



## **PLENARY 07**

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### **NATIONAL REPORT OF THE REPUBLIC OF KOREA Korean Tuna and Tuna-like Fisheries in the North Pacific Ocean in 2019**

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## SUMMARY

Korean distant water fisheries for tuna and tuna-like species have two types of fishing gears, purse seine and longline, operating in the North Pacific Ocean. The number of longline vessels was 97 in 2019, which has remained less than 100 since 2015. The number of purse seine vessels in 2019 was 26, which was the same of 2018. The total catch of tuna and tuna-like species caught by those two fisheries in the North Pacific Ocean was 84,188 ton in 2019. The total catch of the longline fishery in 2019 was 14,791 ton, which was decreased to 91% of the 2018 catch. That of the purse seine fishery was 69,397 ton, which was decreased to 94% of the 2018 catch, but it was about 17% higher than the average for the recent 5 years (57,418 ton). The main target species of the longline fishery were bigeye tuna and yellowfin tuna which accounted for 59.2% and 27.8% of the total catch in 2019, respectively. For the purse seine fishery, skipjack tuna (84.4%) was dominant, followed by yellowfin tuna (15.0%) and bigeye tuna (0.6%). Pacific bluefin tuna has been caught by coastal and offshore fisheries in the Korean waters, and mostly by offshore large purse seine fishery. The catch by the offshore large purse seine fishery in 2019 was 542 ton which accounted for 93% of the total catch. The large PBF (30kg or larger than 30kg) accounted for 3% of the total catch in 2019.

## 1. INTRODUCTION

Korean distant water fisheries for tuna and tuna-like species consist of longline fishery (DWLL) and purse seine fishery (DWPS) in the Pacific Ocean. A 60 year-old tuna longline fishery (DWLL) that commenced its first fishing in the Indian Ocean in 1957, has explored the Pacific Ocean since 1958 and the Atlantic Ocean since 1967.

Tuna purse seine fishery (DWPS) was initiated by accessing into the Eastern Pacific Ocean (EPO) with 3 vessels in 1971, and helicopter-aided mass operations were introduced in 1979 for the first time. The number of active vessels was the highest of 39 in 1990 and sharply decreased to 27-28 during the early 1990s and then maintained around 25-28 in the recent decade.

All Korean distant water fisheries are managed by the Distant Water Fisheries Development Act, which came into effect on 4 February 2008. From 1 September 2015, electronic reporting (ER) system started its operation, and catch information of all vessels belonging to Korean distant water fisheries have been reported through this system and managed by National Institute of Fisheries Science (NIFS).

Pacific bluefin tuna (PBF) has been caught by domestic fleets in the Korean waters, mostly by an offshore large purse seine fishery (OLPS) which targets pelagic species such as mackerels operating in the Korean waters. Fisheries related to catching PBF in the Korean waters have been managed under the Ministerial Directive, established on 26 May 2011. To strengthen management of PBF in Korea, the Ministerial Directive has been gradually revised in 2014 and 2017. Accordingly, the catch limit of PBF has been set by fishery, and the catch reporting system has improved as well.

This report provides the information on effort and catch of the Korean distant water fisheries for tuna and tuna like species and PBF catch information by domestic fleets in the Korean waters.

## **2. FISHERIES**

### **2.1 Distant Water Fisheries**

#### **2.1.1 Fleet Structure**

The North Pacific Ocean (NPO) is an integral part of the fishing ground for Korean distant water fisheries belonging to the Western and Central Pacific Fisheries Commission (WCPFC) and the Inter-American Tropical Tuna Commission (IATTC) convention areas. The number of active vessels by gear and size is presented in Fig. 1 and Table 1. The number of purse seine vessels, once peaked at 39 in 1990, reduced to 28 in 1996 and since then has been maintained around 25-28. In 2019, 26 vessels operated in the Pacific Ocean, of which 6 vessels were 501-1,000 GRT class, 15 vessels were 1,001-1,500 GRT class and 5 vessels were over 1,500 GRT class. The number of longline vessels reduced from 220 in 1991 to 108 in 2008, and then slightly increased to 111-126. However, after 2013 it decreased to 96 vessels in 2016, and then has maintained 96-97 in recent years. Most of longline vessels belong to 201-500 GRT class except one vessel of 51-200 GRT.

#### **2.1.2 Fishing Pattern**

The distributions of catch and effort for the recent 5 years by Korean tuna purse seine (DWPS) and longline (DWLL) fisheries in the Pacific Ocean are presented in Figs. 2 and 3, respectively.

In general, purse seine (DWPS) fishery has operated in the tropical area of the WCPO between 140°E-170°W throughout the year, and its fishing ground extended to the east subject to oceanographic conditions from time to time. Fishing efforts of purse seine fleets in 2019 were highly concentrated on the central tropical area of 170°-180°E compared to the previous years. Yellowfin tuna catch was higher in the eastern equatorial area of WCPO compared to the previous years (Fig. 2).

Recently longline (DWLL) fishery has mainly operated in the tropical area of 160°E-120°W. Fishing efforts of longline fleets were higher in both west of 180°E and east of 140°W during 2015-2017. In 2018 and 2019, however, longline fishing effort was highly concentrated on the central tropical area of 165°E -170°W compared to the previous years, and for 2018, there were little fishing efforts in the Eastern Pacific Ocean. While bigeye tuna was caught by longline fishery throughout the tropical area, yellowfin tuna was mostly caught in the central Pacific Ocean (Fig. 3).

#### **2.1.3 Annual Catch and Effort**

Annual catch and effort by Korean tuna distant water fisheries in the NPO are shown in Tables 2-3, and Figs. 4-5. Most catches by longline (DWLL) and purse seine (DWPS) fisheries came from south of 20°N.

The fishing effort (no. of hooks) of longline (DWLL) fishery was 29,013 thousand hooks in 2019, which decreased by 24% of 2018, however, it was about 20% higher than the average of the recent 5 years (24,208 thousand hooks) (Table 2). As for the fishing effort (no. of sets) of purse seine (DWPS) fishery, it was 1,507 sets in 2019, a 30% decrease over the effort in 2018 (Table 3).

The total catch of longline (DWLL) fishery was 14,791 ton in 2019, which was decreased by 9% of the catch in 2018. In particular, bigeye tuna and blue marlin were largely reduced by 15% and 29% compared to those catches in 2018, respectively. The total catch of purse seine (DWPS) fishery in 2019 was 69,397 ton, which decreased by 6% of the catch in 2018, and especially bigeye

tuna was significantly reduced by 70% of the catch in 2018. However, it is about 17% higher than the average of recent 5 years (57,418 ton).

As for the catch proportion by species of longline (DWLL) fishery in 2019, bigeye tuna, yellowfin tuna, blue marlin and swordfish accounted for 59.2%, 27.8%, 6.6% and 3.2% in total, respectively. (Table 2, Fig. 4). For purse seine (DWPS) fishery, skipjack, yellowfin and bigeye tunas accounted for 80.8%, 17.4 % and 1.8% in total, respectively (Table 3, Fig. 5).

## **2.2 PBF Catch by Coastal Fisheries**

### **2.2.1 Fleet Structure**

Pacific Bluefin tuna (PBF) is mainly caught by offshore large purse seine (OLPS) fishery which targets mackerels in the Korean waters. Due to strategy for controlling fishing capacity by the government, the number of vessels belonging to the purse seine (OLPS) fishery was decreased from 32 in 2002 to 24 in 2012, thereafter it has been maintained at 24 by 2018. In 2019, the number of vessels catching PBF was 23 vessels. PBF is also caught by set net, trawl, etc. in the Korean waters (Table 4).

### **2.2.2 Fishing Pattern**

In 2019, most PBF were caught by purse seine (OLPS) fishery around Jeju Island in the South Sea during the first quarter, which is a similar fishing pattern to the previous operation. And the catch of set net fishery which were located along the coast of north of 36°N in the East Sea was significantly increased in 2019 (Fig. 6).

Due to the allocated quota by fishery, purse seine (OLPS) and trawl vessels were prohibited to catch PBF from 25<sup>th</sup> April and 15<sup>th</sup> May 2019, respectively.

### **2.2.3 Annual Catch and Effort**

The annual PBF catch by fishery are presented in Table 4 and Fig. 7. The total catch of PBF was the highest with 2,601 ton in 2003, thereafter it has been decreased with annual fluctuations. In 2019, the PBF catch by purse seine (OLPS) fishery was 542 ton, which accounted for 93% in total. The PBF catch by set net significantly increased, recording 36 ton and offshore trawl fisheries caught about 3 ton.

According to the historical catches, there was no catch of large PBF (30kg or larger than 30kg) prior to 2008. Since 2008, large PBF (30kg or larger than 30kg) has been caught in Korean waters, and the catch in 2016 was even caught about 469 ton which accounted for over 46% in total. In 2019, the proportion of large PBF was about 3% of total catch. In terms of large and small PBF catch by month, small size was high in February and large PBF in March 2019, which was the same as 2018 (Fig. 8).

The mean fork length was 89.0 cm in 2019, which was higher than in 2018 (Fig. 9).

### **3. DATA COLLECTING SYSTEM**

#### **3.1 Distant Water Fisheries**

The National Institute of Fisheries Science (NIFS) is responsible for data collection and management of Korean distant water fisheries. In accordance with data reporting and submission requirement by the RFMOs, necessary improvements have been continuously made in data coverage, accuracy and verification through cross-checking between NIFS and Korea Overseas Fisheries Association (KOFA). Since 1<sup>st</sup> September 2015, the Act on Fisheries Information and Data Reporting has obliged fishers of distant water fisheries to report catch information to the NIFS in real time through the electronic reporting (ER) system. It includes data collection and reporting requirements recently adopted by the all RFMOs regarding especially ecologically related species (ERS), discard/release and seabird mitigation measures used.

#### **3.2 Observer Program**

The scientific observer program of Korean distant water fisheries started in 2002. The basic requirement for observers is college graduate with major in nature science or fisheries high school graduate with at least 1-year experience on board and certificate of qualification to deck officer. Candidates for observer, who have passed the paper review (including medical check) and oral interview, have to take three-weeks training program. Observer training program includes basic safety training for seafaring, operations of navigation devices, biological information training on target and non-target species and data collecting/reporting method for fishing activities. During the training program, they have two kinds of test. One is for a technical term of fisheries and biology, and the other is for species identification. The person who scored 70% out of 100 points in the two tests and attended 100% of the course timetable can be qualified for a scientific observer and deployed on board. Korea has a total of 48 scientific observers at present.

#### **3.3 PBF Catch by Coastal Fisheries**

The PBF catch data for 1982-1999 came from the import products information recorded by Japan, those for 2000-2004 from the export data to Japanese markets obtained from Korean offshore large purse seine fisheries cooperatives. Since 2005, monthly sale slips of Busan Cooperative Fish Market for purse seine (OLPS) fishery and National Federation of Fisheries Cooperative for other fisheries have been compiled by the NIFS as PBF catch data

### **4. RESEARCH**

#### **4.1 PBF Close-kin Program**

Since 2016, the NIFS has been collecting tissue samples of PBF caught by purse seine (OLPS) fishery for the close-kin program, which collected 1,045 tissue samples in 2016, 348 in 2017, 245 in 2018, and 313 in 2019, respectively.

Table 1. The number of active vessels and size by the Korean distant water tuna fisheries operated in the Pacific Ocean, 2008-2019

Year	GRT class by fishery									
	Longline					Purse seine				
	Total	0-50	51-200	201-500	500+	Total	0-500	501-1000	1001-1500	1500+
2008	108	-	-	108	-	28	-	15	12	1
2009	111	-	-	111	-	27	-	13	11	3
2010	122	-	-	122	-	28	-	13	13	3
2011	124	-	-	124	-	28	-	12	11	5
2012	126	-	-	126	-	28	-	12	11	5
2013	125	-	1	124	-	27	-	12	10	5
2014	110	-	1	112	-	28	-	10	13	5
2015	98	-	1	97	-	25	-	7	13	5
2016	96	-	1	95	-	25	-	7	14	4
2017	96	-	1	95	-	26	-	7	15	4
2018	96	-	1	95	-	26	-	6	15	5
2019	97	-	1	96	-	26	-	6	15	5

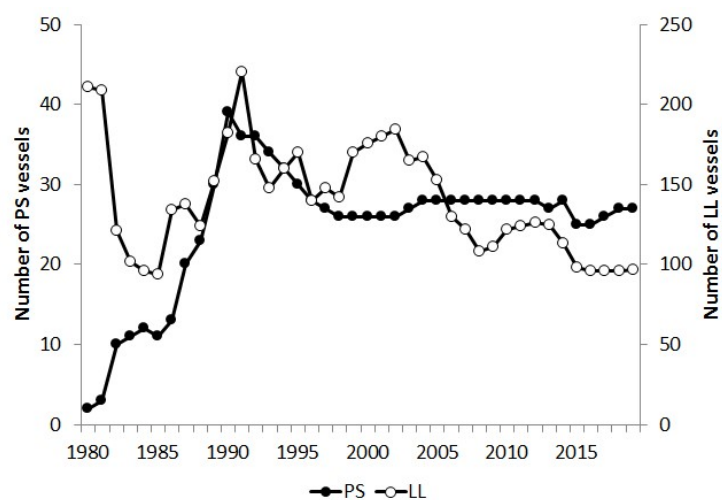


Fig. 1. Historical number of active fishing vessels by the Korean distant water tuna fisheries operated in the Pacific Ocean, 1980-2019.

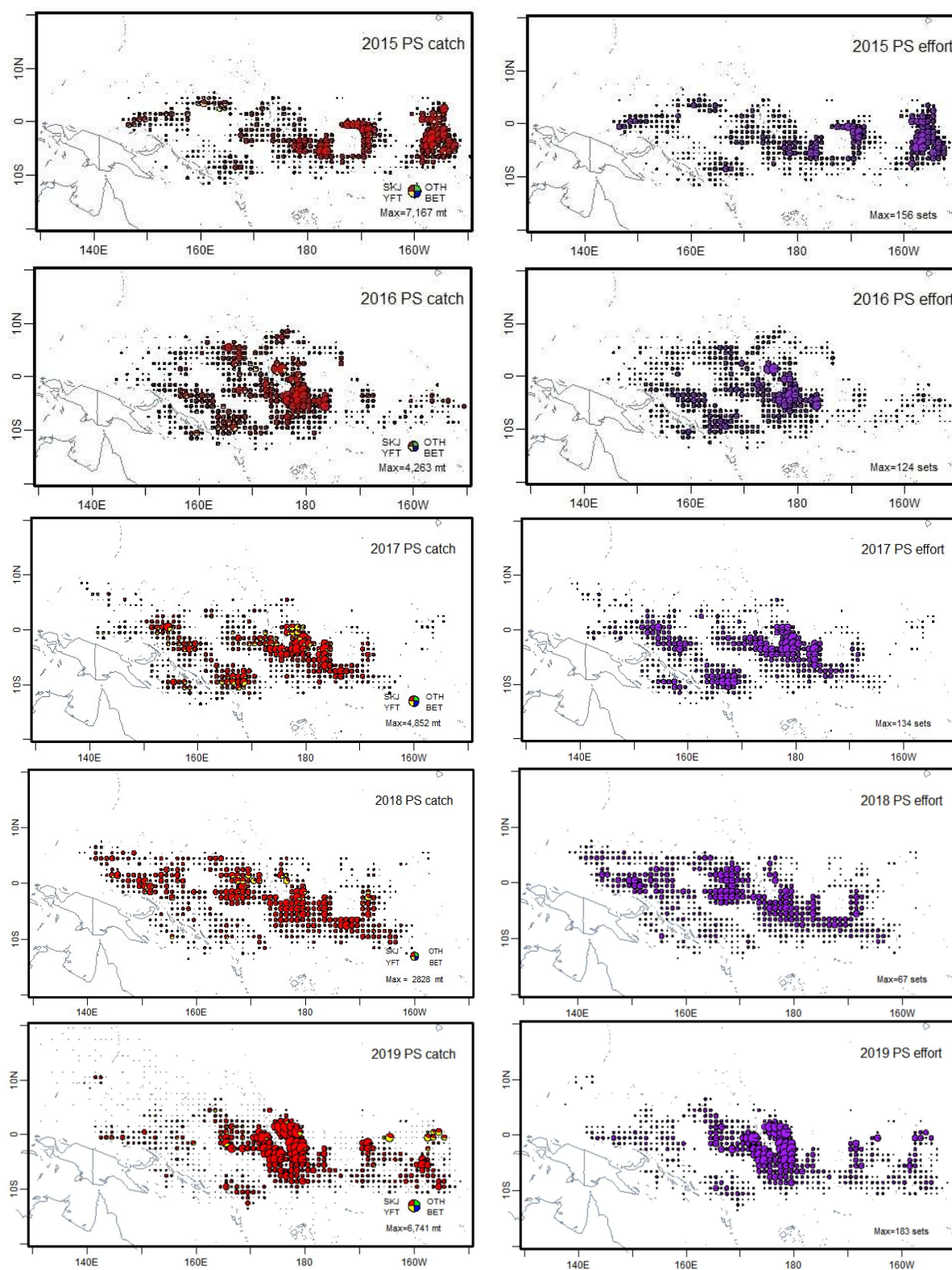


Fig. 2. Distributions of catch (left) and effort (right) of the Korean distant water tuna purse seine fishery operated in the Pacific Ocean, 2015-2019.



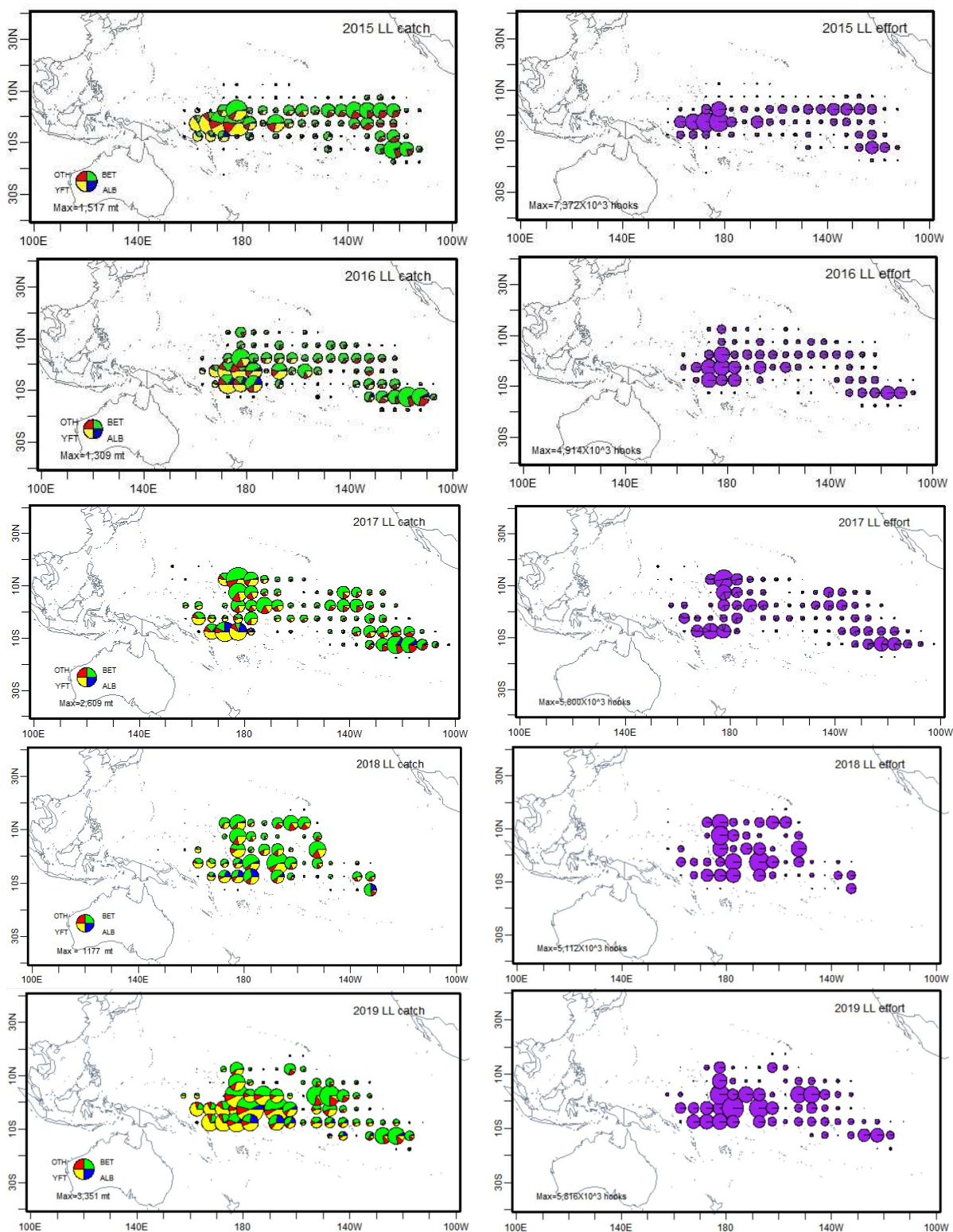


Fig. 3. Distributions of catch (left) and effort (right) of the Korean distant water tuna longline fishery operated in the Pacific Ocean, 2015-2019.

Table 2. Fishing effort (X1,000 hooks) and catch (ton) of the Korean distant water tuna longline fishery in the North Pacific Ocean, 2002-2019. Data for 2019 is provisional

Year	Hooks (X1000)	ALB	YFT	BET	SKJ	BUM	MLS	SWO	BLM	SFA	SKH	OTH	Total
2002	16,478	112	3,137	10,786	0	152	188	439	479	123	185	1,400	17,001
2003	21,431	146	4,741	9,739	6	159	206	381	819	129	95	931	17,352
2004	18,746	78	5,144	12,453	101	227	75	410	919	1	8	404	19,819
2005	14,955	420	2,958	9,257	35	304	136	404	997	0	10	820	15,340
2006	18,259	135	5,096	11,494	0	217	56	465	1,063	0	0	941	19,468
2007	15,441	137	2,175	9,606	0	121	47	453	887	0	1	291	13,718
2008	16,466	400	2,730	11,075	0	220	30	795	748	0	4	741	16,742
2009	13,286	95	2,992	10,979	0	224	23	994	654	0	13	878	16,852
2010	14,729	107	2,011	9,303	0	257	18	663	570	0	69	532	13,531
2011	16,654	78	3,146	9,047	0	684	48	962	159	1	546	941	15,614
2012	15,553	157	2,398	11,385	8	587	34	856	57	1	499	876	16,859
2013	13,780	173	1,988	6,041	22	963	65	1,071	41	2	735	204	11,306
2014	11,646	116	2,102	7,735	50	801	82	829	31	3	610	256	13,208
2015	8,022	38	1,520	6,132	41	531	44	776	82	2	250	115	9,531
2016	26,241	56	1,626	6,871	73	1,116	61	582	30	11	9	158	10,593
2017	36,780	202	3,775	10,303	147	1,453	81	583	17	13	31	262	16,867
2018	38,352	101	3,426	10,286	99	1,373	70	664	35	10	37	230	16,332
2019	29,013	64	4,106	8,758	142	981	48	468	18	8	37	160	14,791

ALB : Albacore tuna, YFT : Yellowfin tuna, BET : Bigeye tuna, SKJ : Skipjack tuna, BUM : Blue marlin, MLS : Striped marlin, SWO : Swordfish, BLM : Black marlin, SKH : Sharks, OTH : Others.

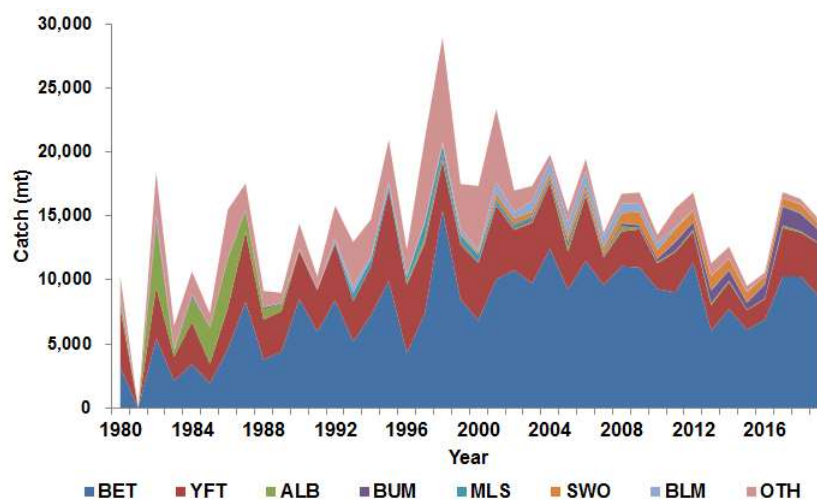


Fig. 4. Historical catch by major species caught by Korean distant water tuna longline fishery in the North Pacific Ocean, 1980-2019.

Table 3. Fishing effort (no. of sets) and catch (ton) of the Korean distant water tuna purse seine fishery in the North Pacific Ocean, 2002-2019. Data for 2019 is provisional

Year	Effort (sets)	Catch (ton)				Total
		SKJ	BET	YFT	OTH	
2002	2,537	64,897	0	16,389	0	81,286
2003	2,876	88,654	319	11,714	0	100,687
2004	1,633	43,797	48	7,426	0	51,271
2005	1,035	49,724	0	11,027	0	60,751
2006	510	67,564	13	15,394	0	82,970
2007	543	18,270	0	3,585	0	21,855
2008	490	9,233	4	7,842	0	17,079
2009	1,237	38,436	15	7,232	0	45,683
2010	727	20,751	374	4,020	0	25,145
2011	770	18,331	216	5,256	0	23,803
2012	2,402	67,448	404	19,467	1	87,320
2013	1,644	40,809	232	4,344	0	45,386
2014	1,732	40,690	265	11,343	0	52,298
2015	1,296	40,195	739	13,859	0	54,793
2016	2,379	62,849	1,025	10,088	31	73,993
2017	863	22,672	858	8,829	2	32,361
2018	2,141	59,479	1,327	12,838	1	73,645
2019	1,507	58,574	398	10,425	1	69,397

SKJ : Skipjack tuna, BET : Bigeye tuna, YFT : Yellowfin tuna, OTH : Others.

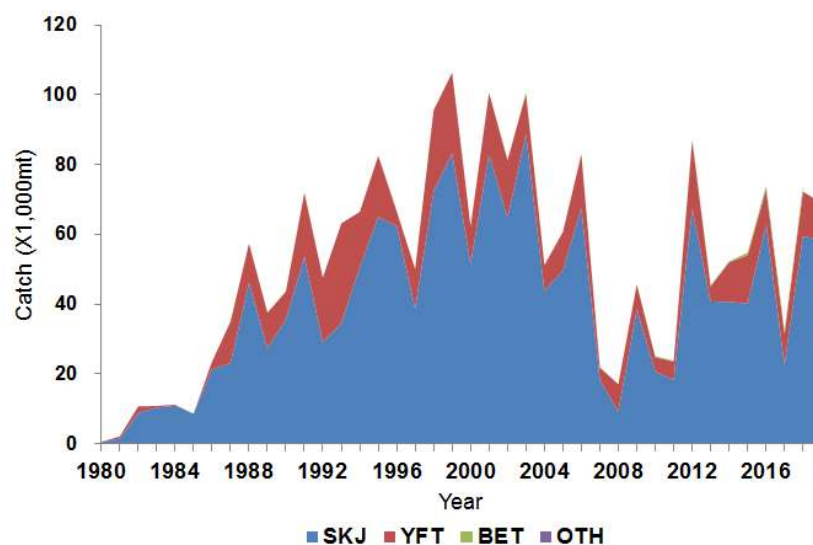


Fig. 5. Historical catch by major species caught by the Korean distant water tuna purse seine fishery in the North Pacific Ocean, 1980-2019.

Table 4. Annual catch of Pacific bluefin tuna by fishery in the Korean waters, 2002 – 2019. Data for 2019 is provisional

Year	Catch (ton)				
	PS (no. of vessels)	Set Net	Troll	Trawl	Total
2002	932 (32)	0	0	1	933
2003	2,601 (29)	0	0	0	2,601
2004	773 (29)	0	0	0	773
2005	1,318 (29)	0	0	9	1,327
2006	1,012 (29)	0	0	3	1,015
2007	1,281 (29)	0	0	4	1,285
2008	1,866 (29)	0	0	10	1,876
2009	936 (27)	0	0	4	940
2010	1,196 (25)	0	0	16	1,212
2011	670 (25)	0	0	14	685
2012	1,421 (24)	0	1	2	1,424
2013	604 (24)	1	0	0	605
2014	1,305 (24)	6	0	0	1,311
2015	676 (24)	1	0	0	677
2016	1,024 (24)	3	0	2	1,029
2017	734 (24)	3	0	6	743
2018	523 (24)	7	0	5	535
2019	542 (23)	36	0	3	581

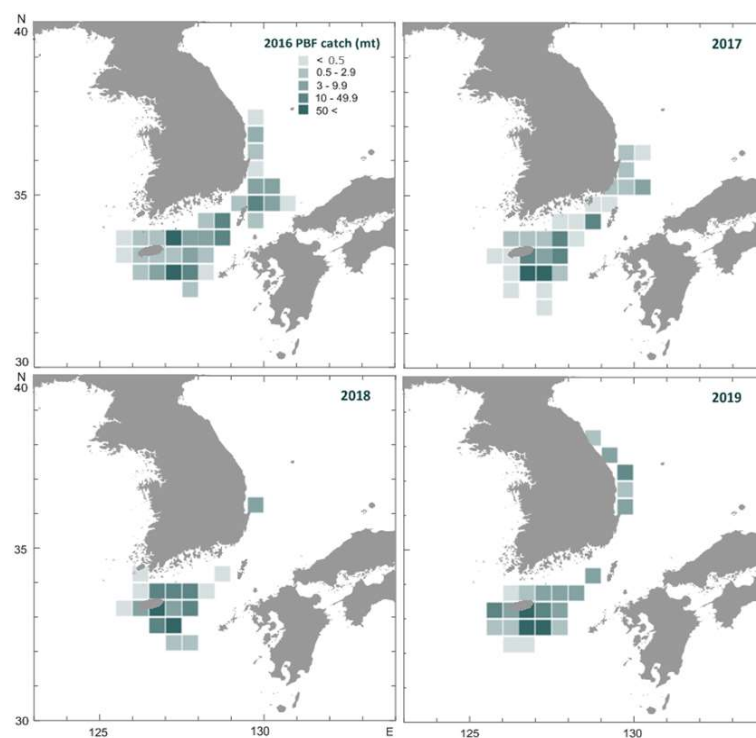


Fig. 6. Distribution of catch of Pacific bluefin tuna caught by Korean coastal and offshore fisheries, 2016-2019.

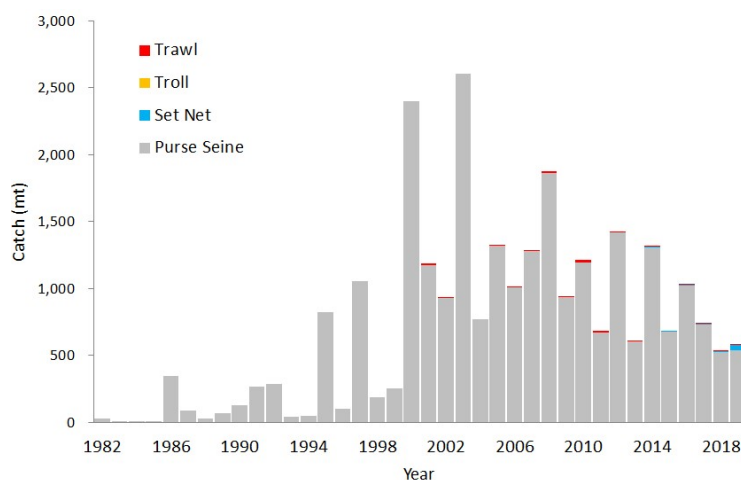


Fig. 7. Historical catch of Pacific bluefin tuna by fishery in the Korean waters, 1982-2019.

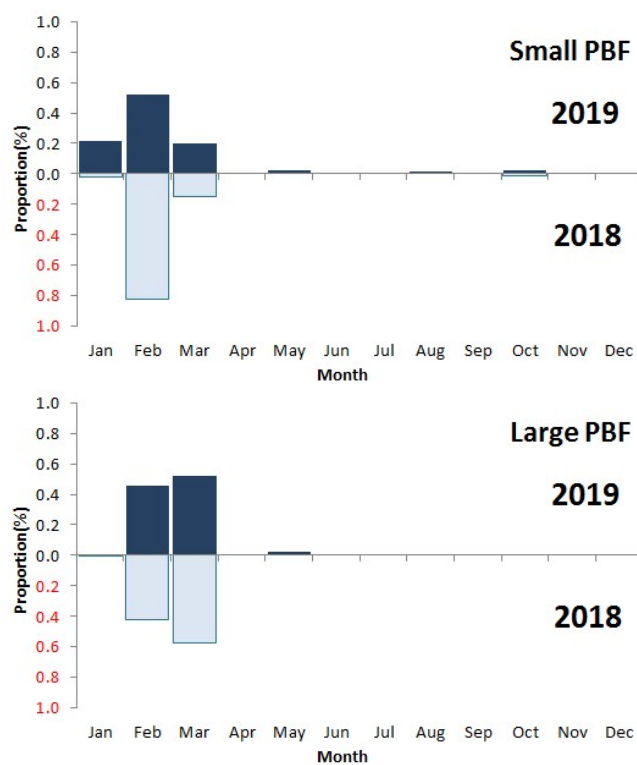


Fig. 8. Monthly catch proportions by size of Pacific bluefin tuna caught by Korean coastal and offshore fisheries in 2018 and 2019.

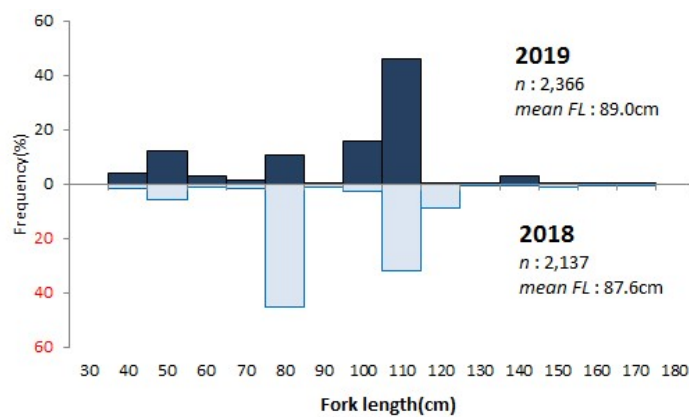


Fig. 9. Length frequency of Pacific bluefin tuna caught by Korean offshore large purse seine fishery in 2018 and 2019.