Indian Ocean Tuna Commission
Commission des Thons de l'Ocean Indien
iotc ctoi

IOTC-2019-SC22-NR12_Rev1

[KENYA] National Report to the Scientific Committee of the Indian Ocean Tuna Commission, 2019

Authors

[1]E. Mueni, [1]S. Ndegwa , [2]N. Wambiji , [2]G. Okemwa and [3]Nelly Kadagi

affiliation [organisation/s]

State Department for Fisheries, Aquaculture and the Blue Economy

[1]Kenya Fisheries Service and [2]Kenya Marine and Fisheries Research Institute

[3]African Billfish Foundation

INFORMATION ON FISHERIES, RESEARCH AND STATISTICS

In accordance with IOTC Resolution 15/02, final scientific data for the previous year was provided to the IOTC Secretariat by 30 June of the current year, **for all fleets other than longline** [e.g. for a National Report submitted to the IOTC Secretariat in 2019, final data for the 2018 calendar year must be provided to the Secretariat by 30 June 2019)	YES 30/06/2019
In accordance with IOTC Resolution 15/02, provisional **longline data** for the previous year was provided to the IOTC Secretariat by 30 June of the current year [e.g. for a National Report submitted to the IOTC Secretariat in 2019, preliminary data for the 2018 calendar year was provided to the IOTC Secretariat by 30 June 2019). **REMINDER:** Final longline data for the previous year is due to the IOTC Secretariat by 30 Dec of the current year [e.g. for a National Report submitted to the IOTC Secretariat in 2019, final data for the 2018 calendar year must be provided to the Secretariat by 30 December 2019).	YES 30/06/2019
If no, please indicate the reason(s) and intended actions:	

Executive Summary

The Kenyan tuna and tuna-like fishing fleets comprise of the artisanal, semi-industrial, industrial and recreational fisheries which have an impact on IOTC's priority species. The commercial artisanal fishing fleet is composed of a multi-gear and multi-species fleet operating in the territorial waters. The artisanal boats are broadly categorized as outrigger boats or dhows which come with variants depending on the construction designs. It is estimated that 414 artisanal vessels are engaged in the fishing for tuna and tuna like species in 2016 within the coastal waters. The main gears used are artisanal long line hooks, gillnets, monofilament nets and artisanal trolling lines.

In 2018, three (3) Kenya pelagic longline vessels operated in the IOTC area of competence. The IOTC species landed during the year included swordfish (294 tons), yellowfin tuna (108 tons) Bigeye tuna (28 tons) while other species combined (99 tons).

Catches of scombrids from artisanal fisheries were 3,476 tons, which is an increase from 1,931 tons recorded in 2017. Other IOTC species landed during the year were sailfish (427 tons), Swordfish (216 tons), Sharks (536 tons), Rays and Skates (879 tons) and hammerhead sharks (26 tons).

The main target species from the recreational fisheries are marlins and sailfish (Istiophiridae), swordfish (Xiiphidae) and tuna (Scombridae). Other species caught include small pelagic species such as barracuda, Spanish mackerel, Wahoo and sharks are landed. The artisanal fisheries and recreational fishing fleets have interactions with sharks where sharks are caught and the carcass is retained and fully utilised in artisanal fisheries and recreational trolling line fisheries have a voluntary shark release policy for sharks.

CONTENTS

1. BACKGROUND/GENERAL FISHERY INFORMATION 5

2. FLEET STRUCTURE 5

3. CATCH AND EFFORT (BY SPECIES AND GEAR) 6

4. RECREATIONAL FISHERY 8

5. ECOSYSTEM AND BYCATCH ISSUES 9

6. NATIONAL DATA COLLECTION AND PROCESSING SYSTEMS 13

7. NATIONAL RESEARCH PROGRAMS 16

8. IMPLEMENTATION OF SCIENTIFIC COMMITTEE RECOMMENDATIONS AND RESOLUTIONS OF THE IOTC RELEVANT TO THE SC 21

9. LITERATURE CITED 25

1. BACKGROUND/GENERAL FISHERY INFORMATION

Kenya's straight coastline measures 640 km long and 880 Km including bays and inlets. Situated in the Western Indian Ocean, it borders Somalia to the north and Tanzania to the south. The declared Exclusive Economic Zone (EEZ) extends 200 nautical miles from the Kenya coastal baselines measuring 142,400 Km. The most distinctive feature is its almost continuous fringing coral reef that runs parallel to the coast. The continental shelf is narrow (3-5 km) in most parts except in Ungwana bay, the shelf area measures 6500 km. The coastal and marine environment supports rich inshore fishing grounds located in and around Lamu Archipelago, Ungwana Bay, North Kenya Banks and Malindi Bank. The areas where the two major Kenyan rivers (Tana and Sabaki) empty into the sea are also very productive. The extensive fringing reef system supports vibrant artisanal fisheries for demersal, crustacean and molluscs fisheries vital for the livelihoods of the dependant coastal communities. The annual production from artisanal coastal fisheries in 2017 was 23,286 MT consisting of demersal 48%, pelagic 33%, sharks and rays 8% mollusc 9% and crustaceans 3%. Annual catches of Scombridae were the highest of the pelagic with 1,931 tons recorded.

Kenya's entire artisanal fishing fleet consists of 3,500 small scale mostly wooden crafts usually for single day fishing trips. Fishing is heavily influenced by the monsoon season cycles, the most important fishing season is during the calm north east monsoon from September to March. The species under the IOTC mandate that are landed include tuna (yellowfin tuna, skipjack tuna and Kawakawa), but are not always distinguished to species level in catches. Billfish catches in the artisanal fishermen landings are represented mainly by sailfish (Istiophoridae). A recreational trolling line fishery is also important in Kenya's pelagic fisheries. The recreational catch is considered significant especially when compared to the artisanal commercial fisheries and is composed of a total of fifteen pelagic species commonly landed however the mainstay of the fishery is composed of sailfish, marlins, tuna and swordfish.

2. FLEET STRUCTURE

The national tuna fishing fleet structure consists of an artisanal commercial segment and to a lesser extent recreational fleet which all combined target and impact species under the IOTC mandate. An estimate of the total fishing fleet for the entire artisanal sector is obtained from biennial frame surveys conducted regularly for the entire artisanal fishery since 2004. The fishing fleet estimates provided in this report are based on the frame survey estimates of February 2016.

The commercial artisanal fishing fleet is composed of a multi-gear and multi- species fleet operating in the territorial waters. The local boats are broadly categorized as outrigger boats or dhows which come with variants depending on the construction designs. It is estimated that 414 artisanal vessels are engaged in the fishing of tuna and tuna like species in 2018. A majority of the vessels are wooden planked propelled by sails and increasingly being motorised. These boats operate day fishing trips within the territorial waters. The mean craft size for tuna fishing vessels based on the frame survey was eight meters. The main gears used are artisanal long lines (45), handlines (75), gillnets (150), trolling lines (106), monofilament nets (15) and other gears (23). Recreational fishing vessels use trolling lines.

Table 1: Number of vessels operating in the IOTC area of competence, by gear type and size

	2014	**2015**	**2016**	**2017**	**2018**
LONGLINERS	0	0	1	1	3

3. CATCH AND EFFORT (BY SPECIES AND GEAR)

Artisanal commercial fishing for tuna and tuna-like species in the territorial waters use artisanal long line hooks, gillnets, monofilament nets and artisanal trolling lines. Generally fishing for tuna species is highly seasonal activity where artisanal vessels in July-November target migratory tuna which occur in the coastal waters. The peak season for sailfish landings is during the November to March in coastal waters. Species landed are tuna yellowfin tuna, Skipjack tuna, Kawakawa, sailfish and Spanish mackerel. Table 1 summarises artisanal catch data for the year 2015- 2018. In 2018, landings of tunas from artisanal fishers were 3,476 tons which was an increase compared to 1,931 tons caught in 2017 respectively.

The spatial representation of the catch by species and the fishing fleet dynamics is not possible primarily because the entire catch is caught by artisanal operators who do not have GPS devices equipped on their vessels. All the fleet operates within the territorial waters and mainly within the 5 nm area**.**

Table 2a: Annual catch from coastal fisheries at family level (pooled for all gears) for primary species in the IOTC area of competence. (Include a 'not elsewhere indicated – NEI' category for all other catches combined.)

Species/Year	**2015**	**2016**	**2017**	**2018**
Istiophoridae	162.5	371.5	356.1	427.3
Scombridae	8,264.9	3,430.9	1,931.1	3,476.0
Xiphiidae	75.9	199.8	166.0	215.8
Carcharhinidae	218.1	411.9	466.0	535.9
Dasyatidae	400.8	596.8	462.5	601.2
Myliobatidae	236.2	112.9	231.8	278.2
Sphyrnidae	12.1	30.8	20.3	26.4
Other rays	1.0	-	12.6	15.2

The Kenya flag industrial longline vessels fished within the EEZ and the high seas in the period of 2017-2018 with the total number of hooks ranging from 259125 hooks in 2017 to 618,385 hooks in 2018. The vessel fished for a total of 340 days at sea. The catch and effort data as well as length frequency data was submitted IOTC. A total of 527,820kg of fish was landed in 2018 with yellowfin (107589kg) and swordfish (293,950 kg) most dominant species.

Table 2b: Annual catch Kenyan flagged longline vessels (within Kenyan EEZ and high seas), 2016-2018 for primary species in the IOTC area of competence

Species/Year	**2016**	**2017**	**2018**
Yellowfin	50.2	14.4	107.6
Bigeye	28.1	10.6	27.6
Tuna NEI	-	-	10.1
Swordfish	19.4	2.3	294.0

Marlin	11.1	2.3	8.8
Sailfish	-	0.8	1.3
Sharks	8.8	6.3	55.9
NEI	32.7	10.5	22.6
Effort (Hooks)	275593	259125	618,385
Fishing days	151	85	340

4. RECREATIONAL FISHERY

Sportfishing also termed as big game fishing or recreational fishing dates back to the 1930s, and became prominent in the 1950s with the establishment of the Malindi Sea Fishing Club (Wambiji and Kadagi, 2018). The fishery has been mostly been regarded as a European pastime and luxurious activity mostly for fishing tourists.

The main target species are species belonging to family Scombridae (tuna), Istiophoridae (sailfish, marlin and short-billed spearfish) and Xiiphidae (swordfish), sharks, and small pelagic species such as barracuda, spanish mackerel, wahoo, kingfish, giant trevally among others. Previous catch records have shown that sailfish are the most commonly caught (28%) followed by tuna (19%) (Le Menach et al., 2015). However, sailfish landings have declined over the past 7 years based on the African Billfish Foundation tagging data (Kadagi, 2019). In addition, the number of fishing trips have reduced significantly reduced ranging from 60 -120 days a year (Kadagi, 2019; Pepperell et al., 2017). The fishery uses various methods of fishing such as trolling and casting which may with baits and artificial lures on chartered or private boats. The common fishing locations are banks and reef drop offs, the Pemba Channel and sea mounts. Specifically, the sport fishing season starts from July to the end of April, and it is characterized by the occurrence of a sailfish run (October - December), and a marlin run (January - March) (Wambiji and Kadagi, 2018; Pepperell et al., 2017).

Tagging records indicate that a total of 617 billfish species were tagged by the sport fishing sector through the African Billfish Foundation (ABF) in 2018/2019 fishing season. The highest number of tagged billfish was between November 2018 and February 2019. Sailfish were the most tagged (370) followed by the blue marlin (97) and striped marlin (68).

From the recreational fishing data in the period; September to December indicate that 12,151.2 kg of tuna and tuna like species a well as sharks were caught of which 3,882kg (31.9%) were released while 8269,2kg

(68.0%) was retained. Sailfish was most target and out of 58.3% out of which 52.5% was retailed and 47.5% was released. All the yellowfin tuna species were retained (19.3%). A total of 1,764.7 kg of Kingfish was reported during the period.

5. ECOSYSTEM AND BYCATCH ISSUES

Kenyan pelagic fisheries encounter sharks in the fishing operations of the artisanal longline, trolling line, handline and gillnet fisheries in territorial waters. Sharks are caught and the carcass is retained and fully utilised. Recreational trolling line fisheries encounter sharks as by catch but have a voluntary shark release policy for sharks caught. Sharks are also caught in industrial longline fishing tuna by licensed foreign vessels operating within the Kenya EEZ. Sharks interact with other fisheries based on the marine frame survey reports 2004-2016. Different sharks and ray families are caught in the different gears identified as important in the fishery. More than 80% of species of the carcharhinidae are caught in line (longline an trolling lines) and monofilament gears while over 60% are caught in gillnets and handlines. Rays of the family dasyatidae and mobulidae are caught using spearguns, beach seines, ringnets and traps (mainly fence traps). Whale sharks are also reported to be entangles in artisanal bottom set gillnets.

Information from recent studies including the regional BYCAM WIOMSA funded project, indicate that the Carcharhinidae and Sphyrnidae dominate the species of artisanal catch landings in Kenya. 11 families of sharks and rays are categorized as target in the artisanal fishery while 16 families are caught as bycatch based an ecological risk assessment for shark fishery. Carcharhinidae, Sphyrhinidae, Lamnidae and Alopiaidae shark families are considered as the main target groups from the 14 shark families. Sharks species of the families Carcharhinidae, Sphyrhinidae, Lamnidae and Dasyatidae, Myliobatidae and Rhinopteridae ray families were also categorized as bycatch based on the fishing gear.

An ecological risk assessment of the sharks and rays species (FAO EAF methodology) was conducted as one of the step towards development of the National plan of action for sharks. The shark and ray fishery interaction/overlap with threatened and endangered species e.g. turtles, mammals, sea birds due fishing gear interactions with the environment or active targeting by fishers was assessed. Due to the limited knowledge on vulnerable shark and ray species especially in the artisanal fishery, it is possible that fishers may actively target these protected sharks and rays. Sea turtle mortality in the gillnet fishery is certain yet these nets are used to actively target sharks, longlines on the other hand are associated with sea bird mortalities.

Thirteen species of elasmobranchs representing 8 families were recorded from Underwater Visual Census (UVC) and Baited Remote Underwater Videos (BRUVs) including juveniles. Sightings of tiger shark

(Galeocerdo cuvier) around the Marine protected areas is reported to have declined based on recreational fishers (Musembi et al, 2017).

Monitoring programs have been initiated through various initiatives to monitor sharks, rays and associated habitats that will contribute to management of the sharks' species

5.1 Sharks

The species composition of shark catches recorded from 1989 to 2016 is poorly known except for key species that are distinguished under national statutory requirements, largely for IOTC, SWIOFC, FAO. These comprise Mako sharks, Isurus spp. at 37% by number of the catch and Blue sharks, Prionace glauca at 34%. The remaining sharks identified to species level comprise of 29% by number of the catch between these periods with a large proportion from the family Carcharhinidae (Kiilu and Ndegwa, 2013, Kiilu, 2016, Oddenyo, 2017). The most common species are *Carcharhinus limbatus, Sphyrna lewini* and *Carcharhinus longimata.* (Wambiji et al, unpublished data).

Currently there are no specific regulations to manage shark fishery but there are management strategies that also manage sharks species. The Marine protected Areas established and managed under the Wildlife Management and Conservation Act 2013 as well as community management areas through the co-management arrangements play a role in management of the biodiversity. Trade of sharks and rays products of protected and endangered species is regulated in Kenya with CITES permits required for such exports.

Sharks and ray species are caught as bycatch in the prawn trawl fishery. The fishery is managed through a management plan that zones the fishing ground, enforces a 5 months closed season and includes use of turtle excluder device as a management measures.

5.1.1. NPOA sharks

The development of a National Plan of Action for sharks was started in 2017 through an ecosystem approach to fisheries process. Two key steps have been implemented that include the baseline situation analysis and risk assessment of the fishery. Sharks fisheries interactions have been documented in recent studies and during the risk assessment stakeholder workshops. Key recommendations from the action plan will form part of the fisheries regulations to enhance conservation and management of sharks species and their long-term sustainable use.

5.1.2. Sharks finning regulation

Currently there is no shark finning specific regulations. Shark finning management measures have been prepared and submitted for legal review and gazettement by the Cabinet Secretary.

5.1.3. Blue shark

Kenya implements 100% observer coverage and training scientific observers and establishment of an regional observer scheme is underway to enhance observer coverage and reporting. Landbased monitoring of sharks and rays species is being undertaken in collaboration with academic institutions and Non-governmental organizations. Catch assessment surveys are conducted under the National research program.

5.2 Seabirds [Mandatory]

The observers on board the longline vessel have also been supplied with bird identification guides in case they happen to encountering birds in their course of duty.

Observer seabird interaction data sheet for the IOTC longline fleet

Name of member state: __Kenya_____;

Reporting period* or calendar year____2018_____

Species ___Albatrosses nei_____

Fishery		Observed					Estimate
Area[1]	Total effort[2]	Total observed effort[2]	Observer coverage[3]	Captures (number)	Mortalities (number)	Live releases (number)	Mortality estimate (number)
	Not indicated	Not indicated	86	2		2	0
Total							

*This field can be used to specify a temporal stratification to the data e.g. season

[1]Spatial stratification (5x5, 10x10 or other – to be determined)

[2]Number of hooks observed hauled

[3]Percentage of all hooks set that were observed hauled

1. How many vessels operated south of 25˚S in the period covered by this report? N/A
2. How many of those vessels used bird scaring lines (as a proportion of total effort)? N/A
3. How many of those vessels used line weighting (as a proportion of total effort)?N/A
4. How many of those vessels used night setting (as a proportion of total effort)?N/A

5.3 Marine Turtles

Reporting on the sea turtles gears interactions in the artisanal tuna fishing fleet is still limited due to the artisanal nature of the fishing operations. There are no annual statistics for sea turtle capture which makes the country to be the only one reporting 0 mt/ year since 1964 (FAO 2016b). Most recently under the BYCAM project, a number of turtles were caught in bottom-set nets namely one loggerhead 24 green turtles, 43 hawksbills while the handlines landed four loggerhead and one hawksbill (Temple et al, 2019).

Turtle exclude devices are mandatory in the Kenya prawn trawl fishery since 2001. In September 2019, National Oceanic and Atmospheric Administration (NOAA) officers Kenya (Kenya marine and Fisheries Research Institute and together with the Kenya Fisheries Service, the fishing industry and scientific observers made a TED based on NOAA specifications and its efficacy was tested and the industry is working to install the new TED designs.

There are plans to update the National Sea Turtle conservation strategy (2010 - 2014) spearheaded by the Kenya Wildlife Services in collaboration other relevant government agencies and stakeholders. Development of an online electronic data collection and monitoring system is underway and standardized data collection protocols have been developed. The collection information on artisanal fisheries interactions has been incorporated in the data collection forms; however, there is limited reporting as more efforts have been placed on reporting nesting and stranding activities.

4 sea turtles (Hawksbill-2, loggerhead -1 and green turtles -1 are reported through observer reports to have been caught three dead and one alive. All were returned to the sea.

Details of marine turtle interactions with Kenyan Flagged longline vessels by geographical positions

	Fishery: LL			Observed ** Observer data				
Year	Lat*	Lon	Total	Total effort	Species	Captures	Mortalities	Live

			effort	observed		(number)	(number)	releases (number)
2018	3S	41E	Not indicated		Hawksbill	1	1	-
	4S	40E	Not indicated		Loggerhead	2	1	1
	4S	40E	Not indicated		Green turtle		1	

NB: Effort units should be appropriate for the gear type, i.e., hooks or sets for LL and sets of fishing days for purse seine or gillnet fleets and fishing days for pole and line fleets.

5.4 Other ecologically related species (e.g. marine mammals, whale sharks)

Marine mammals are protected according to Fisheries Management and Development Act 2016 sec 46. The observers on board the longline vessel have also been supplied with identification guides in case they happen to encountering marine mammals and ceataceans in their course of duty. One Bottlenose dolphin was observed and escaped alive.

6. NATIONAL DATA COLLECTION AND PROCESSING SYSTEMS

6.1. Logsheet data collection and verification (including date commenced and status of implementation)

Logbook data collection and verification started in 2007 and applied to the authorised long line vessel flying the Kenyan flag. Currently, Kenya has two (3) longliner flagged 2016 and 2018 year and the verified logbook data was submitted in 2018 to the IOTC as per the requirements. The rest of the fleet which is largely artisanal does not have a logsheet data collection system. The Fisheries Management and Development Act 2016 provides for data reporting by licenced operator in a prescribed. Kenya has developed simple logbooks for artisanal data reporting and its been piloted through licensing scheme. A recreational fisheries logsheet was developed in collaboration with IOTC and introduced in some clubs hence need for further monitoring. The form has been

incorporated in integrated Fisheries Data and Information Management System (FDIMS) expected to be fully operation once the web based database is launched.

6.2. Vessel Monitoring System (including date commenced and status of implementation)

The current fleet structure is artisanal tuna fishing vessels are small in size and cannot be fitted with the VMS equipment. All Kenyan flagged and licensed foreign vessels are registered on the country's VMS. The monitoring of fishing vessels is now effected.

6.3. Observer programme (including date commenced and status; number of observer, include percentage coverage by gear type)

The FMDA 2016 and small and medium purse seine net management plan provides that semi-industrial fleet operate with observers on board observer but the scheme has not been introduced. The current authorised tuna vessels are too small to accommodate observers while management plan is awaiting gazettement. The scientific observers have been deployed onboard the Kenyan flagged longliners at all time during fishing voyage. The current observer coverage is 86%, with both scientific and compliance observers boarding simultaneously. The observer data has also been submitted to the IOTC.

Annual observer coverage on Kenyan Longline fleet in 2018

	2014	**2015**	**2016**	**2017**	**2018**
Industrial (>24m)	0	0	1 vessel 100%	1 vessel 100%	3 vessels 86%
Artisanal (<24m)	390 vessels 10%	390 vessels 10%	414 vessels 10%	414 vessels 10%	414 vessels 10%

The artisanal fishery is undertaken mostly in the territorial waters and no observers on board but land based sampling conducted at selected sites.

Annual observer coverage on Kenyan Longline fleet in 2018

Year	Gear	Period	Number of days
2018	Longline	3/04/2018 – 27/05/2018	42
		2/06/2018 – 25/06/208	20
		8/08/2018 – 8/10/2018	60
		24/08/2018 – 18/09/2018	31
		17/10/2018 – 16/01/2019	85
		3/11/2018 – 17/12/2018	45

6.4. Port sampling programme

Port sampling of vessels at the port of Mombasa has been boosted following the signing into law fisheries management and development act of 2016. The FMDA 2016 incorporated a lot of the port state measures agreement. Kenya has launched the revival of a jetty towards development of a fishing port. This is an opportunity to implement port sampling for length frequency during offloading.

6.5. Unloading/Transhipment of flag vessels [including date commenced and status of implementation]

Data is collected for unloading and at port transhipment and submitted to the secretariat in the prescribed format. All unloading is monitored for vessels offloading. Inspections were conducted for at port transhipment and inspection report send to IOTC. In 2019 one of Kenya flag vessels transhipped at sea under the observation by a IOTC authorised observer and a report shared for submission. The vessel also had an observer on board during the transhipment. Detailed data on this monitoring /observation was included in a report submitted to IOTC.

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

Land based monitoring of artisanal fishery and observer monitoring on board Kenya flagged logline vessels

7. NATIONAL RESEARCH PROGRAMS

- The pelagic fisheries resources within Kenya's EEZ are mainly exploited by DWFN through annual licenses. In the past few years, KMFRI has undertaken hydroacoustic surveys on RV Mtafiti to collect information on the abundance of fish in the Kenya EEZ. The offshore waters are grouped into four blocks: Territorial waters; EEZ off Lamu County (Block 1); EEZ off Kilifi County (Block 2); and EEZ off Kwale County (Block 3). Using the target strength of tuna to calculate indicative biomass, the highest fish abundance was observed in the territorial waters was off Lamu and the North Kenya banks in Malindi during the 2017 surveys. Within the EEZ, 90% of the fish biomass was concentrated within the upper 100 m layer of the water column, while about 9% of the fish biomass was in the mesopelagic layer (100-350 m), and only 1% was detected beyond the 350m depth.

- In 2018 an area of 14,156 Km^2 was surveyed. The acoustic estimates showed varied fish density distribution with the mean density at 25.05 Mt Km^{-2}. The highest densities observed at lower Mombasa, Mida creek near Kilifi and at the North Kenyan banks.

- Industrial longline fleets reported significant biomass of demersal fish within the territorial waters in the northern Kenya Banks in the upper 200 m. The longliners mostly caught tuna species (52%) of which Yellowfin tuna constituted 35% of the total catches, followed by Bigeye tuna constituting 13%. Yellowfin tuna catches were mainly caught from Block 1 (Off Lamu), while the Bigeye tuna were mainly fished from Block 3 (49%) and Block 1 (34%). Other species such as sharks were captured in Block 1 (56%) while Swordfish were caught in Block 2 (32%) and 3 (34%); the secondary target species included striped marlins and blue sharks. The longliners also had discards comprising of shark *Carcharhinus longimanus* which constituted approximately 73% followed by the Snake mackerel *Gempylus serpens* (17%). Endangered shark species such as the Scalloped hammerhead, *Sphyrna lewini* were also discarded.

7.1. National research programs on blue shark

Implementation of scientific observer coverage to monitor catches of blue sharks

7.2. National research programs on Striped Marlin, Black Marlin, Blue Marlin and Indo-pacific Sailfish

The BILLFISH-WIO (www.billfishwio.com) project funded by The Western Indian Ocean Marine Science Association (WIOMSA) will focus on 4 thematic areas to assess the catch status, genetic structure, the habitat and distribution, and socio-economics associated with billfish in Kenya and other regional countries. The project will collect data on blue marlin, striped marlin, sailfish and black marlin.

7.3. National research programs on sharks

Landbased catch assessment monitoring is being conducted by KMFRI at 16 landing sites along the coast. All species including sharks are captured in landed.

7.4. National research programs on oceanic whitetip sharks

Landbased catch assessment monitoring is being conducted by KMFRI at 16 landing sites along the coast. All species including sharks are captured in landed.

7.5. National research programs on marine turtles

There are initiatives to implement online Sea turtle monitoring and reporting through a mobile application coordinated by Kenya Wildlife service.

7.6. National research programs on thresher sharks

Landbased catch assessment monitoring is being conducted by KMFRI at 16 landing sites along the coast. All species including sharks are captured in landed.

Table 8: Summary table of national research programs, including dates. [currently underway]

Project title	Period	Countries involved	Budget total	Funding source	Objectives	Short description
Enabling	2019 -	Kenya,	329,990		• Determine genetic	The project

Sustainable Exploitation of the Coastal Tuna Species (Kawakawa and Skipjack) in the Western Indian Ocean	2022	Tanzania, Mozambique, South Africa		WIOMSA - MASMA	diversity among populations of Kawakawa and Skipjack tunas within the WIO region, • Investigate the influence of oceanographic factors on the distribution, genetic structuring, spawning pattern and abundance of Kawakawa and Skipjack in the WIO region. • Conduct a regional characterization and economic analysis of Kawakawa and Skipjack tuna fisheries in the WIO region	aims to provide robust information on the stock structure, and fishery dynamics of the two coastal tuna species as well as the environmental drivers that contribute to their sustainable management.
Bycatch assessment and mitigation in the Western Indian Ocean (BYCAM)	2015 - 2018	Kenya, Madagascar, South Africa, Tanzania, Mozambique	US$ 369969	WIOMSA	Assessment of current regional fisheries statistics and bycatch data -Bycatch assessment in coastal gillnet, longline and prawn trawl fisheries -Mitigation of	The project aims to re invigorate initiatives to reduce bycatch in WIO fisheries, and

					bycatch in coastal gillnet, longline and prawn trawl fisheries. -Data mapping (spatial data management) Comprehensive Final Framework	improve the uptake of TEDs and other mitigation methods
The RV Mtafiti-Hydro acoustics survey	2016 to date	Kenya	300 million KES	Kenyan Government		RV Mtafiti's role is to facilitate biomass estimates of the offshore pelagic fish stocks, collect oceanographic data and biodiversity.
Catch Assessment Survey CAS	2016 to date	Kenya	10 million KES	Kenyan Government	1. Determine seasonal and spatial patterns in catch production, catch rates, species and size composition by gear-vessel type 2. Conduct	Generate information to support monitoring and sustainable management

					biological studies on priority species 3. Explore the implications for management	of fisheries resources.
Observer programme	2016 To date	Kenya	5 million KES	Kenyan Government	The scientific observers board fishing vessels to collect unbiased data and report on technical, regulatory, scientific and economic aspects of a fishing operation.	The Fisheries Observer Programme is responsible for providing the training and support necessary for deploying observers on board fishing vessels in order to collect fisheries-dependent information essential to achieving the fisheries management

						objectives. Started during SWIOPF project

8. IMPLEMENTATION OF SCIENTIFIC COMMITTEE RECOMMENDATIONS AND RESOLUTIONS OF THE IOTC RELEVANT TO THE SC

Respond with progress made to recommendations of the SC and specific Resolutions relevant to the work of the Scientific Committee [to be updated annually to include most recent Conservation and Management Measures adopted by the Commission].

Table 9. Scientific requirements contained in Resolutions of the Commission, adopted between 2011 and 2018.

Res. No.	Resolution	Scientific requirement	CPC progress
11/04	On a regional observer scheme	Paragraph 9	Currently Kenya is undertaking 86% observer coverage on the Kenyan flagged longline vessels Four more personnel trained as scientific Plans to train 10 observers underway
12/04	On the conservation of marine turtles	Paragraphs 3, 4, 6–10	• Re. Para 3: Form 1 DI has been completed from the observer data and the logbook data verified in the week of 18th November and form 1DI to be submitted. • Re. Para 4: Collation and analysis of nesting and mortality data in collaboration with Kenya Wildlife Services • Re. Para 6 - 9: Gazette notice prepared and submitted to the Director General for

Res. No.	Resolution	Scientific requirement	CPC progress
			publication • Re. Para 10. Research on by-catch from artisanal fishery has been undertaken by Kenya Marine and Fisheries Research Institute (KMFRI) and the findings will be availed to the scientific committee next year.
12/06	On reducing the incidental bycatch of seabirds in longline fisheries.	Paragraphs 3–7	• Re. Para 3: Form 1 DI has been completed from the observer data and the logbook data verified in the week of 18th November and form 1DI will be submitted. • Re. Para 4 - 7: Gazette notice prepared and submitted to the Director General for publication
12/09	On the conservation of thresher sharks (family alopiidae) caught in association with fisheries in the IOTC area of competence	Paragraphs 4–8	Re. Para. 4: Logbook for the country is being designed. • Re. Para 5 – 7: Gazette notice prepared and submitted to the Director General for publication • Re. Para. 8: Form 1 DI has been completed from the observer data and the logbook data verified in the week of 18th November and form 1DI will be submitted.
13/04	On the conservation of cetaceans	Paragraphs 7– 9	Re. Para. 7: Logbook for the country is being designed.

Res. No.	Resolution	Scientific requirement	CPC progress
			• Form 1 DI has been completed from the observer data and the logbook data verified in the week of 18th November and form 1DI will be submitted.
13/05	On the conservation of whale sharks (*Rhincodon typus*)	Paragraphs 7– 9	Re. Para. 7: Logbook for the country is being designed. • Form 1 DI has been completed from the observer data and the logbook data verified in the week of 18th November and form 1DI will be submitted.
13/06	On a scientific and management framework on the conservation of shark species caught in association with IOTC managed fisheries	Paragraph 5–6	Re. Para. 5: Logbook for the country is being designed.
15/01	On the recording of catch and effort by fishing vessels in the IOTC area of competence	Paragraphs 1–10	Re. Para. 1-9: Logbook for the country is being designed. Re. Para. 10: Aggregated data from the longlines was submitted to the IOTC.
15/02	Mandatory statistical reporting requirements for IOTC Contracting Parties and Cooperating Non-Contracting Parties (CPCs)	Paragraphs 1–7	The longline data collected as per the requirement and submitted to the IOTC by 30th June. The coastal fisheries length frequency data has also been submitted by 30th June. The nominal catch data and effort by gear has not been well documented due to the

Res. No.	Resolution	Scientific requirement	CPC progress
			challenges of identification but is being addressed through the training of data collectors
17/05	On the conservation of sharks caught in association with fisheries managed by IOTC	Paragraphs 6, 9, 11	Re. Para. 6: Data on sharks reported according the 15/02 Re. Para. 9: Kenya participated in the WPEB and provided a report on sharks
18/02	On management measures for the conservation of blue shark caught in association with IOTC fisheries	Paragraphs 2-5	Re. Para. 2 – 4: Data on Blue sharks has been collected and reported to the IOTC according to Res. 15/02. Re. Para. 5: Kenya researchers have been encouraged to work on the Blue sharks and report to the IOTC for the 2021 assessment of the blue sharks
18/05	On management measures for the conservation of the Billfishes: Striped marlin, black marlin, blue marlin and Indo-Pacific sailfish	Paragraphs 7 - 11	Re. Para. 7 – 10: Data on Billfishes has been collected and reported to the IOTC according to Res. 15/01 and 15/02. Re. Para. 11: Kenya researchers have been encouraged to work on the Billfishes and report to the IOTC
18/07	On measures applicable in case of non-fulfilment of reporting obligations in the IOTC	Paragraphs 1, 4	Re. Para 1: Kenya reported in the Implementation Report actions taken to implement reporting obligations. Re. Para 4; Catch reported in 30th June using the IOTC template

9. LITERATURE CITED

1. By-catch Assessment and Mitigation in Wetsern Indian Ocean Fisheries (BYCAM) project (bycam wio.weebly.com)
2. KMFRI (2018) The RV Mtafiti: Marine Research towards Food Security and Economic Development for Kenya.115 pp
3. Government of Kenya (2017) State of the Coast Report II: Enhancing Integrated Management of Coastal and Marine Resources in Kenya. National Environment Management Authority (NEMA), Nairobi.
4. Temple, A.J., **Wambiji, N.,** Poonian, C.N.S., Jiddawi, N., Stead, S. M., Kiszka, J.J., Berggren, P. (2019). Marine megafauna catch in southwestern Indian Ocean small-scale fisheries from landings data. Biological Conservation 230 113–121
5. Olendo, M., Okemwa, G.M., Munga, C.M., Mulupi, L., Mwasi, L., Bwanamkuu, H., Sibanda, M., Ong'anda, H. (2017). The value of long-term, community-based monitoring of marine turtle nesting: a study in the Lamu archipelago, Kenya. Oryx, doi:10.1017/S0030605317000771
6. KMFRI (2018) The RV Mtafiti: Marine Research towards Food Security and Economic Development for Kenya. (Eds) Njiru JM, Ruwa RK, Kimani EN, Ong'anda HO, Okemwa GM and Osore MK. Kenya Marine and Fisheries Research Institute, Mombasa, Kenya. 102pp
7. Wambiji N. and Kadagi, N.I. (2018). Recreational fisheries. In: Kimani EN, Aura MC, Okemwa GM (eds.) (2018) The Status of Kenya Fisheries: Towards the sustainable exploitation of fisheries resources for food security and economic development. Kenya Marine and Fisheries Research Institute (KMFRI), Mombasa. 135 pp.
8. Le Manach F, Abunge CA, McClanahan TR, Pauly D (2015) Tentative reconstruction of Kenya's marine fisheries catch, 1950-2010. In: Le Manach F and Pauly D (eds) Fisheries catch reconstructions in the Western Indian Ocean, 1950–2010. Fisheries Research Centre Reports. Fisheries Centre, University of British Colombia 23: 37-45
9. Pepperell, J., Griffiths, S., & Kadagi, N. (2017). Acquisition of catch-and-effort and size data from sport fisheries in the Western Indian Ocean. Report prepared for the Indian Ocean Tuna Commission. IOTC-2017-SC20-INF04 100pp.

10. Kadagi, N.I (2019). Contextualizing Socio-ecological Interactions in recreational and artisanal fisheries: Implications for Sustainable Use and Management of Billfish in the Western Indian Ocean. *University of Florida. Dissertations*.158