



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

Authors (Stephen Ndegwa¹, Elizabeth Mueni¹, Alex Lukhwenda¹, Zackary Ogari¹, Benedict Kiilu¹, Collins Ndoro¹, Lilian Kabira¹, Grace Nduku¹, Edward Kimani², Gladys Okemwa², Nina Wambiji², Esther Fondo²)

Author/s affiliation [Kenya Fisheries Service ¹, Kenya Marine Fisheries Research Institute ²]

INFORMATION ON FISHERIES, RESEARCH AND STATISTICS

<p>In accordance with IOTC Resolution 15/02 (and other data related CMMs as noted below), final scientific data for the previous year were 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 2023, final data for the 2022 calendar year must be provided to the Secretariat by 30 June 2023)</p>	<p>YES</p> <p>30/06/2023</p>
<p>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 2023, preliminary data for the 2022 calendar year were provided to the IOTC Secretariat by 30 June 2023).</p> <p>REMINDER: Final longline data for the previous year are due to the IOTC Secretariat by 30 Dec of the current year [e.g., for a National Report submitted to the IOTC Secretariat in 2023, final data for the 2022 calendar year must be provided to the Secretariat by 30 December 2023).</p>	<p>YES</p> <p>30/06/2023</p>
<p>If no, please indicate the reason(s) and intended actions:</p>	



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 606 artisanal vessels are engaged in the fishing for tuna and tuna like species in 2022 within the coastal waters. The main gears used are artisanal long line hooks, gillnets, monofilament nets and artisanal trolling lines. In 2019, three (3) Kenya pelagic longline vessels operated in the IOTC area of competence. The IOTC species landed during the year included swordfish (261 tons), yellowfin tuna (18.7 tons) Bigeye tuna (11.6 tons), Sharks (80.7 tons) while other species combined (101 tons). Artisanal fishers landed 388 tons of marlins, 6160 tons of tuna and tuna like species and 989 tons of sharks and rays. Catches of scombrids increased to 6,160 tons which was a sharp increase compared to 1,953 tons and 1,613 tons in 2020 and 2021 compared to 3,476 tons recorded in 2018. The main target species from the recreational fisheries are marlins and sailfish (Istiophiridae), swordfish (Xiphidae) and tuna (Scombridae). Other species caught include small pelagic species such as barracuda, Spanish mackerel, Wahoo and sharks. 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.

1. BACKGROUND/GENERAL FISHERY INFORMATION

Kenya’s coastline is estimated to be 640 km long and 880 km including bays and inlets. Situated in the Western Indian Ocean (WIO), it borders Somalia to the north and Tanzania to the south. Kenya’s Exclusive Economic Zone (EEZ) extends 200 nautical miles from the coastal baseline measuring 142,400 km². The coastline is lined with an almost continuous fringing coral reef that runs parallel to the shoreline. The continental shelf is narrow (3-5 km) in most parts except in Ungwana bay. The richest inshore fishing grounds are located around the 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 annual production from artisanal coastal fisheries in 2022 was estimated at 35,596 MT consisting of demersal(45%), pelagics (35%), sharks and rays (4%) mollusc (10%) and crustaceans (6%). The artisanal fishing fleet consists of 3,171 vessels, dominated by wooden crafts usually for single day fishing trips. Troll lines, ringnets, handlines, longlines and gillnets are the most common artisanal gear types used to catch tuna and tuna-like species along the Kenya coast. Species under the IOTC mandate that are landed include yellowfin tuna, bigeye tuna, skipjack tuna and kawaka. The bulk of tuna and tuna-like species are caught by troll lines, ringnets, and drift gillnets. These gear types also catch other species, but the proportion of tuna and tuna-like species greatly differs among the gear types. Trolling lines, longlines and drift gillnets are more selective in capturing yellowfin and bigeye tuna, while neritic species are primarily caught by ringnets and reef seines. Billfish, mainly sailfish (Istiophoridae) are also caught by artisanal fishers using troll lines and handlines. Key landing sites for tuna along the Kenya coast are located in Vanga, Gazi, Kilifi central, Watamu, Mayungu, Amu and Kiwayu.

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. The fishing fleet estimates provided in this report are based on the frame survey estimates of October 2022. 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 606 artisanal vessels are engaged in the fishing of tuna and tuna like species in 2022. 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 (75) handlines (201), gillnets (117), trolling lines (103), monofilament nets (110) and other gears (90). Recreational fishing vessels use trolling lines.

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

YEAR	2017	2018	2019	2020	2021	2022
Longliner	1	3	3	4	4	6
Purse seiners	0	0	0	6	6	0

3. CATCH AND EFFORT (BY SPECIES AND FISHERY)

Artisanal Fishery: Table 2 summarises artisanal catch data for the year 2017- 2022. Landings of tunas from artisanal fishers were 6,160 tons in 2022 which is a sharp increase compared to 1,953 tons and 1,613 tons in 2020 and 2021. The artisanal tuna fishery in Kenya is highly seasonal, heavily influenced by the seasonal monsoon cycle. Fishing effort in terms of number of fishers per trip ranges from 3 fishers per vessel for handlines to 23 fishers per vessel for ringnets (Okemwa et al., 2023). The most productive season when catch rates are high is during the calm north east monsoon from September to March when fishing conditions are optimal. A total of 8 gear types catches tuna and tuna like species with the highest proportion being caught by trolling lines (Figure x). Kawakawa is caught by the highest diversity of gear types. Maps of the spatial distribution of fishing effort and the fishing fleet dynamics is not possible due to lack of spatially disaggregated catch information.

Table 2. Annual catch and effort by fishery and primary species in the IOTC area of competence. Include a ‘not elsewhere indicated – NEI’ category for all other catches combined.

Species	2017	2018	2019	2020	2021	2022
Istiophoridae	356.1	427.3	200.6	123	263	388
Scombridae	1,931	3,476	2,737	1953	1613	6160
Xiphiidae	166	215.8	205.8	137	571	0
Carcharinidae	466	535.9	563.6	757.7	12	989
Dasyatidae	462.5	601.2	232.8	342	0	80
Myliobatidae	231.8	278.2	0	109.8	0	11
Sphyrnidae	20.3	26.4	0	487	722	875
Other rays	12.6	15.2	0	0	0	0

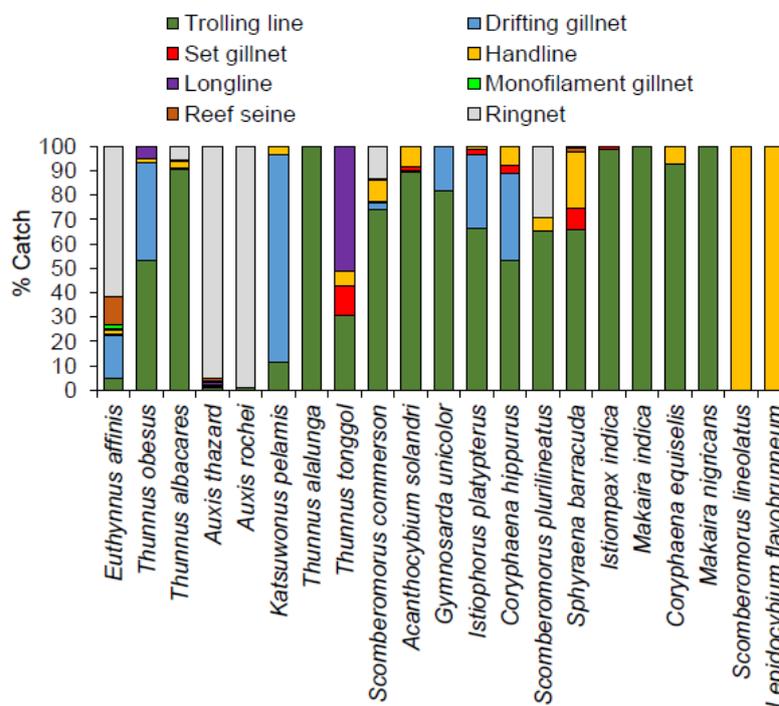


Figure 1. The contribution of artisanal gear types to landed catches of tuna and tuna-like species caught along the Kenya coast (Source: Okemwa et al., 2022)

The Kenya flagged industrial longline vessels fished within the EEZ and the high seas in the period of 2018-2021 with the average number of hooks per vessel per day being 1290 in 2022. The vessel fished for a total of 764 days at sea. The catch and effort data as well as length frequency data was submitted IOTC. A total of 432.7 tons of fish was landed in 2021 with swordfish (261 tons) and sharks (80.7 tons) reported as the main species caught.

Table 3. Historical annual catch for the national fisheries by primary species, for the IOTC area of competence for the entire history of the fisheries.

Species	2017	2018	2019	2020	2021	2022
Yellow fin Tuna	14.4	107.6	190.3	131.9	12.2	18.7
Bigeye tuna	10.6	27.6	52.5	68.7	17.6	11.6
Swordfish	2.3	294	385.2	331.9	297.7	261
Marlins	2.3	8.8	14.3	19.3	4.1	1.4
Sailfish	0.8	1.3	5	5	1.1	1.01
Sharks	6.3	55.9	114.6	92.8	96.5	80.7

Others	10.5	22.6	35.1	19.13	3.4	5.2
Efforts Hooks	259,125	618,385	985,560	1,252,160	1,406,960	123,400
Fishing Days	85	340	573	728	830	764

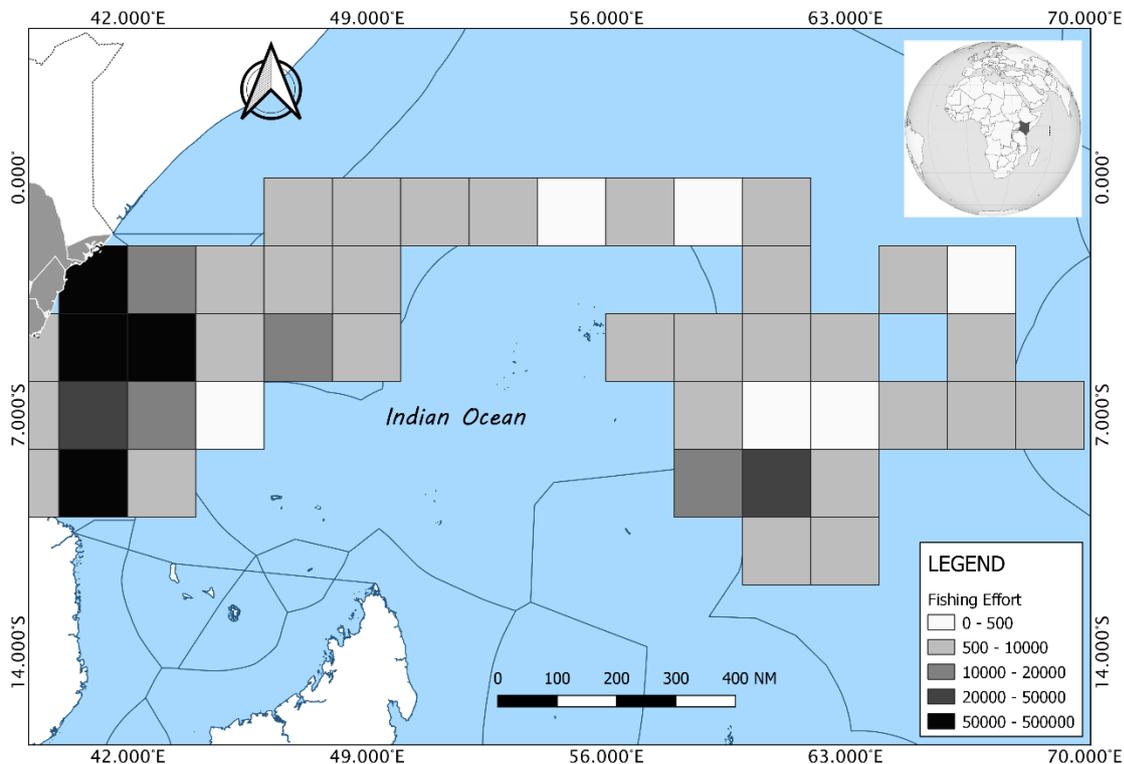


Figure 2a. Map of the distribution of fishing effort, by national fishery in the IOTC area of competence year 2022

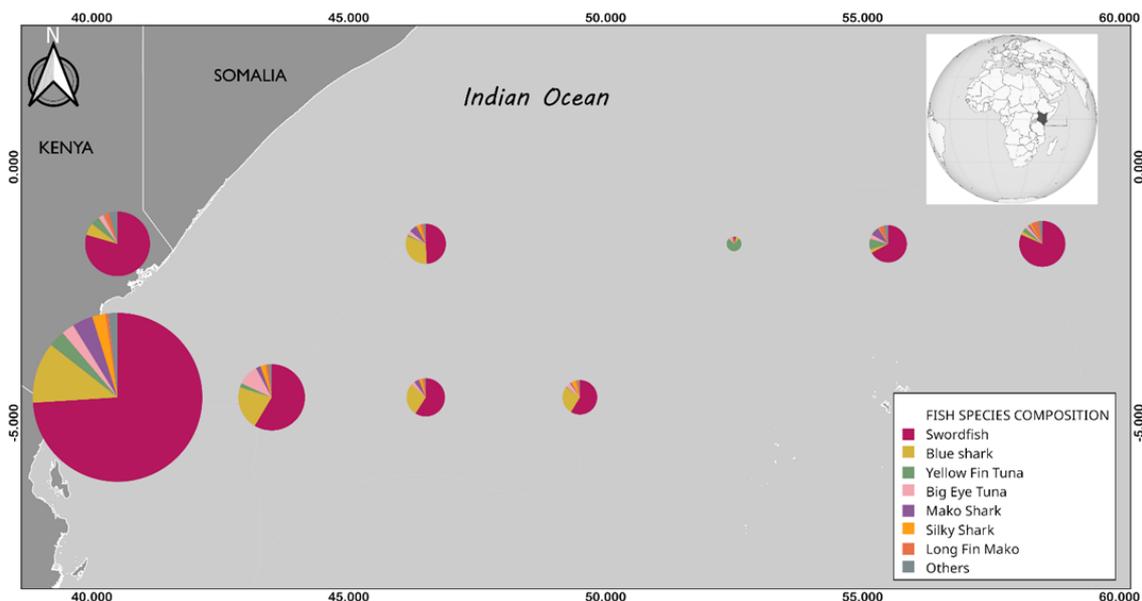


Figure 2b. Map of distribution of fishing catch, by species for the national fisheries, in the IOTC area of competence year 2022.

4. RECREATIONAL FISHERY

Recreational fishing which mainly encompasses sport or big game fishing in the case of Kenya is undertaken predominantly in five centres along the coast. These include Watamu, Malindi, Kilifi, Diani, Shimoni and Mombasa with coordinated annual tournaments and competitions conducted in Malindi, Kilifi, Watamu and Diani (Kadagi *et al.*, 2020, <https://captainandyskenya.com/kasa-fishing-tournaments-22-23/>). The Kenyan recreational fishery targets billfish (sailfish, marlins and swordfish), species belonging to family Scombridae (yellowfin, skip jack, bigeye tuna etc.), giant trevally, barracuda, spanish mackerel, wahoo, and kingfish among others.

Recreational fishing for billfish is predominantly catch, tag and release which is practiced by charter and private boats that fish during the fishing year or occasionally. Tags are supplied by the African Billfish Foundation, a regional tagging programme based out Kenya which has overseen tagging of billfish in Kenya and other areas for over 30 years). Tagging records indicate that over 600 billfish species were tagged by the sport fishing sector through the African Billfish Foundation (ABF) in the 2019/2020 fishing season. The highest number of tagged billfish between October and December were Sailfish ~400 followed by blue and black marlin ~200. Overall, sailfishes were the most common in all the fishing zones, more pronounced in Kilifi, Watamu and Malindi while marlins, especially blue and black were more pronounced in Watamu and Malindi

Findings by Kadagi *et al* (2021) show competitive interactions between recreational and artisanal fisheries whereby both groups target billfish predominantly sailfish landings. in the same space and time. Further, results show that billfish are of socio-economic importance to both fisheries and therefore increases the potential for conflicts.

In a study looking at the distribution and habitat association of billfish across transboundary levels in the Indian Ocean, Thoya *et al*, 2022 noted that the EEZ and the high seas are essential areas for billfish, with 55% of the billfish spatial distributions found in the EEZ of the IO nations, while 45% were found in the high seas Thoya *et al*, 2022.

5. ECOSYSTEM AND BYCATCH ISSUES

Sharks and rays have formed part of Kenya's coastal and marine landings for a long period with records dating back to the 1980s (Marshall, 1997). The shark fishery in Kenya entails both a small artisanal targeted fishery as well as incidental catches. by Kenya Marine and Fisheries Research Institute (KMFRI) and Kenya Fisheries Service (KeFS), CORDIO-EA and WCS are collecting data on the sharks being fished in the Kenyan waters so as to inform fisheries management towards minimizing fishing impacts on them since a number are protected under CITES. Catch Assessment surveys undertaken on quarterly basis by KMFRI and KeFS further promote the data collection. In addition, semi-industrial prawn trawl industrial data, deep water trawls, crabbers, and longline data is monitored through vessel logbooks and a dedicated observer programme. The longline fishery caught the highest number of sharks (1688) followed by deep water prawn (348), shallow water prawn (280) and the least by crab fishery (34). Sharks caught in the longline fishery belonged to five families namely: - Alopiidae, Carcharhinidae, Lamnidae, Rhincodontidae and Sphyrinidae.

A total of 99 elasmobranch species (sharks, rays and skates) are estimated to occur in Kenya's marine waters consisting of 57 species of sharks and 42 species of rays based on an ongoing study and information from survey reports, and desktop review of the fisheries.

Of the 57 species of sharks, 56% are threatened with extinction at the global level, of which 28% are Vulnerable (VU), while 19.0% are Endangered (EN) and 9% are Critically Endangered (CR) according to the IUCN Red List of Threatened Species (www.iucnredlist.org, release 2022). For the ray species, 60% of the species (n = 42) potentially occurring in Kenyan waters are assessed to be those threatened at a global scale. Of the threatened species, 24% are Vulnerable and equally 24% Endangered, while 12% are Critically Endangered. A relatively high proportion of ray species (16%) have a Data Deficient

(DD) status compared to those of sharks (10%). A higher proportion of sharks (23%) have a Near Threatened (NT) status as compared to rays (7%).

From a 2020 survey conducted in the longline industrial fishery, seventeen species of sharks ($n = 13$) and rays ($n = 4$) were documented. Furthermore, recent studies on sharks and rays in Kenya (Kiszka & van der Elst, 2015; Kiilu et al., 2019; Temple et al. 2019,) provide information on the abundance and distribution of species caught in artisanal, trawl and longline fisheries but there are still significant knowledge gaps to be filled regarding spatio-temporal patterns of distribution, biology and ecology of the species. Sixteen species of sharks, 501 individual sharks caught using either trolling lines or rods and reels. were recorded in the recreational tagging data between 1987 and 2016. The families Carcharhinidae (56%) and Sphyrnidae (12%) represented the highest proportion of the catch (Wambiji et al, 2022). About thirty species are assessed to have High Relative Vulnerabilities to the fishing gears at all fishery categories (artisanal, prawn trawl and industrial longline) and form a High Vulnerability Species Assemblage (HVSA) that will require more targeted management strategies applied through a hierarchical approach in addition to a quantitative stock assessment.

Overall, in 2022, 6 species of sharks were caught and landed by the longliners namely blue sharks (*Prionace glauca*) 61 tons, silky sharks (*Carcharhinus falciformis*) 5.8 tons, Shortfin mako, (*Isurus oxyrinchus*) 1.9tons, Longfin Mako Shark, (*Isurus paucus*) 2 tons, and other unidentified sharks weighing 9 kgs.

5.1 Sharks

Sharks and rays have formed part of Kenya's coastal and marine landings for a long period with records dating back to the 1980s (Marshall, 1997). The shark fishery in Kenya entails both a targeted fishery as well as incidental catches. Kenya's small scale fishery targeting sharks is made up of artisanal fishers using canoes, outriggers or wooden boats powered either by oars, long sticks, sail or engines (Fulanda, 2011; Samoilys et al. 2011; Munga, 2014). Handlines are used offshore in the Kenya North Bank targeting snappers (Lutjanidae), while sharks are caught incidentally (Oddenyo, 2017). Fisher's operating nearshore in the Malindi-Ungwana Bay utilize various types of gear such as seine nets, monofilament nets and handlines targeting prawns, crabs, catfishes and tilapia but also catch sharks as bycatch (Oddenyo et al., 2016). In Mombasa, the semi-commercial long line fishery targets sharks mostly thresher sharks, Alopi sp. and mako sharks, Isurus sp. (Kiilu and Ndegwa, 2013). The semi-industrial prawn fishery in Ungwana Bay also catches sharks and rays as bycatch and discards.

5.1.1. NPOA sharks

Kenya received support from World Bank through the Kenya Marine and Social Economic Project (KEMFSED) to finalise the process of developing a National Plan of Action (NPOA) for Sharks as guided by FAO IPOA guidelines. The drafting of the National Plan of Action for Sharks and Rays (NPOA-Sharks and rays), was finalized in April 2023. The draft NPOA sharks awaits final stakeholder engagement, approvals and publication.

5.1.2. Sharks finning regulation

Kenya has banned shark finning through a gazette notice no. 3409 of 08 May 2020 and also submitted to IOTC secretariat. The ban applies to all licensed industrial vessels fishing within or outside of Kenya's EEZ in case of Kenya flagged vessels). Moreover, the trade and sale of fins must be in appropriate proportion to the quantity of carcasses landed (five per cent of dressed carcass weight is usually recommended in the Western Indian Ocean region). This is usually confirmed through compliance inspections and observer data collection. Kenya is implementing sampling and monitoring of catch from Industrial long line fisheries at the port during landing by land-based observers.

5.1.3. Blue shark

In 2019 and 2020, concrete plans were put in place by the government to enable the Kenya Marine Fisheries Research Institute (KMFRI) to carry out pelagic fisheries research in Kenya's EEZ. This survey collected some data on the blue sharks among others for proper reporting. Kenya has also been implementing a scientific observer program on-board industrial fishing vessel since 2016. The data collected include catches and fate of blue sharks.

Table 4: Total weight and number of sharks, by species, retained by the national fleet in the IOTC area of competence (for the most recent five years at a minimum, e.g. 2016–2022).

		Weight								
Common Name	Scientific Name	2016	2017	2018	2019	2020	2021	2022	Grand Total	
Blue Shark	<i>Prionace glauca</i>	0	2,262	28,779	87,395	37,819	63,677	61,919	281,851	
Shortfin mako shark	<i>Isurus oxyrinchus</i>	40	0	7,197	15,266	5,374	22,396	6,335	56,608	
Silky Shark	<i>Carcharhinus falciformis</i>	0	0	2,213	7,889	7,233	10,466	5,137	32,938	
Hammerhead sharks		8,773	3,354	0	0	0	0	0	12,127	
Black Tip shark	<i>Carcharhinus limbatus</i>	5,196	644	0	0	0	0	0	5,840	
Other sharks		572		4,234	863	23	0	0	5,692	
Tiger sharks	<i>Galeocerdo cuvier</i>	5,334	0	0	0	0	0	0	5,334	
Grand Total		19,915	6,260	42,423	111,413	50,449	96,539	73,391	400,390	
		Number								
Common Name	Scientific Name	2016	2017	2018	2019	2020	2021	2022	Grand Total	
Blue Shark	<i>Prionace glauca</i>	0	90	954	2698	1258	1,961	1907	8,868	
Silky Shark	<i>Carcharhinus falciformis</i>	0	0	115	425	329	584	165	1,618	
Shortfin mako shark	<i>Isurus oxyrinchus</i>	1	0	109	238	66	329	161	904	
Hammer head shark		243	136	0	0	0	0	0	379	
Black Tip shark	<i>Carcharhinus limbatus</i>	158	58	0	0	0	0	0	216	
Other sharks		14	0	102	19	1	0	0	136	
Tiger sharks	<i>Galeocerdo cuvier</i>	121	0	0	0	0	0	0	121	
Grand Total		537	284	1280	3380	1654	2874	2233	12,242	

5.2 Seabirds

Kenya has initiated the process to develop NPOA for Seabirds, under the world bank funded KEMSFED project. A gazette notice with the IOTC requirements for mitigations against sea turtles was published in a gazette notice 2020 and contains the measures to protect seabirds. In 2022, no Kenyan flagged vessel operated south of 25°S.

5.3 Marine Turtles

Kenya has initiated the process to develop NPOA for Sea turtles, under the world bank funded KEMSFED project. A gazette notice with the IOTC requirements for mitigations against sea turtles was published in a gazette notice 2020. Kenya has implemented the use of TEDs since 2011 through a management plan for the prawn trawl fishery. Kenya is working in collaboration with NOAA to increase the efficacy of TEDs in the trawl fishery and for certification. Other measures taken by Kenya related to the conservation of marine turtles have been included in the 'Reporting of progress of implementation of the FAO Guideline to Reduce Sea Turtle Mortality in Fishing Operation and on the implementation of resolution 12/04 on marine turtles' already in April 2022.

5.4 Other ecologically related species (e.g., cetaceans, mobulid rays, whale sharks)

Fishing around sea mammals and whale sharks is prohibited by the Kenyan laws. The Fisheries Management and Development Act no 35 of 2016 makes provision for the protection of marine mammals under Section 46(1) and with subject to section 3) and Section 45 (2,4) with regard to protection of whale sharks. Kenya is currently preparing a national plan of action for sharks and in the process of gazetting measures as stipulated in Res 13/05 (8). No catch of seabirds, marine turtles and marine mammals have been recorded for the national fleet in the IOTC area of competence for the most recent five years. Fishing around sea mammals and whale sharks is prohibited by the Kenyan laws.

Table 6. Observed annual catches of species of special interest by species (seabirds, marine turtles and marine mammals) by gear for the national fleet, in the IOTC area of competence (for the most recent five years at a minimum, e.g. 2015–2019 or to the extent available).

Year	lat	long	Gear Type	Total effort	Total effort observed	Species	Captures (Numbers)	Release condition
2019	-3	40	longline	44 sets	44 sets	Dolphin whale (species not indicated)	1	Released alive
2019	-2	41	Longline	13 sets	13 sets	<i>Coryphaena hippurus</i>	1	Released alive
2018	-2	41	Longline	30 sets	30 sets	Dolphin (species not indicated)	1	Released alive
2018	-4	40	longline	56 sets	56 sets	<i>Rhincodon typus</i>	2	Released alive

No species of special interest were caught by the longliners in 2019 to 2022

6. NATIONAL DATA COLLECTION AND PROCESSING SYSTEMS

6.1. Log sheet data collection and verification

Data reporting is a requirement according to the Fisheries management and Development Act 2016 section 75. Kenya initiated the implementation of artisanal fishers' data log sheets since 2020 and monitoring through the Beach management units. In 2022, we fully adopted an application to capture the data and report through the mobile phones. A recreational fisheries log sheet was developed in collaboration with IOTC and introduced to the fishing clubs. The data collection and reporting forms have been published and will be fully integrated into the Fisheries Information Management system (FIMS) currently under development. Further capacity building on species identification is necessary. As a license condition all vessels are required to fill data in the vessel logbook and submit the logbooks for inspection when they call to port. The logbooks are verified on

routine basis during inspection and annually once the vessels submit the logbook data. The verified logbook data for 2022 to be submitted to IOTC as per the requirements.

6.2. Vessel Monitoring System

Fisheries Management and Development Act No. 35 of 2016 stipulates the need for fishing vessels to have a functional VMS any time the fishing operations are ongoing. The VMS was established at the Mombasa Fisheries Monitoring Centre (FMC) in March 2017. This system has capacity to track vessels using Themis VMS module, AIS, Satellite imagery module and also has capacity to associate oceanographic parameters, including waves and their speed, plankton concentration, temperature etc. to the possibility of where most fishing vessels are likely to be. Oceanographic module helps in prediction of movement of fishing vessels and therefore possible to detect IUU fishers

6.3. Observer scheme

As of 2022, Kenya Observers pool comprises of fully employed Kenya Fisheries Service, Kenya Marine and Fisheries Research Institute and County fisheries officers. During the year the country had a had a pool of 30 observers including both trained and untrained. The categorization is as; 10 fully trained (STCW certification and IOTC Technical Scientific Training) KeFS Officers (waiting certification); 6 partially trained (STCW certification only) KMFRI Officers; 14 untrained KeFS and County Fisheries Officers (just in-house training).

Kenya's current commercial fishing fleet consists of eight (8) trawlers, six (6) long liners and two (2) pot vessels. Number of observation days for the long line fisheries in the years 2021 and 2022 is 540 days and 456 days respectively. Total deployments for the years 2021 and 2022 in the longline fishery is 10 and 34 deployments respectively.

6.4. Port sampling programme

Port sampling is mainly done for the longline fisheries. Kenya is in the process of training more staff in the port sampling so as to cover all the Kenyan commercial fisheries as it is provided for in section 150 (1) of the FMDA No. 35 of 2016. In the year 2022, only two port sampling were conducted for longline vessels.

6.5. Unloading/Transshipment of flag vessels

No transshipment occurred during the period of observation, 2022.

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

KMFRI is monitoring catches from 16 landing sites where billfish are caught and recorded. In addition, with the Observer program and logbooks submitted from the commercial fisheries especially the longlines and midwater trawlers, billfish species records are monitored.

6.7. Gillnet observer coverage and monitoring

Monitoring of the gillnet fishery is conducted through field sampling of landed catches in selected landing sites based on standardized catch assessment surveys. Three gear types capture tuna and tuna: monofilament gillnets, drift gillnets and set gillnets (Figure x). Monofilament gillnets mainly catch kawakawa and mackerels. Drift gillnets mainly catch skipjack, bigeye and some kawakawa while set gillnets mainly catch kawakawa, sailfish and frigate tuna

6.8. Sampling plans for mobulid rays

A study on the distribution taxonomy, biology and ecology of mobulid species in Kenya to enhance Kenya's biodiversity conservation and management is currently being finalized. This study is working toward realisation of the objectives of the Convention on Biological Diversity, biodiversity conservation, sustainable use and

equitable share of resultant benefits from utilization of biodiversity among the stakeholders. It will also contribute to an efficient system or mechanism of linking in-situ and ex-situ conservation of marine sharks and rays. Sampling of mobulid rays is undertaken incidentally during field sampling in selected landing sites. However, there is no targeted sampling programme

7. RESEARCH PROGRAMS

A catch monitoring programme is undertaken by KMFRI to collect biological information on some tuna species. Relatively consistent monitoring of artisanal tuna catches was initiated during 2022/2023 with financial support of the KEMFSED Project. Collection of biological data for skipjack and kawakawa was supported by WIOMSA through a MASMA funded regional project: Enabling Sustainable Exploitation of Coastal Tuna. Data collected during the project period includes length, weight, sex, and gonad maturity. Data analysis for a PhD thesis and scientific publications is ongoing.

8. 7.1. National research programs on blue sharks

Currently, KMFRI is conducting assessment surveys and monitoring of the blue shark catches.

9. 7.2. National research programs on Striped Marlin, Black Marlin, Blue Marlin and Indo-pacific Sailfish

Currently, KMFRI is conducting Catch Assessment surveys and monitoring the billfishes

10. 7.3. National research programs on sharks

Currently, KMFRI is conducting Catch Assessment surveys and monitoring the sharks harvests with specific objectives below: Determining the species composition of the shark; determining the productivity of the different fisheries in which sharks are encountered; Collecting species length data for length frequency determination of key species in the catches and all this information will be key in updating or contributing to the IUCN Redlists.

11. 7.4. National research programs on oceanic whitetip sharks

No research programs on marine turtles in 2022

12. 7.5. National research programs on marine turtles

No research programs on marine turtles in 2022

13. 7.6. National research programs on thresher sharks

Currently, KMFRI is conducting no specific study on thresher sharks but their presence is being monitored and when caught released back into the waters

Table 8. Summary table of national research programs, including dates

Project title	Period	Countries involved	Budget total	Funding source	Objectives	Short description
Programme régional de marquage de thons	2018–2022	EU – France and Spain		ED- DG FISH	Observer program: collection of bycatch data	

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

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

Res. No.	Resolution	Scientific requirement	CPC progress
12/04	On the conservation of marine turtles	Paragraphs 3, 4, 6–10	Conservation measures gazetted
12/06	On reducing the incidental bycatch of seabirds in longline fisheries.	Paragraphs 3–7	Conservation measures gazetted
12/09	On the conservation of thresher sharks (family alopiidae) caught in association with fisheries in the IOTC area of competence	Paragraphs 4–8	Conservation measures gazetted
13/04	On the conservation of cetaceans	Paragraphs 7–9	Conservation measures gazetted
13/05	On the conservation of whale sharks (<i>Rhincodon typus</i>)	Paragraphs 7–9	Conservation measures gazetted
13/06	On a scientific and management framework on the conservation of shark species caught in association with IOTC managed fisheries	Paragraph 5–6	Research taking place in the Kenyan EEZ
15/01	On the recording of catch and effort by fishing vessels in the IOTC area of competence	Paragraphs 1–10	Catch assessment survey to monitor catch and effort in artisanal fishery
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 also submitted
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 in the process of development of the NPOAsharks, Kenya participated.
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 research institutions have been encouraged to work on the blue sharks and report to the IOTC for the 2023 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	Attendance of the Working Party of Billfish
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
19/01	On an Interim Plan for Rebuilding the Indian Ocean Yellowfin Tuna Stock in the IOTC Area of Competence (<i>If not provided under Res 21/01 below</i>)	Paragraph 22	Re. Para 22. Kenyan catches are below the required threshold
19/03	On the Conservation of Mobulid Rays Caught in Association with Fisheries in the IOTC Area of Competence	Paragraph 11	Have developed measures to implement Resolutions 13/05 whale sharks. Awaiting gazettelement

Res. No.	Resolution	Scientific requirement	CPC progress
21/01	On an Interim Plan for Rebuilding the Indian Ocean Yellowfin Tuna Stock in the IOTC Area of Competence (<i>If not provided under Res 19/01 above</i>)	Paragraph 23	Re. Para 22. Kenyan catches are below the required threshold
22/04	On a regional observer scheme	Paragraph 12	National observer program - 10 observers undergoing training under IOTC ROS pilot

15. LITERATURE CITED

- Kadagi, N.I., Wambiji, N., Belhabib, D. and Ahrens, R.N., 2021. Ocean safaris or food: characterizing competitive interactions between recreational and artisanal billfish fisheries on the coast of Kenya. *Ocean & Coastal Management*, 201, p.105432.
- Kadagi, N.I., Wambiji, N., Mann, B., Parker, D., Daly, R., Thoya, P., Rato, D.A.M., Halafo, J., Gaspare, L., Sweke, E.A. and Ahmed, S., 2022. Status and challenges for sustainable billfish fisheries in the Western Indian Ocean. *Reviews in fish biology and fisheries*, pp.1- 27. <https://doi.org/10.1007/s11160-022-09725-8>
- Okemwa, G.M., Abubakar, A.A., Mzingirwa, F., Kimani, E.N., Kamau, J.N., Njiru, J.M. and Sauer, W., 2023. Characterizing gear-based exploitation patterns of artisanal tuna fisheries in the western Indian Ocean: A snapshot from Kenya. *Regional Studies in Marine Science*, 61, p.102877.
- Wambiji Nina, Isigi Kadagi N. Jeremy Kiszka, Edward Kimani, Bernadine Everett, Andrew Temple, Per Berggren, Isigi Kadagi. Integrating citizen science and historical data to investigate the extent of small-scale (artisanal) and recreational shark fisheries in Kenya, *Aquatic Conservation: Marine and Freshwater Ecosystems*. 16 pp, <https://doi.org/10.1002/aqc.3829>
- Thoya, P., Kadagi, N.I., Wambiji, N., Williams, S.M., Pepperell, J., Möllmann, C., Schiele, K.S. and Maina, J., 2022. Environmental controls of billfish species in the Indian Ocean and implications for their management and conservation. *Diversity and Distributions*, 28(8), pp.1554-1567. <https://doi.org/10.1111/ddi.13525>
- Berggren, P. 2009. Whales and dolphins: a field guide to marine mammals of East Africa. WIOMSA/East Publishing, 2009. , p. 128