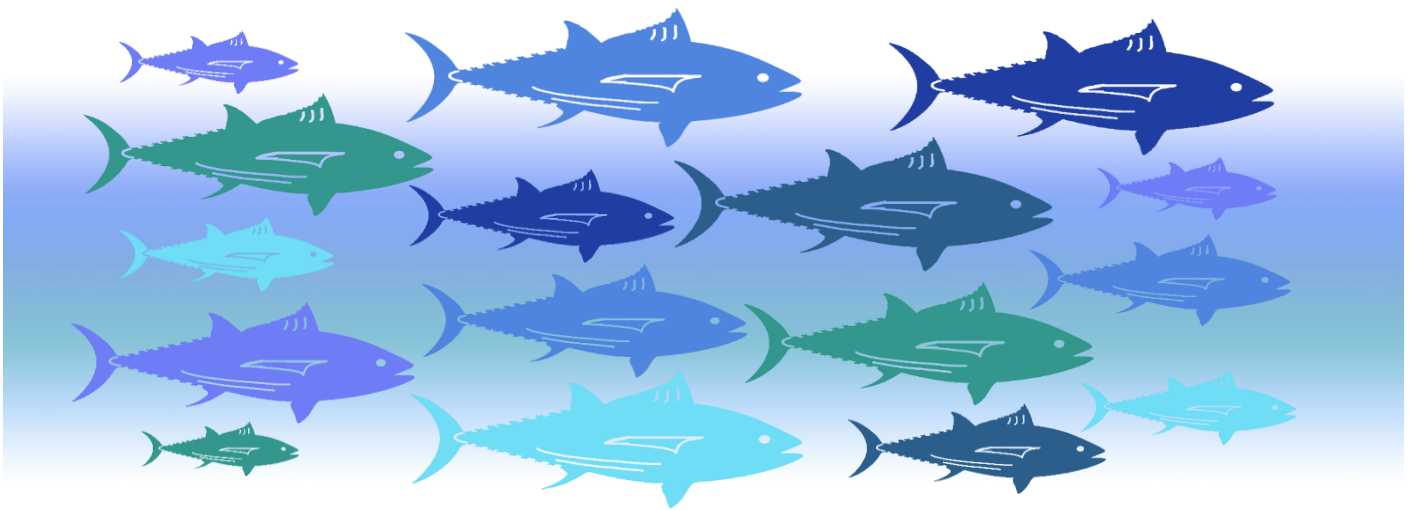




सत्यमेव जयते

India's National Report to the Scientific Committee of the Indian Ocean Tuna Commission 2022



**India's National Report to the Scientific Committee of the
Indian Ocean Tuna Commission
2022**

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INFORMATION ON FISHERIES, RESEARCH AND STATISTICS

<p>In accordance with IOTC Resolution 15/02, final scientific data for the previous year was provided to the IOTC Secretariat by 30 June of the current year, for all fleets other than longline [e.g. for a National Report submitted to the IOTC Secretariat in 2022, final data for the 2021 calendar year must be provided to the Secretariat by 30 June 2022)</p>	<p>YES 30/06/2022</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 2022, preliminary data for the 2021 calendar year was provided to the IOTC Secretariat by 30 June 2022).</p> <p>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 2022, final data for the 2021 calendar year must be provided to the Secretariat by 30 December 2022).</p>	<p>YES 30/06/2022</p>
<p>If no, please indicate the reason(s) and intended actions:</p>	

Executive Summary

The total landings of tuna and tuna-like species along Indian coasts had been showing a decreasing trend in the recent past. However, there was a marginal increase of 4.69% during the year 2021 with reference to 2020. The total landings of tuna and tuna-like species for 2021 is estimated at 1,59,744.03 tonnes, against 1,52,593.16 tonnes during 2020. Gillnets remained the major gear contributing to the tuna and tuna like fish catch during 2021 also. Trawl and ring seine (19.28% and 12.66% respectively), followed by small longline (10.18%) were the principal gears contributing the catch. Pole and line fishing, practiced exclusively in the waters of the Lakshadweep Group of Islands, contributed 6.25% to the total landings. Other gears like Drift longline, Small purse seines, Handline, and Troll lines also contributed to the tuna landings in small quantities during the year.

Considerable spatial variation was observed in the tuna landings during 2020. The western coast of India (FAO area 51) contributed the larger share to the landings (56.71%) and the balance 43.29% landings came from the east coast (FAO area 57). Tuna landings in 2021 comprised seven species, four representing the neritic (44.62%) and three from the oceanic group (55.38%). Kawakawa (*Euthynnus affinis*, 31.01%) and Skipjack (*Katsuwonus pelamis*; 28.01%) contributed the maximum tuna catch, followed by Yellowfin tuna (*Thunnus albacares*) (26.55%).

There was no reporting of sea bird interactions with the tuna fishery during the reporting period. Similarly, there was no reporting of the mortality of sea turtles, marine mammals and whale sharks, which are protected under Schedule 1 of the Wildlife (Protection) Act of 1972 of India. The Central Marine Fisheries Research Institute of the Indian Council of Agricultural Research (ICAR-CMFRI), Fishery Survey of India (FSI) of the Department of Fisheries, Ministry of Fisheries, Animal Husbandry & Dairying, Government of India and the Department of Fisheries of the coastal States and Union Territories (UTs) are the main agencies responsible for data collection and collation on tuna fishery.

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1.0 Background/General Fishery Information

India have a long coastline of 8118 km with a continental shelf area of 0.53 million square km and have exclusive rights over the marine living and non-living resources of 2.02 million square kilometres Exclusive Economic Zone (EEZ). Owing to this vast area of marine waters under her jurisdiction, marine fisheries had always playing an important role in the food and nutritional security, livelihoods and economic prosperity of the nation.

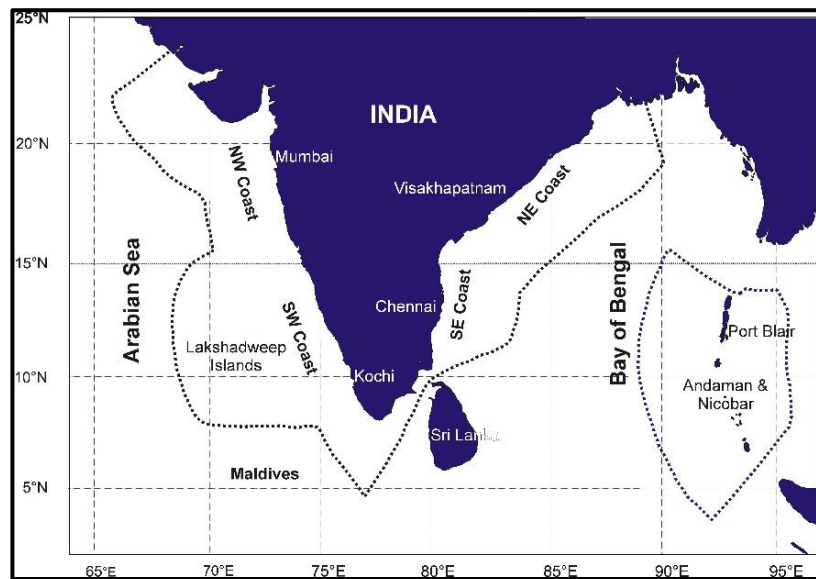


Figure 1: Exclusive Economic Zone of India

Further, marine fisheries are a major source of employment and livelihoods for one million coastal fishermen and households, who also generate further multiplier employment in the ancillary activities like fish processing and marketing. Government of India had been keen on the sustainable harvest for perpetuity of fisheries resources.

Fisheries contribute 1.29 percent to India's economy (Gol, 2021). During 2020-21, the total marine fish production was 3.5 million tonnes (Gol, 2021). India has also become a major global player in the seafood trade, with total seafood exports amounting to over 1.15 million tonnes, valued at over US\$ 5956.93 million during 2020-21.

India's Exclusive Economic Zone (EEZ) covering 2.02 million sq.km contains diverse fish stocks, exploited by various gears. However, 80% of the fisheries resources are concentrated in the coastal areas (<100m depth). Major fisheries exploit includes small pelagics (e.g. sardines, mackerels), demersals (e.g. ribbonfishes) and crustaceans (e.g. shrimps). The registered fishing fleet structure is mainly comprised of motorised (143594 nos.), mechanised (64578 nos.) and non-motorised (48710 nos.) fishing crafts operating from 1,457 landing centres in the 9 coastal States, 2 Union Territories (UTs) and the 2 Island groups.

In India, the small-scale and artisanal sectors largely contribute to the tuna fishery, deploying both mechanized¹ and motorized² boats, using a variety of gear. The Lakshadweep group of Islands located in the Arabian Sea (FAO Area 51) use artisanal pole and line targeting the surface swimming oceanic species, primarily the skipjack tunas. In the past one decade,

¹In India, the mechanized fleet pertains to fishing vessels fitted with inboard engines that are used for both propulsion and hauling the gear. The mechanized boats have a wheel house and the entire fleet is below 24-meter length overall (LoA).

²The Indian motorized fleet comprises undecked boats using outboard motors for propulsion only. The entire fleet is below 24 meter LoA.

efforts were made to convert the small-scale trawlers into longliners to promote resource specific fishing within the country's EEZ.

2.0 Fleet Structure

The Indian fishing fleet comprises an assemblage of fishing boats that mainly include trawlers, gillnetters, small purse/ring seiners, hook and line boats, etc. All the commercial fishing crafts are less than 24m LOA, fishing within the Indian Exclusive Economic Zone. These crafts operate a multitude of fishing gears, sometimes, a single craft using combination of gears. Other than pole and line boats and to some extent hook and line boats, other gears record tunas as bycatch.

For registration and licensing record of fishing vessels and ensure transparency, India has launched the ReALCRAFT database. Table 1 below provides the data on the fishing fleet structure. As per the latest record (30th June 2022), there are 2,56,882 crafts registered as fishing vessel in the country, out of which 1,86,527 (73%) are operational (Table 1). About 58% of the total fleet in operation are motorised, 28% mechanised, while the remaining 14% are non-motorised vessels.

Table 1: Fishing fleet structure of India ((ReALCRAFT))

Category	Registered	Operational
Motorised	143594	108801
Mechanised	64578	51904
Non-motorised	48710	25822
Total	256882	186527

3.0 Catch and effort by species and gear

The Indian fishery of tuna and tuna-like species (hereinafter referred to as tuna fishery) comprises a complement of 14 types of gear (plus some minor gears operated locally) harvesting a total of 14 tuna and tuna like species in 2021. **Table 2** provides the composition of species/groups harvested by different gear type.

The total landings of tuna and tuna-like species along Indian coasts had been showing a decreasing trend in the recent past. However, there was a marginal increase of 4.69% during the year 2021 with reference to 2020. The total landings of tuna and tuna-like species for 2021 is estimated at 1,59,744.03 tonnes, against 1,52,593.16 tonnes during 2020. Gillnets remained the major gear contributing to the tuna and tuna like fish catch during 2021 also. Trawl and ring seine (19.28% and 12.66% respectively), followed by small longline (10.18%) where the principle gears contributing the catch. Pole and line fishing, practiced exclusively in the waters of the Lakshadweep Group of Islands, contributed 6.25% to the total landings.

Other gears like Drift longline, small purse seines, Small purse seines, Handline, Troll lines also contributed to the tuna landings in small quantities during the year (Fig. 2 & Table 2).

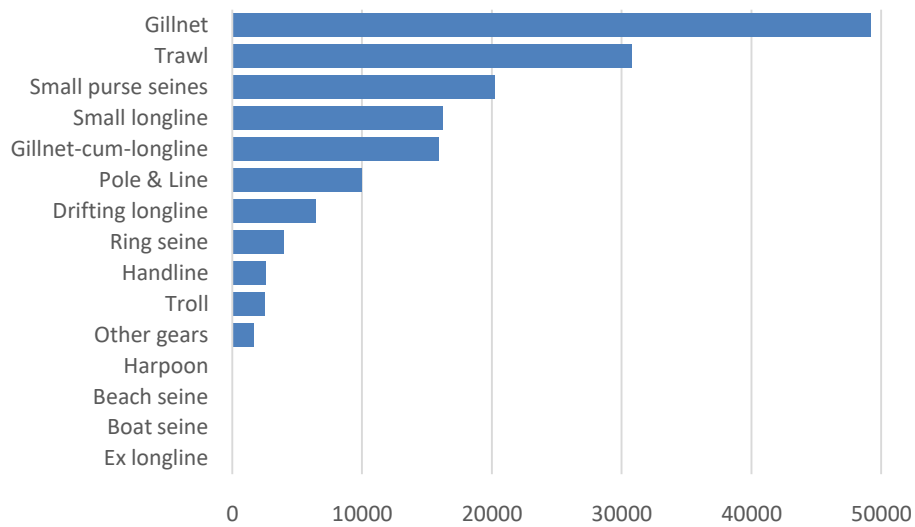


Figure 2: Gear-wise catch composition in tuna fishery in 2021

The oceanic tunas comprising three species (yellowfin [YFT], skipjack [SKJ] and bigeye [BET] tunas) contributed to 32.1 percent of the total tuna landings during 2021. The neritic tunas comprising four species contributed to 25.79 percent during the same period.

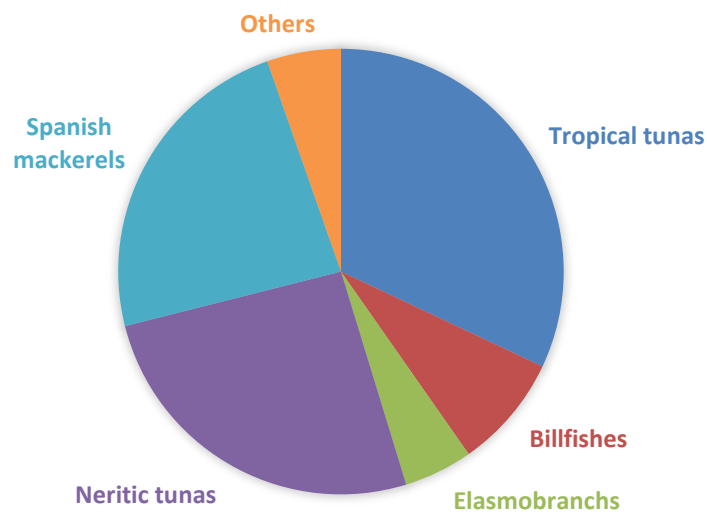


Figure 3: Group-wise catch composition of tunas and tuna-like fishes, 2021

The Spanish mackerels also contributed significantly (23.57%) to the total tuna and tuna-like species landings of India during the year 2020. The billfishes, including Indo-Pacific sailfish, marlins and swordfish collectively formed 8.27 percent, whereas pelagic sharks (4.99%) and the other species (5.37%) constituted the rest of the landings (Fig. 3).

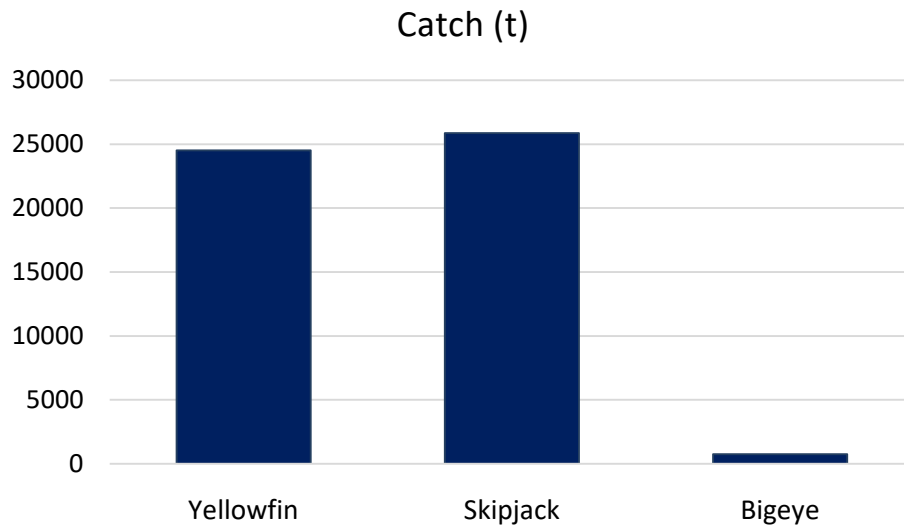


Fig. 4: Nominal catch of tropical tunas (yellowfin, skipjack and bigeye tunas), 2021

The nominal catch of tropical tunas (yellowfin, skipjack and bigeye tunas), in 2021 was 51136.5 t, comprising 24515.40t of yellowfin tuna, 25860.87t of skipjack tuna and 760.23t of bigeye tuna (**Fig.4**). Area-wise landings indicate that 66.26percent of the total landings were from the west coast of India including the Lakshadweep Islands (FAO Area 51), whereas the remaining 33.74percent was from the east coast, including the Andaman and Nicobar Islands (FAO Area 57) (**Figs.5 (a) and 5 (b)**).

The landings on the east coast of India comprised 52.33 percent of yellowfin, 47.15 percent of skipjack and 9.97 percent of bigeye tuna, whereas the west coast landings constituted the remaining 47.67 percent of yellowfin, 52.85 percent of skipjack and 90.03 percent of bigeye during 2021.

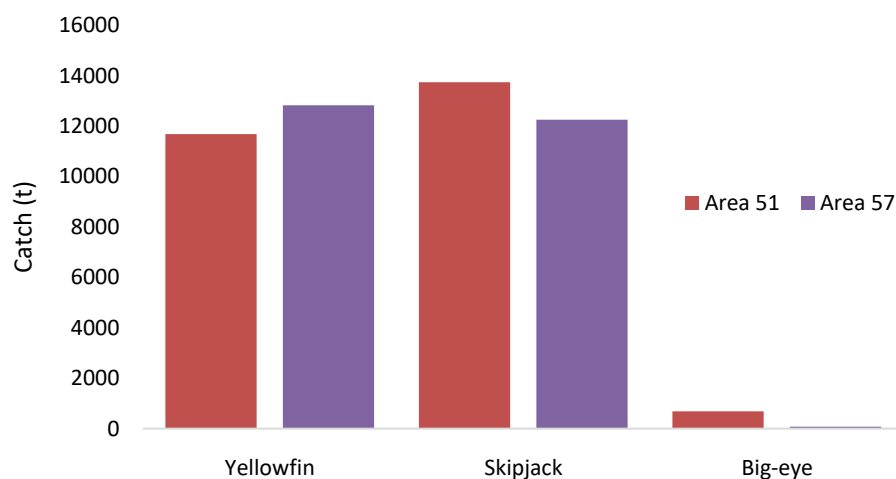


Fig. 5a. Pattern of tropical tuna catch in west and eastcoasts of India (2021)

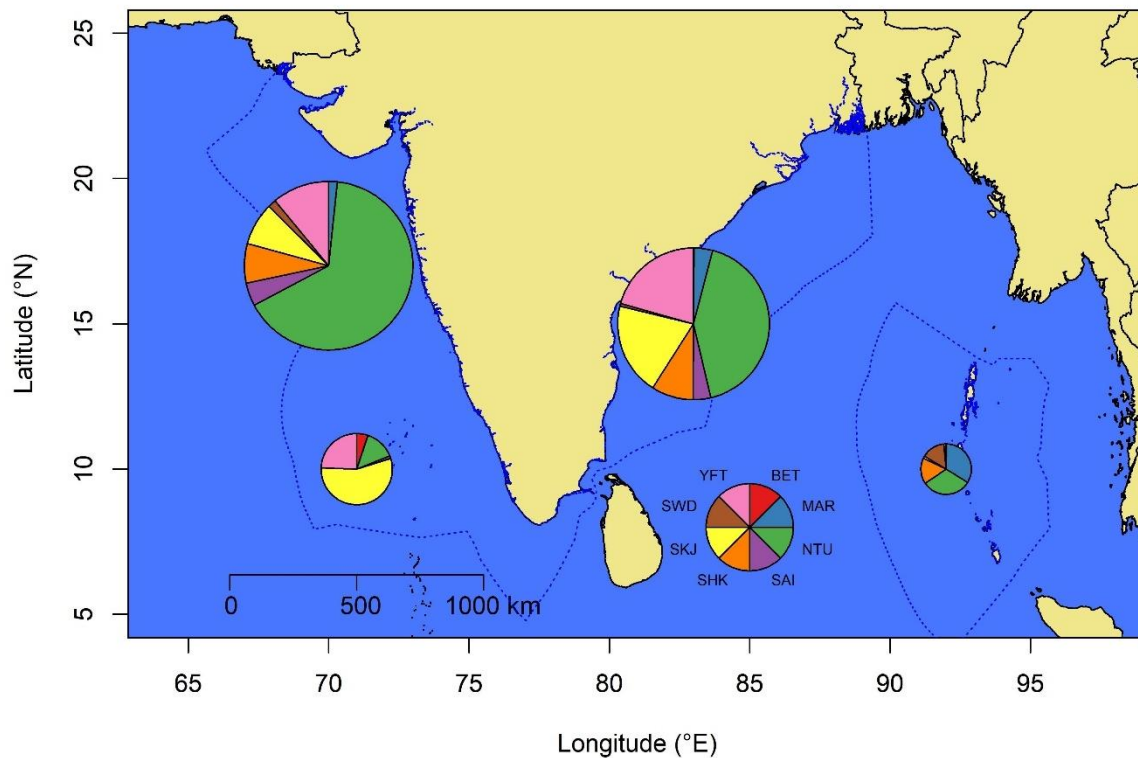


Fig. 5b. Spatial distribution of tuna and tuna-like species catch in the west coast (eastern Arabian Sea), Lakshadweep, east coast (western Bay of Bengal) and A&N Islands of Indian EEZ (2021)

Ten types fishing gears were employed for catching the tropical tuna species. Drift gillnets remained the major gear contributing to the tuna and tuna like fish catch during 2021 also. Trawl and ring seine (19.28% and 12.66% respectively), followed by small longline (10.18%) were the principal gears contributing the catch. Pole and line fishing, practiced exclusively in the waters of the Lakshadweep Group of Islands, contributed 6.25% to the total landings. Other gears like Drift longline, small purse seines, Handline, Troll lines also contributed to the tuna landings in small quantities during the year.

Drift gillnet remained the principal gear for exploitation of tropical tunas in India. This gear contributed 37.73 percent of the total landings of tropical tunas that comprised 29.92 percent of yellowfin, 46.24 percent of skipjack, and 0.31 percent of bigeye tuna. Share of pole & line in the Indian tropical tuna catch was 15.92 percent (total catch), 12.56 percent YFT, 16.22 percent SKJ and 3.67 percent BET.

The pole and line fishery practiced in the Lakshadweep Islands (South-eastern Arabian Sea) contributed 15.91 percent of the total tropical tuna catch, which included 4.67 percent YFT and 25.13 percent SKJ and 65.69 percent of BET. Small longlines catching tuna and bringing them ashore preserved in ice contributed 11.37 percent to the total tropical tuna catch, which included 17.27 percent YFT, and 6.11 percent SKJ. Boats using gillnet-cum-longline gear contributed to 14.28 percent of the total tropical tuna catch, comprising 12.56 percent YFT, 16.22 percent SKJ and 3.67 percent BET. Contributions by the other gears, including small purse seines to the tropical tuna catch of India during 2019 was marginal. Catches by the

exploratory longline fishing carried out by the vessels of the Fishery Survey of India (FSI) was very less during this year (**Fig.6**).

Considerable spatial variation was observed in the landings of the tuna and tuna-like species during 2020 in India. The west coast of India (FAO area 51) contributed the larger share (56.71%) and the balance 43.29 percent landings came from the east coast (FAO area 57). West coast, where fishing fleet is more mechanized, dominates the landing across all the groups (**Fig. 7**). Neritic tunas were the dominant group in the landings of the west coast. More than 99 percent of the longtail tuna (*Thunnustonggol*), 56 percent of *Auxisthazard*, 79 percent of *Euthynnusaffinis* and 92 percent of *Auxisrochei* catch was from the west coast, while tropical tunas were increasingly caught from the east coast.

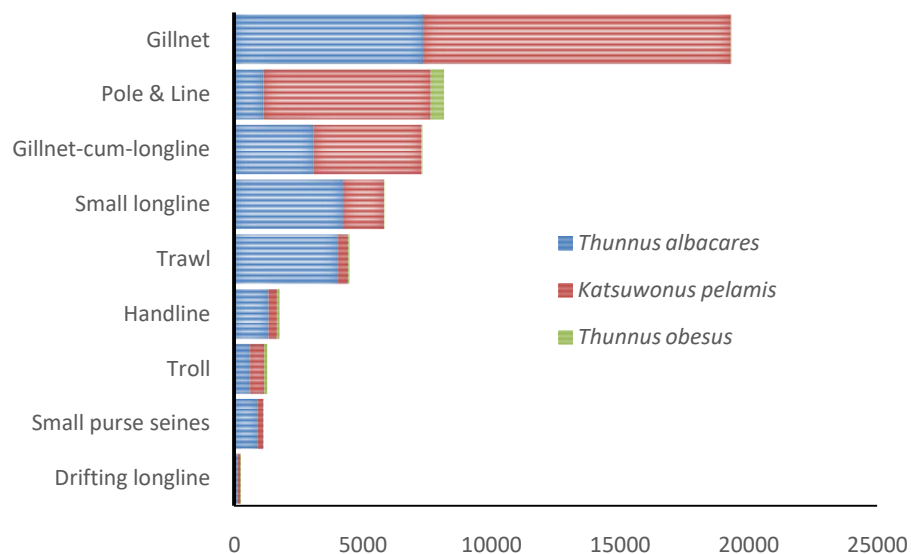


Figure 6: Tropical tuna catch (2021) by different gears

Analysis of trends in the catch during 2014-2021 revealed remarkable reduction in the catch of tuna and tuna like species over the years (**Table 3**). The total catch during 2018 was 2,08,928 t, which was reduced to 1,59,744t during the current year (2021). Similarly, the catch of yellowfin tuna by the Indian fishery in 2018 was 37,488t, which shrank to 24,515t during 2021. There were remarkable reductions in the catch of other species, including skipjack, Spanish mackerels, neritic tunas etc. during 2021 in comparison with 2018. However, there was a marginal increase in the catch, especially of tropical tunas during 2021 in comparison with 2020.

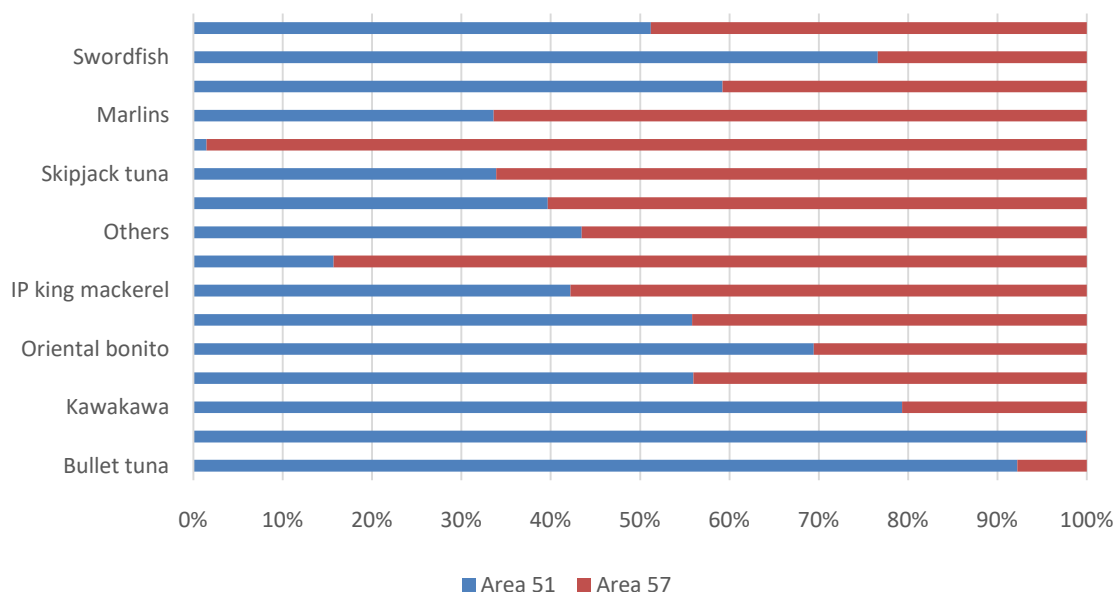


Figure7: Area-wise composition of major groups/species

Table3. Annual trends in the nominal catch (tonnes) of Tuna and allied resources (2016-2021)

Species/group	2016	2017	2018	2019	2020	2021
<i>T. albacares</i>	16,722.24	14,697	37,488.10	33,553.95	20794.73	24,515.40
<i>K. pelamis</i>	16,233.27	18,322.10	36,387.70	25,383.16	19,385.05	25,860.87
<i>T. obesus</i>	30	89	610.4	1043.64	1,031.10	760.23
Marlins	7,179.09	2,032.70	5,454.50	6,027.16	4952.315	3,657.56
<i>I. platypterus</i>	6,148.31	6,852.80	10,025.90	8,699.52	3,438.03	8,020.60
<i>X. gladius</i>	1,692.09	2,462.70	2,876.70	2,310.34	514.35	1,535.24
Pelagic sharks	22,336.80	18,983	959.3	15,247.98	9926.5	7,965.31
<i>S. commerson</i>	37,524	30,169.10	29,959.90	30,780	24,024.00	
<i>S. guttatus</i>	16,835	18,162	15,101.30	16,279	14,126.00	
Spanish mackerels (NEI)						37,655.62
<i>A. thazard</i>	6,900	5,499	8,806	8,669	8,487.00	6,145.70
<i>E. affinis</i>	35,393	27,680	33,208	33,863	30,134.00	28,628.97
<i>T. tonggol</i>	8,090	7,349	7,678.30	5,852	4,050.00	1,707.23
<i>A. rochei</i>	6,505	11,307	8,296.80	7,242	6,930.00	4,715.22
Rays	0.543	0.8	0.2	0.065	0.03	0.26
NEI	1,089.25	38,335.60	12,074.70	4,947.32	4800.074	8,575.83
Total	1,82,678.60	2,01,941.80	2,08,927.80	1,99,898.10	1,52,593.20	1,59,744.03

NEI – not elsewhere included

3.1 Longline tuna fishery in India

In India, the dedicated longline fishery by fishing vessels over 24 meters of length is practiced by the four fishing vessels of the Fishery Survey of India. The key attributes of these four vessels are as follows:

Name	<i>MatsyaVrushti</i>	Yellow Fin	<i>MatsyaDrushti</i>	Blue Marlin
LoA (Meter)	37.5	36	37.5	36
GRT (Tonnage)	465	290	465	290
BHP	1100	800	1100	800
Base of operation	Mumbai	Mormugao	Chennai	Port Blair
IOTC Registration Number	IOTC 003604	IOTC 003602	IOTC 003605	IOTC 003603

The above-referred four longliners undertake exploratory surveys in the Indian EEZ for tuna and tuna-like species. The surveys undertaken during 2021 to assess the resource availability in the Indian EEZ are shown in the following figure (**Fig. 8**). Due to several reasons, the survey operations were limited during the reporting year.

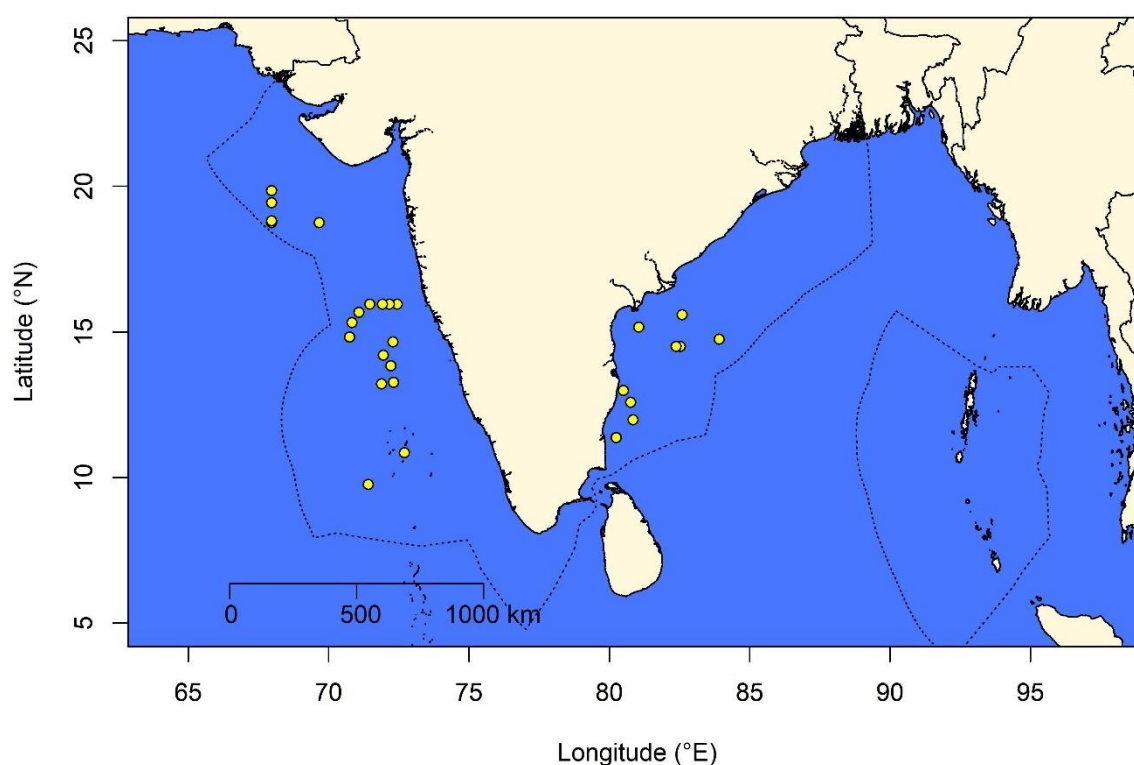


Figure 8: Map showing sampling locations by exploratory longline survey by the FSI vessels (2021)

4.0 Recreational Fishery

Presently, recreational fishery for tunas is limited to few licenses issued in the Andaman and Nicobar Islands (Notification No. 222/2017/F. No. 3-85/2015-16/TS/DF/PF-II) dated 20th September 2017 under the Marine Fishing Regulation Act 2003 of the UT Administration³.

The National Policy on Marine Fisheries, 2017⁴ in its guidance on the promotion of additional/alternative sources of livelihoods, has focused on eco-tourism and in particular

³http://andssw1.and.nic.in:8081/sfpermit/pdf/gazette_notification.pdf

⁴<http://dahd.nic.in/news/notification-national-policy-marine-fisheries-2017>

game fishing and the concept of Catch, Photograph and Release (CPR) while undertaking such fishing. Further, the government also proposes to promote CPR schemes among fishermen in suitable areas and will also consider harmonizing tourism plans related to coastal and marine waters with the livelihood needs of the fishers.

5.0 Ecosystem and by-catch issues

5.1 Sharks

The landings of pelagic sharks in India during 2020 were estimated at 9,927 tonnes. The west coast (FAO Area 51) accounted for 47.85 percent, and the rest (52.15%) from the east coast (FAO Area 57). The mechanized sector contributed to more than 80 percent of the total landings. Trawls, gillnets and longlines were the major gears contributing to pelagic shark landings. Targeted shark fishery along the north Kerala coast has almost stopped, following the relocation of fishermen from Tamil Nadu who were engaged in this fishing (Annual Report CMFRI, 2018). Details of shark catch caught in the exploratory survey of FSI, 2014-2021 is provided in Table 4.

5.1.1. NPOA sharks

The National Plan of Action for Conservation and Management of Sharks (NPOA-Sharks⁵) has been prepared by the Bay of Bengal Programme Inter-Governmental Organisation in collaboration with the Bay of Bengal Large Marine Ecosystem Project (Phase 1).

5.1.2. Sharks finning regulation

In India, the following three species of marine sharks are listed under Schedule I of the Indian Wildlife (Protection) Act, 1972.

Common name	Scientific name
Whale shark	<i>Rhincodontypus</i>
Long nosed shark / Pondicherry shark	<i>Carcharhinushemiodon</i>
Spears tooth shark	<i>Glyphisglyphis</i>

Further, with a view to stop the hunting of sharks and to enable the enforcement agencies to monitor the illegal hunting/poaching of the species of Elasmobranchs listed in Schedule I of the Wild Life (Protection) Act, 1972, the then Ministry of Environment and Forest vide its Policy Circular No. F. No. 4-36/2013 WL dated 25th of August 2013 has prohibited the removal of shark fins on board the vessels in the sea. The policy also prohibits any possession of shark fins that are not naturally attached to the body of the shark. In addition, the Ministry of Commerce, Government of India has also notified vide its Order No. 110 (RE.-2013)/2009-2014 dated 6 February 2015 prohibiting export of shark fins of all species of sharks.

5.1.3. Blue shark

Blue sharks are sporadically reported in the shark bycatch in the Indian tuna fishery. However, India has a well-established fishery data collection system, regularly collecting the

⁵<https://www.boblme.org/documentRepository/BOBLME-2015-Ecology-65.pdf>

data on fish catch, including blue sharks and the catches are being monitored domestically. Data on the blueshark catch is recorded and furnished to the IOTC as and when reported. Scientific research on blue sharks is being undertaken and results have been published (e.g., Varghese *et al.*, 2017)

5.2 Sea birds

There were no reported instances of sea bird interactions in any of the Indian tuna fishery. Indian vessels are not engaged in tuna fishing in the Southern Indian Ocean where the sea bird interactions are reported to be more.

5.3 Marine turtles

All the five species of marine turtles occurring in the Indian waters are listed in the Schedule I of the Indian Wildlife(Protection)Act, 1972, hence protected from capture. Further, the bycatch of sea turtles in the Indian longline fishery was remarkably lower than those reported elsewhere (Varghese *et al.*, 2010). However, during the reporting period, no interaction has been observed in the longline catches.

5.4 Marine mammals

Like marine turtles, all the marine mammal species occurring in the Indian waters are protected under the Wildlife (Protection) Act, 1972. The Government of India through its R&D agencies also undertakes several programmes for conservation of the marine mammal habitats. One such programme pertains to the 'marine mammal stranding interactive map', which provides scientific information on the attributes of the species, its habitat and standard operating procedure in case of stranding (CMFRI, 2018). Further, the Fishery Survey of India, in collaboration with CIFT and MPEDA is undertaking a programme on "Marine Mammals stock assessment in India".

6.0 National Data collection and processing systems

The ICAR-CMFRI collects the landing data in the mainland following a stratified multi-stage random sampling method. The Fishery Survey of India undertakes exploratory surveys and the data from such surveys is also added to the national data processing system. Besides this, the FSI also compiles the landing data received from the two Island Territories – the Lakshadweep and the Andaman & Nicobar Group of Islands.

6.1 Log Sheet data collection and verification

The authorized tuna fishing vessels in India are reporting their catch on log sheets as per the IOTC Resolutions.

6.2 Vessel Monitoring System

While several coastal states in India have installed Vessel Tracking System (VTS) and Automatic Identification System (AIS), a full-fledged Vessel Monitoring System (VMS) is under planning and will be implemented once necessary regulatory approvals are received from other concerned Ministries/Departments within the Government system.

6.3 Observer programme

In India, observers are placed on-board on all the authorized tuna longlining vessels.

6.4 Port sampling programme

The ICAR-CMFRI and the Department of Fisheries of the coastal State/UTs undertakes sampling programmes at the designated centers, following a standard methodology. Besides estimating the landings, important biological and socio-economic information is also collected on a regular basis.

6.5 Unloading / Transshipment

Both unloading by foreign fishing vessels and mid-sea transshipment are not permitted under the prevailing rules/regulations.

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

The landings of Striped Marlin, Black Marlin, Blue Marlin and Indo-pacific Sailfish are monitored through the sampling programme listed in 6.4.

6.7 Gillnet observer coverage and monitoring

India does not have a large-scale gillnet fishery registered in the IOTC RAV.

6.8 Sampling plans for mobulid rays

India has a national sampling programme, for all the fish caught, including mobulid rays caught by the artisanal fishery. The fishery and biology data are being collected at national as well as State (Province) levels.

7.0 National Research Programmes

India has a long-standing research programme on land-based sampling and sea-based exploratory surveys of tuna fishery. The ICAR-CMFRI along with the coastal States/UTs undertakes regular sampling and estimation of the tuna fishery resources from designated landing points along the Indian coastline. Besides estimating the tuna fishery landings, studies on biological and socio-economic attributes of tuna fisheries are also carried out by the Institute on a regular basis. The survey of oceanic resources is undertaken by FSI through its four dedicated longliners, two based on the east coast and two on the west coast. These modern longliners undertake exploratory surveys on a regular basis through pre-determined sampling programmes. The exploratory surveys provide information on the distribution of tuna resources in the Indian EEZ, effort, by-catch and also various environmental parameters to correlate with the exploitation of tuna fishery resources. The FSI, has embarked on a large programme to undertake the marine mammal stock assessment in India, wherein the status of marine mammals in the Indian seas within the EEZ will be monitored, the marine mammal interaction and mortality in fishing will be studied in detail and the mitigation measures will be identified. The Marine Products Export Development Authority (MPEDA) and the ICAR-Central Institute of Fisheries Technology (ICAR-CIFT) are the collaborating Institutes. A research project entitled "Stock Structure of Yellowfin tuna in the Indian EEZ" is being implemented to delineate the stock structure of yellowfin tuna in the Indian EEZ and adjoining highseas. The FSI and ICAR-CMFRI are the participating Institutes.

Besides the above two dedicated institutions, various other agencies, both governmental and non-governmental also undertake R&D activities on tuna fishery. The Centre for Marine

Living Resources and Ecology under the Ministry of Earth Sciences (MoES) also undertakes exploratory surveys of the fishery resources in the Indian EEZ. These surveys often include programmes on tuna fishery. In addition, the Department of Science & Technology of the Ministry of Science & Technology, the Indian National Centre for Ocean Information Services and the National Institute of Ocean Technology under the MoES also undertake dedicated research and development activities on tuna fisheries. Further, the Wildlife Institute of India, an autonomous body under the Ministry of Environment, Forest and Climate Change is working on development of programmes to monitor the marine mammals in the Indian EEZ.

Table 2: Tuna and allied resources nominal catch – gear-wise (in tonnes) from the coastal andoceanic fishery 2021

Species/group	Gillnet	Trawl	Small longline	Small purse seines	Ring seine	Gillnet-cum-longline	Pole & Line	Handline	Beach seine	Boat seine	Troll	Harp oon	Ex longline	Drifting longline	Miscellaneous	Grand total
<i>T.albacares</i>	7334.7	4045.4	4233	915.3	39.1	3080.3	1143.8	1344			623.6		0.093	127.106	1629	24,515.40
<i>K. pelamis</i>	11958.9	382	1581.2	219.2	31.6	4195.9	6497.7	320.3			551.5		0.071	122.5		25,860.87
<i>T.obesus</i>	2.33	35.1	0.9			27.9	499.4	83.1			98.5			13		760.23
<i>Makaira</i> spp.	1131.7	325	1119.7	0.747		930.17	139.7	1.3			9.2			0.045		3,657.56
<i>I.platypterus</i>	2523.3	529.6	656.3	122.2		1791	0.101	9.7			95.6		1.794	2291		8,020.60
<i>Xiphias gladius</i>	738.4	17.3	85.5	6.2		687.1		0.28			0.2		0.256			1,535.24
<i>Scomberomorus</i> spp.	9993.3	18038	4367.22	2461.1	919	783.8			61.4	6.3				1011	14.3	37,655.42
<i>Auxisthazard</i>	2070.3	92.8	516.5	990.8	410	142.8	531.7	62.7	0.3	4.6	203.7			1119.5		6,145.70
<i>E.affinis</i>	6226.1	1651.7	2019.4	12785.5	2537.6	2481.43	574.5	66.3	1.94	15	266.7			2.8		28,628.97
<i>T.tonggol</i>	1537.9	16.73	42.7	109.9												1,707.23
<i>Auxisrochei</i>	924.1	60.7	660.2	2589.6	49.2	412.6			11.32	7.5						4,715.22
Pelagic sharks, rays	3144.65	2372.2	860.4	0.3	3.8	381.1	0.348	5.7	3.5		42.5	2.2	2.268	1130.7	15.9	7,965.31
<i>Sarda orientalis</i>	781.6	16.6	116.2		6.87	80.6										1,001.87
NEI/Others	821.724	3214.6	1.2	15.51	2.1	914.3	593.3	688.3			648.5	77	0.072	597.002		7,573.61
Total	49189	30797.7	16260.42	20216.357	3992.47	15915	9980.549	2581.68	78.46	33.4	2540	79.2	4.554	6414.653	1660	1,59,743.48

Table 4: Shark species (No.& Weight in kg) caught in the exploratory survey of FSI, 2014-2021 (Sharks were not caught during the exploratory longline operations in 2020)

Sl.No	Species	2017		2018		2019		2020		2021	
		No	Wt	No	Wt	No	Wt	No	Wt	No	Wt
1	<i>Alopiaspelagicus</i>	145	522	47	1,582	4	149			12	1032
2	<i>Alopiassuperciliosus</i>	8	436	42	1,681	2	139				
3	<i>Carcharhinus dussumieri</i>					4	27				
4	<i>Carcharhinus longimanus</i>	2	15								
5	<i>Carcharhinus brevipinna</i>										
6	<i>Carcharhinus falciformis</i>	1	60	85	3175	9	163			33	722
7	<i>Carcharhinus hemiodon*</i>										
8	<i>Galeocerdo cuvier</i>	1	213			4	141			4	204
9	<i>Isurusoxyrinchus</i>	2	131			1	70				
10	<i>Sphyrna lewini</i>	1	45								
11	<i>Triaenodonobesus</i>	17	58								
12	<i>Carcharhinus macloti</i>									1	10
Total		177	1480	174	6438	24	689			50	1968

*Released live

8.0 Status of Implementation of the recommendations/Resolutions of the IOTC

Res. No.	Resolution	Scientific requirement	CPC progress
11/04	On a regional observer scheme	Paragraph 9	All authorized tuna longliners are covered by the observer programme. Further, the requirements for monitoring the artisanal fishing vessels landing at the landing sites are also carried out by the field samplers.
12/04	On the conservation of marine turtles	Paragraphs 3, 4, 6-10	<ul style="list-style-type: none"> - All the five species of marine turtles reported from the Indian waters are protected under the law. - The authorised longliners regularly record and report interactions with marine turtles and this information is reported to the IOTC. - The Central Institute of Fisheries Technology is carrying out research on use of circle hooks and the findings have been reported in Journal of Fishery Technology (53 (2016): 284 – 289) and the Indian Journal of Fisheries (Vol. 60(1), 2013 Pp 21-27). - FSI also carries out research on the use of circle hooks and research findings have been published in the Journal 'Current Science' (Vol. 98, No. 10, Pp – 1378-1384 Varghese et al., 2010). - To create awareness, FSI also brings out popular articles in its in-house publications namely, Meena News and Bulletin of the Fishery Survey of India. - The entire stretch of the coastline where mass stranding of turtles takes place in India is protected through national and state legislations and no fishing activity is permitted to be carried out in such areas. Further, the Department of Forest and the Indian Coast Guard monitors the implementation of the conservation measures for protection of marine turtles. - The coastal states where mass stranding takes place have also made it mandatory on the use of Turtle Excluder Devices in the trawl nets.
12/06	On reducing the incidental bycatch of seabirds in longline fisheries.	Paragraphs 3-7	There were no reported instances of sea bird interactions in any of the Indian tuna fishery.
12/09	On the conservation of thresher sharks (family alopiidae) caught in association with fisheries in the IOTC area of competence	Paragraphs 4-8	The Indian authorized longline vessels are implementing this resolution and the same is reported to IOTC.
13/04	On the conservation of cetaceans	Paragraphs 7- 9	The national legislation prohibits capture and trade of marine mammals in Indian waters.
13/05	On the conservation of whale sharks (<i>Rhincodontypus</i>)	Paragraphs 7- 9	The national legislation prohibits capture and trade of whale sharks in Indian waters.
13/06	On a scientific and management framework on the conservation of shark species caught in association with IOTC managed fisheries	Paragraph 5-6	The Wild Life (Protection) Act, 1972 and various orders issued by the Ministry of Environment, Forest and Climate Change and the Ministry of Commerce provide for conservation of shark species in Indian EEZ. Further, a National Plan of Action (NPOA) on Conservation and Management of Sharks is under finalization.
15/01	On the recording of catch	Paragraphs	The authorized longline vessels are collecting the catch

	and effort by fishing vessels in the IOTC area of competence	1-10	and effort data and providing the same to the IOTC on regular basis.
15/02	Mandatory statistical reporting requirements for IOTC Contracting Parties and Cooperating Non-Contracting Parties (CPCs)	Paragraphs 1-7	The mandatory statistical reporting is carried out on regular basis.
17/05	On the conservation of sharks caught in association with fisheries managed by IOTC	Paragraphs 6, 9, 11	<ul style="list-style-type: none"> - The data collected from the authorised longlining vessels are submitted to IOTC to meet the reporting requirements. - The national legislation provided for conservation of shark species, including landing of sharks with fin attached. -India has a national programme on elasmobranchs that includes stock assessment and conservation. A decision on India's participation in the proposed project will be taken after the details on the project are known.
18/02	On management measures for the conservation of blue shark caught in association with IOTC fisheries	Paragraphs 2-5	<ul style="list-style-type: none"> -Data is recorded and furnished to the IOTC -Data collection programmes are in place -Catches are being monitored domestically -Scientific research on blue sharks is being undertaken and results has been published (e.g., Varghese et al., 2017)
18/05	On management measures for the conservation of the Billfishes: Striped marlin, black marlin, blue marlin and Indo-Pacific sailfish	Paragraphs 7 – 11	<p>India is adopting a number of management measures for conservation of fishery resources (including billfishes) in its seas, most important of which is annual ban on fishing for two months.</p> <p>Catches are being monitored and reported to the IOTC</p>
18/07	On measures applicable in case of non-fulfilment of reporting obligations in the IOTC	Paragraphs 1, 4	<p>India is regularly reporting the fishery and other data in respect of all IOTC fisheries; including shark species caught in association with IOTC fisheries, and is working in collaboration with the IOTC Secretariat to improve the data collection for direct and incidental catches.</p> <p>India had submitted the zero/positive matrix by IOTC species as well as the most commonly caught elasmobranch species in the IOTC format while submitting the mandatory catch, effort and size data</p>
19/01	On an Interim Plan for Rebuilding the Indian Ocean Yellowfin Tuna Stock in the IOTC Area of Competence	Paragraph 22	The provisions under this Resolutions do not apply on India
19/03	On the Conservation of Mobulid Rays Caught in Association with Fisheries in the IOTC Area of Competence	Paragraph 11	India has a national sampling programme, for all the fish caught, including mobulid rays caught by artisanal fishery. The fishery and biology data is being collected at national as well as state (province) levels

9.0. Literature cited

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