



**Government of the Republic of Maldives**

Ministry of Fisheries, Marine Resources and Agriculture

Velaanaage, 7<sup>th</sup> Floor, Ameer Ahmed Magu

Malé - 20096, Republic of Maldives

**MALDIVES NATIONAL REPORT  
TO THE SCIENTIFIC COMMITTEE OF THE INDIAN OCEAN  
TUNA COMMISSION, 2023**

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Republic of Maldives

# Maldives National Report to the Scientific Committee of the Indian Ocean Tuna Commission, 2023

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## INFORMATION ON FISHERIES, RESEARCH AND STATISTICS

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|
| <p>In accordance with IOTC Resolution 15/02, final scientific data for the previous year was provided to the IOTC Secretariat by 30 June of the current year, <b>for all fleets other than longline</b> [e.g. for a National Report submitted to the IOTC Secretariat in 2020, final data for the 2019 calendar year must be provided to the Secretariat by 30 June 2023)</p>                                                                                                                                                                                                                                                                               | <p>Yes<br/>29<sup>th</sup> June 2023</p>                     |
| <p>In accordance with IOTC Resolution 15/02, provisional <b>longline data</b> for the previous year was provided to the IOTC Secretariat by 30 June of the current year [e.g. for a National Report submitted to the IOTC Secretariat in 2020, preliminary data for the 2019 calendar year was provided to the IOTC Secretariat by 30 June 2023).</p> <p><b>REMINDER:</b> Final longline data for the previous year is due to the IOTC Secretariat by 30 Dec of the current year [e.g. for a National Report submitted to the IOTC Secretariat in 2023, final data for the 2022 calendar year must be provided to the Secretariat by 30 December 2023).</p> | <p>NA<br/>Maldives did not have longline fishing in 2022</p> |
| <p>If no, please indicate the reason(s) and intended actions:</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                              |

## **Executive Summary**

Maldives is a tuna fishing nation with a history dating back hundreds of years. Pole and line and handlines are the primary gears employed by Maldivian fishers to target catch skipjack (*Katsuwonus pelamis*), yellowfin (*Thunnus albacares*), frigate (*Auxis thazard*) and kawakawa (*Euthynnus affinis*). Total tuna catch has increased from a little over 30,000 tons in 1970 to 154,743 tons in 2022. Skipjack and yellowfin tuna are the most important species with 99% skipjack being landed by of pole and line. Yellowfin tuna catch from the pole and line fishery represent 32% of all yellowfin tuna caught in 2022 with the remaining being landed by the handline fishery. The tuna fleet operates entirely within the Maldives EEZ, with the exception of the longline fleet during its operation prior to 2019. In 2022, the tuna fleet consisted of 736 vessels with the majority of the vessels being in the 12.5 to 32.5 length range. Maldives fishery data collection employs various tools such as logbooks, electronic reporting, real-time web enabled databases, vessel monitoring systems and Electronic Monitoring Systems (EMS).

## 1. Background / General Fishery Information

Maldives is a tuna fishing nation with a history dating back hundreds of years. Tuna fishery was the mainstay of the Maldivian economy, providing employment and income, until the establishment of the tourism industry. Tuna fishery is still the most important source of employment and income for a substantial proportion of the population. Tunas are the main source of protein for Maldivians and remain the single most important export commodity from the Maldives earning a substantial proportion of foreign income from fishery exports.

The Maldives enacted a new fisheries act (14/2019) on 15<sup>th</sup> September 2019. This Act supersedes the Fisheries Act of 1987 (5/87). The Act is structured as a framework law, in that it covers the various multidisciplinary aspects of the sector and serve as the legislative backbone for the sector while leaving the more detailed codification to the regulations and management plans made pursuant to the Act. The Act requires development and implementation of management plans for all commercial fisheries including those on tunas and tuna-like species. All the management plans required by the Act have been gazetted.

The Act applies to all Maldivian fishing vessels and foreign fishing and fishing related vessels entering the maritime zones of the Maldives and vessels flagged to the Maldives operating beyond the maritime zones of the Maldives, if any. It also applies to all fishing and fishing related activities of such vessels and Maldivian and foreign nationals on these vessels.

The tuna fishing fleets of the Maldives operate exclusively within the EEZ of the Maldives. However, operations of the longline fleet were not restricted and did operate on the high seas, until its suspension in 2019.

The most important component of the Maldivian tuna fishery is the pole-and-line fishery. The fishery targets, in the order of importance, skipjack tuna (*Katsuwonus pelamis*), yellowfin tuna (*Thunnus albacares*), frigate tuna (*Auxis thazard*) and kawakawa (*Euthynnus affinis*). While the majority of trips are restricted to coastal areas, within about 100 miles from shore, modern vessels have the capacity to venture further. To assist the fishers, the Maldives government maintains a network of 80 Anchored Fish Aggregating Devices (AFADs) located approximately 12-20 miles from the coast. Some of these AFADs are deployed for sports fishermen for fishing reef and other associated species. The majority of these AFADs are restricted to the pole-and-line fleet. The AFADs are deployed and maintained exclusively by the Government of Maldives. Pole and line fishing trips generally last 1-2 days, however, with the advancement of the vessels and ability to stay at sea longer, fishing trips have mostly become multi-day operations, especially during times of low bait and tuna fishing.

The second most important component of the tuna fishery is the multi-day handline fishery, targeting large yellowfin tuna (>70 cm FL) from the surface (<10m deep) (Adam and Jauharee, 2009, Adam et al., 2015, Ahusan et al., 2016). The export oriented commercial fishery is a relatively recent fishery that began around late 90's or early 2000. Prior to this, seasonal fisheries targeting large sized yellowfin tuna existed in different parts of the country (refer to MRS, 1996) Handline fishing does not require modifying of the pole-and-line vessel except for addition of handline gear and having facilities for fresh-storage of catch. Ease of conducting the fishery off pole-and-line vessels, the ready availability of ice and the high market price have boosted the fishery.

The troll fishery is the smallest component of the tuna fisheries and targets neritic species of kawakawa and frigate tuna. Importance of the fleet, which landed substantial proportions of the species in the past, significantly declined due to mechanization of the fishing fleet during 1970s and 80s. Trolling activity peaked during the period of transition during the mechanization of the pole and line fleet (1975-1982) (Anderson et al., 1996). More recently, troll activity seems to have picked up due to the wide availability of small crafts, popularity of recreational fishing and availability of markets for the catch. However, it is thought that these operations mostly target non-tuna species such as sailfish (*Istiophorus platypterus*), wahoo (*Acanthocybium solandri*) and other large species.

## 2. Fleet structure

The fishing fleet has undergone several changes following the mechanization beginning in 1974. The current fleet is a mix wooden hulled and fibre reinforced plastic (FRP) vessels. Vessels are characterized by having long and open-deck at the stern with a high-rise super structure forward of the vessel. Majority of the Maldivian tuna fishing vessels range from 12.5 - 32.5 m in length (Table 1). Unlike in the past, modern vessels can accommodate up to 30 crew and operate at sea for several days or weeks at a time. However, trip lengths are generally limited by the amount of live-bait, vital for the tuna fishing operations, that can be held onboard the vessels. A typical pole-and-line trip can last from a single day to a week while handline trips are generally several, 10-15 days depending on the catch and bait availability (Adam, Jauharee and Miller, 2015).

Historically, Maldives tuna vessels were gear specific. Pole-and-line fishery was conducted off mechanized tuna vessels (*masdhoni*) while troll fishing was conducted from smaller versions of the pole-and-line tuna vessels, locally called a *vadhu dhoni*. With the introduction of the handline yellowfin tuna fishery in the 1990s, mechanized tuna vessels accommodated handline fishery with minor modifications to the vessel and minimal extra costs. In majority of cases, the mechanized tuna vessels are used exclusively for pole-and-line or handline operations. Occasionally, vessels may switch between pole-and-line and handline operations during high abundance of catch. However, this is not common practice as both fisheries require different types and sized bait.

Table 1: Number of vessels operating in the IOTC area of competence, by gear type and size (2013-2022).

| Year | Vessel type             | Length Range (LoA, meters) |                  |                  |                  |                  |                  |                  |        |
|------|-------------------------|----------------------------|------------------|------------------|------------------|------------------|------------------|------------------|--------|
|      |                         | < 07.5                     | > 07.5<br>< 12.5 | > 12.5<br>< 17.5 | > 17.5<br>< 22.5 | > 22.5<br>< 27.5 | > 27.5<br>< 32.5 | > 32.5<br>< 37.5 | > 37.5 |
| 2013 | Engine row boat         | 4                          | -                | -                | -                | -                | -                | -                | -      |
| 2013 | Longline vessel         | -                          | 1                | 5                | 2                | -                | -                | -                | 7      |
| 2013 | Mechanized masdhoni     | -                          | 23               | 117              | 141              | 224              | 68               | 11               | -      |
| 2013 | Mechanized vadhu dhoani | 1                          | 6                | -                | -                | -                | -                | -                | -      |
| 2014 | Engine row boat         | 2                          | 2                | 1                | 1                | 1                | 3                | --               | -      |
| 2014 | Longline vessel         | 7                          | 34               | 10               | 9                | 2                | --               | --               | 9      |
| 2014 | Mechanized masdhoni     | -                          | -                | 132              | 163              | 277              | 94               | 12               | -      |
| 2014 | Mechanized vadhu dhoani | 1                          | 2                | 1                | 2                | -                | -                | -                | -      |
| 2015 | Mechanized masdhoni     | 11                         | 50               | 161              | 182              | 302              | 108              | 14               | 1      |
| 2015 | Longline vessels        | -                          | -                | 9                | 17               | 2                | -                | -                | -      |
| 2016 | Mechanized masdhoni     | 9                          | 43               | 116              | 155              | 273              | 93               | 16               | -      |
| 2016 | Longline vessel         | -                          | -                | 14               | 21               | 3                | -                | -                | 4      |
| 2017 | Mechanized masdhoni     | -                          | 66               | 140              | 170              | 320              | 104              | 17               | 1      |

|      |                     |    |    |     |     |     |     |    |   |
|------|---------------------|----|----|-----|-----|-----|-----|----|---|
| 2017 | Longline vessel     | -  | 1  | 13  | 23  | 3   | -   | -  | 4 |
| 2018 | Mechanized masdhoni | 11 | 38 | 94  | 134 | 297 | 95  | 19 | - |
| 2018 | Longline vessel     | -  | -  | 6   | 20  | 1   | -   | -  | - |
| 2019 | Mechanized masdhoni | 14 | 47 | 132 | 155 | 320 | 102 | 20 | - |
|      | Longline vessel     | -  | -  | 6   | 21  | 1   | -   | -  | - |
| 2020 | Mechanized masdhoni | 11 | 47 | 134 | 152 | 322 | 107 | 21 | - |
| 2021 | Mechanized masdhoni | 12 | 50 | 124 | 150 | 314 | 108 | 22 | 1 |
| 2022 | Mechanized masdhoni | 10 | 39 | 99  | 143 | 315 | 107 | 22 | 1 |

### 3. Catch and effort (by species and gear)

Total tuna landings (skipjack, yellowfin, bigeye, frigate and kawakawa) in 2022 were 154,743 tons by all gears (PL, HL and TR). Tuna catches reached an all-time high of about 167,000 t in 2006 (Figures 1a and 1b). Catches then declined by 53% by 2010 (101,800 t). Total tuna catches have since recovered from the decline and has remained somewhat stable in the recent years. In terms of species, skipjack and yellowfin tuna are the two most important species in the Maldives tuna fisheries with 81% and 18% contribution respectively in 2022.

Average catch of skipjack tuna in the recent five years (2018-2022) has been around 107,500 tons. The catch increased in the period by 26% (100,099 to 126,385t). The average catch of yellowfin tuna in the same period has been almost 37,400 t with a 40% decrease in catch from 47,216 in 2018 to 28,082 t in 2022. Average catch of bigeye tuna was 29t in the past five years.

Pole and line gear contributed 99% of skipjack tuna (126,362t) and 32% of the yellowfin tuna (9,089t) landed in 2022. Neritic tunas (frigate and kawakawa) used to be a reasonable component in the pole and line catches in the past. However, as neritic tunas are of little value and not purchased by the large processors, targeting neritic tunas by the PL fleet is uncommon. However, PL still remains the main gear for frigate and kawakawa, with almost all being landed by the PL gear. Handline is the most important gear for yellowfin tuna in the Maldives, with 67% of yellowfin tuna being landed by the handline fishery.

Both pole-and-line and handline fisheries operate quite close to the atolls, although there is a difference in the predominant fishing regions of the two fisheries. Most of the pole-and-line catch is taken from the south of the country while the handline catch is mainly taken from the north and central atolls.

The small-scale trolling operate in the coastal areas and atoll lagoons. The main trolling fleet effectively died in the late 1980s due to improved socioeconomic changes. These days, catch of kawakawa and frigate come mainly from pole-and-line vessels. Combined catch of both species was 50t in 2022 by all gears.

Combined effort for pole-and-line, handline and trolling has fluctuated between about 45,334 and 79,600 days in the most recent five-year period. Pole and line effort has increased slightly while handline effort decreased slightly. Table 2 presents effort and catch by gear for the recent five years. Figures 1a and 1b present the historical catch and catch of main tuna species for the national fleet by gear respectively. Spatial maps of effort by gear are presented for 2022 (Figure 2a) and average for the most recent 5 years (Figure 2b). Catch by gear and for the main species is presented for 2022 in Figures 3a (1-3) and average for the most recent five years in Figure 3b (1-4).

Table 2. Annual catch (t) and effort (days) by gear and primary species in the IOTC area of competence 2018-2022.

| Year | Gear | Effort (days) | SKJ (t) | YFT (t) | BET (t) | KAW (t) | FRI (t) |
|------|------|---------------|---------|---------|---------|---------|---------|
| 2018 | PL   | 45,601        | 99,886  | 17,619  | 221     | 74      | 328     |
|      | HL   | 33,797        | 209     | 28,960  | 46      | 5       | 4       |
|      | LL   | Na            | 3.66    | 633     | 163     | 0       | 0       |
|      | TR   | 242           | 0       | 3       | 0.27    | 11      | 5       |
| 2019 | PL   | 31,409        | 88,174  | 17,240  | 224     | 35      | 129     |
|      | HL   | 27,006        | 797     | 26,932  | 86      | 5       | 1       |
|      | LL   | Na            | 1.46    | 479.21  | 83.6    | 0       | 0       |
|      | TR   | 494           | 69      | 49      | 2       | 5       | 2       |
| 2020 | PL   | 28,053        | 103,195 | 15,651  | 162     | 3       | 86      |
|      | HL   | 23,441        | 647     | 27,053  | 51      | 1       | 1       |
|      | LL   | 0             | 0       | 0       | 0       | 0       | 0       |
|      | TR   | 146           | 1       | 1       | 0       | 3       | 1       |
| 2021 | PL   | 26,960        | 118,517 | 10,167  | 207     | 3       | 58      |
|      | HL   | 18,227        | 159     | 14,370  | 17      | 10      | 3       |
|      | LL   | 0             | 0       | 0       | 0       | 0       | 0       |
|      | TR   | 147           | 7       | 11      | 0       | 2       | 0.4     |
| 2022 | PL   | 33,616        | 126,362 | 9,089   | 223     | 2.55    | 47.69   |
|      | HL   | 14,472        | 23      | 18,993  | 0.89    | 0.02    | 0.25    |
|      | TR   | 8             | 0       | 0.11    | 0       | 0       | 0       |

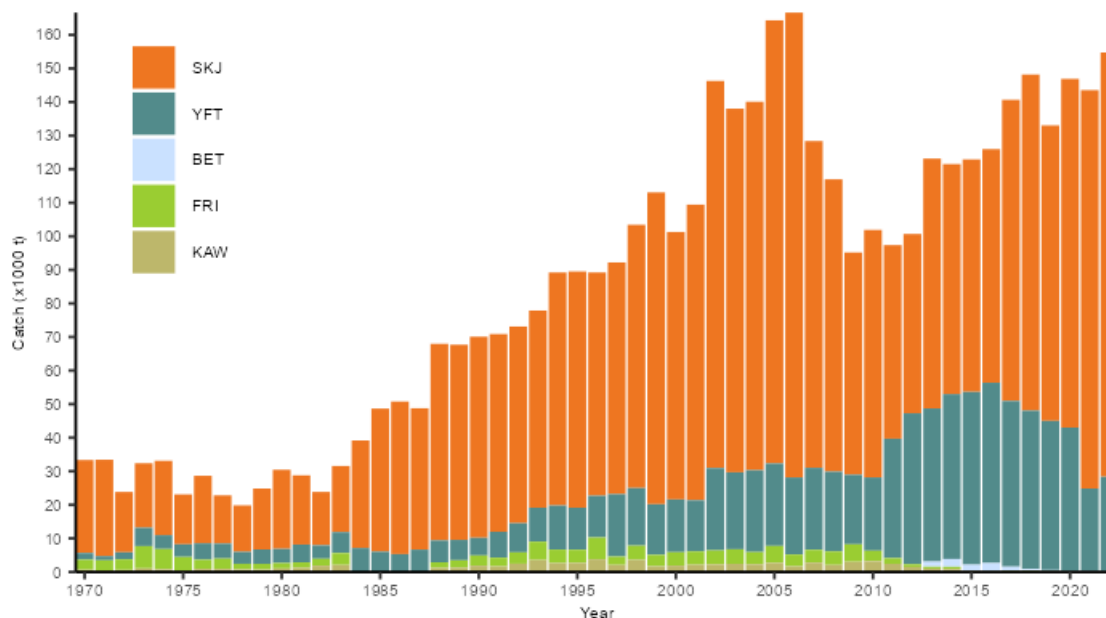


Figure 1a: Historical tuna catch for the national fleet by species (1970-2022). Note that bigeye tuna began to be recorded separately in 2013.

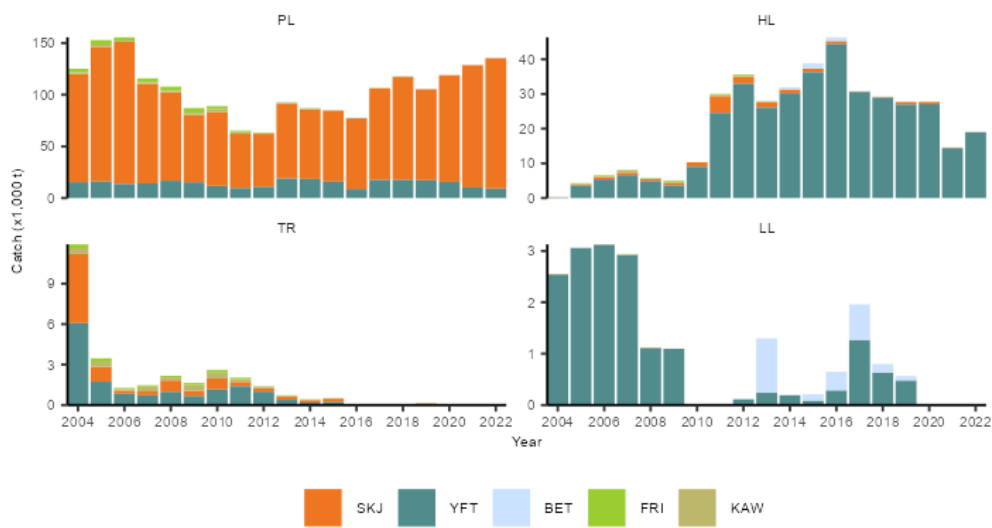


Figure 1b: Catch of main tuna species for the national fleet by gear (2004-2022). Note that bigeye tuna began to be recorded separately in 2013.

Figure 2a. Map of distribution of fishing effort for pole-and-line, handline and trolling gears for 2022.

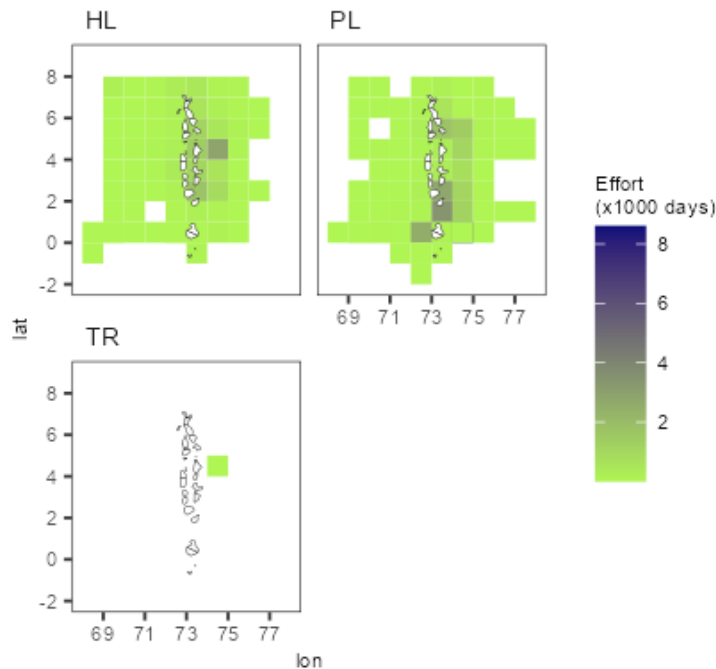


Figure 2b. Map of distribution of fishing effort for pole-and-line and handline gears (average of the period 2018- 2022) and for longline gear (average of the period 2016-2019 as Maldives does not have a longline fleet since 2019).



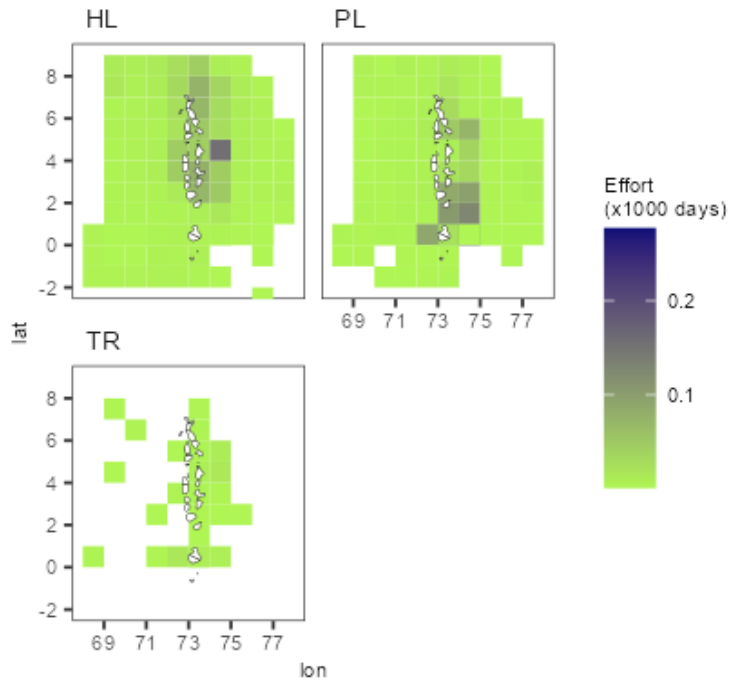


Figure 3a-1. Map of distribution of fishing catch by species for pole-and-line for 2022.

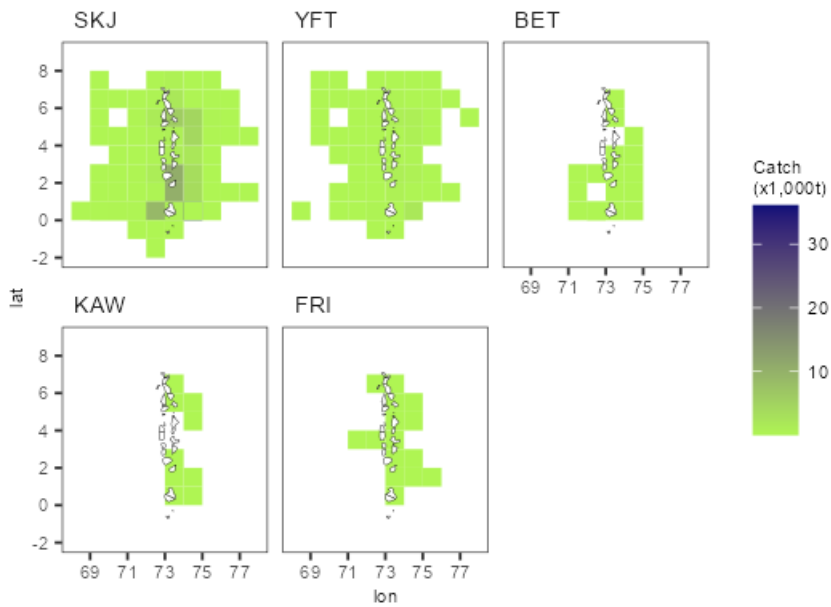


Figure 3a-2. Map of distribution of catch by species for handline for 2022.

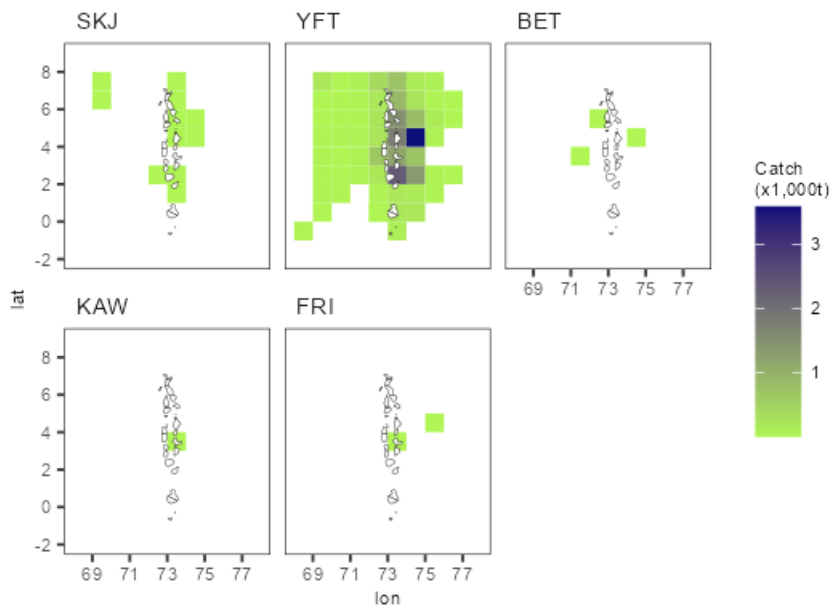


Figure 3b-1. Map of distribution of catch by species for pole-and-line gear (average of the 5 previous years, 2018-2022).

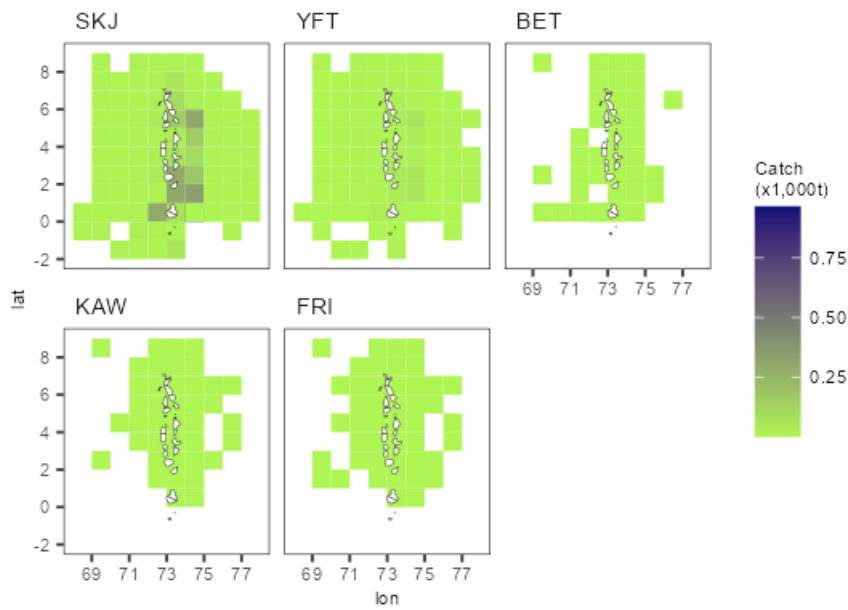


Figure 3b-2. Map of distribution of catch by species for handline gear (average of the 5 previous years, 2018-2022).

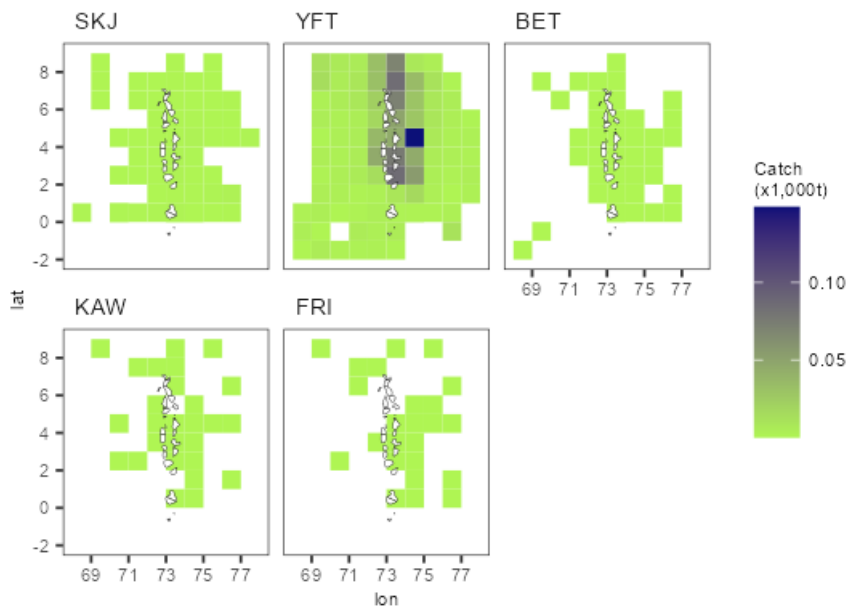
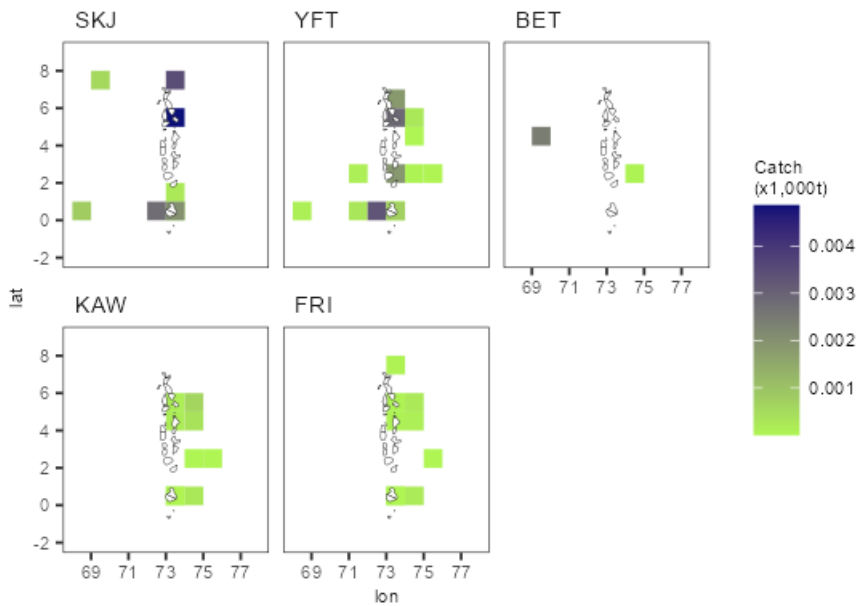


Figure 3b-3. Map of distribution of catch by species for trolling gear (average of the period 2017-2021).



#### 4. Recreational fishery

Big game fishing is popular among tourists and locals, and it is now common practice to have an outfit in almost every resort. Common target species are sailfish (*Makaira* spp.), marlins and wahoo (*Acanthocybium solandri*) but also large yellowfin to some extent. Casting using poppers, rod and reel is also popular game fishing activity targeting mainly large jacks, snappers and other similar fish off the reef and seamounts.

## 5. Ecosystem and bycatch issues

Maldives has a highly selective form of fishing with virtually no by-catch and no discards. Miller et al, 2017, observed 161 pole-and-line fishing events and reported a bycatch figure of 0.65% of total tuna catch by weight. The pole-and-line method alone contributed close to 87% of the total tunas in 2022. Similarly, handline and troll fishing methods are also highly selective with almost no bycatch and discards. This has resulted in minimal impacts from the Maldives tuna fisheries on non-targeted, associated and dependent species and the ecosystem.

Livebait is critical for the tuna pole-and-line and handline fishery. The species harvested by tuna fleet are characterized by short generation times and high intrinsic rates of population growth. These are species that are not easily overexploited. Maldives has recently intensified monitoring and conducted a review of the livebait fishery. It has also produced a management plan for the livebait fishery.

### 5.1. Sharks

Shark fishing is banned in Maldives waters, since March of 2010. Further, all sharks were protected in 2020 by the General Fisheries Regulation (R-75/2020). With the absence of a longline fishery, bycatch of sharks in the tuna fisheries is virtually non-existent.

#### 5.1.1. NPOA-Sharks

Maldives' National Plan of Action on the Conservation and Management of Sharks (NPOA-Sharks) was formulated and presented to the stakeholders in April 2014. It was subsequently endorsed by the Ministry of Fisheries and Agriculture in April 2015. With the aim to ensure the implementation and observation of the shark fishery ban, the NPOA-Sharks addresses six key areas: mitigating the impacts of shark fishery ban; improving data collection and handling of shark by-catch; improving scientific research on shark populations; raising awareness on life-history characteristics of sharks; improving coordination, consultation and monitoring of shark ban; and cooperating on international agreements pertaining to sharks and with relevant RFMOs on research and management of shark species.

#### 5.1.2. Shark finning Regulation

All shark species are protected under the R-75/2020 General Fisheries Regulation which was enacted in 2020. Harvesting, retaining on-board, storing on-board, transshipping, transporting to a landing facility or landing any of the species or a part of any of the species protected under the General Fisheries Regulation is prohibited. With the suspension of longline fishery in 2019, shark bycatch has been non-existent.

#### 5.1.3. Blue shark

The pole-and-line, handline and trolling fisheries for tuna and tuna-like species do not catch blue sharks. The longline fishery that had shark bycatch was suspended in June 2019. Since none of the current gears catch blue sharks, the paragraph 4 of Resolution 18/02 that requires CPCs to monitor the blue shark catches does not apply to Maldives.

Table 3. Total number and weight of sharks, by species, retained by the national fleet in the IOTC area of competence.

|                                                                                                                                      |
|--------------------------------------------------------------------------------------------------------------------------------------|
| <b>Not Applicable:</b> Maldives imposes a fishery ban on sharks and therefore does not retain sharks caught in any of the fisheries. |
|--------------------------------------------------------------------------------------------------------------------------------------|

## 5.2. Seabirds

The interaction with seabirds is minimal in handline, pole-and-line and troll fisheries. Current logbook data collection system allows the fishermen to report such interactions.

All seabirds of the Maldives are protected by the Regulation 2020/R-25. Regulation 2014/R-169 protects all migratory and seasonal birds, including seabirds. An action plan to protect and manage seabird nesting sites have been developed.

## 5.3. Marine Turtles

Maldives imposed a 10-year moratorium on catching or harming of turtles in 1995. The moratorium was renewed in 2005 extending further 10 years with a ban on egg-harvesting from 14 turtle nesting islands (Ali & Shimal, 2016). With the termination of the second ten-year moratorium in 2016, a new legislation on marine turtles under the Environment Protection and Preservation Act (4/93) came into effect in April 2016, declaring all species of marine turtles as protected and prohibiting harvest of turtle eggs throughout the Maldivian archipelago. Maldives is also a signatory to the IOSEA Marine Turtles MoU, signed on April 2010.

With the suspension of the longline fishery in June 2019, Maldives tuna fisheries do not interact with marine turtles anymore.

Table 4. Marine turtle interaction in the PL fishery. Source: Observer data

| Year | Fishery: PL SKJ fishery |     |                     | Data source: Observer report |                |                   |                      |                        |
|------|-------------------------|-----|---------------------|------------------------------|----------------|-------------------|----------------------|------------------------|
|      | Lat*                    | Lon | Total effort (days) | Total effort observed        | Species        | Captures (number) | Mortalities (number) | Live releases (number) |
| 2107 | 0                       | 73  | 1                   | 1                            | Marine turtles | 0                 | 0                    | 0                      |
| 2018 | 0                       | 72  | 2                   | 2                            | Marine turtles | 0                 | 0                    | 0                      |
| 2019 | 0                       | 71  | 2                   | 2                            | Marine turtles | 0                 | 0                    | 0                      |
| 2019 | 0                       | 72  | 5                   | 5                            | Marine turtles | 0                 | 0                    | 0                      |
| 2019 | 0                       | 73  | 13                  | 13                           | Marine turtles | 0                 | 0                    | 0                      |
| 2019 | 0                       | 74  | 1                   | 1                            | Marine turtles | 0                 | 0                    | 0                      |
| 2019 | 1                       | 73  | 4                   | 4                            | Marine turtles | 0                 | 0                    | 0                      |
| 2019 | 1                       | 74  | 3                   | 3                            | Marine turtles | 0                 | 0                    | 0                      |
| 2019 | 2                       | 73  | 9                   | 9                            | Marine turtles | 0                 | 0                    | 0                      |
| 2019 | 4                       | 73  | 1                   | 1                            | Marine turtles | 0                 | 0                    | 0                      |
| 2019 | 5                       | 72  | 6                   | 6                            | Marine turtles | 0                 | 0                    | 0                      |
| 2019 | 5                       | 73  | 2                   | 2                            | Marine turtles | 0                 | 0                    | 0                      |

## 5.4. Other ecologically important species

Whale sharks and dolphins are protected by the fisheries law in the Maldives. Even though handline fishermen target yellowfin tuna from dolphin associated schools, the interactions are minimal and fishermen avoid hooking dolphins as there is no value in it.

Table 5. Reported annual bycatch of special interest species (seabirds, marine turtles and marine mammals) as reported for the longline fishery. Note that the longline fishery was suspended in June 2019 and did not operate in 2022.

| Year | Fishery | Seabirds | Marine Turtles | Marine Mammals |
|------|---------|----------|----------------|----------------|
| 2018 | LL      | 0        | 4              | 0              |
| 2019 | LL      | 0        | 5              | 0              |
| 2020 | LL      | 0        | 0              | 0              |
| 2021 | LL      | 0        | 0              | 0              |
| 2022 | LL      | 0        | 0              | 0              |

## 6. National data collection and processing systems

Data collection from the tuna fishery began in 1959, with species level data being collected since 1970 and vessel specific catch and effort data being available from 1995 onwards. The system was based on total enumeration of catches, requiring conversion factors for estimating weight. Vessels reported catch by species and effort data (number of days fished) to their respective island offices where the vessels are registered. The data were then aggregated by vessel and month providing catch by species/species groups and effort in number of days fished. In 2010, the Ministry of Fisheries introduced logbooks for the tuna fisheries to address the reporting requirements and obligations as well as to address other challenges in the data reporting system at the time. The logbooks were revised based on the experience of the initial few years. The previous reporting system was completely stopped by the end of 2017.

### 6.1. Logbook data collection and verification (FMS)

Logbooks were introduced to the tuna fisheries in 2010 and refined twice, with the most recent revision in 2012 and the revised logbooks being introduced in January 2013. Following successful establishment of the logbooks, the enumerated system of data reporting was ceased on 31<sup>st</sup> December 2017, which was gradually being phased out since 2010. The logbook data allowed Maldives to report data by the required spatial resolution improving compliance with the data reporting requirements.

The major challenge was to increase the coverage of logbook submission rates. To address this issue, changes were brought to the regulatory framework and fishing license conditions, making it mandatory for the completed logbooks to be returned to the processing or purchase facilities prior to the unloading operations. This change was put into effect on 1st March 2019 and the return rates have improved considerably since.

A web-enabled fishery information system, “*Keyolhu*” is now fully functional, and all catch data are recorded and analysed through the system. This is a major improvement to the old database for data recording. The system facilitates vessel registration, issuing fishing licenses and fish processing licenses, data entry of fish purchase (by the commercial companies) and logbook data to provide a comprehensive system of compilation and reporting. The system is also designed to computerize the process of issuance of catch documentation required for the exports of all forms of tuna from the Maldives.

Logbook data could be verified through different mechanisms. The observer data collected by the Maldives Marine Research Institute, with donor funding, allow verification of all aspects of logbook reported data. Further, landings data, obtained through the tuna exporting companies is used to verify the logbook data. Additionally, the Fisheries Information System, *Keyolhu*, allows near real-time tracking of landings and

purchases as well as licensing. The FIS is currently being further developed to integrate logbook reporting online by fishers through a smart phone application. This will allow the Ministry to ensure that all purchases made by processing facilities are associated with the electronic logbook of the corresponding fishing trip. To ensure the accuracy of data received, the system is being developed with a number of validation features that will ensure e-logbooks are submitted with all required fields/information.

## 6.2. Vessel Monitoring System

Through the Sustainable Fisheries Resources Development Project, funded by the World Bank, the current Vessel Monitoring System (VMS) project was initiated in 2019. Currently, over 70% of the IOTC mandated vessel category (375 vessels over 24m or vessels operating beyond EEZ) is covered under this project. The newly enacted tuna fisheries regulation mandates vessels that fit the criterion for VMS (vessels over 18m in length) to install the VMS systems.

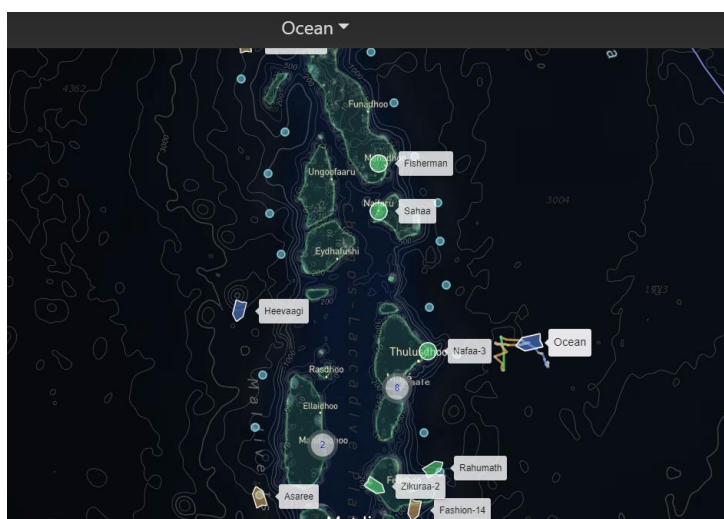


Figure 6. Screen capture of the Maldives VMS System. Currently 280 vessels over 24, or above in length have VLDs, monitored by the Fishery Management Division, of the Ministry of Fisheries, Marine Resources and Agriculture

## 6.3. Observer Scheme

The National Observer program was established in 2015. The program has proven to be costly and due to high staff turn-over, consistent implementation of the programme has been challenging. Due to the nature of the fishery and the size of the fleet, achieving the mandatory 5% observer coverage has been further challenge.

To complement the National Observer program, MoFMRA initiated a World Bank (WB) funded project to implement Electronic Monitoring (EM) in 2019. Electronic Observer Systems was installed on 14 fishing vessels. This project has faced multiple challenges, the major one being the high cost associated with the EM. MoFMRA is currently working with different service providers to find cost effective EM solutions for the Maldivian tuna fleet.

The bycatch sampling and observer trips by MMRI and partners began in 2014 and a number of observer reports were submitted to IOTC in the past. The objective of the programme is to take part on fishing trips to and collect data biological and operational data. A sampling protocol is established for the observer on sampling and recording of catch and bycatch.

**Table 6.** Number of trips observed for the years 2017-2022.

| Year | Fishery       | Number of trips observed |
|------|---------------|--------------------------|
| 2017 | Pole-and-line | 1                        |
| 2018 | Pole-and-line | 2                        |
| 2019 | Pole-and-line | 54                       |
| 2020 |               | 0                        |
| 2021 |               | 0                        |
| 2022 |               | 0                        |

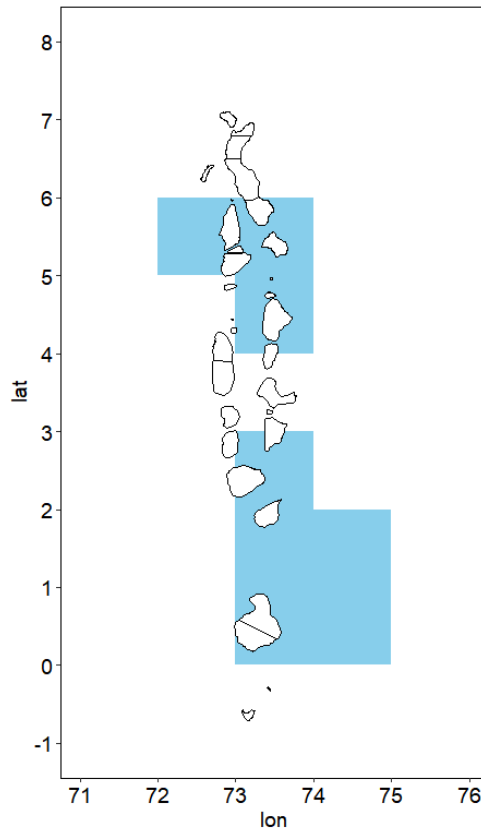


Figure 4. Spatial distribution of observer coverage for 2019. There were no observer data reported for 2020, 2021 and 2022.

#### 6.4. Port sampling programme

A systematic port-sampling programme to monitor artisanal landings is not in place yet. However, size sampling of catch landed at the ports are conducted regularly through samplers at PL tuna landing ports, by fishermen samplers on their vessels, and scientific observer and MMRI staff.

All fish processing and purchasing facilities are required to obtain a processing license to process fish for the export market as stipulated by the licensing regulation (2020/R-92). Changes have been made to the license conditions and data reporting requirements to make it mandatory for all licensed fish processing facilities to record and report size frequency data. This will ensure that Maldives complies with length frequency data reporting requirements to the IOTC in the future. Table 8 provides a summary of the size data for the year 2022.



Table 7. Number of vessel trips or vessels active monitored (measured), by species and fishery for vessels < 24m LOA

| <b>Fishery</b> | <b>SKJ</b> | <b>YFT</b> | <b>FRI</b> |
|----------------|------------|------------|------------|
| PL             | 1954       | 596        | 49         |

Table 8. Number of individuals measured, by species and gear for 2022, for the national fleet

| <b>Gear</b> | <b>SKJ</b> | <b>YFT</b> | <b>BET</b> | <b>FRI</b> |
|-------------|------------|------------|------------|------------|
| PL          | 44,596     | 15,949     | 47         | 1,030      |

### 6.5. Unloading/Transshipment

This section is not applicable to Maldives as at-sea transshipments are banned in Maldivian waters and Maldivian-flagged vessels do not tranship at sea.

Table 9. Quantities by species and gear landed in ports located in the IOTC area of competence

This table is not applicable to Maldives as at-sea transshipments are banned in Maldivian waters and Maldivian-flagged vessels do not tranship at sea.

Table 10. Quantities by species and gear transhipped in ports located in the IOTC area of competence

This table is not applicable to Maldives as at-sea transshipments are banned in Maldivian waters and Maldivian-flagged vessels do not tranship at sea.

### 6.6. Actions taken to monitor catches and manage fisheries for Striped Marlin, Black Marlin, Blue Marlin and Indo-Pacific Sailfish

The Maldives Billfish Fishery Management Plan published in 2020 include provisions to manage billfish fishery including measures related to data collection and monitoring of all billfish species.

### 6.7. Sampling plans for mobulid rays

The Maldives tuna fisheries have minimal bycatch and interactions with non-targeted, endangered and threatened species. As such, the pole and line, handline and trolling fisheries do not catch mobulid rays. Miller et. Al, (2017), after monitoring 106 pole and line fishing trips, reported 7 species of finfish caught as bycatch and did not record mobulid rays. Additional observer data since shows zero interactions with mobulid rays in the Maldives tuna fisheries. The longline fishery, which as the potential for interaction has been suspended in 2019. Due to the non-interaction of Maldives tuna fisheries with mobulid rays, a sampling plan as stipulated in Paragraph 11 of Resolution 19/03 is not required.

## 7. National research programs

The Maldives Marine Research Institute (MMRI) is national agency mandated to conduct research on the marine resources, including fishery resources and the marine environment. Various programs exist that are of relevance to IOTC. These include fishery monitoring and research, as well as ecosystem

monitoring and research activities. In addition to national activities, MMRI collaborates with regional and international agencies that would contribute to better understanding of the stocks of tuna and tuna-like species.

#### **7.1. National research programs on blue shark**

The pole and line, handline and trolling fisheries that target tunas and tuna like species do not have blue shark by-catch.

#### **7.2. National research programs on Striped Marlin, Black Marlin, Blue Marlin and Indo-Pacific Sailfish**

The Maldives Billfish Fishery Management Plan published in 2020 include provisions to manage billfish fishery including measures related to data collection data reporting of all species of billfishes.

#### **7.3. National research programs on sharks**

Baited Remote Underwater Vehicle studies to understand the population of sharks are part of the ecosystem research activities at MMRI. The study has been ongoing since 2018. In 2022, 138 BRUV surveys were carried out to assess local populations of sharks within the inner atoll reefs. The surveys are to be continued in 2023 and initial findings to be published by late 2023 or early 2024.

As sharks are fully protected within the Maldives waters, and the tuna fisheries have minimal interaction with sharks, studies on the aspects of post-release survival, safe release and fishing practices do not apply.

#### **7.4. National research programs on oceanic whitetip sharks**

The pole and line, handline and trolling fisheries that target tunas and tuna like species do not have oceanic whitetip shark by-catch.

#### **7.5. National research programs on marine turtles**

The pole and line, handline and trolling fisheries that target tunas and tuna like species do not have turtle by-catch. Further, the Anchored FADs used in the Maldives are of non-entangling designs. It is noted that under the Environment Protection and Preservation Act (4/93), marine turtles are fully protected in the Maldives.

#### **7.6. National research programs on thresher sharks**

Maldives does not currently implement a research program on thresher sharks that would contribute to the requirements of Resolution 12.09 paragraph 6 (CPCs shall, where possible, implement research on sharks of the species *Alopias* spp in the IOTC area of competence, in order to identify potential nursery areas). The surface fisheries (pole and line, handline and trolling) do not interact with thresher sharks.

Table 8 provides a summary of the major research program being implemented. They are primarily geared towards improving national reporting and compliance to IOTC Conservation and Management Measures.

## 8. Implementation of Scientific Committee Recommendations and Resolutions of the IOTC relevant to the SC

Table 9: Scientific requirements contained in Resolutions of the Commission, adopted between 2012 and 2022.

| Res. No. | Resolution                                                                                                                    | Scientific requirement | CPC progress                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|----------|-------------------------------------------------------------------------------------------------------------------------------|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12/04    | On the conservation of marine turtles                                                                                         | Paragraphs 3, 4, 6–10  | <p>With the termination of the second ten-year turtle moratorium in 2016, a new legislation on marine turtles under the Environment Protection and Preservation Act (4/93) came into effect in April 2016 which fully protects marine turtles in the Maldives.</p> <p>The Strategic Action Plan of the Maldives (2019-2023) pledges to protect from each atoll, representative sites of reefs, wetlands, islands and sandbanks. These sites include areas important for marine turtles among other things.</p> <p>Logbooks for all the tuna fisheries have provisions to report interactions with non-targeted protected species, including marine turtles. The data is reported regularly to IOTC.</p>                                         |
| 12/06    | On reducing the incidental bycatch of seabirds in longline fisheries.                                                         | Paragraphs 3–7         | <p>All sea birds are protected in the Maldives.</p> <p>Seabird interactions are recorded in detail in the logbooks of all fisheries targeting tunas (PL and HL) and information seabird interactions has been reported to the IOTC as required.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 12/09    | On the conservation of thresher sharks (family alopiidae) caught in association with fisheries in the IOTC area of competence | Paragraphs 4–8         | <p>All species of sharks are protected in the Maldives.</p> <p>Incidental catch of sharks is reported from all tuna fisheries through the logbooks. All data relating to shark interactions and catch is reported to IOTC.</p> <p>Shark fishing is prohibited in Maldivian waters. See section on Resolution 13/06 for details. An observer scheme is established and the information on shark interactions will be verified through these observer schemes.</p>                                                                                                                                                                                                                                                                                |
| 13/04    | On the conservation of cetaceans                                                                                              | Paragraphs 7– 9        | <p>Maldives is part of the International Whaling Commission’s Indian Ocean Sanctuary established in 1979. Furthermore, all whales and dolphins are protected by law in the Maldives and their interactions with the fisheries are minimal. The observer &amp; bycatch sampling programme records all interactions with cetaceans during fishing trips. Reports from the observer program will present all, if any, interactions with cetaceans.</p> <p>Maldives recently completed the progress report on List of Foreign Fisheries and Marine Mammals to comply with US Marine Mammal Protection Act’s Import Provisions. MMPA requires exporting countries to maintain risks of mortality to cetaceans in par with US regulation by 2023.</p> |

| Res. No. | Resolution                                                                                                                      | Scientific requirement | CPC progress                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------|---------------------------------------------------------------------------------------------------------------------------------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 13/05    | On the conservation of whale sharks ( <i>Rhincodon typus</i> )                                                                  | Paragraphs 7– 9        | Whale sharks are protected in the Maldives. None of fisheries of the Maldives are known to harm the whale sharks. The logbooks which are mandatory, do have provisions to report interactions with non-targeted and bycatch species                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 13/06    | On a scientific and management framework on the conservation of shark species caught in association with IOTC managed fisheries | Paragraph 5–6          | All species of sharks are protected in the Maldives.<br><br>Observer data suggests that interactions with sharks in the pole-and-line and handline fisheries are minimal.<br><br>Shark interactions are recorded in detail in the log books of all fisheries targeting tunas (PL and HL) and information on shark interactions has been reported to the IOTC as required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 15/01    | On the recording of catch and effort by fishing vessels in the IOTC area of competence                                          | Paragraphs 1–10        | It has been made mandatory for the completed logbooks to be returned to the processing or purchase facilities prior to the unloading operations which has improved the submission of logbook data. Furthermore, the Fisheries Information System (FIS) is currently being further developed to integrate logbook reporting online by fishers through a phone application. This will allow the Ministry to ensure that all purchases made by processing facilities are associated with the electronic logbook of the corresponding fishing trip. To ensure the accuracy of data received, the system is being developed with a number of validation features that will ensure e-logbooks are submitted with all required fields/information.                                                                                                                      |
| 15/02    | Mandatory statistical reporting requirements for IOTC Contracting Parties and Cooperating Non-Contracting Parties (CPCs)        | Paragraphs 1–7         | Maldives implements a size sampling programme at key commercial landing sites that are operated by the major fish processors and exporters in the country. Additionally, scientific observers and MMRI staff also contribute data from observer trips and visits to landing sites.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 17/05    | On the conservation of sharks caught in association with fisheries managed by IOTC                                              | Paragraphs 6, 9, 11    | Shark fishing is prohibited in Maldives waters (the entire EEZ). The ban is effective from May 2010. The new fishery regulation (2020/R-75) prohibits intentional catch, harming and removal of sharks. The regulation further prohibits the sale, display and import and export of sharks and shark products. Hence, any incidental catch of shark by other gears has to be released immediately.<br><br>The tuna fishery logbook has provisions to report any incidental catch of sharks. The data are reported to IOTC regularly.<br><br>As there is virtually zero catch of sharks in Maldivian tuna fisheries, the provisions on reducing shark bycatch, safe release, post release survival, improve gear selectivity and handling practices do not apply to Maldives.<br><br>MMRI undertakes shark research as part of the Ecosystem research activities. |

| Res. No. | Resolution                                                                                                                                              | Scientific requirement | CPC progress                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 18/02    | On management measures for the conservation of blue shark caught in association with IOTC fisheries                                                     | Paragraphs 2-5         | <p>Shark fishing is prohibited in Maldives waters (the entire EEZ). The ban is effective from May 2010. The new fishery regulation (2020/R-75) prohibits intentional catch, harming and removal of sharks. The regulation further prohibits the sale, display and import and export of sharks and shark products. Hence, any incidental catch of shark by other gears has to be released immediately.</p> <p>As none of the tuna fisheries in the Maldives (by)catch blue sharks, the paragraphs 2-5 do not apply to Maldives.</p>                                                               |
| 18/05    | On management measures for the conservation of the Billfishes: Striped marlin, black marlin, blue marlin and Indo-Pacific sailfish                      | Paragraphs 7 – 11      | <p>The Maldives Billfish Fishery Management Plan published in 2020 include provisions to manage billfish fishery including measures related to data collection data reporting of all species of billfishes.</p> <p>Further, with funding from the Sustainable Fisheries Resources, the Maldives Marine Research Centre is to begin scientific data collection of billfish landings. It is expected that this effort will produce a better understanding of the fishery in the Maldives.</p>                                                                                                      |
| 18/07    | On measures applicable in case of non-fulfilment of reporting obligations in the IOTC                                                                   | Paragraphs 1, 4        | <p>Maldives has taken measures to strengthen implementation of logbook scheme in tuna fishing fleet by strengthening enforcement at the landing centres. Landing centres are now required to confirm the submission of logbook prior to the offloading of the catch.</p> <p>All data related to tuna fisheries including fishing license, logbook, landing data are electronically logged into Fisheries Information System.</p> <p>Maldives reports its actions taken to implement the reporting obligations as well as report the zero-catch matrix in accordance with Paragraphs 1 and 4.</p> |
| 19/01    | On an Interim Plan for Rebuilding the Indian Ocean Yellowfin Tuna Stock in the IOTC Area of Competence ( <i>If not provided under Res 21/01 below</i> ) | Paragraph 22           | <p>The use of Gillnets is banned in the Maldives. Therefore, the paragraph 22 (CPCs are encouraged to increase their observer coverage or field sampling in gillnet fishing vessels by 10% using alternative data collection methodologies (electronic or human) verified by the IOTC Scientific Committee by 2023) does not apply.</p>                                                                                                                                                                                                                                                          |
| 19/03    | On the Conservation of Mobulid Rays Caught in Association with Fisheries in the IOTC Area of Competence                                                 | Paragraph 11           | <p>The Maldives tuna fisheries have minimal bycatch and interactions with non-targeted, endangered, and threatened species. As such, the pole and line, handline and trolling fisheries do not catch mobulid rays. Therefore, Paragraph 11 of the Resolution 19/03 does not apply to Maldives.</p>                                                                                                                                                                                                                                                                                               |
| 21/01    | On an Interim Plan for Rebuilding the Indian Ocean Yellowfin Tuna Stock in the IOTC Area of Competence ( <i>If not provided under Res 19/01 above</i> ) | Paragraph 23           | <p>Not Applicable. Maldives do have a gillnet fishery; it is banned by law.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Res. No. | Resolution                    | Scientific requirement | CPC progress                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----------|-------------------------------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 22/04    | On a regional observer scheme | Paragraph 12           | Maldives initiated an observer program in 2015. Recruiting observers and their high turnover rate proved to be challenges. MoFMRA initiated an Electronic Monitoring Systems (EMS) in 2019 and EM units were installed in 14 vessels. Maldives is currently working in addressing the challenges and gaps in EM program.<br><br>MMRI is planning to conduct observer trips for the handline and pole and line fleet in 2024. |

## 9. References

- Adam, M.S., A.R. Jauharee and K. Miller (2015). Review of Yellowfin Tuna Fisheries in the Maldives, Paper submitted to IOTC Working Party on Tropical Tunas (IOTC-2015-WPTT-17-17), October 23-29, 2015, Montpellier, France, 15pp.
- Adam, M. S and A.R Jauharee (2009). Handline yellowfin tuna fishery of the Maldives. Paper submitted to WPTT 2009, Mombasa, Kenya. 14 pp.
- Ahusan, M., I. Nadheeh, and M Shiham Adam (2016). Length Distribution of Yellowfin Tuna from the Maldives Pole-and-line and Handline Tuna, Paper submitted to IOTC-WPTT18, October 4-10, Seychelles. 6 pp.
- Anderson, R.C., Hafiz, A. & Adam, M.S. (1996). Review of the Maldivian Tuna Fishery. Maldives Marine Research Bulletin 2:176pp.
- Ali, K and Shimal, M. (2016). Review of the Status of Marine Turtles in the Maldives. Marine Research Centre. Ministry of Fisheries and Agriculture, Male', Rep. of Maldives. 27 pp.
- Miller KI, Nadheeh I, Jauharee AR, Anderson RC, Adam MS (2017). Bycatch in the Maldivian pole-and-line tuna fishery. PLOS ONE 12(5): e0177391. <https://doi.org/10.1371/journal.pone.0177391>
- MRS (1996) The Maldivian Tuna Fishery: A Collection of Tuna Resource Research Papers. Maldives Marine Research Bulletin 2: 176

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