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Korea National Report to the Scientific Committee of the Indian Ocean Tuna Commission, 2016

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INFORMATION ON FISHERIES, RESEARCH AND STATISTICS

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 2016, final data for the 2015 calendar year must be provided to the Secretariat by 30 June 2016)	YES 30/06/2016
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 2016, preliminary data for the 2015 calendar year was provided to the IOTC Secretariat by 30 June 2016). **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 2016, final data for the 2015 calendar year must be provided to the Secretariat by 30 December 2016).	YES 30/06/2016
If no, please indicate the reason(s) and intended actions:	

Executive Summary

The number of active vessels in 2015 was 14 for longline fishery and 5 for purse seine fishery. With this fishing capacity, Korean tuna longline fishery caught 3,364 mt in 2015, which was 5% higher than that of 2014. The fishing efforts in 2015 were 7,365 thousand hooks and mainly distributed in the western Indian Ocean, while the fishing efforts averaged for 5 recent years (2011-2015) were 5,689 thousand hooks and distributed in the western tropical areas around 0-20°S as well as in the western and eastern areas around 20°S-40°S. In 2015, some vessels moved to the western tropical area between 5°N-5°S to fish for bigeye tuna and yellowfin tuna. As results, the catch of bigeye tuna increased, while the catch of albacore tuna decreased. Korean tuna purse seine fishery in the Indian Ocean recorded about 14,559 mt in 2015. In 2015, 5 vessels of Korean tuna purse seine fishery operated mainly in the western and central tropical areas around 10°N-10°S to fish for skipjack tuna and yellowfin tuna. The fishing efforts in 2015 were 922 sets, which mainly distributed in the western and central tropical areas around 45°E-70°E. In 2015, 4 scientific observers for longline fishery and 1 scientific observer for purse seine fishery were dispatched onboard for implementing observer program and scientific data collection, which carried out 4.3% and 2.5% 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 distributed in the central tropical area between 20°N and 20°S, and extended south to 45°S and east to 120°E for fishing for southern bluefin tuna in recent years. The number of active vessels peaked at 185 in 1975, but after that gradually decreased to 21 in 2009 and 7 in 2011, and has increased to 14 since 2013. The catch recorded the highest with about 70 thousand mt in 1978, since then also has gradually decreased, and is showing a level of about 3 thousands mt in recent years.

Since 2012 Korean tuna purse seine fishery has operated mainly in the central and western tropical area. In 2014, 5 vessels operated and recorded about 15 thousand mt in catch.

2. FLEET STRUCTURE

Korean tuna longline fleets in the Indian Ocean are all deep freezing tuna vessels. In 2015, the size ranges from 200 to 1,000 gross tonnage classes (Table 1). Total number of vessels had decreased from 185 in 1975 to 7 in 2011, but it is showing somewhat of increasing after 2013. In 2015, 14 vessels of Korean tuna longline fishery operated in the Indian Ocean.

Korean tuna purse seine fishery initiated operating in 2012 with 3 vessels, and 5 vessels operated in 2015 (Table 1).

Table 1: Number of vessels operating in the IOTC area of competence, by gear type and size, 2011-2015

Gear type	GT	Year				
		2011	2012	2013	2014	2015
Longline	200-500	-	-	-	-	3
	500-1,000	7	7	9	10	11
Purse seine	1,000-2,000	-	1	1	1	1
	2,000-3,500	-	2	3	3	4

3. CATCH AND EFFORT

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 fluctuations, where the decadal average of catch was about 39 thousands mt in the 1970's, 33 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 2015, the total catch was 3,364 mt, which accounted for 5% increasing from that of 2014 (3,191 mt). The changes in the number of active vessels closely coincided with the catch trend throughout the periods. The number of active vessels peaked at 185 in 1975, after that sharply decreased to 7 vessels in 2011-2012, and has increased to 14 vessels in 2015. In 2015, the fishing efforts were 7,365 thousand hooks and mainly distributed in the western Indian Ocean, while the fishing efforts averaged for 5 recent years (2011-2015) were 5,689 thousand hooks and distributed in the western tropical areas around 0-20°S as well as in the western and eastern areas around 20°S-40°S (Table 2a, Figs. 2a and 2b). In 2015, some vessels moved to the western tropical area between 5°N-5°S to fish for bigeye tuna and yellowfin tuna. As results, the catch of bigeye tuna increased, while the catch of albacore tuna decreased (Table 2a, Figs. 1a, 3a and 3b).

Korean tuna purse seine fishery in the Indian Ocean commenced in 2012 and recorded about 15 thousand mt in 2015 (Table 2b, Fig. 1b). In 2015, 5 vessels of Korean tuna purse seine fishery operated mainly in the western and central tropical areas around 10°N-10°S to fish for skipjack tuna and yellowfin tuna (Table 1, Fig. 3a). The fishing efforts in 2015 were 922 sets, which mainly distributed in the western and central tropical areas around 45°E-70°E (Table 2b, Figs. 2a).

Table 2a. Annual catch (in number) and effort of Korea longline fisheries by primary species in the IOTC area of competence. 2011-2015

Year	No. hooks ($X10^3$)	BET	YFT	SKJ	ALB	SBF	SWO	BLM	BUM	MLS	SFA	NEI	Total
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	5,429	8,815	23,245	156	46,954	6,347	952	43	275	220	398	13,081	100,486
2014	5,999	5,869	40,198	608	44,656	5,139	1,515	241	527	284	1,574	24,184	124,795
2015	7,365	10,675	47,387	512	16,656	3,690	2,654	531	1,314	277	2,308	36,991	122,995

Table 2a. Annual catch (in metric ton) and effort of Korea longline fisheries by primary species in the IOTC area of competence. 2012-2015

Year	No. sets	SKJ	BET	YFT	NEI	Total
2012	150	1,263	260	1,202	-	2,725
2013	724	8,605	1,205	2,437	4	12,251
2014	828	6,674	882	8,847	18	16,421
2015	922	5,896	1,152	7,507	4	14,559

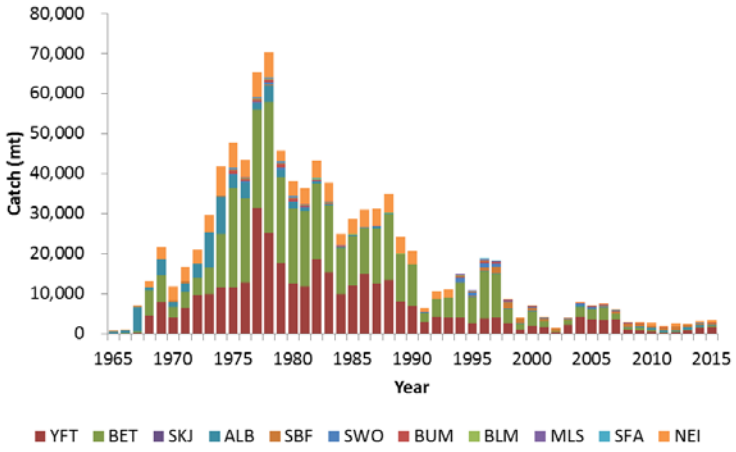


Figure 1a. Historical annual catch for Korean tuna longline fisheries by primary species, for the IOTC area of competence.

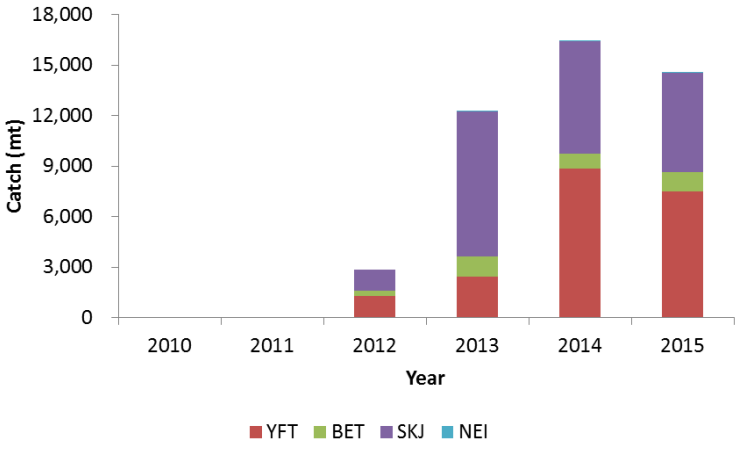


Figure 1b. Historical annual catch for Korean tuna purse seine fisheries by primary species, for the IOTC area of competence.

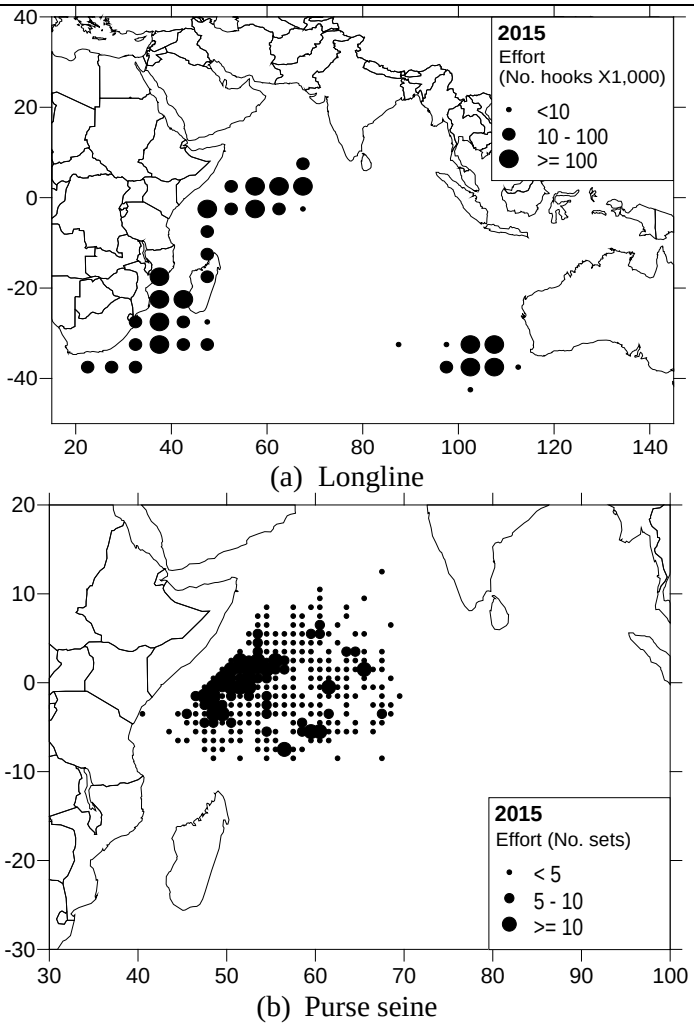
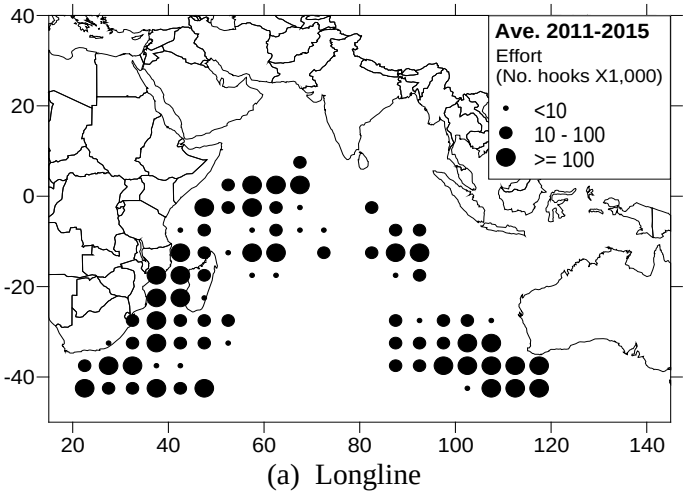
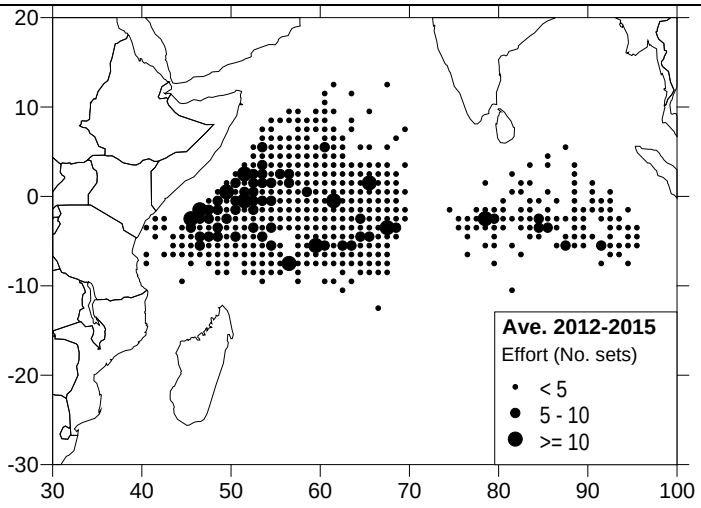


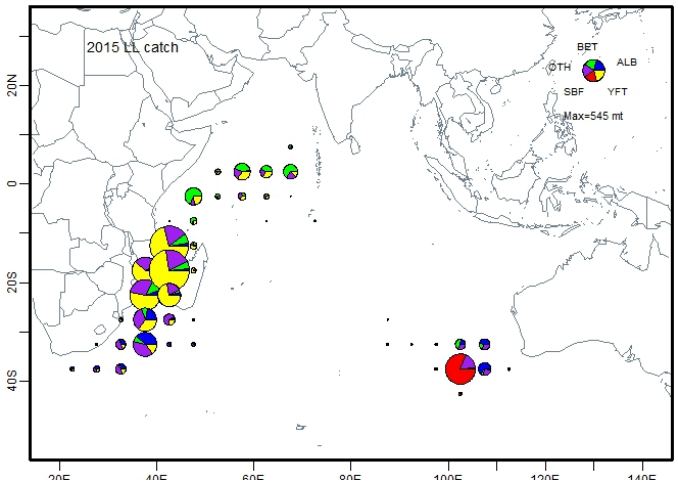
Figure 2a. Map of the distribution of fishing effort by gear type in the IOTC area of competence, 2015.



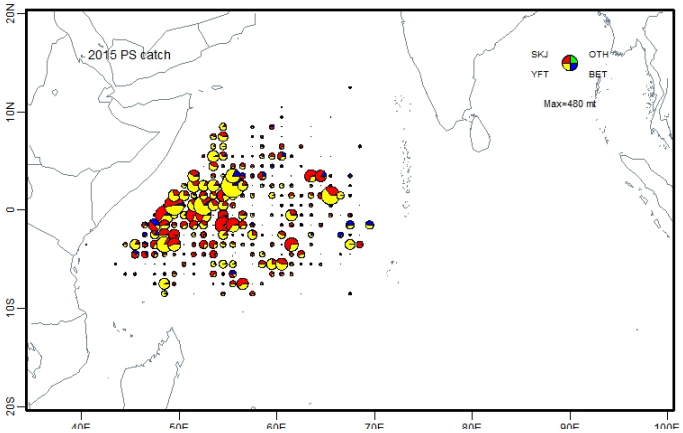


(b) Purse seine

Figure 2b. Map of the distribution of fishing effort by gear in the IOTC area of competence for average of the 5 previous years.

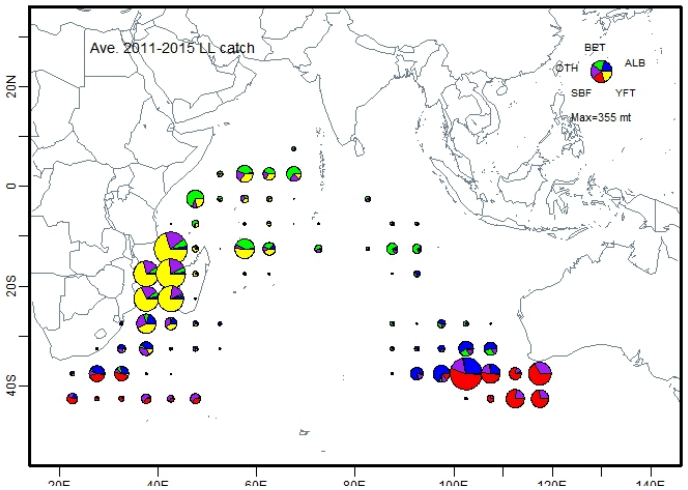


(a) Longline

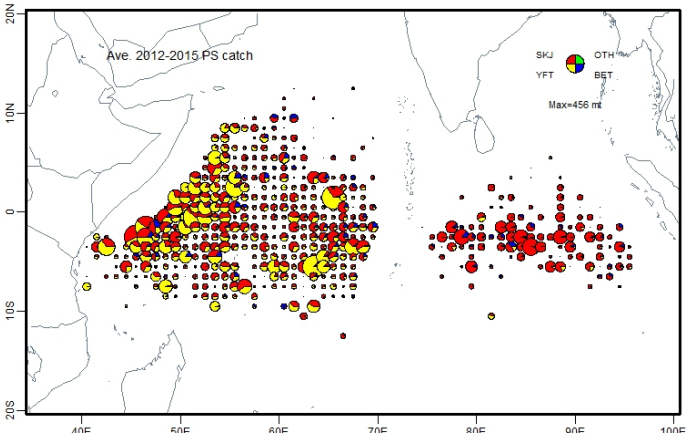


(b) Purse seine

Figure 3a. Map of distribution of fishing catch by species for Korean tuna longline fishery and purse seine fishery in the IOTC area of competence, 2015.



(a) Longline



(b) Purse seine

Figure 3b. Map of distribution of fishing catch by species for Korean tuna longline fishery and purse seine fishery in the IOTC area of competence for average of the 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 Distant Water Fisheries Development Act (2008). And to address the increasing data collection and reporting requirement by the tuna RFMOs for ecologically related species (ERS) such as sharks, seabirds, marine turtles, etc., the Act on Fisheries Information and Data Reporting was revised in December, 2012. It includes the data recording and reporting requirements recently adopted by the tuna RFMOs regarding catch by species, discards/release (alive/dead), seabird mitigation measures used, etc.

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 shall do not to have onboard fins that total more than 5% of the weight of sharks onboard, up to the first point of landing. Statistic and biological information on sharks have been collected through logsheet compiled from fishermen onboard and national scientific observer program (Tables 3 and 4). Especially, in 2011, logsheet was revised with addition of format for ecologically related species, and since then fishermen have been educated and requested to record and report the required data with great emphasis on ERS and implementation of mitigation measures in close cooperation with the National Institute of Fisheries Science (NIFS).

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	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
	2014	127,361 /7,281	48,663 /1,086	11,768 /400	0 /0	0 /0	0 /0	2,591 /217	190,383 /8,984
	2015	230,332 /12,334	40,063 /1,072	1,248 /63	0 /0	204 /4	0 /0	11,075 /345	282,922 /13,818
Purse seine	2013	0 /0	0 /0	0 /0	0 /0	0 /0	0 /0	0 /0	0 /0
	2014	0 /0	0 /0	0 /0	0 /0	0 /0	0 /0	0 /0	0 /0
	2015	0 /0	0 /0	0 /0	0 /0	0 /0	0 /0	0 /0	0 /0

* Data were compiled from logsheet by fishermen in 2011, 2013-2015, and by observer in 2012.

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									
		Blue shark	Mako sharks	Porbeagle shark	Silky shark	Oceanic whitetip shark	Hammerhead sharks	Bigeye thresher shark	Thresher sharks	Others	Total
Longline (inds.)	2011	-	-	-	-	-	-	-	-	-	-
	2012	142	4	19	0	0	0	0	14	0	179
	2013	1,017	0	0	0	0	1	0	0	0	1,018
	2014	992	29	59	0	0	0	0	4	0	1,084
	2015	2,156	21	205	0	2	0	1	1	207	2,593
Purse seine (mt)	2013	0.072	0.04	0	2.664	0	0	0	0	1.77	4.549
	2014	0.024	0.043	0	5.712	0.205	0	0	0	0.02	6.004
	2015	0	0.117	6.554	2.810	0	0	0	0	0.917	10.398

* Data were compiled from logsheet by fishermen in 2013, 2014-2015, and by observer in 2012.
** No data in 2011.

5.2 Seabirds

Korean National Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries (NPOA-seabirds) was established in January 2014. Interactions 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 been yet familiar with provisions and associated works on data recording 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 seabird species, and the field guide for identifying seabird 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 record and report the required data with great emphasis on ERS and implementation of mitigation measures in close cooperation with the NIFS.

5.3 Marine Turtles

Interactions 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 turtle was distributed on board to encourage fishermen to record and report the data for marine turtles, likewise the case of seabirds.

5.4 Other ecologically related species

Interaction and mortality of marine mammals and whale sharks 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

Fishery	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	Unidenti -fied
Longline	2011	-	-	-	-	-	-	-	-	-	-
	2012	0	0	3	0	1	0	1	2	0	0
	2013	2	0	1	0	0	0	0	0	3	0
	2014	0	0	2	0	0	0	0	0	0	0
	2015	1	0	0	0	0	0	0	1	0	0

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

(b) Other ecologically related species

Fishery	Year	Marine turtles			Marine mammals		Whale shark
		Loggerhead turtle	Olive ridley sea turtle	Unidentified	Spinner dolphin	Pygmy killer whale	
Longline	2011	-	-	-	-	-	-
	2012	0	0	0	0	0	0
	2013	0	0	0	0	0	0
	2014	0	1	0	0	0	0
	2015	0	0	0	0	0	0
Purse seine	2013	0	0	1	0	0	0
	2014	0	0	0	0	0	0
	2015	0	1	1	2	0	0

* Data were compiled by observer, and PS data for 2013 and 2015 were from by fishermen.
** No data in 2011.

6. NATIONAL DATA COLLECTION AND PROCESSING SYSTEMS

6.1. Logsheet data collection and verification

The National Institute of Fisheries Science (NIFS) has collected the data of Korean tuna fisheries. Data from logsheet are available from 1971. In 2012, Korean domestic law (Distant Water Fisheries Development Act) 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 for improving the data collection 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, seabird mitigation measures implemented, etc. After September 2014, the Act obliged fishers to report the catch statistics to the NIFS every week, and since 1st September 2015, the Act on Fisheries Information and Data Reporting has obliged fishers to report the catch statistics every day to the NIFS through the electronic reporting system in order to manage/cross-check the data in real time.

Catch statistics of Korean fishing vessels are obtained from two sources of data reporting. The Korea Overseas Fisheries Association (KOSFA) collects catch by species and by vessels from fishery industries. The NIFS collects logbook data from vessels filled out by captain onboard. The data collected are verified and confirmed through cross-checking between the NIFS and the KOSFA. In addition, catch data are cross-checked between those of the NIFS and the National Fishery Products Quality Management Service (NFQS) prior to issuing Catch Documentation Scheme (CDS).

6.2. Vessel Monitoring System

Korea operates Vessel Monitoring System (VMS) program to comply with the requirement of the RFMO's 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 Water Fisheries Development (2008). And Korea established the Fisheries Monitoring Center (FMC) in March 2014 to monitor/manage the VMS data so that the data are cross-checked with fishing position from logbook.

6.3. Observer programme

Korean scientific observer program for distant water fisheries was started in 2002. The National Institute of Fisheries Science (NIFS) is responsible for implementing and developing the observer 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. At present, Korea has 31 persons being able to be deployed onboard as an active scientific observer.

In 2015, Korean had deployed 4 observers on 4 longline vessels and 1 observer on 1 purse seine vessels operating in the Indian Ocean (Fig. 4). They observed the fishing effort of 314 thousands hooks in 258 sets for longline fishery and 23 sets in 43 days for purse seine fishery, which their observer coverages were estimated to be 4.3% and 2.5%, respectively (Table 6).

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, ERS interaction, biological information, sighting of marine mammals, etc. 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	2011	2012	2013	2014	2015
Longline	0	6.2	10.1	5.1	4.3
Purse seine	-	-	6.2	7.2	2.5

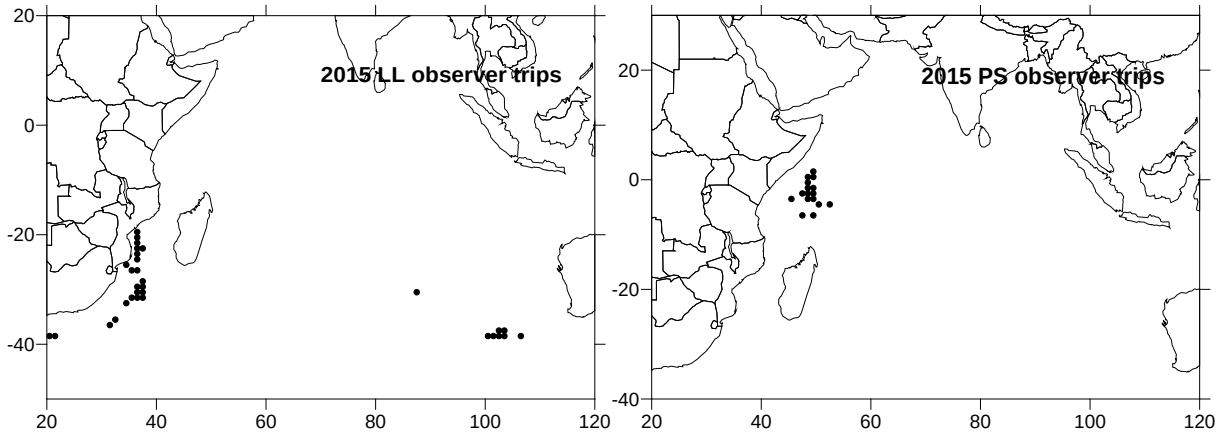


Figure 4. Map showing the spatial distribution of observer coverage for 2015

6.4. Port sampling programme

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

6.4. Unloading/Transhipment

The information on the transhipment of Korean tuna fleets within the IOTC area of competence in 2015 is summarized in Table 7.

Table 7. Total amount of transhipment of Korean tuna fleets within the IOTC area of competence, 2015

Species	At sea transshipment (kg)	In port transshipment(kg)
Albacore tuna	105,339	30,123
Yellowfin tuna	858,694	264,954
Bigeye tuna	106,121	32,210
Skipjack	629	-
Southern bluefin tuna	130,744	344,712
Blue marlin	26,154	5,738
Black marlin	16,266	1,817
Striped marlin	5,224	1,482
Swordfish	41,948	10,763
Others	30,157	-

7. NATIONAL RESEARCH PROGRAMS

Since 2013 Korea has 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. In addition, Korea started to carry out project on development of improved FAD design to reduce the incidence of entanglement of non-target species, and study on age and growth of yellowfin tuna in 2016.

Table 8. Summary table of Korean research programs

Project title	Period	Countries involved	Budget total	Funding source	Objectives	Short description
Sea trial on seabirds mitigation measures on weighted line	2013-2016	Korea and BirdLife International			To facilitate the implementation of seabirds mitigation measures	See the paper of IOTC-2016-WPEB12-33 Rev_1
Development of FAD design	2016-2018	Korea			To reduce the incidence of entanglement of non-target species	In progress
Study on age and growth of yellowfin tuna	2016-2018	Korea			To investigate the ecological characteristics of yellowfin tuna	In progress

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 2016.

Res. No.	Resolution	Scientific requirement	CPC progress
15/01	On the recording of catch and effort by fishing vessels in the IOTC area of competence	Paragraphs 1–10	Fishermen shall record catch and effort data on logbook and keep it onboard. And they shall daily report logbook data, in accordance with IOTC logbook template, to the NIFS, Korea. Korea has submitted the official logbook template used in Korean vessel and catch and effort data on an aggregated basis to the Secretariat.
15/02	Mandatory statistical reporting requirements for IOTC Contracting Parties and Cooperating Non-Contracting Parties (CPCs)	Paragraphs 1–7	All Korean fishing vessels shall record and report the data to government on daily basis, and measure biological information on at least1 fish per a ton of catch.
15/05	On conservation measures for striped marlin, black marlin and blue marlin	Paragraph 4	N/A
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.
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 shall 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 implemented 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 and logsheet. Study on use of circle hook was conducted in the Pacific Ocean in 2006. The NIFS conducts education for conservation of marine

Res. No.	Resolution	Scientific requirement	CPC progress
			turtles to the fishermen, and fishing vessels carry the device for handling and releasing marine turtles onboard.
11/04	On a regional observer scheme	Paragraph 9	Korea reports annually the number of vessels monitored, observer coverage with its trip report.
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. Sharks bycaught are fully utilised. Fishermen comply with paragraphs 3, 4, 6 and 7.
16/06	On measures applicable in case of non-fulfilment of reporting obligations in the IOTC	Paragraph 1	The information on actions taken to implement the reporting obligations for Korean fisheries was included in Annual Report.

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