat's plans to work with Indonesia to address these gaps and improve data provision in the future.

61. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-16 on Update on bycatch management and ecosystem-based fisheries management in Madagascar fisheries (case of shark and ray in small-scale fisheries sector), including the following abstract provided by the authors:

    "Madagascar's large maritime region in the Indian Ocean is not only an important ecological resource but also the basis of livelihoods for people living along the coast. To conserve its marine species while at the same time maintaining productive fisheries, Madagascar needs better information, effective governance and genuine participation by the people who rely on the sea."

62. The WPEB **NOTED** that the study used market-based monitoring undertaken in collaboration with the Wildlife Conservation Society (WCS) as an approach to address information gaps in small-scale fisheries. Monitoring was conducted across three markets and included information from sellers and photographic records of shark and ray products.

63. The WPEB **WELCOMED** the information from Madagascar and **NOTED** the importance of developing approaches to improve information from small-scale and coastal fisheries that are not adequately represented through conventional observer programmes.

64. The WPEB **NOTED** that there were substantial challenges in species identification because products were frequently marketed after being processed. The WPEB therefore **HIGLIGHTED** the need to strengthen species-identification capacity through training and identification guides, support DNA barcoding, expand monitoring to source areas and over longer periods, and engage fishers and market participants. The importance of aligning these activities with Madagascar's national shark and ray management initiatives including its NPOA was also highlighted.

65. The WPEB **NOTED** that the current results represented only a relatively small part of Madagascar's coastline and that species composition and priorities may change as monitoring is extended to other coastal areas.

66. The WPEB **NOTED** that market-based surveys and other alternative sampling approaches could provide useful information or indicators for these fisheries.

67. The WPEB further **NOTED** that work was ongoing with WCS to evaluate implementation of activities under the NPOA and identify activities that had and had not yet been implemented.

68. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-17 on Bycatch Presence Recorded in Purse Seine Fishing Logbooks from the Andaman Sea of Thailand, including the following abstract provided by the authors:

    "This study presents a preliminary analysis of bycatch presence recorded in purse seine fishing logbooks operated in the Andaman Sea of Thailand. The total logbook data of 20,274 trips were examined, which four trips found recorded bycatch presence entry for sharks and dolphins but no sea turtle or whale recorded. All bycatches were visually observed at sea without taken or retaining onboard. These observations appeared in the national EEZ within the fleet's normal range of distance to coast. The bycatch observed presence found to be in shallower water (13–29 m depth) and the distant to coast ranged 16.1-30.7 km. Bycatch-presented trips tended toward lower catch compares to no-bycatch trips, while fishing duration showed no associated difference. Given the limited bycatch records, this result should be interpreted as preliminary and descriptive with consideration for strengthening future logbook-based bycatch monitoring."

69. The WPEB **NOTED** the very low levels of recorded bycatch during the study, with interactions with the species concerned reported in only 0.02% of fishing trips and no retention of these species. The WPEB **NOTED** that recorded encounters were concentrated in shallow waters.

70. The WPEB **NOTED** the challenges associated with strengthening the information collected through logbooks, particularly given the practical difficulties of changing existing logbook requirements. The

WPEB **NOTED** that haul-by-haul data were not available but that fishing trip locations are recorded through latitude and longitude in the logbooks and were matched with NOAA spatial maps to provide additional spatial information.

71. The WPEB **NOTED** that there are currently no onboard observers on domestic commercial vessels, while observers are deployed on the overseas fishing vessels. The WPEB **NOTED** that electronic monitoring is a means of cross-checking catch data and obtaining additional information on bycatch and that EM has already been installed on some overseas fishing vessels, but that the costs are high for individual vessels. The WPEB **NOTED** that implementing EM on domestic vessels would present additional challenges, as these are generally smaller vessels (approximately 16–21 m LOA) and the associated costs and requirements could place a significant burden on fishers.

6. Review information on biology, ecology, fisheries and environmental data relating to sharks

6.1 Presentation of new information available on sharks

72. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-14 on Estimation of shortfin mako shark discards from the South African Longline Fleet in the IOTC using the Bycatch Estimator tool, including the following abstract provided by the authors:

"A preliminary assessment of shortfin mako (Isurus oxyrinchus) discards by the South African pelagic longline fleet during 2012–2025 was produced using the Bycatch Estimator Tool (BYET). Observer and logbook data were combined, and the response variable expanded to include observed dead discards plus an expected fraction of live releases (post-release mortality, PRM = 0.294). Candidate model families (Delta–Lognormal, Delta–Gamma, and Tweedie) were compared, each fitted with random intercepts for vessel and latlong to account for between-vessel variation and unresolved spatial structure. Model selection using BIC and DHARMa diagnostics identified a Delta–Lognormal specification retaining Year as the only fixed effect; month and fishing tactic were not retained by BIC in any of the three catch-model families (weight ≈ 0 for all candidate models including these terms). Estimated annual dead discards increased over the study period, from 116 individuals in 2012 to 26 in 2025, although annual estimates were moderately uncertain. Year-specific mean weights, derived from observer length-frequency data and a length–weight relationship, ranged from approximately 38.7 kg (2012) to 50.6 kg (2025). Applying these weights yielded an estimated dead-discard biomass of 11.9t (95% CI: 7.7–30.9t) in 2025."

73. The WPEB **NOTED** that this study represents the first application of the Bycatch Estimator Tool (BYET) to an IOTC fishery and that the estimates are based on a combination of observer and logbook data. The WPEB **DISCUSSED** the representativeness of observer data and the potential influence of changes in observer overall and spatial coverage on the resulting bycatch estimates. The WPEB **NOTED** that covariates used to scale observer observations to the whole fishery need to be consistently available in both observer and logbook datasets.

74. The WPEB **DISCUSSED** the spatial distribution of fishing activity and **SUGGESTED** that spatial variables such as latitude and longitude could potentially be considered as random effects, depending on the characteristics and spatial homogeneity of the fishery. The WPEB **NOTED** that the relevance of this kind of approach should be assessed on a case-by-case basis, depending on the distribution of fishing effort and fishing grounds.

75. The WPEB **NOTED** that observer data contain information on the condition of shortfin mako sharks at release, with several release-condition categories. The WPEB **RECOGNISED** that these data could be useful for the analysis of post-release mortality and further investigate the conservation implications of shortfin mako shark interactions.

76. The WPEB **RECALLED** that retention of shortfin mako sharks is prohibited unless an observer certifies that the individual was already dead when brought on board. The WPEB **NOTED** that the data used in for the Bycatch Estimator included only observer discards and releases scaled up against the effort from logbook data. The WPEB further **NOTED** that handling guidelines recommend cutting the line whenever possible to allow the shark to swim away directly in the water. The WPEB **ENCOURAGED** the authors to investigate, using observer data, whether these recommended release practices are effectively implemented.

77. The WPEB **NOTED** that the BYET is designed to be applied separately for each species, and will produce species-specific estimates. The WPEB further **NOTED** that for species with insufficient observations such as turtles, aggregation of species or taxonomic groups may be necessary to obtain reliable estimates.

78. The WPEB **DISCUSSED** the potential use of the BYET for other IOTC fisheries and **NOTED** that its application should take into account the spatial and operational characteristics of each fishery, as the reliability of the resulting estimates may depend on the homogeneity of the fishing distribution and the availability of suitable covariates.

79. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-18 on Exploratory assessment of growth, maturity and Length-Based Spawning Potential Ratio (LB-SPR) of priority shark species from Kenya's industrial longline fishery, including the following abstract provided by the authors:

    "Sustainable management of pelagic sharks in the Western Indian Ocean requires robust data on demographic structure and stock status. This study provides an integrated assessment of four key species namely Blue shark (Prionace glauca), Oceanic whitetip shark (Carcharhinus longimanus), Shortfin mako shark (Isurus oxyrinchus), and Silky shark (Carcharhinus falciformis) utilizing catch data to evaluate population resilience.

    We developed sex-specific maturity ogives to determine length-at-50% maturity (L_{50}), revealing distinct sexual dimorphism across all focal species. Subsequent Length-Based Spawning Potential Ratio (LB-SPR) modeling was applied to length-frequency distributions to estimate current stock status relative to unfished levels.

    Results indicate varying levels of exploitation, with notably low SPR values observed for the Silky shark (SPR = 0.09) and Oceanic whitetip shark (SPR = 0.07), suggesting significant recruitment overfishing and a critical need for enhanced conservation measures. Conversely, the Blue shark exhibited a relatively higher SPR (0.41), while the Shortfin mako shark showed moderate status (SPR = 0.34).

    These findings highlight the utility of length-based metrics in data-limited contexts to inform IOTC management strategies, emphasizing that species-specific and sex-disaggregated approaches are essential for mitigating further declines in pelagic shark populations within the region."

80. The WPEB **NOTED** that the analyses presented provide useful information on the growth, maturity and length-based spawning potential of the WPEB's priority shark species for this year (silky shark, oceanic whitetip shark, shortfin mako and blue shark) from the Kenyan industrial longline fishery. The WPEB **RECOGNISED** the utility of length-based indicators for data-limited shark species, but **EXPRESSED** caution regarding the interpretation of the resulting stock status indicators given the limited spatial coverage of the data.

81. The WPEB **NOTED** the low estimated spawning potential ratios for silky shark and oceanic whitetip shark and the potential implications for their population status. The WPEB **NOTED** that the conclusion of strong depletion should be interpreted with caution, as the data used in the analysis are obtained from a relatively small fishing area and may not be representative of the wider Indian Ocean populations.

82. The WPEB **NOTED** that the selectivity of the Kenyan industrial longline fishery may strongly influence the length distributions used in the LB-SPR analyses. The WPEB **NOTED** that silky shark and shortfin mako shark catches in this fishery mainly are juveniles, while adults may not be available to the fishery. The WPEB therefore **NOTED** that the resulting estimates of depletion could be strongly affected by fishery selectivity and **ENCOURAGED** the authors to investigate approaches that explicitly account for selectivity when interpreting LB-SPR results.

83. The WPEB **NOTED** that the analysis was based on data collected by Kenyan observers onboard industrial longline vessels between 2016 and 2025 and **ENCOURAGED** Kenya to provide these data to the Secretariat. The WPEB **STRESSED** the importance of improving data coverage and production from additional sources in order to provide a broader representation of shark populations and support more robust stock status assessments.

84. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-26 on Conservation status and Life History of Whale Shark (*Rhincodon typus*) in the Indian Ocean, including the following abstract provided by the authors:

    "IOTC Resolution 25/08 provisionally established a retention ban for whale shark (Rhincodon typus) in the Indian Ocean, subject to a recommendation from the IOTC Scientific Committee that whale shark is considered a species "of the greatest biological vulnerability and conservation concern for which there are very few data" and that the IOTC Scientific Committee "explicitly and unambiguously recommends… a retention ban for whale sharks".

    Here, we summarise aspects of the life history and conservation status of whale shark, and protections established under various national and international instruments.

    Whale shark is a large-bodied species characterised by slow growth and late maturation, although there are no robust estimates of the intrinsic rate of population growth. The IUCN has assessed whale shark as being Endangered since 2016. Whale shark populations have a generation length of approximately 40 years.

    A number of legal protections have been established for whale shark, both at a national level by many IOTC CPCs and through several international instruments. Despite this, whale shark remains threatened by several sources of anthropogenic mortality in the Indian Ocean, including fisheries bycatch and vessel strikes, as well as being vulnerable to climate change impacts on food availability. Whale shark is a data-limited species, with abundance data, biological data and catch data all considered incomplete.

    Given that whale shark can be considered "a taxon of the greatest biological vulnerability and conservation concern for which there are very few data", we recommend that the IOTC Scientific Committee provides explicit advice to the Commission that precautionary measures for whale shark are wholly appropriate, including a retention ban. This would enable paragraph 3(c) of IOTC Resolution 25/08 to enter into force."

85. The WPEB **RECALLED** that, at WPEB21, the Working Party **AGREED** that whale sharks meet the definition of a "*taxon of the greatest biological vulnerability and conservation concern for which there are very few data*". The WPEB reiterates its agreement that whale shark meets this definition. The WPEB further **NOTED** that no information has been presented since that would alter this conclusion and to the best available information the animals in the Indian Ocean are generally considered to belong to the Indo-Pacific population, although further research on the population dynamics of the species should be encouraged.

86. The WPEB **NOTED** that the whale shark is a data-limited species for which robust estimates of abundance, biological parameters and population growth rate are not unavailable. The WPEB

NOTED that the current best understanding supports the existence of two populations, an Atlantic population and an Indo-Pacific population.

87. The WPEB further **NOTED** that an information paper providing Close-Kin Mark-Recapture estimates of whale shark abundance in the Indian Ocean had been made available to the meeting (IOTC-2026-WPEB22(AS)-INF03). The WPEB **NOTED** that this paper presented preliminary results of the CKMR study which estimated a declining population trend for the species with a 43.37% decline from 2000-2019.

88. The WPEB **NOTED** the evidence supporting a decline in whale shark abundance and mean body size. The WPEB **NOTED** the need for further information to improve the understanding of the status of the Indian Ocean population, particularly additional information on interactions between whale sharks and fishing activities, that would be useful to inform the assessment of the impact of fisheries. The WPEB **ENCOURAGED** CPCs and scientists holding relevant information on interaction rates with IOTC fishing activities to make such information available.

89. The WPEB **NOTED** that the discussion on the status of the whale shark remains broadly similar to the discussion on the same subject of the previous year. The WPEB **DISCUSSED** the practical implications of the provisions of IOTC Resolution 25/08 regarding whale shark conservation, including the retention ban. The WPEB **NOTED** that the adoption of the retention ban is linked to an explicit recommendation from the Scientific Committee. The WPEB **RECOMMENDED** presenting this to the Scientific Committee, **AGREEING** that it should explicitly state that a retention ban for whale shark is recommended.

90. The WPEB **NOTED** that available information indicates that whale shark interactions occur in IOTC fisheries, The WPEB **AGREED** that there remains considerable uncertainty as to the magnitude of interactions between IOTC fisheries and whale shark, and that whale sharks are also exposed to other sources of anthropogenic mortality. The WPEB further **RECALLED** IOTC Resolution 12/01 on the Precautionary Principle, and **NOTED** that, in spite of this uncertainty, a full retention ban could still have significant conservation value, given the declining trend in the status of the Indo-Pacific whale shark population, and the high post-release survival rates. The WPEB therefore also **RECOMMENDED** that a retention ban for whale sharks is the most appropriate conservation measure for the species (paragraph 3 of 25/08).

91. The WPEB **NOTED** that genetic sampling of live whale sharks for close-kin mark-recapture studies does not require the animals to be brought on board (biopsy taken via a lance or spear) and that samples can be collected directly from live individuals and shared a protocol for genetic sampling.

92. The WPEB **NOTED** that Resolution 25/08 currently only permits sampling from animals that are dead at haulback. The WPEB therefore **RECOMMENDED** that the SC advise the Commission to amend the Resolution to clarify that the collection of biological samples from live sharks may also be undertaken for scientific purposes, without constituting a retention of the animal, provided that sampling is undertaken without the animal being removed from the water and in accordance with scientific protocols approved or endorsed by the IOTC Scientific Committee. The WPEB **STRESSED** that the proposed amendment is intended to allow for ongoing research in support of population status monitoring and ensuring that the WPEB can update its advice to the IOTC Scientific Committee, with respect to shark species conservation status in future, as it considers appropriate.

93. The WPEB **NOTED** the request to provide additional information on the sex ratio and size distribution of whale sharks and **AGREED** that such information would be useful for future discussions.

94. The WPEB further **NOTED** that the whale shark (*Rhincodon typus*) is listed in Appendix I of CMS, thereby triggering the corresponding obligations of Parties under this Convention, including the strict

protection measures required under CMS, except in the limited circumstances provided for under the Convention.

95. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-36 on Addressing Gaps in Hammerhead Shark (*Sphyrna* spp.) Conservation and Management in the Indian Ocean, including the following abstract provided by the authors:

"Hammerhead sharks in the Indian Ocean reveal a widening gap between their threatened status, limited biological and fisheries data, and inadequate regional management action. Confirmed Indian Ocean species include the scalloped hammerhead (Sphyrna lewini), great hammerhead (S. mokarran), smooth hammerhead (S. zygaena) and winghead shark (Eusphyra blochii). All are threatened or of conservation concern, with S. lewini and S. mokarran of particular concern because they are Critically Endangered and exposed to both coastal and offshore fisheries. However, information on biology, distribution, stock structure, catch composition and fishery mortality remains incomplete. Available evidence shows that hammerheads are caught by industrial, semi-industrial and artisanal fleets using longlines, purse seines, gillnets, trawls and coastal gears, while reported catches remain sparse, inconsistent and often aggregated as Sphyrnidae, Sphyrna spp., "hammerheads not elsewhere included" or "sharks not elsewhere included".

Species identification remains a major constraint on both science and compliance. Juvenile hammerheads are difficult to distinguish because diagnostic head shape, fin shape and body proportions are less pronounced than in adults, and small individuals are often landed together with other juvenile sharks. Identification and reporting are further weakened because local landing-site names often refer to broad shark groups rather than scientific species. These issues undermine catch statistics, CITES non-detriment findings and stock assessments. At the same time, international governance is moving toward stronger protection: CITES Appendix II requires species-level non-detriment findings for all Sphyrnidae, CMS Appendix I listings require Range State Parties to prohibit the taking of Sphyrna lewini and S. mokarran, and ICCAT has prohibited hammerhead retention since 2011, as have several IOTC member states.

IOTC Resolution 25/08 strengthens shark conservation within IOTC but does not introduce hammerhead-specific measures such as a retention ban, mortality limit, rebuilding plan, or mandatory best-handling and release requirements. It does, however, require the Scientific Committee to review the status of other shark species that may need conservation measures, explicitly including hammerhead sharks.

This paper therefore summarises gaps in existing management and conservation measures at both IOTC and coastal-country levels, using Kenya to illustrate why coordinated action is needed at both scales. Research on Kenyan artisanal fisheries shows that landings include threatened species, including Critically Endangered scalloped hammerheads; that most landed sharks are neonates or immature individuals; and that gillnets are a primary gear type. The paper presents complementary regional and national recommendations, including an IOTC-level non-retention measure for S. lewini and S. mokarran, with all other hammerheads treated as look-alike species to support monitoring and compliance. The authors conclude that hammerhead sharks qualify as being taxa of the greatest biological vulnerability and conservation concern for which there are very few data available justifying precautionary management measures as recommended by this paper"

96. The WPEB **NOTED** that despite national legal protection, catches continue in Kenya and some products are exported as dried fish, making trade volumes difficult to estimate. The WPEB further **NOTED** the need to combine fishing restrictions with protection of pupping and reproductive habitats. The WPEB **NOTED** the need for a coordinated effort by coastal States and IOTC to identify and protect pupping, reproductive and migratory areas.

97. The WPEB **NOTED** that India has protected three hammerhead shark species under national legislation since 2023, that Spain has prohibited the retention of hammerhead and thresher sharks by Spanish-flagged vessels since 2010, as well as implemented best practices in handling and release, and that Pakistan has prohibited the retention of all hammerhead sharks as well as all *Carcharhinidae*, *Lamnidae*, *Alopiidae* and *Rhincodontidae* since 2025. However, the WPEB **NOTED** that IOTC does not have a retention ban for these species.

98. The WPEB **NOTED** that proposed amendments to Resolution 15/01 had previously been recommended by the Scientific Committee but were not considered by the Commission in 2026 because no CPC submitted a proposal. The WPEB further **NOTED** that hammerhead sharks have so far not been specifically considered during the review of Resolution 25/08, although the Resolution requests the Scientific Committee to review the status of other shark species that may require conservation measures with hammerhead sharks, silky sharks and shortfin mako sharks mentioned as species in need of specific attention throughout Resolution 25/08. The WPEB **RECALLED** that earlier Scientific Committee advice on species-specific reporting and safe-handling and release guidance had not resulted in corresponding Commission measures.

99. The WPEB **RECOGNISED** that non-retention measures for any species should not be considered a stand-alone measure and **NOTED** the importance of applying the bycatch mitigation hierarchy by first avoiding or at least minimising interactions wherever possible, then remediate mortality by reducing at-vessel mortality and maximizing post-release survival through gear-appropriate handling and release practices. The WPEB further **NOTED** that non-retention measures may remove economic incentives, raise awareness and provide a clear conservation signal, but should be accompanied by effective implementation of mitigation and handling measures across fisheries.

100. The WPEB **NOTED** that hammerheads may be identifiable reliably at the family level while still in the water, while species-level identification can remain difficult even when retained, particularly for juveniles and for specimens landed without diagnostic body parts. The WPEB further **NOTED** that identification guides for fins and trunks, as well as relevant training materials, are available through CITES-related initiatives. The WPEB **AGREED** that improved species-identification training and reporting are necessary to estimate total fishery mortality by species and to support future assessments.

101. The WPEB **NOTED** that some hammerhead populations in the Indian Ocean may already be functionally depleted and have limited prospects for recovery without additional measures. The WPEB **NOTED** the need to map and protect reproductive habitats and migratory pathways and further **NOTED** that demand for both fins and dried or salted meat is an important driver of catches and should be considered when designing conservation measures. The WPEB also **RECALLED** that relevant obligations under CMS require national implementation by Parties, while effective bycatch mitigation remains necessary to reduce fishing mortality.

102. The WPEB **DISCUSSED** the need for clearly defined recovery objectives. Some participants called for an explicit and measurable endpoint, **NOTING** that the preliminary recovery plan identifies recovery to a non-threatened IUCN category as its long-term goal and proposes, as an interim 10-year objective, halting the decline and demonstrating an increasing population trend. The WPEB **NOTED** that quantitative biomass or abundance reference points cannot yet be established because of insufficient data for these species. The WPEB **NOTED** that the absence of a full stock assessment should not preclude precautionary action where available evidence indicates population decline and proposed mitigation measures are scientifically justified, consistent with Resolution 12/01 on the precautionary approach and Recommendation 12/15 on the best available science. The WPEB further **NOTED** that measurable reference points and recovery targets should be developed as data become available.

103. The WPEB **RECALLED** that related advice had previously been endorsed by the Scientific Committee but had not progressed at Commission level and **NOTED** calls for the matter to receive renewed and strengthened consideration. The WPEB **ENCOURAGED** the development of a comprehensive, coordinated and time-bound recovery approach combining avoidance, bycatch mitigation, safe handling and release, improved monitoring and reporting, protection of important habitats, and appropriate national and regional management measures.

104. The WPEB **RECOGNISED** that IOTC fisheries represent only part of the fishing mortality affecting hammerheads, particularly in coastal areas, and that IOTC measures alone would therefore be insufficient to recover the populations. Effective conservation would require complementary action by coastal CPCs, as required under relevant international agreements and the Commission. The WPEB **NOTED** that progress at Commission level would require one or more CPCs to champion and submit a proposal supported by a clear scientific and management rationale, and **ENCOURAGED** coordinated action among coastal CPCs and other interested parties.

105. The WPEB **NOTED** that the confirmed Indian Ocean hammerhead species include scalloped hammerhead (*Sphyrna lewini*), great hammerhead (*S. mokarran*), smooth hammerhead (*S. zygaena*) and winghead shark (*Eusphyra blochii*). Scalloped hammerhead, great hammerhead and winghead shark are assessed by the IUCN as Critically Endangered and smooth hammerhead is assessed as Vulnerable. The WPEB further **NOTED** that all hammerhead shark species are caught by a range of industrial, semi-industrial and artisanal fisheries, including longline, purse seine, gillnet, trawl and other coastal fisheries.

106. The WPEB **NOTED** that scalloped hammerhead (*Sphyrna lewini*) and great hammerhead (*S. mokarran*) are listed in Appendix I of the Convention on the Conservation of Migratory Species of Wild Animals (CMS), effective 27 June 2026, and that CMS Parties that are Range States of these species shall, in accordance with Article III (5) of the Convention prohibit the taking of animals belonging to such species. Furthermore, in accordance with CMS Resolution 12.22 (Rev. COP15) CMS Parties are urged to implement applicable measures for Appendix I-listed species to actively prevent, mitigate, and where possible, eliminate bycatch; and to ensure that any specimens of Appendix I-listed species that are caught are recorded, reported, handled safely and humanely, and released immediately if alive, and that no specimens are retained on board, transshipped, landed, or used as bait, unless in accordance with the Convention and consistent with national legislation. The WPEB further **NOTED** that CMS Parties that are Range States to CMS are therefore expected to implement appropriate national measures to give effect to their obligations under CMS, including a prohibition of taking of animals belonging to such species measures addressing the taking which applies also to and conservation of these species in fisheries.

107. The WPEB **NOTED** the threatened conservation status of hammerhead sharks (*Sphyrnidae*) and the limited availability of species-specific biological and fisheries information for hammerhead sharks in the IOTC Area of Competence. The WPEB therefore **RECOMMENDED** that the SC advise the Commission to consider implementing management measures for these species.

108. The WPEB **NOTED** the importance of adopting and implementing the handling guidelines for live release and prioritizing release of the animal in the water to improve the survival of hammerhead sharks when incidentally caught in association with fisheries and released. Since Post Release Mortality is currently still high, the WPEB also **NOTED** that consideration of effective measures that address the biological vulnerability of the species and the characteristics of the fisheries is necessary, to reduce high at-vessel and post-release mortality. The WPEB therefore **ENCOURAGED** the consideration of this target as part of the management or recovery plan and also improving the monitoring system of populations by strengthening of data submission by all CPCs.

109. The WPEB **NOTED** the particular challenges of monitoring and the implementation of conservation measures in small-scale and artisanal fisheries operating from numerous dispersed landing sites. Sri Lanka emphasized the importance of involving fishing communities in monitoring and mortality mitigation when undertaking fishery-independent surveys around nursery habitats, and testing gear modifications. The WPEB **RECOGNISED** that effective communication and the participation of fishing communities would be essential to the implementation of any recovery measures.

110. The WPEB **DISCUSSED** the continuing limitations in the availability of data on catch, discards and species-composition data. The WPEB **NOTED** concern from some that non-retention measures may further reduce the availability of landing data and stressed the need to monitor population recovery. Others observed that reporting deficiencies already occur irrespective of retention status and should not be used as an argument to delay conservation action where declining populations and scientifically justified mitigation measures have been identified. The WPEB **REITERATED** the need for CPCs to comply fully with existing data-reporting requirements, including the reporting of discards and associated mortality, and **NOTED** the value of fishery-independent information for the monitoring of population trends.

111. The WPEB **NOTED** that available catch or interaction information is sparse and inconsistent, with hammerhead catches frequently reported at aggregated taxonomic levels, including *Sphyrna* spp (Hammerhead sharks NEI), Sphyrnidae (Hammerhead sharks, etc. NEI), and "Sharks NEI". The WPEB further **NOTED** that difficulties in species identification, particularly for juvenile hammerheads, and the use of broad local landing-site categories contribute to uncertainty in species-specific catch and mortality estimates. The WPEB **AGREED** that improved species-specific identification and reporting of hammerhead sharks would be important to support monitoring, assessment, and conservation.

112. The WPEB **NOTED** small improvements resulting from revisions to historical hammerhead data and **ENCOURAGED** CPCs to work with the Secretariat to provide additional historical data to further improve the time series.

113. **NOTING** that Resolution 15/01 includes a list of species for which reporting catch data is mandatory or optional, and varies by gear and by fishery type (i.e. artisanal vs commercial fisheries), the WPEB **NOTED** that many species of interest to the WPEB are not mandatory for reporting for all gears or fishery types. This recommendation was made in 2025, and is **RECOMMENDED** again in 2026.

114. The WPEB therefore **RECOMMENDED** that the SC review the list of species that are mandatory for reporting to species level while considering the feasibility of such data collection in artisanal fisheries, and included the following suggested changes:

- Silky sharks to be added also for gillnet fisheries
- Hammerhead sharks to be reported at species level at least for scalloped, smooth and great hammerhead sharks for all gear types (explicitly including purse seine fisheries)
- Mantas and devil rays to be reported at species level differentiating at least between manta rays (giant manta and reef manta) and other devil rays adding them for mandatory reporting at least for purse seine fisheries and for gillnet fisheries instead of optional
- Great white sharks as mandatory for all gear types
- Oceanic whitetip sharks as mandatory for all gear types

115. The WPEB **NOTED** that currently only *S. lewini* is included in the summary table showing the status of sharks. Although there is a general understanding that the sharks in the table were selected

based on the amount of the catch and an extent of data availability for assessments, the WPEB **AGREED** to clarify the criteria for inclusion to the table and listed species with the SC. The WPEB **SUGGESTED** that at least *S. mokarran* and *S. zygaena* should be added to improve the review of species- specific data reporting and measures.

116. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-38 on Environmental status of silky sharks in Eastern Indian Ocean from length-based catch data, including the following abstract provided by the authors:

"BACKGROUND AND OBJECTIVES: *Silky sharks (Carcharhinus falciformis) are among the most exploited pelagic species in the Eastern Indian Ocean, yet their population dynamics remain poorly documented. The study objective was to evaluate the status of silky shark populations landed by artisanal fisheries at Tanjung Luar Port, West Nusa Tenggara, by combining length-based indicators with standardized catch-per-unit-effort modelling to detect early warning signs of overexploitation.*

METHODS: *Data were collected between 2017 and 2023, covering 33,129 individuals captured by bottom longline, surface longline, and gillnet gears. Biological parameters included length-frequency distribution and sex ratio, while operational indicators comprised trip frequency, vessel numbers, and fishing days per trip. Standardization of catch-per-unit-effort was achieved via a dual-component delta framework. The architecture integrated a binomial generalized linear mixed model evaluating encounter probability with a negative-binomial generalized additive model analyzing positive catch rates, while explicitly controlling provincial fishing grounds, effort duration in fishing days, gear typology, vessel-level random effects, and all potential two-way interactive effects.*

FINDINGS: *Catch-Per-Unit-Effort (CPUE) displayed consistent biannual peaks in May and November, reflecting seasonal variation in availability or catchability, but overall abundance declined steadily. Length-frequency* distributions demonstrated *truncated* population *structures* heavily skewed toward *juveniles* fractions*, with* the majority of *individuals* falling *below published length-at-maturity thresholds. A persistent female bias was evident, with females comprising more than half of annual catches and reaching ~71 percent in 2023. Effort dynamics showed declining efficiency; Catch-per-unit-effort decreased as trip frequency increased, while total catch was maintained only through increased fishing trips. Furthermore, the manifestation of fleet growth alongside shortened operational windows exemplifies tactical adaptations capable of temporarily concealing structural biological degradation.*

CONCLUSION: *The convergence of biological and operational signals highlights a fishery increasingly sustained by juvenile recruitment rather than adult spawning biomass, raising concerns about reduced spawning potential. Precautionary measures are urgently required to safeguard spawning potential and ensure long-term sustainability. Recommended policy measures entail the enforcement of seasonal closures during critical aggregation phases, restrictions on juvenile removal, technical gear adjustments to curtail retention, and the application of effort constraints calibrated against vessel- and trip-level operational parameters."*

117. The WPEB **NOTED** that the presented data are from an artisanal fishery targeting sharks as secondary species and that silky sharks make up for the majority of its catches. The WPEB **DISCUSSED** the interpretation of the standardized CPUE series **NOTING** that the apparent decline was strongly influenced by the low estimate for 2023 and considered that the preceding time series appeared relatively stable. The WPEB **NOTED** that additional observations beyond 2023 would be required to determine whether the most recent estimate represented the beginning of a persistent decline or short-term interannual variability.

118. The WPEB **NOTED** that the CPUE trend presented for this fishery differed from trends in other CPUE information submitted to IOTC for silky sharks in which silky sharks are an incidental bycatch

in high seas fishing operations and caught at much lower numbers. However, the WPEB also **NOTED** that the presented size data of a large sample size of more than 33,000 animals between 2017 and 2023 demonstrates that the fishery is increasingly sustained by recruitment as a consistently increasing number of landed animals were well below the published size of sexual maturity.. The WPEB **NOTED** that the study concerned a geographically and operationally specific artisanal fishery and that the results should therefore be interpreted at the local scale. Nevertheless, given the highly migratory nature of silky sharks, the WPEB **RECOGNISED** that local trends and management responses should also be considered within the broader regional context of IOTC.

119. The WPEB **DISCUSSED** how the measures proposed in the paper including effort controls, reductions in juvenile catches and gear modifications could be extended to other fishing areas and incorporated into national regulations. The WPEB **NOTED** that the Tanjung Luar fishery represents an important case study of a locally concentrated artisanal fishery in Indonesia and provides an opportunity to evaluate fishery-specific management measures. These results should be interpreted at the local fishery scale and should not be extrapolated directly to all Indonesian fisheries without consideration of differences in fishing areas, gears, fleet characteristics and fishing practices.

120. The WPEB **COMMENDED** the authors on the comprehensive dataset, which included information from Indonesian vessels less than 24 m operating exclusively within the national EEZ. The WPEB **NOTED** that these vessels may be exempt from some IOTC data-reporting requirements, but that the information collected would nevertheless be valuable for estimating species-specific catches, fishing mortality and population trends.

121. The WPEB **NOTED** that Indonesia had reported some species-specific shark catches from several fisheries in recent years. Given the availability and scientific value of the information presented in the paper, participants **ENCOURAGED** Indonesia to submit these data to the IOTC Secretariat in accordance with the applicable data-reporting standards, including relevant information on catch, effort, size, sex, gear, fishing area and fleet characteristics.

122. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-28 on An update for 2025-2026 on the development of IOTC BTH PRM Project, including the following abstract provided by the authors:

“This note provides recent updates on IOTC bigeye thresher shark (Alopias superciliosus, BTH) post-release mortality study project (IOTC BTH PRM Project). The objective of the study is to evaluate the efficiency of the IOTC Conservation and Management Measure on non-retention of thresher sharks of the genus Alopias (Resolution 12/09). The summary of collective efforts since the 21st IOTC WPEB are presented. “

123. The WPEB **RECALLED** that the Scientific Committee had requested the WPEB to assess the effectiveness of non-retention measures in 2017. The WPEB **NOTED** that the Shark Year Plan in 2014 (ShYP) had ranked PSAT tagging studies as a high priority, and that bigeye thresher shark (BTH) had been identified as a high-priority species due to its presumed high vulnerability to longline fisheries.

124. The WPEB **NOTED** that, since the beginning of the study, 34 bigeye thresher sharks (BTH) and two pelagic thresher sharks (PTH) had been tagged, including nine tags deployed during 2025–2026. The WPEB **NOTED** that the size distribution of tagged individuals ranged from approximately 100 to 300 cm, with the majority measuring between 160 and 200 cm.

125. The WPEB **NOTED** that survival rates were very low during the initial stages of the study but had subsequently increased to 61.3%. The WPEB **NOTED** that all sharks tagged while in the water survived, whereas sharks tagged on deck did not survive, suggesting that handling and tagging on deck may substantially reduce survival. The WPEB therefore **SUGGESTED** that sharks should be tagged and released while remaining in the water wherever possible, rather than being brought onboard.

126. The WPEB **NOTED** that four miniPATs and nine sPATs remain available for deployment as part of the study. The WPEB **NOTED** the recommendation to extend the project until the end of 2028 as, based on current tagging rates, tagging is expected to be completed by the end of 2027.

127. The WPEB **NOTED** that additional funding would be required to cover transmission costs for the final 13 tags and **HIGHLIGHTED** the need to ensure sufficient ARGOS transmission funding through to deployment of the final tag.

128. The WPEB **NOTED** that the data generated by the project could potentially contribute to future risk assessment work, which is one of the objectives of the study. The WPEB **NOTED** that only preliminary results had been presented to date, as the project had not yet been completed, and **HIGHLIGHTED** the need to agree on how the data should be treated and to ensure that the analysis and use of the data follow the provisions of the Letter of Understanding signed at the beginning of the project by all participating institutions.

6.2 Collaboration with international organisations of interest to WPEB

129. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-27 on Migratory sharks and rays in the Indian Ocean: chronology of the work of IOTC, CMS and the sharks MOU, potential synergies and emerging issues , including the following abstract provided by the authors:

"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."

130. The WPEB **NOTED** that Parties to the Convention on the Conservation of Migratory Species of Wild Animals (CMS) have committed to protect CMS-listed species against bycatch and to take precautionary measures where bycatch is poorly known or levels are unquantified.

131. The WPEB **NOTED** that species listed under CMS Appendix I are prohibited from being taken, that CMS Parties are legally bound by this requirement, and that Parties to CMS have further committed to implement applicable measures for Appendix I-listed species to actively prevent, mitigate, and where possible, eliminate bycatch; and to ensure that any specimens of Appendix I-listed species that are caught are recorded, reported, handled safely and humanely, and released immediately if alive, and that no specimens are retained on board, transshipped, landed, or used as bait, unless in accordance with the Convention and consistent with national legislation.

132. The WPEB **HIGHLIGHTED** the great overlap between IOTC Contracting Parties and CMS Parties and the mismatch between the species listed under CMS Appendix I and the species for which IOTC has adopted retention bans. The WPEB **NOTED** that the following species are listed on Appendix I of CMS but are not yet subject to retention bans by IOTC: whale shark, great and scalloped hammerhead sharks, and great white shark.

133. The WPEB **NOTED** that for species listed in Appendix II of CMS, Parties shall endeavour to conclude agreements where these would benefit the species and have committed to reduce bycatch to levels that do not threaten the conservation of these species and where possible eliminate it.

134. The WPEB **NOTED** that currently only two hammerhead species (*S. mokarran* and *S. lewini*) are listed on CMS Appendix I and II, whilst a third species *S. zynaena* is listed only on Appendix II of CMS, but that other species may be added in the future.

135. The WPEB **NOTED** that some of the priority research areas identified by CMS were well reflected in the IOTC Shark Research Plan and **HIGHLIGHTED** the coherence between the two approaches.

136. The WPEB **IDENTIFIED** potential opportunities for collaboration, including: improving identification guides for observers and crews; linking IOTC catch, effort, and observer data with spatial distribution and movement data; coordinating tagging, satellite telemetry, and genetic research across national EEZs and high-seas waters; identifying spatial/seasonal interaction hotspots to evaluate targeted bycatch mitigation and avoidance measures; and developing indicators for safe handling, release protocols, and post-release survival rates.

137. The WPEB **SUPPORTED** such collaboration among IOTC Members and **NOTED** that additional funding would be required to support this work. The WPEB **NOTED** that the CMS Secretariat does not undertake research directly but relies on competent bodies to generate and provide the information needed to support its Parties. The WPEB **NOTED** that, although the CMS Sharks Memorandum of Understanding (Sharks MOU) provides a conservation framework, CMS does not have mechanisms to directly implement research activities under the MOU.

138. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-31 on Using fisheries data to support the identification of Important Shark and Ray Areas (ISRAs): opportunities for collaboration with Regional Fishery Bodies, including the following abstract provided by the authors:

"Understanding where chondrichthyans (sharks, rays, and chimaeras) undertake important life-history functions is fundamental to effective conservation and fisheries management, yet spatial ecological information remains limited for many species. Fisheries-dependent data collected by Regional Fishery Bodies (RFBs), national fisheries agencies, research programmes, and observer schemes represent a potentially important but underused source of information on the spatial and temporal occurrence of these species.

Important Shark and Ray Areas (ISRAs) are discrete, three-dimensional portions of habitat that are important for the persistence of chondrichthyans. They are identified using standardised, science-based criteria. ISRAs are advisory and biocentric: their identification is based solely on the ecological and biological importance of an area to sharks, rays, and chimaeras. They are not marine protected areas, confer no legal designation, and impose no restrictions on fishing, but provide a standardised spatial evidence base that decision-makers can choose to use. Fisheries-dependent data collected by RFBs, national fisheries agencies, observer programmes, and research programmes represent a potentially valuable source of information for identifying such areas, particularly where other spatial ecological data are limited.

This paper introduces the ISRA process and explores how fisheries data can contribute to identifying areas that meet specific ISRA Criteria. Relevant information may include spatially and temporally referenced species occurrence and catch records, fishing effort, size, sex, maturity, and reproductive status. These data may provide evidence of the regular or predictable occurrence of range-restricted species (Criterion B), reproductive areas through observations of neonates, young-of-the-year, juveniles, or pregnant females (Sub-criterion C1), and recurrent aggregations of particular species, sexes, or life-history stages (Sub-criterion C5).

We propose a collaborative, data-holder-led approach whereby relevant analyses can be undertaken within existing data-governance arrangements, without requiring the transfer of confidential raw datasets. Working directly with data holders can also enable finer-scale information to support more precise ISRA boundaries, increasing their utility for targeted conservation or fisheries-management

responses where these are subsequently considered. The ISRA team can support data holders in identifying suitable species and datasets, developing analytical approaches, interpreting spatial patterns, and preparing candidate ISRA proposals.

The paper outlines the types of fisheries information that may support ISRA identification, key analytical considerations, and opportunities for collaboration between the ISRA initiative, RFBs, and their scientific communities."

139. The WPEB **NOTED** that fisheries-dependent, fisheries-independent, observer, survey and tracking data may provide evidence for the identification and refinement of Important Shark and Ray Areas (ISRAs), and **ENCOURAGED** the Secretariat, CPC scientists and data holders to explore relevant existing datasets. The WPEB **NOTED** that confidential raw data need not be transferred to the IUCN SSC Shark Specialist Group, with analyses potentially undertaken by authorised data holders, and **ENCOURAGED** a pilot collaboration between IOTC scientists and the ISRA initiative to develop appropriate data-access, ownership and confidentiality arrangements.

140. The WPEB **NOTED** that ISRA boundaries are based on the scientific evidence supporting each proposal and may vary in shape and complexity, including boundaries based on coastal features, depth and bathymetry. The WPEB **NOTED** that information on ISRAs, supporting evidence and data sources is available through the ISRA eAtlas and associated factsheets, with spatial layers provided in accordance with ISRA data-access arrangements with ongoing work to maintain version control and refine boundaries. The WPEB **NOTED** that a first global baseline map is expected by early 2027 and that static ISRA layers could potentially be incorporated into the Indian Ocean Digital Atlas in the future.

141. The WPEB **NOTED** that the ISRA eAtlas platform includes designated ISRAs as well as Areas of Interest (AoIs) that do not yet meet the criteria due to insufficient supporting data. The WPEB **NOTED** that some underlying data cannot be publicly shared and that contributor ownership is maintained and confidentiality of contributed data are respected, with factsheets identifying contributors. The WPEB **NOTED** that a compendium of Areas of Interest is being developed to identify research priorities and encourage funding for further data collection.

142. The WPEB **NOTED** that some coastal countries already have MPAs and fisheries management areas that may overlap with ISRAs and fishing grounds. The WPEB **HIGHLIGHTED** that ISRAs provide a science-based information layer to support national and international management decisions, while implementation will depend on national priorities, capacity and willingness. The WPEB **NOTED** that there is a range of management measures beyond no-take MPAs which could provide conservation benefits and these will be laid out in an upcoming paper by the IUCN Shark Specialist Group (SSG).

143. The WPEB **NOTED** that RFMOs provide an important opportunity to identify and incorporate ISRAs in areas beyond national jurisdiction (ABNJ) and so **ENCOURAGED** collaboration between RFMOs and the ISRA initiative to support the identification of ISRAs in ABNJ through the established ISRA process, and to explore how identified ISRAs could subsequently inform relevant RFMO scientific and management processes.

144. The WPEB **NOTED** that the interaction between the BBNJ Agreement and existing RFMO mandates remains to be clarified, including the role of RFMOs in reviewing proposals for area-based measures in ABNJ, and that further clarity is expected following the first BBNJ meeting in January 2027. The WPEB **HIGHLIGHTED** the importance of ensuring that proposals reflect existing fisheries and species-specific scientific information and are developed through appropriate collaboration with RFMOs.

145. The WPEB **NOTED** that the ISRA process aims to establish a standardised global scientific approach and **HIGHLIGHTED** the importance of applying consistent criteria and review processes across regions. The WPEB **ENCOURAGED** continued collaboration among IOTC, CMS, the BBNJ process, CITES and other relevant organisations to avoid duplication and ensure that responsibilities are complementary, while recognising that implementation remains the responsibility of Parties.

146. The WPEB **NOTED** potential spatial overlap between important areas for sharks, rays and marine mammals and **HIGHLIGHTED** the potential for fisheries datasets to support multi-taxa spatial analyses. The WPEB **NOTED** collaboration with the Important Marine Mammal Area (IMMA) team with preliminary analysis indicating some overlap between shark and marine mammal aggregations, particularly in highly productive feeding areas, and **ENCOURAGED** further collaboration on important areas for other taxa.

147. The WPEB **NOTED** that ISRAs are not intended to assess population status or directly inform IUCN Red List of Threatened Species assessments, which focus on population trends and extinction risk, whereas ISRAs identify areas important for specific life-history functions and special attributes (e.g. diversity). The WPEB **NOTED** that species vulnerability can be considered within ISRA proposals but does not by itself satisfy the designation criteria. The WPEB **ENCOURAGED** the Secretariat, CPCs and data-holders to contribute relevant data and collaborate in the identification of ISRAs, IMMAs and important areas for other taxa, in support of the objectives of the WPEB.

6.3 Development of shark research work plan

148. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-32: Draft report of the Indian Ocean shark research plan workshop, including the following abstract provided by the authors:

"The Indian Ocean Shark Year Program workshop (IOShPl02) was held in Cape Town, South Africa from 28 to 30 July 2026. A total of 12 invited experts attended the workshop. The group reviewed the current status of the knowledge around sharks caught as bycatch in IOTC fisheries, identified gaps in knowledge and proposed actions to be taken to address these gaps."

149. The WPEB **NOTED** that the tables summarising the proposed actions to be taken can be seen in Appendix XVVI.

150. The WPEB **NOTED** that TORs for a shark research plan have been requested by the Commission. The WPEB **NOTED** that a shark research plan has been in discussion for the last couple of years and that in 2024, the WPEB **AGREED** that a workshop should be held in 2026 to update the shark year plan that was developed by IOTC in 2014.

151. The WPEB **CONGRATULATED** the participants of the workshop for putting together such a comprehensive shark research plan.

152. The WPEB **NOTED** the need to clarify how shark species should be prioritised within the research plan and associated action plan. In particular, hammerhead sharks were proposed for inclusion in the action plan, while recognising that knowledge gaps may differ among species, notably between great hammerhead (SPK) and scalloped hammerhead (SPL) and thereby the focus of needed research activities differs between the two.

153. The WPEB **NOTED** that gillnet fisheries were identified as a high priority for data collection and research. Potential deterrent technologies, such as LED lights, were also mentioned, but the WPEB **NOTED** that they were not considered a current priority because their effectiveness and applicability remain insufficiently understood.

154. The WPEB **NOTED** concerns about the criteria used to identify species for inclusion in the summary table and for which species executive summaries or stock assessments should be developed. The WPEB **NOTED** that great and scalloped hammerhead sharks are not currently

considered key species for the IOTC and therefore do not have executive summaries or dedicated assessments. The WPEB **DISCUSSED** what would be required to bring these species to a level where such assessments could be undertaken and **NOTED** that they should be included in the table and considered when updating the list of priority species. While the species currently included in the summary table were thought to have been selected largely on the basis of reported catches, the WPEB **RECOGNISED** that this criterion alone may not adequately reflect research needs, particularly given that most shark catches continue to be reported at an aggregated level. Further reflection is therefore needed on transparent criteria for prioritising species and determining which should be covered by executive summaries. The WPEB **HIGHLIGHTED** that, in principle, all shark species could be considered priorities, making a clear prioritisation framework particularly important.

155. The WPEB **NOTED** that the list of species for which executive summaries are developed has traditionally been provided by the Commission and **RECOMMENDED** that the SC provide guidance on whether additional species could be added directly through the Working Party. The WPEB **AGREED** that consideration should also be given to identifying additional species for which further work could be undertaken, considering the potential value and feasibility of additional species-specific actions.

156. The WPEB **NOTED** suggestions that great hammerhead and smooth hammerhead should be added to the list of sharks for which an executive summary is created.

157. The WPEB **NOTED** the potential application of Close-Kin Mark-Recapture (CKMR) for hammerhead sharks, building on ongoing research projects, while the possibility of applying a similar approach to whale sharks was raised. The WPEB also **HIGHLIGHTED** the need to consider the feasibility and added value of CKMR across species for which conventional approaches cannot be used.

158. The WPEB **NOTED** that data collection has historically been an important priority and has not recently emerged as a new research objective. Rather, data collection should be considered a prerequisite for research and assessment, while a dedicated data-collection strategy is distinct from the research plan itself. The WPEB **NOTED** that historically, data collection and research have largely progressed through a passive process, with research activities developing around the data that happened to become available. The research plan provides an opportunity to move towards a more structured approach by explicitly identifying the data requirements needed to support priority research and assessments, and by incorporating these requirements into the overall research planning process.

159. The WPEB **NOTED** that many highly migratory/ trans-boundary vulnerable pelagic species of concern to the IOTC are also caught by coastal fisheries outside the jurisdiction of the IOTC. The WPEB **AGREED** to establish a small group to explore appropriate ways for the IOTC to effectively contribute to the conservation and management of such species within the existing institutional framework.

7. Review of new information on indicators and data-poor assessments

7.1 Review of indicators

160. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-19 on Standardized CPUE of Silky Shark (*Carcharhinus falciformis*) from the Taiwanese Large-Scale Tuna Longline Fishery in the Indian Ocean, 2005–2025, including the following abstract provided by the authors:

"We revisited the previous Taiwanese silky shark catch per unit effort (CPUE) standardization using a spatio-temporal modeling framework based on tinyVAST. Taiwanese large-scale tuna longline logbook data from 2005 to 2025 (624,917 fishing sets; 2.03 billion hooks) were analyzed. We fitted

and compared eight candidate models to identify the best-supported observation family and random-field structure, then evaluated four fixed-effects configurations. The best-supported model was selected to estimate a standardized CPUE index for silky sharks. Model adequacy was evaluated using numerical-convergence checks, AIC and cAIC, simulated-quantile residual diagnostics, and Moran's I. Annual relative standardized CPUE varied considerably during 2005–2025, with its highest value in 2014, its lowest level in 2015, and values generally above the long-term mean during 2018–2025. Predicted spatial distributions showed relatively high standardized CPUE (hotspots) in the northwestern Indian Ocean off Somalia and eastern Africa, around Madagascar and the Mozambique Channel, and in the central tropical Indian Ocean. Low values occurred over the southeastern Indian Ocean. The resulting fishery-dependent, relative standardized CPUE index provides an updated abundance index for the upcoming Indian Ocean silky shark benchmark stock assessment and demonstrates the applicability of modern geostatistical CPUE standardization to long-term Taiwanese tuna longline logbook data."

161. The WPEB **NOTED** that previous standardisations of silky shark CPUE relied on a zero-inflated GLM, and that the analysis has since advanced to a state-of-the-art spatio-temporal model using the tinyVAST package, intended to provide useful inputs for a future silky shark assessment.

162. The WPEB **NOTED** that encounter rates for silky shark are very low in the Taiwanese longline fishery, with zeros exceeding 90% of records across all years in both the logbook and observer data. Accordingly, the analysis used a hurdle model to separate the two underlying processes — encounter probability and positive catch rate. A cluster analysis of species composition was also used to define fishing strategy as an explanatory variable.

163. The WPEB **ASKED** whether shifts in fishing operations such as changes in hook deployment, bait type, mitigation measures, or vessel size and layout had occurred over the time series. The WPEB **NOTED** that this information is available in the observer data, albeit with relatively low coverage, and could be incorporated into further standardisation work.

164. The WPEB **CAUTIONED** against potential over-parameterisation of the model, **NOTING** that AIC, the primary model-selection criterion used, tends to favour the most complex model available. For 2015 and 2016 in particular, the model appeared to be tracking noise in the data rather than a genuine signal. The WPEB **SUGGESTED** not relying on AIC alone as a definitive basis for model selection.

165. The WPEB **ACKNOWLEDGED** the importance of this analysis, as it covers an important segment of the fishery, the large-scale industrial longline fleets, where silky shark is taken as bycatch, complementing analyses from other fisheries where silky shark is a target species. This broader coverage helps capture population trends for a highly migratory species such as silky shark.

7.2 Data poor assessments

166. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-12 on Application of per-recruit and length-based data-limited assessment methods to pelagic sharks in the Indian Ocean, including the following abstract provided by the authors:

"In this study, we applied a set of data-limited methods to pelagic shark species that are a priority for the IOTC/WPEB, providing a preliminary indication of the relative vulnerability and status of these data-limited sharks in the Indian Ocean. We focused on the 2026 priority shark species (silky shark, oceanic whitetip, and scalloped hammerhead) and included also the blue shark as a data-moderate species for which full assessments are carried out, to be used mostly as a comparison. The methods included per-recruit analyses, namely Yield Per Recruit (YPR) and Spawning Potential Ratio (SPR), and two length-based data-limited assessments, namely Length-Based Spawning Potential Ratio (LB-SPR) and Bayesian Length Interval Catch Curve Analysis (FISHBLICC). The analyses used size-

frequency data from the IOTC databases, together with compiled life-history parameters. Across all species, the yield-based reference point F0.1 exceeded the spawning-based target F at SPR40 in almost all scenarios, indicating that yield-based reference points might not be the most adequate or precautionary for these low-productivity shark species. LB-SPR estimates indicated that current fishing mortality on blue shark longline is likely between the SPR 40% target and SPR 20% limit, that the silky shark longline fishery is likely close to the SPR 20% limit, while the silky shark purse seine fishery showed spawning potential much lower than the SPR 20% limit. The FISHBLICC results are largely comparable to the LB-SPR."

167. The WPEB **NOTED** that the analysis applied Yield per Recruit (YPR) and Spawning per Recruit (SPR) methods to derive reference points, together with length-based assessment models (LB-SPR and FISHBLICC) to estimate stock status. The work focused mainly on blue shark from the longline fishery and silky shark from both the longline and purse seine fisheries. Data on oceanic whitetip and hammerhead sharks in the IOTC database were insufficient to interpret meaningful patterns, limiting the applicability of these methods to those species.

168. The WPEB **NOTED** that LB-SPR and FISHBLICC use the same underlying data and produce similar dynamics, though FISHBLICC offers greater flexibility in selectivity assumptions and configurations, representing a further evolution of the length-based approach.

169. The WPEB **THANKED** the authors for a comprehensive piece of work and **NOTED** that, in the absence of any formal assessment for silky shark, the length-based approach provides an effective means of assessing the species using available data. For blue shark, the length-based assessment complements the existing Stock Synthesis assessment and can serve as a monitoring tool between benchmark assessments.

170. The WPEB **NOTED** that YPR analysis is focused on yield optimisation and may not be well suited to shark species, whereas SPR, being more conservation-oriented, is more relevant. However, it remains unclear what target or limit reference points would be appropriate for sharks. The commonly used limit of 20% SPR and target of 40% SPR are considered reasonably risk-averse and are widely applied across many management regimes, but their suitability for shark species has not been confirmed by studies accounting for shark-specific biology and productivity.

171. If 20% SPR and 40% SPR were used for blue sharks as limit and target reference points, respectively, the WPEB **NOTED** that current fishing mortality for blue shark is estimated to be below the limit reference point (the constant fishing mortality that achieves 20% SPR at equilibrium) but above the target (the mortality that achieves 40% SPR). The same pattern holds for silky shark in the longline fishery: current mortality is below the limit but above the target. For silky shark in the purse seine fishery, however, current fishing mortality exceeds the limit.

172. The WPEB **DISCUSSED** how selectivity affects the estimated stock status of silky shark, **NOTING** that the purse seine fishery mainly catches juveniles. Because LB-SPR assumes asymptotic, logistic selectivity, the absence of large fish in the size data is attributed entirely to fishing mortality, which likely biases current F estimates upward. A dome-shaped selectivity curve would be more appropriate but is difficult to estimate from the data, as it is confounded with F. The WPEB **NOTED** that FISHBLICC can fit data from multiple fisheries simultaneously, including the longline fishery, which catches adults, and the purse seine fishery, which catches juveniles, potentially allowing better separation of selectivity from fishing mortality, though further analysis is needed to understand model performance under different selectivity configurations. The WPEB also **NOTED** that the recent sharp increase in estimated fishing mortality for silky shark in the purse seine fishery warrants further investigation, though it is likely linked to a reduction in average fish length in the catch samples.

173. The WPEB **AGREED** that the work provides useful findings on the status of those data-limited shark species in the Indian Ocean, and that the approach should be continued, further explored and expanded to additional species where possible. The WPEB further **RECOMMENDED** that the SC support studies to improve region-specific life-history information on pelagic sharks, strengthen size-composition sampling and reporting to IOTC, and improve the quantification of discard rates and post-release mortality, so that a more complete estimate of fishing mortality can be achieved.

174. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-39 on Ecological Risk Assessment of sharks in India's artisanal fisheries: An exploratory study, including the following abstract provided by the authors:

"Shark assessments are often constrained by limited fishery and biological data, especially in the tropical regions and developing countries. The Productivity -Susceptibility Analysis (PSA) is a semi-quantitative tool to assess species vulnerability based on biological productivity and susceptibility to fishing and, in extended frameworks, the effectiveness of existing management measures. This study used an exploratory composite PSA to assess the vulnerability of three shark species -Alopias pelagicus, Carcharhinus falciformis and Sphyrna lewini in Indian artisanal fisheries. The results indicated low vulnerability for A. pelagicus, moderate for C. falciformis and high vulnerability for S. lewini. Alopias pelagicus scored high on productivity, whereas the other two species scored high on susceptibility, indicating that for the former the vulnerability was driven mainly by its inherent life history, whereas for the latter two species the fishery parameters were more critical. Additionally, the size composition of these species in Indian landings during 2025 was analysed. Landings of A. pelagicus were dominated by adults, while juveniles constituted the majority of landings of C. falciformis and S. lewini. Landing monitoring survey records were further compared with available fishing-ground information from fishery and exploratory surveys to examine the spatial distribution of these three species in Indian waters. A practical tool to manage and conserve fish stocks in the tropics is partly through the use of Minimum Legal Size (MLS) for retention and trade. and implementation of dynamic area-based management based on life history and abundance in fishing locations. An MLS of 220 cm TL has already been recommended for S. lewini for Indian waters. We recommend the urgent estimation and evaluation of species-specific MLS values for A. pelagicus and C. falciformis, to support the sustainable management of these species in Indian waters."

175. The WPEB **NOTED** that India has implemented size-based management measures (a minimum legal size, or MLS) for sharks, similar to measures adopted by other countries such as Australia and South Africa, and asked whether such measures are well supported and enforceable given that different fisheries catch markedly different size ranges. The WPEB **NOTED** that this has always been a challenge, requiring an adaptation process for fishers and now that it is a formal regulation, enforcement and compliance are the focus. The WPEB **NOTED** that substantial fines are imposed where more than 50% of a fisher's catch falls under the MLS, giving fishers an incentive to increase the mesh size of their gear. The WPEB **CONSIDERED** these experiences valuable, given that the candidate management procedure currently under development for blue shark is considering a size limit as a potential management measure.

176. The WPEB **NOTED** that India has adopted stringent measures to protect more than 20 shark species, including introducing minimum size limits, a complete finning ban, and trade and export controls of shark fins. India's National Plan of Action (NPOA) for sharks was adopted in 2024. The WPEB also **ACKNOWLEDGED** India's efforts to report shark catches at the species level in recent years and **NOTED** the potential to review historical catch data as well. The WPEB **REQUESTED** the Secretariat to liaise with India to review the reporting of historical shark catches.

177. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-41: Exploration toward implementation of management procedures with qualitative/ semi-quantitative risk assessment approach for data-

poor bycatch species relevant to the IOTC fisheries, including the following abstract provided by the authors:

"This document introduces the concept utilized in the Australian risk assessment processes, Ecological Risk Assessment for the Effects of Fishing (ERAEF), largely relying on qualitative and semi-quantitative analyses through stakeholder consultations to rank the impacts on fishing activities on species and ecosystem. The document proposes a work plan to examine the applicability and feasibility of such approaches in the IOTC context, in particular for monitoring and management of data-poor bycaught species, using manta rays as focused species and through test-case application of the first two processes in a limited number of relevant CPCs."

178. The WPEB **NOTED** that this risk assessment approach is being proposed because data availability for IOTC bycatch species (e.g., sharks) is unlikely to improve significantly in the near term, and efforts to do so are resource-intensive and not very productive, while management and monitoring needs continue to grow. The WPEB **AGREED** that a lack of data is not sufficient justification for inaction, and that evidence-based assessment should remain an option for providing management advice wherever possible.

179. The WPEB **NOTED** that for many IOTC CPCs, tuna fishing is only a minor component of broader multi-gear, multi-species fisheries, many of which also catch species outside the IOTC mandate. Management is further complicated by the transboundary and migratory nature of tuna species. While IOTC has no direct mandate over these non-target fisheries, which remain the responsibility of individual CPCs, coordinated effort is needed for effective management, and IOTC is well placed to provide both a forum and a coordinating role in support of this.

180. The WPEB **NOTED** that the proposed Ecological Risk Assessment for the Effects of Fishing (ERAEF) approach, developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in partnership with the Australian Fisheries Management Authority (AFMA), applies a hierarchical framework to evaluate and manage the impacts of fishing operations, including commercial fisheries, on marine ecosystems. It is a tiered approach: Level 1 (SICA, Scale, Intensity, Consequence Analysis) ranks the likelihood and consequence of each hazard, risk, or fishing impact, while Level 2 (PSA, Productivity and Susceptibility Analysis) evaluates and ranks the vulnerability of individual species. Both tiers were considered applicable to IOTC fisheries.

181. The WPEB **NOTED** that full application of the ERAEF approach is resource-intensive and time-consuming. Even in Australia, where the approach originated, implementation has proven difficult, and scaling it up to IOTC, where fisheries are considerably more complex, is expected to be even more challenging. In Australia, many species began at Tier 1 (SICA) and moved to Tier 2 (PSA) over time while most IOTC species are expected to fall into Tier 2. Rather than adopting the full ERAEF approach, the WPEB **NOTED** the suggestion that a more efficient option would be an update to the risk assessment approach described by Murua et al. 2018, based on the PSA method, which could also incorporate the Sustainability Assessment for Fishing Effects (SAFE, Zhou & Griffiths 2007) approach.

182. The WPEB **NOTED** that the seabird risk assessment conducted by CCSBT (IOTC-2026-WPEB22(AS)-25) offers an excellent example of how a risk assessment framework developed locally, originally in New Zealand, can be expanded globally, and how that process can be managed effectively through collaboration and stakeholder consultation.

183. The WPEB **NOTED** that the SICA (Tier 1) process requires expert judgement and stakeholder consultation, and asked how reproducibility could be ensured and whether IOTC data would be used. The WPEB **NOTED** that ongoing efforts to improve data collection must continue and should be incorporated into the assessment process, and that consultation would need to take place within

individual CPCs, requiring their commitment. The WPEB **NOTED** the suggestion that three CPCs be identified to participate in a pilot study. The WPEB **SUGGESTED** the proposal be incorporated into the shark research plan so its applicability to IOTC fisheries can be further evaluated and discussed.

7.3 Update on MSE for blue shark

184. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-15 on Management Procedure for blue shark in the Indian Ocean: current project status, including the following abstract provided by the authors:

"An update is provided regarding the current status of the Indian Ocean blue shark MSE, with requests for feedback from the WPEB."

185. The WPEB **NOTED** that the modeller sought guidance on management objectives, reference points, and the feasibility and implementation of alternative management measures. The WPEB **WELCOMED** the progress made in developing the blue shark MSE. The paper considered both TAC- and length-based approaches, **NOTING** that length-based restrictions could potentially reduce juvenile mortality but may be difficult to monitor and enforce.

186. The WPEB **DISCUSSED** the potential use of size-based management measures for blue shark and **NOTED** that, while such measures could potentially improve population productivity by limiting juvenile mortality, their practical implementation remains uncertain. Challenges include the ability to accurately estimate or measure shark length without bringing individuals onboard, as well as monitoring, compliance and enforcement. The WPEB further **NOTED** that the effectiveness of size-based measures would depend on at-haulback and post-release mortality, which may vary among fleets, fishing practices and size classes, acknowledging post-release mortality is generally considered low for blue shark. Existing studies from the Atlantic and Indian Oceans could provide initial estimates for simulation testing.

187. The WPEB **DISCUSSED** the biological basis for defining size limits. A minimum size related to size at maturity was identified as one possible approach, with a lower size limit in the range of 100–120 cm mentioned for exploration. The WPEB also **DISCUSSED** whether lower and upper size limits could be considered together. Larger females may have greater reproductive output, and relationships between female size and fecundity, including the size at which increases in fecundity may begin to plateau, could potentially inform biologically meaningful upper size thresholds. The WPEB **NOTED** examples of minimum and maximum size restrictions applied to sharks in other fisheries, including slot limits in South Africa, and **ENCOURAGED** further evaluation of alternative size-limit scenarios during the intersessional period.

188. The WPEB **NOTED** that size-based measures could have substantially different consequences among fleets because blue shark length composition varies spatially and temporally and among fisheries. Some fleets may therefore interact predominantly with particular size classes, potentially resulting in disproportionate effects from a common size restriction. The WPEB further **NOTED** that retention of larger sharks may also be affected by other considerations, including concerns regarding heavy-metal concentrations.

189. The WPEB **NOTED** that the IOTC has not formally adopted target (TRP) or limit (LRP) reference points for blue shark. The WPEB discussed whether MSY-based reference points would be appropriate if the management objective is conservation-oriented rather than the optimisation of catches. Given the uncertainty in historical catch levels, which makes it difficult to determine MSY and BMSY, the WPEB **SUGGESTED** that depletion-based reference points could be considered as an alternative. A depletion level of approximately 20% was mentioned as a potential starting point for consideration, while alternative scenarios, including levels in the order of 40–50% of unfished biomass, could also be explored through simulation testing rather than selected without supporting

analyses. The WPEB **AGREED** that the development of a management target should adequately consider blue shark biology, productivity and the agreed management objectives.

190. The WPEB **DISCUSSED** whether fishing-mortality-based reference points could provide an alternative approach. The WPEB **NOTED** that fishing mortality could potentially be inferred from size-composition information without requiring precise estimates of total historical catch, and that biologically derived fishing-mortality reference levels could therefore provide useful information. The WPEB further **SUGGESTED** that depletion levels corresponding to BMSY in the assessment Operating Model could be examined as potential limit rather than target reference levels.

191. The WPEB **HIGHLIGHTED** that blue shark is caught under substantially different fishing contexts, ranging from fisheries where it is targeted or secondary-targeted to fisheries where it is primarily bycatch. The WPEB **NOTED** that this distinction is not always clear and may change between fisheries or even fishing operations, and that it could substantially influence the feasibility, effectiveness and socioeconomic consequences of candidate management measures. The WPEB **NOTED** that Taiwan,China, EU,Spain, EU,Portugal, Sri Lanka, and Indonesia account for substantial reported blue shark catches and could provide useful starting points for further investigation and stakeholder engagement. In Indonesia, blue shark is predominantly bycatch in some commercial longline fisheries, while other fisheries, including artisanal fisheries, may have different targeting practices.

192. The WPEB **EMPHASIZED** the importance of engaging CPCs, fishers, industry representatives and other relevant stakeholders in the development and simulation testing of candidate MPs, including stakeholders from fisheries where blue shark is predominantly bycatch as well as those where it is targeted or secondary-targeted. Such engagement would help characterize fishing practices and assess the operational feasibility, enforceability and potential unintended effects of candidate management measures across different fleet components.

193. The WPEB **ENCOURAGED** engagement with the Working Party on Billfish (WPB), **NOTING** that blue shark and swordfish are frequently caught in the same longline fisheries and that blue shark management measures could interact with the management of target species. The WPEB also **ENCOURAGED** continued exchange with scientists involved in blue shark assessments and management strategy development in other tuna RFMOs, including ICCAT, to benefit from relevant methodological developments and experience.

194. The WPEB **AGREED** that the outcomes of these discussions would be presented to the Working Party on Methods (WPM), with subsequent outcomes presented to the TCMP in 2027 for consideration. The WPEB **ENCOURAGED** intersessional collaboration with the modeller, CPCs, industry representatives and relevant Working Parties to further develop and evaluate practical candidate management scenarios.

195. **NOTING** that blue sharks are often taken as bycatch and/or as the secondary target and that the management procedure for blue sharks should take into account the impacts to the operations and catch of target species, the WPEB **RECOMMENDED** the SC include other WPs including WPB, WPTmT and WPM in review process of the development of blue shark MSE.

8. New information on biology, ecology, fisheries and environmental data relating to ecosystems and bycatch species

8.1 Review new information on the environment and ecosystem interactions and modelling, including climate change issues affecting pelagic ecosystems in the IOTC area of responsibility

196. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-20 on First insights into the use of traplines in the Portuguese pelagic longline fleet in the Indian Ocean, including the following abstract provided by the authors:

"A new gear modification known as "traplines" has been expanding in pelagic longline fisheries at a global scale. Recently, IOTC has made requests on the need to study this new gear. To address this, the Portuguese Fisheries Administration (DGRM) and the Portuguese Institute for the Sea and Atmosphere (IPMA) started a pilot project, with this paper presenting the first preliminary analysis and results available for the Indian Ocean. The species composition is significantly different between the two terminal gears, as the main catch with hooks is blue shark followed by swordfish, while with traplines the catch is almost exclusively swordfish. The CPUEs are significantly different, with swordfish CPUEs higher in traplines, and the CPUE of sharks (blue shark and shortfin mako) much higher in hooks. The sizes are also different, with a tendency for both larger swordfish and blue shark to be captured in traplines compared to hooks. These results provide the first preliminary evidence from the Indian Ocean that this gear is considerably more selective, capturing almost exclusively swordfish, and having much lower catch rates of other species, including vulnerable species of pelagic sharks. This pilot project is ongoing, and updated results will be presented as additional data is collected."

197. The WPEB **NOTED** that the pilot project is ongoing and **SUGGESTED** that future experimental work make use of available observational data to estimate the effort required for a full-scale experimental at-sea trial. The WPEB **NOTED** that such trials should allow a robust comparison of the two terminal gear configurations.

198. The WPEB **NOTED** the preliminary results of trials conducted by the Portuguese pelagic longline fleet using traplines or loop lines. Conventional hooks primarily caught blue shark and swordfish, whereas catches on traplines consisted almost exclusively of swordfish. Swordfish CPUE was higher with traplines, while blue shark and shortfin mako shark CPUE was substantially higher with conventional hooks. The WPEB **NOTED** that differences in the size composition of the catch were also observed. With a median trapline substitution rate of approximately 30%, traplines tended to catch larger swordfish than conventional hooks. It is stated that traplines significantly reduced bycatch of vulnerable species such as turtles.

199. The WPEB **NOTED** that these preliminary results suggest that traplines may have potential both to increase swordfish catch rates and to reduce shark bycatch. The WPEB further **NOTED** that the results are consistent with the need identified previously to improve information on the use of this emerging gear configuration, its associated catch and effort, and its potential role as a mitigation measure.

200. The WPEB **NOTED** that similar trends had been observed in Japan, outside the IOTC area but that observer data from the Indian Ocean were being examined to determine the level of use of traplines in the Indian Ocean to be used for comparison with other studies. The WPEB **NOTED** that the available information from the Japanese fleet appeared to show similar patterns, including low catches of turtles, seabirds and cetaceans and relatively high catches of swordfish.

201. The WPEB **NOTED** that the mechanism by which the gear captures fish is not yet well understood and so **ENCOURAGED** the ongoing trials to investigate the capture process. The WPEB **NOTED** that cameras are being used to document the capture mechanism onboard Japanese vessels and that further information will be presented as the work progresses.

202. The WPEB **AGREED** that further discussion of the capture mechanisms would be more appropriately undertaken at the Working Party on Billfish (WPB), given its relevance to swordfish, while **NOTING** that the implications for bycatch mitigation would also be relevant for discussion at the WPEB.

203. The WPEB **WELCOMED** the development and testing of this new type of gear and **ENCOURAGED** continuation and expansion of the pilot work, including collection of comparable information by

other CPCs whose fleets use traplines or similar configurations. Particular attention should be given to catch composition, CPUE, size selectivity, operational characteristics and potential effects on vulnerable species.

204. The WPEB **HIGHLIGHTED** that a specific code was included in the ROS forms to report the use of traplines and **ENCOURAGED** CPCs to report these data accordingly.

205. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-21 on Optimizing tori line performance through terminal towing configurations in tuna longline fisheries, including the following abstract provided by the authors:

"Tori lines are commonly used to mitigate seabird bycatch in distant-water tuna longline fisheries. Their effective application is important for reducing the impacts of distant-water fishing activities on marine biodiversity, and aerial extent directly determines the effective range of the aerial deterrent zone formed astern of a vessel. At present, several regional fisheries management organizations use an aerial extent of 100 m as an important reference benchmark. However, tori line performance under actual fishing conditions can be influenced by multiple factors, and whether aerial extent can consistently attain this target has not yet been systematically evaluated. To examine the effects of different tail-section towing configurations on tori line aerial-extent performance, an at-sea comparative trial was conducted aboard the tuna longline vessel Rongheng 513. Three tori line configurations were evaluated at representative operational vessel speeds of 4.5, 6.0, and 8.2 kt. These included the baseline streamer configuration as the reference, the plastic-cone configuration, and the drogue configuration. A sensitivity analysis was also conducted using low-, moderate-, and high-drag scenarios, and the drag force generated by each configuration was estimated using an engineering approach. The results showed that tail-section towing configuration clearly affected the aerial deployment of the tori line, and the ranking of estimated drag force was generally consistent with that of measured aerial extent. The drogue configuration achieved the best aerial-extent performance at all tested vessel speeds, with measured values ranging from 103.8 to 116.2 m, and met or exceeded the 100 m benchmark under all test conditions. The baseline streamer configuration ranked second, with aerial extent ranging from 98.9 to 109.7 m. The plastic-cone configuration consistently produced the shortest aerial extent, ranging from 70.8 to 82.5 m. These findings indicate that both the magnitude and stability of the drag generated by the tail-section towing configuration are important factors influencing tori line aerial-extent performance. A configuration that produces insufficient drag or exhibits poor dynamic stability may fail to improve aerial extent and may even reduce it. Accordingly, future revisions of relevant conservation and management measures or technical guidance should encourage fleets to conduct configuration assessments suited to their own vessel characteristics and operational conditions. Rather than prescribing a specific type of towing configuration, such measures or guidance should further clarify that tail-section towing configurations need to generate sufficient and stable hydrodynamic drag. These findings highlight the importance of performance-based evaluation of bycatch mitigation devices in distant-water fisheries."

206. The WPEB **NOTED** that the first sea trial was primarily designed to examine how different terminal towing configurations affected the aerial extent of the towing device, and therefore did not specifically evaluate the effect of total device weight. The WPEB **NOTED** that weight differences were considered during the second trial, with preliminary observations suggesting that the effect of weight may be relatively small compared with differences associated with terminal towing configurations. The WPEB **NOTED** that further testing is required to distinguish these effects more clearly.

207. The WPEB **HIGHLIGHTED** the importance of evaluating the durability and operational reliability of towing devices. The WPEB **NOTED** that, during the second trial, the drogue configuration

broke at a higher vessel speed. The WPEB **NOTED** that the device had been designed to withstand a tensile load of approximately 800 kg, but that the precise cause of the failure could not yet be determined.

208. The WPEB **NOTED** that the trial focused on testing different tori-line configurations rather than evaluating their performance during normal fishing operations. The WPEB **NOTED** that very few tangling incidents were observed during the trial, but that, because the experiment was not conducted under normal fishing conditions, it was not possible to determine whether the towing devices could increase the risk of entanglement with fishing gear. The WPEB **HIGHLIGHTED** the need to evaluate this issue in future trials conducted under normal fishing conditions.

209. The WPEB **NOTED** that the trial did not directly measure seabird interactions or bycatch reduction, but focused on the physical performance of the tori line, particularly its aerial extent. The WPEB **NOTED** that a greater and more stable aerial extent could provide a larger protected area behind the vessel, but that this does not necessarily translate into a greater reduction in seabird bycatch. The WPEB **ENCOURAGED** further research to be carried out to examine the relationship between aerial extent and actual seabird interactions, while also accounting for operational and environmental factors.

210. The WPEB **NOTED** that the study provides useful technical information for the development of effective tori-line specifications. However, further trials under operational fishing conditions would be useful to evaluate durability, entanglement risk and the extent to which improvements in aerial coverage translate into reductions in seabird interactions.

211. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-22 on Field application and evaluation of safe-release methods for sharks bycaught in tropical tuna purse-seine fisheries, including the following abstract provided by the authors:

"Sharks are an important bycatch group in tropical tuna purse-seine fisheries, and improving the handling and release of bycaught individuals is a practical means of reducing fishery-related mortality. Best handling and release practices (BHRPs) for sharks have been progressively developed by tuna regional fisheries management organizations and research institutions, but their applicability and associated post-release survival can vary with vessel configuration and fishing operations. From May to June 2026, we conducted an onboard field trial aboard the tuna purse seiner Zhong Tai 6 in the western and central Pacific Ocean. Safe handling and release procedures based on existing BHRPs were implemented, and shark species composition, deck-arrival pathway, on-deck condition, and immediate post-release condition were recorded. MiniPAT pop-up satellite archival tags were deployed on selected silky sharks (Carcharhinus falciformis) to assess short-term post-release fate. A total of 100 sharks were recorded, including 97 silky sharks. On-deck mortality of silky sharks was 36.1%. Observed mortality varied among deck-arrival pathways: 24.7% for sharks brought aboard after entanglement in netting, 88.9% for sharks brailed aboard with the catch from the sack, and 60.0% for sharks brought aboard using a dip net. Eight silky sharks classified as A1 on deck were tagged; two were inferred to have died after release. Kaplan-Meier analysis estimated a 10-day survival probability of 75.0%, corresponding to cumulative mortality of 25.0% (95% CI: 6.9%-68.5%). These preliminary results show that the tested handling and release protocol is operationally feasible aboard a large commercial tuna purse seiner, while post-release outcomes may reflect the combined effects of pre-release capture and transfer processes and delayed mortality. Immediate condition at release alone may therefore be insufficient to assess post-release survival. This study provides initial field evidence to support further evaluation of BHRPs through larger tag samples, improved post-release tracking, and comparisons among fleets."

212. The WPEB **NOTED** that the field trial presented was conducted aboard a commercial tropical tuna purse seiner in the western and central Pacific Ocean in 2026.

213. The WPEB **NOTED** that a total of 100 sharks were recorded, of which 97 were silky sharks. The study evaluated the pathway by which sharks arrived on deck, their condition on arrival and immediately after release, and short-term post-release survival using satellite tags. The observed onboard mortality rate reached a 37.1%.

214. The WPEB **NOTED** substantial differences in at-vessel mortality among the different pathways by which sharks reached the deck, indicating that mortality may be influenced by processes occurring before the animal is actually handled for release. The study therefore emphasised that post-release fate needs to be interpreted in the context of the complete capture process, including capture, transfer, on-deck handling and release.

215. The WPEB **NOTED** that eight sharks in suitable condition were monitored using satellite tags and the estimated survival probability at 10 days was 75%. The WPEB **NOTED** the large uncertainty associated with this estimate owing to the small sample size and premature tag detachments, and that comparisons by shark size and immediate post-release condition should therefore be regarded as exploratory.

216. The WPEB **QUESTIONED** the rationale for limiting the survival monitoring period to 10 days, noting that post-release mortality (PRM) can include delayed mortality occurring beyond this period and that a 30-day period is commonly used to capture delayed mortality following capture and release. The WPEB **NOTED** that the 10-day period was selected specifically to estimate short-term release survival, as has been done in previous silky shark (FAL) post-release survival studies, and **HIGHLIGHTED** that the resulting estimates should therefore be interpreted as short-term rather than long-term survival rates. The WPEB further **NOTED** that post-release responses are thought to differ significantly between longline and purse seine fisheries, with sharks released from purse seine operations experiencing higher mortality immediately and shortly after release than is the case with longline operations. The WPEB **NOTED** that mortality associated with stress is generally expected to occur relatively soon after release, with few deaths observed after approximately 20 days.

217. The WPEB **NOTED** that premature tag detachment is an important source of uncertainty. Similar premature detachments have been encountered in other silky shark tagging programmes, and further work was considered necessary to distinguish tag failure or attachment problems from biological outcomes.

218. The WPEB **NOTED** that immediate visual condition at release provides useful information but cannot, on its own, be assumed to represent post-release survival. This point was illustrated by the tagging results and by the limited number of individuals available in some vitality categories.

219. The WPEB **ENCOURAGED** further trials with larger sample sizes, improved tag attachment and retention, and comparative testing of alternative release methods across commercial fleets.

220. The WPEB **NOTED** that the mortality rates observed in this study were substantially lower than those reported in other similar studies from the Indian Ocean, including the work of Poisson et al., 2014 and colleagues. The WPEB **NOTED** that this was a preliminary trial with a relatively small sample size, which could have contributed to the observed results and differences from other studies.

221. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-35 on Post-release survival of silky sharks in tropical tuna purse seine fisheries under best handling practices: insights from tagging and predictive modelling, including the following abstract provided by the authors:

"Silky sharks (Carcharhinus falciformis) are the most common shark bycatch species in tropical tuna purse seine fisheries. Although purse seine fisheries account for a small proportion of total silky shark catches, reliable post-release survival estimates are essential to evaluate mitigation measures and quantify fishery impacts on the species. This study aimed to identify the main factors influencing post-release survival and to estimate survivorship at the scale of commercial fishing operations. Between 2020 and 2026, 2,685 released silky sharks were monitored aboard purse seiners operating in the Atlantic, Indian, and Pacific Oceans. Of these, 220 individuals were equipped with satellite tags to determine post-release fate. Using sharks with known fate, binomial Generalized Additive Models (GAMs) were developed to evaluate the influence of biological, environmental, physiological, and operational variables on post-release survival probability. The best-performing model included vitality condition at release, total tuna catch in the set, and shark length, explaining 41.4% of the observed deviance and showing good predictive performance (AUC = 0.87; TSS = 0.66). Survival probability increased markedly with vitality condition, approaching 100% for sharks released in excellent condition, whereas increasing fishing set catch size was associated with reduced survival. Shark length showed a non-linear relationship with survival, with intermediate-sized individuals exhibiting the highest probabilities of survival. Application of the model to the entire population of sharks observed during these fishing trips, regardless of whether they were tagged, revealed substantial variation in mean predicted survival among fishing trips. Estimated mean survival rates by trip ranged from 0.205 to 0.636 in trips where best release handling practices were applied. Exploratory trip-level analyses further indicated that larger target catches and longer retention times in the sac were associated with lower survival probabilities. These findings highlight the importance of shark condition at release and suggest that differences in trip-level survival are largely driven by the proportion of sharks brought aboard in poor vitality condition, which in turn depends on fishing operations and catch handling practices that influence retention time and duration of the fishing set. The widespread implementation of best handling and release practices therefore remains essential to increase the survival rates. Further improvements in post-release survival are likely to depend primarily on minimizing the time sharks are exposed to stressful conditions (i.e., in the sack and on deck), thereby reducing the risk of injury."

222. The WPEB **NOTED** that these results constitute the most comprehensive assessment to date of silky shark post-release survival in tropical tuna purse-seine fisheries operating under current best handling and release practices. The study combined observations from 2,685 sharks with satellite-tagging information from 195 individuals for which post-release fate could be determined. An overall post-release survival rate of 70.3% was estimated among tagged sharks released with signs of life.

223. The WPEB **NOTED** that vitality at release was the strongest predictor of post-release survival. Catch size and shark body length were also retained in the final model, which explained approximately 41% of the observed deviance. Survival declined as catch size increased, while intermediate sized sharks showed the highest predicted survival probability. Substantial differences were estimated among fishing trips. The survival probabilities were around 50% for sharks classified in a crisis level vitality state, increasing to nearly 100% for higher vitality states.

224. The WPEB **NOTED** that the twelve commercial trips analysed covered the Pacific, Atlantic and Indian Oceans and included different vessel-specific release arrangements, ranging from manual release to hoppers, ramps, gutters and conveyor-type systems. Best handling practices were applied at a high level throughout the study.

225. The WPEB **NOTED** that no independent ocean effect was detected and differences among trips appeared to be more closely associated with vessel and operational characteristics, particularly the duration of fishing operations, catch size and the condition in which sharks reached the deck. Indian Ocean trips themselves showed substantial variability, demonstrating that results should not be interpreted simply as an ocean basin effect.

226. The WPEB **NOTED** that the absence of a detectable independent effect of bycatch release devices should not be interpreted as evidence that these devices or best handling practices are ineffective. All trips were conducted under a best practice scenario, and operational factors such as large catches and long retention times may mask the additional effect of individual release devices. The WPEB therefore **STRESSED** the importance of maintaining best practices while adapting release systems to the characteristics of individual vessels.

227. The WPEB **NOTED** the existence of a practical limit to what can be achieved through on-deck improvements alone. Sharks may arrive on deck already physiologically compromised as a consequence of processes occurring earlier in the fishing operation. For some vessels, even high compliance with best handling practices and the presence of release devices may therefore be insufficient to overcome mortality associated with large catches or prolonged retention in the sack. Further cooperation with industry was considered necessary to explore mitigation measures acting earlier in the capture process.

228. The WPEB **NOTED** the value of routinely collecting vitality at release information as a practical proxy for survival. Such information could be incorporated more systematically into observer programmes. Electronic monitoring systems may also contribute in the future, although current camera configurations do not necessarily provide an adequate view of the release point. Camera positioning could therefore be considered when designing EMS protocols for monitoring ETP species releases.

229. The WPEB **NOTED** the importance of distinguishing between at-vessel mortality from post-release mortality, since the factors determining each component appear to differ. The WPEB **NOTED** that the study highlighted that further work is needed to quantify their relative contributions and thereby improve estimates of total fishery related mortality.

230. The WPEB **ENCOURAGED** continued implementation and improvement of Best Handling and Release Practices and Bycatch Release Devices and further research aimed at reducing retention times and handling stress.

8.2 Assessment of the impacts of climate change on IOTC fisheries and bycatch species (all)

231. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-10 on Future trajectories of the tropical Indian Ocean pelagic ecosystem under fisheries management and climate change scenarios, including the following abstract provided by the authors:

"Climate change and fishing are among the main drivers shaping the future of marine ecosystems, yet their cumulative effects remain poorly understood in large oceanic pelagic systems. We used an Ecopath with Ecosim (EwE) model representing the tropical Indian Ocean (TIO) pelagic ecosystem to evaluate the individual and combined effects of climate change and fisheries management on ecosystem dynamics through 2100. Under the high/emission climate change scenario (SSP3-7.0), substantial biomass declines were projected for several target species, particularly tropical tunas and albacore, relative to the baseline scenario. Vulnerable functional groups such as mobulas and sea turtles, and forage communities also exhibited generalized biomass reductions. Fisheries management measures produced contrasting outcomes. Under the yellowfin tuna Total Allowable Catch (TAC) scenario, fishing effort increased for several fleets to attain allocated catch limits, increasing catches for several target species but generally reducing their future biomass and generating mixed responses among vulnerable species. In contrast, improving post-release survival increased the biomass of all vulnerable groups, particularly mobulas, sharks, and sea turtles, with negligible impacts on the rest of the ecosystem. Combined climate and TAC scenarios showed that management measures could partially buffer climate-induced catch losses for some target species but were unable to prevent climate-driven biomass declines across the ecosystem. Overall, the results

suggest that fisheries management remains effective for reducing direct fishing impacts but has limited capacity to offset climate-driven ecosystem change. These findings highlight the need to explicitly integrate climate change considerations into ecosystem-based fisheries management within the Indian Ocean Tuna Commission governance framework."

232. The WPEB **NOTED** that this paper presented the projected impacts of climate change, selected fisheries management, and the combination of both measures on the tropical Indian Ocean pelagic ecosystem between 2023 and 2100, based on simulations conducted using an Ecopath with Ecosim modelling framework. The study simulated seven scenarios, including baseline conditions, climate change projections, and management strategies, finding that climate change appears as the dominant driver of ecosystem change, potentially undermining the benefits of current fisheries management measures.

233. The WPEB **NOTED** that this work could complement stock assessments, support the integration of climate change into fisheries management and feed advice products such as ecocards in the future which will help IOTC advance towards the ecosystem-based fisheries management.

234. The WPEB **NOTED** the interest expressed by participants in the capacity of the model to integrate the effects of strong, localised adverse environmental variations (e.g. marine heatwaves) on fishing operations. The WPEB **NOTED** that the current configuration is non-spatial and uses environmental forcing averaged over the model domain, consequently, it cannot resolve localized impacts at sub-area level.

235. The WPEB **NOTED** the complexity of the interactions across different trophic levels and the influence of climate variability, and **WELCOMED** the study as a useful exercise to better understand these dynamics.

236. The WPEB **NOTED** that changes in species distributions resulting from climate variability could have different impacts across CPCs, with some potentially benefiting while others may experience reduced availability of target species. The WPEB **HIGHLIGHTED** that understanding these changes will be important for informing future stock management and fisheries management decisions.

237. The WPEB **NOTED** that the model was used to characterise trends over the past 20 years prior to generating future projections. The WPEB **NOTED** that model performance differed substantially among functional groups.

238. The WPEB **NOTED** that the model estimates biomass using information from stock assessments and fisheries data, while also incorporating a range of environmental variables. The WPEB **NOTED** that time series from approximately 800 fisheries were included in the model, compared with a much smaller number of time series of biomass, resulting in the fisheries data having a greater influence on model fitting. The WPEB **NOTED** that, in its current configuration, the model attempts to fit all available catch and environmental time series simultaneously with the biomass data, which can result in the model prioritising the representation of catch trends rather than biomass trends.

239. The WPEB **NOTED** that the proposed approach moving forwards is to revise the fisheries time series for which there is lower confidence and explore refitting the model using less fisheries information, with the objective of allowing the model to better capture biomass trends rather than primarily reproducing catch trends. The WPEB **NOTED** that preliminary results seem to indicate improved model fit following this approach.

240. The WPEB **ENCOURAGED** further work to incorporate a spatial dimension into the modelling framework, **NOTING** that the spatially explicit model Ecospace could integrate spatial information on environmental variables, fisheries, and species distributions, thereby allowing impacts in specific areas to be characterized and ecological and fisheries trade-offs to be assessed. The WPEB further

RECOGNISED the potential of this approach for IOTC species for a range of management and research purposes, **NOTING** similar applications already undertaken in the Pacific Ocean using SEAPODYM models. The WPEB **ENCOURAGED** further work on model fitting, so as to improve the reliability of the hindcast model and the projections derived from the simulated future scenarios. The WPEB **NOTED** that a new fitting will be performed targeting a better fitting of the Ecosim model to the available biomass time series.

241. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-29 on Explore ocean patterns and trends at your fingertips with the newly released Indian Ocean Digital Atlas, including the following abstract provided by the authors:

"The IODA is a newly developed digital platform that integrates oceanographic data from data-assimilative models and satellite observations with advanced visualisation tools into a single operational system. The platform provides free access to more than thirty years of environmental observations describing the physical and biological state of the Indian Ocean. Updated monthly, IODA enables users to explore ocean variability, identify long-term trends, and analyse the effects of climate variability and climate change on marine ecosystems and ocean-based activities. In this paper, we present the datasets and main features of the atlas. This paper documents the achievements of the project in relation to its Terms of Reference and aims to foster ownership and uptake of the atlas within the IOTC scientific community"

242. The WPEB **NOTED** that the tool provides a useful means of visualising Copernicus environmental data over more than three decades (since 1993).

243. The WPEB **WELCOMED** the tool as a useful resource for researchers and **DISCUSSSED** its potential application. The WPEB **NOTED** the potential value of such tools for fishers, particularly in relation to understanding environmental conditions that influence fisheries.

244. The WPEB **NOTED** that the current tool operates at a monthly temporal resolution, which may limit its suitability for operational fisheries applications requiring short-term advice to fishers. The WPEB **NOTED** that work in Seychelles is exploring outputs at a weekly resolution, which may be more appropriate for operational applications.

245. The WPEB **NOTED** that the current tool may nevertheless have greater potential for examining longer-term fisheries performance in relation to environmental trends and that its outputs could be incorporated into other analyses. The WPEB **NOTED** that, while the tool may not be the most appropriate product for short-term operational fisheries advice, there is considerable potential to further explore its application for longer-term monitoring, research and analysis, especially in a context of climate change.

246. The WPEB **NOTED** that the tool could be useful for both oceanographic and fisheries analyses. The WPEB **NOTED** that the demonstration was conducted using a test server, with a short data series, as the final components of the datasets were not yet fully uploaded on the production server.

247. The WPEB **NOTED** that the tool will not be hosted on the IOTC website, as the IOTC website is being migrated to the FAO platform. The WPEB **NOTED** that the tool will be made publicly available shortly at the dedicated website (https://ioda-atlas.gov.sc) hosted in the Seychelles, once the remaining data components have been uploaded and that it will provide open and free access to the tool for users. The WPEB **NOTED** that a user manual will be provided with the tool.

248. The WPEB **NOTED** that the addition of layers such as MPAs and important areas for sharks (ISRAs) and mammals (IMMAs) would be useful to be combined into this application. The WPEB **NOTED** that currently polygons or other objects as shape files, have not been incorporated into the application but it should be possible to do this in the near future.

249. The WPEB **ENCOURAGED** the developers to collaborate with other organisations and tools such as the CMS atlas which is used to map important habitat areas and movements for migratory species.

250. The WPEB **NOTED** that IODA data from maps and profiles can be extracted to various formats (csv, Excel, Json, tabulated text files, images) and external data can be added on the maps but this can currently only be with GPS type coordinates (Longitude, Latitude, optionally with a value for each location) however polygons can be integrated in the future.

251. The WPEB **ENCOURAGED** researchers to trial this application and submit any suggestions for improvements through the website.

9. Bycatch, species interactions and ecosystem risk assessments for other shark species, marine mammals, seabirds and sea turtles

9.1 All bycatch species (all)

252. The WPEB **NOTED** information paper IOTC-2026-WPEB22(AS)-INF01: Safe handling and live release best practices master document development:

253. The WPEB **NOTED** the draft *Best Practices Guidelines for the Handling and Release of sharks, rays, seabirds and cetaceans*, which are intended to provide a standalone guidance document that can be updated as new research, technologies and operational experience become available. The WPEB **NOTED** that an intersessional group of cross-gear and cross-taxa experts had developed the draft, including consideration of safety, available handling tools and taxon-specific best practices based on the best available scientific knowledge, including recommended actions and actions to avoid.

254. **NOTING** the heterogeneity of IOTC fisheries and potential implementation challenges, particularly for small-scale vessels and vessels under 24 m with limited space, equipment and resources, as well as differing operational practices, the WPEB **AGREED** that the document should remain a best practices guidance document rather than a mandatory standard, with the primary objective of providing practical guidance to improve post-release survival while allowing flexibility to accommodate different fisheries and operational contexts. The WPEB **NOTED** that decisions on mandatory implementation and compliance requirements fall within the remit of the Commission and not the WPEB or Scientific Committee (SC).

255. The WPEB **REQUESTED** that interested CPCs report back on the effectiveness and challenges for implementing the handling guidelines so that the document can be adapted as required.

256. The WPEB **RECALLED** that in 2025, the WPEB recommended the following: "*The WPEB further NOTED that work on best practice handling guidelines is ongoing and frequently evolves. The WPEB therefore RECOMMENDED that the SC suggest that the Commission consider adopting a master document containing handling guidelines for all taxa, rather than requiring Resolutions containing such guidelines to be updated when new information becomes available. Future Resolutions could then refer back to this master document adopted by the SC. The WPEB AGREED that a small working group will work on compiling these intersessionally for review by the SC*."

257. The WPEB **RECOMMENDED** that the SC **ENDORSE** this best practice handling and release document (found in Appendix XVVII) for consideration by the Commission with the understanding that the master document would be reviewed and updated by the WPEB based on new information. The WPEB further **NOTED** that guidelines should ensure sufficient flexibility to accommodate different fisheries and operational contexts.

258. The WPEB **NOTED** that this document would be updated based on new research presented to the WPEB and endorsed by the group. The WPEB seeks guidance on whether this periodic review

and update requires the specific endorsement of the SC with each revision. The WPEB **NOTED** that there is precedence for endorsing a live document as the ROS data fields which have been systematically revised as necessary.

9.2 Mobulids

259. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-34 on Field guide to manta and devil rays of the world including species identification and best practice handling techniques, including the following abstract provided by the authors:

"Manta and devil rays (mobulids) face ongoing fisheries-related mortality across the Indian Ocean, with the IOTC area accounting for 72% of the estimated global catch of ~265,000 individuals annually. Recent research confirms declines exceeding 80%-99% for studies on populations in Pakistan, Sri Lanka, Mozambique, Indonesia, India and Kenya. In addition, all three oceanic devil ray species to Critically Endangered in 2025 (IUCN). The 30th IOTC Annual Meeting's update to Resolution 19/03, incorporating updated mobulid bycatch best practices (e.g., the mobulid grid) into safe handling and release guidelines now represents a comprehensive standard among tuna Regional Fisheries Management Organizations (tRFMOs). On the water, however, its effectiveness remains constrained by two persistent barriers: inadequate species-level catch reporting, and poor species identification stemming from visual similarity between species, post-mortem color changes, and inconsistent use of outdated taxonomy.

In direct response to these challenges, a coalition of scientists and practitioners developed the Field Guide to the Manta and Devil Rays of the World, a global, field-ready resource available in four languages (English, Spanish, French and Portuguese), distilling over two decades of taxonomic, ecological and handling knowledge into more than 200 images, maps and illustrations, including the first-ever documented reference for post-mortem color change and a new set of illustrated safe handling and release guidelines.

Building on this resource, this paper recommends that IOTC supports collaborative work to create vessel-ready visual tools, e.g., region-tailored live/dead specimen ID plates (e.g., visual reference cards/sheets for each species), an illustrated version of the adopted safe handling and release guidelines, and visual data collection aids designed to be accessible to fishers and translated into formats and languages to be defined jointly with the IOTC Secretariat and CPCs. Immediate next steps are to confirm these specifications and secure funding for development."

260. The WPEB **CONGRATULATED** the Manta Trust on the development of this field guide that includes species identification and handling guides and **WELCOMED** the potential for developing additional visual resources for use onboard fishing vessels. The WPEB **HIGHLIGHTED** the particular value of visual handling and species identification guides for addressing challenges associated with low literacy levels and improving the identification and handling of IOTC species onboard vessels.

261. The WPEB **SUGGESTED** that such resources could be developed by the Manta Trust and translated into the relevant IOTC languages to facilitate their wider use. The WPEB **NOTED** that funding opportunities would need to be explored to support the development and translation of these resources.

262. The WPEB **NOTED** that an application version of the guide is being considered, with a particular focus on trade and enforcement applications, which could eventually include the ability to upload photographs and identify species. The WPEB **NOTED** that this work is still at an early stage and that the guides are also available in electronic PDF (ePDF) format.

263. The WPEB **NOTED** that it was not yet clear whether the application could be linked to automated image-matching software, although the Manta Trust's existing MantaBase provides a

potential basis for photographic identification of manta rays and larger devil rays. The WPEB **NOTED** the potential to further develop similar functionality for other IOTC species in the future.

264. The WPEB **NOTED** that work is underway by Manta Trust to develop size–weight relationships for mobulid species.

9.3 Marine Mammals

265. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-33 on Cetacean Bycatch Mitigation Research in the Indian Ocean, including the following abstract provided by the authors:

"Following recommendations from the 21st Session of the WPEB, the International Whaling Commission (IWC), through the GEF-funded FAO Common Oceans Tuna Project, has initiated a pilot study in Sri Lanka to evaluate subsurface and illuminated drift gillnets as cetacean bycatch mitigation measures. Led by Blue Resources Trust, the project will compare bycatch and target catch rates across modified and traditional gillnets using a controlled experimental design with commercial fishers in the port of Jaffna. The IWC welcomes any feedback on the project and dissemination of future results."

266. The WPEB **NOTED** an update from the International Whaling Commission (IWC) on a cetacean bycatch mitigation pilot study being undertaken in Sri Lanka, following the WPEB21 recommendation to investigate subsurface gillnets as a potential mitigation measure for bycatch. The pilot, supported through the GEF-funded FAO Common Oceans Tuna Project and led by Blue Resources Trust, is evaluating subsurface and illuminated gillnets against traditional surface-set gillnets through controlled trials with commercial fishers in Jaffna, in northern Sri Lanka. The study is collecting information on cetacean bycatch, target catch, fishing effort and operational factors, with GPS and photographic data being used to document fishing locations and bycatch species.

267. The WPEB **NOTED** preliminary results from related trials on the east coast of Sri Lanka, during which 60 small cetaceans were captured across 774 gillnet sets, with the lowest number of captures recorded in subsurface nets. The WPEB **NOTED** that additional data are required to draw robust conclusions, particularly given the zero-inflated nature of the bycatch data.

268. The WPEB **ENCOURAGED** the continuation of the pilot and **REQUESTED** that final results include an assessment of the effectiveness of the mitigation measures in reducing cetacean bycatch, together with their effects on target catch, fishing operations and, where possible, economic considerations for participating fishers.

269. The WPEB also **NOTED** the IWC's intention to undertake a further pilot study in Tanzania investigating the use of traps as an alternative to bottom-set gillnets, with the aim of assessing their potential to reduce bycatch of Indian Ocean humpback dolphins while maintaining economically viable target catches.

270. The WPEB **ENCOURAGED** continued collaboration and information exchange on cetacean bycatch mitigation initiatives across the Indian Ocean and welcomed future updates on both the Sri Lankan and Tanzanian pilot studies.

271. The WPEB **ENCOURAGED** the full results of these two studies to be presented to the WPEB when these are available.

9.4 Seabirds

272. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-11 on Assessing Seabird Interactions in the Sri Lankan Tuna Longline Fishery: An Integrated Analysis of Fishers' Perceptions, Observer Data, and Logbook Records, including the following abstract provided by the authors:

"Although Seabird interactions in tuna longline fisheries are a global conservation concern, information on Seabird interactions with tuna longline fisheries operating in the Northern Indian Ocean remains limited. This study presents the integrated assessment of seabird interactions with the Sri Lankan tuna longline fishery, with fisher's perception evaluated using a pre-structured questionnaire, observer program data (2020-2025)and fisheries logbook records (2020-2025). The target group assessed via the questionnaire survey was skippers engaged in the tuna longline fishery within the Sri Lankan EEZ and high seas. According to the logbook data, longline fishing operations were concentrated in three distinct regions: The Western- central Indian Ocean, the Southern Indian Ocean, and the Bay of Bengal. 57,399 sets from 19,259 fishing trips were analyzed. Longline sets deployed during the scientific observer programme were representative of the fishing areas selected for the analysis. No seabird entangling was recorded in the logbook for the 2020-2025 period, while observer data documented vessel-associated behavior of Seabirds but no confirmed hooking or entanglements. Petrels and Terns were the species commonly observed around fishing vessels, particularly under rough sea conditions, and frequently feeding on discarded fish offal. Sixty-three percent of respondents indicated that seabirds caused no disruptions to fishing operations and therefore did not consider seabird-related observations as requiring reporting. However, respondents demonstrated limited knowledge on the importance of recording seabird interactions (74.2% of respondents) and seabird identification at least up to major groups (81% of respondents). The study highlighted the importance of strengthening fisher awareness, species identification, monitoring and reporting systems to support evidence-based implementation of IOTC seabird conservation and bycatch mitigation measures."

273. The WPEB **WELCOMED** the presentation on the integration of logbook, observer and survey data to assess seabird interactions. The WPEB **NOTED** that seabirds were frequently observed attending vessels, but that no direct gear interactions were detected during the monitored effort, while **HIGHLIGHTING** that the low level of observer coverage limited the conclusions that could be drawn.

274. The WPEB **AGREED** that strengthening monitoring should be a priority moving forwards, including increasing observer coverage, conducting crew-based surveys within EEZs, focusing monitoring on areas and periods where seabirds are frequently reported around vessels, improving species identification and reporting, and continuing the review of available evidence.

275. The WPEB **NOTED** that seabirds are reportedly used in some artisanal fisheries in Japan as an indicator of fishing grounds, while information from Sri Lanka suggested that fishers primarily rely on traditional knowledge rather than seabirds to identify fishing grounds. The WPEB **NOTED** that seabirds are observed around vessels in some fisheries but were not generally considered to interfere with fishing operations, while **HIGHLIGHTING** the limited availability of systematic information and the potential for increased monitoring to provide further evidence.

276. The WPEB **NOTED** similar observations reported at ICCAT ecosystems and bycatch meeting, where direct interactions between tropical seabirds and longline fisheries appeared to be rare. The WPEB **HIGHLIGHTED**, however, that potential ecosystem effects of fishing should also be considered, including facilitated foraging by seabirds when tuna drive prey towards the surface and the potential effects of removing tuna on such interactions.

277. The WPEB **NOTED** that work examining how gear characteristics influence seabird interactions remains ongoing.

278. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-25 on CCSBT seabird risk assessment approach, including the following abstract provided by the authors:

"A quantitative, spatially-explicit risk assessment for 25 taxa of albatrosses and petrels potentially caught in surface longline fisheries by participating Members of the CCSBT (Australia, Japan, Korea,

New Zealand, South Africa, and the Fishing Entity of Taiwan) is described, which reproduces the original report tabled at CCSBT 32 in October 2025. The 2025 Spatially Explicit Fisheries Risk Assessment (SEFRA) builds on the 2024 SEFRA tabled at the CCSBT's ERSWG15 in April 2024. Diagnostics suggest that the 2025 SEFRA model had converged, fitted the data very well, and did not appreciably update any of the priors for biological inputs. The key concerns raised about the 2024 iteration have been resolved in the 2025 iteration in that: conflicts between estimated overlap of fishing and seabirds and the observed captures (i.e., the presence of observed captures where the estimated overlap was zero) have been resolved; and the fitted models no longer require implausible updates to the priors on biological inputs. Updating the available information on seabird distributions reduced the number of "zero overlap captures" somewhat but fitting to genus level (or higher) capture data (as opposed to species level, where available) was by far the most influential change." – see paper for full abstract.

279. The WPEB **NOTED** the methodology used by the CCSBT ERS technical working group in 2025 to assess the risk to seabirds from surface longline fisheries of CCSBT members in the southern hemisphere.

280. The WPEB **NOTED** that the CCSBT ERS Working Group is currently considering the SEFRA outputs to identify areas of elevated risk based on the spatial overlap between priority seabird species and longline fishing effort. The WPEB **NOTED** that the outcomes of this work may inform consideration of management responses, including enhanced monitoring, strengthened seabird bycatch mitigation, and potential coordination of fishing effort, with further consideration by the CCSBT Commission expected in October 2026. The WPEB **AGREED** that the CCSBT Seabird Strategy outputs should be used to inform the development of an IOTC Seabird Strategy. The WPEB **NOTED** the importance of ensuring that any future IOTC Seabird Strategy is complementary to, and where appropriate aligned with, the approach adopted by CCSBT.

281. The WPEB **AGREED** that development of an IOTC Seabird Strategy could be deferred for one year to allow the outcomes of the CCSBT Commission discussions to be considered and to facilitate the development of a common and shared approach between CCSBT and IOTC. The WPEB **NOTED** that technical discussions and preparatory work could continue intersessionally, with a view to considering the development of an IOTC Seabird Strategy at the 2027 WPEB meeting.

282. The WPEB **NOTED** a proposal to develop a review paper summarising available information on seabird interactions in IOTC fisheries and the mitigation approaches currently applied across IOTC fleets. The WPEB **NOTED** that this review could be developed by a small group of interested WPEB scientists and could provide a technical resource to support consideration of an IOTC Seabird Strategy in 2027.

283. The WPEB **NOTED** that genetic approaches could potentially provide additional information on seabird mortality and abundance, although such approaches were not currently incorporated into the SEFRA, and **NOTED** that seabird population size can be comparatively well monitored through breeding colonies.

284. The WPEB **NOTED** that SEFRA outputs and the resulting CCSBT Seabird Strategy can inform the development of an IOTC seabird strategy, including identification of areas where additional observer coverage or other mitigation measures may be appropriate.

285. The WPEB **AGREED** that waiting for the outcome of the CCSBT Commission discussions would help ensure that any IOTC strategy is complementary to existing CCSBT measures. The WPEB **ENCOURAGED** greater engagement by CPCs and ACAP in future discussions and **NOTED** Australia's willingness to lead or contribute to the development of an IOTC seabird strategy.

286. The WPEB **AGREED** that further consideration of an IOTC seabird strategy should take account of the outcomes of the CCSBT Commission discussions and **NOTED** that technical material, including a draft CCSBT seabird strategy where appropriate, could potentially be shared to support future WPEB discussions.

287. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-37 on ACAP Guidelines to measure the sink rates of baited hooks in pelagic longline fisheries using Time-Depth Recorders, including the following abstract provided by the authors:

"IOTC Resolution 23/07 On Reducing the Incidental Bycatch of Seabirds in Longline Fisheries has tasked the Scientific Committee (SC) to develop advice on best practice branch line weighting. In 2024, the 20th Working Party on Ecosystems and Bycatch Assessment Meeting (WPEB20 AS) addressed this request. The WPEB noted that IOTC's Resolution 23/07 partially aligns with ACAP's advice, but branch line weighting remains a major area of divergence as fisheries might experience difficulties in implementing certain branch line configurations. Noting that ACAP has recently recommended that branch lines achieve a minimum sink rate under experimentally controlled conditions of 0.5 m/s to 5 m depth, WPEB has requested that ACAP develop clear protocols for measuring sink rates. In June 2026 ACAP's Advisory Committee endorsed ACAP Guidelines for Measuring the Sink Rates of Baited Hooks in Pelagic Longline Fisheries Using Time-Depth Recorders. This paper provides those ACAP Guidelines for consideration by WPEB when continuing its work to provide advice to the IOTC Commission on best practice branch line weighting. The WPEB is also encouraged to take into account ACAP's Best Practice Advice on branch line weighting when developing the requested advice for the IOTC Commission."

288. The WPEB **RECALLED** Resolution 23/07, which requests the SC to continue providing recommendations to the Commission on advances and best practices in seabird bycatch mitigation, including advice on branchline weighting. The WPEB **NOTED** that the proposed branchline configuration differs from the specifications of existing mitigation measures and was developed primarily to investigate alternative configurations.

289. The WPEB **HIGHLIGHTED** the importance of assessing safety implications, particularly in relation to bite-offs and the potential for weighted branchlines to fly back towards the vessel and crew.

290. The WPEB **NOTED** that existing safety guidelines on branchline weighting were developed several years ago based on research and may require review and updating. The WPEB **EMPHASISED** that safety considerations should be incorporated into any further testing of branchline weighting.

291. The WPEB **NOTED** that sink rate could provide a useful indicator for evaluating weighted branchline configurations. The WPEB **NOTED** that weighted lines offer fishers a broader range of options that provide effective mitigation. The WPEB **NOTED**, however, that sink rate may be difficult to measure consistently and could present challenges for compliance monitoring. The WPEB **NOTED** that the current sink-rate protocol is intended primarily as a research tool for comparing configurations and identifying effective mitigation options, rather than as a measure for at-sea compliance verification. The WPEB **NOTED** that options for compliance monitoring could be considered in future reviews of seabird mitigation measures.

292. The WPEB **NOTED** that work was underway to collate information on injuries associated with branchline fly-backs and **ENCOURAGED** efforts to develop practical safety advice, including the use of sliding weights, keeping the mainline submerged for as long as possible, considering vessel direction relative to the mainline, and appropriate personal protective equipment (PPE) for crew. The WPEB **NOTED** that this information would be submitted to ICCAT and could subsequently be shared with the WPEB.

9.5 Sea turtles

293. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-23 on A review of technical and operational measures to mitigate bycatch of marine turtles in commercial fisheries, including the following abstract provided by the authors:

"Marine turtles are incidentally killed in a range of fisheries throughout the world and levels of global sea turtle bycatch have been estimated at between 85,000 and 250,000 individuals annually, mainly by pelagic fisheries targeting tuna and billfish. Turtles are killed when they become hooked and drown in longline fisheries, become entangled in netting used in trawl, purse seine or gillnet fisheries, or suffer stress and trauma during retrieval of fishing gear when animals are captured. This bycatch in active fishing gear is one of the biggest threats to marine turtle populations. As these species are long-lived with high adult survival and low breeding productivity, anthropogenic activities that increase mortality levels, such as fisheries bycatch, can have significant, long-term population impacts.

This review assesses technical and operational bycatch mitigation measures across four major gear types – trawl, purse seine, set and gillnet, and longline fisheries – drawing from peer-reviewed literature and grey literature." – see paper for full abstract

294. The WPEB **NOTED** that Resolution 12/04 contains significant gaps in relation to current scientific knowledge, and that a review of the Resolution is intended to be presented at a future meeting.

295. The WPEB **DISCUSSED** the mixed results of studies on longline mitigation measures, in particular circle hooks. Some studies had not found significant reductions in turtle bycatch associated with circle hook use, while reductions in target catches were observed. Other studies evaluating hook shape and hook size in pelagic longline fisheries had found significant reductions in bycatch were observed in some fisheries. Also mentioned was a study conducted in the Pacific Ocean which had reported increased mouth injuries in some turtles caught on circle hooks. It was suggested that alternative gear modifications, including trap-line or loop-gear configurations and deep-setting strategies, may provide greater benefits and warrant further investigation.

296. The WPEB **NOTED** that studies across several oceans have generally found that circular hooks may not significantly reduce turtle bycatch in some fisheries and may reduce target catch, particularly fleets specifically targeting swordfish in the Spanish fleet. The WPEB **NOTED** that some studies have also reported potential negative effects on sharks, including increased mortality of shortfin mako shark, although other studies have found that larger circular hooks may reduce shark mortality by reducing deep hooking and limiting damage.

297. The WPEB **NOTED** that preliminary studies of trapline terminal gear indicate potential for reducing turtle bycatch, as turtles appear less attracted to the gear and any entanglements observed were generally outside the mouth and could be readily addressed by cutting the line. The WPEB **NOTED** that alternative mitigation measures, including deeper longline setting, are also being used by the Spanish fleet in some areas.

298. The WPEB **NOTED** that a European study reviewing the performance of circular hooks found that their use across the EU fleet could substantially reduce target catches, particularly swordfish, while providing limited reduction in turtle bycatch. The WPEB **HIGHLIGHTED** the need to consider the effects of circular hooks on sharks when evaluating their use as a turtle bycatch mitigation measure and **NOTED** that relevant studies could be provided to the authors for consideration in the review.

299. The WPEB **NOTED** that other measures such as bait type, hook size and setting depth were also investigated during this review.

300. The WPEB **HIGHLIGHTED** that the effectiveness and impacts of bycatch mitigation measures including circle hooks may vary among species, reflecting differences in foraging behaviour and ecology. The WPEB **NOTED** that leatherback turtles, for example, exhibit different foraging behaviour from other turtle species, and **ENCOURAGED** consideration of species-specific effects when evaluating mitigation measures.

301. The WPEB **HIGHLIGHTED** that the effectiveness of mitigation measures depends on the region, fishery and gear configuration in which they are implemented. The WPEB **NOTED** that factors such as setting depth and bait type should be considered when evaluating measures and **NOTED** that the review paper specifies the regions and fisheries in which each measure has been tested.

302. The WPEB **NOTED** the current IOTC prohibition on the use of LED lights on fishing gears which prohibits their use as a mitigation measure while **NOTING** that LED lights are used as a bycatch mitigation measure in other fisheries. The WPEB **HIGHLIGHTED** the need to clarify the basis for the current prohibition and consider whether amendments may be appropriate in relation to bycatch mitigation.

303. The WPEB **RECALLED** that in the northern Indian Ocean, sub-surface gillnet configurations have reduced bycatch of turtles and other vulnerable taxa by approximately 90% relative to traditional surface-set gillnets. Although some entanglement in ropes continues to occur, turtle interactions with the net panels themselves were substantially reduced. That this approach could be broadly applied within offshore gillnet fleets operating in the region.

304. The WPEB **NOTED** that the effectiveness of mitigation measures is influenced by a combination of factors including hook type, hook size, bait type and depth of deployment, and **NOTED** that mitigation strategies should be assessed holistically, taking into account potential trade-offs between reductions in bycatch and impacts on target catch rates.

305. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-24: Sea turtle bycatch and mitigation in the Indian Ocean and South-East Asia region: results from the IOSEA sea turtle bycatch questionnaire consultation, 2025, including the following abstract provided by the authors:

“Bycatch in commercial and artisanal fisheries is considered the greatest threat to sea turtles in the Indian Ocean and South-East Asia (IOSEA) region, a region which hosts six of the world's seven species of marine turtles. In response to Activity 8 of the Work Programme adopted at the 9th Meeting of the Signatory States (MOS9) and CMS Decision 14.33, the Steering Group on Bycatch of the IOSEA Marine Turtle MOU Advisory Committee developed a questionnaire to elicit feedback on people's knowledge of sea turtle bycatch in their respective countries and the current use of mitigation measures to safeguard sea turtles. The questionnaire, comprising 39 questions over nine sections, was deployed online in April 2025 to 354 conservation practitioners, academics and government officials across the region, and garnered 135 responses (a 40.7% response rate) from 30 countries.

Green and hawksbill turtles were the most frequently reported species, comprising 59.7% of reported bycatch in commercial fisheries and 63.5% in artisanal fisheries, followed by olive ridley, leatherback and loggerhead turtles. Trawls, longlines and gillnets together comprised 52.8% of commercial fishing effort, and gillnets a further 20% of artisanal fisheries; given the widespread use of gillnets and the difficulties in enforcing regulatory measures, it is likely gillnets present the largest challenge in addressing bycatch of sea turtles. Turtle Excluder Devices were the best-known mitigation measure but were reportedly barely used across the region, with the highest levels of uptake in Australia. Of particular concern was the prevalence of Do not know responses: over 40% of respondents indicated having no knowledge of what mitigation measures were in place in any of the fisheries, commercial or artisanal. A lack of technical know-how and skills, a lack of funding, and a

lack of prioritisation by governments were ranked as the key challenges, while national and international policy support and funding were ranked as the highest priority requirements for moving forward. The magnitude of bycatch is likely very high, in the tens of thousands of sea turtles per year, and turtles will continue to be taken at an alarming rate unless proactive measures are taken to address the particular impacts of different fisheries and the threats these pose to turtle species in the region."

306. The WPEB **NOTED** the results of a questionnaire conducted under the auspices of the Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA Marine Turtle MOU). The questionnaire sought expert views regarding turtle interactions with fisheries across the Indian Ocean region.

307. The WPEB **NOTED** that responses suggested that a potentially large number of marine turtles are taken in commercial fisheries throughout the region. However, the WPEB also **NOTED** that a substantial proportion of responses were classified as "don't know", highlighting considerable uncertainty and important information gaps regarding the scale and nature of turtle-fishery interactions. The WPEB further **NOTED** that the impacts of fisheries differ among turtle species and that some apparent patterns may reflect limited understanding of turtle distribution, behaviour and fisheries operations on the side of respondents rather than actual differences in risk.

308. The WPEB **NOTED** that the main conclusions of the questionnaire analysis were that turtle bycatch is likely substantial across many fisheries, mitigation measures remain inadequately implemented across the Indian Ocean, and substantial improvements are required in monitoring and reporting systems.

309. The WPEB **NOTED** that assessing the impact of fisheries on turtle populations requires consideration of the overall population size and trends of the species concerned. The WPEB **NOTED** that population abundance remains poorly understood for many species, particularly given their wide distributions, long time to maturity and difficulties in estimating abundance. The WPEB **NOTED** that nesting beach surveys can provide a useful proxy for population trends based on the number of nesting females, but **HIGHLIGHTED** that these surveys do not account for juveniles or males. The WPEB **NOTED** that low juvenile survival further complicates population assessments and **HIGHLIGHTED** the need to give greater attention to species with smaller or more vulnerable populations, particularly leatherback and hawksbill turtles.

310. The WPEB **NOTED** that one of the key findings was the magnitude of turtle bycatch and the relatively limited adoption of known mitigation measures.

311. The WPEB **NOTED** that the study was not specifically designed around IOTC fisheries or regional fisheries management processes, but rather aimed to provide an independent assessment of the magnitude of turtle catches and the use of mitigation measures. The WPEB **NOTED** that limitations in reporting and public availability of information remain a significant challenge. The questionnaire was anonymous and therefore did not allow respondents to be linked to specific IOTC fisheries, although many respondents appeared to be from government and fisheries sectors. The WPEB **HIGHLIGHTED** the need for greater reporting and sharing of information on mitigation measures to improve understanding of their implementation across the region.

312. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-40 on Operation-standardized spatial and temporal analysis of marine turtle interactions in Pakistan's tuna gillnet fishery identifies a robust interaction-priority area, including the following abstract provided by the authors[1]:

[1] The terminology belongs to the authors; IOTC is considering the science, not adjudicating geographic nomenclature

"Marine turtle interactions with tuna gillnet fisheries remain an important conservation concern, yet fishery-dependent records can be difficult to interpret when the underlying distribution of fishing activity is not explicitly incorporated. We analysed 2012–2019 data from WWF-Pakistan's crew-based observer programme for the tuna gillnet fishery of the northern Arabian Sea, quantifying temporal variation, biological composition, immediate release condition and spatial structure of marine turtle interactions within a zero-inclusive, operation-standardized analytical framework. The primary rate-model population comprised 30,195 eligible fishing operations, including 845 turtle-positive operations, while 955 definite-capture turtle individuals were recorded in the biological dataset. Operation-standardized interaction rates declined markedly through the monitoring period after adjustment for fishing phase, whereas broad fishing-phase differences were not supported after accounting for year. Species-level interpretation was constrained because 98.0% of captured turtles were reported under the aggregate category "Turtle spp." Among 782 eligible single-turtle events with determined release condition, 3.96% were recorded as released dead, representing immediate condition at release only. Formal spatial hotspot analysis on the IOTC 1×1 lattice identified four contiguous cells with significantly elevated local clustering for both turtle-individual burden and turtle-positive-operation occurrence. These cells remained comparatively stable under leave-one-year-out analysis, fishing-method omission, operation and vessel bootstrap resampling, and a secondary reported-net-km effort sensitivity. The resulting connected area represents the strongest internally supported marine turtle–gillnet interaction-priority area within the monitored fishery and provides a practical focus for enhanced monitoring and bycatch mitigation. However, the fishery-dependent evidence does not establish turtle abundance, habitat preference, exact entanglement locations or biological movement connectivity. Independent telemetry, tagging, genetic or other movement-based evidence would be required to determine whether the identified area corresponds to a biological Blue Corridor."

313. The WPEB **NOTED** that the study utilised data collected through a crew-based observer programme and examined the distribution of both turtle interactions and fishing effort to identify areas and periods of elevated interaction risk.

314. The WPEB **NOTED** that the study explicitly included records of both interaction and non-interaction events, allowing interaction rates to be evaluated relative to fishing activity, acknowledging that the inclusion of zero-interaction observations provides a more robust basis for analysing turtle-fishery interactions than datasets based solely on recorded bycatch events.

315. The WPEB **NOTED** that the use of fishery-dependent information to support spatial risk assessments could contribute to the development of more targeted and effective bycatch mitigation strategies. The WPEB further **NOTED** that information on the distribution of fishing effort is an important component of understanding fisheries impacts on vulnerable species.

316. The WPEB **NOTED** that, although the study focused on marine turtles, the underlying dataset has broader applicability and could support similar analyses for other bycatch taxa, such as sharks, rays and other vulnerable species frequently interacting with gillnet fisheries.

10.WPEB Program of Work (Research and Priorities)

10.1 Revision of the WPEB Program of Work 2027-2031

317. The WPEB **NOTED** paper IOTC-2026-WPEB22(AS)-09 on WPEB Program of Work which provided the WPEB21 with the latest Program of Work (2026-2030) with an opportunity to consider and revise this for 2027-2031 by taking into account the specific requests of the Commission and Scientific Committee, given the current status of resources available to the IOTC Secretariat and CPCs.

318. **NOTING** that many items on the PoW for the WPEB relate to improving data which are valid for many working parties, the WPEB **REQUESTED** the Secretariat to summarise common issues across Working Parties for discussion during the meeting. The WPEB further **REQUESTED** the WPDCS to ensure that their PoW is harmonised with all the Working Parties then take any common issues to the SC for discussion and endorsement.

319. The WPEB **NOTED** that many teleost species are also caught as bycatch in IOTC fisheries and **NOTED** that currently no Working Party is specifically considering these species. The WPEB **ENCOURAGED** CPCs to present information on these species to the WPEB in the future.

320. The WPEB **RECOMMENDED** that the SC consider and endorse the WPEB Program of Work (2027–2031), as provided in Appendix XVV.

10.2 Development of priorities for an Invited Expert at the next WPEB meeting

321. The WPEB **AGREED** to the following core areas of expertise and priority areas for contribution that need to be enhanced for the next meeting of the WPEB in 2027, by the Invited Expert:

- Indicator analysis;
- Data poor methods for assessments.

11.Other Matters

11.1 Date and place of the 23rd and 24th Working Party on Ecosystems and Bycatch

322. The WPEB **NOTED** the intention to continue to hold the WPEB back-to-back with the WPB in early to mid-September and further **NOTED** that the WPEB will be held first in 2027.

323. The WPEB **NOTED** that the Shanghai Ocean University expressed interest in hosting both WPEB and WPB in 2027 and **THANKED** them for this offer.

324. The WPEB **REQUESTED** CPCs that may be interested in hosting the 24th Working Party on Ecosystems and Bycatch to contact the Secretariat.

325. The WPEB **RECOMMENDED** that the SC engage with ICCAT to ensure that there are no future overlaps between RFMO meetings, especially those likely to share participating CPCs and scientists

11.2 Review of the draft, and adoption of the Report of the 22nd Session of the WPEB

326. The WPEB **RECOMMENDED** that the Scientific Committee consider the consolidated set of recommendations arising from WPEB22, provided at Appendix XVVII, as well as the management advice provided in the draft resource stock status summary for each of the eight shark species, as well of those for marine turtles, seabirds, cetaceans and mobulids:

Sharks

- Blue shark (*Prionace glauca*) – Appendix VII
- Oceanic whitetip shark (*Carcharhinus longimanus*) – Appendix VIII
- Scalloped hammerhead shark (*Sphyrna lewini*) – Appendix IX
- Shortfin mako shark (*Isurus oxyrinchus*) – Appendix X
- Silky shark (*Carcharhinus falciformis*) – Appendix XI
- Bigeye thresher shark (*Alopias superciliosus*) – Appendix XII
- Pelagic thresher shark (*Alopias pelagicus*) – Appendix XIII
- Porbeagle shark (*Lamna nasus*) - Appendix XIV

Other species/groups

- Marine turtles – Appendix XV

- Seabirds – Appendix XVI
- Marine mammals – Appendix XVII
- Mobulids – Appendix XVIV

327. The report of the 22nd Session of the Working Party on Ecosystems and Bycatch (IOTC–2026–WPEB22(AS)–R) was **ADOPTED** by correspondence.

APPENDIX I
LIST OF PARTICIPANTS

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APPENDIX II
AGENDA FOR THE 22ND WORKING PARTY ON ECOSYSTEMS AND BYCATCH ASSESSMENT MEETING

Date: 14-18 September 2026
Location: Hotel Le Battant des Lames, Saint-Pierre, La Réunion
Time: 09:00 – 17:00 (La Réunion time, GMT+4)
Chair: Dr Charlene da Silva (South Africa)
Vice-Chair: Dr Philippe Sabarros (EU, France) and Dr Yanan Li (China)

1. **OPENING OF THE MEETING** (Chair)

2. **ADOPTION OF THE AGENDA AND ARRANGEMENTS FOR THE SESSION** (Chair)

3. **THE IOTC PROCESS: OUTCOMES, UPDATES AND PROGRESS** (IOTC Secretariat)

   3.1. Outcomes of the 28th Session of the Scientific Committee (IOTC Secretariat)
   3.2. Outcomes of the 30th Session of the Commission (IOTC Secretariat)
   3.3. Review of the Conservation and Management Measures relevant to Ecosystems and Bycatch (IOTC Secretariat)
   3.4. Progress on the recommendations of WPEB21 (IOTC Secretariat)

4. **REVIEW OF THE DATA AVAILABLE AT THE SECRETARIAT FOR BYCATCH SPECIES** (All)

   4.1. Review of data available at the Secretariat for bycatch species (all)
   4.2. Data re-estimation for bycatch species (all)

5. **REVIEW OF NATIONAL BYCATCH ISSUES IN IOTC MANAGED FISHERIES AND NATIONAL PLANS OF ACTION** (sharks; seabirds; marine turtles) (CPCs and IOTC Secretariat)

   5.1. Updated status of development and implementation of NPOA for seabirds and sharks, and the implementation of the FAO guidelines to reduce marine turtle mortality in fishing operations (CPCs)
   5.2. Updated status of national fisheries and bycatch (CPCs)

6. **REVIEW INFORMATION ON BIOLOGY, ECOLOGY, FISHERIES AND ENVIRONMENTAL DATA RELATING TO SHARKS** (all)

   6.1. Presentation of new information available on sharks (all)
   6.2. Collaboration with international organisations of interest to WPEB (all)
   6.3. Shark research work plan review (all)

7. **REVIEW OF NEW INFORMATION ON INDICATORS AND DATA-POOR ASSESSMENTS** (all)

   7.1. Review of indicators (all)
   7.2. Data-poor assessments (all)
   7.3. Update on MSE for blue shark (all)

8. NEW INFORMATION ON BIOLOGY, ECOLOGY, FISHERIES AND ENVIRONMENTAL DATA RELATING TO ECOSYSTEMS AND BYCATCH SPECIES (all)

8.1. Review new information on the environment and ecosystem interactions and modelling, including climate change issues affecting pelagic ecosystems in the IOTC area of responsibility (all)

- Ecosystems and climate
- Impact of gears
- Mitigation devices/techniques

8.2. Assessment of the impacts of climate change on IOTC fisheries and bycatch species (all)

9. BYCATCH, SPECIES INTERACTIONS, AND ECOSYSTEM RISK ASSESSMENTS FOR OTHER SHARK SPECIES, MARINE MAMMALS, SEABIRDS, AND SEA TURTLES (all)

9.1. All bycatch species (all)

- Review of the minimum standards for safe handling and live release procedures (master document development) (all)

9.2. Other sharks and rays (all)

- Review existing data and information relating to the life history and conservation status of whale sharks (all)

9.3. Mobulids (all)

- Review new information on mobulid biology, ecology, fisheries interactions and bycatch mitigation measures (all);
- Review of indicators for mobulids (all)

9.4. Marine mammals (all)

- Best practice guidelines for safe release and handling of cetaceans (all);
- Review new information on marine mammal biology, ecology, fisheries interactions and bycatch mitigation measures (all);
- Development of management advice on the status of marine mammal species (all)

9.5. Seabirds (all)

- Review new information on seabird biology, ecology, fisheries interactions and bycatch mitigation measures (all)
- Developing advice on best practices for branch weighting
- Development of draft work plan (all)

9.6. Sea turtles

- Review new information on marine turtle biology, ecology, fisheries interactions and bycatch mitigation measures (all)

10. WPEB PROGRAM OF WORK (RESEARCH AND PRIORITIES) (all)

10.1. Revision of the WPEB Program of Work 2027-2031 (Chairperson and IOTC Secretariat)

10.2. Development of priorities for an Invited Expert at the next WPEB meeting (Chairperson)

11. OTHER MATTERS (Chair)

11.1. Date and place of the 23rd and 24th Working Party on Ecosystems and Bycatch (Chair)

11.2. Review of the draft, and adoption of the Report of the 22nd Session of the Working Party on Ecosystems and Bycatch (Chairperson)

APPENDIX III
LIST OF DOCUMENTS

Document	Title
IOTC-2026-WPEB22(AS)-01a	Agenda of the 22nd Working Party on Ecosystems and Bycatch
IOTC-2026-WPEB22(AS)-01b	Annotated agenda of the 22nd Working Party on Ecosystems and Bycatch Assessment Meeting
IOTC-2026-WPEB22(AS)-02	List of documents of the 22nd Working Party on Ecosystems and Bycatch Assessment Meeting
IOTC-2026-WPEB22(AS)-03	Outcomes of the 28th Session of the Scientific Committee (IOTC Secretariat)
IOTC-2026-WPEB22(AS)-04	Outcomes of the 30th Session of the Commission (IOTC Secretariat)
IOTC-2026-WPEB22(AS)-05	Review of Conservation and Management Measures relevant to ecosystems and bycatch (IOTC Secretariat)
IOTC-2026-WPEB22(AS)-06	Progress made on the recommendations and requests of WPEB21 and SC28 (IOTC Secretariat)
IOTC-2026-WPEB22(AS)-07	Review of the statistical data and fishery trends for ecosystems and bycatch species (IOTC Secretariat)
IOTC-2026-WPEB22(AS)-08	Status of development and implementation of National Plans of Action for seabirds and sharks, and implementation of the FAO guidelines to reduce marine turtle mortality in fishing operations (IOTC Secretariat)
IOTC-2026-WPEB22(AS)-09	Revision of the WPEB Program of Work (2027–2031) (IOTC Secretariat & Chairperson)
IOTC-2026-WPEB22(AS)-10	Future trajectories of the tropical Indian Ocean pelagic ecosystem under fisheries management and climate change scenarios (Amate R. ,Juan-Jordá José, Xavier C, Iker Z, Eider A)
IOTC-2026-WPEB22(AS)-11	Assessing Seabird Interactions in the Sri Lankan Tuna Longline Fishery: An Integrated Analysis of Fishers' Perceptions, Observer Data, and Logbook Records (T. Balawardana)
IOTC-2026-WPEB22(AS)-12	Application of per-recruit and length-based data-limited assessment methods to pelagic sharks in the Indian Ocean (R. Coelho and D. Fu)
IOTC-2026-WPEB22(AS)-13	Shark Species Composition and Size Distribution in Indonesian Longline Fisheries Operating in the Indian Ocean. (T. Noegroho, I. Jatmiko, Y. Hanny R, P. Lestari, L. Sadiyah, F. Satria and P. Suadela)
IOTC-2026-WPEB22(AS)-14	Estimation of shortfin mako shark discards from the South African Longline Fleet in the IOTC using the Bycatch Estimator tool. (C. da Silva and W. West)
IOTC-2026-WPEB22(AS)-15	Management Procedure for blue shark in the Indian Ocean: current project status (Edwards, C.)

Document	Title
IOTC-2026-WPEB22(AS)-16	Update on bycatch management and ecosystem-based fisheries management in Madagascar fisheries (case of shark and ray in small-scale fisheries sector) (T. Andriamaharo Ny Aina)
IOTC-2026-WPEB22(AS)-17	Bycatch Presence Recorded in Purse Seine Fishing Logbooks from the Andaman Sea of Thailand (N. Polchoke, A. Sangnarin, W. Thitipongtraku)
IOTC-2026-WPEB22(AS)-18	Exploratory assessment of growth, maturity and Length-Based Spawning Potential Ratio (LB-SPR) of priority shark species from Kenya's industrial longline fishery (B. K. Kiilu, K. Wachira, B. Fulanda, E. Kimani, G. Okemwa, Z. Ogari and E. Mueni)
IOTC-2026-WPEB22(AS)-19	Standardized CPUE of Silky Shark (Carcharhinus falciformis) from the Taiwanese Large-Scale Tuna Longline Fishery in the Indian Ocean, 2005–2025 (W. P. Tsai)
IOTC-2026-WPEB22(AS)-20	First insights into the use of traplines in the Portuguese pelagic longline fleet in the Indian Ocean (R. Coelho, D. Rosa and P. G. Lino)
IOTC-2026-WPEB22(AS)-21	Optimizing tori line performance through terminal towing configurations in tuna longline fisheries (Xuefang)
IOTC-2026-WPEB22(AS)-22	Field application and evaluation of safe-release methods for sharks bycaught in tropical tuna purse-seine fisheries (Xuefang)
IOTC-2026-WPEB22(AS)-23	A review of technical and operational measures to mitigate bycatch of marine turtles in commercial fisheries (Breimann, L. and Baker, B.)
IOTC-2026-WPEB22(AS)-24	Sea turtle bycatch and mitigation in the Indian Ocean and South-East Asia region (Pilcher, N., Bache, S., Baldwin, R., Barret, M., Islam, Z., Jani, J. M., Phillott, A. D., Shahid, U., Sutaria, D., Tiwari, M., and Jahan, D.)
IOTC-2026-WPEB22(AS)-25	CCSBT seabird risk assessment approach (Peatman T. and Edwards C.)
IOTC-2026-WPEB22(AS)-26	Conservation status and Life History of Whale Shark (Rhincodon typus) in the Indian Ocean (Bell J., da Silva C., Murray J., McCully Phillips S., Roebuck E., Pierce S., Pillans R. and Ellis J.)
IOTC-2026-WPEB22(AS)-27	Migratory sharks and rays in the Indian Ocean: chronology of the work of IOTC, CMS and the sharks MOU, potential synergies and emerging issues (Acevado-Ramirez, P. A., Ellis, J. R., Nelson, L., and Pauly, A.)
IOTC-2026-WPEB22(AS)-28	Update on BTH PRM project (Romanov E.)
IOTC-2026-WPEB22(AS)-29	Exploring ocean patterns and trends at your fingertips with the newly released Indian Ocean Digital Atlas (Marsac F. and Noel, E.)
IOTC-2026-WPEB22(AS)-30	Reconstructing Historical Catch Series for Blue Shark (Prionace glauca) and Shortfin Mako (Isurus oxyrinchus) in the Indian Ocean: Methodological Approaches and Uncertainty Quantification. (Rice J)
IOTC-2026-WPEB22(AS)-31	Using fisheries data to support the identification of Important Shark and Ray Areas: opportunities for collaboration with Regional Fishery Bodies (Jabado, R. W. and Rohner, C. A.)

Document	Title
IOTC-2026-WPEB22(AS)-32	Draft report of the Indian Ocean shark research plan workshop (Secretariat)
IOTC-2026-WPEB22(AS)-33	Cetacean Bycatch Mitigation Research in the Indian Ocean (Austin R., Kisza J. J., Fernando D., Tanna A., Sitsabeshan S. and Stewart J.)
IOTC-2026-WPEB22(AS)-34	Visual resources as tools for conservation and compliance of Res. 19/03 (Barros, N., Cronin, M. R., D'Costa, N. G., Carter, R. and Stevens, G.)
IOTC-2026-WPEB22(AS)-35	Post-release survival of silky sharks in tropical tuna purse seine fisheries under best handling practices: insights from tagging and predictive modelling (Lopetegui-Eguren L., Grande M., Murua J., Cuevas N., Salgado A., Erauskin-Extramiana M., Onandia I., Mugerza A., Horrach L., Ruiz J., Murua H., and Arrizabalaga H.)
IOTC-2026-WPEB22(AS)-36	Addressing Gaps in Hammerhead Shark (Sphyrna spp.) Conservation and Management in the Indian Ocean (Kiilu, B. and Ziegler, I.)
IOTC-2026-WPEB22(AS)-37	ACAP Guidelines to measure the sink rates of baited hooks in pelagic longline fisheries using Time-Depth Recorders (Jiménez S.)
IOTC-2026-WPEB22(AS)-38	Environmental status of silky sharks in Eastern Indian Ocean from length-based catch data (Budiarto, A. Yulianto, I., Wiryawan, B. Taurusman, A. A., Iskandar, D., Ziegler, I., Gigentika, S., and Agustina, S.)
IOTC-2026-WPEB22(AS)-39	Ecological Risk Assessment of sharks in India's artisanal fisheries: An exploratory study (Muktha M., Babu C., Gyanranjan D., Kizhakudan, S. J., Akhilesh K. V., Surya S., Swatipriyanka, R. K. M., Dash, S. , Najmudeen, A. C., Shikha Rahangdale, T. M., Purushottama G B, Roul, S. K., Remya L., Azeez, A., Veera Venthan, K. R., Wilson, L., Mahesh V., Thomas, S., Nakhawa, A., Varghese, E., Jayasankar, J., Varghese, S. P., Sreenath K. R., Pandey, S., Mohammed K. and Grinson G.)
IOTC-2026-WPEB22(AS)-40	Operation-standardized spatial and temporal analysis of marine turtle interactions in Pakistan's tuna gillnet fishery identifies a robust interaction-priority area (Razzaque, S. A., Nawaz, R., Haroon, M., Hussain, A., Abid, S., Zafar, A., Rehman, H. U., Madden, C.)
IOTC-2026-WPEB22(AS)-41	Exploration toward implementation of management procedures with qualitative/ semi-quantitative risk assessment approach for data-poor bycatch species relevant to the IOTC fisheries (S. Tsuji)
Information papers	
IOTC-2026-WPEB22(AS)-INF01	Safe handling and live release best practices master document development (Secretariat)
IOTC-2026-WPEB22(AS)-INF02	CCSBT multi-year Seabird Strategy
IOTC-2026-WPEB22(AS)-INF03	Close-kin mark recapture estimates of whale shark abundance in the Indian Ocean
IOTC-2026-WPEB22(AS)-INF04	Limited latitudinal ranging of juvenile whale sharks in the Western Indian Ocean suggests the existence of regional management units
IOTC-2026-WPEB22(AS)-INF05	Stable Isotope Analysis of Dermis and the Foraging Behavior of Whale Sharks at Ningaloo Reef, Western Australia
IOTC-2026-WPEB22(AS)-INF06	CSIRO briefing to DCCEEW on Indian Ocean whale shark abundance estimates

APPENDIX IV

THE STANDING OF A RANGE OF INFORMATION RECEIVED BY THE IOTC SECRETARIAT FOR BYCATCH SPECIES

Extract from IOTC–2026–WPEB22(AS)–07.
(Appendix references in this Appendix, refer only to those contained in this appendix)

Sharks bycatch levels & trends

Reported shark catches increased substantially from approximately 8,000 t in 1950 to a peak of nearly 87,000 t around 2003–2004, followed by a gradual decline through the late 2010s and a partial recovery in the most recent years (Figure A1) Throughout the time series, catches classified only to the family or order level ("Various sharks nei" and "Unclassified", hereafter aggregated as SKH/UNCL) have consistently dominated the reported composition, exceeding 90% of total catch for most of the period prior to the mid-1980s and remaining above 50% in relative terms even in recent decades. Species-specific reporting became more prominent from the 1990s onward, with silky shark (Carcharhinus falciformis) and blue shark (Prionace glauca) emerging as the most consistently identified taxa, while mako (Isurus spp.) and hammerhead (Sphyrna spp.) shark groups show a more marginal but steady presence in the catch composition from the same period (Figure A1)

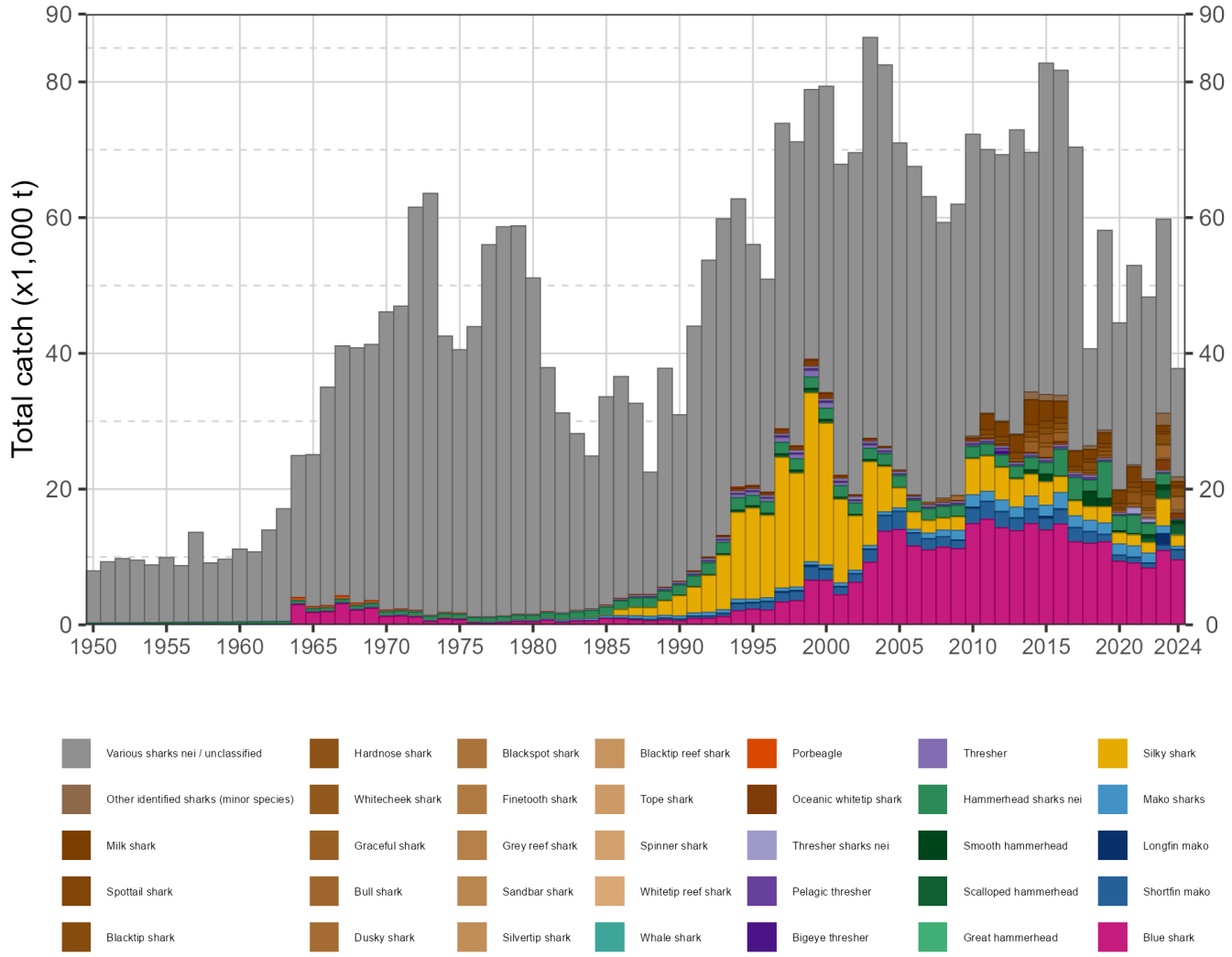


Figure A 1: Annual time series of cumulative nominal absolute catches (metric tons; t) of shark species or species category for the period 1950-2024

Disaggregating catch composition by fishery group reveals substantial differences in species composition among gear types. Gillnet fisheries account for the largest cumulative shark catch of any fishery group in the dataset approximately 1.79 million t), exceeding longline (approximately 584,000 t) for the complete data series. Longline and line fisheries show broadly similar species composition, dominated by blue shark, with smaller but consistent contributions from silky shark, mako sharks, and hammerhead species.

Rays bycatch levels & trends

Ray catches have been recorded since 1987, averaging 100 tonnes up to 2007. Although the data has been patchy, catches have increased since 2010, averaging around 1,000 tonnes and peaking in 2018 at 2,092 tonnes. Last year, unusually high catches of over 6,000 tonnes were recorded and are currently under review (Figure A2).

On the data available eleven categories are identified, six of which are generic aggregates ("nei" categories: Rays, stingrays, mantas nei (SRX); Mantas, devil rays nei (MAN); Stingrays, butterfly rays nei (STT); Eagle rays nei (EAG); Mobula nei (RMV); Rays and skates nei (RAJ) and five of which are identified to species level: Devil fish (RMM); Giant manta (RMB); Chilean devil ray (RMT); Alfred manta (RMA) and Pelagic stingray (PLS).

The data are mostly aggregated and both total catch and the share reported at generic level show substantial year-to-year volatility rather than a smooth trend, indicating that this dataset is sensitive to single-fleet or single-year reporting changes.

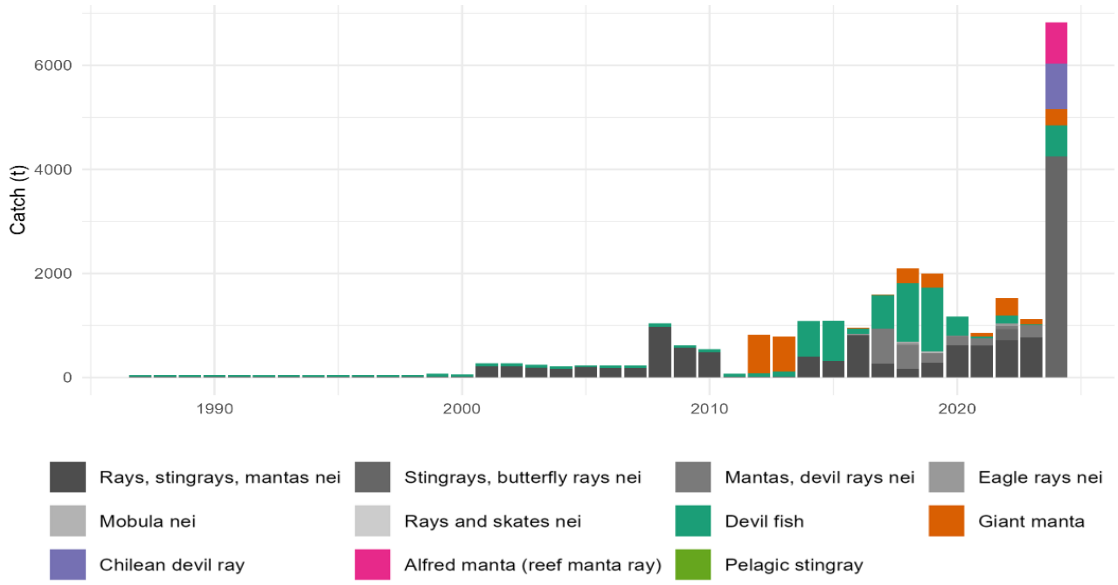


Figure A 2: Annual time series of cumulative nominal absolute catches (metric tons; t) of rays species or species category for the period 1950-2024

APPENDIX V
MAIN ISSUES IDENTIFIED CONCERNING DATA ON NON-IOTC SPECIES

Extract from IOTC–2026-WPEB22(AS)–07

Reported catches

Although in recent years were some improvements on the reporting at species level from come coastal CPCs aggregate catches represent around 60% of the total shark catches reported. Longline fisheries have better reporting at species level while gillnet and line fisheries as relevant amounts of aggregated species and uncertainties associated with the reestimation of catches in recent years. Similarly, for rays the data are mostly aggregated and both total catch and the relative reported at generic level show substantial year-to-year volatility rather than a smooth trend, indicating that this dataset is sensitive to single-fleet or single-year reporting changes.

Size data

Length-frequency data available is dominated by blue shark samples, longline accounts for most size measurements and silky shark is the only species with a more mixed gear composition. Data from other species /fisheries are scarce and inconsistent over time. Pelagic stingray alone accounts for 95% of the length measurements available for rays.

Spatial data

Cross-referencing the resulting spatial footprint of reported catch (2005–2024, matching the period covered by the size-frequency database) against the footprint of length sampling shows that the best-sampled pelagic species reach reasonably high, though still incomplete, spatial overlap. While blue shark shows correspondingly extensive geographic overlap between catch and length-sampling there is a spatial mismatch for other species, like the hammerhead’s sharks and rays.

APPENDIX VI

2026: STATUS OF DEVELOPMENT AND IMPLEMENTATION OF NATIONAL PLANS OF ACTION FOR SEABIRDS AND SHARKS, AND IMPLEMENTATION OF THE FAO GUIDELINES TO REDUCE MARINE TURTLE MORTALITY IN FISHING OPERATIONS

(*updated September 2026*)

CPC	Sharks	Date of Implementation	Seabirds	Date of implementation	Marine turtles	Date of implementation	Comments
MEMBERS							
Australia		1st: April 2004 2nd: July 2012 3rd: 2021 4th: August 2024		1st: 1998 2nd: 2006 3rd: 2014 NPOA in 2018.		2003	**Sharks:** 3rd NPOA-Sharks (Shark-plan 3) was released in 2021 replacing the previous Shark-plan 2. Australia produced a revised NPOA for the conservation and management of sharks (Revised Shark-plan 2) in 2024. **Seabirds:** Has implemented a Threat Abatement Plan [TAP] for the Incidental Catch (or Bycatch) of Seabirds During Oceanic Longline Fishing Operations since 1998. The present TAP took effect from 2014 and largely fulfilled the role of an NPOA in terms of longline fisheries. http://www.antarctica.gov.au/__data/assets/pdf_file/0017/21509/Threat-Abatement-Plan-2014.pdf. In 2018 Australia finalised an NPOA to address the potential risk posed to seabirds by other fishing methods, including longline fishing in state and territory waters, which are not covered by the current threat abatement plan. This NPOA is currently being reviewed. **Marine turtles:** Australia's current marine turtle bycatch management and mitigation measures fulfil Australia's obligations under the FAO-Sea turtles Guidelines.
Bangladesh			n.a.				**Sharks:** Bangladesh has finalised a NPOA for shark and rays which will be in place for 2023-2027. The Wildlife Conservation and Security Act introduced in 2012 lays out rules on requirements for hunting wild animals. It includes provisions for the protection of sharks and rays including the species for which there are active IOTC CMMs (hammerhead, blue, mako, silky, oceanic whitetip, thresher and whale sharks, and mobulid rays). **Seabirds:** Bangladesh currently does not have a NPOA for seabirds. The Wildlife Conservation and Security Act introduced in 2012 lays out rules on permits required to hunt wild animals and includes provisions for the protection of seabirds. Bangladesh does not have any flagged purse seine or longline vessels so do not consider there to be any problems with seabird interactions in their fisheries. **Marine turtles:** Bangladesh currently have no information on their implementation of FAO guidelines on sea turtles. The Wildlife Conservation and Security Act introduced in 2012 lays out rules on requirements for hunting wild animals and

							includes provisions for the protection of marine turtles. A Marine Fisheries Rules act was finalised in 2023 which requires the use of turtle excluder devices onboard shrimp trawlers. The act also requires live release of marine turtles for all gear and the mandatory use of circle hooks for hook and line fishing.
China		–		–			**Sharks:** China is currently considering developing an NPOA for sharks. Regulations relating to the conservation of sharks managed by RFMOs have been updated. Targeted distant water fisheries for sharks and rays are prohibited and vessels must avoid or reduce catching of sharks. Sharks (species not under a retention ban) caught as bycatch shall be fully utilised and finning is prohibited. Longliners are prohibited from using shark lines and wire tracers. **Seabirds:** China is currently considering developing an NPOA for seabirds. Regulations relating to the conservation of seabirds managed by RFMOs have been updated. Vessels operating in the area south of 25ºS shall use two mitigation measures from: tori lines, night setting and weighted branch lines. They may also use hook-shielding devices to replace the above three measures. **Marine turtles:** Regulations relating to the conservation of turtles managed by RFMOs has been updated. All longlines shall use circle hooks whenever possible. Longline vessels are encouraged to use finfish as bait, not squid.
–Taiwan,China		1st: May 2006 2nd: May 2012		1st: May 2006 2nd: Jul 2014			**Sharks:** No revision currently planned. **Seabirds:** No revision currently planned. **Marine turtles:** Wildlife Protection Act introduced in 2013, Protected Wildlife shall not be disturbed, abused, hunted, killed, traded, exhibited, displayed, owned, imported, exported, raised or bred, unless under special circumstances recognized in this or related legislation. *Cheloniidae spp*., *Caretta Caretta*, *Chelonia mydas*, *Eretmochelys imbricata, Lepidochelys olivacea* and *Dermochelys coriacea* are listed into List of Protected Species. Domestic Fisheries Management Regulation on Far Sea Fisheries request all fishing vessels must carry line cutters, de-hookers and hauling nets in order to facilitate the appropriate handling and prompt release of marine turtles caught or entangled.
Comoros		–		–			**Sharks:** No NPOA has been developed. Shark fishing is prohibited but measures are difficult to enforce due to the artisanal nature of the fisheries. A campaign to raise awareness of measures is being implemented to improve compliance. Shark catches and size frequency data are submitted to IOTC **Seabirds:** No NPOA has been developed. There is no fleet in operation south of 25 degrees south and no long-line fleet. The main fishery is artisanal operating within 24 miles of the coast where there is low risk of interactions with seabirds. **Marine turtles:** According to the Comoros Fisheries Code Article 78, fishing, capture, possession and marketing of turtle and marine mammals or of protected aquatic organisms is strictly forbidden in accordance with national legislation in force and International Conventions applicable to the Comoros.

European Union		5 Feb 2009		16-Nov-2012		2007	Regulation n°2021-47 of 9th of July 2021 legislating tuna and tuna-like species fisheries includes marine species protection measures, especially in its Annex 2, aiming to reduce the impact on marine turtles, sea birds and sharks. **Sharks:** Approved on 05-Feb-2009 and it is currently being implemented. **Seabirds:** The EU adopted on Friday 16 November 2012 an Action Plan to address the problem of incidental catches of seabirds in fishing gears. A specific national plan of action has been published for Albatrosses which runs from 2018-2027. **Marine turtles**: European Union Council Regulation (EC) No 520/2007 of 7 May 2007 lay down technical measures for the conservation of marine turtles including articles and provisions to reduce marine turtle bycatch. The regulation urges Member States to do their utmost to reduce the impact of fishing on sea turtles, in particular by applying the measures provided for in paragraphs 2, 3 and 4 of the resolution.
France (territories)		2009		2009, 2011		2015	**Sharks:** NPOA for sharks was approved on 05-Feb-2009. No vessel on the RAV and no coastal fisheries active in 2025. Under decree n° 2021-47 of 6 July 2021, confirmation of recording of by-catch and accidental catches, in particular catches of sharks, rays, sea turtles, birds and marine mammals, relating to each of the fishing operations carried out. **Seabirds:** NPOA for seabirds was implemented in 2009 and 2011. 2009 for Barrau's petrel and 2019 for Amsterdam albatross which will be in force from 2018-2027. **Marine turtles:** Implemented in 2015 for the five species of marine turtles that are present in the southwest Indian Ocean for the period 2015-2020. This is still being applied and currently being revised and will be published in 2025.
India							**Sharks:** India published their NPOA sharks in 2024. **Seabirds:** India has determined that seabird interactions are not a problem for their fleets. However, a formal evaluation has not yet taken place which the WPEB and SC require. **Marine turtles:** India published an action plan for marine turtles in 2021 titled "National Marine Turtle Action Plan".
Indonesia		2016		–			**Sharks:** Indonesia first drafted a NPOA in 2010 then later developed a revised NPOA for sharks and rays for the period 2016-2020. Indonesia has also established a national plan of action for whale sharks from 2021-2025 through Ministerial Decree No. 16 of 2021. Indonesia plans to review the NPOA for sharks in 2025. **Seabirds:** An NPOA for seabirds was finalized in 2016 **Marine turtles:** Indonesia has established an NPOA for Marine Turtles in 2022 and this will be reviewed in 2025. Indonesia has also been implementing Ministerial Regulations 12/2012 and 30/2012 regarding capture fishing business on high seas to reduce turtle bycatch. Indonesia is also cooperating with Coral Triangle countries including Malaysia, the Philippines, the Solomon Islands, Papua New Guinea, and Timor Leste through Coral Triangle Initiatives on Coral Reefs, Fish, and Food Security (CTI CFF) platform to protect threatened migratory species, including marine turtles. The CTI CFF is now developing a regional plan of action (RPOA) 2020-

							2030 and areas of critical habitats, such as migratory corridors, nesting beaches, and Inter-nesting and feeding areas, have been identified.
Iran, Islamic Republic of		–		–		_	**Sharks:** A NPOA for sharks and rays has been developed and is currently under review. Iran has implemented a nationwide ban on the targeted fishing and retention of sharks which has been formally communicated to all fishing operations, fishermen and fishing cooperatives. **Seabirds:** I.R. Iran determined that seabird interactions are not a problem for their fleet as they consist of gillnet vessels only. i.e. no longline vessels. The nets are set between 1-2m below the surface of the water and no bycatch of oceanic seabirds has been reported to date. **Marine turtles:** An Action Plan for the conservation of sea turtles has been fully developed and is now awaiting translation into English for submission to the Secretariat.
Japan		2012 2016, 2023		2012, 2016			**Sharks:** NPOA–Shark assessment implementation report submitted to COFI in July 2012 has since been revised in 2016 and again in 2023. **Seabirds:** NPOA–Seabird implementation report submitted to COFI in July 2012 (Revised in 2016). **Marine turtles:** All Japanese fleets fully implement Resolution 12/04.
Kenya		2023	n.a.	–			**Sharks:** A National Plan of Action for sharks was finalised in 2023. This document shall put in place a framework to ensure the conservation and management of sharks and their long-term sustainable use in Kenya. **Seabirds:** Kenya does not have any flagged longline vessels on its registry. There is no evidence of any gear seabird interaction with the current fishing fleet. Kenya has prepared a NPOA for seabirds which is in the process of being reviewed by relevant stakeholders. **Marine turtles:** The Kenyan fisheries law prohibits retention and landing of turtles caught incidentally in fishing operations. Public awareness efforts are conducted for artisanal gillnet and artisanal longline fishing fleets on the mitigations measures that enhance marine turtle conservation. Kenya has prepared a NPOA for marine turtles which is in the process of being reviewed by relevant stakeholders.
Korea, Republic of		08-Aug-11		2019		–	**Sharks:** NPOA sharks is currently being implemented. **Seabirds:** NPOA seabirds was submitted to FAO in 2019. **Marine turtles:** All Rep. of Korea vessels fully implement Res 12/04.
Madagascar		2022		–			**Sharks:** Madagascar developed a NPOA for sharks in 2022 which is valid from 2022-2026. **Seabirds:** Development on a NPOA for seabirds has not begun. Note: A fisheries monitoring system is in place in order to ensure compliance by vessels with the IOTC's shark and seabird conservation and management measures. **Marine turtles:** There is zero capture of marine turtle recorded in logbooks. All longliners use circle hooks. This has been confirmed by onboard observers and port samplers.

Malaysia		2008 2014 2024		–		2008	**Sharks:** A revised NPOA-sharks was published in 2024 and will be in place for 2024-2030. **Seabirds:** A NPOA for seabirds is yet to be developed **Marine turtles:** A NPOA For Conservation and Management of Sea Turtles had been published in 2008. A revision will be published in 2017.
Maldives, Republic of		Apr 2015	n.a.	–			**Sharks:** NPOA Sharks was finalised in 2015 with the assistance of Bay of Bengal Large Marine Ecosystem (BoBLME) Project. On 14th July 2019 the Government of Maldives officially announced the cessation of the Maldives long line fishery in Maldives EEZ and High Seas so consider the NPOA for sharks to now be unnecessary. **Seabirds:** Maldives is in the final stages of developing an action plan on seabird nesting sites. Article 12 of IPOA states that if a 'problem exists' CPCs adopt an NPOA. IOTC Resolution 05/09 suggests CPCs to report on seabirds to the IOTC Scientific Committee if the issue is appropriate'. Maldives considers that seabird entanglement and bycatch is not an issue in Maldives fisheries especially with the cessation of the Maldives long line fishery in 2019. **Marine turtles:** Standards of code and conduct for managing sea turtles have been developed by the Environmental Protection Agency in the drafted national sea turtle management plan under the protected species regulation. Longline regulation has provisions to reduce marine turtle bycatch. The regulation urges longline vessels to have dehookers for removal of hook and a line cutter on board, to release the caught marine turtles as prescribed in Resolution 12/04.
Mauritius		2016					**Sharks:** The NPOA-sharks has been implemented since 2015 at the national level; it focuses on actions needed to exercise influence on foreign fishing through the IOTC process and licence conditions, as well as improving the national legislation and the skills and data handling systems available for managing sharks. **Seabirds:** Mauritius does not have national vessels operating beyond 25^{o}S. However, fishing companies have been requested to implement all mitigation measures as provided in the IOTC Resolutions. There are currently no plans to develop a NPOA for seabirds. **Marine turtles:** Marine turtles are protected by the national law. Fishing companies have been **requested** to carry line cutters and de-hookers in order to facilitate the appropriate handling and prompt release of marine turtles caught or entangled. There are currently no plans to develop a NPOA for marine turtles.
Mozambique		–		–			**Sharks**: Mozambique developed and approved a NPOA for sharks in 2025. This is just in the final stages of being published. **Seabirds**: Mozambique is regularly briefing the Masters of their fishing vessels on the mandatory requirement to report any seabird interaction with longliner fleet. **Marine turtles**: see above.
Oman, Sultanate of							**Sharks:** Oman is still developing a NPOA for sharks. A public consultation process is ongoing to establish a proper national plan, in line with FAO guidelines. **Seabirds:** Not yet initiated.

							Marine turtles: The law does not allow the catch of sea turtles, and the fishermen are requested to release any hooked or entangled turtle. The longline fleet are required to carry out the line cutters and de-hookers.
Pakistan							**Sharks:** Pakistan is in the process of consultation with stakeholders for the formulation of NPOA for sharks with the assistance of FAO. The NPOA will be completed in due course of time after the complete consultation with stake holders. in the mean time Pakistan has enforced the measures suggested in FAO in its statues IPOA. Pakistan vide S.R.O 752(I)2025 dated February 11th, 2025 notified conservation measures for marine biodiversity including all species of sharks occurring in IOTC area of competence. **Seabirds:** Pakistan considers that seabird interactions are not a problem for the Pakistani fishing fleet as the tuna fishing operations do not include longline vessels. **Marine turtles:** Pakistan has already framed Regulations regarding the prohibition of catching and retaining marine turtles. As regards to the reduction of marine turtle bycatch by gillnetters; presently Marine Fisheries Department (MFD) in collaboration with International Union for Conservation of Nature (IUCN) Pakistan, is undertaking an assessment. Stakeholder Coordination Committee Meeting was conducted on 10th September 2014. The "Turtle Assessment Report (TAR)" will be finalized by February 2015 and necessary guidelines / action plan will be finalized by June 2015. As per clause-5 (c) of Pakistan Fish Inspection & Quality Control Act, 1997, "Aquatic turtles, tortoises, snakes, mammals including dugongs, dolphins, porpoises and whales etc" are totally forbidden for export and domestic consumption. Pakistan is also in the process of drafting a NPOA for cetaceans.
Philippines		Sept. 2009 2017		–			**Sharks:** A first NPOA sharks was published in 2009. A second was published in 2017 and was meant to be in place from 2017-2022. Several regulatory and management measures have since been adopted to strengthen the conservation and management of sharks and related species. These include Fisheries Administrative Order No. 272, Series of 2023, providing rules and regulations for the conservation and management of sharks for Philippine-flagged fishing vessels, as well as Fisheries Administrative Order No. 208-1, Series of 2024, providing additional regulatory measures relevant to the conservation and management of sharks and rays. In addition, the Philippines has formulated the Shark, Ray, and Chimaera Conservation and Fisheries Management Framework as part of the preparation for the development/update of the next NPOA-Sharks. The framework provides a national basis for strengthening and coordinating conservation, management, monitoring, enforcement, research, capacity-building, and socio-economic measures for sharks, rays, and chimaeras. **Seabirds and Marine Turtles:** Seabirds and marine turtles are primarily under the jurisdiction of the Department of Environment and Natural Resources (DENR). However, both are also covered by relevant fisheries regulations. In particular, Department of Agriculture Administrative Order No. 10, Series of 2015, the

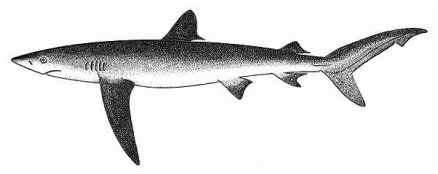
							Implementing Rules and Regulations of Republic Act No. 10654, provides under Section 32 that distant-water fishing vessels shall comply with the monitoring, control, and surveillance requirements, conservation and management measures, and fishing access conditions of the Department, the relevant RFMO, or other coastal States.
Seychelles, Republic of		Apr-2007 2016		–			**Sharks:** Seychelles developed and is implementing a NPOA for Sharks for years 2016-2020 which was extended for 2025. Seychelles are working to review the previous NPOA for sharks, the review process will begin in mid 2026. **Seabirds:** SFA is collaborating with Birdlife South Africa to develop an NPOA for seabirds. Phase one, which addressed the biology, ecology, and population of seabirds potentially impacted by the Seychelles longline fleet, has been completed. Phase two will assess the potential impacts of the fleet on vulnerable seabirds and recommend mitigation measures and is scheduled for 2027. The NPOA is being developed specifically to address marine turtle bycatch and mortality associated with fisheries. **Marine turtles:** The development of a NPOA for turtles has started with the stakeholder consultant phase.
Somalia							**Sharks:** Somalia is currently revising its fisheries legislation (current one being from 1985) and has completed the necessary steps for required for the consultative process to begin in order to develop these NPOAs. **Seabirds:** See above. **Marine turtles:** The Somali national fisheries law and legislation was reviewed and approved in 2014. This includes Articles on the protection of marine turtles. Further review of the National Law is underway to harmonize this with IOTC Resolutions and is expected to be presented to the new parliament for endorsement in 2017.
South Africa, Republic of		2013 2022		2008			**Sharks**: The NPOA-sharks was first approved and published in 2013. A revised version of the document was finalised in 2022 following extensive review including input from the research community and affected stakeholders. **Seabirds**: The NPOA seabirds was published in August 2008 and fully implemented. An updated NPOA has been drafted and is now awaiting approval. **Marine turtles**: All FAO guidelines to reduce marine turtle mortality have been inserted into permit conditions. A report from 2019 on the implementation of FAO guidelines to reduce marine turtle mortality has been provided to the IOTC. Bycatch in South African fisheries is considered to be very low. The South African permit conditions for the large pelagic longline fishery prohibits landing of turtles. All interactions with turtles are recorded, by species, within logbooks and in observer reports, including data on release condition. Vessels are required to carry a de-hooker on board and instructions on turtle handling and release in line with the FAO guidelines are included in the South African Large Pelagic permit conditions. All turtle interactions in respective areas of competence are reported to the respective RFMOs. Recent South African led studies on impact of marine debris on turtles have

							been published in the scientific literature (Ryan et al. 2016). Marine turtle nesting sites in South Africa are protected by coastal MPAs since 1963.
Sri Lanka		2013 2018					**Sharks:** The first NPOA-sharks was finalized in 2013 then revised in 2018 which was valid until 2022. A new version was developed in 2025 and is now awaiting stakeholder inputs. Shark data collection is done through logbooks and a large pelagic data collection programme. NARA has started to collect fisheries and biological data on blue, silky and scalloped hammerhead sharks. **Seabirds:** Sri Lanka has determined that seabird interactions are not a problem for their fleets. However, a formal review has not yet been provided to the WPEB and SC for approval. **Marine turtles:** Implementation of the FAO Guideline to Reduce Sea Turtle Mortality in Fishing Operation in 2015 was submitted to IOTC in January 2016. Marine turtles are legally protected in Sri Lanka. Longliner vessels are required to have dehookers for removal of hooks and a line cutter on board, to release the caught marine turtles. Gillnets longer than 2.5 km are now prohibited in domestic legislation. Reporting of bycatch has made legally mandatory and facilitated via logbooks.
Sudan							**Sharks:** No information received by the Secretariat. **Seabirds:** No information received by the Secretariat. **Marine turtles:** No information received by the Secretariat.
Tanzania, United Republic of		2025		–		2024	**Sharks:** A NPOA was developed and finalised in 2025 and will be in place for 2026-2035. **Seabirds:** NPOA for seabirds is being finalised. Note: Terms and conditions related to protected sharks and seabirds contained within fishing licenses. **Marine turtles:** A NPOA for turtles was developed in 2024. Sea turtles are protected by law. However, as there is a national turtle and Dugong conservation committee that oversee all issues related to sea turtles and dugongs. There is no information so far with regards to interaction between sea turtles and long line fishery.
Thailand		2020		–			**Sharks:** An updated NPOA Sharks has been developed for the years 2020-2024 and has been submitted to the Secretariat and FAO. There is a new NPOA for sharks going through an internal reviewing process. **Seabirds:** The NPOA for seabirds has been finalised and submitted to the Secretariat. Thailand has the Notification of the Department of Fisheries on Requirement and Regulations of Fishing Vessels Operating Outside Thai Water in IOTC Area of Competence (IOTC) B.E. 2565 (2022), Clause 18 and 21 include requirements for line-cutters and dehookers to be carried for releasing marine animals and for any fishing vessel operating south of 25°S to follow the measures for mitigating capture of seabirds. **Marine turtles:** Thailand reports on progress of the implementation of FAO guidelines on turtles in their National Report to IOTC. Regulations on Fishing Vessels operating outside Thai waters in the IOTC area of competence contains clauses relating to the conservation of marine turtles including: Clause 14 prohibiting purse

							seines from setting around cetaceans, marine turtles or whale sharks; Clause 18 requiring the release and recording of incidental bycatch of sensitive species including marine turtles; Clause 19 requiring that any bycaught marine turtles that are not healthy should be cared for until it is ready to be released.
United Kingdom	n.a.	–	n.a.	–		–	British Indian Ocean Territory (Chagos Archipelago) waters are a Marine Protected Area closed to fishing except recreational fishing in the 3nm territorial waters around Diego Garcia. Separate NPOAs have not been developed within this context. **Sharks/Seabirds:** For sharks, UK is the 24th signatory to the Convention on Migratory Species 'Memorandum of Understanding on the Conservation of Migratory Sharks' which extends the agreement to UK Overseas Territories including the British Indian Ocean Territory; Section 7 (10) (e) of the *Fisheries (Conservation and Management) Ordinance* refers to recreational fishing and requires sharks to be released alive. No seabirds are caught in the recreational fishery. **Marine turtles:** No marine turtles are captured in the recreational fishery. A monitoring programme is taking place to assess the marine turtle population in UK (OT). In August 2022 the UK Government published the Bycatch Mitigation Initiative which applies to metropolitan UK waters but includes commitments to work with the international community to contribute to the understanding, reduction and elimination of bycatch globally, including by advocating for effective measures through RFMOs.
Yemen							**Sharks:** No information received by the Secretariat. **Seabirds:** No information received by the Secretariat. **Marine turtles:** No information received by the Secretariat.

Colour key	
Completed	
Drafting being finalised	
Drafting commenced	
Not begun	

APPENDIX VII
EXECUTIVE SUMMARY: BLUE SHARK (2026)



CITES APPENDIX II species

Table 2. Status of blue shark (*Prionace glauca*) in the Indian Ocean

Area	Indicators		2025 stock status determination
Indian Ocean	Catch (2024) (t)	9,562[2]	100%
	Catch of NEI sharks (2024) (t)	15,742[3]	
	Mean annual catch (2020-2024) (t)	9,463	
	Mean annual catch of NEI sharks (2020-2024) (t)	24,929[3]	
	MSY (1,000 MT) (95% CI)[4]	30.81 (21.79 - 39.84)	
	F_{MSY} (95% CI)[4]	0.18 (0.18 - 0.18)	
	SB_{MSY} (1,000 MT) (95% CI)[4,5]	52.87 (37.38 - 68.37)	
	F_{2023}/F_{MSY} (95% CI)[4]	0.39 (0.21 - 0.57)	
	SB_{2023}/SB_{MSY} (95% CI)[4]	2.22 (1.76 - 2.68)	
	SB_{2023}/SB_0 (95% CI)[4]	0.73 (0.34 - 1.13)	

[1]Stock boundaries defined as the IOTC area of competence; [2]Proportion of catch fully or partially estimated for 2024: 0%; [3]NEI includes all other shark catches reported to the IOTC Secretariat, which may contain this species, i.e., AG38: Blue shark, shortfin mako, oceanic whitetip shark; RSK: Requiem sharks nei; SKH: Various sharks nei

[4]Estimates refer to the base case model using estimated catches

[5]Refers to fecund stock biomass

Colour key	Stock overfished ($SB_{2023}/SB_{MSY}< 1$)	Stock not overfished ($SB_{2023}/SB_{MSY}\geq 1$)
Stock subject to overfishing ($F_{2023}/F_{MSY}> 1$)	0%	0.0%
Stock not subject to overfishing ($F_{2023}/F_{MSY}\leq 1$)	0%	100%
Not assessed/Uncertain		

Table 3. Blue shark: IUCN threat status of blue shark (*Prionace glauca*) in the Indian Ocean (Sources: Stevens 2009, Rigby et al., 2019).

Common name	Scientific name	IUCN threat status[6]		
		Global status	WIO	EIO
Blue shark	*Prionace glauca*	Near Threatened	–	–

IUCN = International Union for Conservation of Nature; WIO = Western Indian Ocean; EIO = Eastern Indian Ocean

[6]The process of the threat assessment from IUCN is independent from the IOTC and is presented for information purposes only

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

Stock status.

Two stock assessments were carried out for blue shark (BSH) in 2025: one using a Bayesian state-space surplus production model (JABBA) and another using an integrated age-structured model (SS3). Both assessments used data (catch and indices of abundance) from 1950 to 2023, although the model structure was inherently different. The SS3 model included annual length composition data where available. Uncertainty in data inputs and model configuration were explored through sensitivity analyses. All models produced similar results, suggesting the stock is currently **not overfished** and **not subject to overfishing** (**Figure 3**) with respect to MSY related reference points (although the IOTC has not adopted reference points for this species).

A base case model, using SS3, was selected to provide management advice based on the best available Indian Ocean biological data, parameter estimates, consistency of standardised CPUE relative abundance series, model fits/diagnostics and the spatial extent of the data (**Fig. A** 1, **Table A 1**).

The major sources of uncertainty identified in the current model are based on the estimated and reported catches. Nominal reported catches were considered unrealistic, and several alternative catch series were developed for this assessment. Recent revisions of reported catch related to large portions of the historical catch have resulted in a wide range of estimates, it is expected that these revisions will continue soon. The WP suggests further research regarding the estimation of non-reported and under reported catch.

All of the CPUE indices of abundance accepted for consideration in the assessment are largely consistent except for the CPUEs from South Africa and Portugal which show a declining trend in recent years, compared to more stable trends from the other CPCs.

The base case models used the GAM-based catch history estimates (lower estimates for catch – “D1 GAM LOW”) and CPUE series from EU-Spain, Taiwan,China and Japan, and a starting year of 1950. Model assumptions regarding the parameterization of steepness, natural mortality and the estimated selectivity were considered with respect to their sensitivity to the major axes of uncertainty identified.

The ecological risk assessment (ERA) conducted for the Indian Ocean by the WPEB and SC in 2018 consisted of a semi-quantitative risk assessment analysis to evaluate the resilience of shark species to the impact of a given fishery by combining the biological productivity of the species and its susceptibility to each fishing gear type. Blue sharks received a medium vulnerability ranking (No. 10) in the ERA rank for longline gear because it was estimated as the most productive shark species, but was also characterized by the second highest susceptibility to longline gear. Blue shark was estimated as not being susceptible thus not vulnerable to purse seine gear.

The current IUCN threat status of ‘Near Threatened’ applies to blue sharks globally (**Table 3**). Information available on this species has been improving in recent years. Blue sharks are commonly taken by a range of fisheries in the Indian Ocean and in some areas they are fished in their nursery grounds. Due to their life history characteristics – they live until at least 25 years, mature at 4–6 years, and have 25–50 pups every year – they are considered to be the most productive of the pelagic sharks. On the weight-of-evidence available in 2025, the stock status is determined to be **not overfished** and **not subject to overfishing** (**Table 2**).

Outlook. Increasing effort could result in declines in biomass. The Kobe II Strategy Matrix (**Table 4**) provides the probability of exceeding reference levels in the short (3 years) and long term (10 years) given a range of percentage changes in catch.

Management advice. The SS3 assessment indicates current catches are near MSY, and significant increases could result in decreasing biomass and the stock becoming subject to overfishing in the future (**Table 4**). The stock should be closely monitored, especially with respect to overall catch and discard reporting. While mechanisms exist for encouraging CPCs to comply with their recording and reporting requirements (Resolution 16/06), these need to be further implemented by the Commission, so as to better inform scientific advice in the future.

The following key points should also be noted:

- **Maximum Sustainable Yield (MSY)**: The MSY estimate for the Indian Ocean blue shark stock is approximately, 31,000t (95% CI is 21.79 - 39.84 thousand tonnes).
    - The current stock assessment suggests that catch amounts near the estimated MSY values are likely supportable in the near future. However, noting that firstly, the current MSY catch estimates from the assessment model are based on nominal reported catch (which are currently under revision and likely under-reported based on sharks not reported to species)

and secondly, key uncertainties in other model inputs and parameters, it is recommended that there is no increase in fishing pressure until such uncertainties are resolved.
    - It is expected that as the nominal reported catch is revised, estimates of MSY and other parameters will change.
    - The upcoming blue shark MSE process will address the uncertainties in the stock assessment.

- **Reference points**: The Commission has not adopted reference points or harvest control rules for any shark species.

- **Main fisheries (mean annual retained catch 2020-2024)**: blue shark are caught using longline (81.4%), followed by line (13.9%) and purse seine (3.5%). The remaining catches taken with other gears contributed to 1.2% of the total catches in recent years (**Fig. 1**).
- **Main fleets (mean annual retained catch 2020-2024)**: the majority of blue shark catches are attributed to vessels flagged to Taiwan,China (29.8%) followed by EU (Spain) (29.5%) and Indonesia (17.8%). The 15 other fleets catching blue shark contributed to 22.9% of the total catch in recent years (**Fig 2**).

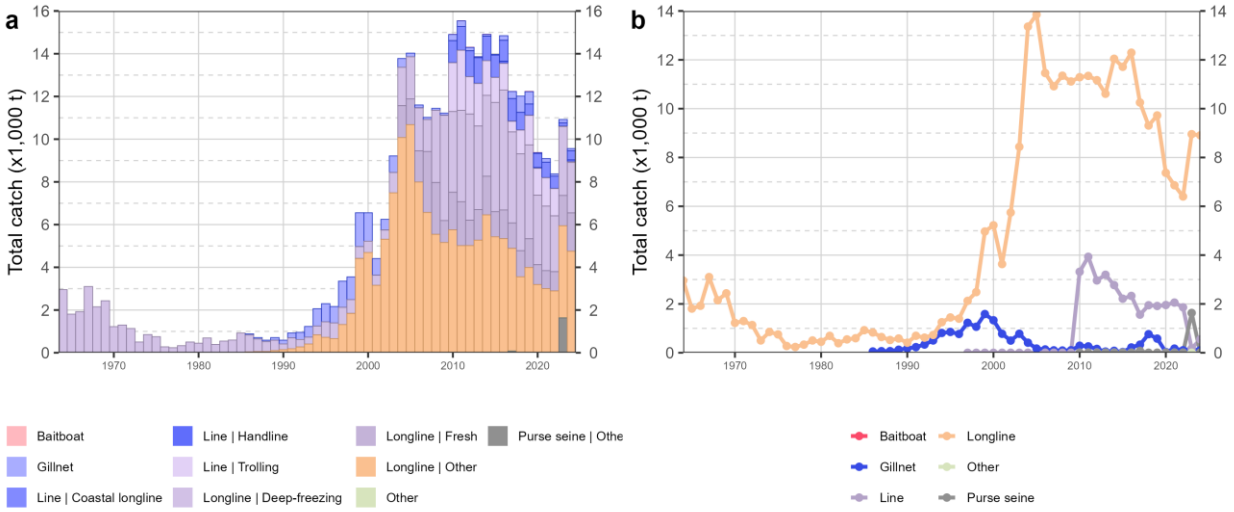


Figure 1 Annual time series of (a) cumulative retained catches (metric tonnes; t) by fishery and (b) individual retained catches (metric tonnes; t) by fishery group for blue shark during 1950-2024. FS = free-swimming school; LS = school associated with drifting floating objects. Purse seine | Other: coastal purse seine, purse seine of unknown association type, ring net; Longline | Other: swordfish and sharks-targeted longlines; Other: all remaining fishing gears

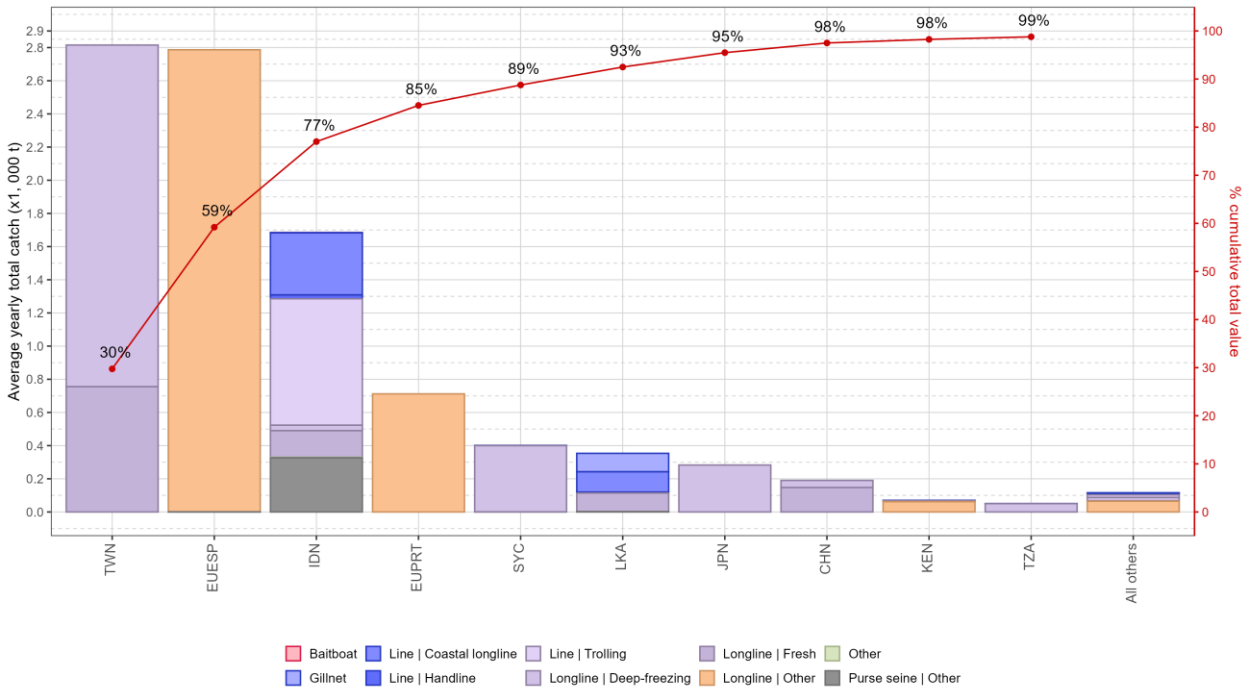
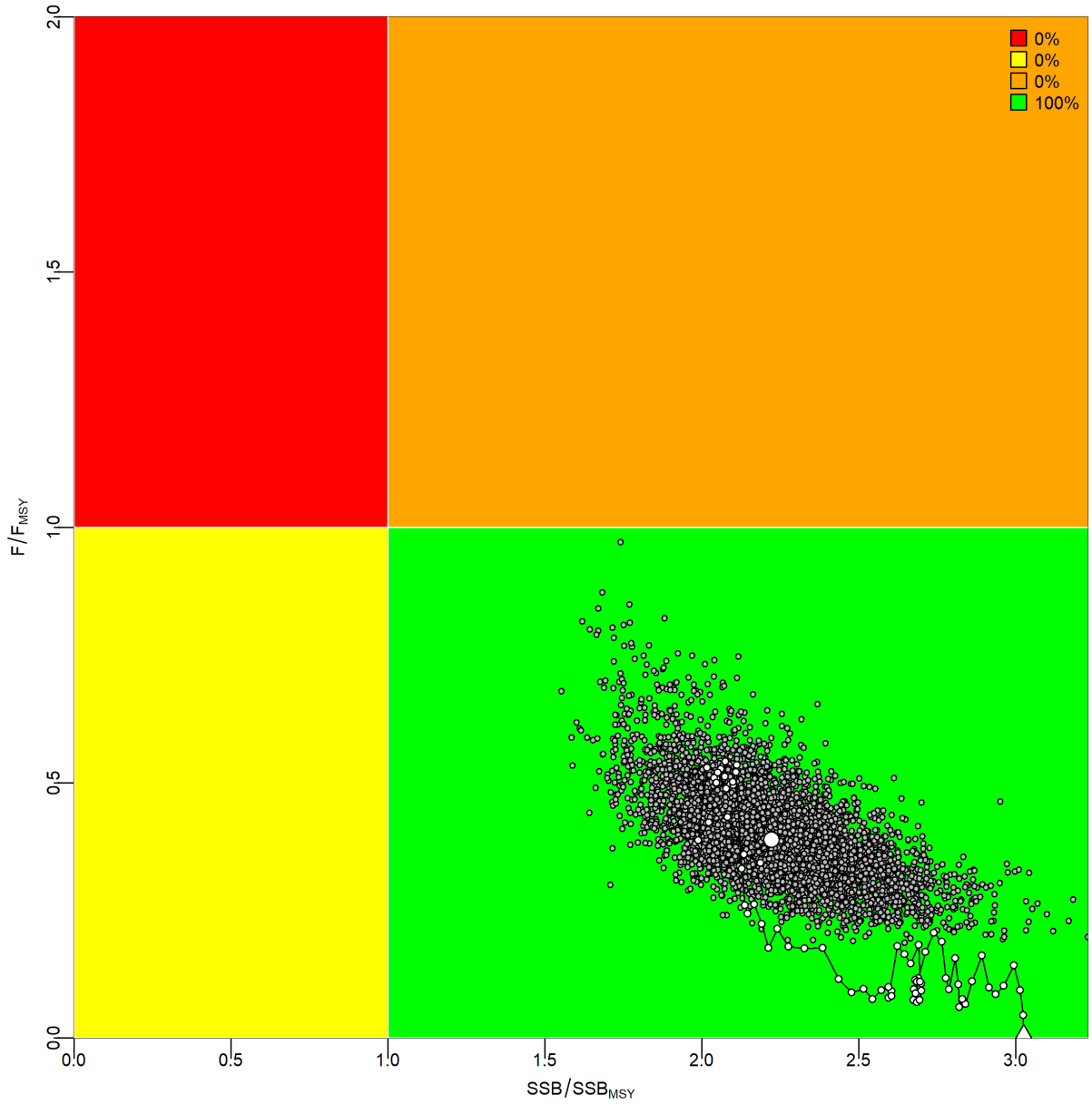


Figure 2: Mean annual retained catches (metric tonnes; t) of blue shark by fleet and fishery between 2020 and 2024, with indication of cumulative catches by fleet. FS = free-swimming school; LS = school associated with drifting floating objects. Purse seine | Other: coastal purse

seine, purse seine of unknown association type, ring net; Longline | Other: swordfish and sharks-targeted longlines; Other: all remaining



fishing gears

Fig. 3. Blue shark: Aggregated Indian Ocean stock assessment Kobe plot (based on SS3) for the estimate based on 2025 assessment base case model. (base case model with trajectory and uncertainty in the terminal year).

Table 4. Blue shark: Aggregated Indian Ocean assessment Kobe II Strategy Matrix. Probability (percentage) of violating the MSY-based reference points for nine constant catch projections using the base case model (average catch level from 2021-2023)* (25,877MT), ± 10%, ± 20%, ± 30% and ± 40%) projected for 3 and 10 years

Kobe II Strategy Matrix: Probability (%) of violating MSY-based reference points

	Alternative TAC projections								
Reference point and projection timeframe	**60% (15,526 t)**	**70% (18,113 t)**	**80% (20,701 t)**	**90% (23289 t)**	**100% (25877 t)**	**110% (28464 t)**	**120% (31052 t)**	**130% (33640 t)**	**140% (36227 t)**
B2028<BMSY	0	0	0	0	0	0	0	0	0
F2028>FMSY	0	0	0	0	0	0	0	0	1
B2035<BMSY	0	0	0	0	0	0	0	0	1

Kobe II Strategy Matrix: Probability (%) of violating MSY-based reference points

	Alternative TAC projections								
Reference point and projection timeframe	**60% (15,526 t)**	**70% (18,113 t)**	**80% (20,701 t)**	**90% (23289 t)**	**100% (25877 t)**	**110% (28464 t)**	**120% (31052 t)**	**130% (33640 t)**	**140% (36227 t)**
F2035>FMSY	0	0	0	0	0	0	2	5	12

*Average catch level and respective % changes refer to the estimated catch series used in the final base case model (IOTC-2025-WPEB21(AS)-30)

LITERATURE CITED

Methot, R. D., and Wetzel. C.R. 2013. Stock Synthesis: A Biological and Statistical Framework for Fish Stock Assessment and Fishery Management. Fisheries Research 142 (May): 86–99. https://doi.org/10.1016/j.fishres.2012.10.012.

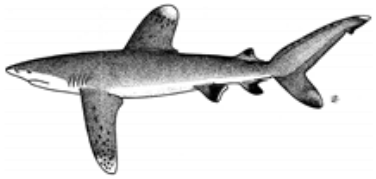
Rice, J. 2025. Catch estimates of blue shark (Prionace glauca) in the IOTC area. IOTC-2025-WPEB21(AS)-28

Rigby, C.L., Barreto, R., Carlson, J., Fernando, D., Fordham, S., Francis, M.P., Herman, K., Jabado, R.W., Liu, K.M., Marshall, A., Pacoureau, N., Romanov, E., Sherley, R.B. & Winker, H. 2019. Prionace glauca. The IUCN Red List of Threatened Species 2019: e.T39381A2915850. https://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T39381A2915850.en.

Stevens J (2009) *Prionace glauca*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. www.iucnredlist.org. Downloaded on 08 November 2012

Winker, H., Carvalho, F., Kapur, M., 2018. JABBA: Just Another Bayesian Biomass Assessment. Fish. Res. 204, 275–288. https://doi.org/http://doi.org/10.1016/j.fishres.2018.03.01.

APPENDIX VIII
EXECUTIVE SUMMARY: OCEANIC WHITETIP SHARK (2026)



CITES APPENDIX I species

Table A 1. Status of oceanic whitetip shark (*Carcharhinus longimanus*) in the Indian Ocean.

Area[1]	Indicators		2018 stock status determination
Indian Ocean	Catch (2024) (t)	901[2]	
	Catch of NEI sharks (2024) (t)	15,742[3]	
	Mean annual catch (2020-2024) (t)	541	
	Mean annual catch of NEI sharks (2020-2024) (t)	24,929[3]	
	MSY (1,000 t) (80% CI)	unknown	
	F_{MSY} (80% CI)		
	SB_{MSY} (1,000 t) (80% CI)		
	$F_{current}/F_{MSY}$ (80% CI)		
	$SB_{current}/SB_{MSY}$ (80% CI)		
	$SB_{current}/SB_0$ (80% CI)		

[1]Stock boundaries defined as the IOTC area of competence; [2]Proportion of catch fully or partially estimated for 2024: 0%; [3]NEI includes all other shark catches reported to the IOTC Secretariat, which may contain this species, i.e., AG38: Blue shark, shortfin mako, oceanic whitetip shark; RSK: Requiem sharks nei; SKH: Various sharks nei

Colour key	Stock overfished ($SB_{year}/SB_{MSY}< 1$)	Stock not overfished ($SB_{year}/SB_{MSY}\geq 1$)
Stock subject to overfishing ($F_{year}/F_{MSY}> 1$)		
Stock not subject to overfishing ($F_{year}/F_{MSY}\leq 1$)		
Not assessed/Uncertain		

Table A 2. Oceanic whitetip shark: IUCN threat status of oceanic whitetip shark (*Carcharhinus longimanus*) in the Indian Ocean.

Common name	Scientific name	IUCN threat status[4]		
		Global status	WIO	EIO
Oceanic whitetip shark	*Carcharhinus longimanus*	Critically Endangered	–	–

IUCN = International Union for Conservation of Nature; WIO = Western Indian Ocean; EIO = Eastern Indian Ocean

[4]The process of the threat assessment from IUCN is independent from the IOTC and is presented for information purpose only

Sources: Rigby et al 2019

CITES - In March 2013, CITES agreed to include oceanic whitetip shark to Appendix II to provide further protections prohibiting the international trade; which will become effective on September 14, 2014.

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

Stock status. There remains considerable uncertainty about the relationship between abundance, standardised CPUE series and total catches over the past decade (**Table A 1**). The ecological risk assessment (ERA) conducted for the Indian Ocean by the WPEB and SC in 2018 consisted of a semi-quantitative risk assessment analysis to evaluate the resilience of shark species to the impact of a given fishery, by combining the biological productivity of the species and its susceptibility to each fishing gear type (Murua *et al.* 2018). Oceanic whitetip shark received a medium vulnerability ranking (No. 9) in the ERA rank for longline gear because it was estimated as one of the least productive shark species

but was only characterised by a medium susceptibility to longline gear. Oceanic whitetip shark was estimated as being the 11th most vulnerable shark species to purse seine gear, as it was characterised as having a relatively low productive rate, and medium susceptibility to the gear. The current IUCN threat status of 'Critically Endangered' applies to oceanic whitetip sharks globally and the species is now listed on Appendix I of CITES (**Table A 2**). There is a paucity of information available on this species in the Indian Ocean and this situation is not expected to improve in the short to medium term. Oceanic whitetip sharks are commonly taken by a range of fisheries in the Indian Ocean. Because of their life history characteristics – they are relatively long lived, mature at 4–5 years, and have relatively few offspring (<20 pups every two years), the oceanic whitetip shark is likely vulnerable to overfishing. Despite the limited amount of data, recent studies (Tolotti et al., 2016) suggest that oceanic whitetip shark abundance has declined in recent years (2000-2015) compared with historic years (1986-1999). Available pelagic longline standardised CPUE indices from Japan and EU,Spain indicate conflicting trends as discussed in the IOTC Supporting Information for oceanic whitetip sharks. There is no quantitative stock assessment and limited basic fishery indicators currently available for oceanic whitetip sharks in the Indian Ocean therefore the stock status is **unknown** (**Table A**).

Outlook. Maintaining or increasing effort with associated fishing mortality can result in declines in biomass, productivity and CPUE. Piracy in the western Indian Ocean resulted in the displacement and subsequent concentration of a substantial portion of longline fishing effort into certain areas in the southern and eastern Indian Ocean. Some longline vessels have returned to their traditional fishing areas in the northwest Indian Ocean, due to the increased security onboard vessels, with the exception of the Japanese fleet which has still not returned to the levels seen before the start of the piracy threat. It is therefore unlikely that catch and effort on oceanic whitetip sharks declined in the southern and eastern areas and may have resulted in localised depletion there.

Management advice. A cautious approach to the management of oceanic whitetip shark should be considered by the Commission, noting that recent studies suggest that longline mortality at haulback is high (50%) in the Indian Ocean (IOTC-2016-WPEB12-26), while mortality rates for interactions with other gear types such as purse seines and gillnets may be higher.

Mitigation measures should be taken to reduce at-vessel and post release mortality, including consideration of potential gear modifications in longline fleets targeting tuna and swordfish. Noting that a recent study (Bigelow et al. 2021) concluded in WCPFC that banning both shark lines and wire leaders has the potential to reduce fishing mortality by 40.5% for oceanic whitetip shark.

While mechanisms exist for encouraging CPCs to comply with their recording and reporting requirements (Resolution 18/07), these need to be further implemented by the Commission, so as to better inform scientific advice. IOTC Resolution 13/06 *on a scientific and management framework on the conservation of shark species caught in association with IOTC managed fisheries*, prohibits retention onboard, transhipping, landing or storing any part or whole carcass of oceanic whitetip sharks. Given that some CPCs are still reporting oceanic whitetip shark as landed catch, there is a need to strengthen mechanisms to ensure CPCs comply with Resolution 13/06.

The following key points should be also noted:

- **Maximum Sustainable Yield (MSY)**: Not applicable. Retention prohibited.
- **Reference points**: Not applicable.
- **Main fisheries (mean annual retained catch 2020-2024):** oceanic whitetip shark are caught using purse seine (60.4%), followed by line (33.5%) and gillnet (5.7%). The remaining catches taken with other gears contributed to 0.4% of the total catches in recent years (Fig. 1).
- **Main fleets (mean annual retained catch 2020-2024):** the majority of oceanic whitetip shark catches are attributed to vessels flagged to Indonesia (61.7%) followed by Mozambique (26.8%) and Madagascar (5.2%). The 5 other fleets catching oceanic whitetip shark contributed to 6.3% of the total catch in recent years (Fig. 2).

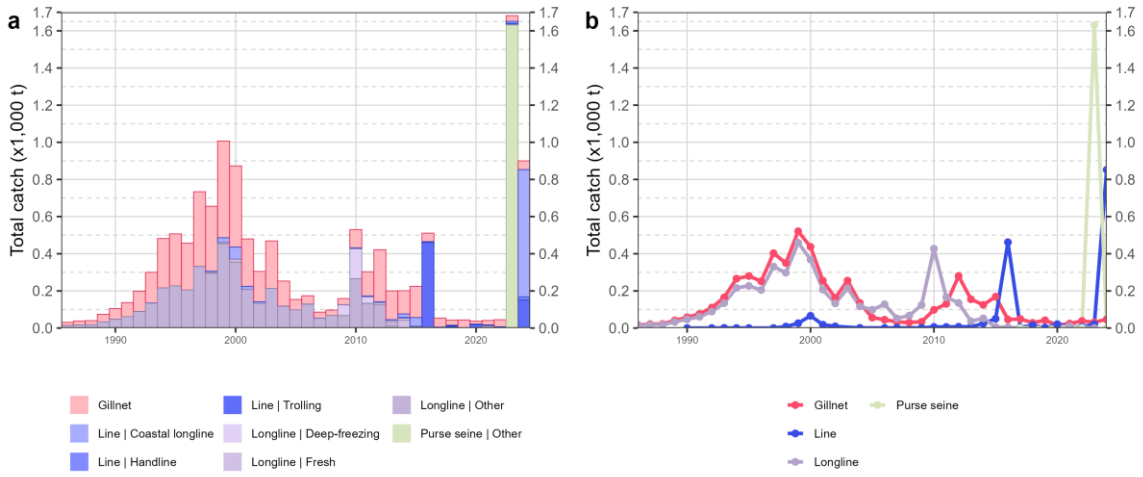


Figure 1 . Annual time series of (a) cumulative retained catches (metric tonnes; t) by fishery and (b) individual retained catches (metric tonnes; t) by fishery group for oceanic whitetip shark during 1950-2024. FS = free-swimming school; LS = school associated with drifting floating objects. Purse seine | Other: coastal purse seine, purse seine of unknown association type, ring net; Longline | Other: swordfish and sharks-targeted longlines; Other: all remaining fishing gears.

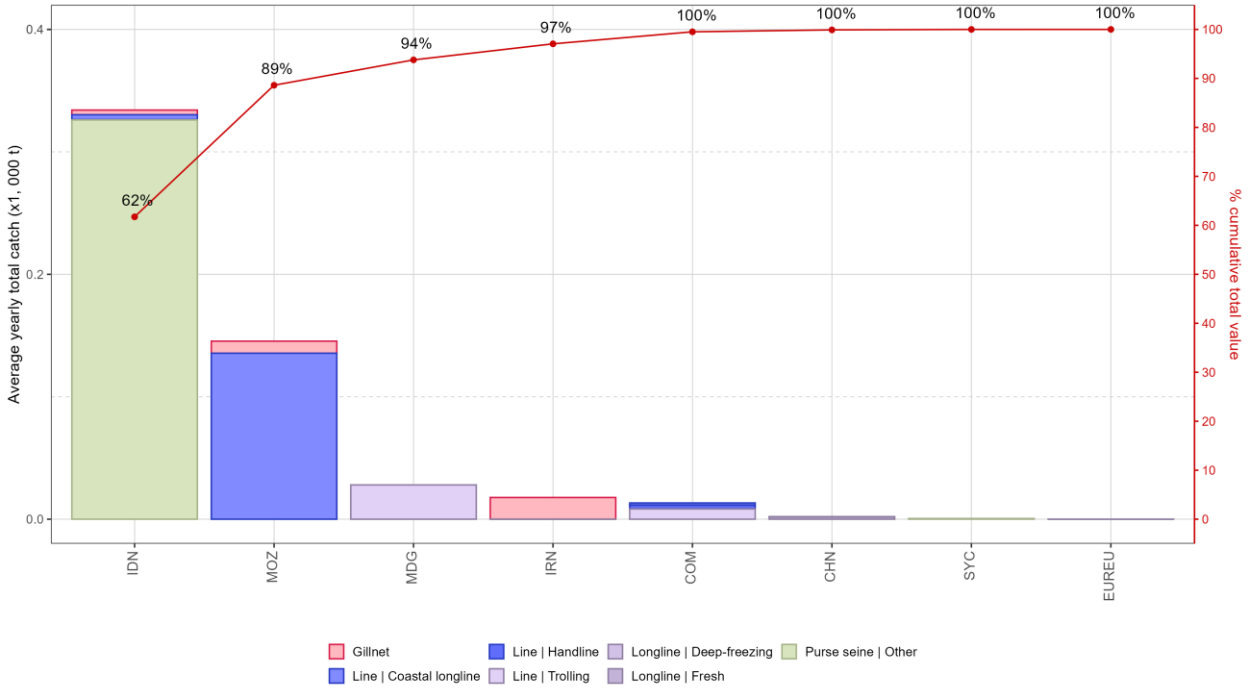


Figure 2. Mean annual retained catches (metric tonnes; t) of oceanic whitetip shark by fleet and fishery between 2020 and 2024, with indication of cumulative catches by fleet. FS = free-swimming school; LS = school associated with drifting floating objects. Purse seine | Other: coastal purse seine, purse seine of unknown association type, ring net; Longline | Other: swordfish and sharks-targeted longlines; Other: all remaining fishing gears.

LITERATURE CITED

Bigelow, K. and Carvalho, F. 2021. Review of potential mitigation measures to reduce fishing-related mortality on silky and oceanic whitetip sharks (Project 101). WCPFC Scientific Committee 17th Regular Session. WCPFC-SC17-2021/EB-WP-01. Available: https://meetings.wcpfc.int/node/12598

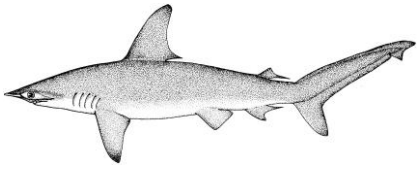
Coelho, R. 2016. Hooking mortality of oceanic whitetip sharks caught in pelagic longline targeting swordfish in the SW Indian Ocean: comments on the efficiency of no-retention measures. IOTC-2016-WPEB12-26

Murua H, Santiago, J, Coelho, R, Zudaire I, Neves C, Rosa D, Semba Y, Geng Z, Bach P, Arrizabalaga, H., Baez JC, Ramos ML, Zhu JF and Ruiz J. (2018). Updated Ecological Risk Assessment (ERA) for shark species caught in fisheries managed by the Indian Ocean Tuna Commission (IOTC). IOTC–2018–SC21–14_Rev_1.

Rigby, C.L., Barreto, R., Carlson, J., Fernando, D., Fordham, S., Francis, M.P., Herman, K., Jabado, R.W., Liu, K.M., Marshall, A., Pacoureau, N., Romanov, E., Sherley, R.B. & Winker, H. 2019. Carcharhinus longimanus. The IUCN Red List of Threatened Species 2019: e.T39374A2911619. https://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T39374A2911619.en. Accessed on 06 December 2023.

Tolotti M.T., Capello M., Bach P., Romanov E., Murua H., Dagorn L. 2016. Using FADs to estimate a population trend for the oceanic whitetip shark in the Indian Ocean. IOTC-2016-WPEB12-25.

APPENDIX IX
EXECUTIVE SUMMARY: SCALLOPED HAMMERHEAD SHARK (2026)



CITES APPENDIX II species

Table A 1. Status of scalloped hammerhead shark (*Sphyrna lewini*) in the Indian Ocean.

Area[1]	Indicators		2018 stock status determination
Indian Ocean	Reported catch 2024 (t)[3]	1,537	
	Not elsewhere included (nei) sharks[2] 2024 (t)	15,694	
	Average reported catch 2020-24 (t)	766	
	Av. not elsewhere included 2020-2024 (nei) sharks[2] (t)	24,976	
	MSY (1,000 t) (80% CI) F_{MSY} (80% CI) SB_{MSY} (1,000 t) (80% CI) $F_{current}/F_{MSY}$ (80% CI) $SB_{current}/SB_{MSY}$ (80% CI) $SB_{current}/SB_0$ (80% CI)	unknown	

[1]Boundaries for the Indian Ocean = IOTC area of competence

[2]Includes all other shark catches reported to the IOTC Secretariat, which may contain this species (i.e., SKH: Various sharks nei; SPN: Hammerhead sharks nei).

[3]Proportion of catch fully or partially estimated for 2023: 0% All catches within the database were reported by CPCs.

Colour key	Stock overfished ($SB_{year}/SB_{MSY}< 1$)	Stock not overfished ($SB_{year}/SB_{MSY}\geq 1$)
Stock subject to overfishing ($F_{year}/F_{MSY}> 1$)		
Stock not subject to overfishing ($F_{year}/F_{MSY}\leq 1$)		
Not assessed/Uncertain		

Table A 1. IUCN threat status of scalloped hammerhead shark (*Sphyrna lewini*) in the Indian Ocean.

Common name	Scientific name	IUCN threat status[4]		
		Global status	WIO	EIO
Scalloped hammerhead shark	*Sphyrna lewini*	Critically Endangered	Critically Endangered	–

IUCN = International Union for Conservation of Nature; WIO = Western Indian Ocean; EIO = Eastern Indian Ocean

[4]The process of the threat assessment from IUCN is independent from the IOTC and is presented for information purpose only

Sources: Rigby et al 2019

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

Stock status. The current IUCN threat status of 'Critically Endangered' applies to scalloped hammerhead sharks globally but specifically for the western Indian Ocean the status is 'Critically Endangered' (**Table A** 1). The ecological risk assessment (ERA) conducted for the Indian Ocean by the WPEB and SC in 2018 consisted of a semi-quantitative risk assessment analysis to evaluate the resilience of shark species to the impact of a given fishery, by combining the biological productivity of the species and its susceptibility to each fishing gear type (Murua *et al.* 2018). Scalloped

hammerhead shark received a low vulnerability ranking (No. 17) in the ERA rank for longline gear because it was estimated to be one of the least productive shark species but was also characterised by a lower susceptibility to longline gear. Scalloped hammerhead shark was estimated as the twelfth most vulnerable shark species in the ERA ranking for purse seine gear, but with lower levels of vulnerability compared to longline gear, because the susceptibility was lower for purse seine gear. There is a paucity of information available on this species and this situation is not expected to improve in the short to medium term. Scalloped hammerhead sharks are commonly taken by a range of fisheries in the Indian Ocean. They are extremely vulnerable to gillnet and prawn trawl fisheries, especially when these occur in and around nursery areas. Scalloped hammerheads are commonly landed in coastal fisheries in the Western Indian Ocean, and have often been recorded among the species with the highest catches numerically. While species-level catch data are limited for the region, there are several sources of published and unpublished data on catches of this species. Furthermore, pups occupy shallow coastal nursery grounds, often heavily exploited by inshore fisheries. Because of their life history characteristics – they are relatively long lived (over 30 years) and have relativity few offspring (<31 pups each year), the scalloped hammerhead shark is vulnerable to overfishing. The stock status is **unknown** due to a lack of data available for quantitative stock assessment or basic fishery indicators (**Table A**).

Outlook. The marked increase in catches over the previous year (200 t) is due to the breakdown by species reporting this year by Kenya and Tanzania, which previously reported sharks aggregated. Piracy in the western Indian Ocean has resulted in the displacement and subsequent concentration of a substantial portion of longline fishing effort into certain areas in the southern and eastern Indian Ocean. Some longline vessels have returned to their traditional fishing areas in the northwest Indian Ocean, due to the increased security onboard vessels, with the exception of the Japanese fleet which has still not returned to the levels seen before the start of the piracy threat. It is therefore unlikely that catch and effort from longline fleets on scalloped hammerhead shark declined in the southern and eastern areas during this time period and may have resulted in localised depletion there. Mortality from coastal fisheries remain high and unmonitored.

Management advice. Despite the absence of stock assessment information, the Commission should consider taking a cautious approach by implementing some management actions for scalloped hammerhead sharks. While mechanisms exist for encouraging CPCs to comply with their recording and reporting requirements (Resolution 18/07), these need to be further implemented by the Commission so as to better inform scientific advice.

The following key points should be noted:

- **Maximum Sustainable Yield (MSY)**: Unknown.
- **Reference points**: Not applicable.
- **Main fisheries (mean annual retained catch 2020-2024):** scalloped hammerhead are caught using gillnet (53.5%), followed by line (29.8%) and other (16.3%). The remaining catches taken with other gears contributed to 0.4% of the total catches in recent years (Fig.1).
- **Main fleets (mean annual retained catch 2020-2024):** the majority of scalloped hammerhead catches are attributed to vessels flagged to Mozambique (73.9%) followed by Kenya (16.1%) and Sri Lanka (6.7%). The 5 other fleets catching scalloped hammerhead contributed to 3.4% of the total catch in recent years (Fig. 2).

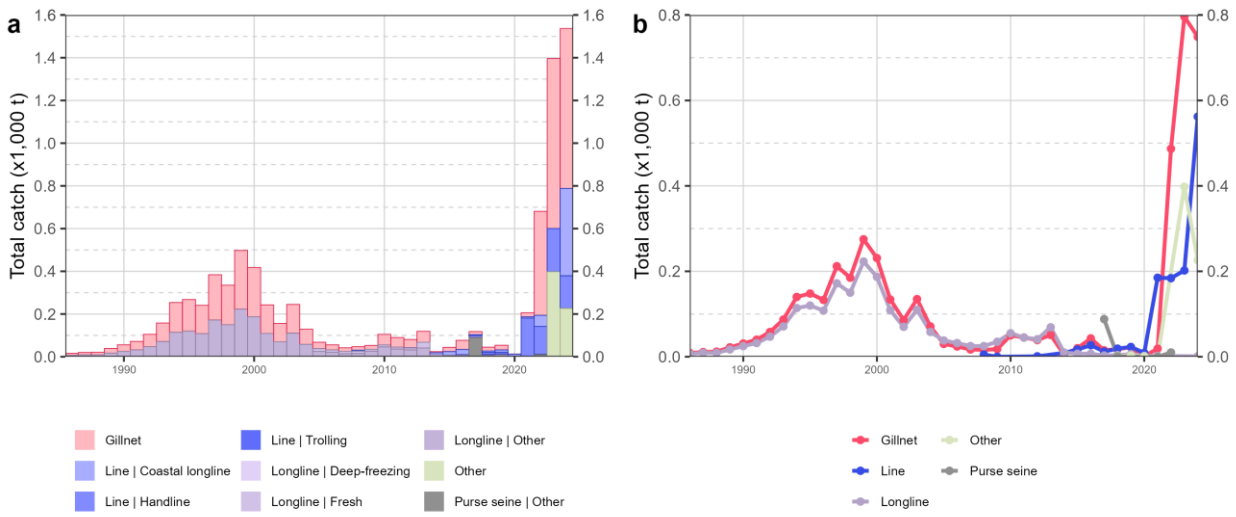


Figure 1. Annual time series of (a) cumulative retained catches (metric tonnes; t) by fishery and (b) individual retained catches (metric tonnes; t) by fishery group for scalloped hammerhead during 1950-2024. FS = free-swimming school; LS = school associated with drifting floating objects. Purse seine | Other: coastal purse seine, purse seine of unknown association type, ring net; Longline | Other: swordfish and sharks-targeted longlines; Other: all remaining fishing gears.

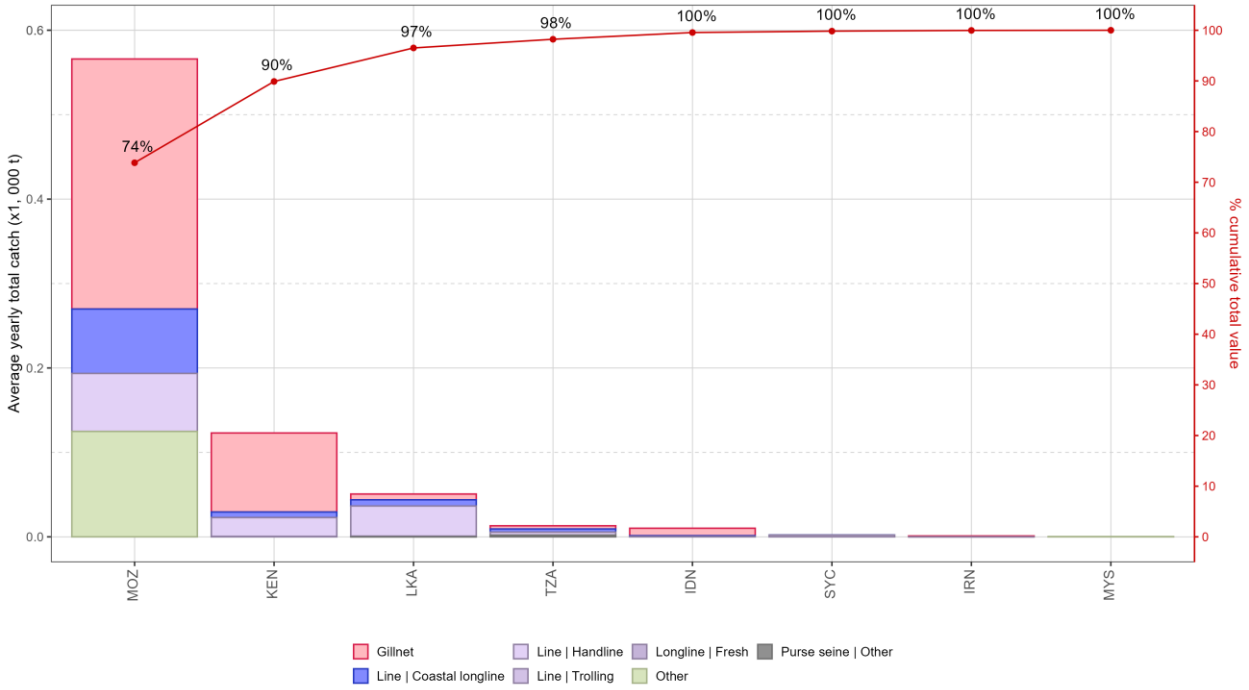


Figure 2. Mean annual retained catches (metric tonnes; t) of scalloped hammerhead by fleet and fishery between 2020 and 2024, with indication of cumulative catches by fleet. FS = free-swimming school; LS = school associated with drifting floating objects. Purse seine | Other: coastal purse seine, purse seine of unknown association type, ring net; Longline | Other: swordfish and sharks-targeted longlines; Other: all remaining fishing gears.

LITERATURE CITED

De Bruyn, P., Dudley, S.F.J., Cliff, G. and Smale, M.J., 2005. Sharks caught in the protective gill nets off KwaZulu-Natal, South Africa. 11. The scalloped hammerhead shark Sphyrna lewini (Griffith and Smith). African Journal of Marine Science, 27(3), pp.517-528.

Doukakis, P., Hanner, R., Shivji, M., Bartholomew, C., Chapman, D., Wong, E. and Amato, G., 2011. Applying genetic techniques to study remote shark fisheries in northeastern Madagascar. Mitochondrial DNA, 22(sup1), pp.15-20.

Kiilu, B.K., Kaunda-Arara, B., Oddenyo, R.M., Thoya, P. and Njiru, J.M., 2019. Spatial distribution, seasonal abundance and exploitation status of shark species in Kenyan coastal waters. African Journal of Marine Science, 41(2), pp.191-201.

Humber, F., Andriamahaino, E.T., Beriziny, T., Botosoamananto, R., Godley, B.J., Gough, C., Pedron, S., Ramahery, V. and Broderick, A.C., 2017. Assessing the small-scale shark fishery of Madagascar through community-based monitoring and knowledge. Fisheries Research, 186, pp.131-143.

Marshall, N.T., and Barnett, R. 1997. The trade in sharks and shark products in the Western Indian and Southeast Atlantic Oceans. Nairobi, Kenya.

Murua H, Santiago, J, Coelho, R, Zudaire I, Neves C, Rosa D, Semba Y, Geng Z, Bach P, Arrizabalaga, H., Baez JC, Ramos ML, Zhu JF and Ruiz J. (2018). Updated Ecological Risk Assessment (ERA) for shark species caught in fisheries managed by the Indian Ocean Tuna Commission (IOTC). IOTC–2018–SC21–14_Rev_1.

Osuka, K.E., Samoilys, M.A., Musembi, P., Thouless, C.J., Obota, C. and Rambahiniarison, J., 2025. Status and characteristics of sharks and rays impacted by artisanal fisheries: potential implications for management and conservation. Marine and Fishery Sciences (MAFIS), 38(1).

Rigby, C.L., Dulvy, N.K., Barreto, R., Carlson, J., Fernando, D., Fordham, S., Francis, M.P., Herman, K., Jabado, R.W., Liu, K.M., Marshall, A., Pacoureau, N., Romanov, E., Sherley, R.B. & Winker, H. 2019. Sphyrna lewini. The IUCN Red List of Threatened Species 2019: e.T39385A2918526. Accessed on 06 December 2023.

Robinson, L., and Sauer, W.H.H. 2013. A first description of the artisanal shark fishery in northern Madagascar: implications for management. African Journal of Marine Science, 35:1, pp. 9-15, DOI: 10.2989/1814232X.2013.769906

APPENDIX X
EXECUTIVE SUMMARY: SHORTFIN MAKO SHARK (2026)



CITES APPENDIX II species

Table A 1. Status of shortfin mako shark (*Isurus oxyrinchus*) in the Indian Ocean.

Area[1]	Indicators		2024 stock status determination
Indian Ocean	Catch (2024) (t) Catch of NEI sharks (2024) (t) Mean annual catch (2020-2024) (t) Average catches (SMA, MAK, MSK) 2020-2024 Mean annual catch of NEI sharks (2020-2024) (t)	1,451[2] 16,033[3] 930 25,873[3]	49.7%
	MSY (1,000 t) (80% CI) F_{MSY} (80% CI) B_{MSY} (1,000 t) (80% CI) $F_{current}/F_{MSY}$ (80% CI) $B_{current}/B_{MSY}$ (80% CI) $B_{current}/B_0$ (80% CI)	1.93 (0.99 – 3.31) 0.03 (0.01 – 0.07) 60.0 (35.7 – 103.8) 1.53 (0.65 – 3.71) 0.96 (0.58 – 1.41) 0.45 (0.27- 0.69)	

[1]Stock boundaries defined as the IOTC area of competence; [2]Proportion of catch fully or partially estimated for 2024: 0%; [3]NEI includes all other shark catches reported to the IOTC Secretariat, which may contain this species, i.e., AG38: Blue shark, shortfin mako, oceanic whitetip shark; MAK: Mako sharks; MSK: Mackerel sharks,porbeagles nei; SKH: Various sharks nei

Colour key	Stock overfished (SB_{year}/SB_{MSY}< 1)	Stock not overfished (SB_{year}/SB_{MSY}≥ 1)
Stock subject to overfishing (F_{year}/F_{MSY}> 1)	49.7	24.0
Stock not subject to overfishing (F_{year}/F_{MSY}≤ 1)	4.1	22.2
Not assessed/Uncertain		

Table A 2. Shortfin mako shark: IUCN threat status of shortfin mako shark (*Isurus oxyrinchus*) in the Indian Ocean.

Common name	Scientific name	IUCN threat status[4]		
		Global status	WIO	EIO
Shortfin mako shark	*Isurus oxyrinchus*	Endangered	–	–

IUCN = International Union for Conservation of Nature; WIO = Western Indian Ocean; EIO = Eastern Indian Ocean

[4]The process of the threat assessment from IUCN is independent from the IOTC and is presented for information purpose only

Sources: Rigby et al 2019

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

Stock status. In 2024 a stock assessment was carried out for the shortfin mako shark in the IOTC area of competence, using data until 2022. The WPEB carried out a data-preparatory meeting earlier in the year followed by the stock assessment meeting. The model applied was a population biomass dynamics model using the platform JABBA. The stock status and projections were based on an ensemble grid of 9 models designed to capture the main uncertainties relating to biology (3 options) and the shape of the production curve used in biomass dynamics models (3 options). A

number of additional options and model configurations were explored as sensitivity runs. The MSY for the stock is estimated at 1,930 t (80% CI: 985 – 3,313 t). The median biomass in 2022 was estimated to be at 45% (80% CI: 27-69%) of the unfished levels and below the levels that support MSY (B/BMSY in 2022 = 0.96, 80% CI: 0.58-1.48) (**Table 1**). The median fishing mortality in 2022 was estimated to be higher than the level that supports MSY (F/FMSY in 2022 = 1.53, 80% CI: 0.65-3.71) (**Table 1**). While in recent years there were a number of CPUE indices to compare, the assessment relied on the Japanese CPUE index which showed a large depletion through the late 1990s and there is no alternative abundance index to compare the extent of this decline during that period. Additionally, although the reported catches of shortfin mako are generally considered to be reliable because this species used to be retained by several fleets, there is still significant uncertainty about the accuracy of reports from earlier years. This uncertainty also applies to more recent years (post-2018) due to discarding or non-retention.

A semi-quantitative ecological risk assessment (ERA) was conducted for the Indian Ocean by the WPEB and SC in 2018 to evaluate the resilience of shark species to the impact of pelagic fisheries (Murua *et al.* 2018). Shortfin mako sharks received the highest vulnerability ranking in the ERA for longline gear (No. 1) because of their low productivity and high susceptibility to longline gear, and were ranked the fourth most vulnerable shark species for purse seine gear. Considering the characterized uncertainty, and on the weight-of-evidence available in 2024, the shortfin mako shark stock is determined to be **overfished** and subject to **overfishing** (**Table 1, Fig 3**).

Outlook. Catches increased mostly from the mid-1980s up to 2016 followed by a decrease until 2022 as it has been under domestic landing restrictions by a number of fleets, and as a result of it having been listed in CITES Appendix II. The CPUE series for several key fleets which have been available since the early 2000s are generally stable or are increasing.

Management advice The Commission should take a cautious approach by implementing management actions that reduce fishing mortality on shortfin mako sharks, and the stock should be closely monitored. While mechanisms exist for encouraging CPCs to comply with their recording and reporting requirements (Resolution 18/07), these need to be further implemented by the Commission so as to better inform future scientific advice. The Kobe II Strategy Matrix (Table 3) provides the probability of exceeding reference levels over 3-, 10-, 20- and 30-year periods, over a range of TAC options established as a percentage of current catches. Catches at the terminal year of the model (2022) were higher than MSY, and the shortfin mako is currently overfished (B/Bmsy < 1) and undergoing overfishing (F/Fmsy > 1). Under those levels of catches, the biomass will continue to decline, and fishing mortality will continue to increase over time. In order to have a lower than 50% probability of exceeding MSY-reference points in 10 years, i.e., to recover the stock to the green quadrant of the Kobe plot with at least 50% probability in 10 years, future catches should not exceed 40% of the average catches between 2020-2022 (i.e., last 3 year of catches used in the model). This corresponds to an annual TAC of 1,217.2 t (representing all fishing mortality including retention, dead discards and post-release mortality), noting that this TAC level should include and account for the SMA, MAK and MSK species codes as reported to IOTC.

The following key points should also be noted:

- **Maximum Sustainable Yield (MSY)**: estimate for the Indian Ocean is approximately 1,930 t
- **Reference points**: The Commission has not adopted reference points or harvest control rules for any shark species.
- **Main fisheries (mean annual retained catch 2020-2024):** shortfin mako are caught using longline (62%), followed by gillnet (27.4%) and other (7.2%). The remaining catches taken with other gears contributed to 3.3% of the total catches in recent years (Fig. 1).
- **Main fleets (mean annual retained catch 2020-2024):** the majority of shortfin mako catches are attributed to vessels flagged to EU (Spain) (38.9%) followed by Pakistan (24.3%) and EU (Portugal) (11.6%). The 13 other fleets catching shortfin mako contributed to 25.2% of the total catch in recent years (Fig. 2).
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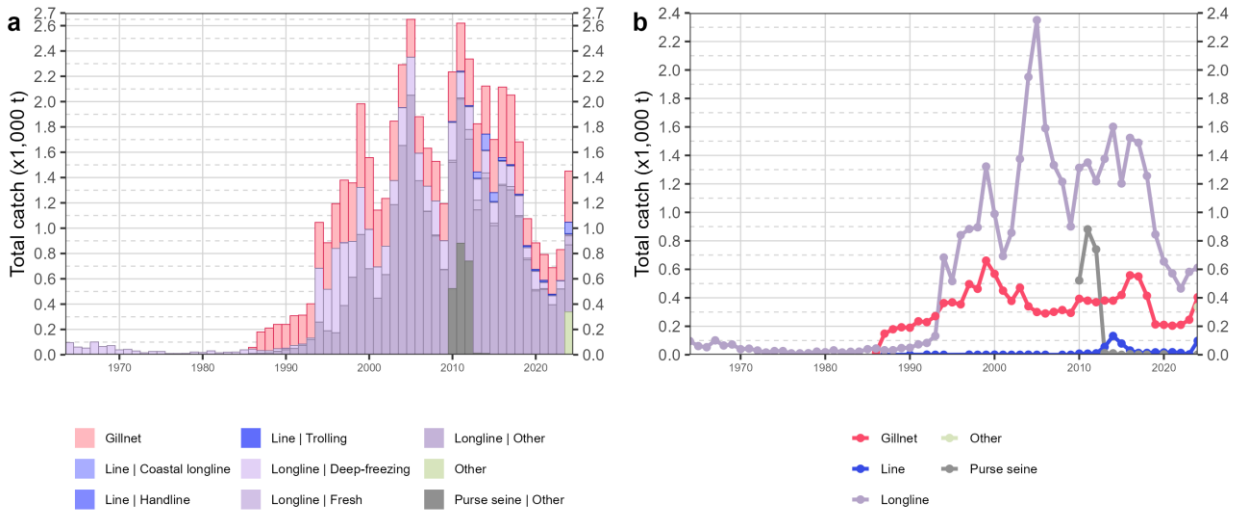


Figure 1. Annual time series of (a) cumulative retained catches (metric tonnes; t) by fishery and (b) individual retained catches (metric tonnes; t) by fishery group for shortfin mako during 1950-2024. FS = free-swimming school; LS = school associated with drifting floating objects. Purse seine | Other: coastal purse seine, purse seine of unknown association type, ring net; Longline | Other: swordfish and sharks-targeted longlines; Other: all remaining fishing gears

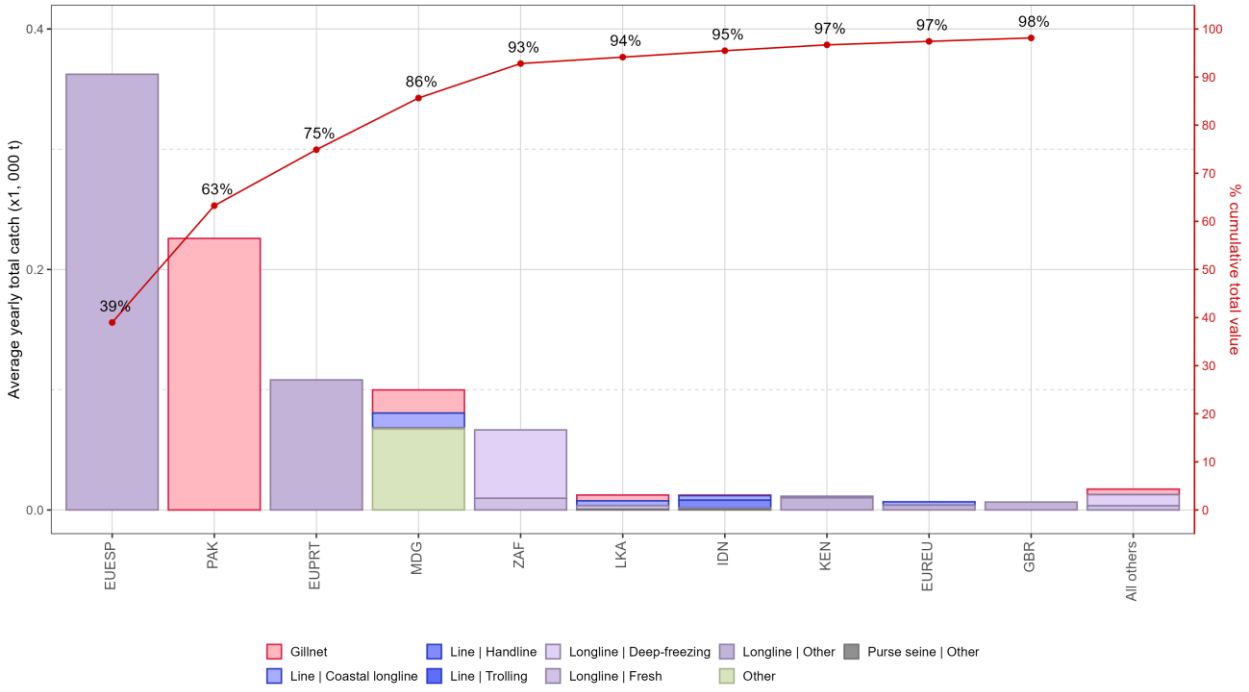


Figure 2. Mean annual retained catches (metric tonnes; t) of shortfin mako by fleet and fishery between 2020 and 2024, with indication of cumulative catches by fleet. FS = free-swimming school; LS = school associated with drifting floating objects. Purse seine | Other: coastal purse seine, purse seine of unknown association type, ring net; Longline | Other: swordfish and sharks-targeted longlines; Other: all remaining fishing gears

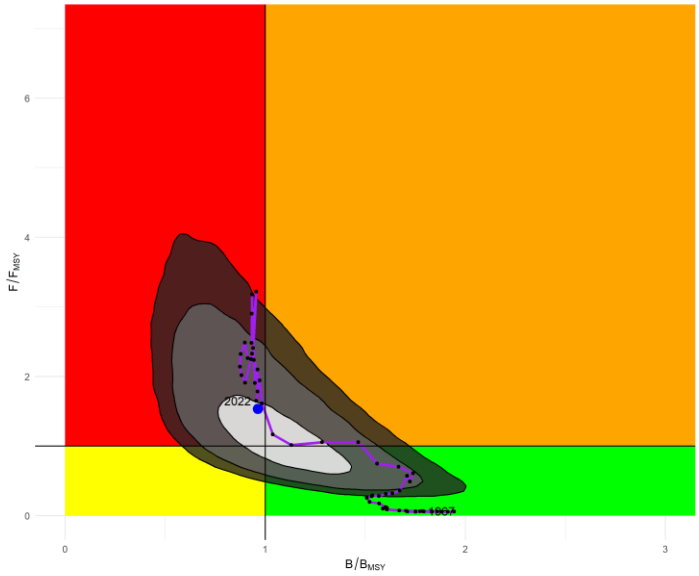


Fig 3: **Shortfin mako**: 2024 stock status, relative to BMSY (x-axis) and FMSY (y-axis) for the final model (terminal year of the model is 2022). The point represents the median of the 9 final models used in the ensemble grid and the shaded areas are the 50%, 80% and 90% contours of the uncertainties in the terminal year. The line represents the time series of the median stock trajectory from the ensemble grid of models.

Table 3. **Shortfin mako**: Final model ensemble aggregated Indian Ocean Kobe II Strategy Matrix. The values represent the probabilities (percentage) of exceeding the MSY-based target reference points, for constant catch projections between 0%-100% (10% intervals) relative to last years of catches used in the model (i.e., average of last 3 years, 2020-2022), and projected for periods of 3, 10, 20 and 30 years.

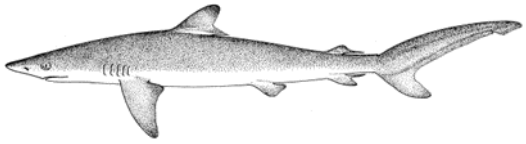
Reference point and projection time	Catch projections (relative to the 2020-2022 catches) and probability (%) of exceeding MSY-based reference points										
Catch relative to 2020-2022 (%)	**0%**	**10%**	**20%**	**30%**	**40%**	**50%**	**60%**	**70%**	**80%**	**90%**	**100%**
TAC (t)	**0.0**	**304.3**	**608.6**	**912.9**	**1217.2**	**1521.5**	**1825.7**	**2130.0**	**2434.3**	**2738.6**	**3042.9**
3 year projection											
B2025 < BMSY	57.7	57.7	57.7	57.7	57.7	57.7	57.7	57.7	57.7	57.7	57.7
F2025 > FMSY	0.0	1.5	9.6	21.7	34.1	45.3	55.1	63.2	70.0	75.7	80.2
10 year projection											
B2032 < BMSY	39.2	41.8	44.5	47.1	49.8	52.5	55.2	57.9	60.6	63.2	65.8
F2032 > FMSY	0.0	2.0	10.0	21.2	32.8	43.8	53.6	62.2	69.5	75.6	80.6
20 year projection											
B2042 < BMSY	26.1	30.0	34.4	39.1	44.0	49.0	54.1	59.1	64.0	68.6	72.9
F2042 > FMSY	0.0	2.4	10.2	20.6	31.9	42.8	52.9	62.0	69.9	76.5	81.8
30 year projection											
B2052 < BMSY	19.3	23.9	29.0	34.9	41.2	47.7	54.3	60.7	66.7	72.3	77.3
F2052 > FMSY	0.0	2.6	10.2	20.4	31.6	42.6	53.1	62.4	70.6	77.5	83.0

LITERATURE CITED

Murua H, Santiago, J, Coelho, R, Zudaire I, Neves C, Rosa D, Semba Y, Geng Z, Bach P, Arrizabalaga, H., Baez JC, Ramos ML, Zhu JF and Ruiz J. (2018). Updated Ecological Risk Assessment (ERA) for shark species caught in fisheries managed by the Indian Ocean Tuna Commission (IOTC). IOTC–2018–SC21–14_Rev_1.

Rigby, C.L., Barreto, R., Carlson, J., Fernando, D., Fordham, S., Francis, M.P., Jabado, R.W., Liu, K.M., Marshall, A., Pacoureau, N., Romanov, E., Sherley, R.B. & Winker, H. 2019. Isurus oxyrinchus. The IUCN Red List of Threatened Species 2019: e.T39341A2903170. https://dx.doi.org/10.2305/IUCN.UK.2019-1.RLTS.T39341A2903170.en. Accessed on 06 December 2023.

APPENDIX XI
EXECUTIVE SUMMARY: SILKY SHARK (2026)



CITES APPENDIX II species

Table A 1. Status of silky shark (*Carcharhinus falciformis*) in the Indian Ocean.

Area[1]	Indicators		2018 stock status determination
Indian Ocean	Catch (2024) (t) Catch of NEI sharks (2024) (t) Mean annual catch (2020-2024) (t) Mean annual catch of NEI sharks (2020-2024) (t)	1,591[2] 15,742[3] 2,062 24,929[3]	
	MSY (1,000 t) (80% CI) F_{MSY} (80% CI) SB_{MSY} (1,000 t) (80% CI) $F_{current}/F_{MSY}$ (80% CI) $SB_{current}/SB_{MSY}$ (80% CI) $SB_{current}/SB_0$ (80% CI)	unknown	

[1]Stock boundaries defined as the IOTC area of competence; [2]Proportion of catch fully or partially estimated for 2024: 0%; [3]NEI includes all other shark catches reported to the IOTC Secretariat, which may contain this species, i.e., RSK: Requiem sharks nei; SKH: Various sharks nei

Colour key	Stock overfished ($SB_{year}/SB_{MSY}< 1$)	Stock not overfished ($SB_{year}/SB_{MSY}\geq 1$)
Stock subject to overfishing ($F_{year}/F_{MSY}> 1$)		
Stock not subject to overfishing ($F_{year}/F_{MSY}\leq 1$)		
Not assessed/Uncertain		

Table A 2. Silky shark: IUCN threat status of silky shark (*Carcharhinus falciformis*) in the Indian Ocean.

Common name	Scientific name	IUCN threat status[4]		
		Global status	WIO	EIO
Silky shark	*Carcharhinus falciformis*	Vulnerable	-	-

IUCN = International Union for Conservation of Nature; WIO = Western Indian Ocean; EIO = Eastern Indian Ocean

[4]The process of the threat assessment from IUCN is independent from the IOTC and is presented for information purpose only

Sources Rigby 2021

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

Stock status. In 2026, several length-based, data-limited assessment methods were applied to silky shark including YPR, SPR, LBSPR, and FISHBLICC analyses. These analyses used size-frequency data from the IOTC databases, together with compiled life-history parameters. The LB-SPR estimates indicated that current fishing mortality on the silky shark longline fishery is likely close to the SPR 20% limit, while the silky shark purse seine fishery showed spawning potential much lower than the SPR 20% limit. It is cautioned however, that the purse seine fishery mainly caught juvenile silky

sharks, the estimated spawning potential is likely to be overly pessimistic (as the LB-SPR method assumes full vulnerability of adults to the fishery).

There remains considerable uncertainty about the relationship between abundance and the nominal CPUE series from the main longline fleets, and about the total catches over the past decade (**Table** A **A1**). The ecological risk assessment (ERA) conducted for the Indian Ocean by the WPEB and SC in 2018 consisted of a semi-quantitative risk assessment analysis to evaluate the resilience of shark species to the impact of a given fishery, by combining the biological productivity of the species and its susceptibility to each fishing gear type (Murua *et al.* 2018). Silky shark received a high vulnerability ranking (No. 2) in the ERA rank for longline gear because it was estimated to be one of the least productive shark species, and with a high susceptibility to longline gear. Silky shark was estimated to be the fifth most vulnerable shark species in the ERA ranking for purse seine gear, due to its low productivity and high susceptibility to purse seine gear. The current IUCN threat status of this species globally is 'Vulnerable' (**Table** A **A2**). There is a paucity of information available on this species, but several studies have been carried out for this species in the recent years. CPUE derived from longline fishery observations indicated a decrease from 2009 to 2011 with a stable pattern onward. A preliminary stock assessment was run in 2018 but could not be updated in 2019. This assessment is extremely uncertain, however, and so the population status of silky sharks in the Indian Ocean is considered uncertain. Silky sharks are commonly taken by a range of fisheries in the Indian Ocean. Because of their life history characteristics – they are relatively long lived (over 20 years), mature relatively late (at 6–12 years), and have relativity few offspring (<20 pups every two years), the silky shark can be vulnerable to overfishing. Despite the lack of data, there is some anecdotal information suggesting that silky shark abundance has declined over recent decades, including from Indian longline research surveys, which are described in the IOTC Supporting Information for silky shark sharks. There is no quantitative stock assessment or basic fishery indicators currently available for silky shark in the Indian Ocean therefore the stock status is **unknown**.

Outlook. The impact of piracy in the western Indian Ocean has resulted in the displacement and subsequent concentration of a substantial portion of longline fishing effort into certain areas in the southern and eastern Indian Ocean. Some longline vessels have returned to their traditional fishing areas in the northwest Indian Ocean, due to the increased security onboard vessels, with the exception of the Japanese fleet which has still not returned to the levels seen before the start of the piracy threat. It is therefore unlikely that catch and effort on silky shark has declined in the southern and eastern areas and may have resulted in localised depletion there.

Management advice. Despite the attempt of new stock assessment information, there is limitation is the availability of data and the methods being applied. The Commission should consider taking a cautious approach by implementing some management actions for silky sharks. While mechanisms exist for encouraging CPCs to comply with their recording and reporting requirements (Resolution 18/07), these need to be further implemented by the Commission so as to better inform scientific advice.

Mitigation measures should be taken to reduce at-vessel and post release mortality, including consideration of potential gear modifications in longline fleets targeting tuna and swordfish. Noting that a recent study (Bigelow et al. 2021) concluded in WCPFC that banning both shark lines and wire leaders has the potential to reduce fishing mortality by 30.8% for silky shark.

The following key points should also be noted:

- **Maximum Sustainable Yield (MSY)**: Unknown.
- **Reference points**: Not applicable.
- **Main fisheries (mean annual retained catch 2020-2024)**: silky shark are caught using gillnet (32.7%), followed by line (29%) and longline (21%). The remaining catches taken with other gears contributed to 17.3% of the total catches in recent years (Fig. 1).
- **Main fleets (mean annual retained catch 2020-2024):** the majority of silky shark catches are attributed to vessels flagged to Indonesia (26.4%) followed by Sri Lanka (20.2%) and Taiwan,China (14.6%). The 9 other fleets catching silky shark contributed to 38.7% of the total catch in recent years (Fig. 2).

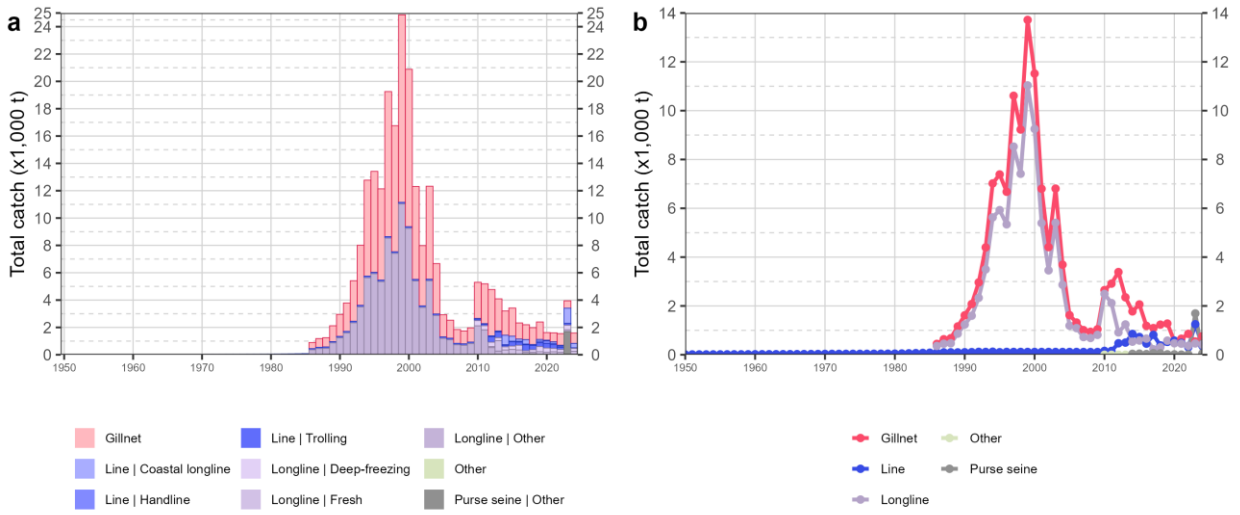


Figure 1. Annual time series of (a) cumulative retained catches (metric tonnes; t) by fishery and (b) individual retained catches (metric tonnes; t) by fishery group for silky shark during 1950-2024. FS = free-swimming school; LS = school associated with drifting floating objects. Purse seine | Other: coastal purse seine, purse seine of unknown association type, ring net; Longline | Other: swordfish and sharks-targeted longlines; Other: all remaining fishing gears.

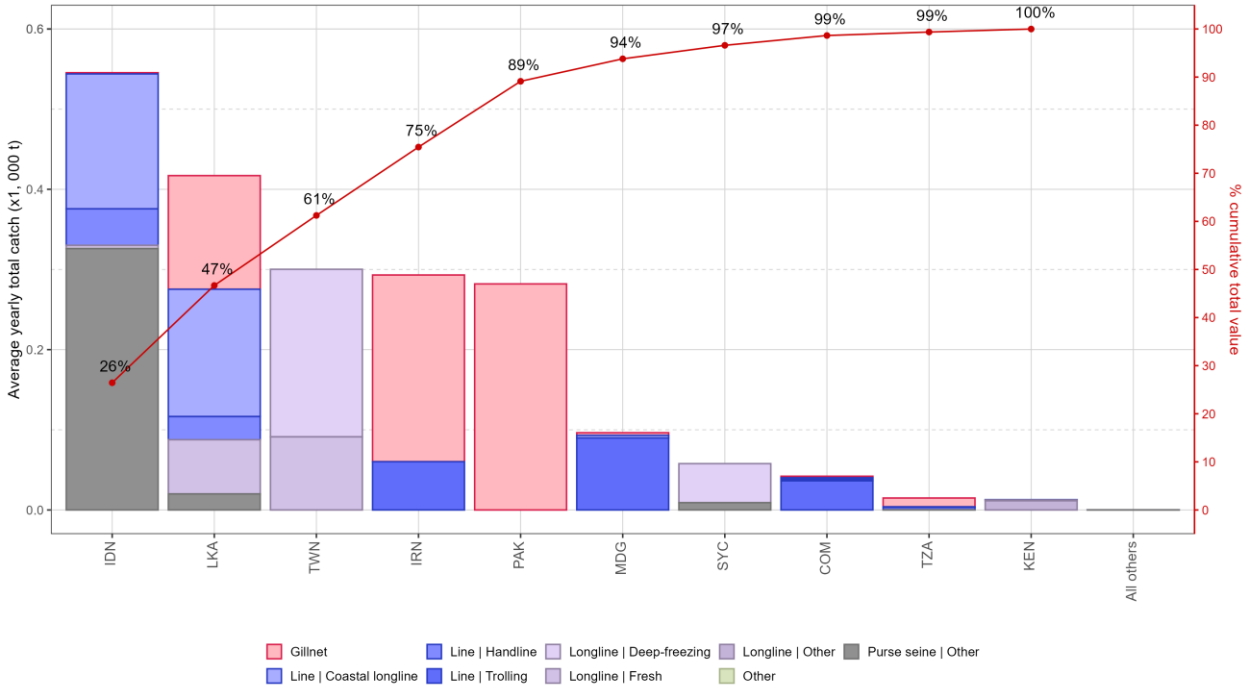


Figure 2. Mean annual retained catches (metric tonnes; t) of silky shark by fleet and fishery between 2020 and 2024, with indication of cumulative catches by fleet. FS = free-swimming school; LS = school associated with drifting floating objects. Purse seine | Other: coastal purse seine, purse seine of unknown association type, ring net; Longline | Other: swordfish and sharks-targeted longlines; Other: all remaining fishing gears.

LITERATURE CITED

Bigelow, K. and Carvalho, F. 2021. Review of potential mitigation measures to reduce fishing-related mortality on silky and oceanic whitetip sharks (Project 101). WCPFC Scientific Committee 17th Regular Session. WCPFC-SC17-2021/EB-WP-01. Available: https://meetings.wcpfc.int/node/12598

Murua H, Santiago, J, Coelho, R, Zudaire I, Neves C, Rosa D, Semba Y, Geng Z, Bach P, Arrizabalaga, H., Baez JC, Ramos ML, Zhu JF and Ruiz J. (2018). Updated Ecological Risk Assessment (ERA) for shark species caught in fisheries managed by the Indian Ocean Tuna Commission (IOTC). IOTC–2018–SC21–14_Rev_1.

Rigby, C.L., Sherman, C.S., Chin, A. & Simpfendorfer, C. 2021. Carcharhinus falciformis (amended version of 2017 assessment). The IUCN Red List of Threatened Species 2021: e.T39370A205782570. https://dx.doi.org/10.2305/IUCN.UK.2021-3.RLTS.T39370A205782570.en. Accessed on 06 December 2023.

APPENDIX XII
EXECUTIVE SUMMARY: BIGEYE THRESHER SHARK (2026)



CITES APPENDIX II species

Table A 1. Status bigeye thresher shark (*Alopias superciliosus*) in the Indian Ocean.

Area[1]	Indicators		2018 stock status determination
Indian Ocean	Reported catch 2024 (t) Not elsewhere included (nei) sharks[2] 2024 (t) Thresher sharks nei 2024 (t) Average reported catch 2020-2024 (t) Av. Not elsewhere included (nei) sharks[2] 2020-2024 (t) Av. Thresher sharks nei 2020-2024 (t)	< 1 15,559 <1 <1 24,976 383	
	MSY (1,000 t) (80% CI) F_{MSY} (80% CI) SB_{MSY} (1,000 t) (80% CI) $F_{current}/F_{MSY}$ (80% CI) $SB_{current}/SB_{MSY}$ (80% CI) $SB_{current}/SB_0$ (80% CI)	unknown	

[1]Boundaries for the Indian Ocean = IOTC area of competence

[2]Includes all other shark catches reported to the IOTC Secretariat, which may contain this species (i.e., SKH: Various sharks nei;THR: Thresher sharks nei; MSK: Mackerel sharks,porbeagles nei).

Colour key	Stock overfished (SB_{year}/SB_{MSY}< 1)	Stock not overfished (SB_{year}/SB_{MSY}≥ 1)
Stock subject to overfishing (F_{year}/F_{MSY}> 1)		
Stock not subject to overfishing (F_{year}/F_{MSY}≤ 1)		
Not assessed/Uncertain		

Table A 2. Bigeye thresher shark: IUCN threat status of bigeye thresher shark (*Alopias superciliosus*) in the Indian Ocean.

Common name	Scientific name	IUCN threat status[3]		
		Global status	WIO	EIO
Bigeye thresher shark	*Alopias superciliosus*	Vulnerable	–	–

IUCN = International Union for Conservation of Nature; WIO = Western Indian Ocean; EIO = Eastern Indian Ocean

[3]The process of the threat assessment from IUCN is independent from the IOTC and is presented for information purpose only

Sources: Rigby et al 2019

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

Stock status. There remains considerable uncertainty in the stock status due to lack of information necessary for assessment or for the development of other indicators of the stock (**Table** A **1**). The ecological risk assessment (ERA) conducted for the Indian Ocean by the WPEB and SC in 2018 consisted of a semi-quantitative risk assessment analysis

to evaluate the resilience of shark species to the impact of a given fishery, by combining the biological productivity of the species and its susceptibility to each fishing gear type (Murua *et al.* 2018). Bigeye thresher shark received a high vulnerability ranking (No. 4) in the ERA rank for longline gear because it was characterised as one of the least productive shark species, and highly susceptible to longline gear. Despite its low productivity, bigeye thresher shark has a low vulnerability ranking to purse seine gear due to its low susceptibility to this particular gear. The current IUCN threat status of 'Vulnerable' applies to bigeye thresher shark globally (**Table** A **2**). There is a paucity of information available on this species and this situation is not expected to improve in the short to medium term. Bigeye thresher sharks are commonly taken by a range of fisheries in the Indian Ocean. Because of their life history characteristics – they are relatively long lived (+20 years), mature at 3–9 years, and have few offspring (2–4 pups every year), the bigeye thresher shark is vulnerable to overfishing. There has been no quantitative stock assessment and limited basic fishery indicators are available for bigeye thresher shark in the Indian Ocean. Therefore, the stock status is **unknown**.

Outlook. Current longline fishing effort is directed at other species, however, bigeye thresher sharks are commonly taken as bycatch in these fisheries. Hooking mortality is apparently very high, therefore IOTC Resolution 12/09 prohibiting retaining of any part of thresher sharks onboard and promoting live release of thresher shark may be largely ineffective for species conservation. Maintaining or increasing effort can result in declines in biomass, productivity and CPUE. However, there are few data to estimate CPUE trends and a reluctance of fishing fleets to report information on discards/non-retained catch. Piracy in the western Indian Ocean resulted in the displacement and subsequent concentration of a substantial portion of longline fishing effort into other areas in the southern and eastern Indian Ocean. Some longline vessels have returned to their traditional fishing areas in the northwest Indian Ocean, due to the increased security onboard vessels, with the exception of the Japanese fleet which has still not returned to the levels seen before the start of the piracy threat. It is therefore unlikely that catch and effort on bigeye thresher shark declined in the southern and eastern areas over that time period, potentially resulting in localised depletion.

Management advice. The prohibition on retention of bigeye thresher shark should be maintained. While mechanisms exist for encouraging CPCs to comply with their recording and reporting requirements (Resolution 18/07), these need to be further implemented by the Commission, so as to better inform scientific advice. IOTC Resolution 12/09 *On the conservation of thresher sharks (family Alopiidae) caught in association with fisheries in the IOTC area of competence*, prohibits retention onboard, transhipping, landing, storing, selling or offering for sale any part or whole carcass of thresher sharks of all the species of the family *Alopiidae*[2].The following key points should also be noted:

- **Maximum Sustainable Yield (MSY)**: Not applicable. Retention prohibited.
- **Reference points**: Not applicable.
- **Main fishing gear:** No report after 2012.Previous reported catches from gillnet and longline targeting swordfish. Reported as discarded/released alive by United Kingdom, South Africa, Indonesia, Korea, EU,France, Taiwan, China (Fig. 1)

[2] Scientific observers shall be allowed to collect biological samples from thresher sharks that are dead at haulback, provided that the samples are part of the research project approved by the Scientific Committee (or the Working Party on Ecosystems and Bycatch).

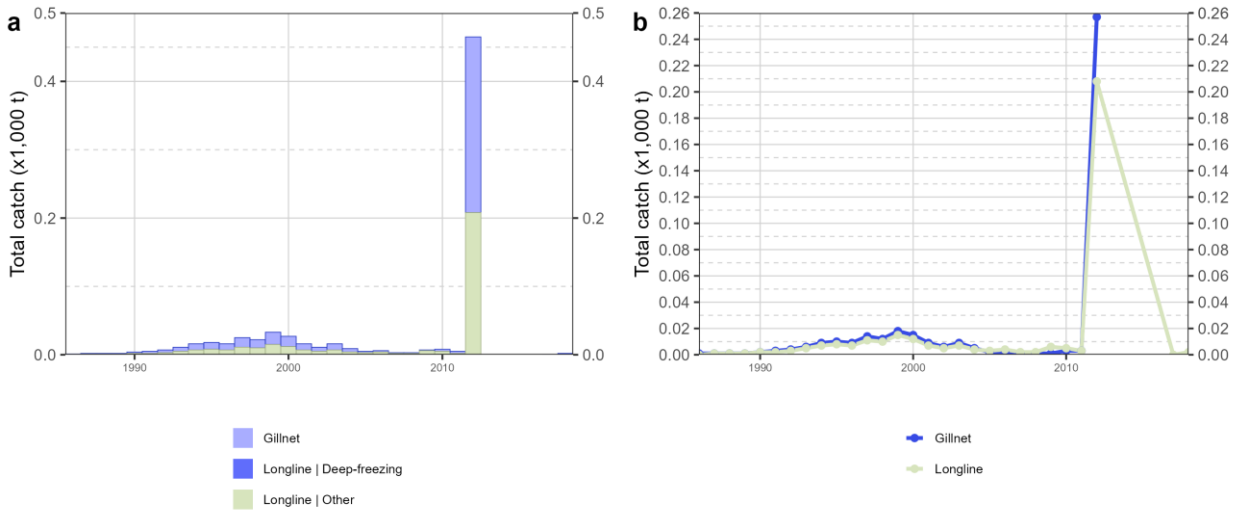


Figure 1. Annual time series of (a) cumulative retained catches (metric tonnes; t) by fishery and (b) individual retained catches (metric tonnes; t) by fishery group for bigeye thresher shark during 1950-2024. Longline | Other: swordfish and sharks-targeted longlines.

LITERATURE CITED

Murua H, Santiago J, Coelho R, Zudaire I, Neves C, Rosa D, Semba Y, Geng Z, Bach P, Arrizabalaga, H, Baez JC, Ramos ML, Zhu JF and Ruiz J (2018). Updated Ecological Risk Assessment (ERA) for shark species caught in fisheries managed by the Indian Ocean Tuna Commission (IOTC). IOTC–2018–SC21–14_Rev_1

Rigby CL, Barreto R, Carlson J, Fernando D, Fordham S, Francis MP, Herman K, Jabado RW, Liu KM, Marshall, A., Pacoureau, N., Romanov, E., Sherley, R.B. & Winker, H. 2019. Alopias superciliosus. The IUCN Red List of Threatened Species 2019: e.T161696A894216. https://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T161696A894216.en. Accessed on 06 December 2023.

APPENDIX XIII
EXECUTIVE SUMMARY: PELAGIC THRESHER SHARK (2026)



CITES APPENDIX II species

Table A 1. Status pelagic thresher shark (*Alopias pelagicus*) in the Indian Ocean.

Area[1]	Indicators		2018 stock status determination
Indian Ocean	Catch (2024) (t) Catch of NEI sharks (2024) (t) Mean annual catch (2020-2024) (t) Mean annual catch of NEI sharks (2020-2024) (t)	145[2] 15,559[3] 149 24,976[3]	
	MSY (1,000 t) (80% CI) F_{MSY} (80% CI) SB_{MSY} (1,000 t) (80% CI) $F_{current}/F_{MSY}$ (80% CI) $SB_{current}/SB_{MSY}$ (80% CI) $SB_{current}/SB_0$ (80% CI)	unknown	

[1]Stock boundaries defined as the IOTC area of competence; [2]Proportion of catch fully or partially estimated for 2024: 0%; [3]NEI includes all other shark catches reported to the IOTC Secretariat, which may contain this species, i.e., MSK: Mackerel sharks,porbeagles nei; SKH: Various sharks nei; THR: Thresher sharks nei

Colour key	Stock overfished ($SB_{year}/SB_{MSY} < 1$)	Stock not overfished ($SB_{year}/SB_{MSY} \geq 1$)
Stock subject to overfishing ($F_{year}/F_{MSY} > 1$)		
Stock not subject to overfishing ($F_{year}/F_{MSY} \leq 1$)		
Not assessed/Uncertain		

Table A 2. Pelagic thresher shark: IUCN threat status of pelagic thresher shark (*Alopias pelagicus*) in the Indian Ocean.

Common name	Scientific name	IUCN threat status[4]		
		Global status	WIO	EIO
Pelagic thresher shark	*Alopias pelagicus*	Endangered	–	–

IUCN = International Union for Conservation of Nature; WIO = Western Indian Ocean; EIO = Eastern Indian Ocean

[4]The process of the threat assessment from IUCN is independent from the IOTC and is presented for information purpose only

Sources: Rigby et al 2019

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

Stock status. There remains considerable uncertainty in the stock status due to lack of information necessary for assessment or for the development of other indicators (**Table** A 1**1**). The ecological risk assessment (ERA) conducted for the Indian Ocean by the WPEB and SC in 2018 consisted of a semi-quantitative analysis to evaluate the resilience of shark species to the impact of a given fishery, by combining the biological productivity of the species and susceptibility to each fishing gear type (Murua *et al.* 2018). Pelagic thresher shark received a medium vulnerability ranking (No. 12) in the ERA for longline gear because it was characterised as one of the least productive shark species, and with a medium susceptibility to longline gear. Due to its low productivity, pelagic thresher shark has a high vulnerability ranking (No. 2) to purse seine gear due to its high availability for this particular gear. The current IUCN threat status of 'Endangered' applies to pelagic thresher shark globally (**Table** A **2**). There is a paucity of information

available on this species and this situation is not expected to improve in the short to medium term. Pelagic thresher sharks are commonly taken by a range of fisheries in the Indian Ocean. Because of their life history characteristics – they are relatively long lived (+ 20 years), mature at 8–9 years, and have few offspring (2 pups every year–) - the pelagic thresher shark is vulnerable to overfishing. There is no quantitative stock assessment and limited basic fishery indicators are currently available for pelagic thresher shark in the Indian Ocean. Therefore, the stock status is **unknown.**

Outlook. Current longline fishing effort is directed at other species, however, pelagic thresher sharks are commonly taken as bycatch in these fisheries. Hooking mortality is apparently very high, therefore IOTC Resolution 12/09 prohibiting retaining of any part of thresher sharks onboard and promoting life release of thresher shark may be largely ineffective for species conservation. Maintaining or increasing effort can result in declines in biomass, productivity and CPUE. However, there are few data to estimate CPUE trends, and a reluctance of fishing fleets to report information on discards/non-retained catch. Piracy in the western Indian Ocean resulted in the displacement and subsequent concentration of a substantial portion of longline fishing effort into other areas in the southern and eastern Indian Ocean. Some longline vessels have returned to their traditional fishing areas in the northwest Indian Ocean, due to the increased security onboard vessels, with the exception of the Japanese fleet which has still not returned to the levels seen before the start of the piracy threat. It is therefore unlikely that catch and effort on pelagic thresher shark declined in the southern and eastern areas over that time period, potentially resulting in localised depletion there.

Management advice. The prohibition on the retention of pelagic thresher shark should be maintained. While mechanisms exist for encouraging CPCs to comply with their recording and reporting requirements (Resolution 18/07), these need to be further implemented by the Commission, so as to better inform scientific advice. IOTC Resolution 12/09 *On the conservation of thresher sharks (family Alopiidae) caught in association with fisheries in the IOTC area of competence*, prohibits retention onboard, transhipping, landing, storing, selling or offering for sale any part or whole carcass of thresher sharks of all the species of the family *Alopiidae*[3].The following key points should also be noted:

- **Maximum Sustainable Yield (MSY):** Not applicable. Retention prohibited.
- **Reference points**: Not applicable.
- **Main fisheries (mean annual retained catch 2020-2024):** pelagic thresher are caught using gillnet (100%) in recent years(Fig. 1).
- **Main fleets (mean annual retained catch 2020-2024):** All pelagic thresher catches are attributed to vessels flagged to Pakistan (100%)

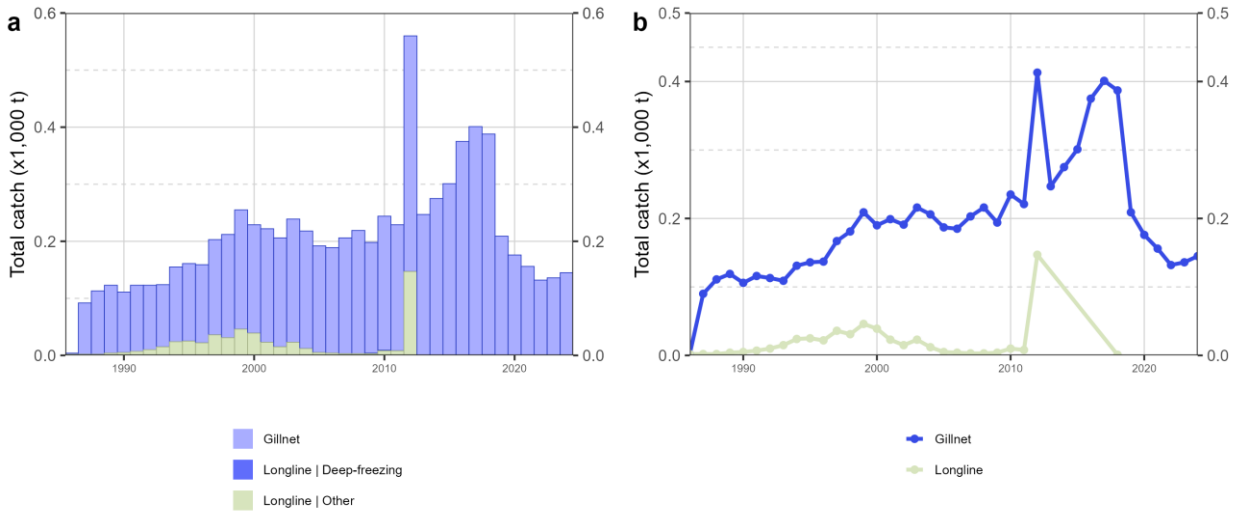


Figure 1. Annual time series of (a) cumulative retained catches (metric tonnes; t) by fishery and (b) individual retained catches (metric tonnes; t) by fishery group for pelagic thresher during 1950-2024. Longline | Other: swordfish and sharks-targeted longlines

[3]Scientific observers shall be allowed to collect biological samples from thresher sharks that are dead at haulback, provided that the samples are part of the research project approved by the Scientific Committee (or the Working Party on Ecosystems and Bycatch).

LITERATURE CITED

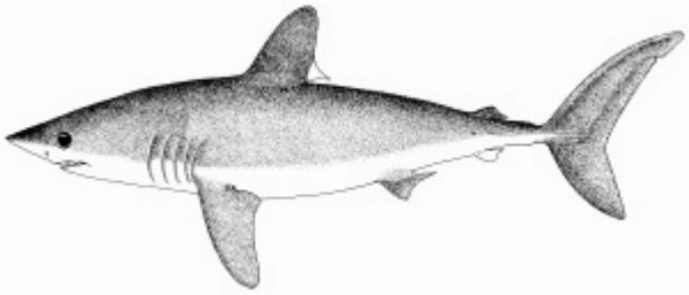
Murua H, Santiago J, Coelho R, Zudaire I, Neves C, Rosa D, Semba Y, Geng Z, Bach P, Arrizabalaga, H, Baez JC, Ramos ML, Zhu JF and Ruiz J. (2018). Updated Ecological Risk Assessment (ERA) for shark species caught in fisheries managed by the Indian Ocean Tuna Commission (IOTC). IOTC–2018–SC21–14_Rev_1. Available from: https://www.iotc.org/documents/SC/21/14

Reardon M, Márquez F, Trejo T, Clarke SC (2009) *Alopias pelagicus*. In: IUCN 2013. IUCN Red List of Threatened Species. Version 2013.1. <www.iucnredlist.org>. Downloaded on 15 September 2013.

Rigby CL, Barreto R, Carlson J, Fernando D, Fordham S, Francis MP, Herman K, Jabado RW, Liu KM, Marshall A, Pacoureau N, Romanov E, Sherley RB & Winker H (2019). Alopias pelagicus. The IUCN Red List of Threatened Species 2019: e.T161597A68607857. https://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T161597A68607857.en. Accessed on 06 December 2023.

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APPENDIX XIV
EXECUTIVE SUMMARY: PORBEAGLE SHARK (2026)



CITES APPENDIX II species

Table 3. Status of porbeagle shark (*Lamna nasus*) in the Indian Ocean

Area	Indicators		2024 stock status determination
Indian Ocean	Catch (2024) (t)	<1	Unknown
	Catch of NEI sharks (2024) (t)	15,559t [2]	
	Mean annual catch (2020-2024) (t)	<1t	
	Mean annual catch of NEI sharks (2020-2024) (t)	24,593t [2]	
	MSY (1,000 t) (80% CI)[2]		
	F_{MSY} (80% CI) [2]		
	SB_{MSY} (1,000 t) (80% CI) [2,3]		
	F_{2019}/F_{MSY} (80% CI) [2]		
	SB_{2019}/SB_{MSY} (80% CI) [2,3]		
	SB_{2019}/SB_0 (80% CI) [2,3]		

[1]Stock boundaries defined as the IOTC area of competence; [2]Proportion of catch fully or partially estimated for 2024: 0%; [3]NEI includes all other shark catches reported to the IOTC Secretariat, which may contain this species, i.e., MSK: Mackerel sharks,porbeagles nei; SKH: Various sharks nei; THR: Thresher sharks nei

Colour key	Stock overfished (SB_{2019}/SB_{MSY}< 1)	Stock not overfished (SB_{2019}/SB_{MSY}≥ 1)
Stock subject to overfishing(F/F_{MSY}> 1)		
Stock not subject to overfishing (F/F_{MSY}≤ 1)		
Not assessed/Uncertain		

Table 4. Porbeagle shark: IUCN threat status of porbeagle shark (*Lamna nasus*) in the Indian Ocean.

Common name	Scientific name	IUCN threat status[4]
		Global status
Porbeagle shark	*Lamna nasus*	Vulnerable

IUCN = International Union for Conservation of Nature; WIO = Western Indian Ocean; EIO = Eastern Indian Ocean

[4]The process of the threat assessment from IUCN is independent from the IOTC and is presented for information purpose only

Sources: Rigby et al., 2019

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

Stock status. No stock assessment was carried out for porbeagle sharks in 2024. There remains considerable uncertainty in the stock status due to lack of information necessary for assessment or for the development of other indicators of the stock. The ecological risk assessment (ERA) conducted for the Indian Ocean by the WPEB and SC in

2018 consisted of a semi-quantitative risk assessment analysis to evaluate the resilience of shark species to the impact of a given fishery, by combining the biological productivity of the species and its susceptibility to each fishing gear type (Murua *et al.* 2018). Porbeagle shark received a high vulnerability ranking (No. 3) in the ERA rank for longline gear because it was characterised as one of the least productive shark species, and highly susceptible to longline gear. Despite its low productivity, porbeagle shark has a low vulnerability ranking to purse seine gear due to its low susceptibility to this particular gear. The current IUCN threat status of 'Vulnerable' applies to porbeagle shark globally. There is a paucity of information available on this species and this situation is not expected to improve in the short to medium term. Porbeagle sharks are commonly taken by a range of fisheries in the Indian Ocean. Because of their life history characteristics – they are relatively long lived (+30 years), mature at around 15 years, and have few offspring (around 4 pups every one or two years), the porbeagle shark is vulnerable to overfishing. There has been no quantitative stock assessment and limited basic fishery indicators are available for porbeagle shark in the Indian Ocean. Therefore, the stock status is **unknown**.

Outlook. Current longline fishing effort is directed at other species, however, porbeagle sharks are taken as bycatch in these fisheries but it may be released by some fleets. Maintaining or increasing effort can result in declines in biomass, productivity and CPUE. However, there are few data to estimate CPUE trends and a reluctance of fishing fleets to report information on discards/non-retained catch. Preliminary analysis of IOTC catch and effort data from the Japanese and Korean fleets found catchability to have declined from 2009 through 2018 (IOTC-2023-WPEB19-20). The Japanese fleet releases porbeagle sharks caught by longline vessels which may be a reason for the decline in catches of this species.

Management advice.

While mechanisms exist for encouraging CPCs to comply with their recording and reporting requirements (Resolution 18/07), these need to be further implemented by the Commission so as to better inform scientific advice. This is considered to be a vulnerable species

The following key points should also be noted:

- **Maximum Sustainable Yield (MSY)**: Unknown
- **Reference points**: The Commission has not adopted reference points or harvest control rules for any shark species.
- **Main fishing gear**: Catches not reported since 2019, previous reports from Longline (deep-freezing) and coastal longline. (Fig 1)
- **Main fleets** : Seychelles and Taiwan, China

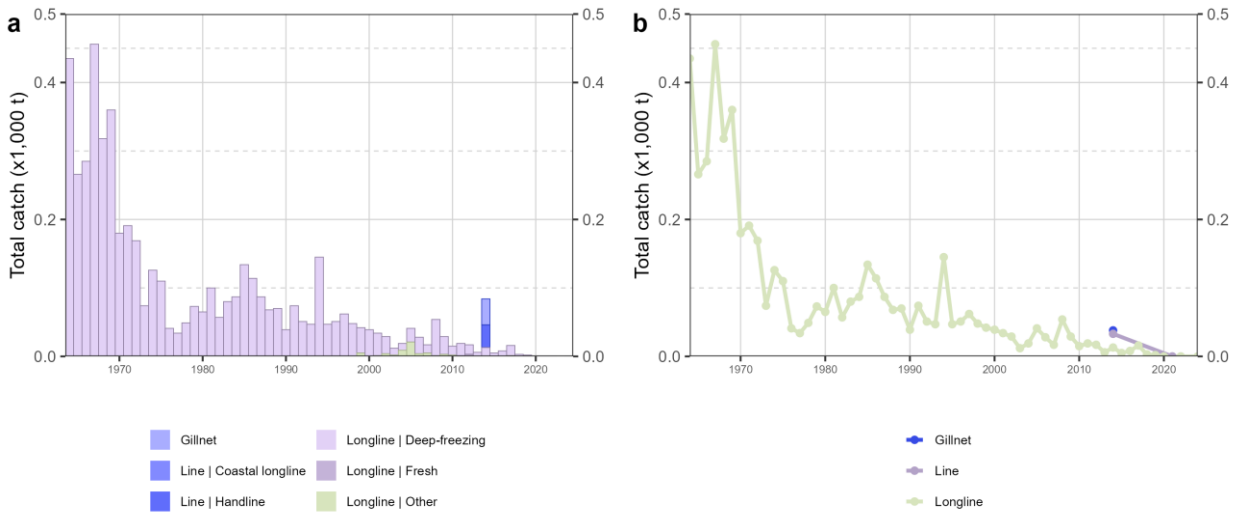


Figure 1. Annual time series of (a) cumulative retained catches (metric tonnes; t) by fishery and (b) individual retained catches (metric tonnes; t) by fishery group for porbeagle shark during 1950-2024. Longline | Other: swordfish and sharks-targeted longlines

LITERATURE CITED

Rigby, C.L., Barreto, R., Carlson, J., Fernando, D., Fordham, S., Francis, M.P., Herman, K., Jabado, R.W., Liu, K.M., Marshall, A., Pacoureau, N., Romanov, E., Sherley, R.B. & Winker, H. 2019. *Lamna nasus*. *The IUCN Red List of Threatened Species* 2019: e.T11200A500969. https://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T11200A500969.en. Accessed on 20 June 2024.

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APPENDIX XIVI
EXECUTIVE SUMMARY: MARINE TURTLES (2026)



Table A 1. Marine turtles: IUCN threat status for all marine turtle species reported as caught in fisheries within the IOTC area of competence.

Common name	Scientific name	IUCN threat status[4]
Flatback turtle	*Natator depressus*	Data deficient
Green turtle	*Chelonia mydas*	Endangered
Hawksbill turtle	*Eretmochelys imbricata*	Critically Endangered
Leatherback turtle	*Dermochelys coriacea*	Vulnerable (Globally)
	(N. East Indian Ocean subpopulation)	Data deficient
	(S. West Indian Ocean subpopulation)	Critically Endangered
Loggerhead turtle	*Caretta caretta*	Vulnerable (Globally)
	(N. West Indian Ocean subpopulation)	Critically Endangered
	(S. East Indian Ocean subpopulation)	Near Threatened
Olive Ridley turtle	*Lepidochelys olivacea*	Vulnerable

Sources: Marine Turtle Specialist Group 1996, Red List Standards & Petitions Subcommittee 1996, Sarti Martinez (Marine Turtle Specialist Group) 2000, Seminoff 2004, Abreu-Grobois & Plotkin 2008, Mortimer et al. 2008, IUCN 2020, The IUCN Red List of Threatened species. <www.iucnredlist.org>. Downloaded on 16 September 2020

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

Stock status. No assessment has been undertaken by the IOTC WPEB for marine turtles due to the lack of data being submitted by CPCs. However, the current International Union for Conservation of Nature (IUCN) threat status for each of the marine turtle species reported as caught in IOTC fisheries to date is provided in **Table** A **1**. It is important to note that a number of international global environmental accords (e.g., Convention on Migratory Species (CMS), Convention on Biological Diversity (CBD), as well as numerous fisheries agreements obligate States to provide protection for these species. In particular, there are now 35 Signatories to the Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia (IOSEA MoU). Of the 35 Signatories to the IOSEA MoU, 25 are also members of the IOTC. While the status of marine turtles is affected by a range of factors such as degradation of marine turtle natural habitats and targeted harvesting of eggs and turtles, the level of mortality of marine turtles due to capture by gillnets is likely to be substantial as shown by the Ecological Risk Assessment (ERA) presented in 2018 (Williams et al., 2018). Stock assessments of all species of marine turtles in the Indian Ocean are limited due to data insufficiencies as well as limited data quality (Wallace et al., 2011). Bycatch and mortality from gillnet fisheries have greater population-level impacts on marine turtles relative to other gear types, such as longline, purse seine and trawl fisheries in the Indian Ocean (Wallace et al., 2013). Population levels of impacts of leatherback turtles caught in longline gear in the Southwest Indian Ocean were also identified as a conservation priority.

Outlook. Resolution 12/04 *On the conservation of marine turtles* includes an annual evaluation requirement (para. 17) by the Scientific Committee (SC). However, given the lack of reporting of marine turtle interactions by CPCs to date, such an evaluation cannot be undertaken. Unless IOTC CPCs become compliant with the data collection and reporting requirements for marine turtles, the WPEB and the SC will continue to be unable to address this issue. So far, reporting of sea turtle interactions are not described at the species level. It is recommended that CPCs now declare interactions

[4] IUCN, 2020. The process of the threat assessment from IUCN is independent from the IOTC and is presented for information purpose only

indicating the sea turtle species. Guides for species identification are available at http://iotc.org/science/species-identification-cards. Notwithstanding this, it is acknowledged that the impact on marine turtle populations from fishing for tuna and tuna-like species will increase as fishing pressure increases, and that the status of the marine turtle populations will continue to worsen due to other factors such as an increase in fishing pressure from other fisheries or anthropological or climatic impacts.

The following should also be noted:

1. The available evidence indicates considerable risk to marine turtles in the Indian Ocean.
2. Given the high mortality rates associated with marine turtle interactions with gillnet fisheries and the increasing use of gillnets in the Indian Ocean (Aranda, 2017) there is a need to both assess and mitigate impacts on threatened and endangered marine turtle populations.
3. The primary sources of data that drive the ability of the WPEB to determine a status for the Indian Ocean, total interactions by fishing vessels or in net fisheries, are highly uncertain and should be addressed as a matter of priority.
4. Current reported interactions are known to be a severe underestimate.
5. The Ecological Risk Assessment (Nel et al., 2013) estimated that ~3,500 and ~250 marine turtles are caught by longline and purse seine vessels, respectively, per annum, with an estimated 75% of turtles released alive[7]. The ERA set out two separate approaches to estimate gillnet impacts on marine turtles, based on very limited data. The first calculated that 52,425 marine turtles p.a. and the second that 11,400–47,500 turtles p.a. are caught in gillnets (with a mean of the two methods being 29,488 marine turtles p.a.). Anecdotal/published studies reported values of >5000–16,000 marine turtles p.a. for each of India, Sri Lanka and Madagascar. Of these reports, green turtles are under the greatest pressure from gillnet fishing, constituting 50–88% of catches for Madagascar. Loggerhead, hawksbill, leatherback and olive Ridley turtles are caught in varying proportions depending on the region, season and type of fishing gear.
6. Maintaining or increasing fishing effort in the Indian Ocean without appropriate mitigation measures in place, will likely result in further declines in marine turtle populations.
7. Efforts should be undertaken to encourage CPCs to investigate means to reduce marine turtle bycatch and at-vessel and post-release mortality in IOTC fisheries and improve data collection and reporting for marine turtles. This may include alternative data collection mechanisms such as skipper-based reporting, port sampling and cost-effective electronic monitoring systems.

LITERATURE CITED

Abreu-Grobois A, Plotkin P (IUCN SSC Marine Turtle Specialist Group) (2008) *Lepidochelys olivacea*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. <www.iucnredlist.org>. Downloaded on 09 November 2012.

Aranda, M. 2017. Description of tuna gillnet capacity and bycatch in the IOTC Convention Area. IOTC-2017-WPEB13-18.

Mortimer JA, Donnelly M (IUCN SSC Marine Turtle Specialist Group) (2008) *Eretmochelys imbricata*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. <www.iucnredlist.org>. Downloaded on 09 November 2012

Nel, R., Wanless, R. M., Angel, A., Mellet, B. and Harris, L. 2013. Ecological Risk Assessment and Productivity - Susceptibility Analysis of sea turtles overlapping with fisheries in the IOTC region IOTC–2013–WPEB09–23

Seminoff JA (Southwest Fisheries Science Center, U.S.) (2004) *Chelonia mydas*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. <www.iucnredlist.org>. Downloaded on 09 November 2012.

Wallace BP, DiMatteo AD, Bolten AB, Chaloupka MY, Hutchinson BJ, et al. (2011) Global Conservation Priorities for Marine Turtles. PLoS ONE 6(9): e24510. doi:10.1371/journal.pone.0024510

Wallace, B. P., C. Y. Kot, A. D. DiMatteo, T. Lee, L. B. Crowder, and R. L. Lewison. 2013. Impacts of fisheries bycatch on marine turtle populations worldwide: toward conservation and research priorities. Ecosphere 4(3):40. http://dx.doi.org/10.1890/ES12-00388.1 (Fig. 13)

Williams, A. J., Georgeson, L., Summerson, R., Hobday, A., Hartog, J., Fuller, M., Swimmer, Y., Wallace, B. and Nicol, S. J. 2018. Assessment of the vulnerability of sea turtles to IOTC tuna fisheries. IOTC-2018-WPEB14-40

APPENDIX XVII
EXECUTIVE SUMMARY: SEABIRDS (2026)



Table A 1. IUCN threat status for all seabird species reported as caught in fisheries within the IOTC area of competence.

Common name	Scientific name	IUCN threat status[5]
Albatross		
Atlantic Yellow-nosed Albatross	*Thalassarche chlororhynchos*	Endangered
Black-browed albatross	*Thalassarche melanophris*	Least Concern
Indian yellow-nosed albatross	*Thalassarche carteri*	Endangered
Shy albatross	*Thalassarche cauta*	Near Threatened
Sooty albatross	*Phoebetria fusca*	Endangered
Light-mantled albatross	*Phoebetria palpebrata*	Near Threatened
Amsterdam albatross	*Diomedea amsterdamensis*	Endangered
Tristan albatross	*Diomedea dabbenena*	Critically Endangered
Wandering albatross	*Diomedea exulans*	Vulnerable
White-capped albatross	*Thalassarche steadi*	Near Threatened
Grey-headed albatross	*Thalassarche chrysostoma*	Endangered
Petrels		
Cape/Pintado petrel	*Daption capense*	Least Concern
Great-winged petrel	*Pterodroma macroptera*	Least Concern
Grey petrel	*Procellaria cinerea*	Near Threatened
Southern giant petrel	*Macronectes giganteus*	Least Concern
Northern giant-petrel	*Macronectes halli*	Least Concern
White-chinned petrel	*Procellaria aequinoctialis*	Vulnerable
Others		
Cape gannet	*Morus capensis*	Endangered
Flesh-footed shearwater	*Puffinus carneipes*	Near Threatened

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

Stock status. Following a data call in 2016, the IOTC Secretariat received seabird bycatch data from 6 CPCs, out of the 15 with reported or expected longline effort South of 25ºS (IOTC-2016-SC19-INF02). Due to the lack of data submissions from other CPCs, and the limited information provided on the use of seabird bycatch mitigations, it has not yet been possible to undertake an assessment for seabirds. The current International Union for Conservation of Nature (IUCN) threat status for each of the seabird species reported as caught in IOTC fisheries to date is provided in **Table** A **1**. A number of international global environmental accords (e.g., Convention on Migratory Species (CMS), the Agreement on the Conservation of Albatrosses and Petrels (ACAP), Convention on Biological Diversity (CBD)), as well as numerous fisheries agreements obligate States to provide protection for these species. While the status of seabirds is affected by a range of factors such as degradation of nesting habitats and targeted harvesting of eggs, for albatrosses and large petrels, fisheries bycatch is generally considered to be the primary threat. The level of mortality of seabirds due to fishing gear in the Indian Ocean is poorly known, although where there has been rigorous assessment of impacts

[5] The process of the threat assessment from IUCN is independent from the IOTC and is presented for information purpose only

in areas south of 25 degrees (e.g., in South Africa), very high seabird incidental catches rates have been recorded in the absence of a suite of proven incidental catches mitigation measures.

Outlook. The level of compliance with Resolution 23/07 (*On Reducing the Incidental Bycatch of Seabirds in Longline Fisheries)* and the frequency of use of each of the 4 measures (because vessels can choose two out of three possible options) are still poorly known. Observer reports and logbook data should be analysed to support assessments of the effectiveness of mitigation measures used and relative impacts on seabird mortality rates. Information regarding seabird interactions reported in National Reports should be stratified by season, broad area, and in the form of catch per unit effort. Following the data call in 2016 it was possible to carry out a preliminary and qualitative analysis. The information provided suggests higher sea bird catch rates at higher latitudes, even within the area south of 25°S, and higher catch rates in the coastal areas in the eastern and western parts of the southern Indian Ocean. In terms of mitigation measures, the preliminary information available suggests that those currently in use (Resolution 23/07) may be proving effective in some cases, but there are also some conflicting aspects that need to be explored further. Unless IOTC CPCs become compliant with the data collection, Regional Observer Scheme and reporting requirements for seabirds, the WPEB will continue to be unable to fully address this issue.

The following should also be noted:

- The available evidence indicates considerable risk from longline fishing to the status of seabirds in the Indian Ocean, where the best practice seabird incidental catches mitigation measures outlined in Resolution 23/07 are not implemented.
- CPCs that have not fully implemented the provisions of the IOTC Regional Observer Scheme outlined in paragraph 3 of Resolution 22/04 shall report seabird incidental catches through logbooks, including details of species, if possible.
- Appropriate mechanisms should be developed by the Compliance Committee to assess levels of compliance by CPCs with the Regional Observer Scheme requirements and the mandatory measures described in Res 23/07.

APPENDIX XVIII
EXECUTIVE SUMMARY: CETACEANS (2026)

Table A 1. Cetaceans: IUCN Red List status and records of interaction (including entanglements and, for purse seines, encirclements) with tuna fishery gear types for all cetacean species that occur within the IOTC area of competence.

Family	Common name	Species	IUCN Red List status*	Interactions by Gear Type**
Balaenidae	Southern right whale	*Eubalaena australis*	LC	GN
Neobalaenidae	Pygmy right whale	*Caperea marginata*	LC	-
Balaenopteridae	Common minke whale	*Balaenoptera acutorostrata*	LC	-
	Antarctic minke whale	*Balaenoptera bonaerensis*	NT	-
	Sei whale	*Balaenoptera borealis*	EN	PS
	Bryde's whale	*Balaenoptera edeni*	LC	-
	Blue whale	*Balaenoptera musculus*	EN	-
	Fin whale	*Balaenoptera physalus*	VU	-
	Omura's whale	*Balaenoptera omurai*	DD	-
	Humpback whale	*Megaptera novaeangliae*	LC***	GN, LL
Physeteridae	Sperm whale	*Physeter macrocephalus*	VU	GN
Kogiidae	Pygmy sperm whale	*Kogia breviceps*	LC	GN
	Dwarf sperm whale	*Kogia sima*	LC	GN
Ziphiidae	Arnoux's beaked whale	*Berardius arnuxii*	LC	-
	Southern bottlenose whale	*Hyperoodon planifrons*	LC	-
	Longman's beaked whale	*Indopacetus pacificus*	LC	GN
	Andrew's beaked whale	*Mesoplodon bowdoini*	DD	-
	Blainville's beaked whale	*Mesoplodon densirostris*	LC	-
	Ramari’s beaked whale	*Mesoplodon eueu*	DD	-
	Gray's beaked whale	*Mesoplodon grayi*	LC	-
	Hector's beaked whale	*Mesoplodon hectori*	DD	-
	Deraniyagala's beaked whale	*Mesoplodon hotaula*	DD	-
	Strap-toothed whale	*Mesoplodon layardii*	LC	-
	Spade-toothed whale	*Mesoplodon traversii*	DD	-
	Shepherd's beaked Whale	*Tasmacetus shepherdi*	DD	-
	Cuvier's beaked whale	*Ziphius cavirostris*	LC	GN
Delphinidae	Common dolphin	*Delphinus delphis*	LC	GN
	Pygmy killer whale	*Feresa attenuata*	LC	GN

	Short-finned pilot whale	*Globicephala macrorhynchus*	LC	LL, GN
	Long-finned pilot whale	*Globicephala melas*	LC	-
	Risso's dolphin	*Grampus griseus*	LC	LL, GN
	Fraser's dolphin	*Lagenodelphis hosei*	LC	-
	Irrawaddy dolphin	*Orcaella brevirostris*	EN	GN
	Australian snubfin dolphin	*Orcaella heinsohni*	VU	GN
	Killer whale	*Orcinus orca*	DD	LL, GN
	Melon-headed whale	*Peponocephala electra*	LC	LL, GN
	False killer whale	*Pseudorca crassidens*	NT	LL, GN
Delphinidae	Indo-Pacific humpback dolphin	*Sousa chinensis*	VU	GN
	Indian Ocean humpback dolphin	*Sousa plumbea*	EN	GN
	Australian humpback dolphin	*Sousa sahulensis*	VU	GN
	Pantropical spotted dolphin	*Stenella attenuata*	LC	PS, GN, LL
	Striped dolphin	*Stenella coeruleoalba*	LC	-
	Spinner dolphin	*Stenella longirostris*	LC	GN
	Rough-toothed dolphin	*Steno bredanensis*	LC	GN
	Indo-Pacific bottlenose dolphin	*Tursiops aduncus*	NT	GN
	Bottlenose dolphin	*Tursiops truncatus*	LC	LL, GN
Phocoenidae	Indo-Pacific finless porpoise	*Neophocaena phocaenoides*	VU	GN

* The assessment of the status level in IUCN is independent of IOTC processes
** Published bycatch records only (reference at the end of the document)
*** Arabian Sea population: EN
The IUCN Red List of Threatened species. <www.iucnredlist.org>.
Downloaded on 16 September 2020.

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Stock status. . The current International Union for Conservation of Nature (IUCN) Red List status for each of the cetacean species reported in the IOTC Area of Competence is provided in Table **A** 1. Information on their interactions with IOTC fisheries is also provided. It is important to note that a number of international global environmental accords (e.g., Convention on Migratory Species (CMS), Convention on Biological Diversity (CBD), International Whaling Commission (IWC)), as well as numerous fisheries agreements obligate States to provide protection for these species. The status of cetaceans is affected by a range of factors such as direct harvesting and habitat degradation, but the level of cetacean mortality due to capture in tuna drift gillnets is likely to be substantial and is also a major cause for concern (Anderson *et al.* 2020, Kiszka *et al.* 2021). Several reports (e.g., Sabarros et al., 2013) also suggest some level of cetacean mortality for species involved in depredation of pelagic longlines, and these interactions need to be further documented throughout the IOTC Area of Competence. Recently published information suggests that the incidental capture of cetaceans in purse seines is low (e.g., Escalle et al., 2015), but should be further monitored.

Outlook. . Resolution 23/06 *On the conservation of cetaceans* highlights the concerns of the IOTC regarding the lack of accurate and complete data collection and reporting to the IOTC Secretariat of interactions and mortalities of cetaceans in association with tuna fisheries in the IOTC Area of Competence. In this resolution, the IOTC have agreed that CPCs shall prohibit their flagged vessels from intentionally setting a purse seine net around a cetacean if the animal is sighted prior to the commencement of the set. The IOTC also agreed that CPCs using other gear types targeting tuna and tuna-like species found in association with cetaceans shall report all interactions with cetaceans to

the relevant authority of the flag State and that these will be reported to the IOTC Secretariat by 30 June of the following year. It is acknowledged that the impact on cetacean populations from fishing for tuna and tuna-like species may increase if fishing pressure increases (which is already clear for tuna gillnet fisheries from IOTC data) or if the status of cetacean populations worsens due to other factors such as an increase in external fishing pressure or other anthropogenic or climatic impacts.

The following should be noted:

- The number of fisheries interactions involving cetaceans is highly uncertain and should be addressed as a matter of priority as it is a prerequisite for the WPEB to determine a status for any Indian Ocean cetacean species.
- Available evidence indicates considerable risk to cetaceans in the Indian Ocean, particularly from tuna drift gillnets.
- Current reported interactions and mortalities are scattered but are most likely severely underestimated (Anderson *et al*., 2020, Kiszka *et al*., 2021).
- Maintaining or increasing fishing effort in the Indian Ocean without appropriate mitigation measures in place will likely result in further declines in a number of cetacean species. An increasing effort by tuna drift gillnet fisheries has been reported to the IOTC, which is a major cause of concern for a number of species, particularly in the northern Indian Ocean.
- Efforts should be undertaken to encourage CPCs to investigate means to reduce cetacean bycatch and at-vessel and post-release mortality in IOTC fisheries and improve data collection and reporting for cetaceans. This may include alternative data collection mechanisms such as skipper-based reporting, port sampling and cost-effective electronic monitoring systems.

RELEVANT LITERATURE

Allen, S.J., Cagnazzi, D.D., Hodgson, A.J., Loneragan, N.R. and Bejder, L., 2012. Tropical inshore dolphins of north-western Australia: Unknown populations in a rapidly changing region. Pacific Conservation Biology, 18: 56-63.

Amir, O.A., 2010. Biology, ecology and anthropogenic threats of Indo-Pacific bottlenose dolphins in East Africa (Doctoral Dissertation, Department of Zoology, Stockholm University).

Anderson C.R. 2014. Cetaceans and tuna fisheries in the western and central Indian Ocean. IOTC-2014-WPEB10-31.

Anderson, R.C., Herrera, M., Ilangakoon, A.D., Koya, K.M., Moazzam, M., Mustika, P.L. and Sutaria, D.N., 2020. Cetacean bycatch in Indian Ocean tuna gillnet fisheries. Endangered Species Research 41: 39-53.

Atkins, S., Cliff, G. and Pillay, N., 2013. Humpback dolphin bycatch in the shark nets in KwaZulu-Natal, South Africa. Biological Conservation, 159: 442-449.

Beasley, I., Jedensjö, M., Wijaya, G.M., Anamiato, J., Kahn, B. and Kreb, D., 2016. Chapter Nine-Observations on Australian Humpback Dolphins (*Sousa sahulensis*) in Waters of the Pacific Islands and New Guinea. Advances in Marine Biology, 73: 219-271.

Braulik, G.T., Findlay, K., Cerchio, S. and Baldwin, R., 2015. Assessment of the Conservation Status of the Indian Ocean Humpback Dolphin (*Sousa plumbea*) Using the IUCN Red List Criteria. Advances in Marine Biology 72: 119-141.

Braulik, G.T., Ranjbar, S., Owfi, F., Aminrad, T., Dakhteh, S.M.H., Kamrani, E. and Mohsenizadeh, F. 2010. Marine mammal records from Iran. Journal of Cetacean Research and Management, 11:49-63.

Collins, T., Minton, G., Baldwin, R., Van Waerebeek, K., Hywel-Davies, A. and Cockcroft, V., 2002. A preliminary assessment of the frequency, distribution and causes of mortality of beach cast cetaceans in the Sultanate of Oman, January 1999 to February 2002. IWC Scientific Committee document SC/54/O4.

Collins, T., Preen, A., Willson, A., Braulik, G. and Baldwin, R. M. 2005. Finless porpoise (*Neophocaena phocaenoides*) in waters of Arabia, Iran and Pakistan. IWC Scientific Committee document SC/57/SM6.

Escalle, L., Capietto, A., Chavance, P., Dubroca, L., De Molina, A.D., Murua, H., Gaertner, D., Romanov, E., Spitz, J., Kiszka, J.J., Floch, L., Damiano, D. and Merigot, B., 2015. Cetaceans and tuna purse seine fisheries in the Atlantic and Indian Oceans: interactions but few mortalities. Marine Ecology Progress Series, 522: 255-268.

Hamer, D.J., Childerhouse, S.J. and Gales, N.J., 2012. Odontocete bycatch and depredation in longline fisheries: a review of available literature and of potential solutions. Marine Mammal Science, 28: 345-374.

Kiszka, J., Pelourdeau, D. and Ridoux, V., 2008. Body Scars and Dorsal Fin Disfigurements as Indicators Interaction Between Small Cetaceans and Fisheries Around the Mozambique Channel Island of Mayotte. Western Indian Ocean Journal of Marine Science, 7: 185-193.

Kiszka, J., Bein, A., Bach, P., Jamon, A., Layssac, K., Labart, S. and Wickel, J., 2010. Catch and bycatch in the pelagic longline fishery around Mayotte (NE Mozambique Channel), July 2009-September 2010. IOTC WPEB-19.

Kiszka, J., Muir, C., Poonian, C., Cox, T.M., Amir, O.A., Bourjea, J., Razafindrakoto, Y., Wambitji, N. and Bristol, N., 2009. Marine mammal bycatch in the southwest Indian Ocean: review and need for a comprehensive status assessment. Western Indian Ocean Journal Marine Science, 7: 119-136.

Kiszka, J., Moazzam, M., Boussarie, G., Shahid, U., Khan, B. and Nawaz, R., 2021. Setting the net lower: A potential low-cost mitigation method to reduce cetacean bycatch in drift gillnet fisheries. Aquatic Conservation: Marine and Freshwater Ecosystems, 31: 3111-3119.

Kruse, S., Leatherwood, S., Prematunga, W.P., Mendes, C. and Gamage, A., 1991. Records of Risso's dolphins, Grampus griseus, in the Indian Ocean, 1891–1986. Cetaceans and Cetacean Research in the Indian Ocean Sanctuary. UNEP Marine Mammal Technical Report, 3: 67-78.

Leatherwood, S., McDonald, D., Prematunga, W.P., Girton, P., Ilangakoon, A. and McBrearty, D., 1991. Recorded of ”he" Blackf”sh" (Killer, False Killer, Pilot, Pygmy Killer and Melon-headed whales) in the Indian Ocean, 1772-1986. Cetaceans and Cetacean Research in the Indian Ocean. UNEP Marine Mammal Technical Report, 3: 33-65.

Meÿer, M.A., Best, P.B., Anderson-Reade, M.D., Cliff, G., Dudley, S.F.J. and Kirkman, S.P., 2011. Trends and interventions in large whale entanglement along the South African coast. African Journal of Marine Science, 33: 429-439.

Razafindrakoto, Y., Andrianarivelo, N., Cerchio, S., Rasoamananto, I. and Rosenbaum, H., 2008. Preliminary assessment of cetacean incidental mortality in artisanal fisheries in Anakao, southwestern region of Madagascar. Western Indian Ocean Journal of Marine Science, 7: 175-184.

Reeves, R.R., McClellan, K. and Werner, T.B., 2013. Marine mammal bycatch in gillnet and other entangling net fisheries, 1990 to 2011. Endangered Species Research, 20: 71-97.

Romanov, E.V., 2002. Bycatch in the tuna purse-seine fisheries of the western Indian Ocean. Fishery Bulletin, 100: 90-105.

Sabarros, P.S., Romanov, E., Le Foulgoc, L., Richard, E., Lamoureux, J.P. and Bach, P., 2013. Commercial catch and discards of pelagic longline fishery of Reunion Island based on the self-reporting data collection program. 9th IOTC Working Party on Ecosystems and Bycatch, La Réunion, France. IOTC-2013-WPEB09-37 Rev_1

Slooten, E., Wang, J.Y., Dungan, S.Z., Forney, K.A., Hung, S.K., Jefferson, T.A., Riehl, K.N., Rojas-Bracho, L., Ross, P.S., Wee, A. and Winkler, R., 2013. Impacts of fisheries on the Critically Endangered humpback dolphin Sousa chinensis population in the eastern Taiwan Strait. Endangered Species Research, 22: 99-114

APPENDIX XVIV
EXECUTIVE SUMMARY: MOBULIDS (2026)

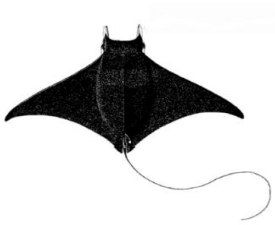


Table A 1. Mobulids: IUCN Red List status for mobulid ray species that occur within the IOTC area of competence.

Family	Common name	Species	IUCN Red List status*	Interactions by Gear Type**
Mobulidae	Oceanic Manta Ray	*Mobula birostris*	EN	GN, PS, LL
	Reef Manta Ray	*Mobula alfredi*	VU	GN, LL***
	Sicklefin Devilray	*Mobula tarapacana*	EN	GN, PS, LL
	Spinetail Devil Ray	*Mobula mobular*	EN	GN, PS, LL
	Bentfin Devil Ray	*Mobula thurstoni*	EN	GN, PS, LL
	Longhorned Pygmy Devil Ray	*Mobula eregoodoo*	EN	GN, LL***
	Shorthorned Pygmy Devil Ray	*Mobula kuhlii*	EN	GN, LL***

* The assessment of the status level in IUCN is independent of IOTC processes
** Gear types: Gill nets (GN), Purse seines (PS), Longlines (LL)
The IUCN Red List of Threatened species. <www.iucnredlist.org>.
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Stock status. The current International Union for Conservation of Nature (IUCN) Red List status for each of the mobulid ray species reported in the IOTC Area of Competence is provided in Table **A** 1. Information on their known interactions with IOTC fisheries is also provided. It is important to note that a number of international global environmental accords (e.g., Convention on Migratory Species (CMS), Convention on Biological Diversity (CBD)), as well as numerous fisheries agreements obligate States to provide protection for these species.

The status of mobulids is affected by a range of factors such as direct harvesting, bycatch, and habitat degradation. The level of mobulid mortality due to capture in tuna fisheries is likely to be substantial and is a major cause for concern. Mobulids are primarily caught as bycatch in gillnet fisheries and, to a lesser extent, purse seine and longline fisheries (Croll et al., 2016, Shahid et al., 2018, White et al., 2006, Ardill et al., 2011, Moazamm, 2018; Ruiz et al., 2017; Murua et al., 2021; Acevedo-Iglesias et al., 2025; Laglbauer et al. 2025). Information on catches of these species is poor and often aggregated rather than reported to species level. It is also uncertain as there are difficulties in classifying them at species level, even by scientific observers (Cronin et al., 2024). A recent study comparing mobulid catch across ocean basins shows that globally, an estimated 39,473 mobulids are caught annually in large vessel fisheries (>15 m) (Laglbauer et al. 2025 [In review]). Purse seines accounted for 18.6% of catch and 19.7% of mortality, and together with drift gillnets had the highest rates of dead discards (57.3% and 50% respectively), while longlines

had lower at-vessel mortality (6.7%). Gear reporting is often incomplete, but retention and mortality rates vary widely by fleet and country.

The Indian Ocean dominates reported mobulid global catches (72%, n = 191,528) and estimated global mortality (73%, n = 191,010) (Laglbauer et al. 2025 [In review]). However, no holistic evaluation of the vulnerability status of these species exists (Griffiths and Lezama-Ochoa, 2021). These interactions need to be better documented throughout the IOTC Area of Competence. However, information submitted to the WPEB has highlighted declines in the catches of mobulids in the Indian Ocean, which may suggest a decline in the populations (Shahid et al., 2018, Moazzam, 2018, Fernando 2018, Venables et al., 2024, Fernando and Stewart, 2021). Additional catch declines have been reported in coastal India based on landings and effort data where available (Raje and Zacharia 2009; Chopra et al.,2025 [In review]; Thomas et al. 2022); in Indonesia based on landings data (Lewis et al., 2015; FAO 2024); in Kenya based on IOTC publicly available data (IOTC, 2025); and possible local declines have been indicated in Madagascar of *M. alfredi* since 2015 based on citizen science observations (Diamant et al 2025).

Outlook. Resolution 19/03 *On the conservation of mobulid rays caught in association with the IOTC area of competence* highlights the lack of accurate and complete data collection and reporting to the IOTC Secretariat of interactions and mortalities of mobulids in association with tuna fisheries in the IOTC Area of Competence.

This resolution prohibits CPCs flagged vessels from intentionally setting any gear type for targeted fishing of mobulid rays, if an animal is sighted prior to the commencement of the set. CPCs shall also prohibit vessels from retaining any part or whole carcass of mobulid rays. However, these two provisions do not apply to vessels carrying out subsistence fisheries[6] (which should not be selling any part or whole carcass of the rays). CPCs are required to require their vessels to promptly release mobulids as soon as they are seen in the gear following adopted safe handling and release practices. The CPCs shall also report information and data collected on interactions (the number of discards and releases) with mobulids by vessels through logbooks and/or through observer programmes and this data should be provided to the IOTC Secretariat by 30 June of the following year.

The following should be noted:

- The number of mobulid interactions in various fisheries is highly uncertain and most likely underestimated, thus, this information should be collected/reported as a matter of priority for the WPEB to determine a status for any Indian Ocean mobulid species.
- Available evidence indicates considerable risk to mobulids in the Indian Ocean, particularly from tuna drift gillnet fisheries, followed by purse seiners and longline to a lesser extent.
- Maintaining or increasing fishing effort in the Indian Ocean without appropriate mitigation measures in place will likely result in further declines in a number of mobulid species. An increasing effort by tuna drift gillnet fisheries has been reported to the IOTC, which is a major cause of concern for a number of species, particularly in the northern Indian Ocean.
- The adoption of updated safe handling and release best practices, especially for gillnet and purse seine gears, would improve post-release mortality and reduce fisheries impacts on mobulid populations in the Indian Ocean
- Efforts should be undertaken to encourage CPCs to investigate means to reduce mobulid bycatch and at-vessel and post-release mortality in IOTC fisheries and improve data collection and reporting for mobulids. This may include alternative data collection mechanisms such as skipper-based reporting, port sampling and cost-effective electronic monitoring systems.

RELEVANT LITERATURE

[6] A subsistence fishery is a fishery in which the fish caught are consumed directly by the families of the fishers rather than being bought by middle-(wo)men and sold at the next larger market, per the FAO Guidelines for the routine collection of capture fishery data. FAO Fisheries Technical Paper. No. 382. Rome, FAO. 1999. 113p

Acevedo-Iglesias, S., Herrera, M., Ramos, M.L., Báez, J.C., Ruiz, J., Rodríguez-Rodríguez, G., Rojo, V., Pascual-Alayón, P.J. and Abascal, F.J., 2025. Bycatch trend and its fate of the Spanish-owned tuna purse seiners fleet from the Atlantic and Indian oceans: Impacts of the implementation of good practices. *Marine Policy*, *177*, p.106694.

Ardill, D., Itano, D. and Gillett, R. (2011) A Review of Bycatch and Discard Issues in Indian Ocean Tuna Fisheries. IOTC-2012-WPEB08-INF20.

Chopra, M., Rowlands, M.G., Stevens, G.M.W., Fernando, D., Mohanraj, T., Laglbauer, B.J., Karnad, D., Katrina, D. Fewer devil rays in the sea: Evidence of declining mobulid populations off India's southeastern coast. *In review.*

Croll, D. A., Dewar, H., Dulvy, N. K., Fernando, D., Francis, M. P., Galván-Magaña, F., Hall, M., Heinrichs, S., Marshall, A., McCauley, D., Newton, K. M., Notarbartolo di Sciara, G., O'Malley, M., O'Sullivan, J., Poortvliet, M., Roman, M., Stevens, G., Tershy, B. R. and White, W. T. (2016) Vulnerabilities and fisheries impacts: the uncertain future of manta and devil rays. Aquatic Conserv: Mar. Freshw. Ecosyst., 26: 562-575.

Cronin, M., Moreno, G., Murua, J. and Restrepo, V. (2024). Progress in addressing key research to inform Mobulid ray conservation in the Pacific Ocean. SC20-EB-IP-18

Diamant, S. Bosio, C., Rambahiniarison, J., Scarffe, C., Strogoff, M., Kiszka J.J., d´Echon, T.G., Sourisseau, E., Fidiarisandratra, L.C.M, Chervio, S., Venables, S., Flam, A., Andrianarisoa, F.R., Barba, C., Rasoamananto. I, Pierce, S.M. (2025) Occurrence of mobulid rays in North-West Madagascar. *Environmental Biology of Fishes, 108*, pp. 365-378.

Fernando, D. (2018). Status of mobulid rays in Sri Lanka. IOTC-2018-WPEB14-39.

Fernando, D. and Stewart, J.D., (2021). High bycatch rates of manta and devil rays in the "small-scale" artisanal fisheries of Sri Lanka. *PeerJ*, *9*, p.e11994.

Food and Agriculture Organization of the United Nations. (FAO) (2024). FishStatJ: Global capture production dataset (2016–2023 catches of mobulid species in Indonesia). Accepted September 13, 2024, from. https://www.fao.org/fishery/statistics/software/fishstatj/

Griffiths, S. P., & Lezama-Ochoa, N. (2021). A 40-year chronology of the vulnerability of spinetail devil ray (Mobula mobular) to eastern Pacific tuna fisheries and options for future conservation and management. *Aquatic Conservation: Marine and Freshwater Ecosystems*, *31*(10), 2910-2925.

Laglbauer, B., D'Costa, N. G., Stewart, J. D., Palacios, M. D., Cronin, M.R. et al. (2025). Global manta and devil ray population declines: Closing policy and management gaps to reduce fisheries mortality. I*n review*.

Laglbauer, B. J., Salim, M. G., Fahmi, F., Oktaviyani, S., Gozali, I. C., Tawang, F., Rizal, H. S., Rosady, V. P., Rudianto, D., Ender, I., Fontes, J. M., Afonso, P., Bennet, M. B., & Stevens, G. M. W. (in press). High take of mobulid rays amongst other threatened elasmobranchs in East Java, Indonesia: Landing trends and socio-economic context. Environmental Biology of Fishes.

Lewis, S. A., Setiasih, N., Fahmi, Dharmadi, D., O'Malley, M. P., Campbell, S. J., Yusuf, M., & Sianipar, A. B. (2015). Assessing Indonesian manta and devil ray populations through historical landings and fishing community interviews. https://doi.org/10.7287/PEERJ.PREPRINTS.1334V1

Moazamm, M. (2018). Unprecedented decline in the catch of mobulids: an important component of tuna gillnet fisheries of the Northern Arabian Sea. IOTC-2018-WPEB14-30

Murua, J. Ferarios, J.M., Grande, Moreno, G. M., Onandia, I., Ruiz, J., Zudaire, I., Santiago, J., Murua, H., Restrepo, V. (2021). Developing solutions to increase survival rates of vulnerable bycatch species in tuna purse seiner FAD fisheries. IOTC-2021-WGFAD02-11.

Raje, S.G. and Zacharia, P.U. 2009. Investigations on fishery and biology of nine species of rays in Mumbai waters. Indian Journal of Fisheries 56(2): 95–101.

Ruiz Gondra, J., Abascal, F. J., Bach, P., Baéz, J. C., Cauquil, P., Krug, I., Lucas, J., Murua, H., Ramos Alonso, M. L., & Sabarros, P. S. (2018). By-catch of the European purse seine tuna fishery in the Indian Ocean for the period 2008–2017. IOTC-2018-WPEB14-15.Shahid et al., (2018). A regional perspective on the mobulid ray interactions with surface fisheries in the Indian Ocean. IOTC-2018-WPEB14-29

Thomas, S., Kizhakudan, S. J., Remya, L., Rahangdale, S., Nair, R. J., Mahesh, V., ... & Gopalakrishnan, A. (2022). CMFRI Marine Fisheries Policy Series No. 21/2022: India Non-Detriment Finding (NDF) for Devil Rays Mobula spp. in the Indian Ocean, 2022 to 2024.

Venables, S.K., Rohner, C.A., Flam, A.L., Pierce, S.J. and Marshall, A.D., (2025). Persistent declines in sightings of manta and devil rays (Mobulidae) at a global hotspot in southern Mozambique. *Environmental Biology of Fishes*, *108*(4), pp.749-765.

White, W., Giles, J., Dharmadi, Potter, I. C. (2006) Data on the bycatch fishery and reproductive biology of mobulid rays (Myliobatiformes) in Indonesia, Fisheries Research, 82, 65-73.

APPENDIX XVV
WORKING PARTY ON ECOSYSTEMS AND BYCATCH PROGRAM OF WORK (2027–2031)

The Program of Work consists of the following, noting that a timeline for implementation would be developed by the SC once it has agreed to the priority projects across all of its Working Parties:

Table A 5: Priority topics for obtaining the information necessary to develop stock status indicators for bycatch in the Indian Ocean; and
Table A6: Stock assessment schedule.

Table A 5. Priority topics for obtaining the information necessary to develop stock status indicators for bycatch species in the Indian Ocean. Note, the action numbers refer to the actions identified in the shark research plan which can be seen in Table A 7 in Appendix XVVI

Topic in order of priority	Sub-topic and project	Timing				
		2027	2028	2029	2030	2031
1. Data improvement * many of these should be harmonised for all IOTC species	1.1 Consultant to work with key GN fleets to assess their data collection systems and help fill gaps (Table A 7 action 2).					
	1.2 Define and implement routine sampling (every year) starting with priority countries, as outlined in the shark research plan (Table A 7 actions 1, 3 & 4).					
	1.2.1 Implement routine detailed sampling (every 2-3 years) focusing on catch composition and size (Table A 7 action 5).					
	1.3 Compile existing and create further capacity building materials (where needed) and carry out periodic workshops as outlined in the shark research plan (including ID guides for all taxa as required) (Table A 7 action 8 & 9).					
2. Shark assessment improvement	2.1 Apply CKMR to feasible species as outlined in the shark research plan (Table A 8Table A 7 action 3).					

	2.2 Implement adaptive management for data-poor species with stakeholder engagement (Table A 8Table A 7 action 4).					
3. Biological information and parameters	3.1 Investigate age and growth parameters (Table A 7 actions 20 & 21).					
	3.1.1 Investigate all biological parameters (lack of information for all species in the Eastern Indian Ocean) (Table A 7 actions 24).					
	3.2 Study at vessel and post release mortality on a regular basis for sharks (Table A 7 action 22) and other taxa.					
	3.3 Carry out studies to better understand movements and migration of shark (Table A 7 action 23).					

Other Future Research Requirements (not in order of priority)

Topic	Sub-topic and project	2027	2028	2029	2030	2031
1. Bycatch mitigation measures	Keep best handling practice master guide up to date for all taxa					
	1.1 Gears 1.1.1 Undertake a series of gear specific workshops focusing on multi-taxa bycatch issues					
	1.1.2 Develop studies on bycatch mitigation measures for the main gears using in the IOTC area (operational, technological aspects and best practices) with the priority measures identified in Table A 9.					
	1.2 Sea turtles 1.2.1 Res. 12/04 (para. 11) Part I. The IOTC Scientific Committee shall request the IOTC Working Party on Ecosystems and Bycatch to:					
	a) Develop recommendations on appropriate mitigation measures for gillnet, longline and purse seine fisheries in the IOTC area; [mostly completed for LL and PS]					
	b) Develop regional standards covering data collection, data exchange and training					
	1.2.2 Res. 12/04 (para. 17) The IOTC Scientific Committee shall annually review the information reported by CPCs pursuant to this measure and, as necessary, provide recommendations to the Commission on ways to strengthen efforts to reduce marine turtle interactions with IOTC fisheries.					
	1.2.3 Regional workshop to review the effectiveness of marine turtle mitigation measures					

	1.3 Seabirds 1.3.1 Bycatch assessment for seabirds taking into account the information from the various ongoing initiatives in the IO and adjacent oceans					
	1.3.2 Study on cryptic mortality of seabirds in tuna LL fisheries.					
	1.3.3 Study post release survival rates for seabirds and harmonise and finalise guidelines and protocols for safe handling and release of seabirds caught in IOTC fisheries					
	1.4 Cetaceans 1.4.1 Testing mitigation methods for cetacean bycatch in tuna drift gillnet fisheries					
	1.5 Mitigation capacity building and effectiveness monitoring 1.5.1 Capacity building for mitigation measures (Table A 7 action 16).					
	1.5.2 Monitoring effectiveness of mitigation measures after implementation (Table A 7 action 17).					
2. Data improvements	2.1 Update morphometric relationships (Table A 7 action 6).					
	2.2 Linking management systems with IOTC's data submission process (Table A 7 action 7).					
	2.3 Data mining: 2.3.1 Involve the broader research community in research useful to RFMOs with a research priorities directory. Call for data and information from CPC scientists. (Table A 7 action 10).					

	2.3.2 Assess the feasibility and relevance of using the information sources identified through the data/information call (Table A 7 action 11).					
	2.3.3 Use alternative information for data-poor species in future assessments (Table A 7 action 12).					
	2.4 Examine trade data - Explore discrepancies between trade data and catch reporting, and investigate the possibility of using these data to improve current catch estimates (Table A 7 action 13).					
	2.5 Discards estimation and extrapolation methods - Improve discards reporting to species level by enforcing mandatory reporting (Table A 7 action 14).					
	2.6 Improve levels of observer coverage by enforcing mandatory reporting (Table A 7 action 15).					
	2.7 Improve AI technology for species ID, size measurements and discards estimates in EMS (Table A 7 action 25).					
3. Biological information and parameters	3.1 Collaborate with RFMOs and other groups to address CITES permit issues and seek research exemptions through RFMOs (Table A 7 action 18).					
	3.2 Create an inventory of available biological samples and tagging data to be used in future work (Table A 7 action 19).					
3. CPUE standardisation / Stock Assessment / Other indicators	3.1 Develop standardised CPUE series for each key shark species and fishery in the Indian Ocean:					
	3.1.1 Development of CPUE guidelines for standardisation of CPC data.					

	3.1.2 Blue shark: Priority fleets: TWN,CHN LL, EU,Spain LL, Japan LL; Indonesia LL; EU,Portugal LL					
	3.1.3 Shortfin mako shark: Priority fleets: Longline and Gillnet fleets					
	3.1.4 Oceanic whitetip shark: Priority fleets: Longline fleets; purse seine fleets					
	3.1.5 Silky shark: Priority fleets: Purse seine fleets					
	3.2 Joint CPUE standardization across the main LL fleets for silky shark, using detailed operational data					
	3.3 Stock assessment and other indicators					
4. Ecosystems	4.1 Develop a plan for Ecosystem Approach to Fisheries (EAF) approaches in the IOTC, in conjunction with the Common Oceans Tuna Project.					
	4.1.2 Workshop for CPCs on continuing efforts to the development of an EAF including delineation of candidate eco regions within IOTC.					
	4.1.3 Practical Implementation of EBFM with the development and testing of ecosystem report cards.					
	4.1.4 Evaluation of EBFM plan in IOTC area of competence by the WPEB to review its elements components and make any corrective measures.					
	4.2 Assessing the impacts of climate change and socio- economic factors on IOTC fisheries					
	4.3 Evaluate alternative approaches to ERAs to assess ecological risk					
	4.4 Progress on Climate webpage on IOTC website and liaise with WPDCS for technical implementation					

Ecoregions development	Support for the development and refinement of ecoregions in the Indian Ocean: Development of a pilot study (focused on two ecoregions: one coastal, the Somali Current ecoregion and one oceanic, the Indian Ocean Gyre ecoregion)					

Table A6. Draft: Assessment schedule for the IOTC Working Party on Ecosystems and Bycatch 2027–2031 (adapted from IOTC–2025–SC28–R).

*Including data poor stock assessment methods; Note: the assessment schedule may be changed dependent on the annual review of fishery indicators, or SC and Commission requests.
*Indicator analysis can include data poor stock assessment method and indicators to complement CPUE
Note: the assessment schedule may be changed dependent on the annual review of fishery indicators, or SC and Commission requests.

Working Party on Ecosystems and Bycatch					
Species	**2027**	**2028**	**2029**	**2030**	**2031**
-	-	-	Data preparatory meeting	Data preparatory meeting	Data preparatory meeting
Blue shark	–	–	–	Full assessment	-
Oceanic whitetip shark	-	–		Indicator analysis*	Indicator analysis*
Scalloped hammerhead shark*	–	–	–	–	Indicator analysis*
Shortfin mako shark			Full assessment		-
Silky shark	-	Indicator analysis*	-	–	Indicator analysis*
Bigeye thresher shark	Indicator analysis*	-	–	–	-
Pelagic thresher shark	Indicator analysis*	-	–	–	-
Porbeagle shark	Indicator analysis*		–	–	-
Mobulid Rays	Interactions / indicator analysis*	-	Interactions/ Indicators	–	-
Marine turtles	–	Indicators	–	Indicators	-
Seabirds	Presentation of the draft Seabird workplan. Review of mitigation measures in Res. 23/07	–	Development of draft workplan		Review branch line weighting protocols

Marine Mammals	–	–	Review of effective mitigation measures Review of handling guidelines		-
Ecosystem Approach to Fisheries Management (EAFM) approaches					Pilot ecosystem fisheries overviews for selected ecoregions
Series of multi-taxa bycatch mitigation workshops	Focus: tbd	Focus: tbd	Focus: gillnets	Focus: tbd	Focus: tbd

APPENDIX XVVI

PRIORITY ACTIONS TO ADDRESS THE CURRENT GAPS IN KNOWLEDGE IDENTIFIED BY THE SHARK RESEARCH PLAN

Table A 7: List of priority actions to address the identified gaps in knowledge

Action number	Action	Start	Duration	Description	Notes	Responsible
				DATA IMPROVEMENTS		
1	Define priority CPC	2027	1 year	Create a matrix with indicators such as fleet size, NDFs, data reporting, engagement, and interest in capacity building. Incorporate trade-data research.	Start with two CPCs and increase the number as the work begins to flow.	IOShPl Working group and WPEB
2	Consultant to work with key GN fleets to assess their data-collection systems and help fill gaps	2027	2 years	Consultant to visit priority CPCs to: Inspect entire process of data collection, processing and management Cover fishing ports, markets and any other landing sites Make recommendations for how to improve the data collection and reporting process		Secretariat to recruit consultant
3	Define a sampling strategy for priority countries	2027	1 year	Ask CPCs to provide lists of sharks caught in their fisheries, species composition percentages, landing sites, gear types, etc. To reconstruct historical data, ask CPCs to engage stakeholders (fishers, sellers, industry, etc.) and include their perceptions of changes over time. Use IUCN species distributions within EEZs as checklists of species likely to be encountered and ask CPCs to validate them. Generate regional lists and create a species		IOShPl Working group and WPEB

Action number	Action	Start	Duration	Description	Notes	Responsible
				dictionary that includes local names. This is an achievable project.		
4	Implement routine sampling for priority countries	2028	every year	Sampling should be conducted by hired experts according to the predefined strategy and followed by CPC-appointed personnel. The sampling operation should be preceded by separate capacity-building workshops targeting the three pillars of data collection: identification, sampling protocols, and reporting. This is to be done first in the priority countries.	Bear in mind that routine sampling should ideally incorporate all IOTC species, as the data issue is widespread across working parties.	Secretariat
5	Implement routine detailed sampling focusing on catch composition and size	2029	every 2–3 years	Sampling initiatives to focus on collecting morphometric data	Ask CPCs to provide information on how sharks are processed, measured, and weighed. Ask CPCs for historical and current L-W data and length types. Use this information to revise the relationships.	Secretariat
6	Updating morphometric relationships	2029	1 year	Finding alternative sources of data to revise morphometric relationships	Approach the KZN Shark Board (in South Africa) who probably have a good dataset for L-W data.	Secretariat
7	Linking management systems with IOTC's data submission process	2030	1 year	Consultant to work to connect CPC data management systems with IOTC's data reporting requirement automatically		Secretariat

Action number	Action	Start	Duration	Description	Notes	Responsible
8	Create capacity building materials	2027	1–2 years	(1) Collate baseline materials into a directory—a living document that can be updated and eventually added to the IOTC website in greater detail; (2) create a Google Form to seek additional materials and improve understanding of CPC needs; (3) create Indian Ocean specific fisheries advisory products; and (4) create training materials to guide people through the process of cleaning data and making it more fit for purpose.	Create a training package that guides through the processes needed to improve data quality and fitness for purpose. An analyst could develop a simple resource tailored by need. Use a training-of-trainers approach: bring together a group to provide training and share experiences and problems. The IATTC provides a good example, working closely with CPCs through webinars and in-person training. Data mentors could hold clinics ahead of the main reporting dates.	IOShPI Working group, WPEB & Secretariat
9	Carry out capacity building workshops	2027	Every 1-2 years	To address the lack of capacity for data collection and management, carry out capacity building workshops on: 1) species ID 2) improving sampling protocols and data management	Review each government's sampling protocols for its fisheries and how it manages the data collected.	Secretariat

Action number	Action	Start	Duration	Description	Notes	Responsible
10	Data mining	2026	1–2 years	Involve the broader research community in research useful to RFMOs. Create a research priorities directory and reach out through groups such as RSN and IUCN. Call for data and information from CPC scientists. Speak directly with NGOs and other identified data holders to obtain data from SSF and Sharks International projects.	Approach the RSN network. Engage IUCN SSG groups. Consider Common Oceans Project III. Issue a call for data. Invite collaboration. Create data directories, as is done for seabirds.	IOShPI Working group and WPEB
11	Data mining	2027	1–2 years	Assess the feasibility and relevance of using the information sources identified through the data/information call.		IOShPI Working Group / assessment expert
12	Data mining	2030	4 years	Use alternative information for data-poor species in future assessments.		WPEB
13	Trade data	2027	Every 2 years	Explore discrepancies between trade data and catch reporting, and investigate the possibility of using these data to improve current catch estimates.	Repeat every two years to align with the CITES Animals Committee.	IOShPI Working group and WPEB
14	Discards estimation & extrapolation methods	2026	2 years	Improve discards reporting to species level by enforcing mandatory reporting	Estimate SMA discards for Resolution 25/09 in 2028. Use training-of-trainers capacity-building activities to address this.	Commission (compliance), working group (scientific work)
15	Improve levels of observer coverage	Ongoing		Improve levels of observer coverage by enforcing mandatory reporting		Commission
				MITIGATION MEASURES IMPLEMENTATION		
16	Capacity building for mitigation measures	2028	1-2 years	Capacity building activities can be used to improve understanding how to implement mitigation measures in certain gears,		Secretariat and WPEB

Action number	Action	Start	Duration	Description	Notes	Responsible
17	Monitoring effectiveness of mitigation measures after implementation	2028	2-3 years	Implementation of mitigation measures is not well monitored currently.		WPEB
				BIOLOGICAL INFORMATION AND PARAMETERS		
18	Collaborate with RFMOs and other groups to address CITES permit issues and seek research exemptions through RFMOs	2027	2-5 years	Joint collaboration among RFMO Secretariats. Speak with CITES. Facilitate communication among RFMO scientists. Agree on a common position to present to CITES. CPCs nominate a scientist to complete and document the application process. Create a Google Sheet describing the process and listing contacts in each CPC who can identify the relevant people (CITES authorities). The Secretariat coordinates CPC responses. Coordinate through the SRG.		Secretariat to coordinate with other RFMOs
19	Create an inventory of available biological samples and tagging data	2026	1 year	Call for samples and tagging data to create an inventory (particularly of any data that have not yet been analysed but could be used in a broader study). Establish a reporting form. Use the IUCN network and others. Include the tagging network at GlobalSharkMovement.org.	ICCAT has a template to review. Investigate whether it is in place for all species and, if so, expand it to include sharks.	IOShPI Working group, WPEB, SC IOTC circular
20	Investigate age and growth parameters	2027	1–2 years	Encourage CPCs (and their observers) to collect information, samples and data that can be used to estimate age and growth. This could be linked to retrieved samples. Conduct age and growth studies.	ICCAT have a template to look at. Investigate if this is in place for all species and if so expand to include sharks	IOShPI Working Group to develop form, Secretariat to circulate

Action number	Action	Start	Duration	Description	Notes	Responsible
					The CITES permit issue will need to be resolved first for many CPCs. OCS data collection is needed because mortality is known to occur. Observers can be asked to collect vertebrae and tissues from dead OCS. Observers should be able to transport these samples under their mandate with a letter from IOTC authorising them to bring the samples home. It is feasible to begin collecting these samples.	
21	Investigate Age and Growth parameters	2028	5 years	Continue to finalise current projects. Identify priority species for future projects	Define priority species with WPEB – OCS as a possibility.	CPC's Scientists
22	Mortality estimates (PRM and AV)	Ongoing	Regular updates (long-term)	Continue to finalise current projects. Identify priority species for future projects	SMA as one priority spp. Others to be identified	CPC's Scientists
23	Movement and migration information	2030	6-10 years	Carry out studies to better understand movements and migrations of sharks		CPC's Scientists
24	All biological parameters	Ongoing	Long-term		There is a lack of all biological parameters for all species in the Eastern Indian Ocean	CPC's scientists
Additional proposed actions						
25	Discards estimation			Improve AI technology for species ID, size measurement and discard estimates in EMS		CPC's Scientists

Table A 8: Actions to be taken to improve assessments of sharks

Action number	Action	Start	Duration	Description
1	Continue with conventional assessment methods	Follow WPEB's schedule	every 4 years	SS3, JABBA, etc. Blue sharks and shortfin mako are currently assessed using these conventional methods. Based on the review of available information for silky sharks, such methods might become possible in the near future (in approximately three years).
2	Data poor methods	2026	4 years	Evaluate new data-poor methods in the year before each data-poor assessment, including ERAs and other risk assessments.
3	Apply CKMR to feasible species	2027	10 years	(1) Start with a workshop to define priority species (e.g., scalloped hammerhead: 500 samples per year for three years) and the sampling protocol. Build on the feasibility studies already conducted. (2) Address CITES permits (lines 2 and 3 of the Overview table). (3) Implement sampling with volunteer CPCs and monitor progress annually.
4	Implement adaptive management for data-poor species with stakeholder engagement, as done in Australia.	2029	Forever (review progress and modify as needed every 4 years)	Start with a pilot study including stakeholder consultations to develop a shared view on way(s) to monitor stock condition and way(s) to react when stock in at-risk situation(s), e.g. focusing on most sensitive but least data available species. This will be a slow process but may offer substantial benefits. It should continue even when data reach 'ideal' levels and can complement traditional methods. It includes a socioeconomic dimension and promotes greater acceptance of management measures.

Table A 9. Summary of mitigation measures reviewed in the shark research plan. The funding level refers to the amount of funding that would be required to conduct the necessary research, the priority of research refers to how high a priority the IOShPl considered the research to be and consideration for implementation refers to how likely/challenging it would be for fleets to implement these measures.

Measure / Method	Approach	Knowledge available	Funding level	Priority for research	Priority level and considerations for implementation	Implemented at IOTC	Implemented elsewhere
			LONGLINE				
Avoiding hotspots	Fleet communication program	Well understood	No	Low	Medium	Ad-hoc implementation	Ad-hoc implementation
Avoiding hotpots: Spatial and/or temporal closure	Spatial and/or temporal closure/MPAs	High research needs	Medium	High	Difficult		
Fishing time	Soaking time	Moderate research needs	Medium	Medium	Difficult		
Fishing depth	Deep setting - traditional	Well understood	No	Low	Difficult		
Fishing depth	Deep setting and elimination of shallow hooks	Well understood	No	Low	Difficult		
Gear configuration	Technical mitigation measures (such as repellents)	High research needs	Medium	High	Expensive to implement		
			LONGLINE				
Decrease fishing mortality	Reduction of fishing effort	Well understood	No	Management decision	Management decision		

Measure / Method	Approach	Knowledge available	Funding level	Priority for research	Priority level and considerations for implementation	Implemented at IOTC	Implemented elsewhere
Decrease fishing mortality	Prohibition of retention	High research needs	Medium	Management decision	Management decision	Implemented	Implemented
Finning prohibition and other legal constrains in the fishery	Prohibition of shark finning	Well understood	No	Already implemented	Already implemented	Implemented	Implemented
Bait modification	Bait type (squid vs. fish)	Well understood	Medium	Low	Medium		
Bait modification	Blue/Green-dyed bait	Well understood	No	Low	Low		
Bait modification	Artificial bait	Moderate research needs	High	Low	Low		
Catchability /Selectivity	Modification of terminal gears (including hook type)	Moderate research needs	High	Low	Medium		
			LONGLINE				
Leader material	Ban on wire leaders	Moderate research needs	High	Medium	Medium	Partially implemented	WCPFC and IATTC
Shark lines	Ban on shark lines	Moderate research needs	High	Medium	Medium	Partially implemented	WCPFC and IATTC

Measure / Method	Approach	Knowledge available	Funding level	Priority for research	Priority level and considerations for implementation	Implemented at IOTC	Implemented elsewhere
Terminal gears	Meka-ring/loop gear/ trap line	High research needs	High	High	Medium		
Safe handling and release	Safe handling and release, promoting post-release survivorship (faster gear retrieval, line cutters, release alongside vessel, avoid bringing large sharks onboard)	High research needs	High	Medium	High	Implemented	All RFMOs
Safe handling and release – handling equipment	Mandatory shark safe handling equipment	Well understood	No	Medium	High	Implemented	All RFMOs
Awareness	Workshop/ training information dissemination on good handling practices/fishing practices	Well understood	Medium	High	High	Partially implemented	Partially implemented
			GILLNET				
Fishing time	Soaking time	Moderate research needs	Medium	High	Medium		
Decrease fishing mortality	Reduction of fishing effort	Well understood	No	Management decision	Management decision		

Measure / Method	Approach	Knowledge available	Funding level	Priority for research	Priority level and considerations for implementation	Implemented at IOTC	Implemented elsewhere
Decrease fishing mortality	Prohibition of retention	High research needs	Medium	Management decision	Management decision	Implemented	Implemented
Gear configuration	Selectivity (mesh size, gear rigging/construction, net panel material)	Well understood	High	High	Medium		
			GILLNET				
Turtle/shark lights for gillnets	LED lights, UV lights, nets constructed of photoluminescent materials.	Well understood	No	Medium	Medium		
Gear modifications	Sub surface setting	Moderate research needs	Medium	Medium	High	Implemented	
Attractant / Deterrent use	Repellent/ attractant	Well understood	No	Low	Low		
Safe handling and release	Safe handling and release, facilitation post-release survivorship (including quick release)	High research needs	High	High	High	Implemented but not well understood	Implemented but not well understood
Safe handling and release – handling equipment	Mandatory turtle/shark safe handling equipment	Well understood	Moderate	Medium	High	Implemented but not well understood	Implemented but not well understood

Measure / Method	Approach	Knowledge available	Funding level	Priority for research	Priority level and considerations for implementation	Implemented at IOTC	Implemented elsewhere
Awareness	Workshop/ training information dissemination on good handling practices/fishing practices	Well understood	Medium	High	High		
			PURSE SEINE				
Decrease ratio bycatch/target catch	Setting on bigger aggregations	Well understood	No	Low	Low		
Avoiding ETP species	Prohibition of setting on whale sharks & mantas	Moderate research needs	Medium	Low	High (implemented)	Implemented	Implemented
Avoiding hotspots	Fleet communication program	Well understood	No	Low	Medium	Ad-hoc implementation	Ad-hoc implementation
Avoiding hotspots	Remote detection, fleet communication	Moderate research needs	Medium	Medium	Low		
Avoiding hotpots: Spatial and/or temporal closure	Spatial and/or temporal closure/MPAs	High research needs	Medium	High	Difficult		
			PURSE SEINE				
Decrease fishing mortality	Prohibition of retention	High research needs	Medium	Management decision	Management decision	Implemented	Implemented

Measure / Method	Approach	Knowledge available	Funding level	Priority for research	Priority level and considerations for implementation	Implemented at IOTC	Implemented elsewhere
Decrease fishing mortality	Reduction of fishing effort for certain types of schools	Well understood	No	Low	Low		
Decrease fishing mortality	Release sharks from net (release panel, fishing from the net, attractors/repellents)	High research needs	High	Low	Low		
Non entangling FADs	Non entangling FADs	Well understood	No	Low	Implemented		
Improved FAD management	Reduce FAD density	Moderate research needs	Medium	Low	Low	Partially implemented – reduction in number of FADs allowed	
			PURSE SEINE				
Safe handling and release	Safe handling and release practice (handling tools)	Good knowledge level	Medium	High	High	Implemented	Implemented
Workshop/training information dissemination on good handling practices/fishing practices	Fishermen training / awareness	Well understood	Medium	High	High	Partially implemented	Partially implemented

APPENDIX XVVII

BEST PRACTICE HANDLING AND RELEASE MASTER DOCUMENT

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INTRODUCTION

While the advice below provides specific guidelines for safe handling and release of different taxonomic groups, a few principles apply in all cases:

1) The safety of crew members should always be given the highest priority above all else. This means that at **NO TIME** should a crew member consider entering the water with an entangled or encircled animal, as this can create a risk of human entanglement, injury, or even death through becoming caught in the gear, exposure to cold temperatures or physical injury by the struggling bycaught animal. Recommended handling and release guidelines may be modified, suspended, or discontinued when sea state, weather, visibility, vessel movement, animal behaviour, or other operational conditions pose a risk to crew safety. Crew safety should remain the paramount consideration.

2) The next consideration should be minimizing further harm to the entangled, encircled and animals arriving on deck and release. The guidelines below have been compiled by species experts in collaboration with fisheries experts, in an effort to distil the most important actions that will ensure the safety of both crew members and the entangled wildlife.

3) These guidelines recognize differences in vessel size, freeboard, deck arrangement, mechanisation, crew strength and lifting capacity. Where a specific handling or release method or tool described in these guidelines cannot be implemented because it is incompatible with the physical or operational characteristics of the vessel, an alternative method may be used, provided that the alternative achieves the same conservation objective and minimises injury and post-release mortality to the greatest extent practicable. This flexibility shall not apply where a specific method or requirement is mandatory under an applicable IOTC Conservation and Management Measure or national legislation, in which case the mandatory requirement shall apply without exception.

LIST OF TOOLS FOR THE RELEASE OF SHARKS, RAYS, SEABIRDS,SMALL CETACEANS AND SEA TURTLES

Useful tools for safe handling and release

(note the tools in **bold** are mandatory under current IOTC CMMs)

- Thick Gloves (Sharks/Seabirds)
- Clean towel, blanket or cloth (Sharks/Seabirds/Cetaceans)
- Shark and/or dolphin harness, stretcher or cradle (Sharks, Cetaceans)
- Ventilated box or bin (seabirds),
- Eye protection (seabirds)
- Long sleeves (seabirds)
- Personal protective equipment (PPE)(all)

Purse seine

- Portable release ramp that can be attached to a release door and wetted with an attached hose (small Rays /Sharks/Sea turtles)
- Hopper with ramp (Rays/Sharks/Sea turtles)

- Bycatch/waste chute on lower/well deck (Rays/Sharks/Sea turtles)
- Stretcher (Rays/Sharks/Cetaceans)
- **Mobulid sorting grid (Rays);**
- **Cargo net, canvas sling, or any similar device that can be attached to any lifting device, such as crane, available onboard;** (Rays/Sharks/Sea turtles)

Longlines

- Dip Net (Sea turtles/Seabirds)
- Dry ventilated cardboard/Wooden Box (Seabirds)
- Pliers (Sea turtles/Seabirds)
- Short handled de-hooker (Sharks/Sea turtles)
- Long-handled de-hooker (Sharks/Sea turtles)
- Long-handled line cutter with protected outer edges (Sharks/Sea turtles/Cetaceans)
- Wire/bolt cutter capable of cutting all hooks used on the vessel (Sharks/Sea turtles /Seabirds; This tool is either a pair of pliers or the other option)
- HPAI (bird flu) protection tools (Seabirds; goggles, disposal mask and etc.; if required)[7]

Gillnets

- Safety knives or net knives (they are capable of cutting through both monofilaments and multifilament netting while minimizing the risk of injury to crew and damage to fishing gear).
- Hand-held net cutters/shears
- Boat hook or float line retrieval hook
- Boarding ladder or release access ladder
- Personal floatation device fitted with whistles, waterproof light, reflective strips
- Protective gloves
- Stretchers, slings or lifting harness
- Release chute, slide or canvas recovery mat
- Soft towels or wet cloths.

[7] https://www.acap.aq/resources/disease-threats/avian-flu/avian-flu-alert-poster-for-fishing-vessels

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Note: A previous version of these guidelines including Minimum Standards and intended to replace Annex III of Resolution 25/08 was adopted during WPEB 2025 and endorsed by the SC in 2025 but was not presented to the Commission for adoption at the 2026 Commission Meeting

BEST PRACTICE HANDLING AND LIVE RELEASE GUIDELINES FOR SHARKS

The primary aim of the following Best practice Handling and Live Release Guidelines is to ensure the highest level of survival of bycaught sharks in IOTC fisheries and that, whenever possible, prompt, and effective action will be taken to release the shark while still in the water or returning it to the sea as quickly as possible and prioritising that the life and safety of the crew is not compromised and that crew members shall endeavour to avoid hazards in the safe handling and release operations for sharks. The following best practices are appropriate for sharks when released whether under no-retention policies, or when released voluntarily. These basic guidelines do not replace any stricter safety rules that may have been established by the National Authorities of individual CPCs.

These guidelines should be applied across all fishing gears in IOTC fisheries, including longline, purse seine, gillnets and other entangling gears. Where sharks are caught in the net rather than hooked, priority should be given to minimising handling time, reducing additional time in the net and time onboard, and releasing the animal with the least possible damage to the shark, the crew and fishing gear.

To maximise the efficacy and utility of adopted Best Handling and Release Practices (BHRPs), CPCs should ensure crew are educated and practical demonstration training are provided on these practices regularly and enough dedicated crew members responsible for releasing bycaught sharks by applying the adopted BHRP. Illustrated best handling and release practices should be available on the vessels in the native languages of the skipper and crew members.

***Safety first:** These best practices should be considered in light of safety and practicability for crew. Crew safety should always come first. In cases where release operations are conducted in the water, alongside the vessel, crew should use personal protective equipment. At a minimum, crew should wear protective gloves and avoid working around the mouths of sharks. In particular, caution is advised while working to release a shark in the water entangled in a net or in a fishing line where tensioned netting and sudden movements may pose risk to the crew. Also minimising manual handling and using appropriate technical release devices instead is preferable to ensure safety of the crew and the animals at the same time.*

***Be prepared:** Tools should be prepared in advance that are always onboard and ready to be used prior to setting or hauling in fishing gear (listed at the end of this document).*

[8] Sharks under no-retention policies of IOTC, or when released voluntarily

Useful tools for safe handling and release for all gears

- Safety gloves (shark skin is rough; ensures safe handling of shark and protects crew's hands from bites and abrasions)
- Towel or cloth (a towel or cloth soaked in seawater can be placed on the eyes of the shark; used to calm sharks down)
- Shark harness, stretcher or cradle

Purse seine specific

- Portable release ramp that can be attached to a release door and wetted with an attached hose
- Hopper equipped with ramp
- Bycatch/waste chute on lower/well deck
- Stretcher

Longline specific

- Pliers
- Short handled de-hooker
- Long-handled de-hooker (equal or greater in length than the vessel's freeboard)
- Line cutter- capable of cutting through all lines used in the gear or suitable alternative
- Long-handled line cutter (equal or greater in length than the vessel's freeboard)
- Wire/bolt cutter capable of cutting all hooks used on the vessel

Gillnet specific

- Long-handed net cutter – capable of cutting through the net/gear (equal or greater in length than the vessel's freeboard)
- Safety knives/net knives.
- Hand-held net cutters or shears.
- Float-line retrieval hook or boat hook.
- Release access ladder.
- Personal flotation devices (with whistle, light and reflective strips).
- Protective gloves.
- Soft slings or stretchers for juvenile animals where onboard handling is unavoidable.

General recommendations for fleets fishing for IOTC species

Do (IOTC fisheries):

- When entangled (in netting, fishing line, etc.), if safe to do so, carefully cut the net/line free from the animal and release it to the sea as quickly as possible with no entanglements attached.
- Whenever possible do not bring sharks on board but attempt releasing them while still in the water
- If, for whatever reason, a shark must be brought on the deck then minimise the time it takes to return it to the water, ideally to less than 5 minutes to increase survival and reduce risks to the

crew. The shark should be adequately supported for release using a stretcher, sling, or cradle or similar locally made device. Manual handling is also an option if best practices are applied (manipulate the shark using the fins or body, do not hang them upside down or drag them by the tail).

Do not (all fisheries)

- Lift sharks using thin wires or cables, or suspending by the tail alone by hand, with cables or ropes.
- Cut the tail or any other body part.
- Cut or punch holes through the shark.
- Gaff or kick a shark, or insert hands into the gill slits.
- Expose the shark to the sun for extended periods.

Longline fisheries specific safe-handling practices

Do

- Whenever possible do not bring sharks on board but attempt releasing them while still in the water. If, for whatever reason, a shark must be brought on the deck then minimise the time it takes to return it to the water, ideally to less than 5 minutes to increase survival and reduce risks to the crew.
- If operationally safe to do so, reduce the vessel speed relative to the water to the lowest possible level and reduce the line hauling rate.
- Bring the shark as close to the vessel as possible without putting too much tension on the branch line to avoid that a released hook or branch line break could shoot hook, weights and other parts toward the vessels and crew at high speed.
- Secure the far side of the longline mainline to the boat to avoid any remaining gear in the water pulling on the line and the animal.
- Avoid bringing the shark onboard for gear removal whenever possible and under no circumstances for vessels with a high freeboard >1m (i.e. too high for crew members to reach the water with their hands).
- If hooked, and the hook is visible in the body or mouth, use a dehooking device or long-handled bolt cutter to remove the hook barb, and then remove the hook as much as possible.
- If attempting to remove hooks, use pliers or dehookers or long-handled de-hookers for vessels with high freeboards (i.e. > 1 meter).
- If it is not possible to remove the hook or the hook cannot be seen, cut the line of the trace (or snood, leader) as close to the hook or mouth as possible leaving no more than 1 meter of gear and no weights attached to the animal).
- For vessels with a freeboard height of less than 1 m, if it is not possible to remove the gear while the shark is still in the water and sharks must be brought on board for gear removal

- Use a net, lasso, harness or second point of attachment to help lift them onboard horizontally.
- Manoeuvre shark using manual restraint of the pectoral fins and the caudal fin (this may require two crew members depending on the size of the animals)
- Use a stretcher or cradle for handling and restraint for the safety of the crew and to reduce injury to the animal. Return the animals to the sea as quickly as possible head forward letting them slide into the water (ideally within 5 minutes)[9].

Do not:

- Lift sharks onboard on vessels with a high freeboard (i.e. > 1 meter)
- If having to lift sharks on board (i.e. on vessels with low freeboard of less than 1 meter where crew can reach the water with their hands), do not lift large sharks (more than 1m in length) onboard without a net or second point of attachment to support the weight of the animal and do not suspend sharks by the tail, noting it is not recommended to lift sharks onboard the vessel at all.
- To the greatest extent practicable, lift sharks from the water using the branch line, especially if hooked
- Use drag or lazy lines or drag sharks behind the vessel until the hook rips free of the jaw or until the animal is easier to handle.
- Use electrical devices, electrical current, or other methods to electrocute, shock, stun, immobilise, or incapacitate sharks.
- Attempt to remove a hook from a live shark if the hook is not visible.
- Damage the mouth to remove hooks.
- Lift or manoeuvre sharks by the gill slits, or spiracles.
- Insert gaffs, hooks, or similar instruments into the bodies of live sharks.
- Lift and drop sharks from the vessel height to rip the hook from the shark's jaw.

[9] Sabarros et al 2025 IOTC-2025-WPEB21(AS)-23 highlights that especially silky should directly be released in water, without being brought on board, and if so, should be promptly release within 5 min to maximize their survival chances. Limiting time on deck to less than 10 minutes had also resulted in high post release survival rates for all investigated shark species

Purse seine fisheries specific safe-handling practices

For all sharks (purse seine)

Releasing sharks from a purse seine net if entangled

- Scan the net as far ahead as possible to spot the sharks early to enable crew to prepare in advance and react quickly.[10] Avoid lifting them up in the net towards the power block. Allow the entangled animal to be removed from the net. If necessary, use clippers/knives to cut the net.
- The net area containing the entangled shark, should be lowered to the deck for release (rolled over the turntable and then the main boom should be moved to starboard or to port (depending on the vessel's orientation) and the net should be rolled back (or 'dropped') so that the shark is lowered to the deck and not thrashing in the air on a rolling vessel).
- Once the net has been dropped and the entangled shark is lowered to the deck the crew should safely cut the net away from the animal.

Releasing sharks if in the brailer or on deck:

- Prioritise the release of sharks that are visible on the top of the sack when starting the brailing process.
- When a larger number of sharks are in the brail, whenever possible return the brailer to the water (outside the net) to allow them to escape.
- Release the sharks as soon as they are detected, provided that safety protocols allow it and make efforts to reduce on board time of sharks to a minimum, (ideally less than 5 minutes). [11]
- The crew member should release the shark from the upper deck whenever possible, avoiding its entry into the lower deck, where the release process becomes longer and potentially more dangerous and complex in the absence of lower deck gutters. [12]

[10] Survival rates of sharks entangled in the net during haul back can still be higher than 80% (Poisson et al. 2014a; Hutchinson et al. 2015; Onandia et al. 2021) if the sharks are released early in the net hauling process and returned to the sea immediately.

[11] Effective bycatch separation methods and Bycatch Reduction Devices such as double conveyer belts or hoppers with a controlled door and a ramp extension (Murua et al. 2025a, 2025b; Onandia 2021; Poisson et al. 2014b) should be installed on board and mobile devices should be used on smaller vessels. Alternatively mobile devices that can be connected without the need of human handling of the animals such as suggested by Murua et al. (2025) could be used.
Hutchinson et al 2026. Handling and survival of silky sharks captured in class 4 and 5 purse seine vessels. https://www.iattc.org/GetAttachment/b7bf7a9f-8b5f-4fce-8938-c868ff93ddd3/EBWG-04_PRES_FAL-PRM-Hutchinson-et-al-EBWG4.pdf

[12] Best practice guidelines for manual handling of sharks can be found in the following documents: Poisson et al., 2012 (https://www.azti.es/atuneroscongeladores/wp-content/uploads/2017/05/MADE_Practices_to_reduce_shark_mortality_purse_seiners_EN.pdf)
Murua et al., 2025. New best handling and release practice guide for vulnerable bycatch tropical species in tropical tuna purse seiners (IOTC-2025-WPEB21(AS)-35)

- Ideally use release ramps attached to the hopper but if not, available sharks need to be handled manually for release.
- If sharks must be handled manually, ensure that sharks larger than 1 m are only handled with the support of a stretcher or harness for moving them across the vessel. Sharks should not be suspended by the tail.
- Use a purpose-built stretcher or similar device or ramp that connects the brailing area with the side of the vessel. If the vessel layout allows, these sharks could also be released by emptying the brail directly on a hopper and release ramp held up at an angle that connects to an opening on the top deck railing, minimizing the need for lifting and handling of sharks.
- In cases when sharks pass inadvertently through the loading hatch to the lower deck, sharks should be released as quickly as possible (e.g. via a bycatch waste chute, using stretchers or by hand for small sharks).

Do not

- Roll sharks through the power block.
- Use gaffs or hooks to manoeuvre sharks.
- Leave sharks abandoned on deck.
- Suspend sharks by the tail by hand or with cables or ropes.
- Drag sharks across the deck.
- Allow visible sharks to pass through the loading hatch

For whale sharks (Purse seine)

- Whale sharks should remain in the water when being released.
- Small whale sharks of less than 2 m, 'brailing' may be used to release the animal from the net without bringing it on board
- The release of whale sharks should be prioritized prior to brailing or when the shark surfaces.
- If a whale shark is encountered the net roll must be immediately stopped to release the whale shark
- If the head of the animal points to the stern of the boat, a crewmember should be available to open the net and/or cut a few meters of net in front of the shark's mouth to release it. The crew must locate the purse line closest to the animal's head and cut **a couple of fathoms** of net from where the purse line is attached, to make a window through which the animal can escape, lowering the net a little to place the window underwater.
- If the head of the animal points towards the bow of the boat, (the crew in charge of the net hauling operation could manoeuvre the winch and the capstan to bring the whale shark close to the hull, then stand the animal on the net to roll it outside the sack corkline). The crew must work from

the boat to submerge the cork line by manoeuvring the net or with the aid of weights or poles to enable the animal to get its head free above the cork line. If the individual does not swim out of the net by itself, a rope can be placed under the animal and attached to the float line to help rolling the animal out of the net

Do not

- Bring the animal on board of the vessel regardless of size.
- Start or continue to conduct the brailing process if the animal is visible from the surface.
- Attempt brailing sharks of more than 2 m for release
- Pull or tow a whale shark by the tail or caudal peduncle or by a loop hooked around its gills
- Leave towing ropes attached to the trunk of the animal
- Gaff whale sharks

Gillnet fisheries specific safe-handling practices

For all sharks (gillnets):

Existing recommendations for best handling and release of sharks that must not be retained and are unwanted is limited but should at least attempt to:

- Prioritize release of live non-retained sharks.
- Leave sharks in the water for gear removal.
- Carefully cut the net away from the animal, allowing it to swim away from the gear.
- Ensure the weight of the net below the entangled animal is supported during gear removal.
- Sharks tend to twist up in gill nets and often the cork or lead lines get wrapped several times around the animal. Determine the direction of roll and carefully untangle the shark whilst keeping it in the water as far as possible.
- Shark teeth often become entangled in gill nets mesh, this has to be pulled off or cut away with suitable long handle cutters, taking extreme care not to injure the shark or get bitten.

For whale sharks (gillnets)

General Principles:

- Prioritise crew safety at all times
- Release whale sharks (large animals) while they remain in the water
- Minimise handling time and entanglement

Do:

- Stop fishing operations, reduce the speed, where possible, stop the vessel, and assess the degree of entanglement and size of the whale shark before attempting release
- Fix the ladder placing it as close as possible to the point of entanglement and approach with caution.
- Carefully cut the net from around the animal while keeping safe distance (1m) to allow the shark to be free
- For partially entangled whale sharks, first attempt to loosen the tension on the net to maneuverer from the vessel before cutting large sections of the net
- Use safety knives or net cutters to cut the netting

Do Not:

- Remove any fins, or body parts,
- Lift or suspend the whale shark by tail, fins, gill or head
- Insert hands into the gill slits, or kick its body
- Drag whale sharks onto the deck or in water or over the gunwale.
- Use gaffs, hooks, and/or puncturing equipment
- Attempt release while putting crew safety at risk.

MOBULIDS

Note: handling guidelines for mobulids were adopted during WPEB and endorsed by SC in 2025. Small changes have been made to these guidelines since then.

BEST PRACTICE HANDLING AND LIVE RELEASE GUIDELINES FOR MOBULIDS

The primary aim of the following best practice Handling and Live Release Guidelines is to ensure the highest level of survival of incidentally caught and released mobulids and that, whenever possible, prompt, and effective action will be taken to return the mobulid promptly and alive to the sea, while prioritising the life and safety of persons on board (hereinafter referred to as "the crew") is not compromised and that crew members shall endeavour to avoid hazards in the safe handling and release operations for mobulid rays.

Safety first: *These best practices should be considered in light of safety and practicability for crew. Crew safety should always come first. Also minimising manual handling and using appropriate technical release devices instead is preferable to ensure safety of the crew and the animals at the same time.*

TOOLS REQUIRED for purse seine fisheries

- Mobulid sorting grid;
- Stretcher;
- Cargo net, canvas sling, or any similar device that can be attached to any lifting device, such as crane, available onboard;
- Large straps.

TOOLS REQUIRED for longline fisheries

- Long-handled line cutter

TOOLS FOR GILLNET FISHERIES

- Long-handled line cutter

General recommendations for all fisheries

Do:

- Mobulid rays shall be released **as soon as possible**. Reducing the release time is the principal factor in determining survival of the released individual – survival is drastically reduced after more than 3 minutes of handling outside of the water[13]

[13] Stewart et al 2024. This study found a significant negative effect of time spent on deck across all studied species, with very different estimated survival rates per species. The 3-minute rule is a critical time limit established by the authors to maximise the survival of accidentally caught mobulids. Within the 3-minute window, the combination of suffocation, physical trauma and intense stress triggers a rapid physiological decline from which mobulids rarely recover.

- Minimise direct contact with the skin of mobulid rays to prevent damage to their protective mucus layer and epidermis; handling should be avoided where possible and, if necessary, conducted with wet, non-abrasive materials.

Do not:

- Use gaffs, hooks, or ropes to move or lift mobulid rays.
- Lift, drag, carry or hold mobulid rays by the horns ("cephalic lobes"), tail, gill slits, mouth, eye or spiracle (opening behind the eye) even by hand.
- Drag by the wings but lifting by the wings by hand is allowed when no other option is available.
- Punch holes through the bodies of mobulid rays (e.g. to pass a cable through for lifting the mobulid ray).

Longline fisheries specific safe-handling and live-release practices

Do:

- If possible stop the vessel to safely remove gear and release large rays.
- Bring the ray alongside the vessel, if possible. Always leave the animal in the water.
- If the animal is not entangled and can be brought close to the boat, consider attaching a flyback prevention device to the branch line to reduce the risk of a lead (or hook) flyback accident.
- For animals that are hooked or have swallowed the hook, cut the line as close to the hook as possible leaving as little trailing line as possible, using a long-handled line cutter.
- For entangled animals, secure excess tangled line with the long-handled gaff/line cutter while another crew member uses a long-handled line cutter to remove as much tangled line as possible.

Do not:

- Use a gaff on the animal.

Purse seine fisheries specific safe-handling practices

Do:

- **Small and medium sized rays** should be released using stretchers to facilitate release or specific bycatch release devices (e.g. mobulids sorting grid), in cases when a stretcher is not available, manual release should include:

The medium predicted survival probability under optimal handling conditions was significantly higher than the observed ones for all species, highlighting the importance of formally adopting robust safe handling and release guidelines and protocols for these endangered species in tRFMO-managed fisheries, which can most rapidly reduce the unsustainable mortality they continue to suffer.

- 2 or 3 crew who carry the animal belly-down supported by the underside of the wings. The ray should be held far away from the tail to avoid contact with the barb (one mobulid species has a barb near the base of its tail).

- **Large and medium sized rays** should be, to the extent possible, directly released from the net using the brailer or directly from the brailer (see methods recommended in document IOTC-2012-WPEB08-INF07) or specific fauna release devices (e.g. mobulids sorting grid).
- If a release from the brailer or the net is not possible, it is recommended to either:
  - Release using a purpose-made mobulid sorting grid with a rigid frame that allows the animal to lie flat during release (see document IOTC-2025-WPEB21(AS)-INF08 for construction instructions). The grid can be placed over the unloading hatch or on the hopper. A crane or snatch block on the boom can be used to lift the grid and release the mobulid over the side of the vessel. Instructions for fabricating the grid can be found later in this document**.**
  - release using a cargo net, a canvas sling, large straps or a similar device lifted with the crane. Try not to allow the animal's wings to bend significantly.

Do not:

- If brought onboard, do not allow the ray to go through the loading chute to the lower deck.
- During manual release:
  - Do not lift the animal by the tail
  - Do not drag, carry or hold an animal by its cephalic lobes ("horns") or in its gill slits.
  - Do not expose the ray for long to air or sun.
  - Do not insert your hands in the mouth or gill slits to carry

Gillnet fisheries specific safe-handling practices

Do:

- For entangled animals, secure excess tangled area in the net with the long-handled gaff while other crew members remove the ray from the entangled areas of the net. The net cutter should be used to remove the animal from the tangled area of the net. Do not use the gaff on the animal.
- Where possible/practical release the animal before it reaches the hauling point
- Before the net is hauled onboard, maintain the animal in the water and use the body of the net to bring the ray alongside the side of the vessel, disentangle it by manoeuvring the net or using tools e.g. a long-handled line cutter and, if necessary, cut the net. Care should be taken to minimise stress and/or injury to the ray
- If it is not possible to disentangle the ray while keeping it in the water (such as in larger vessels where deck height doesn't allow it), carefully bring the ray on board, while ensuring that the ray may not pass above or through the net hauler and making every attempt to support the ray's

weight by at least two points (i.e., one point of contact being the midsection, the other being the bottom end of the body near the tail), or preferably have 2 or 3 people carry the ray by the sides of each wing. If feasible, use a crane/cargo net/grid/stretcher.

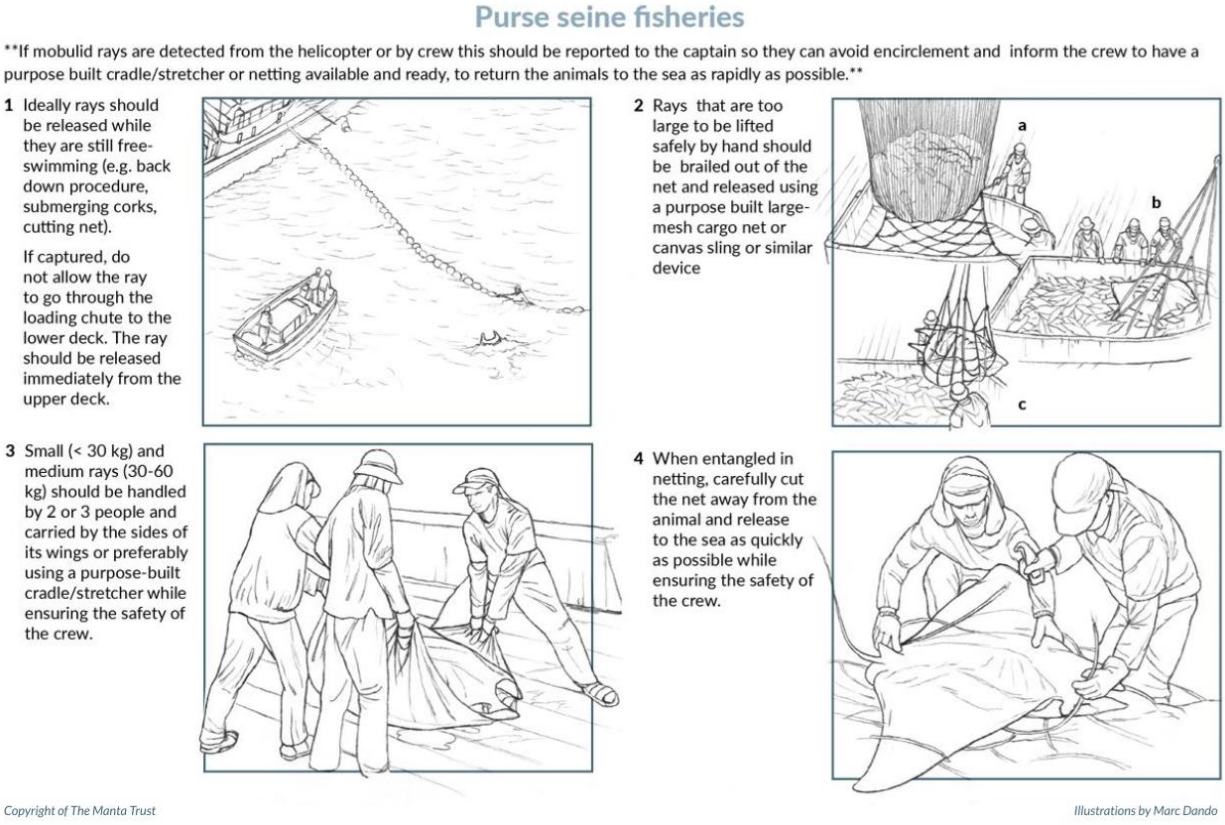
- Minimise the time that the ray spends onboard- ideally less than 3 minutes to increase chances of survival.
- Disentangle the ray from the net—if the ray is 'severely' entangled, you may have to cut some sections of the net (care should be taken to prevent injury to the animal while doing so). Try to minimise handling time and release it as soon as possible.

Do not:

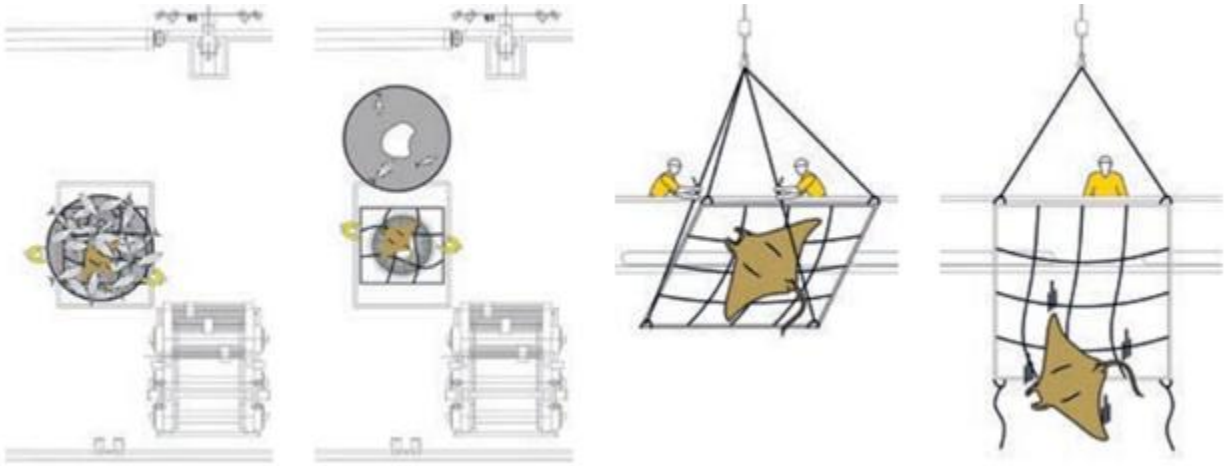
- Intentionally haul mobulids aboard.
- Let the mobulid pass through net hauling equipment such as line haulers, stern roller or drum rollers. Manual handling may be required to get close to the mobulid via a ladder.

Annex I – Illustrations

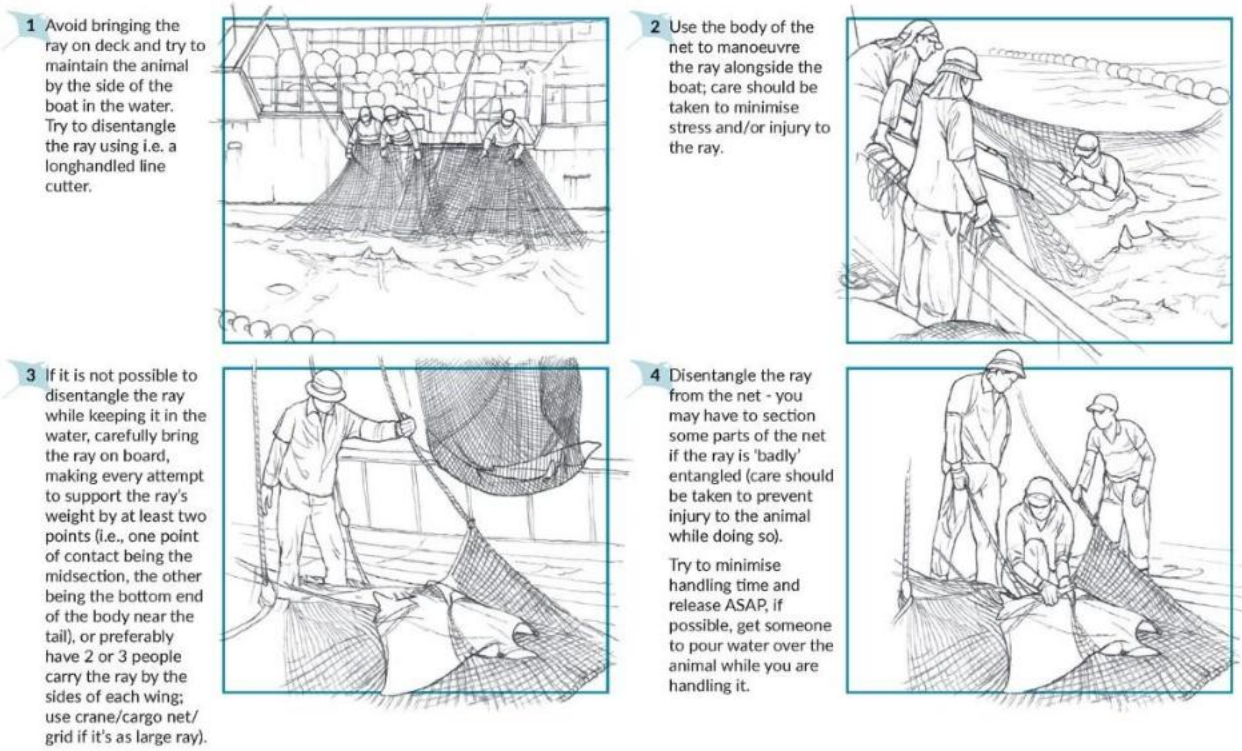
Purse seine



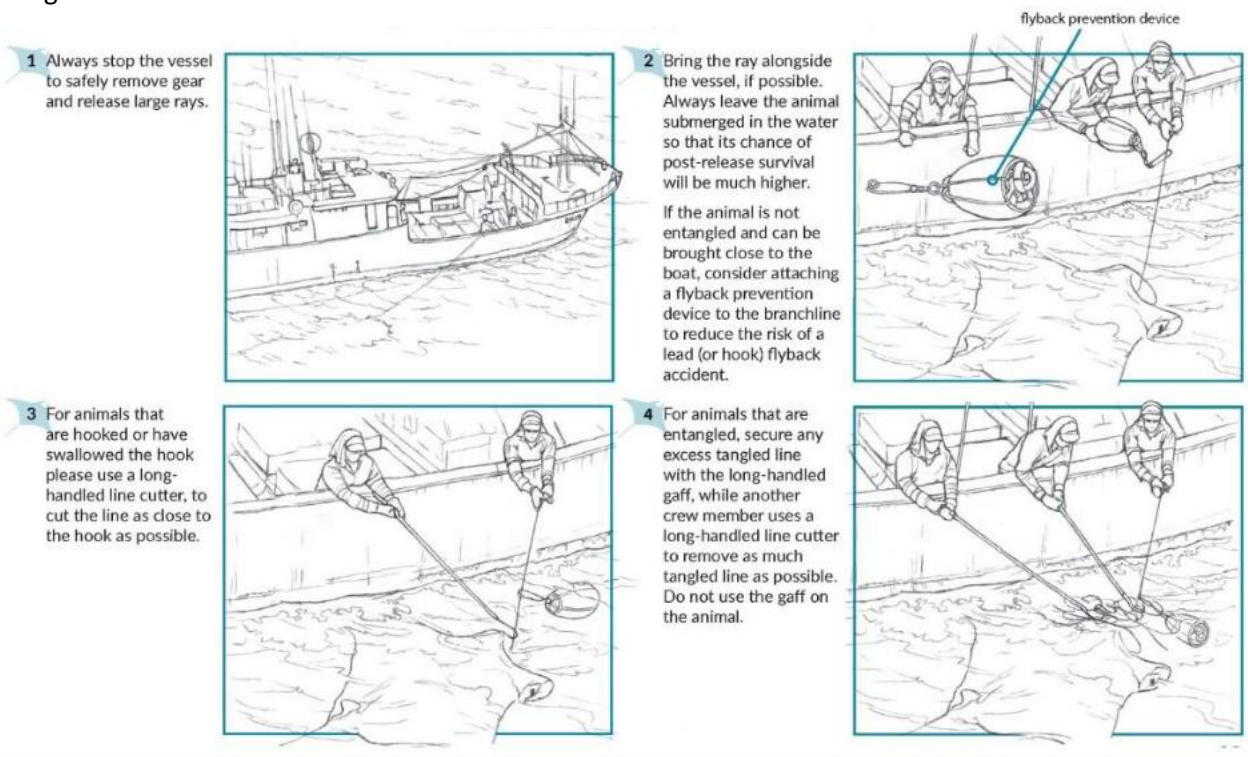
How to use mobulid sorting grids for the release of mobulid rays



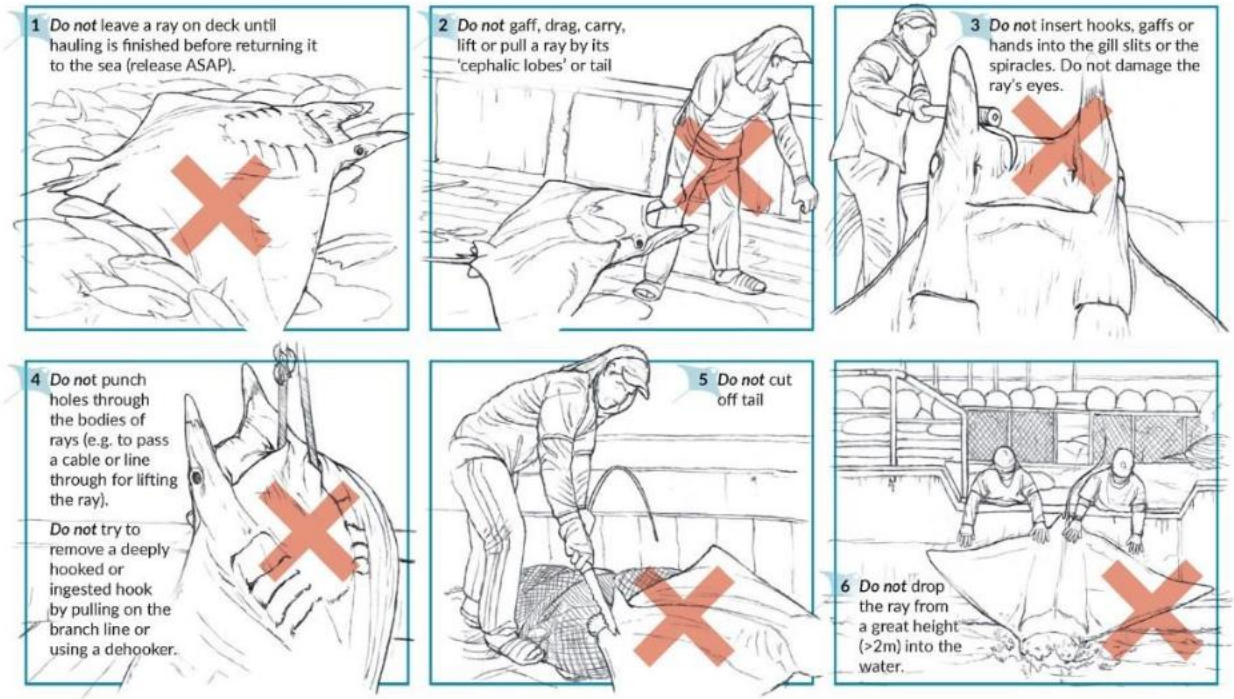
Gillnets


1 Avoid bringing the ray on deck and try to maintain the animal by the side of the boat in the water. Try to disentangle the ray using i.e. a longhandled line cutter.
2 Use the body of the net to manoeuvre the ray alongside the boat; care should be taken to minimise stress and/or injury to the ray.
3 If it is not possible to disentangle the ray while keeping it in the water, carefully bring the ray on board, making every attempt to support the ray's weight by at least two points (i.e., one point of contact being the midsection, the other being the bottom end of the body near the tail), or preferably have 2 or 3 people carry the ray by the sides of each wing; use crane/cargo net/ grid if it's as large ray).
4 Disentangle the ray from the net - you may have to section some parts of the net if the ray is 'badly' entangled (care should be taken to prevent injury to the animal while doing so).
Try to minimise handling time and release ASAP, if possible, get someone to pour water over the animal while you are handling it.

Longline and hook and line



What **not to do** – all gears



SEABIRDS

Useful tools for safe handling and release for all gears

- a long-handled dip net,
- line cutters,
- bolt cutters (LL),
- pliers (LL),
- clean towel or blanket,
- ventilated box or bin,
- safety gloves,
- eye protection (safety glasses),
- long sleeves,
- Other personal protective equipment (PPE) as appropriate.

General recommendations for all fisheries

Do

When handling a bird:

- If a small bird (e.g. diving petrel, prion), hold it one hand, with its back in the palm of the hand and the neck between index and middle fingers.
- If a medium bird (e.g. white-chinned petrel, shearwater), hold behind the head at the top of its neck with one hand and the other hand around the body/wings.
- If a large bird (e.g. albatross, giant petrel), hold the body and folded wings in your arms or crouch over the bird holding it securely in place between your legs without squeezing. Restrain the head by gently but firmly holding the bill in one hand – avoid covering the nostrils.
- Fold the feathers and wings back into their natural position against its body to prevent injury during handling and manoeuvring seabirds.
- Hold seabirds against your body near the waist to keep them safe and their beak away from your face to avoid injury.
- Cover the bird's body with a clean towel (without any sign of oil or petrol) to protect the bird's feathers from oils and other things that could damage it during handling.

To foster recovery:

- Remove all or as much entangling fishing gear as possible.
- A bird's feathers must be dry for it to fly properly. A ventilated cardboard box with a dry and clean towel or blanket placed in a quiet, sheltered area is a good place for the bird to rest and recuperate before being released.
- Do not give the bird food or water.

- If more than one seabird is being recuperated at a time before release, do not place different species in the same box, and do not overcrowd boxes. Ideally it should be one bird per box.[14]
- Make sure the bird does not come into contact with oil or grease on deck. Seabirds cannot fly if their wings become waterlogged (exacerbated by contact with oils).

To assess the bird's health, note that a fully recovered bird can:

- Stand on its feet (with the exception of albatrosses and petrels which tend to sit when healthy).
- Hold its head up.
- React to sound.
- Breathe without making noise.
- Retract its wings into a normal position against its body.

When releasing a bird:

- Stop or slow the vessel.
- Set the bird on the deck railing, facing against the prevailing wind direction and allow it to fly off.
- If it does not fly off on its own, set the bird on the water's surface: gently lower it over the side of the vessel, by hand if you can reach the water surface or with a net or a basket with ropes if you cannot.
- If the freeboard is high, release birds using small boats while they are in the water.
- Wait until the bird is clear of the vessel before reengaging the motor.

Do not:

When handling a bird:

- Accidentally restrict its breathing by covering its nostrils, completely closing the bill (in seabirds without nostrils) or squeezing the body too tightly.
- Restrict the bill or legs with tape, rope or bands.
- Lift or handle seabirds by the wings as this can break delicate bones or dislocate joints.
- Try to feed them or give them water during resuscitation.
- Throw a bird in the air to release it.

Longline fisheries specific safe-handling practices

Most seabirds are caught during line setting and are therefore dead by the time gear is hauled. However, if you discover a live seabird on the line:

Do:

Bringing the bird onboard:

- Release the tension on your mainline by slowing your vessel and the winch speed (if applicable) to a stop to reduce drag on the line.

[14] Small box (35x35 cm approx.): 3 small birds max. (e.g. storm petrels, diving petrels, prions), 1 medium bird max (e.g. white-chinned petrels, shearwaters, skuas), no large birds (e.g. albatross, giant petrels).

Med box (60x60 cm approx.): 6-8 small birds max, 3 med birds max, no large birds.

Large box (130*130 cm approx.): 1 large bird

- Ease the bird to the side of the vessel by steadily bringing in the line.
- Bring the seabird aboard carefully using a net to support its weight. For larger birds where it may not be possible to use a net lift the birds using the branchline to quickly lift them onboard.
- Follow the handling guidelines outlined above.

During hook removal:

- If the bird is lightly hooked in the bill, leg or wing, and you can see the barb of the hook, you should remove the excess line, cut off the barb with bolt cutters, and then back out the rest of the hook.
- Use pliers or bolt cutters to cut through the hook shaft and pull the hook out of the bird.
- If it is necessary to pull the hook through tissue to remove it: flatten the barbs with pliers or cut off barbs with bolt cutters.
- If the hook cannot be broken because it is large/wide, remove the line from the hook eye, and pull from the point of the hook, rather than the other way around.
- If the hook is swallowed and removal is possible: With one crew member holding the bird, another crew member can look for the hook and if they can find the hook position in the neck and it is possible, push the hook tip through the skin and remove it.
- If the bird is deeply hooked in the body or throat (that is, you cannot see the barb and so removal is not possible):
    - Cut the line as close to the hook as possible, leaving the hook in the bird. Removing a deeply embedded hook can cause more harm than good.
    - Untangle and cut away any line caught around the bird's wings, body or legs.

Do not:

- Do not make sudden jerks on the line while bringing the bird to the side of the vessel.
- Handle birds by wingtips as it can break the wing.
- Try to pull on the leader to remove a hook.
- Extract the hook backwards when it is deeply hooked.
- Do not try and pull or rip the hook out from inside the bird.

Purse seine fisheries specific safe-handling practices

For seabirds that have become entangled in the net

Do:

- Stop the net roll and allow the crew to disentangle the animal or cut the net away from the seabird.
- Follow the handling, recovery and release guidelines outlined above.

Do not:

- Allow the seabird to be rolled through the power block

Gillnet fisheries specific safe-handling practices

Do:

Bringing the bird onboard:

- Start pulling the net through net hauler to bring the entangled seabird closer to the boat.
- Start pulling the free end of the net with the help of a gaff from the gunwale to bring the seabird onboard.
- Bring the seabird onboard ensuring that the seabird is not subject to the weight of the net and the catch by supporting the weight of the fishing gear under the area where the seabird is entangled.

Follow the handling and recovery guidelines outlined above.

Do not:

- Handle the birds upside down by its neck or legs.
- Manoeuvre the mainline of the net strongly from the boat.
- Retrieve the entangled bird from the net hauler.
- Squeeze the bird while handling it.
- Disentangle/cut/manoeuvre the net/ropes from the bird without holding its neck, wings and legs (otherwise this could damage its organs).
- Cover the nostrils of the bird when a towel is placed over it.
- Shut the beak of the bird if it vomits (to avoid suffocation).
- Leave the animal on deck exposed to sunlight for a long time in open space.

SMALL CETACEANS

Note: The following guidelines are a condensed version of a document that was adopted during WPEB and endorsed by SC in 2024. They are based on a CMS-published document, with appropriate copyrights granted for illustrations which have been included here.

Note that these Guidelines are aimed at addressing handling and release of small cetaceans (dolphin and porpoise species) only.

These Guidelines are not aimed at addressing large whale disentanglement from fishing gear, which is typically more dangerous and operationally difficult. The International Whaling Commission's Global Large Whale Entanglement Response Network provides training and documentation for such instances (see https://iwc.int/ entanglement).

TOOLS RECOMMENDED for purse seine fisheries

- Cargo net, sorting grid, canvas sling, or any similar device that can be attached to any lifting device, such as crane, available onboard;
- Large straps.

TOOLS RECOMMENDED for longline fisheries

- Knives and pliers,
- line cutters - specialised cutter and poles would be ideal where these are available (e.g. goose-beak cutters where the opposing blades are on the inside of the curve, which look much like a half-shut pocketknife in shape. These cannot cut the animal and have blunt/soft leading edges to easily slide under the material without causing any further injury. Purpose built poles can be used to reach the animal from the main vessel or skiff, if it is impractical or unsafe to be close*)*.

TOOLS RECOMMENDED for gillnet fisheries

- Knives and pliers,
- Specialised cutters (e.g. goose-beak cutter) and poles,
- Ropes

TOOLS RECOMMENDED for all fisheries (when animal is brought onboard)

- Animal stretcher
- Deck hoses and buckets,
- Flat straps and ropes,
- Soft mats,
- Knives and pliers,
- Cloth bags, sheets and towels,
- Cranes or boom winches

GENERAL RECOMMENDATIONS FOR ALL FISHERIES

Do:

- Try to release the animal while it is still in the water

Do not:

- Delay the release of any entangled animals
- Bring the animal onboard if it can be released in the water
- Continue to haul the net when an animal has been entangled
- Use a gaff on the animal to bring it close to the vessel
- Lift, drag, carry or suspend the animal by its fins, flippers, fluke or tail
- Resume fishing operations until the animal has been safely released

General recommendations for all fisheries for small cetaceans brought on board

General points:

Cetaceans should be released from gear while still in the water, as bringing them on board will cause additional stress and potential injury. Bringing an animal on board will not be practical for small vessels and is obviously not possible with large cetaceans.

In some circumstances, a bycaught cetacean may be brought aboard the vessel unintentionally because it is not detected until the fishing gear is hauled alongside or onto the deck, particularly where the animal is heavily entangled or obscured within the gear. In other cases, temporary onboard handling may be necessary where in-water release is not operationally safe or practicable, such as adverse weather conditions, vessel characteristics (such as the size of the vessel, high freeboard among others), or limited access to the animal alongside the vessel.

If a bycaught small cetacean is brought onboard a fishing vessel, the following handling procedures should be followed for releasing the animal as soon as practicable, regardless of its condition, in a way that does not further compromise its welfare, nor the safety of the crew.

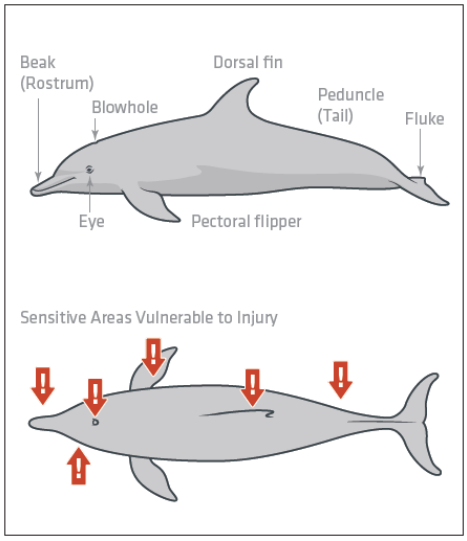
Do's:

- Release the animal as quickly as possible. Delays in releasing the animal may occur for practical reasons (e.g. the fishing operation cannot be stopped for safety reasons and is preventing access to a safe release point), or where the animal is too large or heavily entangled to be safely lifted or released until the fishing gear has been secured.
- Try to place the animal in a quiet shaded part of the deck away from noise, activity and fumes.
- While moving the animal, ensure that it is not twisted or caught in a way that stretches or twists its flippers or tail, or bends its jaw, thus causing further injury or stress. To achieve its most natural posture, it may be necessary to gently lift the animal just above the waterline, then lower into the water again (and repeat a few times) to ensure the animal comes to rest in the best possible position for the lift.
- Stay clear of the tail fluke and rostrum to avoid injury to crew.
- Use props, such as sandbags or rolled towels placed on either side of the animal, to gently hold it upright and in a 'natural' position.

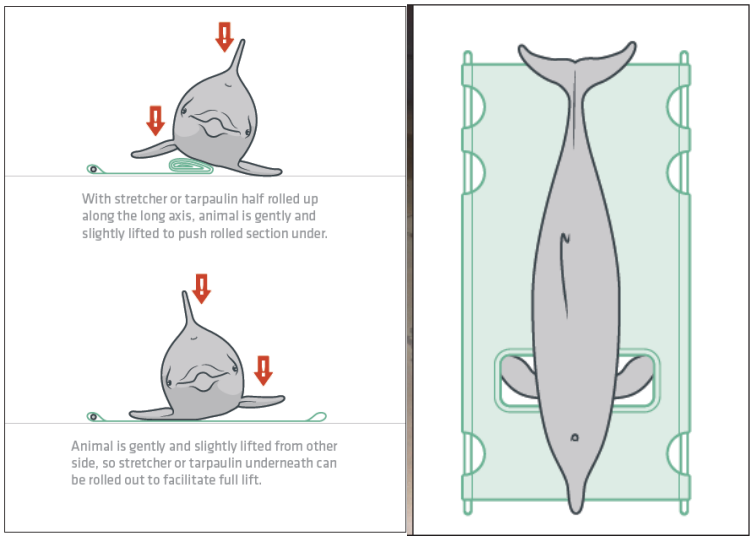
- Make all efforts to keep the animal in an upright position at all times, including when moving, or when returning to the water.
- Whenever possible, use lifting 'stretchers' (see illustration), which are safer for the animals and the crew.
- If immediate release is not possible and the animal must be held aboard the vessel for an extended period (e.g. for more than 10 minutes) the following measures should be followed:
    - Wet towels should be carefully placed over the animal to ensure they are kept moist, using water collected from overboard that is of ambient temperature.
    - Regularly and gently drizzle small amounts of ambient temperature water over the face and eyes, but not into or near the blowhole, to maintain eye hydration and overall condition.
    - If there is any doubt as to whether an animal is (freshly) dead or in an unresponsive state, it should be treated as live. Gentler, quieter and more thoughtful actions create a safer situation, for the small cetacean and for the crew members involved.
- To move an animal and release it back in the water, place it on a stretcher. Although net or tarpaulin can be used to make a makeshift stretcher, a purpose-built item will facilitate the most stable and safe lifts (See illustration below):
    - Half roll up the stretcher along its long axis, once the pole on that side has been removed from the sleeve and placed in a safe location.
    - Partially and gently roll the animal away, so the half-rolled stretcher can be placed underneath. Move to the other side, then partially and gently roll the animal in the other direction, so the portion of rolled up stretcher can be unrolled.
    - Replace the pole in the sleeve. Do not twist on or pull any of the appendages, as this may cause injury.
- Release the animal back into the water using one of the techniques set out below (also illustrated below) as is most appropriate in relation to the size and configuration of the vessel. In all cases try to ensure that the animal's weight is born by a stretcher or tarp for as long as possible, and that its drop into the water is as gentle and well-managed as practicable:
    - Where a sea door or other low access point is available, the animal should be supported in a stretcher and carefully lowered to the waterline before being gently released head first into the water
    - Where manual release is not possible, a crane or boom may be used to lower a stretcher or sling over the side of the vessel. The animal should be lowered until it is in contact with the water before being gently released.

Don'ts:

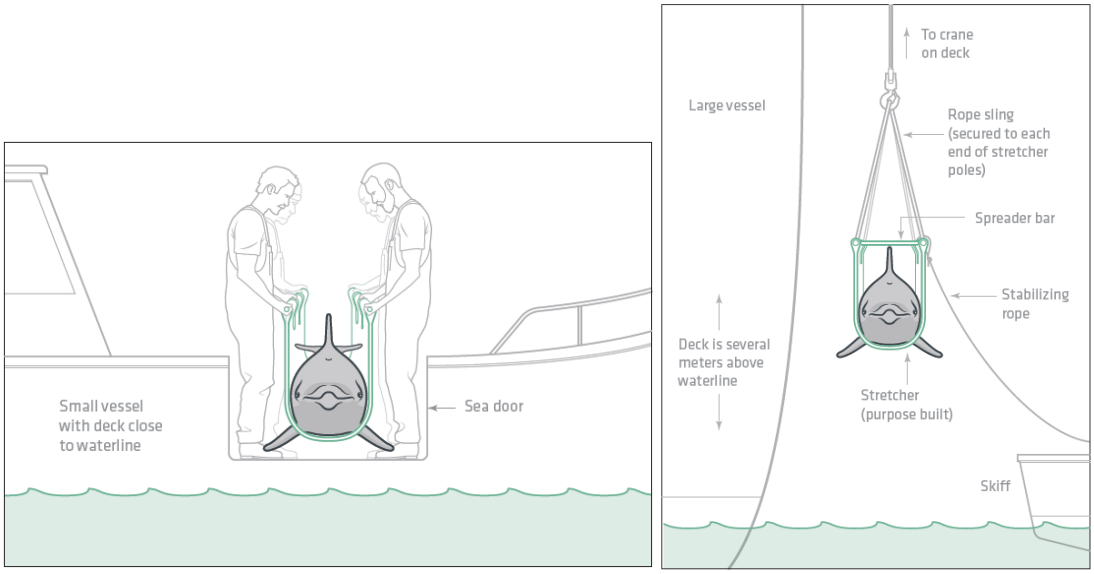
- Bring the animal onboard if this can be avoided.
- Do not lift, drag, carry or suspend a cetacean by its fins, flippers, flukes, tail, head, jaw, blowhole or any other body part. Always support the animal's body weight evenly using an appropriate stretcher, sling or cradle where onboard handling is unavoidable.
- Do not obstruct, cover or pour water into the blowhole, or place the animal where normal breathing is restricted.
- Do not expose the animal to unnecessary handling, excessive noise, direct sunlight or prolonged time out of the water.
- Do not use gaffs, hooks, ropes or other puncturing devices on live cetaceans.
- Do not attempt release if doing so would place the crew at unacceptable risk.
- Do not drag a cetacean across the deck or over the gunwale during handling or release.



Basic detail of a small cetacean, showing the anatomical features of interest (side view) and the delicate and fragile areas (plan view)



Placing the stretcher under a small cetacean.



Left: Returning the small cetacean to the water from a small vessel, with a deck close to the waterline. Right: Returning the small cetacean to the water from a large vessel, with a deck high above the waterline.

Longline or drop-line fisheries specific safe-handling practices (for small cetaceans)

Detection: In a longline or dropline vessel, the crew may be able to detect the blows/breath or splashes of a bycaught small cetacean visually from up to 1 nautical mile away if bycaught during the day. Animals that are exhausted/passive, or those bycaught at night are likely to be seen only when very close to the vessel or may be detected by a change in the nature of the pull on the line and the direction it comes from, plus the exhalation sounds as the animal surfaces and breathes near the boat.

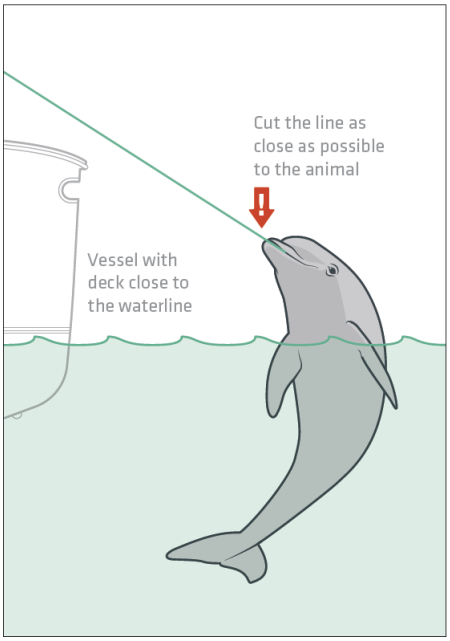
Do's:

- Immediately inform the skipper when a bycaught small cetacean is detected.
- Stop hauling the line immediately, as continuing could cause more injury and stress to the animal.

- Make all attempts to manoeuvre the vessel towards the animal, preventing vessel roll by keeping the bow into the swell.
- Cut the line using an appropriate implement, as close as possible to the animal. If needed, use a blade on an extended pole to reach the line and cut it. Only under extraordinary circumstances (only when necessary to ensure animal welfare and safe release and when completely safe to do so for the crew member) should any attempt be made to remove the hook.

Don'ts:

- Do not continue to haul or pull on the line.
- Do not use any kind of gaff or hook to manoeuvre the animal to bring it closer, as this will further injure it. A gaff can be used to help disentangle the lines but should not be used on the animal directly.
- Bring the animal onboard.



Releasing small cetacean from hook and line.

Purse seine fisheries specific safe-handling practices (for small cetaceans)

Detection: If cetaceans are detected visually, even if in the presence of tuna or tuna-like species, IOTC Resolution 23/06 prohibits the setting of a net around cetaceans. In the Indian Ocean intentional sets on dolphin associated tuna schools do not occur, and the encirclement of small cetaceans is extremely rare. Residual interactions principally involve large whales (baleen whales). These events are infrequent and non-intentional.

If a dolphin gate is installed on the net, the skiff/speedboat should be used to maintain the shape of the net (and prevent net folds from forming) and to shepherd encircled animals towards the exit point, although slow and careful manoeuvring is required to avoid further stress and injury to the animals and to ensure the safety of the operator.

- During release, crew members should keep watch to ensure:
  i. the seine net remains open and net folds do not form,
  ii. all animals observed encircled are accounted for during the release operation, and
  iii. speedboat operations remain safe for the operator and for the encircled animals.

Gillnet fisheries specific safe-handling practices (for small cetaceans)

Detection: In a gillnet, a small cetacean tangled is unlikely to be detected until hauling and until it is close to the vessel. If cetaceans are detected visually, even if in the presence of tuna or tuna-like species, IOTC Resolution 23/06 prohibits the setting of a net around cetaceans. Wait until cetaceans are no longer present or move on. Large cetaceans, especially baleen whales, will be detectable from a distance. The crew member closest to the net roller, or in a position where the net can be seen ahead of the net roller (before it comes aboard), should be on the lookout for small cetaceans tangled in the gillnet during the haul.

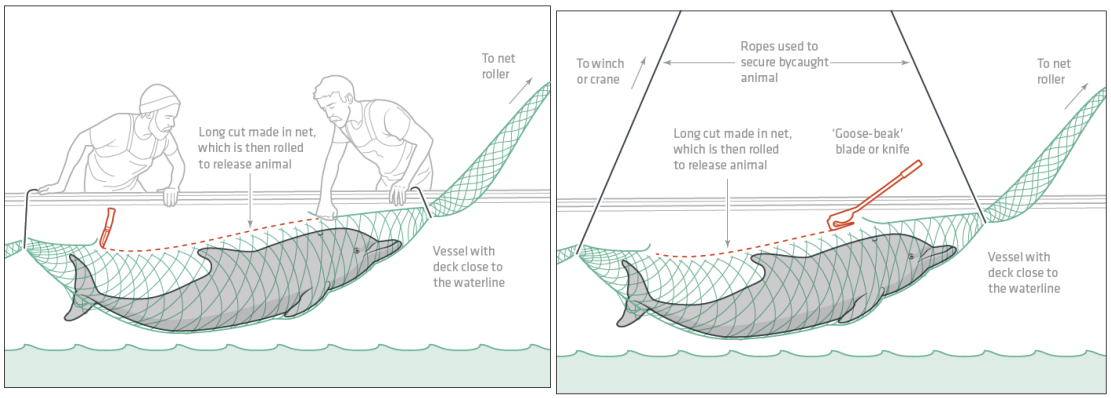
Do's:

- If a cetacean is detected, the skipper should be informed immediately.
- Hauling should be slowed to a minimum or ceased, and release procedures should commence immediately. The vessel should move towards the animal as quickly as possible to avoid stress and frantic movements from the animal itself.
- Ensure that any captured cetaceans are brought alongside, disentangled and released as quickly as practicable, recognizing that prolonged entanglement may increase the risk of mortality due to the inability of air-breathing marine mammals to surface and respire.
- The portion of net in which the animal is bycaught should be brought alongside, by carefully manoeuvring the vessel.
- Securing ropes should be placed around the net, one in front of and one behind the animal, so it can be gently lifted just above the waterline, either using available cranes or winches, or by hand if the animal is sufficiently small and there is available tie off points.
- The net should be cut carefully along the axis of the animal, so it can then be rolled outward away from the boat to facilitate its release and soft landing back into the water:
  a. From a small vessel with a deck close to the waterline, a small cutting tool like a knife can be used,
  b. From a larger vessel with a high deck, a specialised cutting implement on a long handle may be needed.
- If using the curved blade on an extension pole, take care not to injure the animal as the vessel is likely to roll in the swell.

Do not:

- Delay the release of any entangled animals
- Bring the animal onboard if it can be released in the water

- Continue to haul the net when an animal has been entangled
- Resume fishing operations until the animal has been safely released
- Use a gaff on the animal to bring it close to the vessel



Releasing small cetacean tangled in gillnet. a) From a small vessel with a deck close to the waterline where a small cutting tool, like a knife can be used. b) From a larger vessel with a high deck, where a specialised cutting implement on a long handle may be needed.

SEA TURTLES

Useful tools for safe handling and release

Longlines - Vessels with freeboard of 1 meter or less:

- Line clippers capable of cutting fishing line or leaders as close to the eye of an embedded hook as possible, and
- Wire or bolt cutters capable of cutting through any of the hooks on the vessel.
- Net, bucket or similar tool for releasing the sea turtle back into the water, minimize the number of attachments to the bucket where possible (these can cause a risk of entanglement).
- Safe platform or surface for the turtles during hook and line removal .

Longlines - Vessels with freeboard more than 1 meter:

- Long-handled line clipper capable of cutting fishing line or leaders as close to the mouth as possible.
- Long-handled rimmed net (equal or greater in length from the gunwale to the waterline).
- Long-handled dehooker (equal or greater in length from the gunwale to the waterline)
- Short-handled dehooker
- Pliers
- Wire or bolt cutters capable of cutting through any of the hooks on the vessel (only to be used if the turtle is brought onboard)
- Safe platform or surface for turtles during hook removal
- Towel / cloth
- Mouth openers and holding device (piece of wood, wooden brush handle, dog chew bones, rope loop

Purse seiners

- Rimmed net for lifting and lowering sea turtles to and from the small/speed/work boats;
- Brail or other device for lifting and lowering sea turtles to and from the purse seine vessel;
- Line clippers capable of cutting through any of the netting that may entangle a sea turtle;
- Safe platform or surface for the turtles during any disentanglement

Gillnets

- Rimmed net for lifting and lowering sea turtles to and from the small/speed/work boats;
- Line clippers capable of cutting through any of the netting that may entangle a sea turtle;
- Safe platform or surface for the turtles during any disentanglement

General recommendations for all fisheries

Do:

- Prioritise the release of live sea turtles immediately, and where practical leave the turtle in the water while removing and disentangling gear.

- If the animal is entangled, first attempt to disentangle and release it in the water whenever it is safe and feasible to do so. If this cannot be achieved safely or effectively, the animal should be brought onboard to facilitate disentanglement and release. Fully support the weight of the turtle's body – ideally by lifting it by the carapace (shell) with the hands above the head and tail (across the midline) or with a dip net. Never pull a turtle out of the water using fishing gear.
- Remove as much trailing gear as possible when they have been entangled or ingested a hook. If the animal is entangled, cut this off the animal carefully using a knife where possible when brought on deck. If the line is trailing out of the mouth or anus cut it short and keep it intact – do not pull the line.

Resuscitating a turtle

- For any sea turtle brought onboard, take the following actions:
  - Bring the animal onboard safely by supporting its weight manually on the carapace (across the midline) or by using a net.
  - For comatose or severely debilitated turtles, keep the animal inclined, with the head lower than the hindquarters to facilitate drainage. Maintain this position for as long as practicable during resuscitation. Use a tire or other suitable support to keep the turtle incline
  - Turtles that appear alive or active when captured should be released as soon as it is safe to do so after fishing gear has been removed.
  - Keep the turtle shaded and cover the carapace with a wet towel or cloth to keep the animal moist.
  - Attempt resuscitation for up to 24 hours and regularly check for consciousness/reflexes (gently touching the eyelids or the corner of the eye for blinking or check for tail movements. Sea turtles may take some time to revive, do not give up to early
  - Turtles that fail to revive must also be returned to the sea in the same manner as if they were alive.

Releasing a sea turtle

- Place the vessel engine in neutral gear so that the propeller is disengaged, and the vessel is stopped if possible or slowed if this is the only possibility.
- Release the sea turtle away from any deployed fishing gear, at a location on the vessel closest to the water line and head first.
- Place the animal on the water surface (where possible)
- Ensure the turtle is safely away from the vessel before engaging the propeller and continuing operations.

Do not:

- Lift, manoeuvre or handle turtles by their flippers (they are fragile so this can cause injury), head, tail or the sides of the carapace (hold it in the midline only, taking care to only hold the shell in case it retracts its head).
- Never place turtles upside down on deck
  Leave turtles on the deck in the sun – they must be kept shaded

Longline / hook & line fisheries specific safe-handling and live-release practices

Do:

When a sea turtle is seen entangled in fishing gear or hooked on a line

- Slow the vessel as much as possible and slow the hauling of the gear.
- Minimize tension on the line the turtle is captured on.
- Slowly manoeuvre the vessel towards the animal. Put the vessel in neutral once the sea turtle is brought alongside.
- Entangled turtles must not be passed through net or line hauler.
- If all fishing gear is going to be removed, determine whether or not the animal can safely be brought onboard. Ideally hooked sea turtles will be brought onboard to remove all fishing gear.
    - A sea turtle can 'safely' be brought on board either by using a net or other approved lifting device to support its weight.
    - If the animal is too large, always support its weight by manually lifting/ supporting the turtle by the carapace (shell)
    - If a sea turtle is too large or is externally hooked in such a manner as to preclude safe boarding without causing further damage/injury to the turtle, leave the sea turtle in the water for gear removal.
    - If sea turtles are not hooked but are entangled, cut all gear away from the animal.

For turtles brought onboard

- Ensure that the line is cut as close to the mouth as possible (do not attempt to remove an internal hook)[15]
- Remove any trailing gear
- If the hook is visible in the mouth only and can be removed without tearing tissue (not to embedded or not in the throat):
    - If the hook's point and barb are visible, use bolt cutters to cut the point of the hook and remove the hook. If the hook point cannot be cut, depress the barb prior to backing the hook out. Or use a dehooker or pliers to back the hook out of the mouth.
    - If the hook cannot be removed, cut all trailing gear off the hook and cut any portion of the hook that can be cut off and removed from the animal.
- If the hook is not in the mouth, do not attempt to remove it and instead cut the line as close to the mouth as possible.
- Return the animal to the sea as soon as possible following resuscitation and handling guidelines
- If hooks are too deeply embedded in the tongue, glottis or hooks which the insertion point cannot be identified, they should not be removed. In these situations, or in any doubt, cut the line as close as possible as the hook/turtle and all accessible trailing line.

For turtles that cannot safely be brought onboard and must remain in the water

[15] Parga 2012; Barria and Valerio in press; Andraka and Parga pers. comm from IATTC's sea turtle handling guidelines

- The primary focus should be to cut the line as close to the hook or mouth as possible. Cut any entangling material as much as possible and the line as close to the animal as possible.

Do not:

- Haul animals onboard using the line they are hooked on or entangled in.
- Haul animals onboard using their head, tail, flippers or flippers.
- Bring the animal on board if the animal is too big for the biggest available dip net.
- Allow the animal to be passed through the net or line hauler
- Attempt to de-hook if the animal cannot be brought onboard.
- Attempt to remove the hook unless it is externally hooked (example: flipper) or visible in the mouth.
- Release turtles with trailing fishing line still attached, unless it has been cut as short as possible, ideally leaving no more than 10cm.

Purse seine fisheries specific safe-handling and live-release practices

Do:

For turtles found entangled in a FAD

- Carefully cut any entangling gear, netting or other fishing gear off the animal and carefully return it to the sea
- Support the weight of the animal from the carapace (along the midline)

For sea turtles sighted in the net

- Take all reasonable efforts to facilitate the rescue and release of an encircled turtle prior to them becoming entangled in the net and to sacking up (including using small boats if necessary). Release the animal directly from the net.

- Do not actively chase a free-swimming turtle that is clearly evading the net

For turtles entangled in the net during haul back

- If it is entangled during net roll, the net should be hauled over the turntable to a height of about 2m, and the net should be rolled back so the crew can release the turtle from the netting as soon as possible

For turtles brought onboard via brailing

- Ensure that turtles are sorted from the catch on the main/working deck.
    - Follow general guidelines for handling turtles onboard.

Do not:

- Allow turtles to be rolled through the power block
- Re-start net rolling until a turtle has been disentangled and removed from the net
- Allow turtles to go down to the lower deck/wells
- Re-start brailing until a turtle has been released from a brail (does not apply to does in resuscitation situation)

Gillnet fisheries specific safe-handling and live-release practices

Do:

When a turtle is encountered in the net

- Once an entanglement is observed, efforts should be made instantly to release the turtle and the following should be undertaken
- Prioritise the release of live sea turtles immediately, and where practical leave the turtle in the water while removing and disentangling gear (ensuring that the head is above water, so the turtle is able to breathe during this process).
- Stop the hauling operation and determine the degree of entanglement, the turtle's position in the net and the size of the individual.
- The net should be manoeuvred alongside the vessel to ensure the entangled turtle is released without harm.
- Cut the part of the net holding or entangling the turtle using a knife, or cutter, in addition to removing as much gear as possible
    - If the animal is alive and partially entangled, lessening the tension on the rope and net may allow the animal to disentangle itself.
    - If this does not work, determine whether or not the animal can be brought onboard safely.

When a turtle is too large and cannot be hauled on board safely

- Cut the fishing gear/ropes from the mid-part of the turtle towards its head. Make sure the flippers of the turtle are also free from the fishing net/ropes.
- Support the weight of the net and the catch below the turtle during disentanglement and gear removal.
- Cut the fishing gear/lines from the turtle working from the mid-part of the shell towards its head.
- Make sure the flippers are also free from the fishing net/ropes.
- Leave as much of the net and lines intact as possible and avoid cutting in a manner where the turtle may be prematurely freed with gear still remaining on it.

When a turtle can be hauled on board safely

- Manually haul the sea turtle and fishing net onto the boat carefully. Make sure the turtle is not heaved through the net hauler.
- Where onboard handling is unavoidable, lift the turtle by the carapace (on the midline) using both hands or with the help of another crew member, a stretcher, sling or support that evenly distributes the weight.
- If juveniles or sub-adults are caught, and in situations where the vessel has a high freeboard, release using a bucket or any other form of lowering equipment to safely release the turtles without causing any harm or damage.
- Disentangle the sea turtle by cutting net/line working from the mid-part of the shell moving towards the head of sea turtle.
- Return the animal to the sea as soon as possible following the resuscitation and release guidelines

Do not:

- Allow turtle to reach the mechanical net hauler.
- Suspend the turtle in the net for a long time.
- Lift the turtle from the hauling point i.e. the net drum.

- Use gaffs, or other sharp equipment.
- Leave the turtle in the net for a long period of time.

REFERENCES

Grande, et al. 2022. Assessment on accidentally captured silky shark post-release survival in the Indian Ocean tuna purse seine fishery. *IOTC-3rd Ad Hoc Working Group on FADs. IOTC-2022-WGFAD03-09, Online*.

Hutchinson et al. 2015. Assessing shark bycatch condition and the effects of discard practices in the Hawaii- permitted tuna longline fishery. WCPFC-SC12-2016/ EB-WP-07

Hutchinson et al 2026. Handling and survival of silky sharks captured in class 4 and 5 purse seine vessels. https://www.iattc.org/GetAttachment/b7bf7a9f-8b5f-4fce-8938-c868ff93ddd3/EBWG-04_PRES_FAL-PRM-Hutchinson-et-al-EBWG4.pdf

Lopetegui-Eguren L., Grande M., Murua J., Cuevas N., Salgado A., Erauskin-Extramiana M., Onandia I., Mugerza A., Horrach L., Ruiz J., Murua H., and Arrizabalaga H 2026. Post-release survival of silky sharks in tropical tuna purse seine fisheries under best handling practices: insights from tagging and predictive modelling. IOTC-2026-WPEB22(AS)-36

Murua et al. 2025a; Codeveloping on deck conservation technology with tropical tuna purse seine fishers to mitigate elasmobranch bycatch, *ICES Journal of Marine Science*, Volume 82, Issue 5, May 2025, fsaf057, https://doi.org/10.1093/icesjms/fsaf057

Murua et al. (2025b). New best handling and release practice guide for vulnerable bycatch tropical species in tropical tuna purse seiners (IOTC-2025-WPEB21(AS)-35)

Onandia et al. 2021. New assessment on accidentally captured silky shark post-release survival in the Indian Ocean tuna purse seine fishery." *IOTC-17th Working Party on Ecosystems & Bycatch (Data Prep). IOTC-2021-WPEB17 (DP)-13_Rev1* (2021).

Parga, M.L. 2012. Hooks and sea turtles: A veterinary's perspective. Bulletin of Marine Science 88(2): 731-741. http://dx.doi.org/10.5343/bms.2011.1063.

Poisson et al., 2012. Good practices to reduce the mortality of sharks and rays caught incidentally by tropical tuna purse seiners. https://www.azti.es/atuneroscongeladores/wp-content/uploads/2017/05/MADE_Practices_to_reduce_shark_mortality_purse_seiners_EN.pdf

Poisson et al. 2014. Good practices to reduce the mortality of sharks and rays caught incidentally by tropical tuna purse seiners

Sabarros et al 2025 Post-release mortality of pelagic sharks caught by longliners – POREMO and ASUR projects. IOTC-2025-WPEB21(AS)-23

Stewart et al 2024. Get them off the deck: Straightforward interventions increase post-release survival rates of manta and devil rays in tuna purse seine fisheries. https://research.mantatrust.org/stewart-et-al-2024

OTHER GUIDELINES TO CONSIDER

Other guidelines that have been presented to WPEB

Gillnets – all taxa (including seabirds):

https://iotc.org/documents/guidelines-safe-handling-and-release-etp-species-gillnet-fisheries

Purse seiners (Orthongel, 2012):

https://www.orthongel.fr/docs/publications/GoodpracticesGuide_LDef.pdf

Updates on above: https://iotc.org/sites/default/files/documents/2022/08/IOTC-2022-WPEB18-23_-_best_practices_PS.pdf

Purse seiners (AZTI, 2025):

https://iotc.org/sites/default/files/documents/2025/08/IOTC_2025_WPEB21_AS_35_-_PS_best_practices.pdf

All gears, sharks only (IATTC, 2024): https://iotc.org/sites/default/files/documents/2024/08/IOTC-2024-WPEB20AS-INF03_-_IATTC_handling_release_guidelines.pdf

Other available guidelines:

IATTC Seabirds: https://iattc.org/GetAttachment/50881315-0d41-413f-b269-4fbcc7ad253c/WGEB-03-06_Seabird-Best-Handling-and-Release-Practice-Guidelines.pdf

IATTC turtles: https://www.iattc.org/GetAttachment/6ac0f970-94c4-4afe-9c35-fed95e8070cf/EB-04-04_BHRP-guidelines-for-sea-turtles-EN.pdf

IATTC sharks: https://www.iattc.org/getattachment/7e9112a9-d350-4c26-9b45-56363aa21e42/SAC-17-08_Shark-BHRP-guidelines-EN.pdf

ICCAT Rec 21-09 and 25-08 shortfin mako sharks https://www.iccat.int/Documents/Recs/compendiopdf-e/2025-08-e.pdf

ISSF Purse seine skippers guidebook 2025: https://www.issfguidebooks.org/issf-documents/purse-seine-skippers-guidebook-2025-english/

ISSF Longline skippers guidebook 2026: https://www.issfguidebooks.org/issf-documents/longline-skippers-guidebook-english/

CMS Guidelines for the safe and humane handling and release of bycaught small cetaceans from fishing gear: https://www.cms.int/sites/default/files/publication/TS43_Safe_Handling_Release_Guidelines.pdf

ACAP Hook Removal from Seabirds Guide: https://www.acap.aq/resources/bycatch-mitigation/hook-removal-guide

ACAP Avian Flu Alert Poster for Fishing Vessels: https://www.acap.aq/resources/disease-threats/avian-flu/avian-flu-alert-poster-for-fishing-vessels

APPENDIX XVVIII
LIST OF RECOMMENDATIONS FROM THE WPEB22

Note: Appendix references refer to the Report of the 22nd Session of the Working Party on Ecosystems and Bycatch (IOTC–2026–WPEB22(AS)–R)

6.2 Presentation of new information available on sharks

WPEB22(AS).01 (para. 89) The WPEB **NOTED** that the discussion on the status of the whale shark remains broadly similar to the discussion on the same subject of the previous year. The WPEB **DISCUSSED** the practical implications of the provisions of IOTC Resolution 25/08 regarding whale shark conservation, including the retention ban. The WPEB **NOTED** that the adoption of the retention ban is linked to an explicit recommendation from the Scientific Committee. The WPEB **RECOMMENDED** to present this to the Scientific Committee, **AGREEING** that it should explicitly state that a retention ban for whale shark is recommended.

WPEB22(AS).02 (para. 90) The WPEB **NOTED** that available information indicates that whale shark interactions occur in IOTC fisheries, the WPEB **AGREED** that there remains considerable uncertainty as to the magnitude of interactions between IOTC fisheries and whale shark, and that whale sharks are also exposed to other sources of anthropogenic mortality. The WPEB further **RECALLED** IOTC Resolution 12/01 on the Precautionary Principle, and **NOTED** that, in spite of this uncertainty, a full retention ban could still have significant conservation value, given the declining trend in the status of the Indo-Pacific whale shark population, and the high post-release survival rates. The WPEB therefore also **RECOMMENDED** that a retention ban for whale sharks is the most appropriate conservation measure for the species (paragraph 3 of 25/08).

WPEB22(AS).03 (para. 92) The WPEB **NOTED** that Resolution 25/08 currently only permits sampling from animals that are dead at haulback. The WPEB therefore **RECOMMENDED** that the SC advise the Commission to amend the Resolution to clarify that the collection of biological samples from live sharks may also be undertaken for scientific purposes, without constituting a retention of the animal, provided that sampling is undertaken without the animal being removed from the water and in accordance with scientific protocols approved or endorsed by the IOTC Scientific Committee. The WPEB **STRESSED** that the proposed amendment is intended to allow for ongoing research in support of population status monitoring and ensuring that the WPEB can update its advice to the IOTC Scientific Committee, with respect to shark species conservation status in future, as it considers appropriate.

WPEB22(AS).04 (para. 107) The WPEB **NOTED** the threatened conservation status of hammerhead sharks (*Sphyrnidae*) and the limited availability of species-specific biological and fisheries information for hammerhead sharks in the IOTC Area of Competence. The WPEB therefore **RECOMMENDED** that the SC advise the Commission to consider implementing management measures for these species.

WPEB22(AS).05 (para. 113-114) **NOTING** that Resolution 15/01 includes a list of species for which reporting catch data is mandatory or optional, and varies by gear and by fishery type (i.e. artisanal vs commercial fisheries), the WPEB **NOTED** that many species of interest to the WPEB are not mandatory for reporting for all gears or fishery types. This recommendation was made in 2025, and is **RECOMMENDED** again in 2026.

The WPEB therefore **RECOMMENDED** that the SC review the list of species that are mandatory for reporting to species level while considering the feasibility of such data collection in artisanal fisheries, and included the following suggested changes:

- Silky sharks to be added also for gillnet fisheries

- Hammerhead sharks to be reported at species level at least for scalloped, smooth and great hammerhead sharks for all gear types (explicitly including purse seine fisheries)
- Mantas and devil rays to be reported at species level differentiating at least between manta rays (giant manta and reef manta) and other devil rays adding them for mandatory reporting at least for purse seine fisheries and for gillnet fisheries instead of optional
- Great white sharks as mandatory for all gear types
- Oceanic whitetip sharks as mandatory for all gear types

WPEB22(AS).06 (para. 155) The WPEB **NOTED** that the list of species for which executive summaries are developed has traditionally been provided by the Commission and **RECOMMENDED** that the SC provide guidance on whether additional species could be added directly through the Working Party. The WPEB **AGREED** that consideration should also be given to identifying additional species for which further work could be undertaken, taking into account the potential value and feasibility of additional species-specific actions.

7.2 Review of indicators

WPEB22(AS).07 (para. 173) The WPEB **AGREED** that the work provides useful findings on the status of those data-limited shark species in the Indian Ocean, and that the approach should be continued, further explored and expanded to additional species where possible. The WPEB further **RECOMMENDED** that the SC support studies to improve region-specific life-history information on pelagic sharks, strengthen size-composition sampling and reporting to IOTC, and improve the quantification of discard rates and post-release mortality, so that a more complete estimate of fishing mortality can be achieved.

7.5 Update on MSE for blue shark

WPEB22(AS).08 (para. 195) **NOTING** that blue sharks are often taken as bycatch and/or as the secondary target and that the management procedure for blue sharks should take into account the impacts to the operations and catch of target species, the WPEB **RECOMMENDED** the SC include other WPs including WPB, WPTmT and WPM in review process of the development of blue shark MSE.

9.2 All bycatch species (all)

WPEB22(AS).09 (para. 257) The WPEB **RECOMMENDED** that the SC **ENDORSE** this best practice handling and release document (found in Appendix XVVII) for consideration by the Commission with the understanding that the master document would be reviewed and updated by the WPEB based on new information. The WPEB further **NOTED** that guidelines should ensure sufficient flexibility to accommodate different fisheries and operational contexts.

7.6 Revision of the WPEB Program of Work 2027-2031

WPEB22(AS).10 (para. 320) The WPEB **RECOMMENDED** that the SC consider and endorse the WPEB Program of Work (2027–2031), as provided in Appendix XVIV.

11.3 Review of the draft, and adoption of the Report of the 22nd Session of the WPEB

WPEB22(AS).11 (para. 326) The WPEB **RECOMMENDED** that the Scientific Committee consider the consolidated set of recommendations arising from WPEB22, provided at Appendix XVVIII, as well as the management advice provided in the draft resource stock status summary for each of the eight shark species, as well of those for marine turtles, seabirds, cetaceans and mobulids:

Sharks

- Blue shark (*Prionace glauca*) – Appendix VII
- Oceanic whitetip shark (*Carcharhinus longimanus*) – Appendix VIII
- Scalloped hammerhead shark (*Sphyrna lewini*) – Appendix IX
- Shortfin mako shark (*Isurus oxyrinchus*) – Appendix X

- Silky shark (*Carcharhinus falciformis*) – Appendix XI
- Bigeye thresher shark (*Alopias superciliosus*) – Appendix XII
- Pelagic thresher shark (*Alopias pelagicus*) – Appendix XIII
- Porbeagle shark (*Lamna nasus*) - Appendix XIV

Other species/groups

- Marine turtles – Appendix XV
- Seabirds – Appendix XVI
- Marine mammals – Appendix XVII
- Mobulids – Appendix XVIV