Maldives Tuna Fishery Management Plan

JANUARY 2021

UNOFFICIAL TRANSLATION

Government Gazette Reference: Volume 50, Issue 15, 27 January 2021

Ministry of Fisheries, Marine Resources & Agriculture

Malé, Maldives

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January 2021

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Acknowledgement:
The Ministry acknowledges the various government agencies and stakeholders that contributed towards making this management plan holistic and inclusive. The Ministry also thanks the island councils for playing a crucial role in ensuring that the concerns of fishers and sector stakeholders are directly heard at the highest level of fisheries governance and policy making.

The Ministry highly appreciates the time, meticulous contributions and the wealth of knowledge shared by fishers, without whom this plan would not have been possible. Their meaningful insights and constructive suggestions have been invaluable.

The Ministry recognises Maldives Marine Research Institute's efforts to produce research on our marine resources and provide technical support for evidence-based policy making.
Sincere thanks to the World Bank funded Maldives Sustainable Fisheries Resources Development Project (SFRDP) for providing the Ministry with the essential resources and financial support for the formulation of this plan.

For bibliographic purposes, this management plan shall be cited as:

Ministry of Fisheries, Marine Resources and Agriculture (2020) *Maldives Tuna Fishery Management Plan 2021.* MoFMRA, Malé, Maldives.

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Foreword

Praise be to Allah, the Creator of the oceans, marine life and other blessings upon the earth. Prayers and peace be upon our Prophet, Muhammad, who taught us the righteous way to make use of these blessings.

The oceans, lagoons and reefs are national heritages that are inextricably linked to our culture, tradition, and the Maldivian identity. The Maldives fisheries are heavily dependent on this heritage. Hence it is our utmost responsibility to ensure that they are faithfully passed down to our future generations. The Ministry is committed to working towards achieving this goal, and to implement the government's policies on the expansion of the blue economy agenda. To this end, we have compiled this plan to steer our efforts towards maximising long-term benefits of marine resources to Maldivians.

Since the time of our forefathers, the fishery sector has been a major pillar of our economy, upon which our incomes, our livelihoods and our sustenance are dependent. Therefore, the measures included in these fisheries management plans are geared towards the sustainable development and management of these fisheries resources. These legally recognised fisheries management plans mark a watershed moment in the history of marine resource management in the Maldives.

Fisheries resources are common goods, of which all Maldivians hold a share. These plans have been developed based on principles of the Precautionary Approach, Ecosystem-Based Management, Sustainable Development and Equity, with due regard to the various and variety of interactions within an ecosystem and to ensuring timely and cost-effective measures are taken to safeguard ecosystems and prevent irreparable damage to them. This process has been informed by meaningful suggestions and constructive feedback from various stakeholders including fishers, others engaged directly and indirectly within the fisheries sector as well as civil society organisations working towards natural resource management, conservation, and protection.

The fisheries management plans will be the primary basis for guiding the authorities as well as stakeholders in the sustainable management of the fisheries sector in the Maldives. These plans comprise of developmental goals and objectives for each fishery, measures and actions to achieve them, the roles and responsibilities of stakeholder agencies in the implementation of these measures and an implementation timeline for the measures. It is my sincere hope that these plans contribute towards realising the vision set forth by the Fisheries Act of the Maldives.

—

Zaha Waheed

Minister of Fisheries, Marine Resources
and Agriculture

Abbreviations

EPA	Environment Protection Agency
FIS	Fisheries Information System
IGO	Intergovernmental Organisation
IOTC	Indian Ocean Tuna Commission
LGA	Local Government Authority
MCS	Maldives Customs Services
ME	Ministry of Environment
MFDA	Maldives Food and Drug Authority
MIRA	Maldives Inland Revenue Authority
IUU	Illegal, Unreported and Unregulated
UNCLOS	United Nations Convention for the Law of the Sea
UNFSA	United Nations Fish Stocks Agreement
EM	Electronic Monitoring
MMRI	Maldives Marine Research Institute
MNDF - CG	Maldives National Defence Force – Coast Guard
MoE	Ministry of Education
MoED	Ministry of Economic Development
MPS	Maldives Police Services
NBS	National Bureau of Statistics
RFBs	Regional Fisheries Bodies
SDFC	SME Development Finance Corporation

Chapter 1

Preamble

1.1 Introduction and Title

This Plan is made pursuant to Article 18 of the Act No. 2019/14 (Fisheries Act of the Maldives) (hereinafter referred to as the "Fisheries Act") and provides for the management of the fishery stated in Section 17 (a) (3) ,(2) ,(1) and (5) of the Act. The plan will be the primary basis for guiding the authorities as well as stakeholders in the sustainable development of the tuna fishery and trade in the Maldives. This Management Plan shall be cited as "Maldives Tuna Fishery Management Plan".

1.2 Overall purpose

The overall purpose of the management plan is to:

(a) Provide for the sustainable use of tuna fishery resources, their ecosystems and all other marine organisms interconnected therewith, for the benefit of the future generations of the Maldives;

(b) Develop and manage the tuna fishery while upholding the traditional Maldivian way of one-by-one tuna fishing, and maintaining the Maldivian tuna fishery as an exemplary fishery with minimal environmental and ecological impacts;

(c) Provide for a fishery development framework aimed at maximising economic benefit from tuna fishery and ensure long-term benefits to the people of Maldives through the responsible management of the fishery;

(d) Protect the rights of fishers engaged in tuna fishery, and ensure wealth distribution from the fishery are in accordance with principles of equity and good governance; and

(e) To develop a tuna fishery management framework that is aligned with regional and international conservation and management measures.

1.3 Scope and Application

1.3.1 Species

The Plan applies to all the species listed in the table below:

	Scientific name	Common name
(a)	*Katsuwonus pelamis*	Skipjack tuna
(b)	*Thunnus albacares*	Yellowfin tuna
(c)	*Thunnus obesus*	Bigeye tuna
(d)	*Auxis thazard*	Frigate tuna
(e)	*Euthynnus affinis*	Kawakawa

Furthermore, in addition to the target species of the fisheries listed in Section 1.3.2, the Plan shall also apply to all other by-catch species caught in association with the tuna fishery.

1.3.2 Fishing Methods, Related Activities and Parties

Fishing methods/gears within the scope of this Plan are:

a) Pole-and-line skipjack tuna fishing;
b) Handline yellowfin tuna fishing;
c) Longline yellowfin tuna fishing;
d) Trolling; and
e) Any other gears or methods that may introduced to fish for any of the species managed by this Plan

The Plan applies to all activities carried out in the Maldives that may impact tuna resources, including but not limited to all activities pertaining to harvesting, preserving, transporting and transhipment of fish and fisheries products. The Plan also applies to all persons, vessels, vehicles, aircrafts, processing and export facilities or other crafts or places engaged in or otherwise connected with any activity within the scope of this Plan.

All activities associated with tuna fishery related bait fishing will be managed under a separate bait fishery management plan. Therefore, no bait fishery-specific measures are included within this plan.

1.4 Guiding Principles

1.1.1 Precautionary Approach: Timely and cost-effective measures shall be taken to safeguard ecosystems and prevent irreparable damage to them despite the lack of full scientific certainty.

1.1.2 Ecosystem-based management: The various and variety of interactions within an ecosystem, including anthropogenic elements, shall be recognised as opposed to accounting for matters, species, or ecosystem services in isolation.

1.1.3 Universal Responsibility: Local policies governing marine resource management shall be in harmony with global efforts to protect, conserve and manage biodiversity.

1.1.4 Sustainable Development: In developing the fishery, the needs of the present shall be met without compromising the ability of the future generations to benefit from the resource.

1.1.5 Equity: Resources shall be acknowledged as shared common good, and benefits obtained from the utilisation of resources shall be shared in a fair and just manner among all through the application of transparency, legitimacy, accountability and decentralisation.

1.1.6 Participatory Approach: All stakeholders, particularly those who are directly affected by a policy or a measure, shall be engaged in the decision-making process to ensure inclusivity and consensus-oriented outcomes.

1.5 Interpretation

Unless stated otherwise, words or expressions used in this Plan have been given the meanings specified in Annex 1: Glossary.

1.6 Entry into Force

This Plan shall come into force upon its publication on the Government Gazette.

Chapter 2

Tuna Biology and Habitat

Tunas belong to the Family Scombridae, which they share with other species such as mackerels, Spanish mackerels and bonitos. In general, tunas have tropical and subtropical distributions, however, some species such as bluefin tuna are found in temperate regions. While some of these species are typically found in coastal habitats, others are known to be oceanic. Tunas are highly migratory and predatory fishes, capable of travelling at considerable speed due to their streamlined body. Unless otherwise stated, information presented in this Section is drawn from a report by Collette and Nauen (Collette and Nauen 1983). The illustrations presented herein are sourced from the website of the Indian Ocean Tuna Commission.

2.1 Skipjack Tuna

Species name:	*Katsuwonus pelamis (Linnaeus, 1758)*
English Name:	Skipjack tuna
Local Name:	Kalhubila mas

Skipjack tuna is an epipelagic, highly migratory oceanic fish found commonly in tropical waters in temperatures between 14.7o C and 30o C. Depth range of skipjack tuna spans from the surface to 260 m during the day time, but is limited to near surface waters at night. They have a strong tendency to form schools in surface waters, associated with other tuna species, such as small yellowfin tuna, frigate tuna and kawakawa.

Skipjack tuna predominantly feed on fishes, crustaceans and molluscs, but as an opportunistic feeder, they prey on any forage available. Their feeding activity peaks in the early morning and in the late afternoon.

Skipjack tunas mature at around 40 cm fork length (range 40-45 cm) with a maximum length of about 108 cm, corresponding to a weight of 32.5 to 35.5 kg. Common length for skipjack tuna is cited to be around 80 cm, which corresponds to a weight of 8-10 kg.

Skipjack tuna spawn in multiple batches throughout the year in equatorial waters.
In the Maldivian pole-and-line fishery, fork lengths between 36-65 cm were reported to comprise the majority of the catch in the early nineties (Marine Research Centre 1996).

2.2 Yellowfin Tuna

Species name:	*Thunnus albacares (Bonnaterre, 1788)*
English Name:	Yellowfin tuna
Local Name:	Reendhoouraha kanneli

Yellowfin tuna, is an epipelagic, highly migratory species with a worldwide distribution in tropical and subtropical seas in temperatures between 18o C and 31o C. They have a depth range of 1-250 m, but are commonly found between 1-100 m. Yellowfin tuna are distinguishable by their bright yellow dorsal, anal, and caudal fins, with the second dorsal and anal fins being particularly long. They are generally a dark, metallic blue on the dorsal side, and a silvery, iridescent colour on the ventral side, with about 20 vertical lines run across their bellies.

They are a schooling fish and commonly school in near-surface waters. Schooling occurs primarily by size and can be mono or multi species schools. As such, adult fish are commonly associated with

dolphin schools, which Maldivian fishermen use to locate tunas.

Yellowfin tunas are comparatively large fish, with an average recorded fork length of 150 cm and a maximum recorded fork length of 239cm (Froese and Pauly 2019). The maximum published weight for yellowfin tuna is 200kg and maximum reported age is 9 years (Froese and Pauly 2019).They are known to mature as early as 50-60 cm fork length, which corresponds to and age of 12-15 months.

Yellowfin tuna are known to spawn throughout the year in tropical and equatorial waters and are multiple spawners, spawning every few days over the spawning period.

In the Maldivian tuna fisheries, small yellowfin tuna are caught in the pole-and-line tuna fishery, while surface swimming adults and sub-adults larger than about 70 cm fork length are caught using handlines. Trolling is used to a lesser extent to catch large fish.

2.3 Bigeye Tuna

Species name: *Thunnus obesus (Lowe, 1839)*
English Name: Scombridae
Local Name: Loabodu kanneli

Bigeye tuna is a highly migratory species with a worldwide distribution in tropical and subtropical waters of the Atlantic, Indian and Pacific oceans. It is an epipelagic and mesopelagic species occurring from the surface to depths of about 250 m. It has been found in temperatures ranging from 13o C to 29o C, with 17o C to 22o C being the optimum range.

Bigeye tuna is a schooling fish, with juveniles and small adults forming schools at the surface. The schools can be mono-specific or mixed with yellowfin tuna or skipjack tuna. These schools may also be associated with floating objects. Adult bigeye tuna tend to stay in deeper waters.

The average fork length for bigeye tuna is 180 cm, however, the maximum length reported is much higher, at 250 cm. Bigeye tunas have been reported to weight as much as 210 kg (Frimodt 1995). The

maximum reported age is 11 years (Stequert and Marsac 1989). Bigeye tunas have been known to mature between 100 to 130 cm fork length in the Indian Ocean.

Bigeye tuna are multiple spawners and spawn throughout the year in tropical waters. Spawning may occur every 1 or 2 days over several months (Nikaido et al. 1992), over the full moon period (Kailola et al. 1993).

Maldivian tuna fishermen are most familiar with the juvenile stages of bigeye tuna, where it is caught from mixed schools with yellowfin tuna in the pole-and-line tuna fishery. However, adult fish are caught in the longline fishery.

2.4 Frigate Tuna

Species name:	*Auxis thazard (Lacepède, 1800)*
English Name:	Frigate tuna
Local Name:	Raagondi

Much like the other tuna species discussed, frigate tuna is also a highly migratory fish found in the tropical waters of the Indian, Atlantic and Western Central Pacific oceans. It is an epipelagic, oceanic as well as neritic species which forms large schools.

Frigate tuna feed on small fish, squids, planktonic crustaceans (megalops), and stomatopod larvae. Spawning season of frigate tuna is known to vary with area, although in some places, it may extend throughout the year.

Frigate tunas are known to reach a maximum length of 65 cm fork length, but on average, they have a total length of 60 cm. However, frigate tuna in Maldivian pole-and-line catches were mostly in the range 27-41 cm FL during the 1994-1996 period (Anderson et al. 1998).

In Maldivian waters, frigate tunas show seasonal distribution. They occur most commonly on the western side during the northeast monsoon and on the eastern side during the south west monsoon (Anderson et al. 1998).

2.5 Kawakawa

Species name:	*Euthynnus affinis (Cantor, 1849)*
English Name:	Kawakawa
Local Name:	Latti

Kawakawa is a highly migratory species commonly observed in warm waters of the Indo-West Pacific region. It is an epipelagic species found in temperatures ranging from 18o C to 29o C. Kawakawa forms multispecies schools by size, mostly with small yellowfin, skipjack and frigate tunas.

While kawakawas are known to reach maximum lengths of about a 100 cm fork length, they are more commonly reported to be approximately 60 cm FL. Although, Maldivian pole-and-line catches in the 1994-1996 period showed fork length to range between 26-48 cm (95% of the catch) (Anderson et al. 1998). The maximum published weight for a kawakawa is 14 kg. They are known to reach maturity at around 39.8 cm, with a range of 40-65cm. Spawning of kawakawa is seasonal and varies according to region, although sexually mature fish maybe encountered throughout the year.

Kawakawa is an opportunistic predator which feeds on fish, shrimps and cephalopods.

Chapter 3

Overview of the Indian Ocean Tuna Fishery Trends and Stock Status

This section presents a brief overview of the fisheries, fleets and gears harvesting tunas in the Indian Ocean. As tunas are a highly migratory group of species, their stocks are spread across the Indian Ocean, with a number of states actively harvesting these shared resources. As such, their stock assessment and management falls under the purview of the regional fisheries management organisation, the Indian Ocean Tuna Commission (IOTC). To this end, the IOTC regularly collects and analyses fisheries data from all member states fishing in the IOTC Area of Competence. The working parties established within the operational structure of the IOTC are tasked with using such data, amongst other resources, to carry out stock assessments and develop management advice. The findings and advice synthesised from the work of these working parties are reviewed and reported to the IOTC Commission by the Scientific Committee.

The information and data discussed in this section is from IOTC, namely the most recent reports of the Working Party on Tropical Tunas, Working Party on Neritic Tunas and the Scientific Committee.

3.1 Fisheries and Catch Trends

Large scale, industrial tuna fishing in the Indian Ocean began relatively recently. Until the arrival of purse seiners from distant water fishing nations in the mid-1980s, the Japanese, Taiwanese and Korean longline fisheries and small artisanal fisheries of coastal nations, such as the Maldivian pole-and-line fishery and the gillnet fishery and trolling by Srilankan vessels and some

other coastal nations were the major fisheries in the Indian Ocean (Miyake et al. 2004).

With the arrival purse seiners from France and Spain targeting skipjack and yellowfin tuna, Indian Ocean tropical tuna catches increased rapidly. This increase was compounded by increased catches from the Maldives pole-and-line fishery as a result of the developments that took place during 1970s and 1980s. This includes, for instance, the mechanization and advancement of the pole-and-line fleet from 1974 onwards, the installation of Anchored FADs starting from 1981 and development of processing facilities in the country, thereby enabling the production of diversified fishery products and increased access to international markets. Other coastal countries have also developed their fleets and consequently, increased their tuna catches during this time. The fisheries of Indonesia, Sri Lanka, I.R. of Iran and India, together with Maldives, contributes 51% of the total catches of tropical tuna species in the Indian Ocean.

3.2 Tropical Tuna Catch Trends

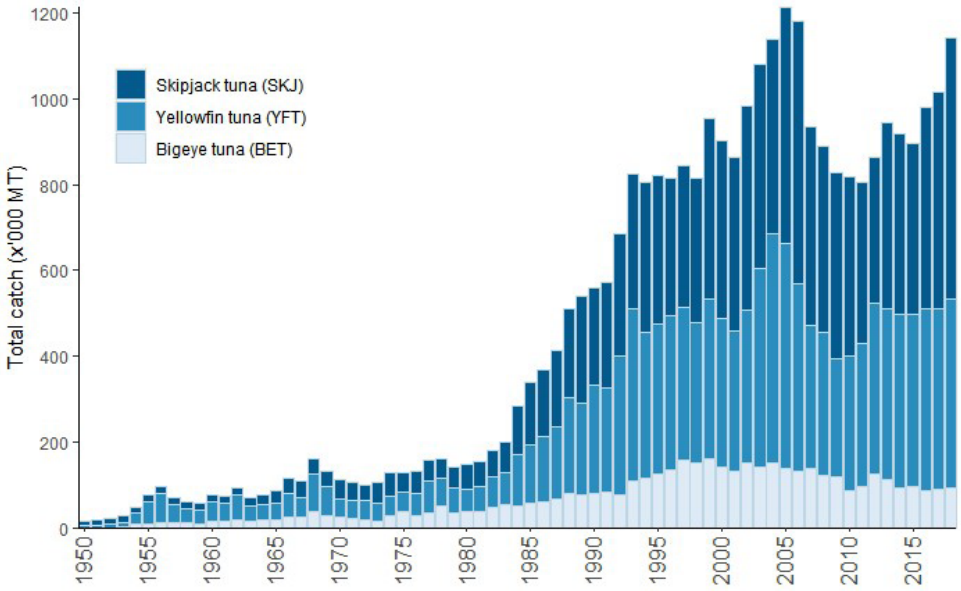
Tropical tunas (skipjack, yellowfin and bigeye) are the most important tuna species caught from the Indian Ocean. Skipjack, small yellowfin and bigeye tuna are primarily caught from surface gears such as purse seines, pole-and-lines and gillnets. Large yellowfin tuna are caught using handline and purse seining on free schools. The longline fishery also catches deeper swimming large yellowfin and bigeye tunas. Of the three tropical tuna species, skipjack is the most important, comprising of 49.7% of the total tropical tuna catches in the recent five years (2015-2019), as per data published by the IOTC. This was followed closely by yellowfin tuna (41.6%) and bigeye tuna (8.7%).

The bulk of the Indian Ocean tropical tunas are landed by a few gears; IOTC data for the 2015-2019 period shows purse seines to be the most important, landing 44% of the total tropical tuna catch. Handlines and trolling (18%), gillnets (18%), pole-and-line (11%) and longline (7%) were the other gears of importance for tropical tunas.

Figure 1 presents the historical catch trend of the three tropical tunas for the Indian Ocean from 1950-2019. As discussed previously, Indian Ocean skipjack tuna catches increased substantially since the mid-1980s, contributed primarily by the industrial purse seiners and the Maldivian pole-and-line fishery. Total catches increased annually until 2006 when it peaked at over 600,000 tonnes, followed by a decline in ensuing years. However, catches have followed an increasing trend from 2013 onwards, reaching 547,248 tonnes in 2019.

A similar catch trend was seen for yellowfin tuna with catch remaining stable prior to 1984 and increasing since. Yellowfin tuna catches peaked in 2004 at over 525,000 tonnes, which was followed by declining catch until 2011. Since 2012, catch of yellowfin tuna has been recovering and was about 424,000 tonnes in 2019.

Bigeye tuna catches for the Indian Ocean increased steadily from 1970's. The increase was primarily due to the industrial longliners and European purse seiners during the 1980s. Bigeye tuna catch for the Indian Ocean peaked in the late 1990's reaching over 162,000 tonnes. However, catches have declined since then and recent catches (2015-2019) have been on average, around 88,303 tonnes.

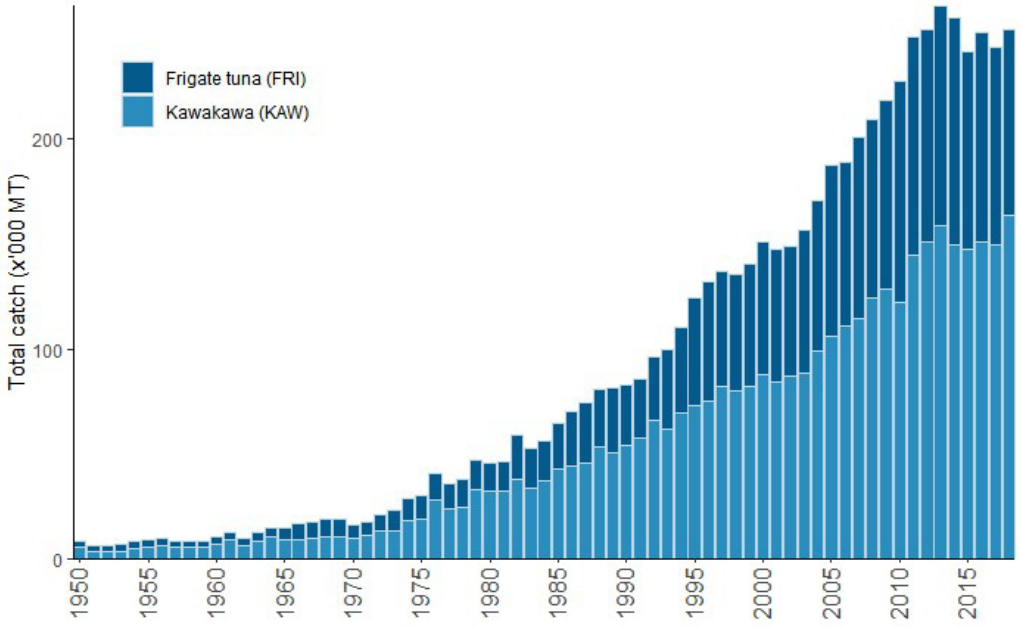


- **Figure 1:** Historical catch trend of the three tropical tunas for the Indian Ocean (1950-2019)

3.3 Neritic Tuna Catch Trends

Neritic tunas are primarily caught in the coastal fisheries in the Indian Ocean. Unlike other tuna fishing basins, catches of neritic tunas represent a significant proportion of total tuna catches in the Indian Ocean (Lecomte et al. 2017). Indian Ocean coastal countries land the bulk of frigate tuna and kawakawa, namely, Indonesia, Iran, Sri Lanka and India. Frigate tuna and kawakawa are also important by-catch species of the industrial purse seiners. Of the neritic tunas caught in the Indian Ocean and managed by the IOTC, frigate and kawakawa are of importance to Maldives as the two are commonly targeted in the tuna fisheries. As such, this section will be focussed on these two species.

Indian Ocean frigate tuna catch was estimated to be around an average of 3,000 tonnes in the 1950's. Since 1970's, catches increased and peaked at over 109,000 tonnes in 2014. Since then, catches decreased slightly, to about 92,000 tonnes in 2018. Kawakawa has also seen an increase in catch during this period, albeit more prominent than frigate tuna. Kawakawa catches peaked in 2019, at 164,000 tonnes. Figure 2 presents the catch trend of Kawakawa and frigate tuna for the Indian Ocean from 1950-2019.



- **Figure 2:** Historical catch trend of Frigate tuna and Kawakawa for the Indian Ocean (1950-2019)

3.4 Status of the Tuna Stocks in the Indian Ocean

Stock assessments for the Indian Ocean tunas are conducted at the IOTC by the Working Party on Tropical Tunas for skipjack, yellowfin and bigeye tuna and by the Working Party on Neritic Tunas for frigate tuna and kawakawa. The Working Party on Tropical Tunas conducted the first stock assessment for skipjack tunas in 2011 for the period 1950 - 2009. This assessment revealed the changes that occurred in the stock during this period, and estimated the stock size in 2009. Based on the results, the Working Party determined that the stock of skipjack tuna was not overfished and not subject to overfishing. The assessment used Maldives pole-and-line standardized catch per unit effort (CPUE) series developed for 2004-2009, as an index of abundance. The most recent assessment was conducted in 2020, based on which and other indicators, the Working Party determined the skipjack tuna stock was not overfished and overfishing was not occurring.

The most recent stock assessment for yellowfin tuna was conducted in 2018. Following this assessment, the stock was determined to be overfished and subject to overfishing. Members of the IOTC have passed a number of resolutions at various sessions of the Commission to reduce the catch of yellowfin tuna and allow rebuilding of the yellowfin tuna stock, the last of which was Resolution 19/01 (On an interim plan for rebuilding the Indian Ocean yellowfin tuna stock in the IOTC area of competence). The Resolution aims to reduce catch of yellowfin by all applicable fishing vessels targeting tuna and tuna like species in the Indian Ocean, by enacting gear based percentage reductions of the yellowfin catch reported for the reference year of 2014/2015. However, achievement of catch limitation by different fleets varied and catch by fleets which were granted exceptions within the resolution increased several fold, resulting in the total catch in 2019 increasing by around 11% from the 2014/2015 catch.

Assessments of the bigeye tuna stock in the previous years indicated that the stock was not over-fished and not subject to over-fishing. However, the assessment in 2019 determined the stock was not overfished but subject to overfishing.

The IOTC Working Party on Neritic Tunas assesses the status of the stocks of neritic tunas and neritic tuna like species caught in the Indian Ocean. Neritic species are described as quantitatively and qualitatively data poor and therefore, their stock determination generally rely on data limited stock assessment methods and stock status indicators. Several of the neritic species of IOTC fall under this category, including frigate tuna, and its stock status remain unknown. The most recent stock assessment for kawakawa was in 2015. Based on the findings and other evidences available, the stock status for kawakawa was classified as not overfished not subject to overfishing in 2020.

Chapter 4

Overview of the Maldives Tuna Fishery

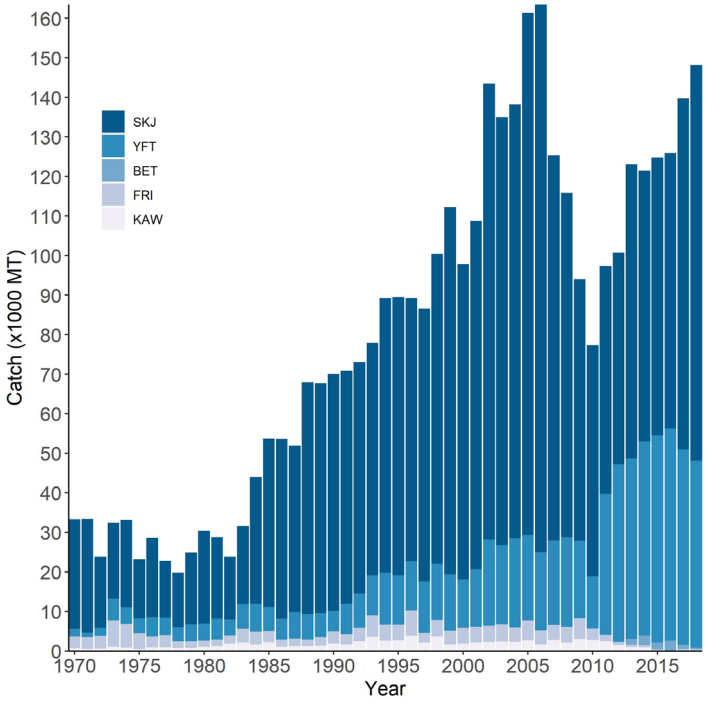
The Maldivian tuna fishery is an indispensable component of Maldivian culture and heritage, contributing significantly to food security, livelihoods and the job market in the Maldives. The traditional Maldivian tuna fishery, which has been practiced over centuries, has for main target species; namely, skipjack tuna, yellowfin tuna, kawakawa and frigate tuna. The two main tuna fisheries practiced in the Maldives, the pole-and-line fishery and the handline fishery, are both highly dependent on the bait fishery which is carried out in and around coral reefs and lagoons. A number of smaller reef and pelagic fish species are used as live-bait in the tuna fishery. Bait species and amount tends to vary dependant on the type of fishery, the target species and the associated gear. For instance, the pole-and-line skipjack tuna fishery typically uses smaller species such as silver sprat and shorthead anchovy, while slightly larger species like bigeye scad and mackeral scad are more prominent in the handline yellowfin tuna fishery. Whereas species like fusiliers are used in both fisheries, depending on their size. Unlike what is practiced in most other countries, the bait fishing operation is carried out as a part of the broader tuna fishing trip.

4.1 Tuna Catch Composition and Trend

Maldives tuna catches were around 30,000 tonnes in 1970, when species-segregated data for the most common species first became available.

The catches remained somewhat stable in the following years until around 1982, from which tuna catches began a steady climb until they peaked at more

than 160,000 tonnes in 2006. This was followed by a period of decline, with catches in 2010 having declined as much as 53%. However, tuna catches has since been recovering and approximately 134,318 tonnes were reported in 2019 (Figure 3).



- **Figure 3:** Tuna catch trend (1970-2019)

By volume, skipjack tuna and yellowfin tuna, respectively, are the two most important species in the Maldives tuna fisheries. Their average contributions to the total tuna catch comprised 66% and 33% respectively, in the recent five years (2015-2019). However, historical contribution of yellowfin tuna was much less in the national tuna landings. The increased proportion in the relatively recent history is accounted for by the handline yellowfin tuna fishery which exclusively targets large yellowfin tuna.

Of the oceanic tunas, bigeye tuna (loabodu kanneli) is caught in small quantities in the pole-and-line fishery, along with yellowfin tuna from mixed schools. Due to its small proportion in the catch and similarity in appearance to yellowfin tuna in the size ranges caught in the pole-and-line fishery, bigeye tuna was not initially segregated from yellowfin tuna in the fishery and data

collection system. Until 2013, Maldives bigeye tuna catch was estimated based on proportions derived from sampling. For the period of 2015-2019, bigeye tuna comprised an average of about 1% of all tuna landed .

Of the coastal or neritic tunas found in the Indian Ocean, frigate tuna and kawakawa are most common in the Maldivian tuna catches. Majority of the neritic tuna catches are taken by the pole-and-line fishery. However, the trolling fleet was traditionally known to land the bulk of frigate tuna and kawakawa in the Maldives (MRS, 1996). In the recent five years, both species combined have contributed an average of less than 1% to the national tuna landings. Importance of neritic species have declined over the years due to the prominence of oceanic tunas, namely skipjack and yellowfin, and the collapse of the traditional troll fishery which primarily landed frigate tuna and kawakawa.

4.2 Gears and Fleets

4.2.1 Pole-and-Line Skipjack Tuna Fishery

For centuries, Maldivians have used pole-and-lines to harvest surface swimming tunas. This traditional form of fishing is relatively clean with minimal impact on the ecosystem, in comparison to other gears used for harvesting skipjack tuna elsewhere. Pole-and-line has remained as the primary gear for tuna fishing throughout the history of the country. Traditionally, pole-and-line fishing was conducted off wooden hulled, sailing vessels or *masdhoni*, built out of coconut lumber. The fleet became increasingly heterogenous and advanced with the developments in the industry during the 70's and 80's, most notable of which was the mechanization of the fleet that began in 1974. By 1978, over 70% of the tuna catch was being landed by mechanized pole-and-line vessels, which grew to 99% by 1984. Other drivers for the change include installation of Anchored Fish Aggregating Devices (AFADs) that began in 1981, opening up of canneries, diversification of export markets and other socio-economic factors.

Pole-and-line remains the most important gear for tunas in the country. Of the four tuna gears, average contribution from pole-and-line fishery to the national tuna catch was around 73% for the recent five years (2015-2019).

Skipjack and yellowfin tuna comprise 99% of the pole-and-line catch (83% and 15% respectively), while bigeye tuna, frigate tuna and *kawakawa* contributed the remaining 1%. The pole-and-line catch is mostly landed at landing ports of processing facilities where it is processed or exported for processing. Additionally, a proportion of the catch is also sold to small-scale processing facilities that specialise in loca products such as dried and smoked tuna.

4.2.2 Handline Tuna Fishery

The handline yellowfin tuna fishery targets surface swimming large yellowfin tuna above 70 cm fork length (Adam and Jauhary 2009; Adam et al. 2015; Ahusan et al. 2016) with over 80% of catch in the 102-160 cm fork length range (Ahusan et al., 2016). The commercial fishery is relatively recent and began during the period of late 1990's and early 2000's when private parties began investing in fresh tuna export businesses as a result of privatization of the fisheries sector (Adam, 2007). Prior to the establishment and commercialization of the handline yellowfin tuna fishery, traditional fisheries for large yellowfin tuna using handlines, trolling and to a lesser extent, pole-and-line existed. The fisheries were seasonal and located in the regions of Haa Alifu Atoll during January to April; Male' Atoll during March-September; and Fuvah Mulaku and Addu Atoll during April and November (MRS, 1996).

With the opportunities for export to the Japanese sashimi and European markets, the fishery observed rapid growth, mostly in the northern and central parts of the country where it has possibly surpassed pole-and-line fishery in terms of number of vessels and fishers. Other key drivers for the expansion include the lucrativeness of the fishery and the ease of switching from pole-and-line to handline fishery as it required minimal investments and modification to the vessel. As the catch was exported fresh or frozen, landing and processing facilities for large yellowfin tuna are situated in the vicinity of Hulhulé, the main international airport.

Contribution from the handline fishery to the total tuna catch was around 26% in the most recent five-year period (2015-2019). Handline is a highly targeted fishery and yellowfin tuna comprised over 96% of the catch volume in the same period.

4.2.3 Longline Fishery

Longline is not a traditional tuna gear in the Maldives and was not employed by Maldivian fishers to harvest tunas. A licensed longline fleet which targeted bigeye and yellowfin tuna operated beyond 75 nm, within Maldives EEZ since 1985 (Anderson, Hafiz and Adam, 1996). Waters within 75 miles was reserved for the local tuna fishery. In August of 1994, all existing longline licenses were terminated by the Ministry of Trade and Industries; the authority issuing longline licenses at the time, partly due to non-compliance with the data submission requirement of the license (Anderson et. Al, 1996).

Longline licensing appears to have resumed around 1997, as indicated by the catch and effort data at the Ministry. As was the case previously, the licenses were issued by the Ministry of Trade and Industries. A royalty of 1USD per kg of tuna was also levied (Anderson, Adam and Rasheed, 2003). The fishery continued until May 2010 when licensing was ceased to develop a fully local longline fleet. The Ministry of Fisheries and Agriculture resumed licensing in 2011 to localised vessels and operators to fish from 75 miles and beyond, within the Maldives EEZ. With the Longline Fishery Regulation of 2014 (No. 2014/R-388), the fishery became highly regulated, consistent with relevant conservation and management measures of IOTC. The regulation allowed longliners to fish for bigeye and yellowfin tuna from 100 miles from the archipelagic baseline, including in the high seas, with VMS, vessel marking and logbook reporting mandated. The Government of Maldives stopped licensing longliners for a third time in 2019 due to non-compliance of vessels and irregularities in the data reporting.

564 tonnes of tuna were caught from longline in 2019. Of this total catch, 84% comprise of yellowfin tuna. In addition to tropical tunas, billfishes were also caught in the longline fishery as by-catch.

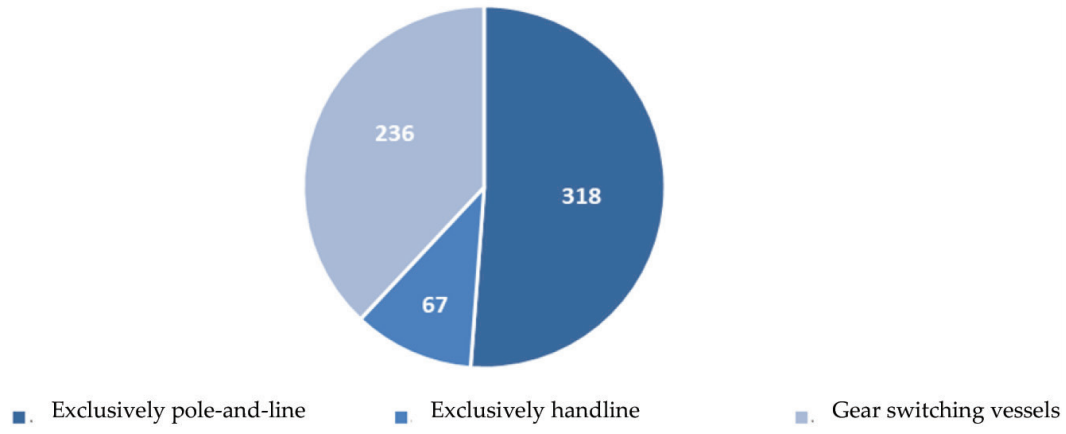
4.2.4 Trolling

Historically, the troll fishery was a significant component of the Maldives tuna fishery. The fleet targeted frigate and kawakawa inside and outside the atolls

and was more common in the northern atolls where the target species were more abundant compared to the south of the Maldives (Anderson, Waheed and Adam, 1998). The fishery was most prominent during the period of mechanization of the pole-and-line fleet from late 1970s to early 1980s (Adam, Anderson and Hafiz, 2003). The size of the fleet peaked in 1982 with almost 3,482 vessels and had declined to 713 by 2010. Tuna catches from the troll fishing was less than 0.12% of all four tuna gears in the recent five-year period (2015-2019) amounting to approximately 790 tonnes. Socio-economic factors are believed to have contributed to the decline of the traditional troll fishery (Adam, Anderson and Hafiz, 2003).

4.3 Number of Fishers and Vessels Engaging in Tuna Fishery

According to surveys conducted by the Ministry, it is estimated that 17,000 fishers are currently involved in the tuna fishery. However, out of the 17,000, only 7,014 fishers are currently registered in the Ministry's official registry. In terms of number of vessels, 621 vessels are licensed to operate in the tuna fishery at present. Of these vessels, some pole-and-line and handline vessels switch between both gears depending on tuna catch rates (ie catch rates of skipjack and large yellowfin tuna). An estimation of vessels engaging exclusively in pole-and-line, handline and vessels that switch gear are presented in Figure 4.



- **Figure 3:** Composition of licensed tuna vessels by gear use (solely using pole-and-line, solely using handline and vessels switching between the use of both gears

Additionally, a survey conducted by the Ministry in 2018 suggested that around 200 vessels are engaged in the fishery within the categories that are not mandated to acquire a license.

4.4 Processing and Exports

Tunas, primarily skipjack, was an important source of food and export commodity for Maldives throughout its recorded history. The strategic location of Maldives in the trade route of the Indian Ocean allowed Maldives to trade skipjack tuna to neighbouring and distant countries. While traditionally processed and traded as dried fish, skipjack tuna is exported either as frozen, fresh, chilled or canned in modern times. Main markets for skipjack tuna include Thailand, Sri Lanka, Iran, UK, Japan and Germany. Thailand is the main export market for frozen and fresh skipjack whereas canned skipjack is exported to Germany and UK. Sri Lanka is the second biggest skipjack tuna export market for the Maldives, following Thailand, with dried fish and salted dried fish being the main export products. The major portion of the yellowfin tuna caught in the Maldives is exported, with Japan, United Kingdom, Europe and the United States of America being the main markets.

The market prices of fish and the quality of fishery products are heavily dependent on the quality of the raw fish. Tuna exports contributed between about 129 and 188 million US dollars to the country (Table 1) in the past five years (2015-2019).

Table 1: Export of Tuna Products from 2015 to 2019

Product (MT)	2015	2016	2017	2018	
Canned	32.70	54.21	291.75	618.97	1,166.60
Dried	2,132.20	1,745.99	1,186.38	1,151.57	1,375.72
Dried/Salted/Brine	-	12.00	3.25	22.33	23.92
Fresh/Chilled	11,095.28	10,975.74	9,617.46	8,357.51	8,311.15
Frozen	25,425.15	28,286.18	53,719.42	45,370.78	37,689.84
Other	2,881.42	2,981.81	4,508.32	7,832.59	6,069.06
Salted	229.10	2980.81	4,508.32	7,832.59	6,069.06
Smoked	0.04	282.79	211.36	8.80	48.90
Steamed	12.50	12.00	96.00	-	-
Value (million USD)	**130.89**	**128.77**	**187.48**	**167.81**	**146.07**

Over the past several years, the Maldivian tuna fishery has undergone considerable development. However, despite the long history, Maldivian tuna fishers have retained the environmentally friendly one-by-one method of fishing they have practiced for centuries. Due to such environmentally friendly fishing practices, the Maldivian tuna fishery has been recognized globally as an exemplary fishery. As such, the fishery has received a number of accreditations and certifications, including the 'Dolphin Free' ecolabel and the Marine Stewardship Council (MSC) certification awarded for the pole-and-line fishery in 2015. While fisheries from other countries, including purse seine fisheries, have also been awarded the MSC certificate, there is a considerably excellent public and market opinion of the Maldivian tuna fishery in comparison to most other fisheries. This ecolabel has been instrumental for the tuna fishery in providing and maintaining access to diverse markets.

The obtainment and retention of such ecolabels involve numerous obligations and responsibilities. This may include the collection and management of fisheries data, ensuring the enforcement of fisheries regulations and conduction of marine scientific research on the fishery, and in particular, on the impact of fisheries activities on the marine ecosystem. This work must be carried out with full cooperation and involvement from fishing communities, stakeholders in the fish processing and trade industries and the government.

Chapter 5

Tuna Management in the Maldives

5.1 Data Collection and Recording

Due to the predominance of tuna fisheries throughout the Maldives' history and their sociocultural significance in the Maldivian society, fisheries management and data collection has been centred around and influenced by tunas and tuna fisheries. This is evidenced by the fact that the first programmes to collect fisheries data were initiated to gather information on the tuna fisheries. For instance, the first systemic catch data collection system in the Maldives was established in 1959 for the tuna fisheries.

Systemic fishery data collection in the Maldives began in 1959, when the Government of Maldives required reporting of tuna catch from the islands in three categories of fish (large skipjack; small skipjack and yellowfin; frigate and kawakawa). In 1966, the system expanded to report catches from vadhu dhoni (trolling vessels) in addition to masdhoni (tuna vessel) (Anderson 1986). Then in 1970, reporting was required in five categories; large skipjack, small skipjack, yellowfin tuna, kawakawa and frigate tuna . Catch of reef fish and some other non-tunua species such as sharks were also reported beginning 1970 (Anderson 1986). Mechanization of the pole-and-line fleet began in 1974 and catches from mechanized and sailing vessels were segregated beginning

1979 (Anderson 1986). From 1992 onwards, data on catches of "large" yellowfin tuna, which were surface swimming sub-adult to adult tunas caught mostly by handline and trolling began to be collected separately. Other notable events in the catch and effort data collection include acquiring non-tuna catch (billfishes; sharks; and reef fishes in three size groupings, small, medium and large fishes); and introduction of logbooks for the tuna fisheries (pole-and-line, handline and longline) in 2010.Prior to the introduction of logbooks, the Maldives fishery data collection system was a complete enumeration system where the fishermen reported daily catches to a designated person at their respective Island Offices, who compiled the information into a "Monthly Fishing Report" and forwarded it to the then, Statistics and Data Management Section of the Ministry (Anderson et al., 2003) . Additionally, a second, "Monthly Fisheries Report 2" was used to report other fishery related information such as export of fishery products from the island, numbers of fishers and registered vessels, and numbers of fish caught by other means (for example beach seining) (Anderson et al., 2003). This system of reporting was adequate for the time as it was custom to count the days catch for distribution among the crew and owners (Anderson 1986) , and the trips were single day trips and the catch was mostly landed at the home island. The system of data reporting remained until January 2017, but was gradually being phased out since introduction of the logbooks in 2010. At present, fishery catch and effort data are reported through logbooks from the pole-and-line, handline, longline, reef fish and grouper fisheries.

A separate ministry to manage the fisheries of the Maldives was first formed in 1968, as the Ministry of Agriculture and Fisheries; which was later split in 1972 to form the Ministry of Fisheries (Anderson et al., 2003). Prior to these, fisheries matters were the responsibility of the Ministry of Home Affairs (Anderson et al., 2003). Over the course of the years hence, fisheries and agriculture has been reunited under the mandate of the same ministry, albeit with minor name changes.

The Statistics Unit which is a part of the Fisheries Management Section (FMS) of the Ministry is responsible for fisheries data collection and management.

The Unit is further responsible for timely submission of fishery data and information to national and international agencies as required. The web enabled, fishery information system, Keyolhu, where all catch and effort data are recorded and compiled, forms the hub of fishery data collation and processing at the Ministry. The system also facilitates vessel registration, issuing of fishing and fish processing licenses, entry of fish purchase data by the commercial tuna processing and export companies as well as issuance of catch certificates required for export of tuna and tuna products.

5.2 Licensing and catch certification

Fishery licensing in the Maldives began in November 2009 with the enactment of the Regulation for Licensing Commercial Fishing, Fish Processing for Export and Aquaculture, 2009. The regulation required all fishing vessels, fishing for the purpose of exporting fish or with the intention of offloading fish to a fish processing facility, and all commercial fish processing facilities to hold a valid license. While there were no specialised regulations to manage the pole-and-line tuna fishery and the handline yellowfin tuna fishery, the management measures needed to regulate both fisheries were enforced under this regulation. Additionally, some other management measures pertinent to both the primary harvesting, and processing sectors were enforced through their inclusion within the license conditions of the licenses issued to fishing vessels and processors.

Prior to the publication of the "Regulation for Licensing Commercial Fishing, Fish Processing for Export and Aquaculture", from the year 1985 onwards, licenses were issued to foreign flagged vessels to carry out longline fishing, beyond 75 nautical miles from the archipelagic baselines, within the Maldivian EEZ. During this time, the licensing mechanism for longline vessels was managed by the, then, Ministry of Trade and Industries. However, in 2010, with the expiration of the last licenses following a ban on issuing licenses to foreign vessels to fish in Maldivian waters, the longline fishery was reintroduced in 2011 with a localised fleet, which was licensed to fish beyond 100 nautical miles from the archipelagic baselines of Maldives. Furthermore, in 2014, a specialised regulation, the Regulation on Longline Fishing (2014/

R-388) was developed to further strengthen the management of the fishery. The management interventions under this regulation included monitoring, control and surveillance measures, measures to strengthen the data collection system and legalised the fishing in the high seas for these Maldivian vessels, under a strict regulatory framework.

The current catch documentation scheme was established in 2010 to fulfil the various international obligations and requirements and strengthen the compliance of the Maldivian fisheries sector with the European Union's Regulation to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (EU IUU Regulation). When the implementation of the scheme began, catch certificates were only required for tuna and tuna products prepared for export.

Chapter 6

Objectives and Strategies

This management plan comprises of objectives, strategies, and actions that would contribute towards achieving the overall purpose.

The five specific objectives are;

1. Ensure all activities associated with the harvest and trade of tuna are carried out through the application of principles of sustainability, ecosystem-based management and the Precautionary Approach to fishery management, in a manner most beneficial to Maldivians;
2. Maximise the economic benefits from the tuna resources through improved commercial operations and by diversifying the tuna processing sector through use of modern technology
3. Enhance contribution to food security and contribute to the improvement of quality of life in the Maldives by ensuring equitable distribution of wealth generated from the fishery;
4. Strengthen Monitoring Control and Surveillance (MCS) to prevent, deter and eliminate Illegal, Unreported and Unregulated (IUU) fishing for tuna and to protect the rights of tuna fishers and ensure their safety.
5. Ensure all management measures taken under this Management Plan facilitate Maldives to implement its national, regional and international tuna fishery management and trade obligations.

Strategies and actions to achieve the objectives are summarised in Table 2.

Table 2: Breakdown of each objective by strategies, actions, time-frames and responsible parties

Objective 1	Ensure all activities associated with the harvest and trade of tuna are carried out through the application of the principles of sustainability, ecosystem-based management and the Precautionary Approach to fishery management, in a manner most beneficial to Maldivians		
Strategy	**Action**	**Time frame**	**Responsible parties**
1.1 Promote and maintain Maldives traditional one-by-one tuna fishery as the primary harvesting method	1.1.1 Prioritise one-by-one tuna fishery when formulating government policies	Immediate	o Ministry
	1.1.2 Promote the traditional, one-by-one fishing methods in the global arena	Immediate	o Ministry o Industry o MoED
1.2 Promote fishing from free swimming schools	1.2.1 Establish and implement a Potential Fishing Zones program to incentivise fishing from free swimming schools	Medium-term (3 – 5 years)	o Ministry o MMRI
	1.2.2 Enable access to financial schemes for pole-and-line fishers to encourage the use of technology that aid in free school fishing (e.g bird radars, binoculars)	Medium-term (3 – 5 years)	o Ministry o MMRI
	1.2.3 Increase awareness among fishers on the benefits of targeting free schools	Immediate	o Ministry o MMRI
1.1 Implement best practices and support existing harvesting and trade restrictions while engaging in all activities associated with the harvest and trade of tuna	1.3.1 Incorporate relevant IOTC Conservation and Management Measures (CMMs) into national legislation	Immediate	o Ministry o MPS o MNDF-CG
	1.3.2 Formulate a national plan of action to implement regional fisheries management measures enacted to rebuild tuna stocks in the Indian Ocean	Immediate	o Ministry o MMRI o Industry

	1.3.3 Implement and enforce restriction on the use of any fishing method or gear prohibited by the Fisheries Act or any other regulations	Immediate	o Ministry
	1.3.4 Formulate and implement a FAD management plan	Short-term (1 – 3 years)	o Ministry o MMRI
1.4 Minimise capture of and interactions with non-targeted and Endangered, Threatened and Protected (ETP) species in the longline fishery	1.4.1 Establish and implement measures to minimise capture of and interactions with non-targeted and ETP species in the longline fishery	Immediate	o Ministry o MMRI o MPS o MNDF-CG o MoE
1.5 Prioritise evidence-based policymaking through the collection of biological, ecological, and socio-economic data on tuna fishery and associated resources	1.5.1 Implement nationwide biological studies, size sampling, and monitoring programmes for tuna and associated resources as required by IOTC	Immediate	o MMRI
	1.5.2 Gather geographical information on fishing grounds in order to study the spatio-temporal exploitation patterns in tuna fishery	Short-term (1 – 3 years)	o MMRI o Ministry
	1.5.3 Conduct a series of socio-economic surveys to identify and understand the scale of tuna fishery in the Maldives	Short-term (1 – 3 years)	o Ministry o MMRI o NBS
	1.5.4 Conduct research on tuna species and associated resources and regularly report on the findings	Medium-term (3 – 5 years)	o Ministry o MMRI
	1.5.5 Actively participate in the scientific and management processes of relevant national and regional bodies	Immediate	o Ministry o MMRI

1.6 Maintain a leading role in IOTC in management and conservation of Indian Ocean tuna resources	1.6.1 Actively participate and engage in IOTC to amplify concerns of all fishing nations and specially play a leading role in advancing the interests of Coastal States and Small Island Developing States in the Indian Ocean	Immediate	o Ministry o MMRI
Objective 2 | Maximise the economic benefits from the tuna resources through improved commercial operations and by diversifying the tuna processing sector through use of modern technology			
Strategy	**Action**	**Time frame**	**Responsible parties**
2.1 Promote and facilitate access to technologies and techniques to increase profitability, improve catch quality, and reduce postharvest losses	2.1.1 Introduce a loan scheme to establish Refrigerated Sea Water (RSW) systems on board fishing vessels	Immediate	o Ministry o SDFC o Ministry of Finance
	2.1.2 Facilitate the design and build of next generation *'Masdhoani'* through finance schemes	Short-term (1 – 3 years)	o Ministry o SDFC o MTA
2.2 Establish and facilitate access to improved infrastructures and public services in accessible locations for fishers and related stakeholders	2.2.1 Introduce a scheme 'Fahi Hakatha" in order to reduce fuel expenses by fishermen	Immediate	o Ministry
	2.2.2 Maintain the network of existing FADs installed by the Ministry	Immediate	o Ministry
	2.2.3 Establish ice plants in accessible locations within key fishing regions	Immediate	o Ministry
2.3 Promote Maldivian tuna fishery and fishery products to improve market access and to increase profitability	2.3.1 Conduct programmes and projects in coordination with the industry and related stakeholders to maintain Marine Stewardship Council (MSC) Certification of the pole-and-line skipjack tuna fishery, and facilitate certification to other segments of the tuna fishery	Immediate	o Ministry

	2.3.2 Participate in international fairs to Promote Maldivian fish and fishery products to international markets	Immediate	o Ministry o Industry
	2.3.3 Develop and implement Fisheries Improvement Projects (FIPs) to maintain confidence in the fishery and to improve access to new markets	Immediate	o Ministry
2.1 Support the diversification of value-added fishery products, in order to foster new market opportunities	2.4.1 Conduct experiments to identify new types of value-added tuna products that could be produced	Short-term (1 – 3 years)	o Ministry o MMRI
2.5 Promote and encourage youth participation in the fishery sector	2.5.1 Coordinate with National Career Guidance Centre (NCGC) to provide career guidance focusing on fishery sector	Short-term (1 – 3 years)	o Ministry o NCGC
	2.5.2 Conduct training programmes on quality inspection, food hygiene and safety, and good manufacturing practices of fish and fishery products	Short-term (1 – 3 years)	o Ministry o MoYSCE
	2.5.3 Incorporate modules on tuna fishery and fish handling practices in the national curriculum to encourage youth into the industry	Long-term (5 – 10 years)	o Ministry o Ministry of Education o MoHE o MNU

Objective 3 | Enhance contribution to food security and contribute to the improvement of quality of life in the Maldives by ensuring equitable distribution of wealth generated from the fishery

Strategy	Action	Time frame	Responsible parties
3.1 Reduce post-harvest loss along the value chain and increase profitability	3.1.1 Conduct training programs on post-harvest handling techniques	Immediate	o Ministry

	3.1.2 Support the diversification of value-added tuna products to maximise economic returns to fishers and traders, with a specific focus on small and medium scale fish producers	Immediate	o Ministry o SDFC
3.2 Create an enabling environment for small and medium scale producers and traders to develop	3.2.1 Conduct training programmes on best practices for financial and data management and the importance of credit worthiness for small and medium scale fish processors	Short-term (1 – 3 years)	o Ministry
	3.2.2 Conduct training programs for small and medium scale fish processors targeting local markets on financially empowering and developing as a profitable and sustainable venture	Short-term (1 – 3 years)	o Ministry
3.3 Ensure participation of all stakeholders in policy formulation and decision making	3.3.1 Establish, maintain, and update a fishers' registry, Masveringe Dhaftharu, to understand fishing community dependence on tuna resources	Immediate	o Ministry
	3.3.2 Improve stakeholder participation and ensure that policy decisions are made through a Participatory Approach	Immediate	o Ministry

Objective 4 | Strengthen Monitoring Control and Surveillance (MCS) to prevent, deter and eliminate Illegal, Unreported and Unregulated (IUU) fishing for tuna and to protect the rights of tuna fishers and ensure their safety

Strategy	Action	Time frame	Responsible parties
4.1 Enhance the existing fishery licensing system to maintain a comprehensive record of fishing fleets, processors and exporters for effective monitoring and management of the fisheries sector	4.1.1 Incorporate all commercial tuna fishing and processing licenses into the Fisheries Information System	Immediate	o Ministry o Local Councils

	4.1.2 Improve collection fishery logbook data (including species specific catch and effort data) and conduct regular awareness and feedback programs to improve quality of logbook data received from fishers	Immediate	o Ministry o MMRI
	4.1.3 Improve and implement the electronic catch and effort reporting mechanism	Short-term (1 – 3 years)	o Ministry
	4.1.4 Regularly compile and manage the information reported to the Ministry by fishers, fish processors and publish the information annually	Immediate	o Ministry
4.1 Enhance MCS mechanism and ensure compliance with national and international instruments and market requirements	4.2.1 Implement the National Plan of Action to prevent, deter and eliminate IUU Fishing	Short-term (1 – 3 years)	o Ministry o MNDF-CG o MCS o MPS
	4.2.2 Develop and implement a National Plan of Action on MCS	Short-term (1 – 3 years)	o Ministry o MNDF-CG o MCS o MPS
	4.2.3 Expand the current VMS coverage to 100% of the licensed vessels above 15 meters in length	Short-term (1 – 3 years)	o Ministry o MPS o MNDF-CG
	4.2.4 Establish an e-observer program to monitor 5% of licensed tuna fishery fleet through electronic monitoring	Short-term (1 – 3 years)	o Ministry o MMRI
	4.2.5 Become party to the FAO Compliance Agreement	Short-term (1 – 3 years)	o Ministry o MoFA o AGO

	4.2.6 Recruit and station fisheries rangers in major tuna fishing areas/islands	Immediate	o Ministry o LGA o Local Councils
	4.2.7 Train and assign officers from relevant enforcement authorities to ensure compliance with the Fisheries Act of the Maldives, pursuant regulations and Management Plans	Short-term (1 – 3 years)	o Ministry o MNDF-CG o MCS o MPS o MFDA
4.3 Improve occupational health and safety standards for fishermen	4.3.1 Improve occupational health and safety measures to levels consistent with international standards in the field of fishery	Immediate	o Ministry
	4.3.2 Conduct workshops and training programs on managing risks during SCUBA diving for bait in tuna fisheries	Immediate	o Ministry
	4.3.3 Establish an acceptable level occupational health and safety standards for longline fishing vessels to ensure the safety of fisher working onboard	Immediate	o Ministry
Objective 5 | Ensure all management measures taken under this Management Plan facilitate Maldives to implement its national, regional and international tuna fishery management and trade obligations.			
Strategy	**Action**	**Time frame**	**Responsible parties**
5.1 Incorporate relevant International and Market requirements for fisheries and trade into national legislature	5.1.1 Ensure the incorporation of IOTC CMMs in relevant national legislature	Short-term (1 – 3 years)	o Ministry o AGO
	5.1.2 Incorporate management advice from SWIOFC and other relevant RFBs into national regulations	Immediate	o Ministry o AGO
	5.1.3 Engage and cooperate with Countries to fulfil necessary requirements set up by target fishery markets	Immediate	o Ministry

Chapter 7

Management Measures of this Plan

The tuna resources occurring in the Maldivian waters form part of the tuna stocks distributed across the Indian Ocean, shared between the fishing nations of the Indian Ocean and other distant water nations. The United Nations Convention on the Law of the Sea (UNCLOS), in its Annex I, lists 17 species, including tunas and billfishes as highly migratory fish stocks and straddling fish stocks. The Convention also calls for states to cooperate, to ensure the conservation and management of such stocks. Article 8 of the Fish Stocks Agreement (UNFSA), a multi-lateral treaty signed in 1995 for the implementation of the provisions of the United Nations Convention on the Law of the Sea relating to the conservation and management of straddling fish stocks and highly migratory fish stocks, forms the basis for cooperation in managing such stocks either directly or through appropriate sub-regional or regional fisheries management organizations. The Agreement states that member states fishing on the high seas shall cooperate in accordance with the Convention to adopt measures to ensure long-term sustainability of straddling fish stocks and highly migratory fish stocks.

The Indian Ocean Tuna Commission (IOTC) was established in 1993, as a regional platform for cooperation among the Indian Ocean coastal states and other states and entities fishing for tuna and other highly migratory species under the management of IOTC, in the Indian Ocean. Member states are required to work together in the conservation and optimum utilization of the stocks relevant to IOTC, as well as, the conservation and management of non-target species caught in association with such species and to encourage the sustainable development of fisheries that rely on these stocks. The IOTC manages under it mandate, 16 tuna and billfish species. Furthermore, the IOTC is also engaged in the management and conservation of other non-target species that are impacted from

fisheries targeting IOTC species, including turtles, tortoises, marine mammals, seabirds, sharks, rays and other by-catch species, and in the reduction of mortality of such species. The IOTC operates through developing Conservation and Management Measures (CMMs), which are adopted by the Commission. Some of these CMMs are in the form of binding resolutions, whereas some are recommendations. Maldives became a full member of the IOTC on 13th July 2011.

As the Maldivian tuna fishery is heavily dependent on the foreign export markets, there is a critical need to ensure that the fishery is compliant with the various rules and regulations and best practices established by the international markets to ensure the sustainable management of fisheries and fish stocks. These may include rules set out by intergovernmental organisations such as the World Trade Organisation (WTO), as well as ones enforced by individual market states. Particularly notable are the EU Regulation to prevent, deter and eliminate illegal, unreported and unregulated (the EU IUU Regulation), the EU directives which aims to address health and safety issues in fish and fishery products, as well as improve their traceability and the Marine Mammal Protection Act (MMPA) of the United States.

In light of these facts, it is paramount that timely management measures are introduced to sustainably manage tuna resources in accordance with the regional and international obligations and best practices. To achieve this, the following are implemented.

7.1 Establishment of a Tuna Management Advisory Committee (TMAC)

Pursuant to Section 20 of the Fisheries Act of the Maldives, advisory committee will be established to advise the Ministry on management of tuna stock, fishery and trade. The committee will also give recommendations to the Ministry on research and sustainable development of this fishery. The meetings of the committee will be convened at least once per year.

The Committee will comprise of the following members:

(a) Chairperson (a representative of the Ministry);
(b) A representative from the MMRI;
(c) Four representatives to represent fishers from each of the tuna fisheries (pole-and-line, handline, trolling and longline) in the Maldives;
(d) A representative of tuna processors, processing for exports;

(e) A representative of tuna processors, processing for local markets;
(f) A representative from the Ministry of Environment;
(g) A representative from the Ministry of Economic Development;
(h) A representative from the Local Government Authority;
(i) Two representatives from relevant locally registered fisheries NGOs; and
(j) A scientist engaged in research on tuna and the tuna fishery

A public announcement will be made by the Ministry, calling for Expressions of Interest for the following Committee positions:

(a) Representatives of tuna fishers;
(b) Representatives of tuna exporters;
(c) Representatives from relevant locally registered NGOs

The responsibilities of the Committee will include:

(a) Monitoring the implementation of this Plan and briefing the Minister on its progress on an annual basis;
(b) Reviewing technical and other reports pertaining to the tuna fishery;
(c) Advising on management measures in response to the outcomes and recommendations from the technical reports and stakeholder workshops and consultations;
(d) Advising the Ministry on implementation of relevant regional and international management measures on a national scale; and
(e) Advising the Ministry on the implementation, monitoring and review of this Plan.

7.2 Licensing

One of the overarching aims of establishing a licensing mechanism is to identify parties that are engaged in the fishery and those who are economically dependent on the fishery resources. Such a mechanism also supports the collection and management of fisheries data. Furthermore, the licensing mechanism plays a crucial role in providing the Ministry with information that contributes towards the development of the fisheries sector and the extension of essential services to fishers.

In addition, a licensing mechanism also allows for the formal recognition of stakeholders engaged in the fishery and trade, which in turn facilitates the Ministry to safeguard their rights and ensure their social and economic security. Maintaining records of the fishing fleet and crew members, as well as information on fish processing facilities, through a licensing system assures the international community that the Maldivian fisheries are effectively and responsibly managed. Such records also serve as an important basis for planning and implementing fishery development projects.

In light of these considerations, the following parties operating within the tuna fishery and trade will be required to acquire a license:

(a) All commercial fishing vessels;
(b) All commercial parties that perform any form of processing of tuna;
(c) Collector vessels that engage in the trade of skipjack tuna; and
(d) Carrier or reefer vessels

The general process of application for and issuance of licenses, their renewal and revocation as well as conditions of the licenses will be set forth in the relevant regulations. The Ministry will establish, maintain and update a database of licensed parties.

7.3 Data collection and Management

Collection and management of comprehensive catch and effort data and maintenance of fisheries statistics is an important measure that contributes towards assessing changes in the abundance of fish stocks in response to fishing. It also plays a critical role in ensuring that stocks are fished at sustainable levels and that future generations continue to benefit from these resources. The fundamental tool used for this purpose is the fishery logbooks, in which catch composition, fuel usage, fishing grounds and other trip details, for each fishing trip, are recorded and submitted by the licensed vessels. Other vital information collected on the fisheries sector include details on processing and trade of fish and fishery products.

Some of this information is shared with regional and international fishery management bodies that Maldives is party to, one of which is the Indian Ocean Tuna Commission (IOTC). IOTC was established to facilitate cooperation among member states in the conservation, management and optimum utilisation of straddling fish stocks and highly migratory species in the Indian Ocean. The catch and effort data shared with IOTC informs regional fishery management decisions and will contribute towards ensuring fair and equitable allocation of fishery resources to the Maldives.

In consideration of the aforementioned factors, an integrated data collection system will be established and used to collect the following information:

- Logbook / fishery data from licensed fishing vessels;
- Purchase reports from licensed tuna processors / processing facilities;
- Purchase reports from parties exporting tuna and tuna products.

7.4 Catch certification

Catch certification is an essential instrument that helps prevent, deter and eliminate Illegal, Unreported and Unregulated (IUU) fishing. Through such a scheme, the catch is certified to have been made in accordance with applicable laws, regulations and international conservation and management measures, fully assuring consumers that the fish traded in the Maldives are sourced from a sustainably and responsibly managed fishery.

The catch certification scheme established by the Ministry will be expanded to include all tuna exports, and all exporters will be required to submit an approved catch certificate with all consignments of tuna products. Details of the fishing vessel, date of catch as well as information on the processing facility will also be collected through the scheme. This will help to track the flow of the product through the supply chain, ensuring product traceability at all stages, from 'hook to plate'.

7.5 Ensuring occupational health and safety of tuna fishermen

Measures consistent with national and international standards will be introduced to create a safe working environment for fishers and ensure the safety of the master and all crew on-board fishing vessels. In this regard, special workshops and trainings will be conducted for fishermen aimed at reducing risk during SCUBA diving for bait. Additionally, all fisheries related diving will be regulated where the Master and vessel owner shall be mandated to ensure compliance with measures stipulated in relevant regulations regarding safe diving.

Furthermore, as the longline fishery operates over considerably long distances and requires the crew to be at sea over extensive periods of time, in order to create a safe working environment for fishers, specialised requirements and conditions shall be introduced within the longline fleet. A list of the requirements that will be enforced onboard longline fishing vessels is included in Annex 2 of this Plan.

7.6 Strengthen the Monitoring, Control and Surveillance Measures Implemented in the Tuna Fishery

A robust fisheries Monitoring, Control and Surveillance (MCS) System is paramount to ensuring that the Maldivian fisheries are sustainably and effectively managed. Vessel monitoring systems and e-observer networks are two key tools that can be utilised to strengthen such a system.

The vessel locating devices, which are established on board fishing vessels as a part of the vessel monitoring system can help locate fishing vessels through the use of satellite signals. Such a system would enable fisheries managers

to identify potential Illegal, Unreported and Unregulated (IUU) fishing and ease the monitoring of the fleet, at large. Furthermore, these systems would also lend to increased workplace safety onboard fishing vessels and aid the mobilisation and speed of search and rescue operations where accidents have occurred at sea.

Resolution 15/03 of the IOTC, On the Vessel Monitoring System (VMS) Programme requires all tuna fishing vessels over 24m LOA and all vessels fishing for tuna on the high seas to adopt satellite-based vessel monitoring systems (VMS). Furthermore, Resolution 11/04, On A Regional Observer Scheme, requires at least 5% of the number of operations/sets for each gear type by such vessels to be covered by an observer scheme. Therefore, the establishment and development of vessel monitoring systems and e-observer systems on board fishing vessels has become critical to ensuring that the Maldivian fisheries are managed in line with the various national, regional and international fishery management requirements, rules and regulations. The following measures will be implemented in order to strengthen the existing MCS System, as it pertains to the tuna fishery.

7.6.1 Vessel Monitoring System (VMS)

(a) All licensed tuna fishing vessels of 24 meters and above in overall length shall install and keep in operation a VMS that meets standards and specifications set out by Ministry;
(b) VMS must remain switched on at all times, while out fishing and/or docked at a port, unless otherwise permitted through prior written approval by the Ministry;
(c) Master shall ensure that the vessel does not leave port if the VMS is not functional;
(d) In the event where the VMS stops functioning, or the Ministry notifies that a vessel cannot be located using the VMS, the Master or vessel owner shall notify the Ministry every 6 hours, in writing, on the status of the vessel, including geographical coordinates, and speed.

7.6.2 Observers and E-monitoring

(a) Should the Ministry require the placement of observers onboard licensed fishing vessels, the vessels owner or operator shall cooperate with the Ministry and make the necessary arrangements to facilitate this.

(b) All vessels shall fully cooperate with the observer(s) and other authorised officers in performing their duties pursuant to the Fisheries Act and General Fisheries Regulation (2020/R-75).

(c) Should the Ministry require the installation and operation of an Electronic Monitoring system on board any pole-and-line or handline vessel, the vessels owner or operator shall cooperate with the Ministry and make the necessary arrangements to facilitate this.

(d) All longline vessels are required to install and keep in operation an Electronic Monitoring system that meet the Ministry's standards.

(e) The Electronic Monitoring System must remain switched on at all times during the fishing operations. The Electronic Monitoring system should not be switched off without a prior written approval by the Ministry.

(f) In the event where the Master or the vessel owner finds that the Electronic Monitoring system has stopped functioning, the Master or vessel operator shall immediately notify the Ministry in writing and endeavour to resolve the matter.

(g) In the event where Ministry finds and notifies the Master, operator or vessel owner that the Electronic Monitoring system onboard a longline fishing vessel is not functional, the vessel shall cease all fishing activity and call into a port designated by the Ministry within 3 days. The vessel shall not engage in any further fisheries activities until Ministry issues a written approval.

7.7 Measures to reduce the impacts of tuna fishing on the marine ecosystem and other marine resources

The following measures will be implemented in order to maintain the legacy of the Maldivian tuna fishery as a world-renowned, exemplary fishery that is environmentally friendly and to reduce the impacts of the tuna fishery on the ecosystem and other marine resources in order to ensure that the tuna fishery resources and their ecosystems are preserved for the future generations.

7.7.1 Declaring banned gears and prohibited areas for tuna fishing

Fishing for tuna using any of the types of fishing methods, gears, or chemicals banned by the Fisheries Act and the General Fisheries Regulation (2020/R-75) is prohibited. This includes fishing using purse seines, gillnets, trawl nets, explosives, poison or such other chemicals and spear guns. Additionally, the use of any airborne vehicles, including drones in finding schools is also prohibited. Furthermore, the installation and use of any form of light to attract tuna schools is also prohibited.

Fishing for tuna in the following areas will also be prohibited, in accordance with the individual requirements of each area:

(a) Fishing in contravention of the established rules in any of the areas protected under the Fishery Management Plans made pursuant to the Fisheries Act.
(b) Pursuant to the General Fisheries Regulation (2020/R-75), with exception of pole-and-line fishing, fishing within 3 nautical miles around FADs.
(c) Conducting longline fishing within 100 (one hundred) miles from the archipelagic baseline of the Maldives; and in the Indian Ocean high seas south of 25 degrees South latitude in the IOTC area of competence.
(d) Within one nautical mile of a data buoy.

7.7.2 Measures Relating to By-catch Mitigation in Longline Fishery

(a) The following measures will be implemented to reduce by-catch and mortality of turtles and sharks in the longline fishery

1. During retrieval of longline, all live shark by-catch shall be released immediately without additional harm.
2. All incidents involving marine turtles and sharks, including live and dead by-catch should be recorded in the logbooks and reported as specified by the Ministry.
3. Sharks and turtles caught in the longlines must be released immediately without additional harm. Vessels shall carry line cutters and de-hookers in order to facilitate the appropriate handling and prompt release of marine turtles caught or entangled.
4. Branch lines of the longline gears should be set at a depth of at least 60 meters from the surface.

(b) Longline fishing vessels must use at least one measure stated below to reduce the incidental catch and mortality of seabirds in their operations.

1. Night setting with minimum deck lighting: Setting of longlines shall not be carried out between nautical dawn and nautical dusk. And setting of longlines shall be carried out with minimum deck lighting.
2. Bird-scaring lines (Tori lines): Bird-scaring lines (BSL) shall be deployed during the entire longline setting to deter birds from approaching the branch line. Required design of BSL and instruction for their deployment are summarised in Annex 3.
3. Line weighting: All branch lines must be weighted prior to setting. Specification for weighting are:
   - If attaching weights 1 metre from the hook, minimum of 45 grams weight attached to all branch lines;
   - If attaching weights 3.5 metres from the hook, minimum of 60 grams weight attached to all branch lines; and
   - If attaching weights 4 metres from the hook, minimum of 98 grams weight attached to all branch lines

(c) The following measures will be implemented to reduce interactions and mortality of marine mammals within the longline fishery

1. Offal shall be discarded at locations and times away from active fishing to allow marine mammals to feed away from catch
2. Vessels shall accurately record and report frequency of incidental mortality and serious injury of marine mammals during the fishery operation through the logbooks.
3. In the event where any unintentional catch of marine mammals or any other ETP species occur, the animals should be released immediately without harming, using a method that will result in minimal harm while releasing or de-hooking;

7.7.3 Use of International Best Practices in Tuna Fishing

In order to protect and preserve the abundant natural resources and natural heritage of the Maldives for the future generations, the following best practices will be implemented onboard licensed fishing vessels and at all licensed processing facilities:

(a) Vessels shall employ measures to prevent abandoned, lost or otherwise discarded shing gear (ALDFG) and report all incidents of ALDFG to the Ministry;
(b) No vessel shall discard of non-biodegradable waste such as plastic at sea;
(c) Reduce discard and waste of fisheries resources;
(d) All waste generated in fish processing facilities shall be managed responsibly; and
(e) All vessels shall abide by the FAO Guidelines to Reduce Sea turtle Mortality in Fishing Operations.

7.8 Involvement of foreign nationals in tuna fishery operations

This Plan aims to preserve the traditional Maldivian way of fishing for the benefit of future generations. This is key to ensuring that the job opportunities and socioeconomic benefits arising from this sector continue to lend to the prosperity of Maldivian families for generations to come. As such, to safeguard the livelihoods of Maldivians within the fisheries sector and to reduce IUU fishing by foreign nationals, the following measures shall be implemented :

(a) For pole-and-line skipjack tuna fishing vessels and handline yellowfin tuna fishing vessels that sell fish to exporters or those processing fish for the export market, the involvement of foreign nationals shall be restricted to a total of 2 personnel, in the following categories only:

1. Housekeeping and Maintenance;
2. Cooking; and
3. Watch-keeping and Security)

(b) For longline fishing vessels, with the exception of a trained master, engineer or a captain, all crew must be Maldivian nationals. The total number of foreign nationals shall be restricted to a total of 2 personnel.

(c) For vessels permitted to employ foreign national, as per the requirements of The Employment Act of the Maldives (2/2008), all such employees must have a valid employment contract with the vessel owner. Differentiation in wage between Maldivian crew members and foreign nationals employed onboard the same vessel is strictly prohibited.

Chapter 7

Monitoring the Implementation of the Plan

The Ministry is responsible for the implementation of each objective in this management plan, by strategies and actions, as outlined and in coordination with the relevant agencies. The Ministry shall also formulate regulations under the Fisheries Act of the Maldives, to implement and enforce all tuna fishery management measures stated in this Plan within three months of publication of this Plan in the Government Gazette. The Maldives Marine Research Institute shall formulate and implement a plan of action to undertake all research activities that the institute is responsible for under this Plan.

Chapter 8

Reviewing the Management Plan

This Plan will be reviewed and revised every 5 (five) years. The Ministry will ensure the engagement of tuna fishing communities, licence holders, processors, exporters, civil society and other stakeholders in the review process. Where there is an immediate need to revise any part(s) or measures of this Plan, the Ministry shall carry out such revisions in consultation with the Committee.

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Annex 1: Glossary

(a) Commercial Fishing	Fishing or Harvesting for the purpose of obtaining a financial benefit
(b) Enforcement officer	Any officer designated pursuant to Section 57 of the Act No. 14/2019 (Fisheries Act of the Maldives) to enforce regulations made under the Act.
(c) Fisheries Ranger	Persons who are appointed for and by the Ministry under Section 58 of the Act No. 14/2019 (Fisheries Act of the Maldives).
(d) Fishing/ Harvesting	(1) Searching for the purpose of catching, taking, killing and harvesting of fish; (2) Attempting to search for, catch, take, kill or harvest fish; (3) Engaging in any other activity that results in the searching, catching, taking, killing or harvesting of fish; (4) Placing or searching or retaking of any fish aggregating device or equipment including "radio beacons"; (5) Undertaking any operation at sea or on an island in preparation for any activity mentioned in subsections (1), (2), (3) or (4).
(e) Industry	-
(f) Fishing vessels	Any type of vessel, ship or any other thing which is used for fishing, which has been prepared for fishing, or which is usually used for fishing or related activities.

(g) Logbook	Any instruments used to record data on fishing trips, including catch and effort data, submitted electronically or via any other medium determined by the Ministry
(h) Management plans	Plans made with regard to fisheries planning, management and development pursuant to Chapter Three of the Act No. 14/2019 (Fisheries Act of the Maldives)
(i) Minister	The minister responsible for fisheries, including aquaculture.
(j) Ministry	The minister responsible for fisheries, including aquaculture.
(k) Precautionary measures	In the absence of complete information based on scientific research or where a matter has not been proved, measures adopted to manage the natural resources in a sustainable manner considering the possibility of an adverse outcome if such measures are not taken.
(l) Processing	Activities undertaken to package, pack or bring any change to fish in order to preserve fish for a long period.
(m) Processing facilities	Lands, buildings, or such other places on or in which: (1) fish or aquaculture products are cleaned, packaged, dried, salted, chilled, frozen or otherwise processed for sale in and outside the Maldives; or (2) fish or aquaculture products are stored for the purposes of packaging, canning, drying, cleaning, salting, chilling, freezing or otherwise for processing for sale in and outside the Maldives.

(n) Fisheries Information System - *Keyolhu*	A web-enabled fishery information system designed to upload record catch data and issue permits and licenses to fishery and fishery related activities.
(o) Vessel Owner	The person who fulfils the duties and obligations of, represents as having the rights of, or accepts the obligations of, whether in personal capacity or through another person, the owner; and person or persons associated with the owner, or the manager, director or secretary of a legal entity.
(p) Data buoy	Consistent with IOTC resolution 11/02 "On the Prohibition of Fishing on Data Buoys", floating devices, either drifting or anchored, that are deployed by governmental or recognised scientific organisations or entities for the purpose of electronically collecting and measuring environmental data, and not for the purpose of fishing activities.
(q) Maritime zones of the Maldives	Maldives internal waters, archipelagic waters, territorial sea and exclusive economic zones as stipulated in the Act No.: 6/96 (Maldives Maritime Zones Act).
(r) Operator	Each person who controls, operates or instructs the vessel, including the owner, charterer, master and any party who benefits economically or financially from the operation of the vessel.

Annex 2. Longline Fishing Vessel Standards

Headroom	Headroom shall not be less than 190 centimetres in any space - or part of any space - in such accommodation, where it is satisfied that this is reasonable and will not result in discomfort to the fishers.
Openings into and between accommodation spaces	There shall be no direct openings into sleeping rooms from fish rooms and machinery spaces, except for the purpose of emergency escape
	For vessels of 24 metres in length and over, there shall be no direct openings, except for the purpose of emergency escape, into sleeping rooms from fish rooms and machinery spaces or from galleys, storerooms, drying rooms or communal sanitary areas; that part of the bulkhead separating such places from sleeping rooms and external bulkheads shall be efficiently constructed of steel or another approved material and shall be watertight and gas-tight.
Insulation	Accommodation spaces shall be adequately insulated; the materials used to construct internal bulkheads, panelling and sheeting, and floors and joinings shall be suitable for the purpose and shall be conducive to ensuring a healthy environment. Sufficient drainage shall be provided in all accommodation spaces.
Emergency escape	Emergency escapes from all crew accommodation spaces shall be provided as necessary

Ventilation	Shall be equipped with a system of ventilation for accommodation, which shall be controlled so as to maintain the air in a satisfactory condition and to ensure sufficiency of air movement in all weather conditions and climates. Ventilation systems shall be in operation at all times when fishers are on board.
Lighting	In any part of the accommodation space available for free movement, the minimum standard for such lighting shall be such as to permit a person with normal vision to read an ordinary printed newspaper on a clear day.
Sleeping rooms	For vessels of 24 metres in length and over but which are less than 45 metres in length, the floor area per person of sleeping rooms, excluding space occupied by berths and lockers, shall not be less than 1.5 square metres. For vessels of 45 metres in length and over, the floor area per person of sleeping rooms, excluding space occupied by berths and lockers, shall not be less than 2 square metres. Individual berths of dimensions not be less than 190 by 70 centimetres shall be provided. Mattresses shall be of a suitable material
Sanitary facilities	For all fishers who do not occupy rooms to which sanitary facilities are attached, there shall be provided at least one tub or shower or both, one toilet, and one washbasin for every four persons or fewer.

Annex 3. Required Design of Bird-Scaring Lines and Instructions on Deployment

1. Bird-Scaring Lined Design:

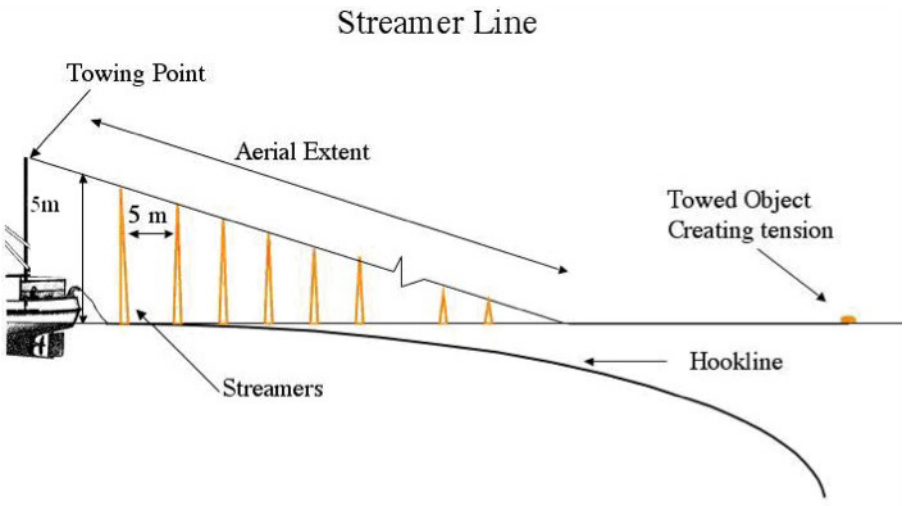
(a) The bird-scaring line shall be a minimum of 100 m in length and if less than 150 m in length will include an object towed at the seaward end to create tension to maximise aerial coverage. The section above water shall be a strong fine line of a conspicuous colour such as red or orange.

(b) The above water section of the line shall be sufficiently light that its movement is unpredictable to avoid habituation by birds and sufficiently heavy to avoid deflection of the line by wind.

(c) Streamers for the bird-scaring line shall be made of material that is conspicuous and produces an unpredictable lively action (e.g. strong fine line sheathed in red polyurethane tubing) and shall be suspended in pairs from a robust three-way swivel attached to the bird scaring line and shall hang just clear of the water.

(d) There shall be a maximum of 5 m between each streamer pair.

(e) The number of streamers shall be adjusted for the setting speed of the vessel, with more streamers necessary at slower setting speeds.



- **Figure 4:** Diagram of Bird Scaring Streamer Line (Figure source: Indian Ocean Tuna Commission, Resolution 12/06

2. Deployment of bird-scaring line

(a) The line shall be deployed before longlines enter into the water.

(b) The line should have an aerial coverage of at least 100 metres. To achieve this coverage, the line shall be suspended from a point a minimum of 5 metres above the water at the stern on the windward side of the point where the branch line enters the water.

(c) The bird scaring line shall be set so that streamers pass over baited hooks in the water. The position of the object towed shall be maintained so as to ensure, even during crosswinds, that the aerial extent of the bird-scaring line is over the branch line as far astern of the vessel as possible.

(d) Because there is the potential for line breakage and tangling, spare bird scaring lines shall be carried on-board to replace damaged lines and to ensure fishing operations can continue uninterrupted

Ministry of Fisheries, Marine Resources & Agriculture

Malé, Maldives