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India's National Report to the Scientific Committee of the Indian Ocean Tuna Commission, 2011

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FISHERY SURVEY OF INDIA

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INFORMATION ON FISHERIES, RESEARCH AND STATISTICS

In accordance with IOTC Resolution 10/02, final scientific data for the previous year was provided to the Secretariat by 30 June of the current year, **for all fleets other than longline** [*e.g.* for a National report submitted to the Secretariat in 2010, final data for the 2009 calendar year must be provided to the Secretariat by 30 June 2010)	YES 28/06/2011
In accordance with IOTC Resolution 10/02, provisional **longline data** for the previous year was provided to the Secretariat by 30 June of the current year [*e.g.* for a National report submitted to the Secretariat in 2010, preliminary data for the 2009 calendar year was provided to the Secretariat by 30 June 2010). **REMINDER:** Final longline data for the previous year is due to the Secretariat by 30 Dec of the current year [*e.g.* for a National report submitted to the Secretariat in 2010, final data for the 2009 calendar year must be provided to the Secretariat by 30 December 2010).	YES 28/06/2011
If no, please indicate the reason(s) and intended actions:	

EXECUTIVE SUMMARY

India's tuna fishing fleet includes coastal multipurpose boats operating a number of traditional gears, oceanic pole and line boats, small longliners and industrial longliners. The total production of tunas and tuna-like fishes, including neritic and oceanic tunas, billfishes and seerfishes during the year 2010 was 127616 tonnes, against a total production of 135262 tonnes during the year 2009. There was a reduction in production by the coastal fishery and increase in the tuna landings by oceanic sector during the year under report. There was considerable reduction in the quantity of tuna exports during the financial year 2010-11 compared to the year 2009-10. Survey conducted by the Fishery Survey of India in the EEZ revealed that sharks constitute 19.49% by number and 28.33% by weight to the total catch in the longline fishery. There are no reported instances of sea bird interaction in any of the Indian tuna fishery. Sea turtles, marine mammals and whale sharks are protected in India under various national legislations. Data on tuna production is collected by different agencies in India including Fishery Survey of India (FSI), Central Marine Fisheries Research Institute (CMFRI) and Marine Products Export Development Authority (MPEDA).

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BACKGROUND/GENERAL FISHERY INFORMATION

India's tuna fishery is contributed by a). Coastal fishery, mainly by artisanal sector/mechanised boats operating a number of traditional gears and b). Oceanic fishery by artisanal pole and line fishery based at the Lakshadweep group of Islands, small longliner (mainly shrimp trawlers converted to tuna longliners) fishery targeting fresh tuna within the EEZ and industrial longline fishery by the Indian owned tuna longline vessels. The total production of tunas and tuna-like fishes, including neritic and oceanic tunas, billfishes and seerfishes during the year 2010 was 127616 tonnes, against the 135262 tonnes produced during the year 2009. There was a reduction in production by the coastal fishery and increase in the production by oceanic sector during the year under report.

FLEET STRUCTURE

The coastal fishery has a large assemblage of small fishing boats, mainly gillnetters, mini purse-seiners, ring-seiners, hook and line boats etc., which are not targeting tunas, but contribute significantly to the tuna landings.

Pole and line boats, numbering 365 are engaged in targeted fishing for tunas in the Lakshadweep waters.

During the 10th five year plan (2002–2007), under the centrally sponsored scheme on "Development of marine fisheries, infrastructure and post-harvest operations", the Ministry of Agriculture, Government of India has been providing financial assistance of Rs.1.5 million (about US $ 32,000) per vessel for conversion of existing trawlers above 20 m OAL for tuna longline fishing. Under this scheme, ten shrimp trawlers in the size range of 21.5–24.0 m OAL were converted for tuna longline fishing.

The Marine Products Export Development Authority (MPEDA) had introduced in the 10th five year plan a scheme for providing financial assistance of Rs. 0.75 million (about US $ 16,000) to existing vessels for conversion to tuna longline fishing. Under the scheme, 225 vessels in the size range of 13 – 24 m OAL have availed the subsidy and converted for tuna longline fishing.

Under the Letter of Permission (LOP) scheme of the Ministry of Agriculture, 53 tuna longline vessels in the range of 21.6 - 58.7 m OAL, and 7 Hook & line vessels which are of foreign origin, but registered as Indian vessels, have been permitted for fishing in the Indian waters.

The structure of the oceanic tuna fleet is given in table 1. All the converted tuna longline vessels are using monofilament longlining system.

Table 1: Structure of tuna longline and Hook & Line fleet in India: 2010

Length range (m)	Indian owned vessels		Converted vessels		Total
	Hook & Line	Longline	MPEDA Scheme	MoA Scheme	
12.0-15.9			147		147
16.0-19.9		2	66		68
20.0-23.9	2	22	11	9	44
24.0-39.9	5		1	1	31
40.0-59.9		24			0
Unspecified		5			5
Total	7	53	225	10	295

CATCH BY SPECIES, AREA AND GEAR

a). By coastal fishery

India's coastal fishery landed 103412 t of tunas and allied species during 2010. The production from the Fishing Areas 51 and 57 was 22839 tonnes and 19133 tonnes (Table 2), i.e., 54.40% and 45.60% respectively. About 72% of skipjack and 67% of yellowfin caught by the coastal fishery was from the area 57. The neritic tunas were obtained in higher proportion from the fishing area 51.

The tuna fishery was supported by ten species; four oceanic species and six neritic species. Oceanic species formed 27% and neritic species 73%. Among the oceanic species, Yellowfin and Skipjack were dominant contributing 9289 tonnes and 4893 tonnes respectively. Among the neritic tunas, Kawakawa was dominant (55.15%) followed by Frigate tuna (16.3%), Longtail tuna (15.8%), and other species.

In the tuna landings from the coastal fishery, 51.9% was obtained in gillnet followed by hook and line (14.7%), trawl net (14.1), mini-purse seine (7.5%), ring seine (3%) and the remaining by other gears. The catch details obtained by different gears are given in Table 3.

Table 2. Nominal catch (tonnes) of tuna and tuna-like fishes from the coastal fishery in India: 2010

Species	FAO Area 51	FAO Area 57	Total
Yellow fin Tuna	3106	6183	9289
Bigeye Tuna	1	37	38
Skipjack Tuna	1373	3520	4893
Albacore	42		42
Longtail Tuna	6077	15	6092
Bullet Tuna	3301	1609	4910
Frigate Tuna	3944	2339	6283

Kawakawa (Little Tuna)	11642	9629	21271
Dogtooth Tuna	12		12
Striped Bonito	172	7	179
Tunas Total	**29670**	**23339**	**53009**
Sailfish	2592	4150	6742
Black Marin	476	533	1009
Swordfish	675	5	680
Billfishes Total	**3743**	**4688**	**8431**
Wahoo	56	63	119
Narrow -Barred Seerfish	15765	9628	25393
Indo- Pacific Seerfish	7014	9430	16444
Streaked Seerfish	4	12	16
Seerfishes Total	**22839**	**19133**	**41972**
Grand Total	**56252**	**47160**	**103412**

Source: Central Marine Fisheries Research Institute

Table 3. Gear - wise nominal catch (tonnes) of tuna and tuna-like fishes from the coastal fishery in India: 2010

Species	Bagnet	Gill net	Gelln et/ Hooks & Lines	Hooks & Lines	Mini-Purse seine	Trawl net	Trawl net/ Hooks & Line	Ring seine	Others	Total
Yellow fin Tuna	13	5258	1199	1648	575	565	31			9289
Bigeye Tuna		4				34				38
Skipjack Tuna		3136	671	728		353	5			4893
Albacore		42								42
Longtail Tuna		4731	35	19	1024	283				6092
Bullet Tuna		1603	40	3042	106	119				4910
Frigate Tuna		2284	85	282	2468		23	726	415	6283
Kawakawa (Little Tuna)	7	9914	336	1974	2193	1120	77	3812	1838	21271
Dogtooth Tuna			12							12
Striped Bonito		161	5	7			2	4		179
Tunas Total	**20**	**27133**	**2383**	**7700**	**6366**	**2474**	**138**	**4542**	**2253**	**53009**
Sailfish		2065	1074	3539		63	1			6742
Black Marin		315	420	274						1009
Swordfish	26	112	361	5		176				680
Billfishes Total	**26**	**2492**	**1855**	**3818**	**0**	**239**	**1**	**0**	**0**	**8431**
Wahoo		68	50	1						119
Narrow -Barred Seerfish	119	14402	252	3303	989	6098	176	23	31	25393
Indo- Pacific Seerfish	72	9583	35	323	355	5764		197	115	16444
Streaked Seerfish		7				9				16
Seerfishes Total	**191**	**24060**	**337**	**3627**	**1344**	**11871**	**176**	**220**	**146**	**41972**
Grand Total	**237**	**53685**	**4575**	**15145**	**7710**	**14584**	**315**	**4762**	**2399**	**103412**

Source: Central Marine Fisheries Research Institute

b). By oceanic tuna fishery

The nominal catch of tunas and allied species from the oceanic fishery was 24204 tonnes (Table 4, Fig. 1 and 2). The catch was dominated by Skipjack, contributing 53% of the total catch. Yellowfin tuna contributed 45% of the total catch. Contribution of bill fishes to the total catch was marginal.

Maximum catch from the oceanic sector was by Small longliners, targeting fresh tuna in the EEZ. The fishery is concentrated mainly in the South-east and South-west coasts. Catch from this sector was 12230 t, dominated by Yellowfin (7300 t) followed by Skipjack (4929 t).

Total Landing by Pole and line fishery based at Lakshadweep was 9978 t. Catch consisted of Skipjack (80%) and Yellowfin tunas (20%).

The effort by industrial tuna fishery, consisting of 53 longline and 7 Hook & line vessels were concentrated mainly in the Andaman and Nicobar waters. Total catch reported by this fishery was 1991 t, consisting of yellowfin (1589 t), Indo-pacific sailfish (147 t), marlins (161 t) and swordfish (93 t).

Table 4. Nominal catch of tunas and allied species (tonnes) from the oceanic fishery

Species/group	Industrial tuna longline	Small longline/other gears	Pole and line	FSI vessels	Total
Yellowfin tuna	1589.15	7300.27	1995.53	3.34	**10888.3**
Skipjack tuna		4929.37	7982.14	0.19	**12911.7**
Indo-Pacific sailfish	147.47			0.97	**148.44**
Marlins	161.12			0.57	**161.69**
Swordfish	93.26			0.49	**93.75**
TOTAL	**1991**	**12229.6**	**9977.67**	**5.56**	**24203.9**

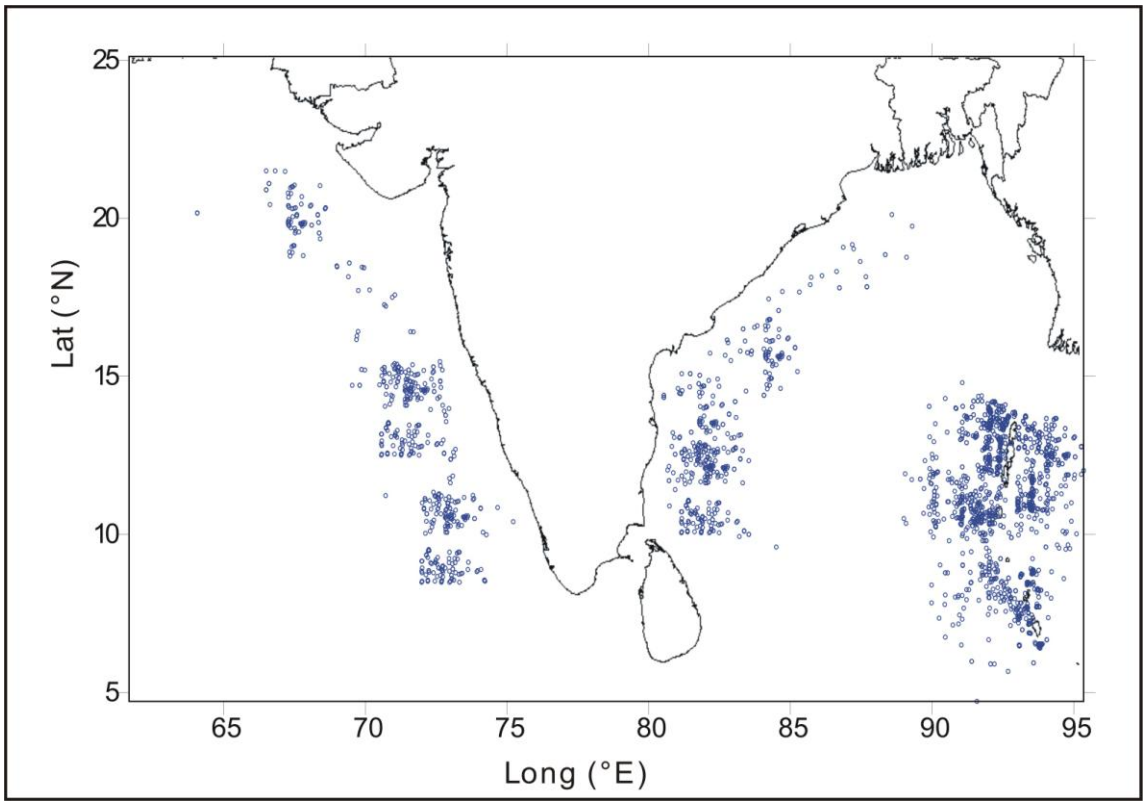

Fig. 1. Map showing distribution of fishing effort (fishing station) by longline fishery

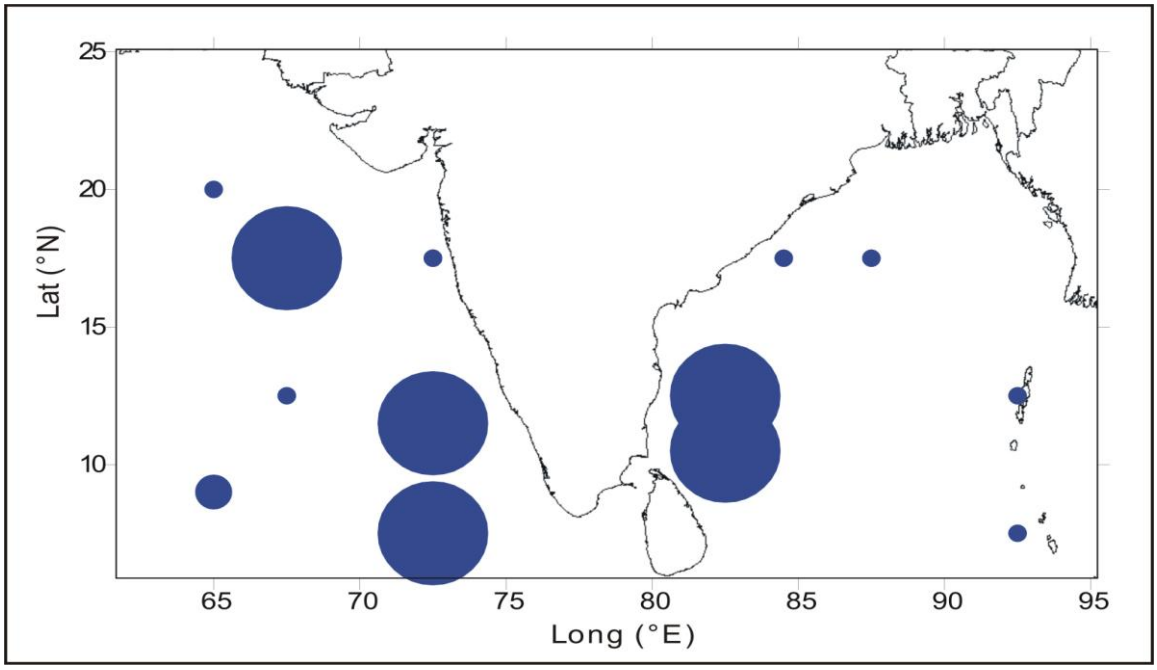

Fig. 2. Map showing total catch distribution by oceanic tuna fishery

ECOSYSTEM AND BYCATCH ISSUES

Sharks

Survey conducted by the Fishery Survey of India in the EEZ revealed that sharks constitute 19.49% by number and 28.33% by weight to the total catch in the longline fishery. However, the reported catch of sharks by industrial longline fishery is negligible. Many of the shark species are protected under the Indian national law. A National Plan of Action for Conservation of Sharks (NPOA-sharks) and also a Regional Plan of Action, jointly by Bangladesh, India, Maldives and Sri Lanka is contemplated. Consultation process is in progress.

Seabirds

There were no reported instances of sea bird interaction 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.

Marine Turtles

Sea turtles are protected in India, being included in the Schedule I of The Indian Wildlife (Protection) Act 1972. Studies conducted by Fishery Survey of India indicated that, the observed hooking rate of sea turtles in the longline fishery of Indian EEZ is 0.108 turtle/1000 hooks (Varghese *et al*., 2010). This rate is remarkably lower than many of the studies conducted in other areas. However, Indian longline vessels are advised to carry dehookers and line cutters while on fishing operations and pamphlets on safe release of sea turtles were distributed to the longline fishermen.

Other ecologically related species

Fishing of marine mammals and whale sharks are banned in Indian waters under various national legislations.

NATIONAL DATA COLLECTION AND PROCESSING SYSTEMS

In the coastal fishery around mainland India, the Central Marine Fisheries Research Institute (CMFRI), under the Indian Council of Agricultural Research (ICAR), collects data on fish landings through a stratified multi-stage random sampling procedure.

For the island groups of Lakshadweep and Andaman & Nicobar, the landing data reported by the respective Union Territory Governments are considered.

From the oceanic fishery, the voyage reports received by the Fishery Survey of India (FSI) and from the Indian owned tuna fishing vessels operating under the Letter of Permission (LOP) scheme formed the data source. New log sheets as per the requirements under the IOTC resolutions were designed and distributed to the LOP vessel operators.

The exports data is collated by the Marine Products Export Development Authority (MPEDA), under the Ministry of Commerce, based on actual export documents.

Vessel Monitoring System

Operation of the Indian industrial tuna fishing vessels is monitored by the ATS (Automatic Tracking System). However, Government of India has finalised a programme for installation

of Vessel Monitoring System onboard all the fishing vessels. This programme will satisfy all the requirements under the IOTC Resolutions on installation of VMS.

Observer programme

A programme for posting of observers onboard tuna fishing vessels is being contemplated by the Government of India.

Port sampling programme

The Central Marine Fisheries Research Institute (CMFRI) is implementing a port sampling programme, wherein the landings, length structure and biological parameters of important species are collected.

Unloading/Transhipment

Mid-sea transhipment is allowed in Indian tuna fishery under the strict monitoring by Indian Coast Guard, Marine Products Export Development Authority and Reserve Bank of India.

NATIONAL RESEARCH PROGRAMS

- Survey of oceanic tunas and allied resources in the Indian EEZ by deploying four tuna longliners, two each on the Arabian Sea and Bay of Bengal, is being undertaken by the Fishery Survey of India (FSI), under the Ministry of Agriculture. Data on resource distribution, CPUE, by-catches and environmental conditions are being collected. Biological studies of all the species occurring are also undertaken.
- A project for "Locating tuna habitat through satellite remote sensing", jointly by the Fishery Survey of India and the Space Applications Centre (SAC) of the Indian Space Research Organization (ISRO), is in progress.
- A project on "Strategies for sustaining tuna fisheries along the coast of India" is being undertaken by the CMFRI, with the objective of studying the impact of exploitation on the neritic tuna stocks and to suggest strategies for sustainable development. The project period is 2008–2012 and it is being implemented from four centers viz., Veraval (northwest coast), Kochi (southwest coat), Tuticorin (southeast coast) and Visakhapatnam (northeast coast).
- A project on "A value chain on oceanic tuna fisheries in Lakshadweep Sea" with funding support from the National Agricultural Innovative Project (NAIP) is operational since 2008. The major activities under the project are resource assessment, trophic modeling, technology development and demonstration for conversion of existing pole and line boats for longlining, improved handling onboard and at landing centers, production of value added products, development of fisheries management advisories, social impact analysis and transfer of technology. The project is being implemented jointly by the Central Marine Fisheries Research Institute (CMFRI), Fishery Survey of India (FSI), Central Institute of Fisheries Technology (CIFT) and the Department of Fisheries, Union Territory of Lakshadweep and National Institute of Fisheries Post Harvest Technology and Training (NIFPHATT).
- A project on "Satellite Telemetric Studies on Migration Pattern of Tunas in the Indian Seas (SATTUNA)", sponsored by the Indian National Centre for Ocean Information Services (INCOIS), aimed to study the migratory pattern of oceanic tunas in Indian

waters by satellite technology was initiated during the current year. Institutes participating in the programme are Fishery Survey of India (FSI), Indian National Centre for Ocean Information Services (INCOIS), Central Marine Fisheries Research Institute (CMFRI) and Centre for Marine Living Resources and Ecology (CMLRE).

- Scientists from India participated in various Working Party meetings of the IOTC, including Working Party on Billfish, Tropical Tunas, Ecosystem and Bycatch, Neritic Tunas. Scientific papers on issues relevant to the Working Parties were presented by the Indian Scientists participating in the above meetings.
- India hosted the First meeting of the IOTC Working Party on Neritic Tunas during 14-16 November 2011 at Chennai.
- India also hosted the first Capacity Building Workshop at Chennai during 17-18 November 2011.

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

Several recommendations of the Scientific Committee / IOTC are being implemented. A Working Group has been constituted under the chairmanship of the Joint Secretary (Fy.), Ministry of Agriculture, with members from the Ministry, Indian Council of Agricultural Research (ICAR) and relevant Research and Development institutions, viz., FSI, CMFRI and MPEDA, for monitoring the implementation of various IOTC resolutions and recommendations. At the FSI, an IOTC cell has been set up to follow up necessary actions. Some of the specific recommendations implemented are given below:

- Logbook has been designed, printed and distributed to the tuna longline operators.
- Studies are being undertaken on depredation from four tuna longline survey vessels of the Government of India.
- Studies on by-catch are being undertaken from four tuna longline survey vessels of the Government of India.
- The commercial vessels, through the logbook introduced, are being advised to report on the depredation, occurrence of turtles, by-catches and discards in the longline fishery.
- For conservation / protection of sea turtles, several measures including area closures for fishing, fabrication and popularization of TEDs, conducting awareness campaigns and protection under Wildlife Protection Act have been implemented. Indian longline vessels are advised to carry dehookers and line cutters while on fishing operations and pamphlets on safe release of sea turtles were distributed to the longline fishermen.
- A National Plan of Action for Conservation of Sharks (NPOA-sharks) and also a Regional Plan of Action, jointly by Bangladesh, India, Maldives and Sri Lanka is contemplated. Consultation process is in progress.

CONCLUSION

Oceanic tuna fishery in India expanded in recent years mainly by the encouragement through the Government policies for diverting the overcapacity in the continental shelf areas to the oceanic waters. However, the fishery is facing serious issues mainly due to declining catches. Since tunas are highly migratory, the over exploitation in one region will influence the abundance in other regions. India's contribution to total oceanic tuna and associated species catch from the Indian Ocean during 2006 was 2.01%. Our oceanic tuna catches are far below the potential estimated (Anon, 2000). India adopts a precautionary approach and has been practicing fishing ban for a period of 65 days coinciding the monsoon season. Similar area-time closure for the entire Indian Ocean and a major fleet reduction programme for major tuna fishing nations (DWFNs, mainly) should be adopted for the sustainability of the Indian Ocean tuna fishery. India is committed to the conservation and management measures within the framework of the IOTC for sustainability of the tuna fishery without affecting the livelihood of the coastal fishermen. India, however, is keen to safeguard the livelihood security of small-scale fishers by advocating appropriate action by major DWFNs.

LITERATURE CITED

Anon, 2000. Report of the Working Group for revalidating the potential of fishery resources in the Indian EEZ. Pp. 27.

S. P. Varghese, S. Varghese and V. S. Somvanshi, 2010. Impact of tuna longline fishery on the sea turtles of Indian seas. *Current Science*, 98 (10), 1378-1384.