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Korea National Report to the Scientific Committee of the Indian Ocean Tuna Commission, 2014

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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 2014, final data for the 2013 calendar year must be provided to the Secretariat by 30 June 2014)	YES 30/06/2014
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 2014, preliminary data for the 2013 calendar year was provided to the Secretariat by 30 June 2014). **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 2014, final data for the 2013 calendar year must be provided to the Secretariat by 30 December 2014).	YES 30/06/2014
If no, please indicate the reason(s) and intended actions:	

Executive Summary

Korea has two type of fishing gears which are lonline fishery and purse seine fishery in the Indian Ocean. Korean tuna longline fishery in the Indian Ocean commenced in 1957. The number of active vessels was 9 for longline fishery and 3 for purse seine fishery. With this fishing capacity, Korean tuna longline fishery caught 2,437 mt in 2013, which was 7% lower than that of 2012. The fishing efforts in 2013 were 5,430 thousand hooks and distributed higher in the western and eastern areas around 20°S-40°S, while the fishing efforts averaged for 5 recent years (2009-2013) were 6,396 thousand hooks and distributed in the tropical areas around 20°N-20°S as well as in the western and eastern areas around 20°S-40°S. It was noted that fishing efforts had not been deployed in the western Indian Ocean around 20°N-20°S in recent years. As results, the catch of bigeye tuna and yellowfin tuna significantly decreased, and albacore tuna became important in catch. Korean tuna purse seine fishery in the Indian Ocean commenced in 2012 and recorded about 12 thousand mt in 2013. In 2013, 3 purse seine vessels operated mainly in the western and central tropical areas around 5°N-10°S to fish skipjack tuna and yellowfin tuna. The fishing efforts in 2013 were 724 sets, which mainly distributed in the tropical areas around 50°E-70°E. In 2013, 2 scientific observers for longline fishery and 1 scientific observer for purse seine fishery were dispatched on board for implementing observer program and scientific data collection, which carried out 10.1% and 6.2% of observer coverage in terms of the number of hooks and sets, respectively.

Contents

1. BACKGROUND/GENERAL FISHERY INFORMATION

Korean tuna longline fishery in the Indian Ocean commenced in 1957, and its target species were yellowfin tuna, bigeye tuna and albacore tuna from the beginning. Since 1991 southern bluefin tuna has been targeted because of the highest value in market. And Korean tuna purse seine fishery initiated operating in 2012, and has targeted skipjack tuna and yellowfin tuna.

The traditional fishing grounds of Korean tuna longline fishery were mainly the central tropical area between 20°Nand 20°S, and extended south to 45°Sand east to 115°E for fishing southern bluefin tuna in recent years. The number of active vessels peaked at 185 in 1975, but since then has gradually decreased to 21in 2009, 13 in 2010 and 7-9 in recent years. The catch recorded the highest with about 70 thousands mt in 1978, since then also has gradually decreased, and is showing a level of below 3 thousands mt in recent years. Since 2012 Korean tuna purse seine fishery has operated mainly in the central and western tropical area. In 2013, 3 vessels operated recorded about 12 thousand mt in catch.

2. FLEET STRUCTURE

Korean tuna longline fleets in the Indian Ocean are all deep freezing tuna vessels. The size ranges from 200 to 500 gross tonnage classes (Table 1). Total number of vessels has decreased from 185 in 1975 to 7 in 2011 and 2012, and especially it showed the rapid decreasing in recent years. In 2013, 9 vessels of Korean tuna longline fishery operated in the Indian Ocean.

Korean tuna purse seine fishery initiated operating in 2012, and 3 and 4 vessels operated in 2012 and 2013, respectively (Table 1).

Table 1: Number of vessels operating in the IOTC area of competence, by gear type and size, 2009-2013

Gear type	GRT	Year				
		2009	2010	2011	2012	2013
Longline	200-500	21	13	7	7	9
Purse seine	400-800	-	-	-	1	1
	1,000-2,000	-	-	-	2	3

3. CATCH AND EFFORT (BY SPECIES AND GEAR)

Total annual catch of Korean tuna longline fishery steeply increased from the mid-1960s, and peaked at about 70 thousands mt in 1978, and then has decreased with large fluctuation, where the decadal average of catch was about 39 thousands mt in the 1970's, 32 thousands mt in the 1980's, 12 thousands mt in the 1990's and 5 thousands mt in the 2000's, respectively (Fig. 1a). In 2013, the total catch was 2,437 mt, which accounted for 7% decreasing from that of 2012 (2,628 mt). The changes in the number of active vessels closely coincided with the catch trend throughout the periods, in which the number were 185 vessels in 1975 and then decreased to 7-9 vessels in recent years. In 2013, the fishing efforts were 5,430 thousand hooks and distributed higher in the western and eastern areas around 20°S-40°S, while the fishing efforts averaged for 5 recent years (2009-2013) were 6,396 thousand hooks and distributed in the tropical areas around 20°N-20°S as well as in the western and eastern areas around 20°S-40°S (Table 2a, Figs. 2a and 2b). It was appeared that fishing efforts had not been deployed in the western Indian Ocean around 20°N-20°S in recent years. As results, the catch of bigeye tuna and yellowfin tuna significantly decreased and albacore tuna became important in catch (Table 2a, Figs. 1a, 3a and 3b).

Korean tuna purse seine fishery in the Indian Ocean commenced in 2012 and recorded about 12 thousand mt in 2013 (Table 2b, Fig. 1b). In 2013, 3 vessels of Korean tuna purse seine fishery operated mainly in the western and central tropical areas around 5°N-10°S to fish skipjack tuna and yellowfin tuna (Table 1, Fig. 3a). The fishing efforts in 2013 were 724 sets, which mainly distributed in the tropical areas around 50°E-70°E (Table 2b, Figs. 2a).

Table 2a. Annual catch (in number) and effort of Korean tuna longline fishery by primary species in the IOTC area of competence, 2009-2013

Year	No. hooks ($X10^3$)	BET	YFT	SKJ	ALB	SBF	SWO	BLM	BUM	MLS	SFA	NEI	Total
2009	10,572	10,399	24,884	9	20,449	20,808	1,424	81	734	219	1,231	17,904	98,142
2010	6,323	7,805	21,791	104	24,089	12,777	791	25	415	456	710	20,530	89,493
2011	5,361	6,738	5,442	108	33,870	12,689	422	9	154	210	50	28,947	88,639
2012	4,290	3,941	13,372	100	32,701	12,173	496	36	204	491	720	24,536	88,770
2013	5,430	8,815	23,245	156	46,954	6,347	952	43	275	220	398	13,081	100,486

Table 2b. Annual catch (in metric ton) and effort of Korean tuna purse fishery by primary species in the IOTC area of competence, 2012-2013

Year	No. sets	SKJ	BET	YFT	OTH	Total
2012	145	1,263	286	1,308	-	2,857
2013	724	8,605	1,205	2,437	4	12,251

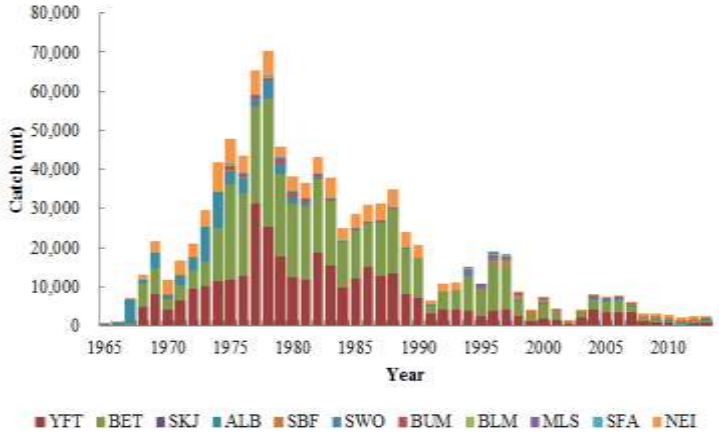


Figure 1a. Historical annual catch for Korean tuna longline fishery by primary species, for the IOTC area of competence.

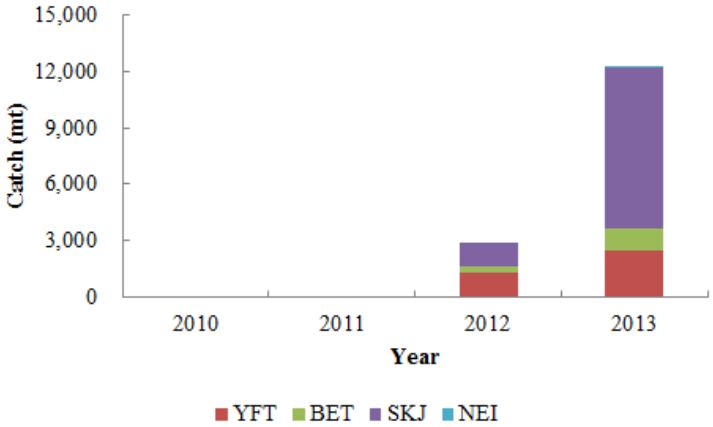
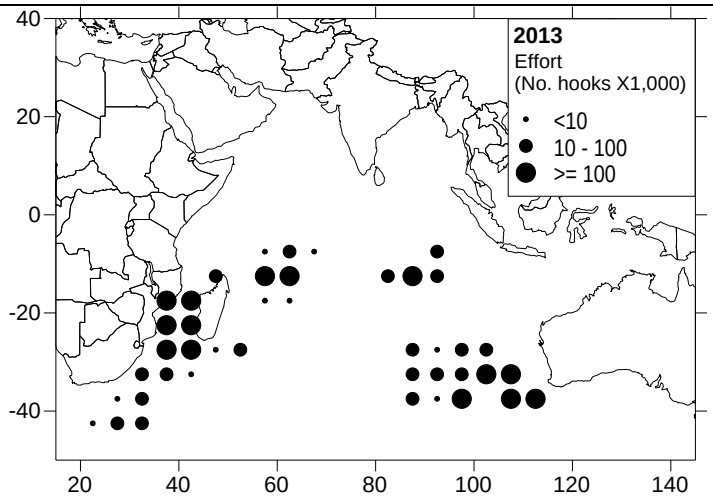
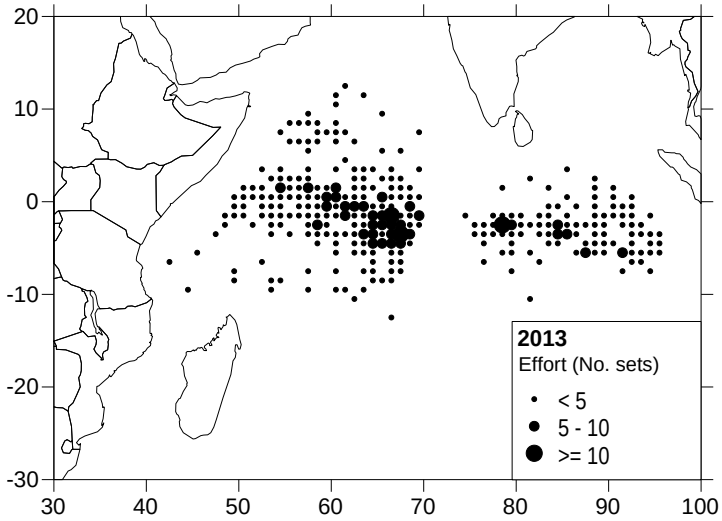


Figure 1b. Historical annual catch for Korean tuna purse seine fishery by primary species, for the IOTC area of competence.

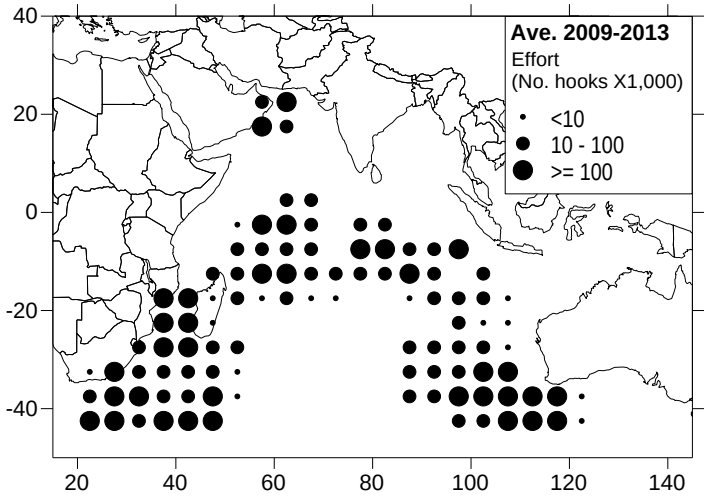


(a) Longline

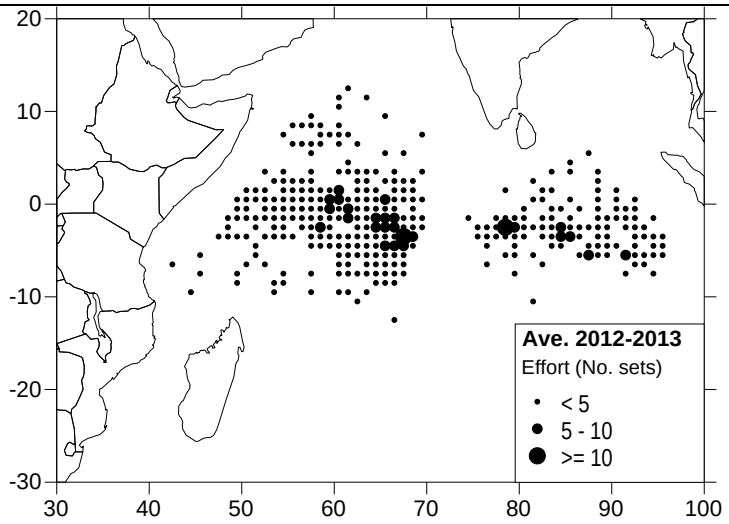


(b) Purse seine

Figure 2a. Map of the distribution of fishing effort by Korean tuna longline fishery (a) and purse seine fishery (b) in the IOTC area of competence, 2013.

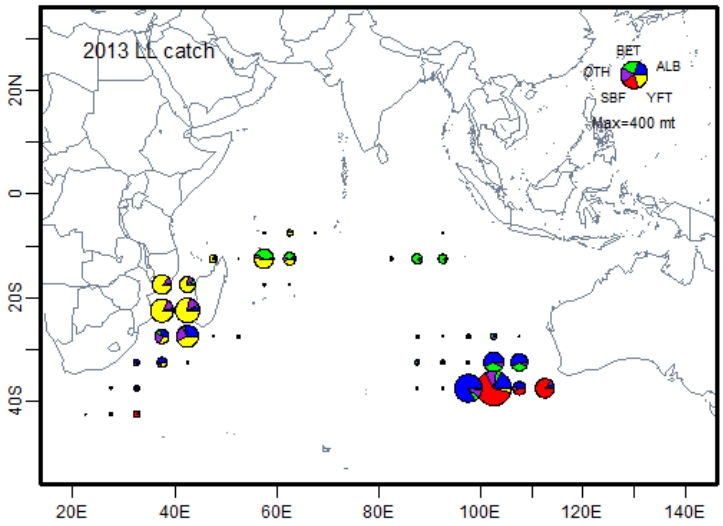


(a) Longline

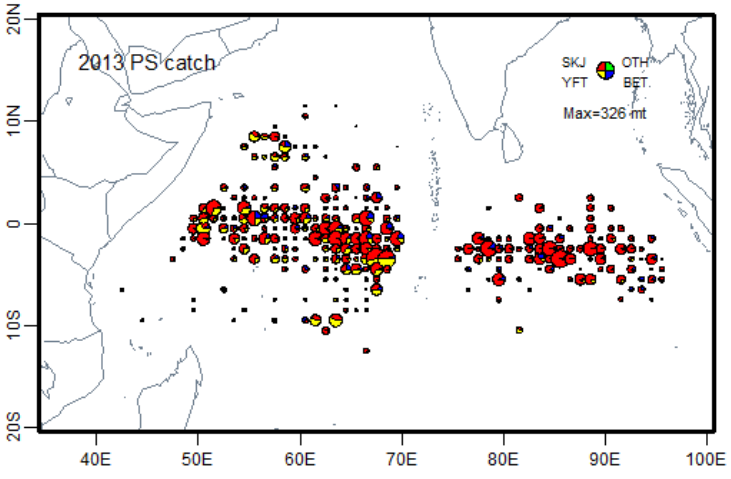


(b) Purse seine

Figure 2b. Map of the distribution of fishing effort by Korean tuna longline fishery (a) and purse seine fishery (b) in the IOTC area of competence for average of 5 previous years.

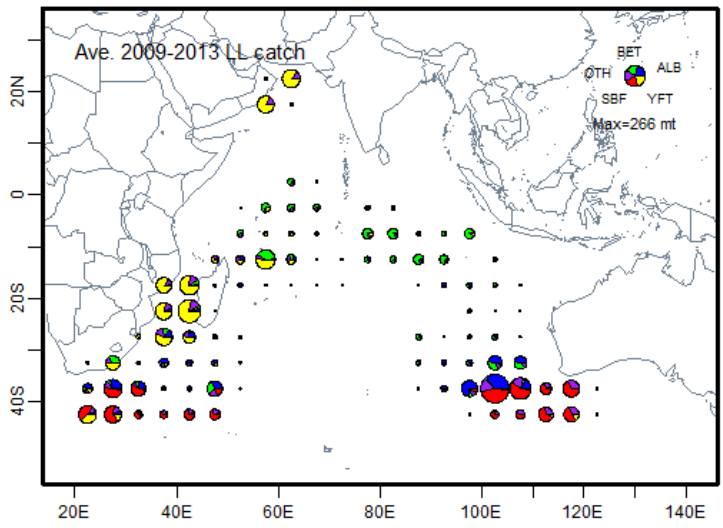


(a) Longline

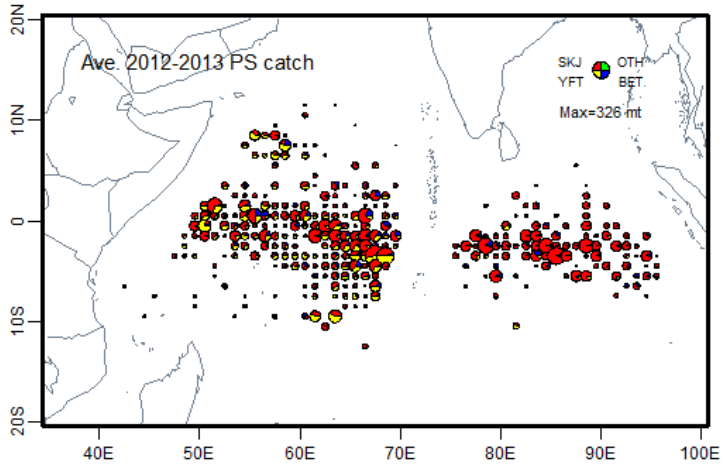


(b) Purse seine

Figure 3a. Map of distribution of fishing catch by species for Korean tuna longline fishery (a) and purse seine fishery (b) in the IOTC area of competence, 2013.



(a) Longline



(b) Purse seine

Figure 3b. Map of distribution of fishing catch by species for Korean tuna longline fishery (a) and purse seine fishery (b) in the IOTC area of competence for average of 5 previous years.

4. RECREATIONAL FISHERY

Korea has no recreational fishery.

5. ECOSYSTEM AND BYCATCH ISSUES

Environmental issues have been administrated with various individual laws since the 1960's. In relation to Korean national fisheries, there are the law of preservation and management of marine ecosystem (2007), the framework act on marine fishery development (2009) and the law of fisheries management (2010). In particular, with regard to Korean distant-water fisheries, they comply with the measures related to ecosystem and bycatch, taken by the 5 tuna Regional Fisheries Management Organizations (RFMOs) to which Korea acceded, in accordance with Article 16 of the Act of the Distant Sea Fisheries Development (2008). And to address the increasing data collection and reporting requirement by the tuna RFMOs for ecologically related species such as sharks, seabirds, marine turtles, etc., the Act on Fisheries Information and Data Reporting was revised in December, 2012.

5.1 Sharks

Korean National Plan of Action for the Conservation and Management of Sharks (NPOA-sharks) was developed and approved in August, 2011. According to the IOTC Resolution 05/05 and the NPOA-sharks, fishing vessels should do not to have onboard fins that total more than 5% of the weight of sharks onboard, up to the first point of landing. Biological and ecological informations on sharks have been collected through national scientific observer program and logsheet compiled from fishermen onboard (Tables 3 and 4). Especially, in 2011, logsheet was revised with addition of format for ecologically related species (ERS), and since then fishermen have been educated and requested to collect and report the required data with great emphasis on ERS and implementation of mitigation measures in close cooperation with the National Fisheries Research and Development Institute (NFRDI). In addition, the Act of Fisheries Information and Data Reporting was enforced in 2012.

Table 3: Total number and weight of sharks by species, retained by Korean tuna longline fishery and purse seine fishery in the IOTC area of competence for the most recent five years

Fishery	Year	Retained catch by species (kg/inds.)							
		Blue shark	Mako sharks	Porbeagle shark	Oceanic whitetip shark	Hammerhead sharks	Thresher sharks	Others	Total
Longline	2009	94,507 /5,007	3,614 /78	3,356 /259	1,378 /26	696 /18	2,791 /53	10,031 /205	116,373 /5,646
	2010	54,741 /3,415	3,097 /78	4,515 /390	0 /0	0 /0	0 /0	515 /5	62,868 /3,888
	2011	107,936 /10,954	4,407 /102	0 /0	0 /0	0 /0	0 /0	83,725 7,334	196,068 /18,390
	2012	7,915 /784	4,798 /207	316 /29	0 /0	0 /0	0 /0	0 /0	13,029 /1,020
	2013	80,415 /5,082	30,971 /693	4,319 /147	0 /0	249 /22	0 /0	3191 /118	119,145 /6,062
Purse seine	2013	0 /0	0 /0	0 /0	0 /0	0 /0	0 /0	0 /0	0 /0

* Data were compiled by observer in 2009, 2010, 2012, and from logsheet by fishermen in 2011, 2013.

Table 4: Total number of sharks by species, released/discarded by Korean tuna longline fishery and purse seine fishery in the IOTC area of competence for the most recent five years

Fishery	Year	Released/discarded by species (inds./mt)								
		Blue shark	Mako sharks	Porbeagle shark	Silky shark	Hammerhead sharks	Bigeye thresher shark	Thresher sharks	Others	Total
Longline	2010	7	1	3	0	0	1	0	0	12
	2012	142	4	19	0	0	0	14	0	179
	2013	1,017	0	0	0	1	0	0	0	1,018
Purse seine	2013	0.072	0.04	0	2.664	0	0	0	1.77	4.549

* The unit is number of individuals for longline and weight (in metric ton) for purse seine.
** Data were compiled by observer in 2010, 2012, and from logsheet by fishermen in 2013.
*** No data in 2009 and 2011.

5.2 Seabirds

Korean National Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries (NPOA-seabirds) was established in the early of this year. Interaction and mortality of seabirds have been collected through national scientific observer program and logsheet compiled from fishermen onboard (Table 5). Although it has been encouraged fishermen to record on logsheet and report the data for seabirds, fishermen have not yet been familiar with provisions and associated works on data collection and reporting for seabirds such as species identification and interaction. Hence, it has recommended that fishermen take a picture when not being able to identify species, and the field guide for identifying seabirds was distributed on board as well. In 2011, logsheet was revised with addition of format for ecologically related species (ERS), and since then fishermen have been educated and requested to collect and report the required data with great emphasis on ERS and implementation of mitigation measures in close cooperation with the National Fisheries Research and Development Institute (NFRDI).

5.3 Marine Turtles

Interaction and mortality of marine turtles have been collected through national scientific observer program and logsheet compiled from fishermen onboard (Table 5). The field guide for identifying marine turtles was distributed on board to encourage fishermen to collect and report the data for marine turtles, likewise the case of seabirds

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

Interaction and mortality of marine mammals have been collected through national scientific observer program and logsheet compiled from fishermen onboard (Table 5).

Table 5. Observed annual catches of species of special interest by species (seabirds, marine turtles and marine mammals) by Korean tuna longline fishery and purse seine fishery in the IOTC area of competence for the most recent five years

(a) Seabirds

Year	Seabirds									
	Yellow nosed albatross	Royal albatross	Black browed Albatross	Buller's albatross	Cape petrel	Grey headed Albatross	Southern Giant Albatross	Wandering Albatross	Shy albatross	Unident-ified
2009	1	11	0	0	0	0	2	0	0	80
2010	14	0	24	9	1	2	1	9	3	9
2011	-	-	-	-	-	-	-	-	-	-
2012	0	0	3	0	1	0	1	2	0	0
2013	2	0	1	0	0	0	0	0	3	0

* Data were compiled by observer.
** No data in 2011.
*** No seabird was bycaught by purse seine fishery.

(b) Other species

Fishery	Year	Marine turtles			Marine mammals	
		Loggerhead turtle	Olive ridley sea turtle	Unidentified	Spinner dolphin	Pygmy killer whale
Longline	2009	7	29	0	1	1
	2010	0	0	0	0	0
	2011	-	-	-	-	-
	2012	0	0	0	0	0
	2013	0	0	0	0	0
Purse seine	2013	0	0	1	0	0

* Data were compiled by observer, and 2013 PS data were from by fishermen.
** No data in 2011.

6. NATIONAL DATA COLLECTION AND PROCESSING SYSTEMS

6.1. Logsheet data collection and verification

National Fisheries Research and Development Institute (NFRDI) has collected the data of Korean tuna fisheries. Data from logsheet are available from 1971. In 2012, Korean domestic law (Act of the Distant Sea Fisheries Development) was revised that the time for data submission was changed from within 30 days (home-based) or 60 days (foreign-based) after completion of their operations to monthly report in electronic format for improving the data collection system to meet the timely submission of data and to have higher quality and quantity of the data. A series of subsequent has been made on logsheet updates including the amount of discard/release, the

incorporation of ERS, implementation of the biological measurement and sampling required, bycatch mitigation measures implemented, etc. This measure has been changed to every week from September 2014 and will be changed to every day from 1st September 2015.

Catch statistics of Korean fishing vessels are obtained from two sources of data reporting. Korea Overseas Fisheries Association (KOSFA) collects monthly catch by species and vessel from fishery industries and National Fisheries Research and Development Institute (NFRDI) collects logsheet data from vessels filled out by captain onboard. The data collected are verified and confirmed through cross-checking between NFRDI and KOSFA. And Korea established the Fisheries Monitoring Center (FMC) in March 2014 to monitor/manage the Vessel Monitoring System (VMS) data so that the data are cross-checked with fishing position from logbook. In addition, catch data are cross-checked between those of NFRDI and National Fishery Products Quality Management Service (NFQS) prior to issuing Catch Documentation Scheme (CDS).

6.2. Vessel Monitoring System

Korea operates VMS program to comply with the requirement of the RFMO's vessel monitoring system (VMS). All Korean flagged fishing vessels and carrier vessels are equipped with VMS and have implemented in compliance with the IOTC Resolution 06/03 and the Korean Act of the Distant Sea Fisheries Development (2008). And Korea established the Fisheries Monitoring Center (FMC) in March 2014 to monitor/manage the Vessel Monitoring System (VMS) data.

6.3. Observer programme

1) Observer Training

Korean scientific observer program for distant-water fisheries was started in 2002. National Fisheries Research and Development Institute (NFRDI) is responsible for implementing and developing the program. The qualification for being observers is college graduated where major field is nature science or fisheries high school graduated with at least 1-year experience on board having a certificate of qualification to deck officer. Candidates for observer who have passed the paper review (including medical check) and oral interview have to take training programs for 3 weeks. Observer training programs include basic safety training for seafaring, operations of navigation devices, biological information training for target and non-target species and data collection method for fishing activities. During the training program they have two kinds of test. One is the test on a technical term of fisheries and biology, and the other is the test on species identification. The person who scored above 70 in the two tests and attended 100% of the course timetable can be qualified and deployed on board as a scientific observer.

2) Scientific Observer Program Design and Coverage

In 2013, Korean had deployed 2 observers on 2 longline vessels and 1 observer on 1 purse seine vessel operating in the Indian Ocean. They observed the fishing effort of 547 thousands hooks in 171 sets for longline fishery and 45 sets in 68 days for purse seine fishery, which their observer coverages were estimated to be 10.1% and 6.2%, respectively.

3) Observer Data Collected

The observers collected the data which are required by the IOTC scientific observer program standards. The data collected were vessel and gear characteristics, setting and catch (retained/discarded) details, incidental catch of ERS and sighting of marine mammals. The biological measurements were conducted on all species, if possible.

Table 6. Annual observer coverage (%) by Korean tuna longline fishery and purse seine fishery for the most recent five years

Fishery	2009	2010	2011	2012	2013
Longline	10.3	7.5	0	6.2	10.1
Purse seine	-	-	-	-	6.2

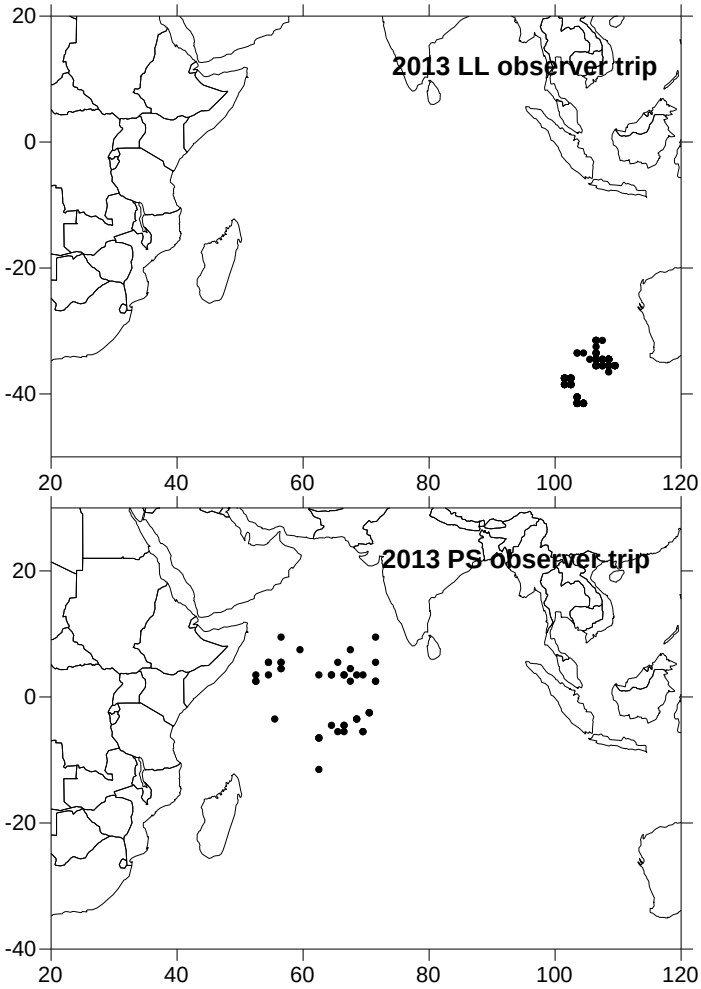


Figure 4. Map showing the spatial distribution of observer coverage for 2013.

6.4. Port sampling programme

Korea has not conducted any port sampling programs within the IOTC Convention Area.

6.5. Unloading/Transhipment

Korea has monitored transhipment of Korean tuna longline fleets within the IOTC Convention Area for 2013, as follows.

Table 7. Total amount of transhipment of Korean tuna longline fleets in the IOTC area of competence for 2013

Species	At sea transshipment (kg)	In port transshipment(kg)
Albacore tuna	481,229	22,624
Yellowfin tuna	453,422	104,290
Bigeye tuna	145,645	135,495
Southern bluefin tuna	186,949	256,015
Blue marlin	9,199	0
Black marlin	2,374	0
Striped marlin	8,763	457
Swordfish	27,924	9,354
Moonfish	7,676	0
Others	0	21,477

7. NATIONAL RESEARCH PROGRAMS

During 2012-2013, Korea had conducted a sea trial to facilitate the implementation of seabirds mitigation measure on weighted line and further investigate as to how this measure affects the Korean tuna longline vessel in collaboration with BirdLife International. The results will be presented at the next meeting.

Table 8. Summary table of Korean research programs

Project title	Period	Countries involved	Budget total	Funding source	Objectives	Short description
Sea trial on the implementation of seabirds mitigation measures on weighted line	2012-2014	Korea and BirdLife International			Implementation of seabirds mitigation measure	See the paper presented at the 16th Scientific Committee meeting

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

Table 9. Scientific requirements contained in Resolutions of the Commission, adopted between 2005 and 2014.

Res. No.	Resolution	Scientific requirement	CPC progress
13/03	On the recording of catch and effort by fishing vessels in the IOTC area of competence	Paragraphs 1–11	Korean tuna fishing vessels have recorded catch and effort data on logsheet from the early 1970's. Fishermen should record and monthly report catch and effort data by species, including bycatch species, in electronic format in accordance with IOTC logbook template under the revised Korean domestic law in 2012.
13/04	On the conservation of cetaceans	Paragraphs 7– 9	Korea collects the data on cetaceans through logsheet and observer programs.
13/05	On the conservation of whale sharks (*Rhincodon typus*)	Paragraphs 7– 9	Korea collects the data on cetaceans through logsheet and observer programs
13/06	On a scientific and management framework on the conservation of shark species caught in association with IOTC managed fisheries	Paragraph 5–6	Fishermen shall record and report the incidental catch with interaction information in accordance with IOTC logsheet template under the revised Korean domestic law in 2012.
12/09	On the conservation of thresher sharks (family alopiidae) caught in association with fisheries in the IOTC area of competence	Paragraphs 4–8	Thresher sharks are prohibited to retain onboard Korean longline vessels. If bycatch occurred, fishermen should cut the line, promptly release unharmed them with proper handling and record the interaction on logbook.
12/06	On reducing the incidental bycatch of seabirds in longline fisheries.	Paragraphs 3–7	Korea has provided information on how we are implementing this measure and have conducted sea trials for developing seabirds mitigation measure since 2013. Korean longline fishing vessels have used seabirds mitigation measures in accordance with IOTC resolution.
12/04	On the conservation of marine turtles	Paragraphs 3, 4, 6–10	Data and interaction on marine turtles are collected through observer programs. In addition, fishermen are encouraged to record them on logsheet. Study on use of circle hook was conducted in the Pacific longline vessels in 2006. Application to Indian Ocean will be tried in the near future. NFRDI conducts education for conservation of marine turtles, and fishing vessels carry the device for handling and releasing marine turtles on board.
11/04	On a regional observer scheme	Paragraph 9	Korea reports annually the number of vessels monitored and the observer coverage (trip report).
10/02	Mandatory statistical requirements for IOTC members and cooperating non	Paragraphs 1–7	All fishing vessels shall record the data and report to government every month, and measure biological

Res. No.	Resolution	Scientific requirement	CPC progress
	contracting parties		information on 1 fish per a ton of catch.
05/05	Concerning the conservation of sharks caught in association with fisheries managed by IOTC	Paragraphs 1–12	Fishermen shall record and report the data by species in accordance with IOTC logsheet template under the revised Korean domestic law in 2012. Sharks bycaught are fully utilised. Fishermen comply with paragraphs 3, 4, 6 and 7.

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