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Japan National Report

to the Scientific Committee of the Indian Ocean Tuna Commission, 2013

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Executive Summary

This Japanese national report describes following 8 issues in recent five years (2009-2013), i.e., (1) tuna fisheries (longline fishery and purse seine fishery) (2) fleet information, (3) catch and effort by species and gear, (4) ecosystem and bycatch, (5) national data collection and processing systems including "logbook data collection and verification", "vessel monitoring system", "scientific observer programme", "port sampling programme" and "unloading/transhipment", (6) national research programs and (7) Implementation of Scientific Committee recommendations & resolutions of the IOTC relevant to the Scientific Committee and (8) working documents.

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 2013 final data for the 2012 calendar year must be provided to the Secretariat by 30 June 2013)	YES 27/Jun/2013
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 2013, preliminary data for the 2012 calendar year was provided to the Secretariat by 30 June 2013). **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 2013, final data for the 2012 calendar year must be provided to the Secretariat by 30 December 2013).	YES 27/Jun/2013
If no, please indicate the reason(s) and intended actions:	

Contents

1. BACKGROUND/GENERAL FISHERY INFORMATION

Longline and purse seine fisheries are two types of Japanese tuna fisheries currently operating in the Indian Ocean. Longline fishery started its operation in 1952 when the limitation of operational area imposed by the GHQ*[1], was removed. On the other hand, commercial purse seine fleet commenced fishing in the Indian Ocean in 1991 after several years of experimental fishing.

The total fishing effort (the number of hooks) of Japanese longliners in the Indian Ocean had been keeping at similar level with fluctuation since 1971, i.e., around 100 million hooks, up until 2007. Thereafter, it has been decreasing down to about 29 million hooks in 2011 due to piracy activities. It slightly increased to 31 million hooks in 2012. Percentage of effort used in this Ocean in the total effort in all oceans fluctuated around 20% until 2003 after when it increased to 35% in 2006 and 2007. Thereafter it has drastically decreased to 27%, 16% and 14% in 2009, 2010 and 2011 respectively, mainly because of increasing activity of piracy off Somalia.

As for the purse seine fishery, fishing took place mainly in the tropical western Indian Ocean until 1993 after when fishing effort shifted almost completely to the eastern Indian Ocean mainly because of economic problem derived from rise of Japanese Yen during that time.

2. FLEET STRUCTURE

All Japanese longline vessels operating in the Indian Ocean have been the distant water category (120-500GRT) with some exceptional offshore vessels (10-120GRT). Historical change in the number of longline vessels from 1987 to 2012 is shown in Table 1. In the last fifteen years, the number of vessels operated in this Ocean was around 170-250 per year until 2008. Although the number of operating vessels was relatively large in number (224-251) during 1995-1999, after that it decreased to less than 200 except for 228 in 2002. Although the number of vessels in 2007 increased to 250, it decreased rapidly year by year until 2011 due to effect of piracy activities. The number of longline vessels in 2011 was 69, and it increased to 108 in 2012.

Japanese purse seine vessels operating in the Indian Ocean are 350-700 GRT class (700-1000 carrying capacity). Historical change in the number of purse seine vessels from 1987 to 2012 is shown in Table 1. Although more than 10 Japanese purse seiners operated during 1991-1994, it decreased year by year and the last commercial purse seiner retreated from the Indian Ocean in 2001 leaving only one vessel “Nippon-Maru”, the research vessel of Fisheries Research Agency (FRA). A few commercial vessels have been operating since 2006. The number of purse seine vessels operated in 2012 was 1.

Table 1. Number of vessels operating in the IOTC area of competence, by gear type

Fleet/Year	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Longliner	272	235	245	216	184	181	206	206	224	251	243	242	223	192
Purse seiner	1	1	3	4	11	12	11	11	8	5	3	4	3	2

Fleet/Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Longliner	199	228	172	189	184	188	250	173	128	84	69	108
Purse seiner	2	1	1	1	1	3	3	3	2	1	1	1

* *GHQ (General Headquarters) of the occupying forces of the Allies after the World War II*

3. CATCH AND EFFORT (BY SPECIES AND GEAR)

3.1 Longline fishery

The latest available longline data is that of 2012.

Fishing effort

The longline fishery commenced in 1952 in the eastern equatorial waters in the Indian Ocean. In the late 1960s, the effort covered entire fishing ground of the longline in the Indian Ocean. The annual amount of the effort has increased until the late 1960s and fluctuated after that. However, fishing effort has been dramatically decreasing since 2008 (Table 2) because of the effect of piracy activities off Somalia. Fishing effort in 2011 (29 thousand hooks) was only about 25% of that in 2007.

Table 2. Annual catch and effort and primary species in the IOTC area of competence (longline fishery, 2008-2012).

(catch in mt and sets and hooks in thousand)

Year	Set	Hooks	SBF	ALB	BET	YFT	SWO	MLS	BLZ	BLM	SFA	SPF	SKJ
2008	27	89,533	1,620	4,812	13,740	10,424	1,574	160	581	140	457	136	35
2009	19	64,951	1,910	3,568	8,993	4,877	1,027	55	416	106	160	92	44
2010	11	37,036	1,480	3,846	4,244	3,472	634	204	244	62	84	105	16
2011	8	28,852	1,497	2,442	3,755	4,541	576	319	242	52	68	188	26
2012	9	31,485	1,389	2,918	5,504	3,337	619	161	238	53	55	94	15

Yearly distributions of longline effort for 2012 and average of 2008-2012 are shown in Fig. 2. In 2012, the effort in African offshore area from off Cape Town to Mozambique and in the eastern part west off Australia and Indonesia seems relatively larger than that for 2008-2012. The effort in the northwestern area has dramatically decreased since 2008 and few effort in 2012 because of the expanded activity of piracy off Somalia.

Catch

Historical catch in weight by species and catch statistics for 2008-2012 by Japanese longliners in the Indian Ocean are shown in Fig. 1 and Table 2, respectively, and geographical distributions of catch in 2012 and average of 2008-2012 for major tuna and billfish species are shown in Fig. 3. Catch of albacore, yellowfin and southern bluefin tunas were very high during 1950s and 1960s, and then sharply decreased. After mid 1990s bigeye and yellowfin tunas have been main components of the catch, but catch of albacore has been comparatively similar level since 2009.

Total catch (the catch of southern bluefin tuna, albacore, bigeye, yellowfin, swordfish, striped marlin, blue marlin, black marlin, sailfish, shortbill spearfish, and skipjack) in 2011 and 2012 was 13,706MT and 14,383MT, respectively. It should be noted that the catch of yellowfin and bigeye drastically decreased during 2007-2010, although the catch of albacore was roughly at the same level during this period. Furthermore, bigeye catch in 2011 and yellowfin catch in 2012 were lowest after 1980s, and this decrease was mainly derived from decrease in effort especially in the tropical area.

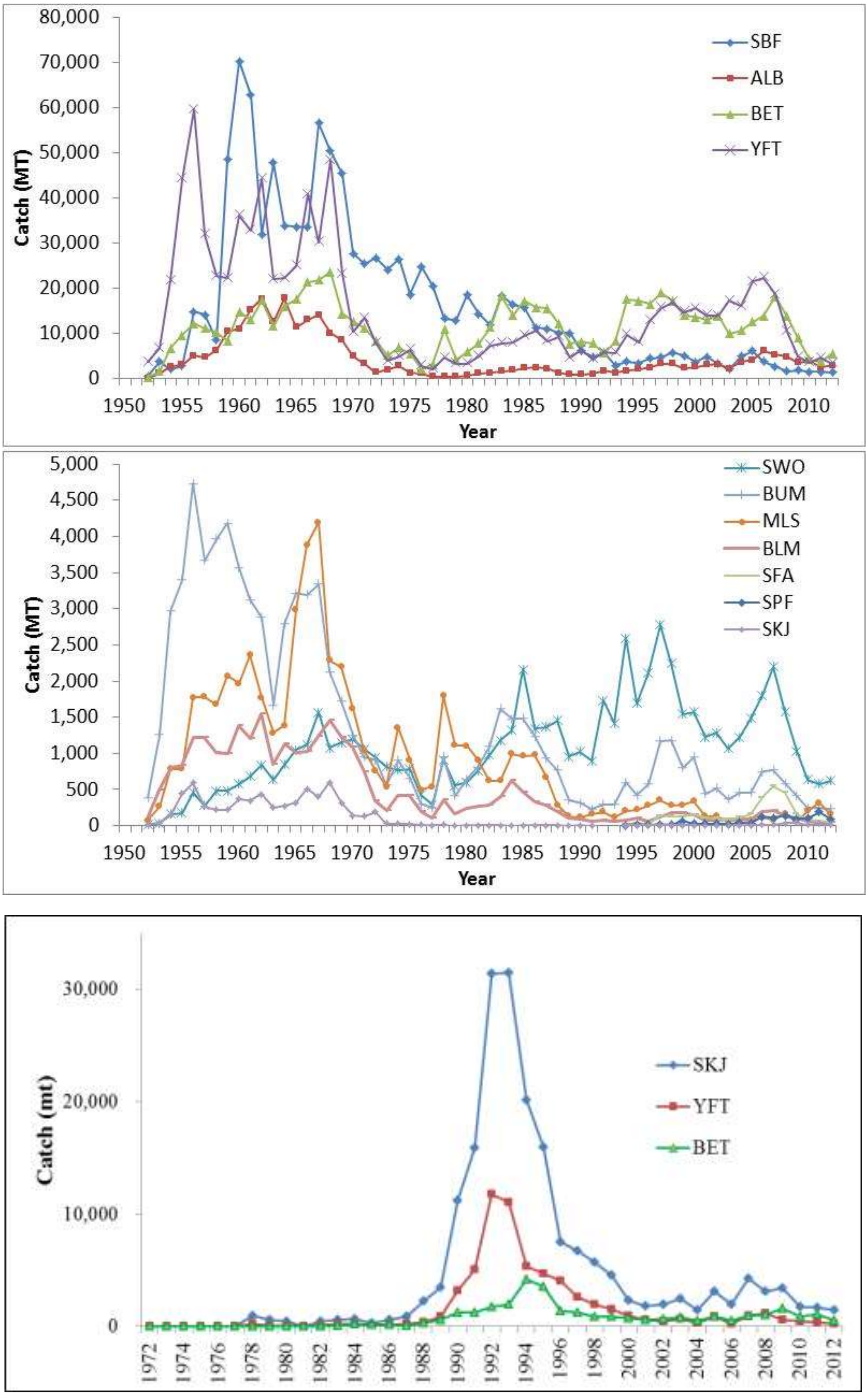

Fig. 1. Historical change of effort exerted into each of West and East Indian Ocean. Upper: longline (tuna species), middle: longline (skipjack and billfish species), lower: purse seine.

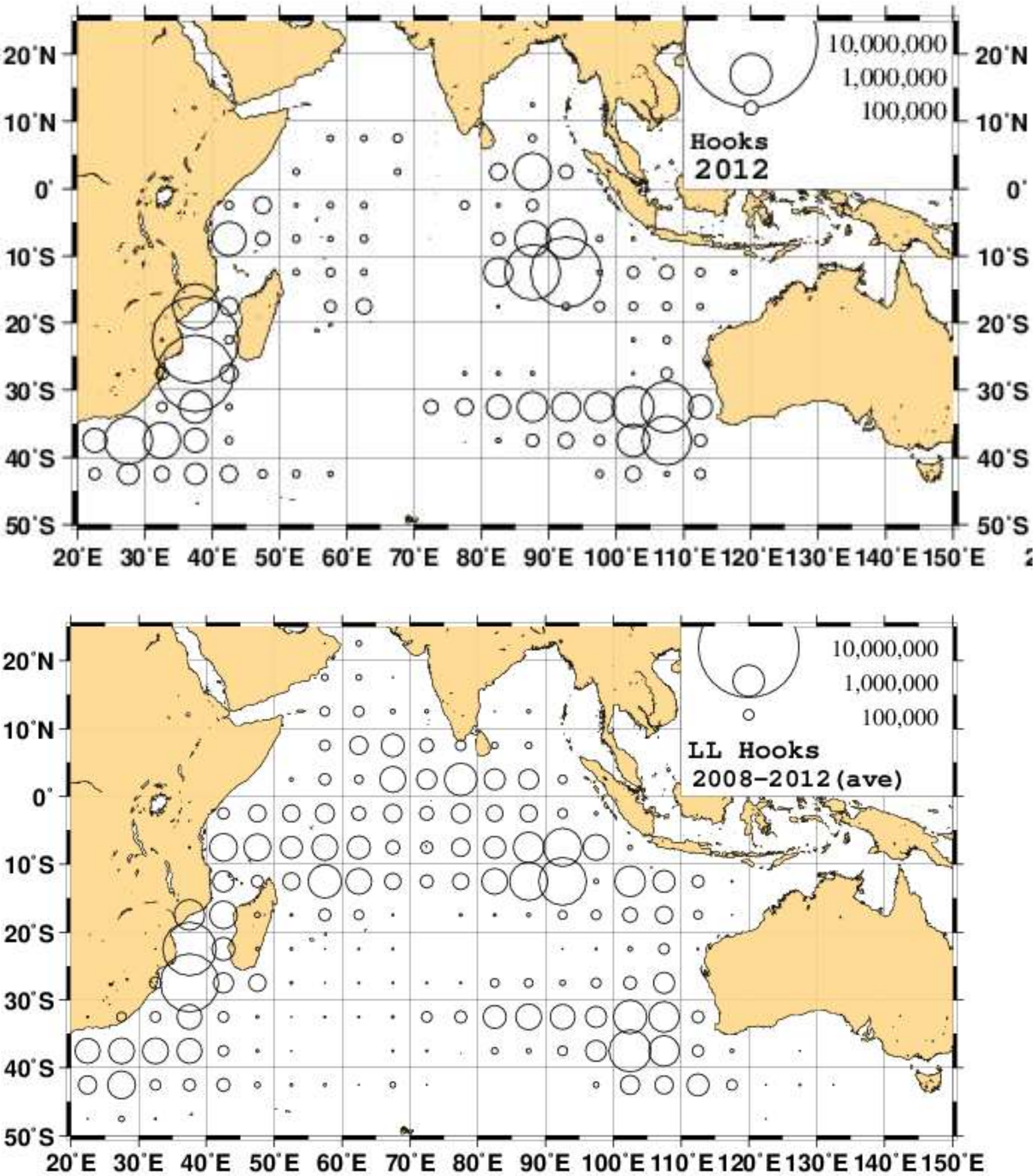

Fig 2. Yearly distributions of longline effort for 2012 (above) and average of 2008-2012 (below)

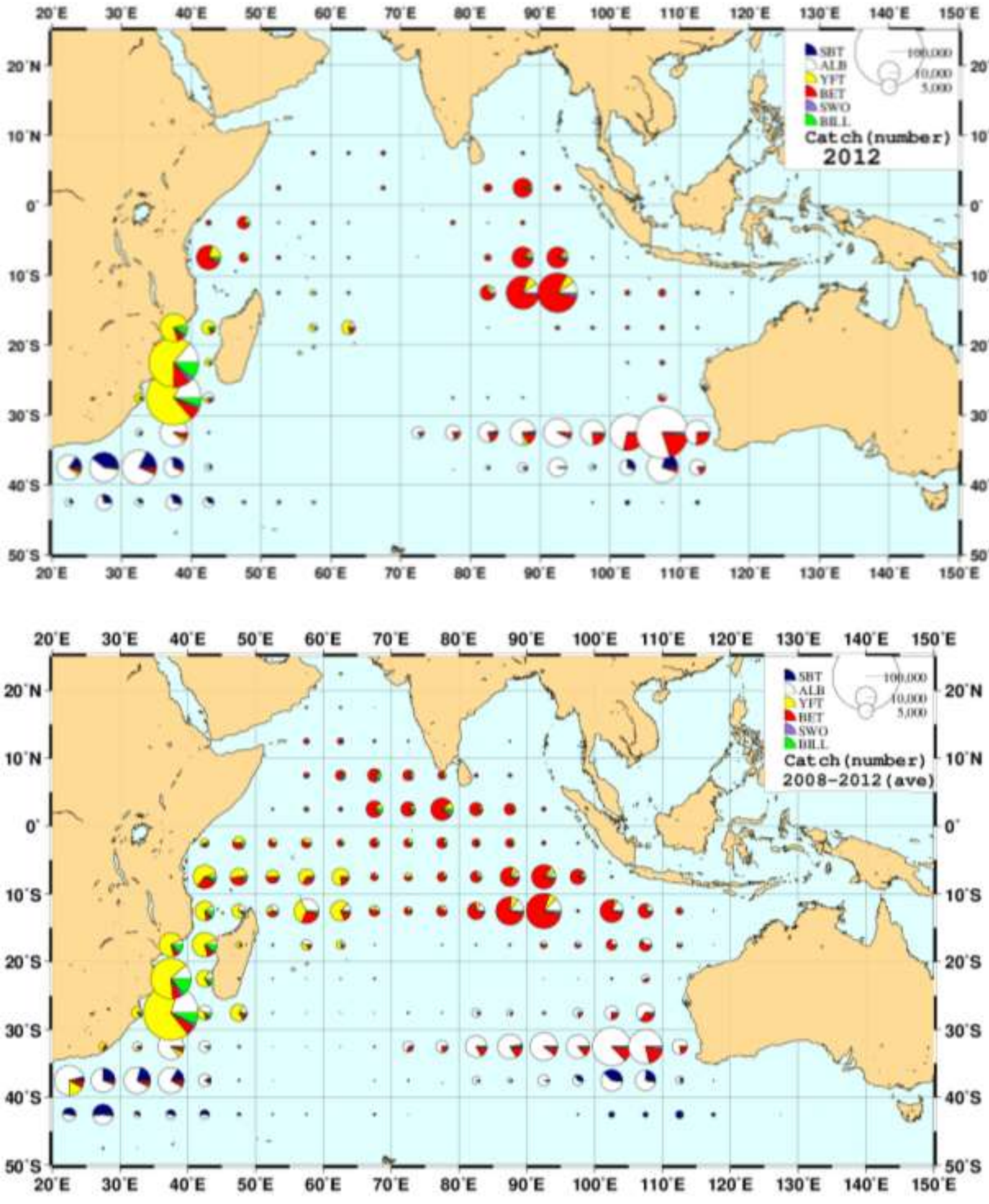

Fig. 3 Geographical distributions of catch (in number) of major species in 2012 (upper) and in average of 2008-2012(lower). Southern bluefin tuna (SBT), albacore (ALB), bigeye tuna (BET), yellowfin tuna (YFT), swordfish (SWO) and billfishes (BILL).

Seeing geographical distribution of the catch, yellowfin and bigeye tunas are mainly caught in the western and eastern part, respectively. Albacore is mainly caught in the temperate area around South Africa and west off Australia, where this species is one of main components of the catch. In 2012 there was few effort in the northwestern area and so yellowfin was mainly caught in the area around Madagascar.

3.2 Purse seine fishery

The latest available data for Japanese purse seine fishery is that for 2012.

Fishing Effort

Total fishing effort (number of set) was 105 in 2011 and 72 in 2012 (Table 3). Geographical distributions of effort for 2012 and the average of 2008-2012 are shown in Fig. 4. Operations were conducted almost only in the eastern part in recent years.

Table 3. Annual catch and effort and primary species in the IOTC area of competence (2008-2012) (purse seine fisheries).

		Catch (mt)			
Year	Number of set	SKJ	YFT	BET	others
2008	239	3,133	1,175	1,009	0
2009	185	3,434	557	1,571	0
2010	92	1,731	481	868	0
2011	105	1,675	352	1,130	0
2012	72	1,437	232	536	0

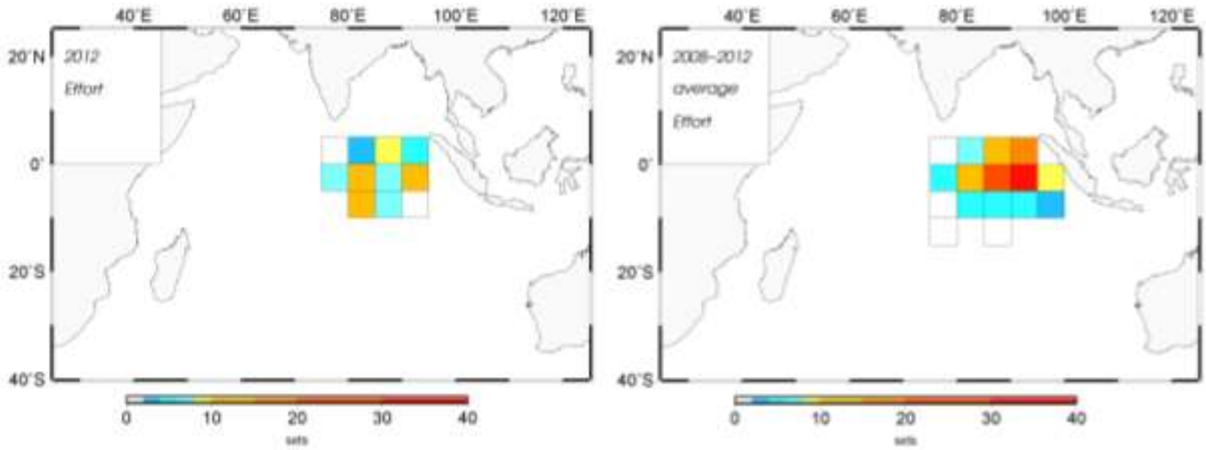

Fig. 4. Distributions of fishing effort in the Indian Ocean in 2012(left) and average of 2008-2012 (right) (Purse seine fisheries)

Catch

Total catch was low (around 1,000 MT or less) until mid-1980s, then increased rapidly to about 45 thousand MT in 1992 and 1993 after when it decreased to 10 thousand MT in 1997 and 10 thousand MT in 1999 (Fig. 1). Thereafter it has fluctuated between 2.0 and 8.6 thousand MT and total catch in 2012 was 2.2 thousand MT. Catch in weight of skipjack, yellowfin and bigeye in 2012 (2011) was 1,437 (1,675) MT, 232 (352) MT and 536 (1,130) MT, respectively. Geographical distributions of catch in 2012 and average of 2008-2012 for major tuna species are shown in Fig. 5. Main component of the catch was skipjack tuna in all the area operating.

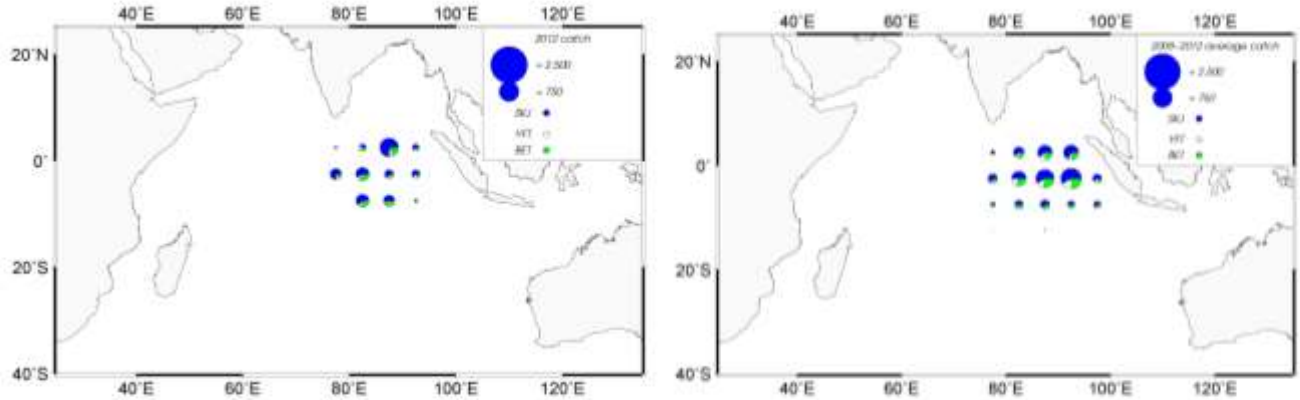

Fig. 5 Geographical distributions of catch of major species in 2012 (left) and the average in 2008-2012 (right)

4. RECREATIONAL FISHERY

None

5. ECOSYSTEM AND BYCATCH ISSUES

5.1 Logbooks information (Sharks)

In accordance with FAO International Action Plans on sharks and seabirds, Japan established the National Action Plans on sharks and seabirds in 2001 then revised in 2009 and 2011. In addition, Japan has been taking actions in accordance with the FAO Guidelines on sea turtle by-catch. Japan has been taking actions in accordance with IOTC conservation and management measures on by-catch of sharks, sea turtles and seabirds. The catch of three major shark species by Japanese longliners (1994-2012) is shown in Table 4.

The catch data were collected through the logbook and compiled in the National Research Institute of Far Seas Fisheries (NRIFSF). In August 2008, the Japanese government obliged Japanese distant water longliners to land all the parts of sharks (although heading, gutting and skinning are allowed) and the quantities given in Table 4 represents the whole weight including the weight of fins. In April 2013, silky and hammerhead sharks were added into shark species to be recorded in the logbooks for longline fishery, in addition to blue, Porbeagle, shortfin mako, oceanic whitetip, thresher and other sharks.

Recently, Japan reviewed the conversion factors of three major shark species from processed weight (kg) reported in the longline log-book system to round weight (RW)(kg), which are used to estimate total catch amount. This is primarily due to the fact that the factors currently used in the longline fishery log-book compiling system are calculated with the data collected by Japanese research and training vessels, which are revealed to adopt different processing method from that of commercial longliners. For the revision of the factors, processed and round weight data collected by ICCAT and CCSBT observers as well as the ones collected by commercial longline boats chartered by NRIFSF in the north Pacific were used.

Total of 1,554 data set of processed and round weight for blue shark, 220 for shortfin mako shark and 202 for porbeagle are available for this analysis. In case of shortfin mako shark, it was found that commercial boats process smaller individuals into the dress (DW) and larger ones into the fillet (FW), so respective data are analyzed separately. The linear regression formula is applied on the each data set to estimate conversion factor. No apparent inter sexual differences are found in the processed and round weight relationship for all three species, and thus sex combined data are used for the estimation of the processed and round weight relationship.

Equation by species, area, product form and sex is shown as follows;

Blue shark

(ICCAT observer) RW=2.1*DW (n =1,554, r^2=0.96)

(North Pacific charted boat) RW=2.0*DW (n =168, r^2=0.98)

Shortfin mako

(ICCAT observer, dressed) RW=1.6*DW (n=89, r^2=0.94)

(ICCAT observer, fillet) RW=1.6*FW (n=131, r^2=0.91)

Porbeagle

(CCSBT observer) RW=1.8*DW (n =202, r^2=0.91)

The results of analysis indicated that strong linear relationships between RW and DW for all species. Though the number of data of blue shark in the north Pacific is limited, the estimated conversion factors from processed to round weight appeared to be quite similar between the north Pacific and the Atlantic in the case of blue shark. The estimated conversion factors of filleted and dressed shortfin mako shark in the Atlantic are also appeared to be almost same. Based on these information, NRIFSF concluded that single conversion factors can be applied for three oceans to convert reported processed weight in the log-book to round weight for the three major shark species analyzed. Currently the NRIFSF used conversion factors of 1.2 for all shark species and these values are proposed to be revised as follows;

	old conversion factor	new conversion factor
Blue shark	1.2	2.1
Shortfin mako shark	1.2	1.6
Porbeagle	1.2	1.8

As Japan has collected species specific catch weight data for these three shark species since 1994 through log-book in the Indian Ocean, their historical catch amount need to be revised using newly estimated conversion factors.

The values appeared in the Table 4 are the current best available estimates of annual landings of major shark species caught by Japanese longliners in the Indian Ocean. The works for estimations of conversion factors of other key shark species and Indian Ocean specific conversion factors are still remaining, and the data necessary for these works will be collected through Japanese observer program in the Indian Ocean. The conversion factor for the Indian Ocean will be reviewed and revised if necessary once such data are collected.

Table 4. Reported annual catch (tons) of three major sharks species caught by Japanese tuna longliners in the Indian Ocean (1994 -2012).

	blue shark		Shortfin mako shark		Porbeagle	
year	revised	old	revised	old	revised	old
1994	414	237	425	319	145	97
1995	724	414	328	246	47	31
1996	736	421	666	499	51	34
1997	805	460	494	371	62	41
1998	645	369	283	212	48	32
1999	557	318	372	279	37	25
2000	530	303	310	233	39	26
2001	477	273	246	184	33	22
2002	433	247	224	168	25	17
2003	355	203	126	94	10	7
2004	330	188	297	223	10	7
2005	577	329	276	207	20	14
2006	398	228	216	162	24	16
2007	790	452	162	122	12	8
2008	2240	1280	208	156	53	35
2009	2657	1518	154	116	26	17
2010	1531	875	176	132	13	9
2011	1409	805	163	122	18	12
2012	1558	891	148	111	8	5

5.2 Observer data

Scientific observers deployed to the Japanese tuna longliners have been collecting bycatch data in the Indian Ocean as a part of the southern bluefin tuna observer program. Observers take photo of bycatch species according to the procedures given in the observer manual made by the NRIFSF scientists. Bycatch experts in the NRIFSF identified species using these photos. Table 5 shows the summary of bycatch information (2010 and 2011).

Table 5

Summary of bycatch information collected by scientific observers on board of Japanese tuna longline vessels in 2010* and 2011*

(*) Japanese fiscal year (April to Mach, next year)

code	English name	2010	2011
Sharks			
200	Unidentified sharks	2	79
202	Velvet dogfish	1	0
231	Bigeye thresher	159	0
235	Unidentified mackerel shark	1	0
237	Shortfin mako	32	168
238	Longfin mako	1	0
240	Porbeagle	39	161
262	Silky shark	2	0
269	Oceanic whitetip shark	10	1
280	Tiger shark	2	0
281	Blue shark	792	1981
291	Scalloped hammerhead	2	0
Rays			
322	Sting ray	2	18
Sea birds			
350	Unidentified birds	0	10
400	Unidentified albatrosses	0	1
401	Wandering albatross	0	1
510	Unidentified gannets & boobys	1	0

6. NATIONAL DATA COLLECTION AND PROCESSING SYSTEMS

6.1 Logbook data collection and verification

Longline

In the logbook of longline, set by set data on catch number and weight in each species, and other information data such as fishing date and location, fishing effort (the number of basket and hooks used), water temperature and time of starting and setting the gear are included. The number of hooks per basket is important information as it suggests the depth of the gear and target species. As for tuna and tuna-like fishes, six tunas (bluefin, southern bluefin, albacore, bigeye, yellowfin and skipjack), and six billfishes (swordfish, striped marlin, blue marlin, black marlin, sailfish and shortbill spearfish) are separately recorded in the logbook. Additionally, information on the cruise (date and port of departure and arrival of the cruise), vessel (name, size, license number and call sign), number of crew and the configurations of the fishing gear (material of main and branch lines) are asked to fill on the top part of the sheet by each cruise. Japan revised the logbook format for distant water fishing vessels in accordance with IOTC Resolution 12/03.

Submitted logbooks are processed into electronic data files. Various error checks, such as date, location, range of weight of the fish, CPUE, are conducted before these data are finalized. Vessel characteristics (call sign, name, license number, etc) are verified with a register.

Purse seine

The logbooks of purse seiners are required to be submitted every month to the Japanese government. The reported catch by species could be verified by comparing with the landing data, which were obtained from market receipts of three major unloading ports (Yaizu, Makurazaki, and Yamagawa).

6.2 Vessel Monitoring System

VMS installation on all distant water and offshore longline and distant water purse seine vessels is obligated since 1st August in 2007.

6.3 Scientific Observer programme

In July, 2010 Japan started the IOTC regional observer program. During 2010-2013, 6, 8, 10 and 9 observers were dispatched to the IOTC area respectively. They covered 5% of the total trips. Japanese observer program in the IOTC area is a part of the southern bluefin tuna one. Data in 2010 and 2011 have been submitted to the IOTC Secretariat and the 2012 data will be submitted soon. Fig. 6 shows areas where observers covered in 2010-2011. Areas monitored in 2011 are limited to the temperate waters in the southern hemisphere.

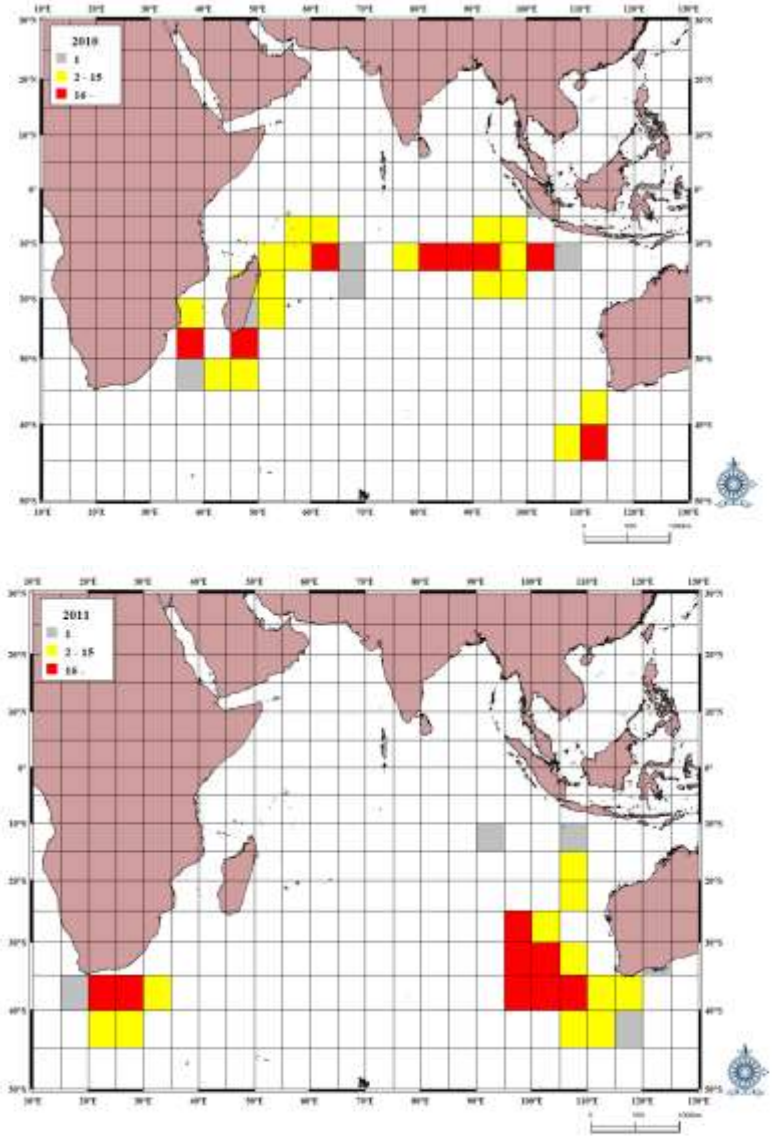

Fig. 6 Areas monitored for Japanese tuna longline operations by scientific observers in 2010 (above) and 2011 (below)
(Red: 16 operations or more, Yellow: 2-15 operations and Grey: 1 operation)

6.4 Port sampling programme

Because catch in the Indian Ocean is mainly unloaded abroad, the port sampling in Japanese ports was held only once in 2008 recently.

6.5 Unloading/Transhipment

Unloading

The owners of fishing vessels are required to submit relevant documents to the Japanese Government 10 days before the planned landing date. In case of unloading abroad the owner of fishing vessels are required to obtain approval from the Government of Japan in advance. To apply for unloading abroad, fishers have to submit relevant documents to the Government of Japan 10 days before the planned date.

Transshipment

The owners of fishing vessels are required to obtain approval from the Government of Japan for at port transhipments in advance. To apply for at port transhipment, fishers have to submit relevant documents to the Government of Japan 10 days before the planned transhipment date. Fishers shall complete the IOTC transshipment declaration and transmit it to the Government of Japan not later than 15 days after the transshipment. Japan controls at sea transhipments by its vessels in accordance with the Resolution 08/02 on establishing a programme for transhipment by large-scale fishing vessels.

7. NATIONAL RESEARCH PROGRAMS

7.1 Research cruises by JAMARC, Fisheries Research Agency (2009-2013)

In recent 5 years, JAMARC has been conducting the experimental purse seine fishings in the eastern Indian Ocean. RV Nippon-Maru (2009-2012) and Taikei-Maru No.1 (2013) were used for the study. The main object of the research program is to mitigate by-catch of juvenile yellowfin and bigeye tuna in purse-seining with FADs. Two kinds of study have been conducted, i.e., (a) Study on the application of light stimuli to force juvenile tuna escaping through large mesh panels of the purse seine net and (b) Study on pre-set estimation of species and size composition of school around FADs using wide band echo sounder. With accurate estimation, sets on FADs with larger concentration of juvenile tunas could be avoided and would lead to protection of juveniles.

7.2 Tag and release research for tunas and skipjack in the eastern Indian Ocean.

Small-scale tagging activities based on the Japanese fund (2005-2009)

There have been tagging activities in 3 areas using the Japanese funds to the IOTC, i.e., in the waters off west Sumatra, in the waters around the Andaman Sea and in the Maldivian waters. 1 or 2 Japanese tagging staff from National Research Institute of Far Seas Fisheries (Asakawa, temporal survey staff and Nishida, scientist) have participated in these tagging activities.

[Off West Sumatra (2006-2007)]
The tagging off western Sumatra was conducted in October- November, 2006, but due to the strong El Niño effect, tuna and skipjack were not caught at all due to the cold surface temperature. Thus the tagging was ceased in November after the first leg was over. Then in September, 2007, the second and third legs were resumed. In the 5 days before ending the leg 3, it was stopped due to the large earthquake off southern Sumatra. In the 2nd and 3rd legs about 300 tags were released.

[Andaman Sea (2008)]
The tagging in Andaman waters were conducted from January 19 to February 28, 2008 based in the port of Barmananla, south of Port Blair City in the Andaman Islands. During this period, 28 tagging trips were achieved including 16 live-bait stockings and 18 separate tagging operations.

[Maldives (2007-2009)]

In 2007 the tagging in the Maldivian waters was held for 2 weeks in October 2007 and tagged 750 fish. One Japanese staff (Asakawa, temporal survey staff in the NRIFSF) participated. Due to the bad weather and oceanographic conditions, planned later tagging cruises in 2007-2008 were cancelled. During 2008-2009, the last tagging experiments were contacted from December, 2008- April, 2009.

IOTC tagging workshops (2008-2009)

[2nd workshop (2008)]

The second workshop was held in May, 2008 Indonesia. The tagging activities off Sumatra, in the Andaman Sea and Maldives were reviewed, As a result, (a) tagging in the Andaman waters would not be conducted any more as it was expected that not enough fish could be released, (b) last tagging activities off Sumatra and Maldives would be implemented in the beginning of 2008 using the remaining fund.

[3rd workshop (2009)]

The third (final) workshop was held in May, 2009, Add atoll, Maldives in May 4-5, 2009. In this workshop the review of the past tagging experiments funded by Japan (2005-2009) were reviewed and recommendation for the future tagging activities were made.

7.3 Development of ADMB_ASPM and Kobe plots I+II software (2009-2013)

Since 2009, the project to develop software for ADMB_ASPM and Kobe plots I+II has been implemented to 2013. This project was funded by Fisheries Research Agency (FRA) of Japan. Developed softwares are available at:

http://ocean-info.ddo.jp/kobeaspm/kobeplot/KobePlot2012Setup_x32.zip
http://ocean-info.ddo.jp/kobeaspm/kobeplot/KobePlot2012Setup_x64.zip
http://ocean-info.ddo.jp/kobeaspm/aspm/aspm.zip

7.4 Project to mitigate depredations by toothed whales (2009-2011)

The international collaborative project to mitigate depredations of longline caught tuna by toothed whales was implemented for 3 years (2009-2011) by a senior scientist in the NRIFSF. The counter part was Dr McPherson (James Cook University, Australia) who is the world outstanding expert in this area. The International Fishers Forum 5 (Taipei, Taiwan,China, 2010) provided the best research award to this project. This project was also funded by Fisheries Research Agency (FRA) of Japan.

7.5 IOTC-OFCF projects (2002-2013)

The IOTC-OFCF joint project to improve tuna fisheries statistics in the IOTC water have been implemented for last 11 years in three phases (1st phase for 5 years: 2002-2006, 2nd phase for 3 years: 2007-2009 and 3rd phase: 2010-2012). From 2013, the 4th phase started for maximum 3 years. Along with the IOTC-OFCF joint project, one additional activities on capacity buildings for fisheries officers and scientists in developing counties was also implemented by OFCF (Mr Fujiwara) and one NRIFSF senior scientist, i.e., the atlas project to create tuna fisheries and resources atlas in Indonesia, Thai, Maldives and Sri Lanka using Marine Explorer (GIS) developed by Environmental Simulation Laboratory for 3 years in the 2nd phase of the IOTC-OFCF project (2007-2009).

8 IMPLEMENTATION OF SC RECOMMENDATIONS & RESOLUTIONS OF THE IOTC RELEVANT TO THE SC.

Progress on the implementation of recommendations of the past SCs relating to Japan is as below:

8.1 Collection of size data

Tuna longliners in Japan have been collecting size data voluntary basis. In 1960-70's, size data were covered up to 20% of the total catch, afterwards the coverage decreased to a few percent. In 1980-1990's, high school training vessels off Java Island, Indonesia collected high levels of coverage. For example, as for bigeye tuna, its coverage of size data was 10-20% of the total catch in the Indian Ocean before 1992. But, afterwards it sharply decreased to only a few percent. This is mainly because these training vessels shifted their operations to the Pacific Ocean due to the pirate problems in the Strait of Malacca. Under such situation, size data sampled have been limited.

In accordance with the Resolution 10/02, Japan started to deploy observers from July, 2010, covering 5% of the fishing trips by observers to collect size data to now. Table 5 shows number of size measured in 2010 and 2011.

Table 6. Number of size measured (4 major species) in 2010 and 2011 under the IOTC ROP.
( ) target numbers recommended by IOTC (1 fish per ton)

Year(*)	No of observers (vessels)(trips)	Yellowfin	Bigeye	Albacore	Swordfish
2010	6	2,217 (3,472)	4,086 (4,244)	1,452 (3,846)	223 (634)
2011	8	324(**) (4,541)	1,819 (3,755)	5,900 (2,442)	86 (576)
2012	10	*To be reported to the IOTC by March, 2014*			

(*) Japanese fiscal (budgetary) year (April- March, next year)

(**) Number is very low as areas monitored are limited to relatively high latitude areas in the southern hemisphere (see Fig.6)

8.2 Modification of log-sheet collection system

The owners of fishing vessels larger than or equal to 10 GRT are required to submit the logbook on their operations and catch information to the Japanese government within three months after each cruise was finished. As the duration of one cruise for distant water longliners is long, sometimes longer than one year, it used to take about two years to complete compiling statistics of longline fishery. Starting in August 2008, distant water longliners are required to submit it every ten days. This change in submission rule of logbook has facilitated earlier compilation of tuna statistics.

8.3 Improvement to speed up to submit fisheries data to the IOTC

From August 1, 2008 Japan started to mandate all the long-distance longline vessels to submit the logbook in quick manner by revising the current law.

8.4 Improvement of the CPUE standardization (2009-2013)

[2009]

Four studies (papers) have been made to improve CPUE standardizations have, i.e., (i) "Japanese longline CPUE for yellowfin tuna in the Indian Ocean up to 2008 standardized by Okamoto *et al*. (ii) "Japanese longline CPUE for bigeye tuna in the Indian Ocean up to 2008 standardized by Okamoto *et al*. and (iii) "Fine scale bigeye tuna CPUE standardization" by Satoh et al. During the 11th tropical tuna working group (WPTT11) meeting in October 2009 in Kenya. These three Japanese CPUE series played key roles in the stock assessments conducted by MULTIFAN-CL, SS3, PROFIT, ASPM, ASPIC and PROCEAN. The last work is (iv) CPUE paper for swordfish by Nishida and Wang which was also used as the key CPUE data for its stock assessments by SS3, ASIA, ASPM and ASPIC in the 5th WPB in July in Seychelles.

[2010]

Seven studies to improve CPUE standardizations have been made, i.e., (1)IOTC-2010-WPB8-09 :Estimation of the Abundance Index (AI) of swordfish in the Indian Ocean based on the fine scale catch and effort data in the Japanese tuna longline fisheries (1980-2008) (Nishida and Wang), (2) IOTC-2010-WPB8-11: CPUE standardization of swordfish caught by Taiwanese longline fishery in the Indian Ocean during 1995-2008 (Wang and Nishida), (3) IOTC-2010- WPTT-29: Japanese longline CPUE for bigeye tuna in the Indian Ocean up to 2009 standardized by GLM (Okamoto and Shono), (4) IOTC-2010- WPTT-30: Japanese longline CPUE for yellowfin tuna in the Indian Ocean up to 2009 standardized by general linear model (Okamoto and Shono), (5) IOTC-2010-WPTT-32: Searching comparable standardized YFT CPUE between Japanese and Taiwanese tuna longline fisheries in the common fishing grounds in the Indian Ocean (Nishida and Chang), (6) IOTC-2010- WPTT-33: Yellowfin tuna CPUE standardization of the Korean tuna longline fisheries in the Indian Ocean (1980-2009) (Hwang and Nishida) and (7) IOTC-2010-WPTT-44: Comparisons of STD YFT CPUE of tuna longline fisheries among Japan, Korea and Taiwan (Nishida). These CPUE studies played key roles in the stock assessments conducted by MULTIFAN-CL, SS3 and ASPIC for yellowfin tuna, swordfish and bigeye tuna.

[2011]

Six studies to improve CPUE standardizations have been made in WPB09 (July, 2011), i.e., (1) IOTC–2011–WPB09–11: Validation of the Global Ocean Data Assimilation System (GODAS) data in the NOAA National Center for Environmental System (NCEP) by theory, comparative studies, applications and sea truth (T. Nishida, T. Kitakado, H. Matsuura and S. P. Wang), (2) IOTC–2011–WPB09–12_rev2: CPUE standardization of blue marlin (*Makaira mazar*a) caught by Taiwanese longline fishery in the Indian Ocean (S. P. Wang, S. H. Lin and T. Nishida), (3) IOTC–2011–WPB09–14: Estimation of the Abundance Index (AI) of swordfish (*Xiphias gladius*) in the Indian Ocean (IO) based on the fine scale catch and effort data of the Japanese tuna longline fisheries (1980–2010) (T. Nishida, T. Kitakado and S. P. Wang), (4) IOTC–2011–WPB09–15: Investigation of the sharp drop of swordfish CPUE of Japanese tuna longline fisheries in 1990's in the SW Indian Ocean (T. Nishida and T. Kitakado), (5) IOTC–2011–WPB09–16_rev1: CPUE standardization of swordfish (*Xiphias gladius*) caught by Taiwanese longline fishery in the Indian Ocean (S. P. Wang and T. Nishida), (6) IOTC–2011–WPB09–25: Note for discussion on the Indian Ocean (IO) swordfish (SWO) CPUE (T. Nishida and T. Kitakado)

One study to improve CPUE standardizations have been made in WPTmT03 (September, 2011), i.e., IOTC–2011–WPTmT03–15: Standardization of albacore CPUE by Japanese longline fishery in the Indian Ocean (T. Matsumoto and K. Uosaki).

Seven studies to improve CPUE standardizations have been made in WPTT13 (October, 2011), i.e., (1) IOTC–2011–WPTT13–32: A comparison of methods for prediction of Integrated Habitat Index of *Thunnus albacares* in the Indian Ocean – general linear model and quantile regression model considerations (L. Song, Y. Wu and T. Nishida), (2) IOTC–2011–WPTT13–34 Rev_1: Japanese longline CPUE for yellowfin tuna in the Indian Ocean up to 2010 standardized by general linear model (H. Okamoto), (3) IOTC–2011–WPTT13–38: Standardization of bigeye tuna CPUE of Korean tuna longline fisheries in the Indian Ocean (S. Lee, Z. Kim and T. Nishida), (4) IOTC–2011–WPTT13–44: Preliminary analyses of the effect of the Piracy activity in the northwestern Indian Ocean on the CPUE trend of bigeye and yellowfin (H. Okamoto), (5) IOTC–2011–WPTT13–52: Updated Japanese longline CPUE for bigeye tuna in the Indian Ocean standardized by GLM for the period from 1960 to 2010 (H. Okamoto), (6) IOTC–2011–WPTT13–INF05: Validation of the Global Ocean Data Assimilation System (GODAS) data in the NOAA National Centre for Environmental System (NCEP) by theory, comparative studies, applications and sea truth (T. Nishida, T. Kitakado, H. Matsuura and S.-P. Wang), (7) IOTC–2011–WPTT13–INF12: Influence of the marine environment variability on the yellowfin tuna (*Thunnus albacares*) catch rate by the Taiwanese longline fishery in the Arabian sea, with special reference to the high catch in 2004 (K.-W. Lan, T. Nishida, M.-A. Lee, H.-J. Lu, H.-W., Huang, S.-K. Chang and Y.-C. Lan)

Three studies to improve CPUE standardizations have been made in WPEB07 (October, 2011), i.e., (1) IOTC–2011–WPEB07–33 Rev_1: Standardized CPUE for blue shark caught by Japanese tuna longline fishery in the Indian Ocean, 1971-1993 and 1994-2010 (Y. Hiraoka and K. Yokawa), (2) IOTC–2011–WPEB07–34: Standardized CPUE of shortfin mako shark (*Isurus oxyrinchus*) caught by Japanese longliners in the Indian Ocean in the period between 1994 and 2010 (A. Kimoto, Y. Hiraoka, T. Ando and K. Yokawa) and (3) IOTC–2011–WPEB07–35: Trends of standardized CPUE of oceanic whitetip shark (*Carcharhinus longimanus*) caught by Japanese longline fishery in the Indian Ocean (Y. Semba and K. Yokawa)

[2012]

Following works improved CPUE standardization and also contributed stock assessments such as ASPIC, ASPM, SS3 and MFCL in WPmT04, WPB10, WPEB07 and WPTP14 in 2012:

For albacore, IOTC–2012–WPTmT04–10 Rev_1: Standardization of albacore CPUE by Japanese longline fishery in the Indian Ocean (Takayuki Matsumoto, Toshihide Kitakado and Hiroaki Okamoto).

For billfish, IOTC–2012–WPB10–19 Rev_2. Standardization of catch rates for Striped marlin (Tetrapturus audax) and Blue marlin (*Makaira nigricans*) in the Indian Ocean based on the operational catch and effort data of the Japanese tuna longline fisheries incorporating time-lag environmental effects (1971–2011) (T. Nishida, Y. Shiba, H. Matsuura and S.-P. Wang). IOTC–2012–WPB10–20: CPUE standardization of blue marlin (Makaira mazara) caught by Taiwanese longline fishery in the Indian Ocean for 1980 to 2010 (S.-P. Wang, S.-H. Lin and T.Nishida). IOTC–2012–WPB10–21: CPUE standardization of striped marlin (*Tetrapterus audax*) caught by Taiwanese longline fishery in the Indian Ocean for 1980 to 2010 (S.P. Wang and T. Nishida).

For sharks, IOTC–2012–WPEB08–26: Update of the standardized CPUE of oceanic whitetip shark Carcharhinus longimanus) caught by Japanese longline fishery in the Indian Ocean (K. Yokawa and Y. Senba) IOTC–2012–WPEB08–28: "Update of CPUE of blue shark caught by Japanese longliner and estimation of annual catch series in the Indian Ocean (Y. Hiraoka and K. Yokawa)".

For yellowfin and bigeye tuna, IOTC–2012–WPTT14–26 Rev_1: Updated Japanese longline CPUE for bigeye tuna in the Indian Ocean standardized by GLM (K. Satoh and H. Okamoto), IOTC–2012–WPTT14–34 Rev_1: CPUE standardization for yellowfin tuna caught by Korean tuna longline fisheries in the Indian Ocean (1978–2011) (S.I. Lee, Z.G. Kim, M.K Lee, D.W. Lee and T. Nishida), IOTC–2012–WPTT14–35: Rev_1Japanese longline CPUE for yellowfin tuna in the Indian Ocean up to 2011 standardized by general linear model (T. Matsumoto, H. Okamoto and T. Kitakado.

[2013]

13 papers were made to improve CPUE standardizations as below:

For blue and striped marlin (3): Core area approach was developed. IOTC–2013–WPB11–23 Rev_1 : Standardization of catch rates for Striped marlin (*Tetrapturus audax*) and Blue marlin (*Makaira mazara*) in the Indian Ocean by the core fishing area approach using operational catch and effort data of the Japanese tuna longline fisheries (1971-2012) (T. Nishida & S.P. Wang). IOTC–2013–WPB11–24 Rev_2: CPUE standardization of blue marlin (*Makaira mazara*) caught by Taiwanese longline fishery in the Indian Ocean for 1995 to 2011 (S.-P. Wang & T. Nishida). IOTC–2013–WPB11–26 Rev_2: CPUE standardization of striped marlin (*Kajikia audax*) caught by Taiwanese longline fishery in the Indian Ocean for 1995 to 2011 (S.-P. Wang & T. Nishida)

For bigeye and yellowfin tuna (2): IOTC–2013–WPTT15–25: Japanese longline CPUE for bigeye tuna in the Indian Ocean standardized by GLM (T. Matsumoto, K. Satoh and H. Okamoto) and IOTC–2013–WPTT15–37: Japanese longline CPUE for yellowfin tuna in the Indian Ocean up to 2012 standardized by generalized linear model (T. Matsumoto, H. Okamoto & T. Kitakado)

For CPUE Workshop to improve STD_CPUE (8): Overview of Japanese longline statistics (Okamoto), Procedures used for standardization for Japanese longline CPUE (Matsumoto), .Analyses of operational data based on Vessel ID (Okamoto). Area stratification based on Tree model (Satoh and Matsumoto), Spatial GLM Approaches to use incorporating spatial auto-correlation (Nishida), Core area approach to estimate JPN STD_CPUE of Striped and Blue Marlin (Nishida), Incorporating environmental factors in STD_CPUE, useful or useless? (Nishida) and Which tuna LL STD_CPUE is useful, Japan, Korea or Taiwan,China? (Nishida)

9 WORKING DUCUMENTS (23)

9.1 SC15 (Scientific Committee) (Seychelles) (December, 2012) (1 document)

IOTC-2012-SC15_NR12. Japan National Report 2012 to the IOTC SC (Matsumoto, Satoh, Okamoto and Nishida)

9.2 WPNT03 (Neritic tuna) (Bali, Indonesia) (July, 2013) (4 documents)

IOTC–2013–WPNT03–22 Rev_1 : Analyses of catch, effort and nominal CPUE data of frigate tuna (*Auxis thazard*) and kawakawa (*Euthynnus affinis*) caught by recreational fishers in Kenya (S. Ndegwa, P.N. Wekesa, C. Ndoro & T. Nishida)

IOTC–2013–WPNT03–31 Rev_2: Standardization of kawakawa (*Euthynnus affinis*) catch rates of drift gillnet fisheries in Sultanate of Oman (F. Rashid Al‐Kiyumi, L. Al‐kharusi, T. Nishida & B. Al‐Siyabi)

IOTC–2013–WPNT03–32 Rev_1: Preliminary kawakawa (*Euthynnus affinis*) stock assessment by ASPIC using standardized CPUE of drift gillnet fisheries in Sultanate of Oman (F. Rashid Al-Kiyumi, B. Al-Siyabi, L. Al-Kharusi & T. Nishida)

IOTC–2013–WPNT03–33 Rev_2: Analyses of catch, fishing efforts and nominal CPUE of neritic tuna and king mackerel exploited by Thai purse seine and king mackerel drift gillnet fisheries in the Andaman Sea (C. Sa nga ngam, P. Nootmorn & T. Nishida)

9.3 WPB11 (Billfish) (Sept., 2013) (La Reunion) (4 documents)

IOTC–2013–WPB11–22 Rev_2: Correlations between environmental factors and CPUEs of blue marlin (*Makaira mazara*) and striped marlin (*Kajikia audax*) caught by Taiwanese longline fishery in the Indian Ocean (S.-P. Wang & T. Nishida)

IOTC–2013–WPB11–23 Rev_1 : Standardization of catch rates for Striped marlin (*Tetrapturus audax*) and Blue marlin (*Makaira mazara*) in the Indian Ocean by the core fishing area approach using operational catch and effort data of the Japanese tuna longline fisheries (1971-2012) (T. Nishida & S.P. Wang)

IOTC–2013–WPB11–24 Rev_2: CPUE standardization of blue marlin (*Makaira mazara*) caught by Taiwanese longline fishery in the Indian Ocean for 1995 to 2011 (S.-P. Wang & T. Nishida)

IOTC–2013–WPB11–26 Rev_2: CPUE standardization of striped marlin (*Kajikia audax*) caught by Taiwanese longline fishery in the Indian Ocean for 1995 to 2011 (S.-P. Wang & T. Nishida)

9.4 WPTT15 (Tropical tuna) (Oct., 2013) (Spain) (6 documents)

IOTC–2013–WPTT15–22: Comparison of size data for bigeye and yellowfin tuna based on different sampling methods caught by Japanese longline in the Indian Ocean (T. Matsumoto)

IOTC–2013–WPTT15–24: CPUE standardization for bigeye tuna caught by Korean tuna longline fisheries in the Indian Ocean (S. Il Lee, Z.G. Kim, M.K. Lee, D-W. Lee & T. Nishida)

IOTC–2013–WPTT15–25: Japanese longline CPUE for bigeye tuna in the Indian Ocean standardized by GLM (T. Matsumoto, K. Satoh and H. Okamoto)

IOTC–2013–WPTT15–31 Rev_1: Stock and risk assessment of bigeye tuna (*Thunnus obesus*) in the Indian Ocean by Age-Structured Production Model (ASPM) (T. Nishida & K. Iwasaki)

IOTC–2013–WPTT15–37: Japanese longline CPUE for yellowfin tuna in the Indian Ocean up to 2012 standardized by generalized linear model (T. Matsumoto, H. Okamoto & T. Kitakado)

IOTC–2013–WPTT15–39 Rev_1: Stock assessment on yellowfin tuna in the Indian Ocean by A Stock-Production Model Incorporating Covariates (ASPIC) (S. Il Lee, Z.G. Kim, M.K. Lee, D-W. Lee & T. Nishida)

9.5 CPUE workshop (Oct., 2013) (Spain) (8 presentations)

Okamoto	: Overview of Japanese longline statistics
Matsumoto	: Procedures used for standardization for Japanese longline CPUE.
Okamoto	: Analyses of operational data based on Vessel ID.
Satoh and Matsumoto	: Area stratification based on Tree model.
Nishida	: Spatial GLM approaches to use incorporating spatial auto-correlation
Nishida	: Core area approach to estimate JPN STD_CPUE of striped and blue marlin
Nishida	: Incorporating environmental factors in STD_CPUE, useful or useless?
Nishida	: Which tuna LL STD_CPUE is useful, Japan, Korea or Taiwan,China?