



Government of the Republic of Maldives

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MALDIVES NATIONAL REPORT
SUBMITTED TO THE
INDIAN OCEAN TUNA COMMISSION
SCIENTIFIC COMMITTEE - 2016

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Maldives National Report to the Scientific Committee of the Indian Ocean Tuna Commission, 2015

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INFORMATION ON FISHERIES, RESEARCH AND STATISTICS

<p>In accordance with IOTC Resolution 10/02, final scientific data for the previous year was provided to the Secretariat by 30 June of the current year, for all fleets other than longline [e.g. for a National report submitted to the Secretariat in 2013 final data for the 2012 calendar year must be provided to the Secretariat by 30 June 2013)</p>	<p>YES 30/06/2016</p>
<p>In accordance with IOTC Resolution 10/02, provisional longline data for the previous year was provided to the Secretariat by 30 June of the current year [e.g. for a National report submitted to the Secretariat in 2013, preliminary data for the 2012 calendar year was provided to the Secretariat by 30 June 2013].</p> <p>REMINDER: Final longline data for the previous year is due to the Secretariat by 30 Dec of the current year [e.g. for a National report submitted to the Secretariat in 2013, final data for the 2012 calendar year must be provided to the Secretariat by 30 December 2013).</p>	<p>YES 30/06/2016</p>
<p>If no, please indicate the reason(s) and intended actions:</p>	

1. Executive Summary

The Maldivian tuna fishery comprises of four main components; pole-and-line, handline, longline and troll line. The most important is still the traditional livebait pole-and-line tuna fishery. The main target species is skipjack tuna (*Katsuwonus pelamis*), but small amounts of juvenile yellowfin tuna (*Thunnus albacares*) are also caught in the fishery of which about 5-10% is bigeye tuna (*Thunnus obesus*). Handline fishery is still expanding which targets large yellowfin tuna (> 70 cm FL) from the surface (<10m). Following termination of joint venture licencing in 2010, a fully Maldivian-flagged longline fishery is now established. Troll fishery is minor and targets mainly neritic species of kawakawa (*Euthynnus affinis*) and frigate tuna (*Auxis thazard*), but occasionally also catches skipjack and yellowfin tuna.

Catches of skipjack registered a slight increase in 2015 relative to level of 2014. Recent catches have been of the order of 60,000 – 75,000 t, still much less than the catch recorded in 2006. Catches of yellowfin are increasing, due to the growing handline fishery. No specialized vessel is required for handline fishing hence many pole-and-line vessels now carry both sets of gears and switch target fishery and gear depending on fishing opportunities. Many also practice multi-day fishing switching them opportunistically. Most recent catches of the yellowfin are around 52,400 t and about 69% of the catch is from handline fishery.

Maldives pole-and-line and handline tuna fishery have minimal impact on the ecosystem. Catch and interactions with Endangered, Threatened and Protected (ETP) species and other species of ecological importance is virtually non-existent. Sharks bycatch and turtles are reported from the longline fishery, which has strict measures to report and release those that are caught. In addition, measures to mitigate bird entanglement in the longline gear are mandated by law. Logbooks for all the tuna fisheries have provisions to report catch and interactions of ETP species. Marine Research Centre currently conducts scientific observations of fishing trips that allow verification of logbook reported data.

The national data collection was based on complete enumeration system, which is now replaced by a modern logbook data collection system. A web-enabled database is now online to allow compilation and processing of catch and effort data. The web-enabled database is also used to record tuna purchases by the exporters. The database will also help maintain records of active fishing vessel and fishing licenses. Vessel monitoring system covers 100% of the longline vessels and trips and a number of PL and HL vessels. In addition, the observer data collected from pole-and-line and handline fisheries enable verification of fishermen reported data.

A number of research programs funded by the Government and NGOs are currently being implemented. The programs are geared towards improving national reporting and compliance to IOTC conservation and management measures and towards understanding and minimising impacts of fisheries on the ecosystem. Recently started activities are bycatch monitoring and collaborative work with ISSF and IRD (France) on biodegradable FADs and studies on association of tunas around anchored FADs.

Maldives’s compliance are improving year by year; catch-and-effort data, size frequency and other biological and fishery data as required by relevant resolutions were submitted on time.

2. Background and General Fishery Information

Maldives is a tuna fishing nation with a long tradition dating back hundreds of years. Until the 1980s the tuna fishery was the mainstay of the Maldivian economy, providing employment and a source of protein for its inhabitants. Tuna remains the single most important export commodity from the Maldives earning currently about 160 million US\$ a year. Although spectacular growth and expansion of tourism in the country has declined fisheries' economic importance, tuna fishing continues to be the main economic activity in the outer islands. The fishery sector currently contributes around 2-3% to GDP.

The most important component of the Maldivian tuna fishery is the livebait pole-and-line fishery targeting skipjack (*Katsuwonus pelamis*). Small amounts (~15-17%) of juvenile yellowfin tuna (*Thunnus albacares*) are also caught in the fishery of which about 5-10% is bigeye tuna (*Thunnus obesus*). In the past bigeye tuna was not recorded separately in the domestic catches and so have been estimated from the *Thunnus* catches. The proportion of bigeye in pole-and-line catches were revised recently (Adam et al., 2014). The fishery is still restricted to coastal areas not extending more than 60-70 miles from the atoll boundary. Fishing effort is highest around the anchored fish aggregating devices (aFADs) located 12-15 miles range from the coast.

A second and still growing 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). Handline fishing does not require specialised modifying of the vessel except for addition of the handline gear and having facilities for fresh-storage of this high-valued catch. Depending on the locale of operation and availability of ice, it is becoming quite common to conduct two types of fishing on the same trip.

The growth and expansion of the handline yellowfin tuna fishery appears to be the reason for the declining effort trend of the pole-and-line component (Table 2 & Figure 1). Recent years have shown increase in catches of yellowfin tuna, to offset reduced catches of skipjack. Recorded catches in yellowfin tuna by all gears in 2015 were about 52,000 t which is an increase of about 6% relative to 2014. Skipjack catches were 70,000 t in 2015, a 2.5% increase from 2014 catch of 68,500t.

Two minor components of the tuna fishery are longline and troll fisheries. Maldives used to have licensed foreign longline fleet operating in the outer EEZ (100 miles and beyond). During the height of the fishery some 30-40 vessels operated in the Maldivian waters. Reporting and monitoring of the foreign longline fishery was sub-optimal. Due to pressure from the pole-and-line and handline fishermen, licensing for foreign vessels was finally brought to an end in mid-2010. Until November 2011, there was no longline fishing in Maldivian waters. Maldivian vessel started operation during 2012. With an increase in interest from locals to buy vessels and based on Maldives' commitment to conservation and management measures of the IOTC, the Government decided to impose a total allowable catch (TAC) for the fishery and a quota system to distribute the TAC among the longline companies. This TAC was based on the fleet development plan submitted by the Maldives to the IOTC and the TAC for 2015 was set 12,500MT. At the time of reporting, 2,280 MT of TAC has been purchased. The quota period for longline TAC is from the beginning of June to end of May of the following year. It is possible that more of the quota will be purchased in the future depending on the catch. The longline fishery is highly regulated with mandatory VMS, strict licensing and reporting of catches of all catch and bycatch varieties via logbooks. The fishery is restricted to the outer EEZ – from 100 miles and beyond by law.

The trolling component targets coastal species of kawakawa (*Euthynnus affinis*) and frigate tuna (*Auxis thazard*) (Ahusan and Adam, 2011a, Ahusan and Adam, 2011b). The trolling fleet which landed substantial proportions of both species in the past, died off due to mechanization of the fishing fleet during 1970s and 80s. Trolling catches have since fluctuated with a record decline in reported catch since 2010; over 85% decline in 2014. Catches of neritic species (FRI and KAW), from all gears have seen substantial declines with 2009 recording the highest catch in recent years. From 5200 MT (FRI) and 3000 MT (KAW) in 2009, catch has plummeted to a mere 118 MT and 220 MT for FRI and KAW

respectively. Ahusan and Adam (2015) argue that these declines are primarily due to under-reporting and decline in effort towards both species due to the low economic value attached to the catch.

3. 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. Two rows of the FRP ice-boxes are commonly placed on the open deck of wooden vessels, a characteristic of handline fishing vessels targeting yellowfin tuna. It is also becoming popular to have insulated fish holds to keep fish in ice or slurry (RSW).

Pole-and-line and handline fishing is conducted from identical vessels and switching from handline to pole-and-line or vice versa is done at no extra cost. Vessels have multiple bait-wells for carrying live, scads (Family: Carangidae) for handline or regular bait for the pole-and-line fishing. The most important visible feature of the handline vessels are the large ice-boxes (0.5 –1.8 t capacity) placed on open fishing platform. Often they are placed in pairs on either side of the engine hatch (2, 4, or 6 numbers are common). Newly build vessels have insulated fish holds that negates the use of ice-boxes and frees up deck space. Relatively large numbers of vessels are known to conduct both types of fishing on single trips lasting around 10-14 days (Adam and Jauharee, 2009 and Adam et al., 2015).

Longline fleet used to be foreign-owned and operated in the EEZ, beyond 100 miles under licensed and joint venture arrangements. Following the cessation EEZ longline foreign licensing in May 2010, the Ministry has undertaken considerable work to establish a Maldivian longline fleet. Nineteen Maldivian-owned longline fishing vessels were licensed in the first year the scheme was established in November 2011. However, these vessels did not start operation until May 2012. Furthermore, there was a growing interest by the locals to either convert large handline yellowfin tuna vessels or to bring in new vessels (purchased from foreign owners) for longline operation. To cater for this demand while promoting a sustainable and transparent approach the Government of the Maldives decided to implement a transparent quota based approach to management of this fishery. As such it was decided to adhere to the fleet development plan submitted by the Maldives to IOTC, and cap the total output of the fishery by introducing a quota system for Maldivian longline vessel.

The quota system increased the revenue from the fishery through licensing fees and also provided a competitive platform for the companies. In 2015, 28 vessels were licensed to operate in the Maldivian waters an on high seas.

Table 1: Number of vessels operating in the IOTC area of competence, by type for last 4 years (2012-2015).

Year	Vessel type	Length Range (LoA, meters)							
		< 07.5	> 07.5 < 12.5	> 12.5 < 17.5	> 17.5 < 22.5	> 22.5 < 27.5	> 27.5 < 32.5	> 32.5 < 37.5	> 37.5
2012	Engine row boat	10	--	--	--	--	--	--	--
2012	Longline vessel	--	--	3	--	--	--	--	--
2012	Mechanized masdhoni	1	50	121	151	223	84	12	--
2012	Mechanized vadhu dhoani	3	6	--	--	--	--	--	--
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	-	-	-

4. Catch and effort (by species and gear)

Reported national tuna landings in 2015 were around 125,000 t. Of these close to 57% was skipjack tuna and 42% was yellowfin tuna. A small quantity of bigeye tuna is caught along with yellowfin component in the pole-and-line fishery. Earlier estimates by Anderson, 1996 showed this bigeye component may be 3-4% while more recent analysis of tag release data has shown that the estimates of bigeye tuna caught in the pole-and-line fishery may be 3 times more (Adam et al., 2014). Bigeye tuna is also caught by the longline fishery operating within the Maldives EEZ, the catch of which in 2015 was 230 MT.

Total tuna catches reached an all-time high of over 167,000 t in 2006. This was followed by a 53% decline in catch until 2010. Total tuna catches have since been recovering with 2015 recording a 60% increase in catch from 2010. A reason for the decline in total catches is the sharp decrease of skipjack catch over the period. Skipjack catches dropped from a record high of 138,000 MT in 2006 to 53,400 MT in 2012.

Yellowfin tuna is the second most important species in the tuna fishery. Catches of yellowfin has increased dramatically over the years, thanks to rapid growth of the handline yellowfin fishery that targets surface dwelling schools of the large yellowfin (> 100 cm FL) (Ahusan et al. 2016). Catches of yellowfin tuna were close to 52,500 t in 2015, the highest recorded so far. Close to 70% of the yellowfin catch was from the handline fishery targeted for export. Both pole-and-line and handline fishery operates 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 fleet targets kawakawa (*Euthynnus affinis*) and frigate tuna (*Auxis thazard*) in the coastal areas and atoll lagoons. The main trolling fleet effectively died in the late 1980s due to improved socio-economic changes. These days catch of kawakawa and frigate is mainly from pole-and-line vessels (Ahusan and Adam, 2011a and b, Ahusan 2016). Combined average catch of both species was 980 MT in the recent five years.

Longline fleet used to be foreign-owned and operated in the EEZ, beyond 100 miles under licensed and joint venture arrangements. Licensing scheme for foreign vessels was scrapped in March 2010. However, in 2011 Maldives has re-started a longline fishery exclusively for Maldivian-owned vessels. In 2015, 28 vessels were given licenses for longline operations. Catch by species by gear and effort trends is shown in Table 1, Figure 1 and Figure 2.

Fishing effort is measured in number of fishing days. This was the most natural and easiest since fishing takes place on day-trips leaving early in the morning and returning by evening. In the past, the uniform fleet structure and use of essentially pole-and-line method for most of the tuna catches makes the choice for unit of effort satisfactory. However, with increasing efficiency of vessels (size, engine horse power, fish hold and bait capacity, and operational factors) the day of fishing should be standardized to use the CPUE data (Kolody and Adam., 2011; Sharma et al. 2014). Total recorded days of fishing have been declining largely due to changes in structure and operational aspects of the fleet. Reduction in pole-and-line effort has been the most prominent due to a combination of factors; increase in vessels size, decline in catch and shift towards handline fishery. Handline effort has been relatively stable in the recent years (Table 2 and Figure 3).

Table 2. Annual catch (MT) and their effort by gear (days fished) in IOTC area of competence for the 2010-2014.
Note the fishing effort for 2014 was estimated.

Year	Gear	SKJ	YFT	BET	KAW	FRI	Effort
2011	HL	4,870	24,518		406	228	44,709
	LL	-	1		2	1	47
	PL	52,849	9,650		1,816	1,344	84,832
	TR	313	1,046		197	123	19,935
2012	HL	1,981	32,969		376	309	51,875
	LL	-	113		-	-	42
	PL	51,134	10,896		1,012	481	79,005
	TR	276	999		197	31	16,334
2013	HL	1,584	26,085		179	70	43,196
	LL	-	239		-	-	1,501
	PL	72,583	18,878		760	478	63,247
	TR	255	387		66	18	12,300
2014	HL	1,015	30,246		103	50	40,000
	LL		183		-	-	NA
	PL	67,301	18,481		741	578	60,000
	TR	181	181		45	22	10,000
2015	HL	1,057	36,299	1,433	19	8	40,072
	LL	0	89	122	-	-	NA
	PL	68,965	15,796	184	180	96	58,500
	TR	252	231	2	23	14	4,096

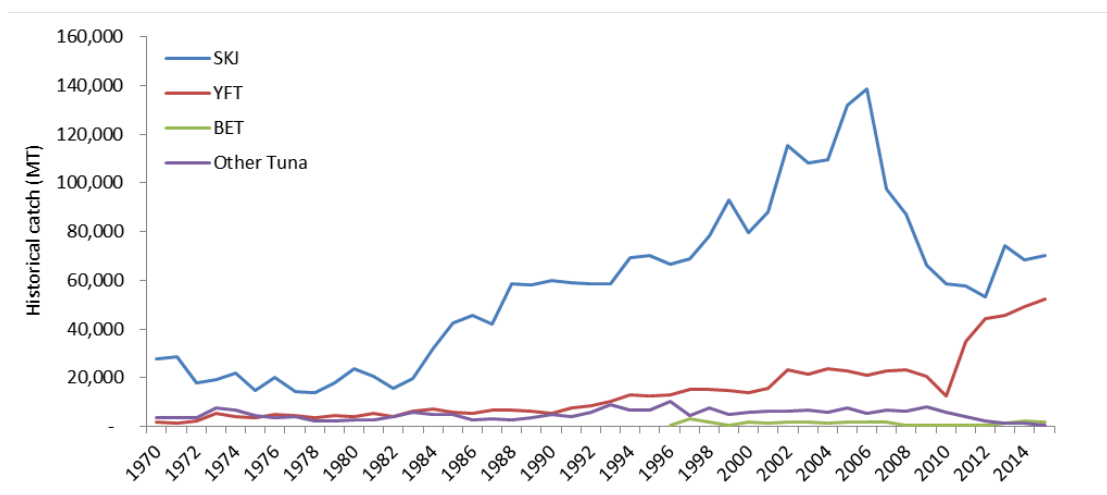


Figure 1: Historical annual catch for the national fleet by species (1970-2015). Other tunas include frigate and kawakawa.

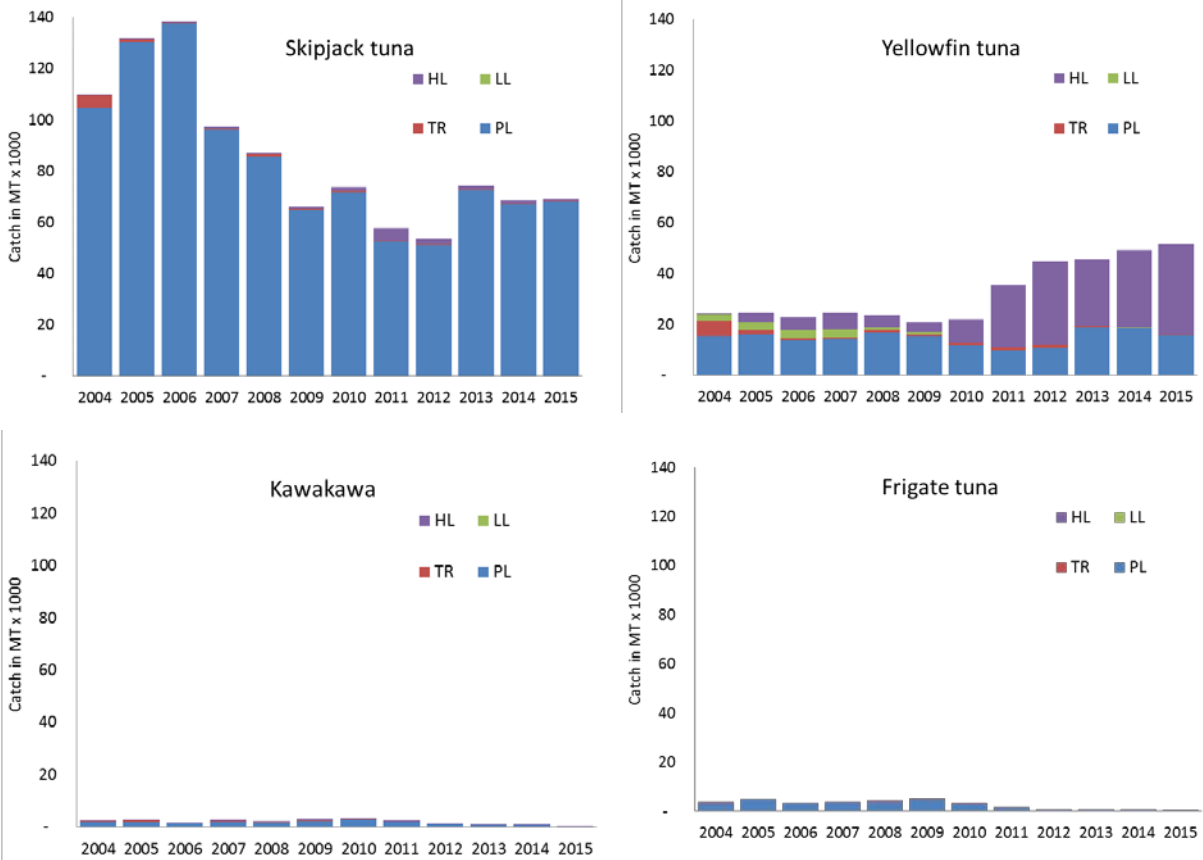


Figure 2: Catch trends by gear for each species for the last 10 years (2004-2014). Top right; skipjack tuna, top left; yellowfin tuna, bottom right; kawakawa, bottom left; frigate tuna.

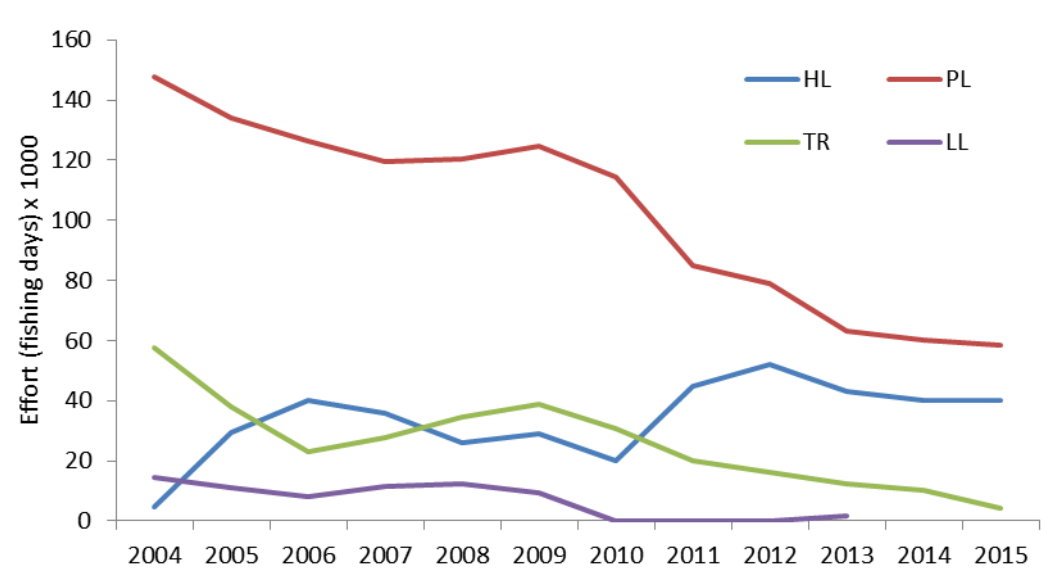


Figure 3: Trends in fishing effort by gear type for the last ten years (2004-2014), Note LL effort days not available for 2014 and 2015 and fishing effort for other three methods for 2014 and 2015 were estimated. Note that from 2014 longline effort is not recorded as number of days fished.

5. Recreational fishery

Big game fishing is popular among tourists and it is now common practice to have an outfit in almost every resort. Common target species are sail fish (*Makaira* spp.) and dolphin fish (*Coryphaena hippurus*), but also large yellowfin and skipjack tuna. Dogtooth tuna (*Gymosarda unicolor*) are often caught on the troll lines operated off the outer atoll reef. 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. The fishery is mostly a catch and release fishery. Tourist resorts have separate fishery landings forms and it is expected that their catch are recorded in the national fishery statistics.

There are no institutionalized mechanisms for recording catch from the recreational fishery. Unlike in other countries, Maldives does not have fishing clubs where recreational fisheries are data recorded.

Reef fishing logbooks have been recently introduced and being enforced slowly. Although not reef associated species, the logbook has provisions to report billfish catch and effort. In addition, MoFA is currently in the process of improving the fishery statistics of billfish and to introduce a data collection system for the billfish fishery. These activities are expected to improve the data on billfish landings in the Maldives and is in compliance with the Scientific Committee’s request (Paragraph 79 - 81, IOTC–2012–SC15–R[E], 2012).

6. Ecosystem and bycatch issues

Maldives has a highly selective form of fishing with virtually no by-catch and no discards (Miller et al, 2016a, Miller et al. in press). The pole-and-line method alone contributes more than 70% of the total tuna landings. Similarly handline and troll fishing methods are also highly selective with almost no bycatch and discards. Ali (2016) noted that currently less than 1% of tuna is caught from longline which contributes catches of non-target, associated and dependent species (such as sharks etc.)

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 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 in the Maldives as protected species for an indefinite period of time and prohibits the harvest of turtle eggs throughout the Maldivian archipelago. Maldives is also a signatory for the IOSEA MoU signed on April 2010.

Livebait is critical for the tuna pole-and-line fishery and considered as retained species. The species exploited 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 of this fishery and conducted a review of the livebait fishery. It has also produced a management plan for the livebait fishery.

6.1. Sharks

Shark fishing is banned in Maldives waters including the EEZ. The ban is effective from March of 2010. However, with the introduction of longline fishing from 100nm and beyond into high seas, there is a possibility of shark by-catch in the fishery. Provisions are in place in “Longline Fishery Regulation” to minimise the by-catch of sharks in adherence to IOTC Resolution 05/05 and the more recent one 12/09. In 2015, 28 vessels were given licenses under the quota system for longline operations.

NPOA-Sharks: Maldives’ National Plan of Action on the Conservation and Management of Sharks (NPOA-Sharks) has been formulated and presented to the stakeholders on April 2014. NPOA-Sharks has been endorsed by the Ministry of Fisheries and Agriculture on April 2015. With the aim to ensure the

implementation and observation of the total shark fishery ban, the NPOA-Sharks addresses six key areas; mitigation of impact of shark fishery ban, improvement of data collection and handling of shark by-catch, improve research on shark stocks, raise awareness on life-history characteristics of sharks, improve coordination, consultation and monitoring of shark ban and cooperate on international agreements pertaining to sharks and with relevant RFMOs on research and management of shark species.

Shark interactions in tuna longline fishery: The shark fishery ban prohibits usage of any shark species caught from the EEZ of the Maldives. The “Longline Fishery Regulation” has provisions to retain the dead shark by-catch for subsequent confiscation. However, as the Maldives do not yet have any observer coverage, the dead shark by-catch from the longline fleet operating in the Maldives’ EEZ is discarded to the sea. Logbooks for tuna longline fishery currently record the shark interactions as species-complexes; mako sharks, thresher sharks, hammerhead sharks, oceanic white tip shark and other sharks. An analysis of shark interactions by species-complexes in the longline fishery in 2014-15 was presented at the IOTC WPEB of 2016 (Figure 4 **Error! Reference source not found.** and Figure 5) (Ali, 2016).

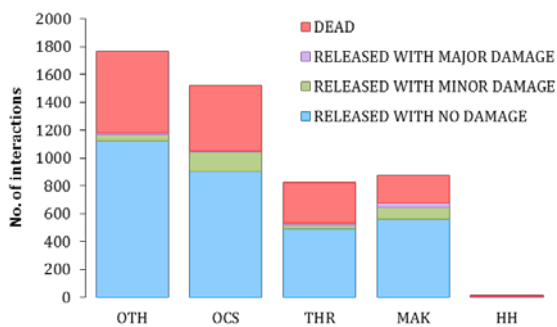


Figure 4: Interactions of sharks in the Maldives longline fishery - 2014

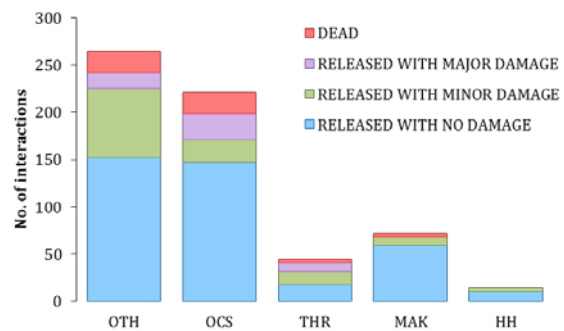


Figure 5: Interactions of sharks in the Maldives longline fishery - 2015

6.2. Seabirds

The interaction with seabirds is minimal in handline, pole-and-line, troll fisheries and longline fisheries. New logbook data collection system allows the fishermen to report such interaction and currently there is none reported. “Longline Fishery Regulation” mandates longline fishing vessels to implement at seabird mitigation measures in adherence to IOTC Resolution nos: 10/06 and the new 12/06.

6.3. Marine Turtles

Maldives is signatory to the Indian Ocean – Southeast Asian (IOSEA) Marine Turtle Memorandum of Understanding. With the end of the second 10-year Turtle Moratorium (2006-2016) that includes banning of hunting, taking, or harming turtles, including harvesting of eggs from 14 islands known for turtle nesting in January 2016, a new legislation on marine turtles came into force under the Environment Preservation and Protection Act (Law no. 04/93), where all marine turtles have now been declared as protected species and a nation-wide ban on turtle egg harvesting is also declared. Longline Fishery Regulation on Fishing and Export of Large Yellowfin Tuna describes turtle mitigation measures during longline fishing operations, including release of live turtles and having de-hookers and line cutters on vessels. Maldives has collaborated with the Bay of Bengal Large Marine Ecosystem Project (BoBLME) to raise awareness on the issue of derelict fishing gear on marine turtles in the central Indian Ocean. A paper studying the impacts of derelict fishing gear on turtles particularly oliveridley turtles (*Lepidochelys olivacea*) has been presented by the Maldives at the IOTC WPEB of 2014. Ali 2016) presented an analysis of marine turtle interactions in tuna longline fishery was presented at IOTC WPEB 2015 and 2016 (Figure 6).

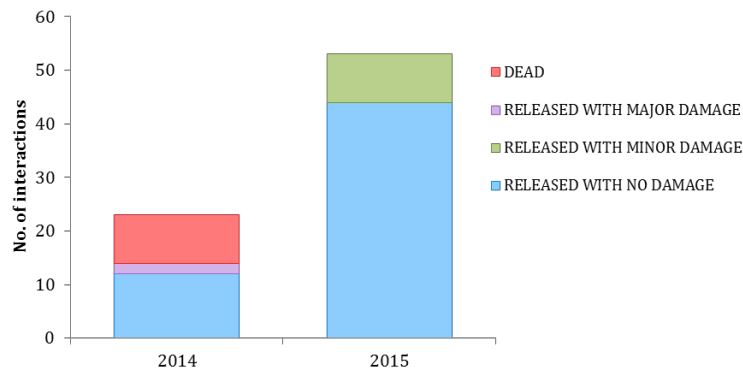


Figure 6: Interactions of marine turtles in the Maldives longline fishery 2014-2015

6.4. Other ecologically related species

Whale sharks and dolphins are protected under fisheries regulation. Even though handline fishermen target yellowfin tuna from dolphin associated schools, the interaction is minimal and there has been no reported dolphin catches or interactions (Table 3).

Table 3. Reported annual bycatch of special interest species (seabirds, marine turtles and marine mammals) as reported in LL, HL/PL logbooks. Note the turtle interactions in 2015 was reported from LL. All turtles were released alive with no harm.

	Seabirds	Marine Turtles	Marine Mammals
2011	NA	NA	0
2012	NA	NA	0
2013	NA	NA	0
2014	NA	24	0
2015	0	53	0

7. National data collection and processing systems

Data collection and reporting system of Maldives was based on total enumeration of the catch requiring conversion factors for estimating weight of the catch. Vessels report catch by species and effort data (number of days fished) to their respective island council offices where the vessels are registered. There the data are aggregated by vessel by month providing catch by species in number along with the number of days fished.

Complication on separating catch by gear occurred due to the prominence attached to vessel type rather than gear (Adam et al. 2012). For historical reasons it is assumed the ‘pole-and-line vessels’ would always use pole-and-line gear and so the vessel type is assigned to presumed gear type in the monthly aggregated forms.

7.1. Logbook data collection and verification

The enumerated system of data reporting through island councils still exist. The system is slowly being replaced by a logbook system starting from 2010. Logbooks went through a second revision in 2012 and the new logbooks were introduced in January 2013. Following successful establishment of logbooks it is now anticipated that the enumerated system of data reporting will be ceased from 1 January 2017. The logbook data has allowed Maldives to report data by the required 1 x 1 degree resolution helping to comply with data reporting requirements.

A web-enabled fishery information system (Figure 7) 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 is one stop shop for vessel registration, issuing fishing licenses & 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 certificates required for the exports of all frozen, fresh or canned tuna from the Maldives.

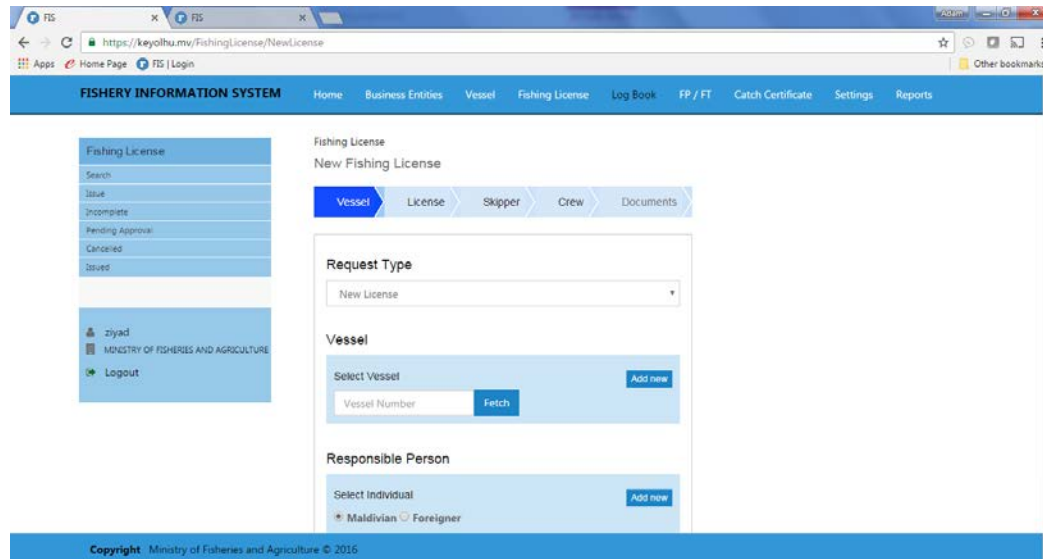


Figure 7. Screen capture of the updated Fisheries Information System (FIS) showing the Fishing License Module.

Logbook data could be verified through different mechanisms. The observer data collected by the Marine Research Centre, with donor funding, will allow verification of all aspects of logbook reported data. Further, landings data, obtained through the tuna exporting companies is used to verify and used in situations of non-reporting. Further, the Fisheries Information System allows near real-time tracking of landings and purchases as well as licensing.

7.2. Vessel Monitoring System

Maldives implements a VMS system on 100% of the longline vessels and a number of PL/HL vessels. At the time of writing, 149 vessels are equipped with VLDs (Figure 8).

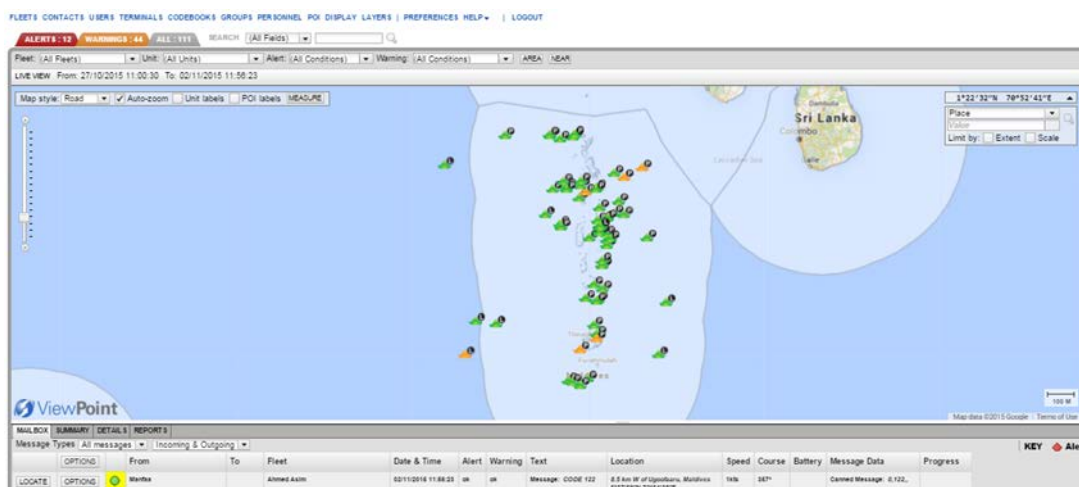


Figure 8. Screen capture of the Maldives VMS System. Currently 149 vessels have VLDs, monitored round the clock by the Fishery Management Division, of the Ministry of Fisheries and Agriculture

7.3. Observer Programme

The Observer program that was established in 2015 is defunct due to various reasons. The program has proven to be costly and due to high staff turn-over, it has been problematic to train and deploy observers on board fishing vessels. To overcome these difficulties the focus is now to shift to an electronic observer system to comply with the requirements of the relevant resolutions of the IOTC. A Worldbank funded project is being developed and is expected to be trialled next year. The initial focus will be to assess the effectiveness and feasibility of the use of such systems in Maldivian fishing vessels.

Furthermore, Marine Research Centre conducts regular scientific observation on pole-and-line and handline fishing trips. These observations are consistent with the IOTC observer requirements. To date, observer data has been collected from over 100 fishing trips in 2015 and 2016 and the information collected has proven to be very useful to cross verify the information provided by the fishermen and the other information regarding fishing events.

7.4. 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 the three main PL tuna landing ports, fishermen samplers, a scientific observer and MRC staff. It should also be noted that under the implementation of EU – IUU instruments, fresh fish collectors (fish buyers) are required to record the details of catch and report to the Ministry which is being used as part of the issuing of catch certificate and to corroborate with the fishermen reported logbooks. Table 4 provides a summary of the size data for the year 2015.

Table 4: Number of individuals measured, by species and gear for 2015.

Gear	SKJ	YFT	BET	KAW	FRI	Total
PL	39,094	37,949	1,478	1,722	2,442	82,230
HL	100	2,079	68	0	0	2,247
LL	0	189	305	0	0	494
Total	39,194	40,217	1,851	1,722	2442	84,971

7.5. 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 in the IOTC Convention Area.

8. National research programs

Table 5 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. The newly implanted Fishery Information System (FIS) continues to be tweaked and debugged to improve performance. The integrated web-enabled database enables to maintain records of landings, fishing vessel registries, fishing license and help to compile the various logbooks (HL, PL and LL). The system is also capable to produce summaries that would facilitate reporting data to IOTC

The bycatch sampling program that started in 2014 continues to date with monitoring of handline large yellowfin tuna trips in addition to PL trips. The objective of the programme is take part on regular fishing trips to observe and collect data from the fishing trips, including biological and operational data. A sampling protocol is established for the observer on sampling, and recording on database of both the catch and bycatch including the livebait fishery, valid to meet IOTC observer criterion.

Table 5: Summary table for national research programs.

Project title	Period	Countries involved	Budget total	Funding source	Objectives	Short description
Maldives Catch and effort data standardization	6 months Starting Date: September 2016	Maldives	US\$ 3,500	IPNLF & World Wise Foods	To develop a standardized CPUE series for the consideration of IOTC Working parties	The project aims to clean the different sources of catch and effort data available from Maldives and develop a standardized CPUE series for possible use in stock assessment of tropical tunas, particularly yellowfin tuna
Investigation of biodegradability of material to be used on eco-FADs	12 months Starting Date: June 2016	Maldives, ISSF	Maldives – US\$ 1,500 ISSF – US\$ 5,500	ISSF and MoFA/MRC (in kind contribution)	To test and biodegradability of material to be used on possible ecoFADs	Three different type of rope material are tested in tropical open-ocean setting to see how fast they would degrade. Ropes attached on mock-fads are removed every other month and tested for their strength and deterioration.
FAD Research in the Maldives - Using Maldives Anchored Fish Aggregating Devices as Research Platforms	36 months, (starting date: October 2016)	Maldives, France (French IRD) UK	US\$ 500,000	IPNLF, Marks & Spencer (UK), MARBEC (IRD, France), MRC/MoFA		Research is linked to PhD (staff of MRC/MoFA). On key objective is to explore possibilities of using presence/absence data of tunas around anchored FADs as a means to estimated abundance proxies independent of the fisheries.

Development of Fishery Information System (FIS) web-enabled database	2012-2018	Maldives	US\$ 81,000	IPNLF & Marks & Spencer (UK)	To develop an integrated database to enter and compile fishery information	This brand new database was developed to accommodate logbook data collection currently in place. It also allows to monitor vessel registry and issue fishing license.
Bycatch sampling Programme	2014-2017	Maldives	US\$ 100,000	IPNLF	To observe and sample bycatch in pole-and-line fishery	Observers take part on regular fishing trips to observe and measure the total catch, including species composition of tuna catch. A sampling protocol has been established for observations, sampling, and recording on database of both the catch and bycatch including the livebait fishery, valid to meet IOTC observer criteria. Data collection encompasses the PL and HL fisheries.
Port Sampling Programme	2015-2016	Maldives	US\$ 30,000	WWF - Pakistan	To increase the size sampling effort in the Maldives	Port-samplers are based in 3 major landing site in the Maldives, where size sampling takes 5 days a week. The project ended early of 2016. The samplers continue data collection with funding from the Government of Maldives.

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

The table below summarises the progress Maldives has made to recommendations of the Scientific Committee and Specific Resolutions relevant to the work of the Scientific Committee.

Table 6: Summary response on the progress made to recommendation of the SC and specific Resolutions relevant to the work of the Scientific Committee.

Res. No.	Resolution	Scientific requirement	CPC progress
15/01	On the recording of catch and effort by fishing vessels in the IOTC area of competence	Paragraphs 1–10	Logbook data collection system has been established in 2010; logbooks revised in 2013 based on the new requirements of Res 13/03. Each fishing vessel should have a logbook on board to record catch and effort and reporting of catch and effort data is mandatory. For the first time, in 2013 Maldives reported the catch and effort data by IOTC requirements of 1x1 geographic grid. A new web-enabled database to compile the data in new format is complete and came into operation in 2016.

Res. No.	Resolution	Scientific requirement	CPC progress
15/02	Mandatory statistical reporting requirements for IOTC Contracting Parties and Cooperating Non-Contracting Parties	Paragraphs 1- 7	Maldives has been regularly providing total catch/effort and size data for the stock assessment work of the working party meetings. Maldives submitted the 2015 catch and effort and size frequency data by June 30, 2016. Longline data was also submitted to IOTC by June 30, 2016.
15/05	On the conservation for striped marlin, black marlin and blue marlin	Paragraph 4	Catches of black marlin in the Maldives are from dropline and to a lesser degree from trolling within coastal areas outside of the atolls. Black marline may also be caught in LL bycatch which are reported. Logbook for the PL/HL has provisions to record marlins which may be caught as bycatch in the fisheries. There is ongoing effort at MoFA to improve the fishery statistics of billfishes.
13/04	On the conservation of cetaceans	Paragraphs 7– 9	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 & bycatch sampling programme records all interactions with cetaceans during fishing trips. Reports from the observer program will present all, if any, interactions with cetaceans.
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. Maldivian flagged vessels only recently started fishing on high seas. These vessels are only longline vessels and are unlikely to encounter any interaction that is worthy of reporting for fishery purpose. The logbooks do have a field for recording such unusual encounters if any. An observer scheme is now in place to verify any such interactions.
13/06	On a scientific and management framework on the conservation of shark species caught in association with IOTC managed fisheries	Paragraphs 5-6	All species of sharks are protected in the Maldives and actively targeting sharks inside Maldivian waters is prohibited. The main types of fishery in Maldives are the pole and line and the handline tuna fishery. Observations suggest that interaction with sharks is minimal in these fisheries and any shark that is caught is released live or with minimal harm. The Regulation on longline fishing in Maldives stipulates that all live sharks must be released immediately should they be caught in the longlines and any dead sharks must be landed at an inspection site for verification. Shark interactions are recorded in detail in the log books of all fisheries targeting tunas (PL, HL and LL) and information on shark interactions has been reported to the IOTC as required. Under the recently formulated shark NPOA, review and analysis of longline bycatch is given a priority. LL shark bycatch data form 2015 has been provided to IOTC.
12/09	On the conservation of thresher sharks (family Alopiidae) caught in association with fisheries in the IOTC area of competence	Paragraphs 4-8	Shark fishing is prohibited in Maldivian waters. See section on Resolution 13/06 for details. An observer scheme is now established and the information on shark interactions will be verified through these observer schemes.
12/06	On reducing the incidental bycatch of seabirds in longline fisheries.	Paragraphs 4-8	The Appendix 2 of "Longline Fishery Regulation" gives 6 ways to mitigate the bycatch of seabirds as per the relevant IOTC resolutions. Implementation of one of these mitigation measures is mandatory. Interactions with seabirds should also be reported as per the IOTC requirements through the logbooks. Most recent data and findings were presented in the 12 th meeting of the Working Party on

Res. No.	Resolution	Scientific requirement	CPC progress
			Bycatch.
12/04	On the conservation of marine turtles	Paragraphs 3, 4, 6-10	Maldives is signatory to the Indian Ocean – Southeast Asian (IOSEA) Marine Turtle Memorandum of Understanding. A second 10-year Turtle Moratorium is in force from 2008-2018 that includes banning of hunting, taking, or harming turtles, including harvesting of eggs. Appendix 2 of Regulation on Longline Fishing in the Maldives describes turtle mitigation measures during longline fishing operations, including release of live turtles having de-hookers and line cutters on vessels as per the relevant IOTC resolutions.
11/04	On a regional observer scheme	Paragraphs 9	The Observer program that was established in 2015 is defunct due to various reasons. The program has proven to be costly and due to high staff turn-over, it has been problematic to train and deploy observers on board fishing vessels. To overcome these difficulties the focus is now to shift to an electronic observer system to comply with the requirements of the relevant resolutions of the IOTC. A Worldbank funded project is being developed and is expected to be trialled next year. The initial focus will be to assess the effectiveness and feasibility of the use of such systems in Maldivian fishing vessels. However, MRC has deployed scientific observers on over 100 fishing trips. The information collected by the observers are consistent with the IOTC requirements and has proven to be very useful to validate the information provided in the fisheries log books.
05/05	Concerning the conservation of sharks caught in association with fisheries managed by IOTC	Paragraphs 1-12	Shark fishing is prohibited in Maldives waters (the entire EEZ). The ban is effective from May 2010. The only fishery likely to catch shark would be longline fishery. Currently there 28 active longline vessels (targeting BET/YFT) operating between 100nm to 200nm of Maldives EEZ. The Regulation on Longline Fishing in Maldivian waters requires shark by-catch to be released alive if possible and landed otherwise to an inspection port.

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