

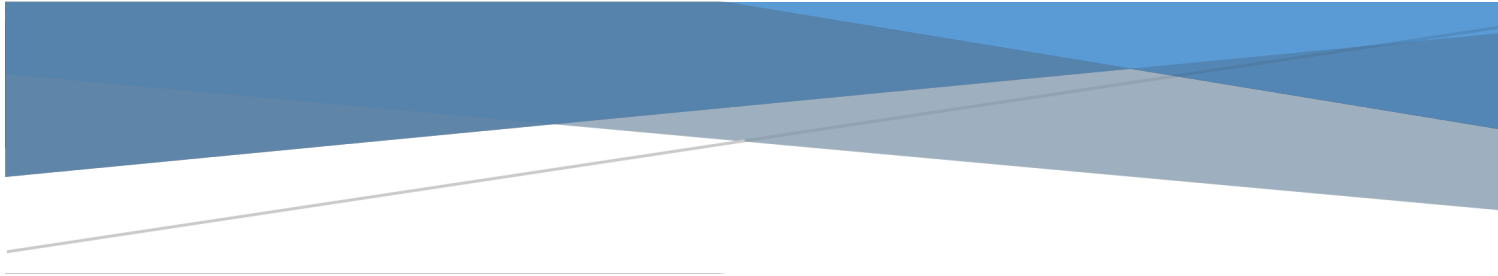
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Republic of Korea



**KOREA ANNUAL REPORT ON
FISHING, RESEARCH ACTIVITIES, AND
OBSERVER IMPLEMENTATION
IN THE SPRFMO CONVENTION AREA
IN 2022**

August 2023



National Institute of
Fisheries Science

NIFS

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1. Introduction

There were no Korean fishing activities in the SPRFMO Convention Area in 2022. Therefore, there is no update on either catch or biological information in the year of 2022—The present report is similar to the 2022 national report submitted.

2. Description of Fisheries

2.1 Trawl fishery

Korea had been conducting trawl fishing targeting jack mackerel (*Trachurus murphyi*) since 2003 when Korean research trawl vessel *Tamgu No.1* operated pristinely in the SPRFMO Convention Area. The number of active Korean trawl vessels has varied from one to three in the last 15 years (Table 1). Since 2020, Korea has not conducted any trawl fishing in the Convention Area.

Table 1. Summary of the number and size of Korean trawlers in the SPRFMO Convention Area.

Year	Number of vessels	Gross registered Tonnage (GRT)			
		2,000-2,999	3,000-3,999	4,000-4,999	5000<
2004	3	√	√	√	
2005	2	√	√	-	
2006-2008	3	√	√	√	
2009	2		√	√	
2010-2012	2		√		√
2013-2014	1		√		
2015-2016	2		√		√
2017	1		√		
2018-2019	2		√		√
2020	0				
2021	0				
2022	0				

2.2 Jigging fishery

Korea jigging fishery targeting jumbo flying squid (*Dosidicus gigas*) has been commercially operating in the Convention Area since 1990. The number of jigging vessels fluctuated in the range of 0-50 in the last 30 years (Figure 1). In the 1990s, the number of vessels peaked at 50 in 1995 and decreased rapidly since then. Only the number of vessels remained the smallest in the 2000s. Korea has not conducted jigging fishing in the Convention Area since 2021.

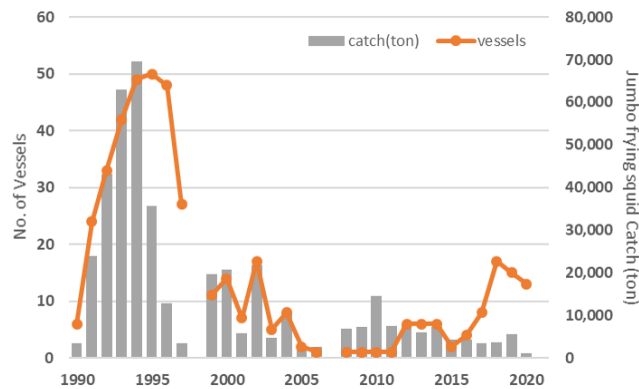


Figure 1. Trends in effort (the number of jigging vessels fishing) and total catch of jumbo flying squid (*Dosidicus gigas*) in the SPRFMO Convention Area from 1990 to 2021.

3. Catch, Effort and CPUE Summaries

3.1 Pelagic trawl fishery

The annual trawl fishing effort and catch by Korean vessels targeting mainly jack mackerel (*Trachurus murphyi*) in the SPRFMO Convention Area are summarized in Table 2. The number of fishing days fluctuated between the range of 40-249, depending on the number of vessels between one to three before 2020. No trawl fishing was conducted in the convention area since 2020.

Jack mackerel is the main target species and has made up more than 85% of the total catch with tonnages ranging from 1,235 to 13,759 tons. Chub mackerel (*Scomber japonicus*) is the second most dominant species in the catch which ranged from 21 to 1,460 tons. Other species that have been significant in the catch include Blue fathead (*Cubiceps caeruleus*), Pacific pomfret (*Brama japonica*), and jumbo flying squid (*Dosidicus gigas*), and the catches of these species were included in the “Other species” category in Table 2.

The CPUE trend of jack mackerel is relatively stable in the range of four to six (ton/hour) except for 2009 when the highest CPUE (10.5 ton/hour) was reported (Figure 2). The total catch in 2019 increased substantially, and the catch of jack mackerel increased by more than twofold of the previous year. However, the CPUE did not increase as much as the catch.

Table 2. Annual fishing effort (number of vessels and tow) and fisher-reported catch (tons) of two main species and others by weight (CJM: jack mackerel, MAS: chub mackerel) by Korean trawlers in the SPRFMO Convention Area.

Year	No. Vessels	*No. Fishing days	No. Tows	Total towed hours	CJM (ton)	MAS (ton)	Other species (ton)	Total catch (ton)
2004	3	205	N/A	N/A	7,438	708	0	8,146
2005	2	170	N/A	N/A	9,126	381	0	9,507
2006	3	232	N/A	N/A	10,474	1,460	0	11,934
2007	3	237	N/A	N/A	10,940	1,240	0	12,180
2008	3	249	N/A	N/A	12,600	968	0	13,568
2009	2	182	N/A	N/A	13,759	716	59	14,534
2010	2	136	N/A	N/A	8,183	84	0	8,267
2011	2	205	N/A	N/A	9,253	24	100	9,377
2012	2	117	N/A	N/A	5,492	0	0	5,492
2013	1	140	N/A	975	5,267	111	0	5,378
2014	1	86	N/A	652	4,078	21	0	4,099
2015	2	104	N/A	900	5,749	82	3	5,834
2016	2	182	N/A	1,581	6,430	486	16	6,931
2017	1	40	N/A	225	1,235	191	3	1,429
2018	2	138	209	882	3,717	246	86	4,049
2019	2	111	249	1,427	7,444	82	96	7,622
2020	0	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0	0
2022	0	0	0	0	0	0	0	0

* No. of fishing days: only days of fishing activity occurred.

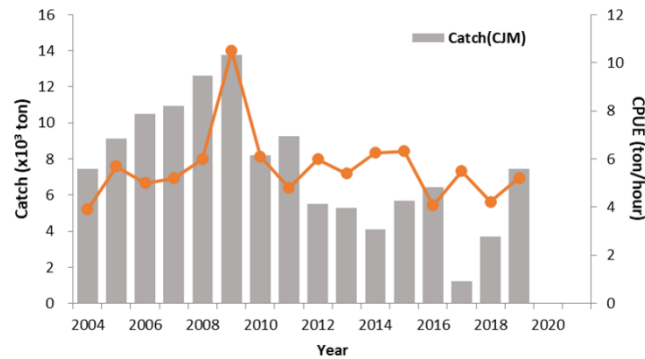


Figure 2. Annual catch and CPUE (ton/hour) of jack mackerel in the SPRFMO Convention Area.

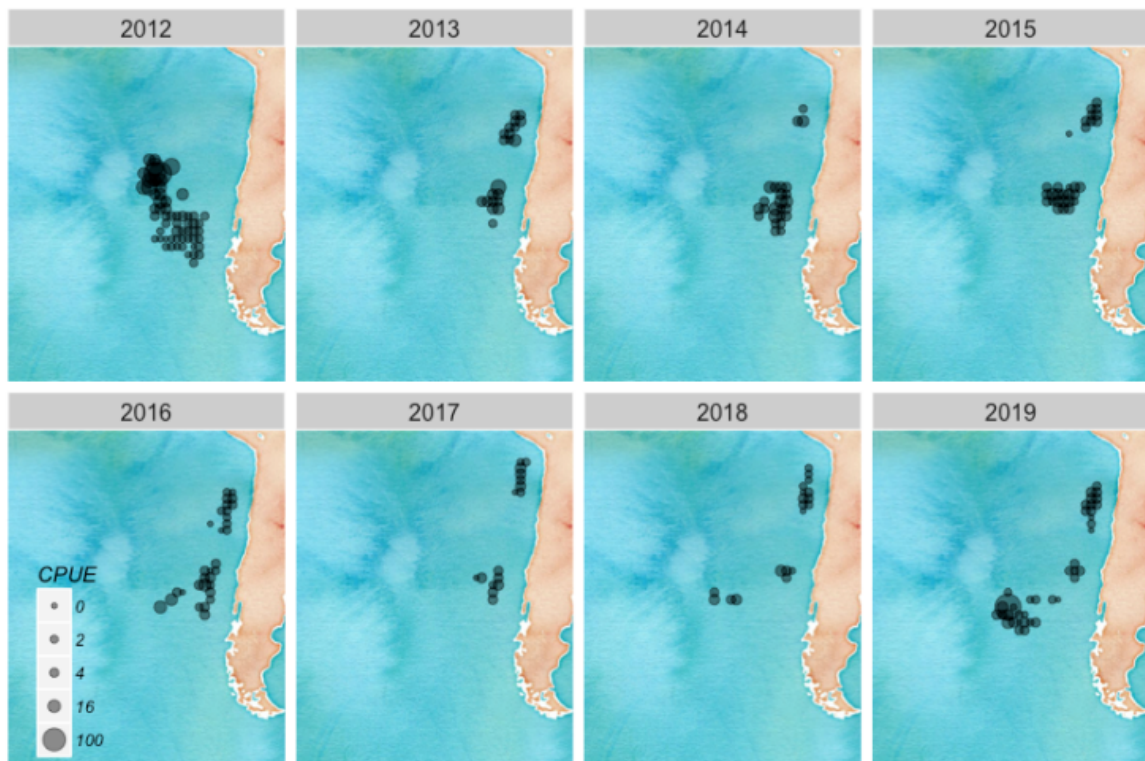


Figure 3. Distribution of CPUE (ton/hour) of jack mackerel in the SPRFMO Convention Area during 2012-2019. No fishing conducted in the Convention area since 2020.

3.2 Bottom trawl fishery

Korean bottom trawl fishery, mainly targeting orange roughy (*Hoplostethus atlanticus*), has not fished in the SPRFMO Convention Area since 2008 (Refer to SC6-Doc27).

3.3 Jigging fishery

The annual fishing effort (fishing days) and catch by Korean jigging vessels are summarized in Table 3. The fishery mainly targets jumbo flying squid. The annual fishing effort and catch varied over time. The biggest catch of jumbo flying squid was over 69 thousand tons in 1994, and the highest number of jigging vessels operated in 1995. The catch trend shows a continuous decrease since the highest catch was observed (Figure 1). The CPUE ranged from 3.6 to 28.2 ton/day in the recent nine years. The CPUE also shows a slight decreasing trend since 2015 (Figure 4).

Table 3. Annual fishing efforts (number of vessels and fishing days) and catches of jumbo flying squid by Korean jigging fisheries in the SPRFMO Convention Area.

Year	No. Vessels	No. Fishing days	Avg. fishing days/vessel	Total catch (ton)
1990	6	N/A	N/A	3,465
1991	24	N/A	N/A	24,015
1992	33	N/A	N/A	43,022
1993	42	N/A	N/A	62,887
1994	49	N/A	N/A	69,664
1995	50	N/A	N/A	35,719
1996	48	N/A	N/A	12,896
1997	27	N/A	N/A	3,359
1998	0	0	0	0
1999	11	N/A	N/A	19,728
2000	14	N/A	N/A	20,822
2001	7	N/A	N/A	5,797
2002	17	N/A	N/A	21,759
2003	5	N/A	N/A	4,722
2004	8	N/A	N/A	10,787
2005	2	N/A	N/A	2,519
2006	1	N/A	N/A	2,485
2007	0	0	0	0
2008	1	N/A	N/A	6,775
2009	1	N/A	N/A	7,221
2010	1	N/A	N/A	14,506
2011	1	N/A	N/A	7,410
2012	6	580	97	7,991
2013	6	365	61	6,034
2014	6	397	66	7,261
2015	2	151	76	4,263
2016	4	409	102	4,388
2017	8	456	57	3,460
2018	17	1,003	59	3,651
2019	15	1,037	69	5,577
2020	13	212	16	1,003
2021	0	0	0	0
2022	0	0	0	0

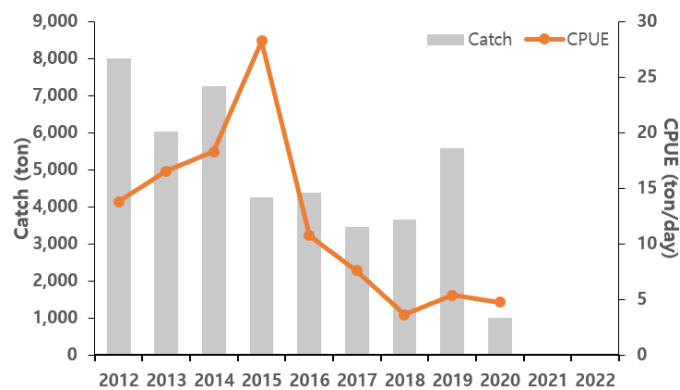


Figure 4. Annual catch (ton) and CPUE (ton/day) of jumbo flying squid in the SPRFMO Convention Area.

4. Fisheries Data Collection and Research Activities

4.1 Fisheries catch & effort data collection system

The data collection system implemented for Korean high seas fishing vessels has been changed since 2015. Before 2015, the system was operated in a dualised manner: total catches of high seas fishing vessels were collected by Korea Overseas Fisheries Association (KOFA) while fishing logbook was collected and managed by National Institute of Fisheries Science (NIFS). Since September 2015, detailed tow-by-tow catch and effort data of all high seas fishing vessels have been reported through Electronic Reporting System (ERS) to Fisheries Monitoring Center (FMC) under the Ministry of Oceans and Fisheries (MOF) of the Republic of Korea. The catch and effort data from all fishing vessels operating in the Convention Area are submitted to the Secretariat in accordance with the data standards of SPRFMO.

5. Observer Implementation Report

5.1 Observer program design and training

Korean scientific observer program for distant-water fisheries has been in place since 2002. According to “Enforcement decree of the distant water fisheries development act,” the Korean scientific observer program is operated by two organizations: 1) National Institute of Fisheries Science (NIFS) and 2) Korea Fisheries Resources Agency (FIRA). NIFS is in charge of the scientific analysis including the briefing/debriefing, management of observer data, data verification, and training of observers on the RFMOs’ Conservation and Management Measures (CMMs), while FIRA is in charge of the management of the program except for NIFS’s responsibilities.

The observer training provided by the Korean scientific observer program is classified into four types: 1) candidate training for recruitment, 2) regular training for all observers, 3) self-development training, and 4) pre-survey training.

The process to recruit observers is as follows. Candidates are selected by reviewing their applications and CVs based on the qualification criteria: a person who is a college graduate whose major field is nature science; or else, a high school specialized fisheries graduate who accompanies at least 1-year experience on board with having a certificate of qualification to deck officer. The candidates who pass the review process are subject to an in-person interview. In the interview, the candidates are asked about their basic knowledge on fisheries, English speaking skills, availability to be on board, etc. The candidates who pass the in-person interview are to attend the candidate training course. The trainees who pass the final test can be selected to be deployed to the vessels.

Biannual regular training sessions are provided for all selected observers who are off-duty. The training includes updated RFMOs’ CMMs, safety training, protected species (marine mammals, seabirds, VMEs), and other subjects including integrity courses.

Due to the limitation in gathering as a group and providing a group training, the self-development training focuses on individual observer’s free will in improving their skills of English, computer, and more. All observers can be provided approximately \$300/year for their self-development training.

NIFS trains observers before dispatching them to each RFMOs convention area. The pre-survey training includes the CMMs of each RFMO, the method to collect the data and biological samples by specific tasks to be done, and detailed information on writing the survey reports.

Table 4. Types of observer training process by the Korean scientific observer program

Type of training	Candidate training	Regular training	Self-development training	Pre-survey training
Organization	FIRA	FIRA	FIRA	NIFS
Period	Only once	Biannual	Time of need	Before every dispatching
Materials	An overview of the observer program, Gear-specific observer duties, Identification and measurement for target species, Observation of sharks/whales/seabirds, Observation of Vulnerable Marine Ecosystems (VMEs), Hand-on computer program training, Marine species identification, Introduction of RFMOs, Systematic management of fishing information, Catch product processing, Marine meteorology, At-sea safety training English (maritime everyday), Organizational structure and culture of a ship, and Fish dissection LAB	Scientific research, Protected species (seabirds, mammals), Identification on VMEs, Safety education, and Integrity education	English, Computer skill, and Physical training	Update on RFMO's CMMs, Scientific survey process, How to write logbook, Sample collection method, and Preparation of survey report

The Korean scientific observer program was approved by the SPRFMO Commission in 2022 after the process of Accreditation Assessment.

5.2 Observer coverage and data collection

Korean observers collect a wide range of data from both target and bycatch species to inform scientific analyses. The lists of data collected by observers are based on SPRFMO CMM 02-2022 Annex 7.

The observer coverage of Korean vessels is summarized in Table 5. In 2008, two trawlers operated in the Convention Area, and one observer was deployed on two vessels for 9 days. No observer was dispatched in 2009-2010. One observer was aboard one trawler in 2011 and 2012, and the coverages were 6.8% and 58.1% respectively. The observer coverage for trawl fishing has been 100% since 2013. No Korean trawler fished in the Convention Area since 2020, so there was no updated observer activity.

The first placement of scientific observers on Korean commercial jigging vessels was in 2015. In 2020, one observer embarked and collected scientific information with a coverage of 20% over the total fishing days.

Table 5. Scientific observer FIRA coverage on Korean vessels in the SPRFMO Convention Area.

Year	Gear types	Vessel name	Observer onboard days	Coverage rate of the vessel (total coverage of the fishing method)
2008	Trawl	<i>Insungho</i>	3	4%
	Trawl	<i>Kwangjaho</i>	6	
2011	Trawl	<i>Kwangjaho</i>	14	6.8%
2012	Trawl	<i>Kwangjaho</i>	68	58.1%

2013	Trawl	<i>Kwangjaho</i>	140	100% (100%)
2014	Trawl	<i>Kwangjaho</i>	86	100% (100%)
2015	Trawl	<i>Kwangjaho</i>	120	100% (100%)
	Trawl	<i>Sejong</i>	10	100% (100%)
	Jigging	<i>No.705 Amor</i>	75	100% (50%)
2016	Trawl	<i>Kwangjaho</i>	179	100% (100%)
	Trawl	<i>Sejong</i>	28	100% (100%)
2017	Trawl	<i>Kwangjaho</i>	88	100% (100%)
2018	Trawl	<i>Kwangjaho</i>	134	100% (100%)
	Trawl	<i>Sejong</i>	37	100% (100%)
	Jigging	<i>No.703 Amor</i>	93	100% (17%)
	Jigging	<i>No.101 Agnes</i>	82	100% (17%)
2019	Trawl	<i>Kwangjaho</i>	194	100% (100%)
	Trawl	<i>Sejong</i>	17	100% (100%)
	Jigging	<i>No.705 Amor</i>	88	84% (18%)
	Jigging	<i>No.316 Sunhae</i>	99	86% (18%)
2020	Jigging	<i>No. 5 Sae In</i>	*103	86%(20%)

* The observer embarked from the domestic port due to COVID-19 and sailed to the Convention Area

5.3 Biological sampling and length composition of catches

There is no update on the biological information of jack mackerel since there was no trawl fishery since 2020. The following information is similar to that provided in the 2020 annual report.

Yearly length frequencies and length-weight relationship of jack mackerel are shown in Figure 5 and 6. The ranges of annual sampling size are from 1,108 to 9,789 for the length measurement, and from 231 to 5,920 for the length and weight measurement. A comparison among the range of the annual fork length measurements taken from 2012 to 2019 suggests that a trend of having a single mode in the earlier part of the sampling year has been changed to have multiple modes in the later sampling period. In 2019, the strongest mode appeared around 23cm in fork length of jack mackerel.

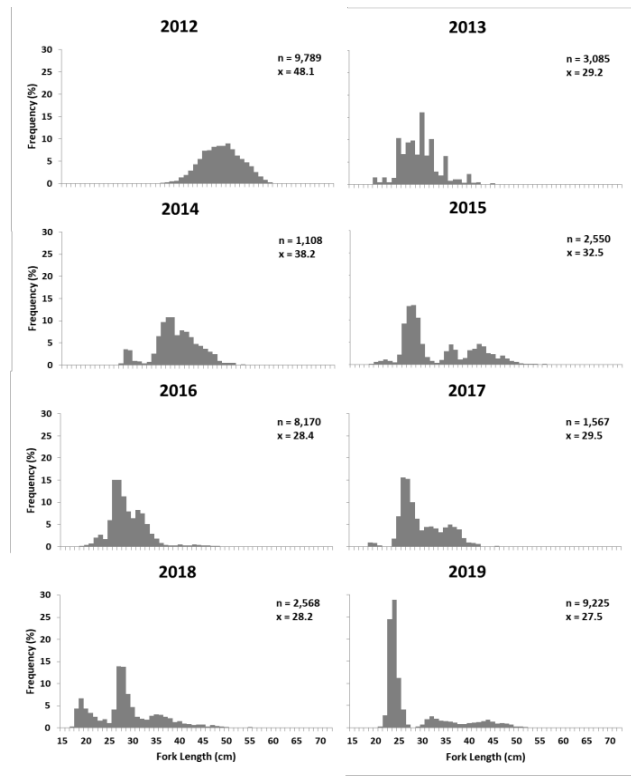


Figure 5. Length frequency distributions for jack mackerel from 2012 to 2019 collected by scientific observers in the SPRFMO Convention Area.

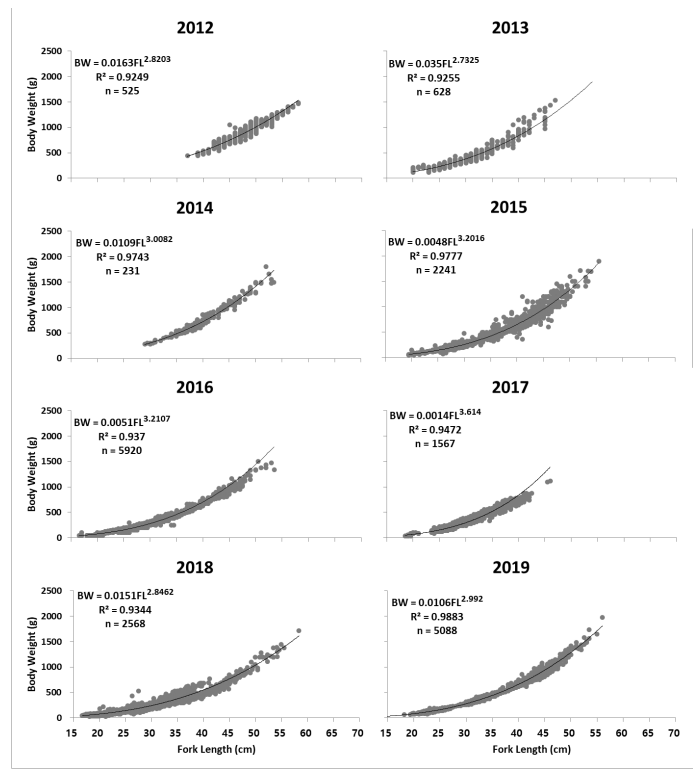


Figure 6. Length-weight relationships of jack mackerel from 2012 to 2019 collected by scientific observers in the SPRFMO Convention Area.

There is no update on the biological information of jumbo flying squid since no jigging fishery operated in 2021. The following information is similar to that provided in the last annual report.

The yearly length frequencies of jumbo flying squid from 2018 to 2020 are shown in Figure 7. The ranges of annual sampling size are from 782 to 4,901. The bimodal distributions appeared through the years with different intensities. In 2020, the most distinct bimodal mode appeared among the years around 55 and 80cm in the dorsal mantle length of jumbo flying squid.

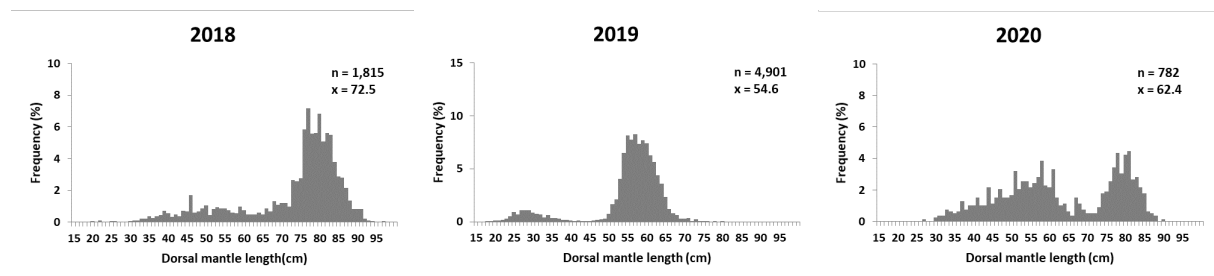


Figure 7. Length frequency distributions for jumbo flying squid from 2018 to 2020 collected by scientific observers in the SPRFMO Convention Area.

6. Ecosystem Approach considerations

6.1 Seabird mitigation measures

All Korean trawl vessels fishing in the SPRFMO Convention Area are required to comply with seabird mitigation measures specified in CMM 09-2017. The requirements include deployment of streamer (tori) lines or bird bafflers where it is not operationally feasible to use streamer lines and management of discharge of biological material. Trawl vessels are prohibited from discharging biological material during shooting and hauling. There is no update on the description of the seabird mitigation measures since no trawl fishing was conducted since 2020.

6.2 Observed interactions with other species of concern

All scientific observers execute daily observation of seabirds at least once every set or haul for more than 15 minutes. Observers are instructed to observe whether the seabirds are dipping their beaks or heads into the water near the net to feed on during fishing. The quantitative information on seabird observation is submitted by observers. A total of 24 species of seabirds were observed on trawl vessels from 2013 to 2020, and eight species were observed on jigging vessels from 2019 to 2020 (Table 6). There were no injured, struck or dead seabirds observed or reported from 2013 to 2020.

Table 6. A list of observed seabirds by scientific observers in the SPRFMO Convention Area.

Observed fishing vessel	FAO species code	Scientific name	English name
Trawl	CSK	<i>Catharacta skua</i>	Great skua
Trawl, Jigging	DAC	<i>Daption capense</i>	Cape petrel
Jigging	DAQ	<i>Phoebastria albatrus</i>	Short-tailed Albatross
Trawl	DCR	<i>Thalassarche chlororhynchos</i>	Yellow-nosed Albatross
Trawl	DIB	<i>Thalassarche bulleri</i>	Buller's albatross

Trawl	DIC	<i>Thalassarche chrysostoma</i>	Grey-headed albatross
Trawl, Jigging	DIM	<i>Thalassarche melanophrys</i>	Black-browed albatross
Trawl	DIU	<i>Thalassarche cauta</i>	Shy albatross
Trawl, Jigging	DIX	<i>Diomedea exulans</i>	Wandering albatross
Trawl	DMP	<i>Diomedea melanophrys</i>	Black browed albatross
Trawl	DSL	<i>Thalassarche salvini</i>	Salvin's albatross
Trawl	DSQ	<i>Sula dactylatra</i>	Masked Booby
Trawl, Jigging	FGZ	<i>Fregatta spp</i>	Storm petrels nei
Trawl	FUG	<i>Fulmarus glacialis</i>	Southern fulmar
Trawl	MAH	<i>Macronectes halli</i>	Hall's giant petrel
Trawl	MAI	<i>Macronectes giganteus</i>	Southern giant petrel
Trawl, Jigging	OCO	<i>Oceanites oceanicus</i>	Wilson's storm petrel
Trawl	PCI	<i>Procellaria cinerea</i>	Grey petrel
Trawl	PFG	<i>Puffinus griseus</i>	Sooty shearwater
Trawl	PHE	<i>Phoebetria palpebrata</i>	Light-mantled albatross
Trawl	PHE	<i>Phoebetria palpebrata</i>	Light-mantled Sooty Albatross
Trawl, Jigging	PRO	<i>Procellaria aequinoctialis</i>	White-chinned petrel
Jigging	PRX	Procellariidae	Petrels nei
Trawl	PWX	<i>Pachyptila spp</i>	Prions nei
Jigging	SZV	<i>Sula variegata</i>	Peruvian booby
Trawl	-	<i>Phaethon spp</i>	Tropicbird
Trawl	-	<i>Pteroderma externa</i>	Juan Fernandez petrel

Previous incidental catches on species of concern are described in Table 7. To encourage the reporting on incidental captures of species of concern and non-target species (CMM 02-2022) by jigging vessels, a poster to aid the identification of bycatch species was provided to all jigging vessels (Figure 8).

Table 7. Summary of species of concern from the Korean vessels in the SPRFMO Convention Area.

Year	Fishing vessels	Species	Amount caught	Datasets
2015	trawl	Porbeagle shark	7 (62kg)	FA, Obs
2016	trawl	Porbeagle shark	8 (97kg)	FA, Obs
2017	trawl	Porbeagle shark	2 (53kg)	FA, Obs
2018	jigging	Porbeagle shark	1 (no info)	Obs
2019	trawl	Porbeagle shark	20 (276.2kg)	Obs

FA: Fishing activity Data, Obs: Observer data

남태평양지역수산물관리기구(SPRFMO)해역
채낚기 부수어획종 및 우려종

채낚기 부수어획종


청상어상어 *Sheltona lewini*
 남태평양지역 수산물 관리 기구(SPRFMO) 관리 대상종
 한국산 어종


참돔 *Scorpaenopsis argentea*
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 한국산 어종


지느러미상어 *Manta birostris*
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Figure 8. A poster for the identification of bycatch species provided to Korean jigging vessels operating in the SPRFMO Convention Area.