Japan National Report to the Scientific Committee of the Indian Ocean Tuna Commission, 2021

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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 2021, final data for the 2020 calendar year must be provided to the Secretariat by 30 June 2021)	YES 29/June/2021
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 2021, preliminary data for the 2020 calendar year was provided to the IOTC Secretariat by 30 June 2021). **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 2021, final data for the 2020 calendar year must be provided to the Secretariat by 30 December 2021).	YES 29/June/2021
If no, please indicate the reason(s) and intended actions:	

Executive Summary

This Japanese national report describes following eight relevant topics stipulated in the 2021 national report guideline mainly in recent five years (2016-2020) (2020 is provisional) , i.e. (1) Fishery information (longline and purse seine fishery), (2) fleet information, (3) catch and effort by species and gear, (4) ecosystem and bycatch (sharks, seabirds, marine turtles), (5) national data collection and processing systems including "logbook data collection and verification", "vessel monitoring system", "observer scheme", "port sampling programs" and "unloading and transshipment", "Monitoring billfish catch", and sampling plans for mobulid rays", (6) national research programs, (7) Implementation of Scientific Committee recommendations and resolutions of the IOTC relevant to the Scientific Committee", and (8) "literature cited". Highlights from the eight topics are described as follows: Japan is currently operating longline and purse seine fisheries in the Indian Ocean. Catch and effort data are collected mainly through logbooks. Bigeye, yellowfin, albacore, southern bluefin tuna are main components of the catch by longliners, while three species (skipjack, yellowfin and bigeye tuna) are exploited by purse seiners. In recent years, catch and effort by longliners are in a low level mainly because of piracy activities off Somalia. Japan has been dispatching scientific observers in accordance with the Resolution 11/04, whose coverage has been more than the 5% compliance level in recent years except for 2020 (provisional) due to COVID-19 pandemic. A number of information including bycatch and biological data, has been collected through the observer program. Japan has been conducting several research activities.

Contents

1. BACKGROUND/GENERAL FISHERY INFORMATION

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

The total fishing effort (the number of hooks) of Japanese longliners in the Indian Ocean sharply increased from 2 million (1952) to 129 million hooks (1967) (the historically highest level), and then there was no clear increasing or decreasing trend with large fluctuation (52-128 million hooks) until 2007. Thereafter, it decreased down to about 28 million hooks in 2011 due to piracy activities off Somalia. It has been kept at the low level with slight decrease and 22 million hooks in 2020. The percentage compositions of fishing effort (number of hooks) in this Ocean against the total effort in all Oceans fluctuated around 20% until 2003, afterwards it increased to 35% in 2006 and 2007. Thereafter it has drastically decreased to 16% in 2010 and kept at a low level (11-19%) to now, mainly because of piracy activities.

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

As for the purse seine fisheries, operations took place mainly in the tropical western Indian Ocean until 1993. Afterwards operations shifted almost completely to the eastern Indian Ocean mainly because of economic problem derived from the rise of Japanese Yen during that time, in addition to the extra cost imposed due to the long geographical distances from Japan.

2. FLEET STRUCTURE

All Japanese longline vessels operating in the Indian Ocean have been the distant water category (120-500GRT) with some exceptional offshore vessels (10-120GRT). Historical change in the number of longline vessels from 1987 to 2020 is shown in Table 1. In the last 20 years, the number of vessels operated in this Ocean was around 172-228 per year until 2008. Although the number of operating vessels was relatively large (223-251) during 1995-1999, after that it decreased to less than 200 except for 228 in 2002. It decreased rapidly year by year until 2011 because of piracy activities off Somalia, and kept in a low level (41-59) after 2013. The number of longline vessels operated in 2020 was 59.

Japanese purse seine vessels operating in the Indian Ocean are the 350-700 GRT class (700-1,000 carrying capacity). Historical change in the number of purse seine vessels from 1987 to 2020 is shown in Table 1. Although 11-12 Japanese purse seiners operated during 1991-1994, it decreased year by year and commercial purse seiner retreated from the Indian Ocean in 2001 leaving only one vessel "Nippon-Maru", the research vessel of Fisheries Research Agency (FRA) with a few commercial vessels. This vessel was replaced by another research vessel "No.1 Taikei-Maru" in 2013. Since 2015 commercial vessels have resumed their operations and the number of total vessels in each year operated during 2016-2020 was 2-3.

Table 1: Number of vessels operating in the IOTC area of competence

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

Fleet/Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Longliners	199	228	172	189	184	188	178	173	130	84	72	75	57	53
Purse seiners	2	1	1	1	1	3	3	3	2	1	1	1	1	1

Fleet/Year	2015	2016	2017	2018	2019	2020
Longliners	52	45	41	46	50	59
Purse seiners	3	3	3	3	3	2

3. CATCH AND EFFORT (BY SPECIES AND GEAR)

3.1 Longline fishery

The latest available longline data is that of 2020 (data for 2020 are preliminary).

Fishing effort

The longline fishery commenced in 1952 in the eastern equatorial waters in the Indian Ocean. In the late 1960s, the effort covered entire fishing ground of the longline in the Indian Ocean. The annual amount of the effort had increased until the late 1960s and fluctuated after that. However, fishing effort had been dramatically decreasing since 2008 and then kept at a low level (Table 2a) because of the effects of piracy activities off Somalia. Fishing effort in 2020 (22,000 thousand hooks) was only about 18% of that in 2007 during the recent highest level.

Table 2a. Annual catch and fishing effort and primary species in the IOTC area of competence (longline fishery, 2016-2020) as of October 2021 (2020 is provisional)

(catch in mt, set in number and hooks in thousand)

Year	Set	Hooks	SBT	ALB	BET	YFT	SWO	MLS	BLZ	BLM	SFA	SPF	SKJ
2016	8,583	27,050	1,616	2,367	4,039	2,967	722	98	122	48	33	61	8
2017	7,346	23,378	1,250	1,668	3,739	3,290	566	61	139	48	56	66	8
2018	6,975	22,207	2,097	1,807	3,398	2,975	500	34	111	27	63	47	11
2019	6,332	19,950	2,477	1,912	3,830	2,573	452	17	80	27	50	25	15
2020	6,904	21,670	3,464	1,518	4,507	2,027	498	14	63	20	28	11	12

(Note) SBT (Southern bluefin tuna), ALB (albacore), BET (bigeye tuna), YFT (yellowfin tuna), SWO (swordfish), MLS (striped marlin), BLZ (blue marlin), BLM (black marlin), SFA (sailfish), SPF (shortbill spearfish), and SKJ (skipjack tuna).

Geographical distributions of longline fishing efforts for 2020 and average of 2016-2020 are shown in Fig. 2a. In 2020, the efforts were mainly in African offshore area (from the waters off Cape of Good Hope to Mozambique) and in the eastern part of the Indian Ocean off Australia and Indonesia, which is similar to that for 2016-2020. The effort in the northwestern area has dramatically decreased since 2008 and the efforts for 2016-2020 is still almost nothing because the threats of piracy remain off Somalia.

Catch

Historical catch in weight by species and catch statistics for 2016-2020 by Japanese tuna longliners in the Indian Ocean are shown in Fig. 1a and Table 2a, respectively, and geographical distributions of catch in 2020 and average of 2016-2020 for major tuna and billfish species are shown in Fig. 3a. Catch of albacore, yellowfin and southern bluefin tunas were very high during 1950s and 1960s, and then sharply decreased. After mid 1990s bigeye and yellowfin tunas have been main components of the catch.

Total catch (the catch of southern bluefin tuna, albacore, bigeye, yellowfin, swordfish, striped marlin, blue marlin, black marlin, sailfish, shortbill spearfish, and skipjack) in 2019 and 2020 was 11,464 MT and 12,169 MT, respectively. It should be noted that the catch of yellowfin and bigeye drastically decreased during 2007-2010, although the catch of albacore was roughly at the same level during this period. Furthermore, bigeye catch in 2018 and yellowfin catch in 2020 were the lowest after 1980s, and this decrease was mainly derived from decrease in fishing effort especially in the tropical area especially in the piracy area (northwestern Indian Ocean).

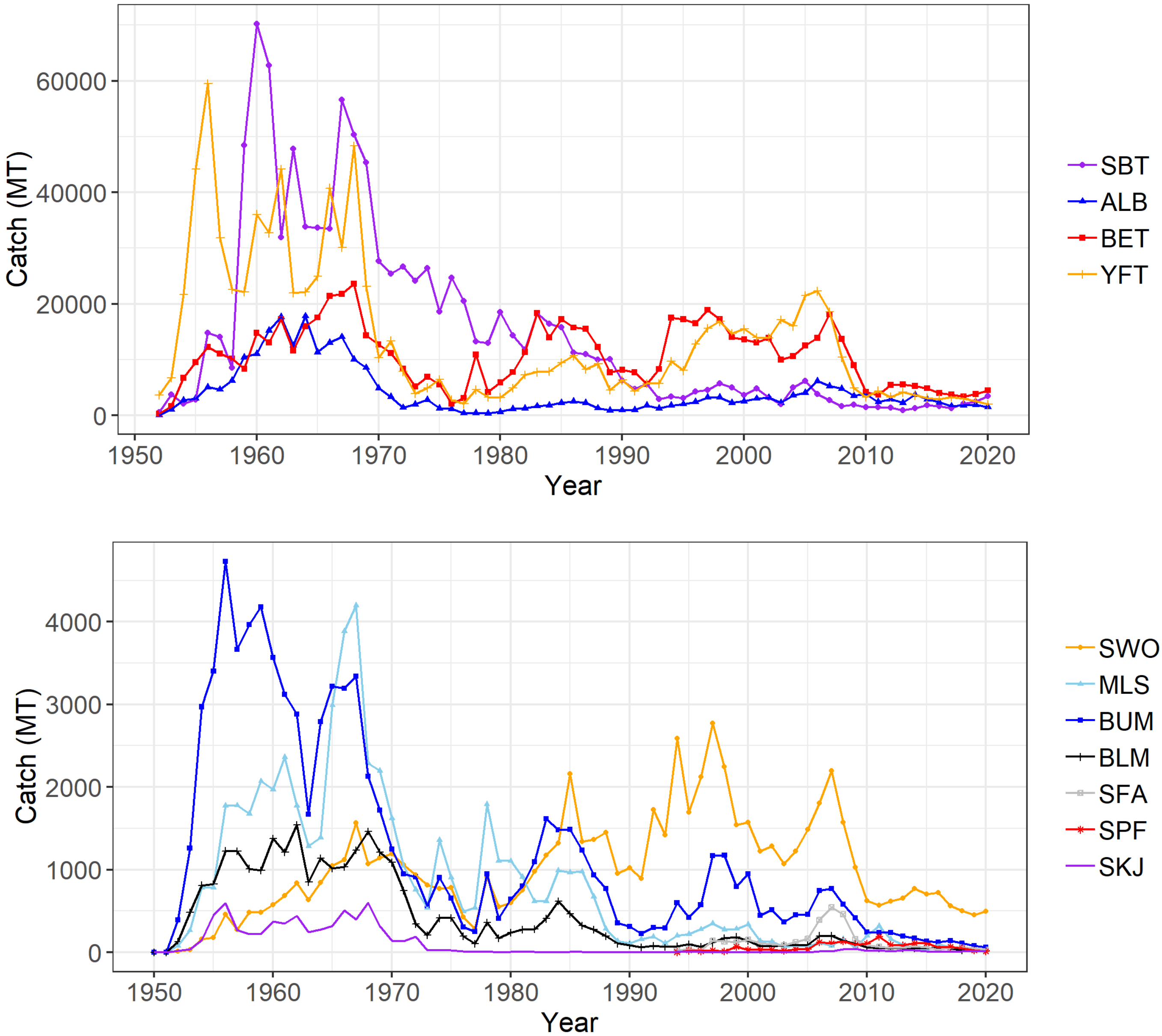
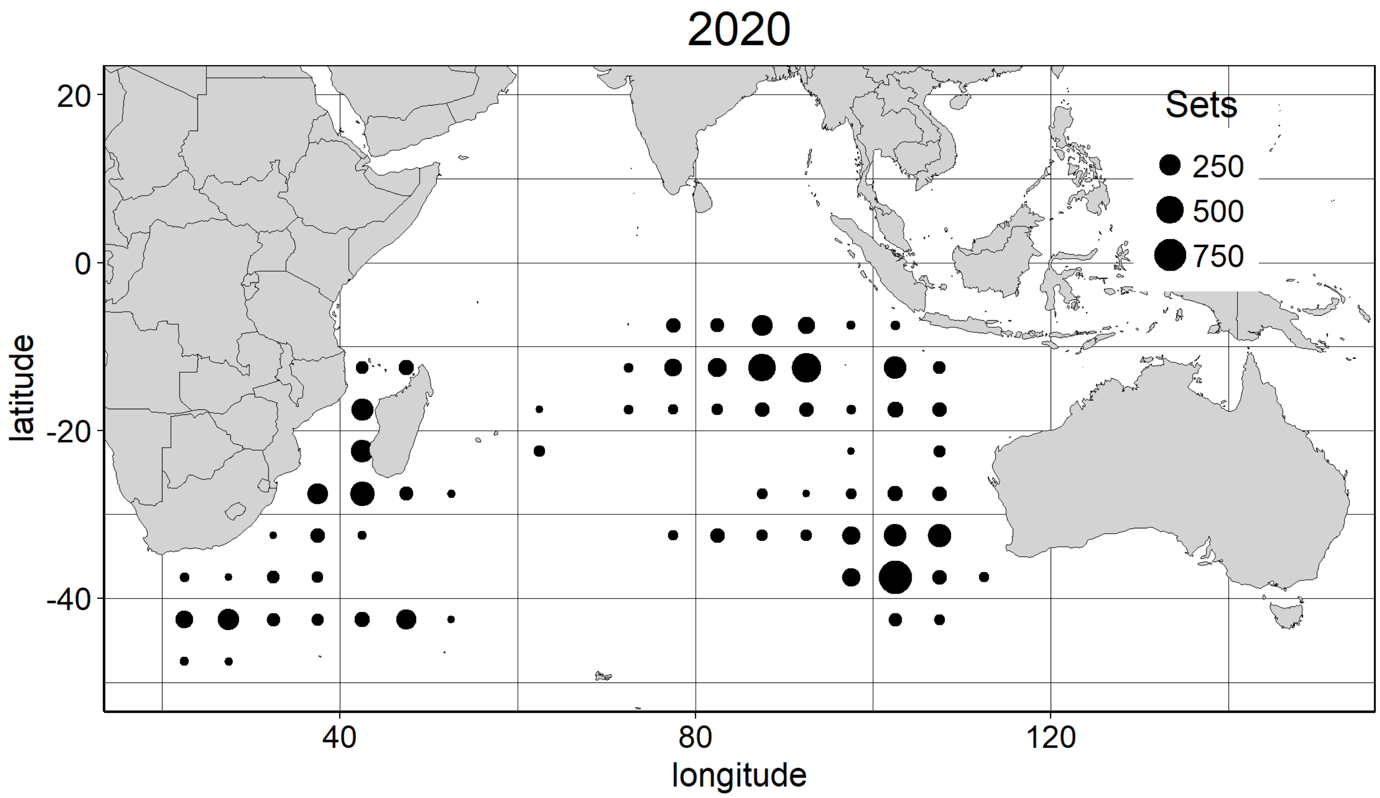


Fig. 1a. Catch trends of tuna and tuna-like species exploited by Japanese longliners

(2020 is provisional).

Upper: tuna species, lower: billfish species and skipjack tuna



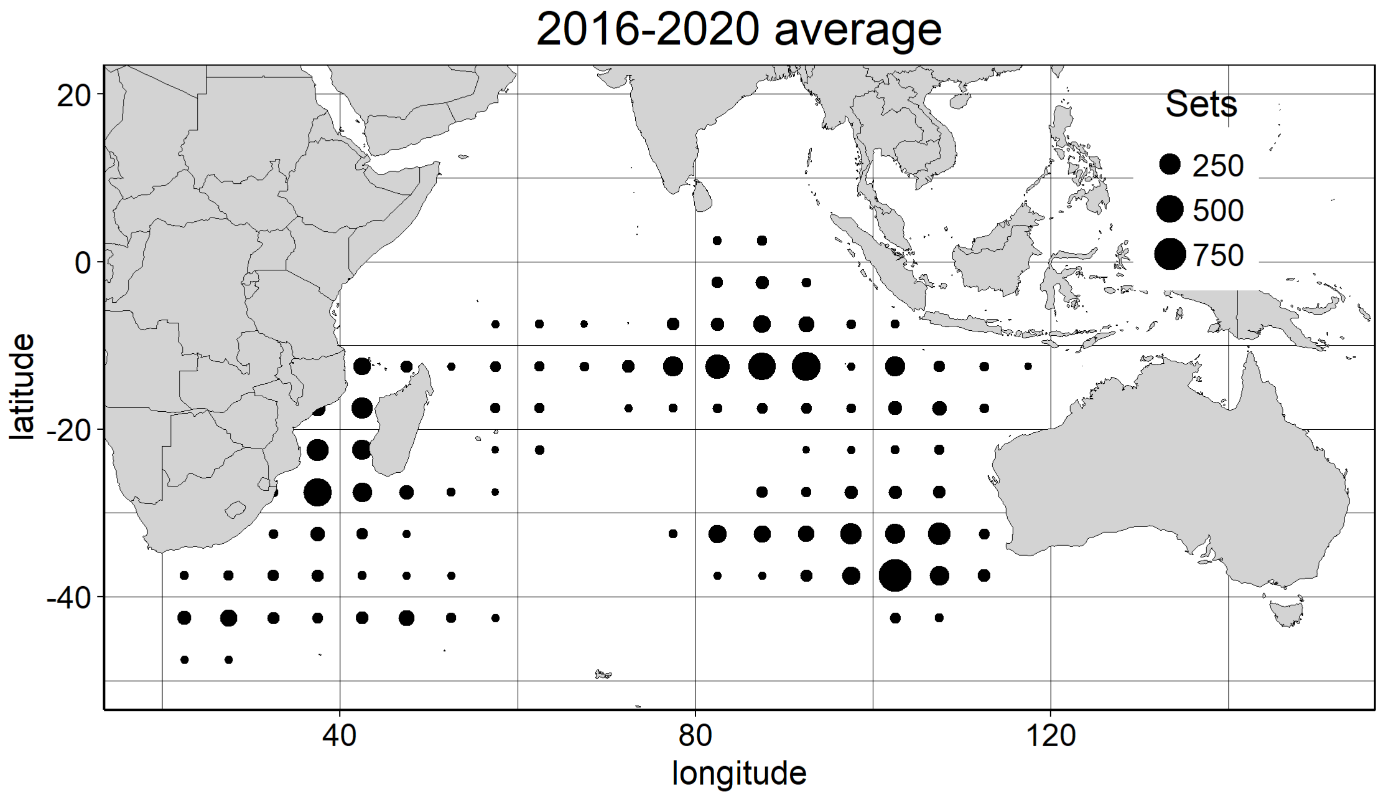
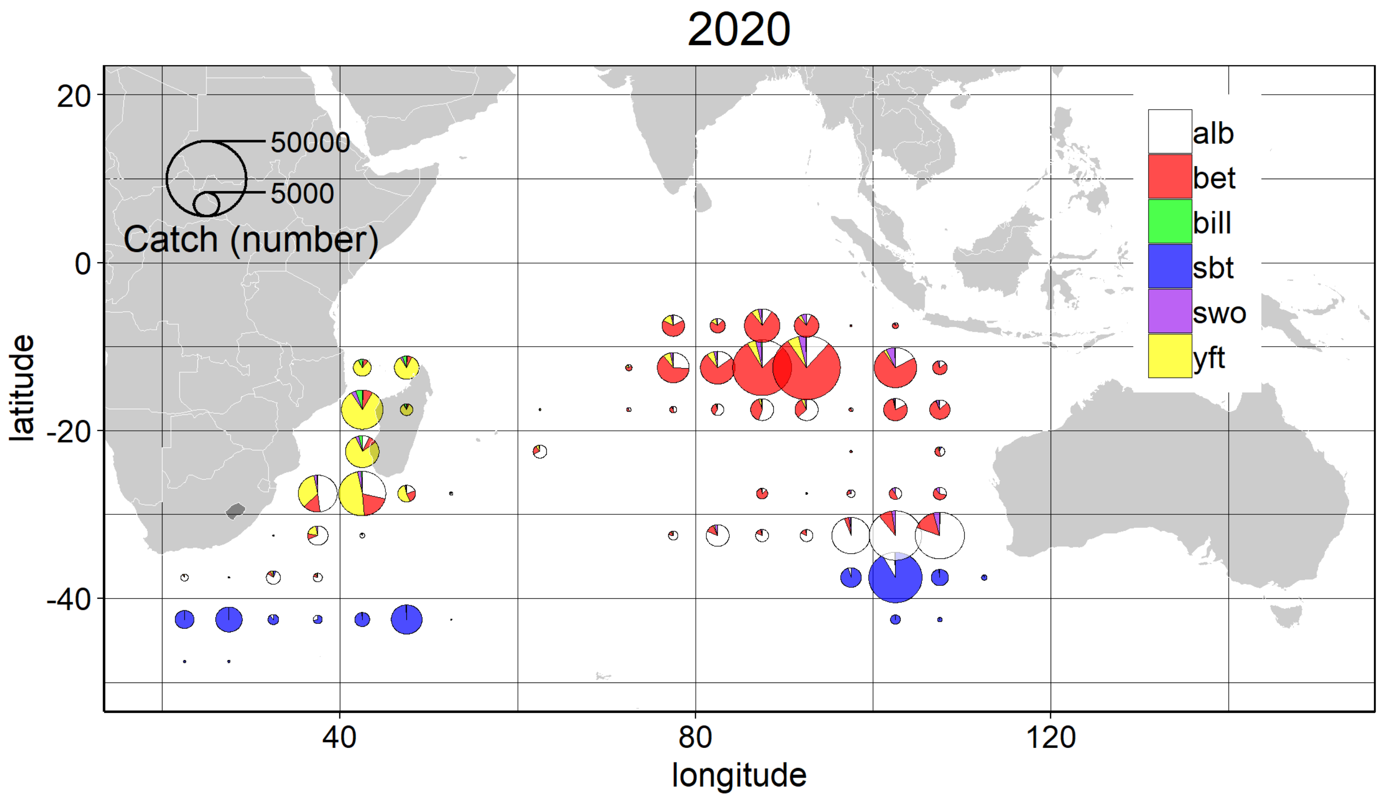


Fig 2a. Geographical distributions of longline fishing effort (in number of sets) for 2020 (above) and average of 2016-2020 (below) *(2020 is provisional).*



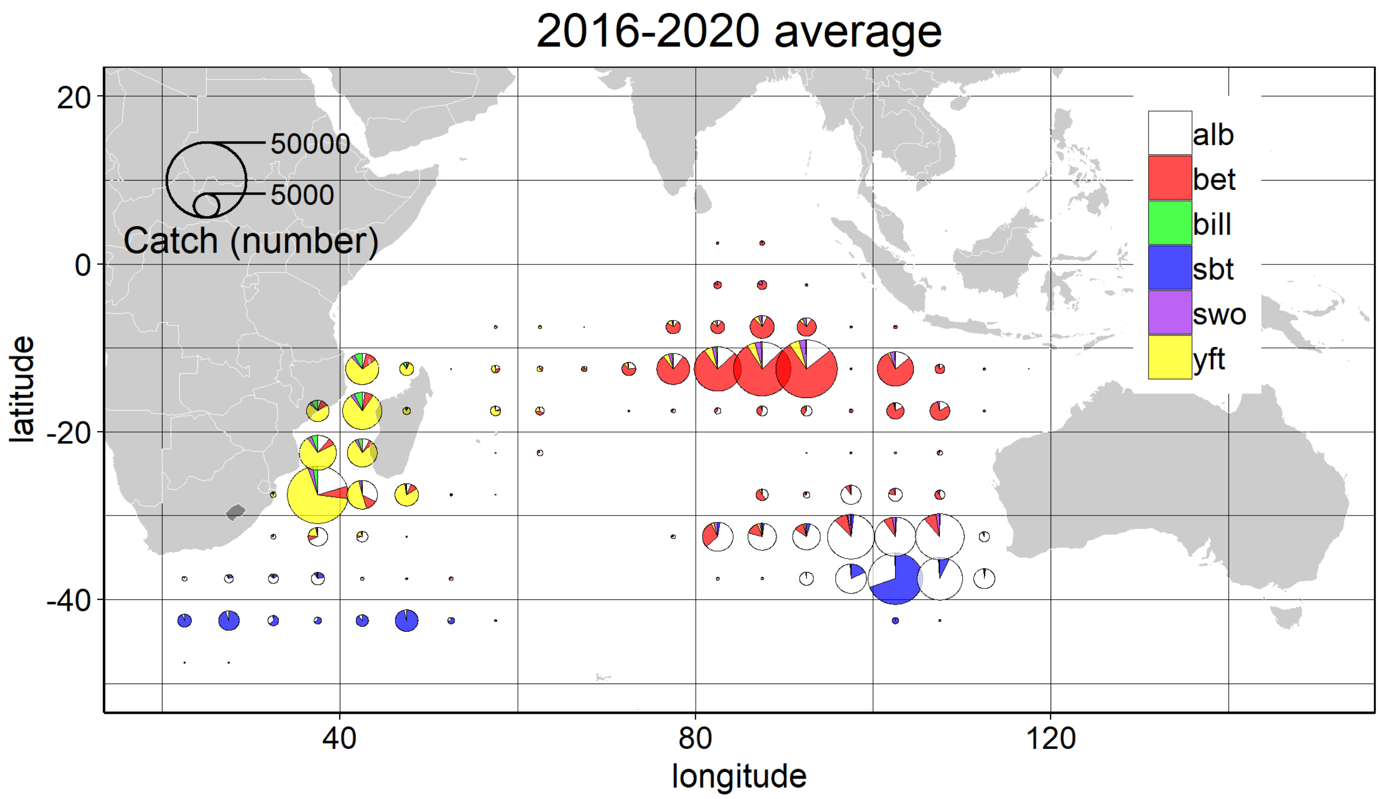


Fig. 3a Geographical distributions of longline catch (in number) of major species in 2020 (upper) and in average of 2016-2020 (lower) *(2020 is provisional)*.

Based on the geographical distribution of the catch (Fig. 3a), yellowfin and bigeye tunas are mainly caught off Mozambique and the central-eastern tropical waters, respectively. Albacore is mainly caught in the temperate area off Australia. During 2016-2020, there was almost no efforts in the northwestern area (good yellowfin fishing grounds), which has been similar situation since 2011 when the piracy activities started. Hence, longliners shifted their operations to the other waters especially off Mozambique and the southeastern Indian Ocean.

3.2 Purse seine fishery

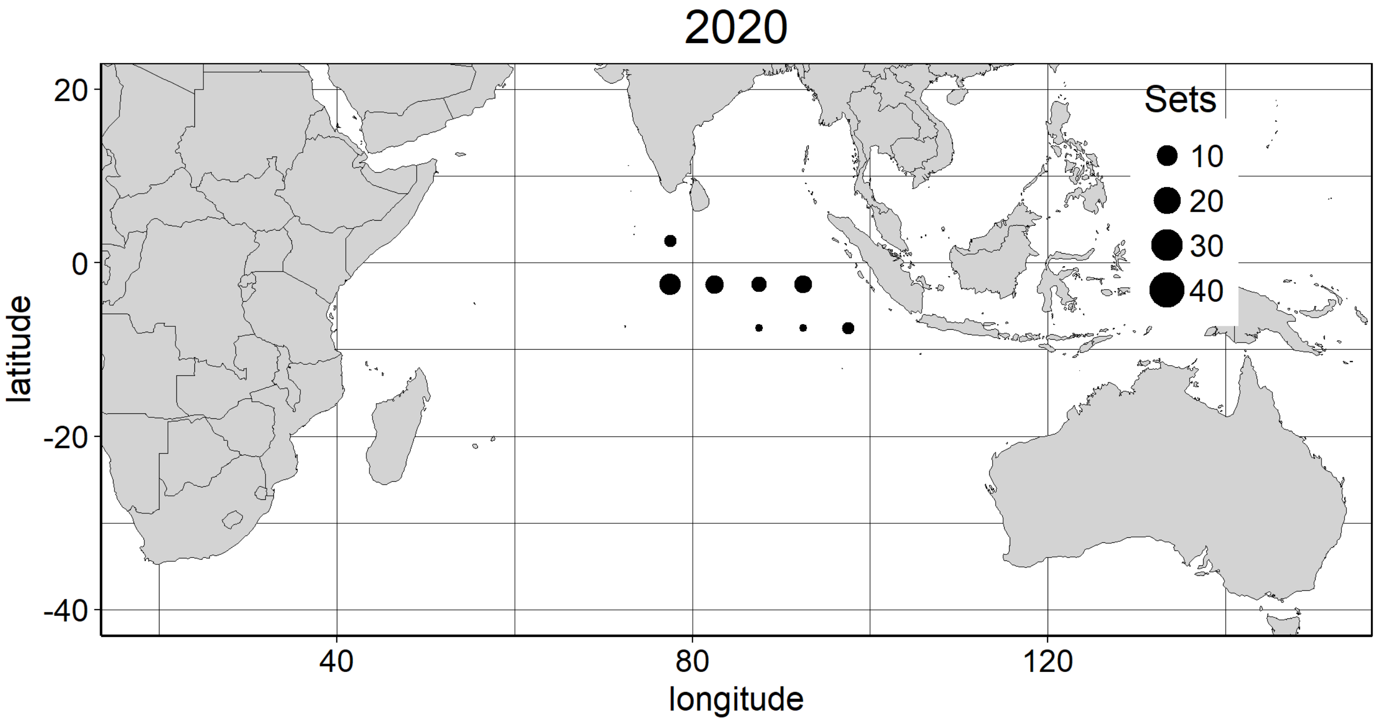
The latest available data for Japanese purse seine fishery is for 2020 (provisional).

Fishing Effort

Total fishing effort (number of set) was 201 in 2017 and 147 in 2018 (Table 2b). These are larger than those in the early 2010s due to the increase in the number of vessels (from 1 to 3). Fishing effort (number of set) in 2019 sharply decreased to 9 because the fishing conditions were extremely poor thus fishing operations ended very quickly in a very short time then purse seine vessels shifted to the Pacific Ocean. Also in 2020, the number of set was small and so the catch was also low. Geographical distributions of effort for 2020 and the average of 2016-2020 are shown in Fig. 2b. Operations were conducted almost only in the eastern part in recent years.

Table 2b. Annual catch and effort and primary species in the IOTC area of competence (2016-2020) (purse seine fisheries).

		Catch (MT)				
Year	Number of set	SKJ	YFT	BET	others	Total
2016	146	2,357	422	258	0	3,037
2017	201	3,129	712	424	0	4,265
2018	147	2,076	407	287	0	2,770
2019	9	187	24	24	0	235
2020	34	494	58	68	0	620



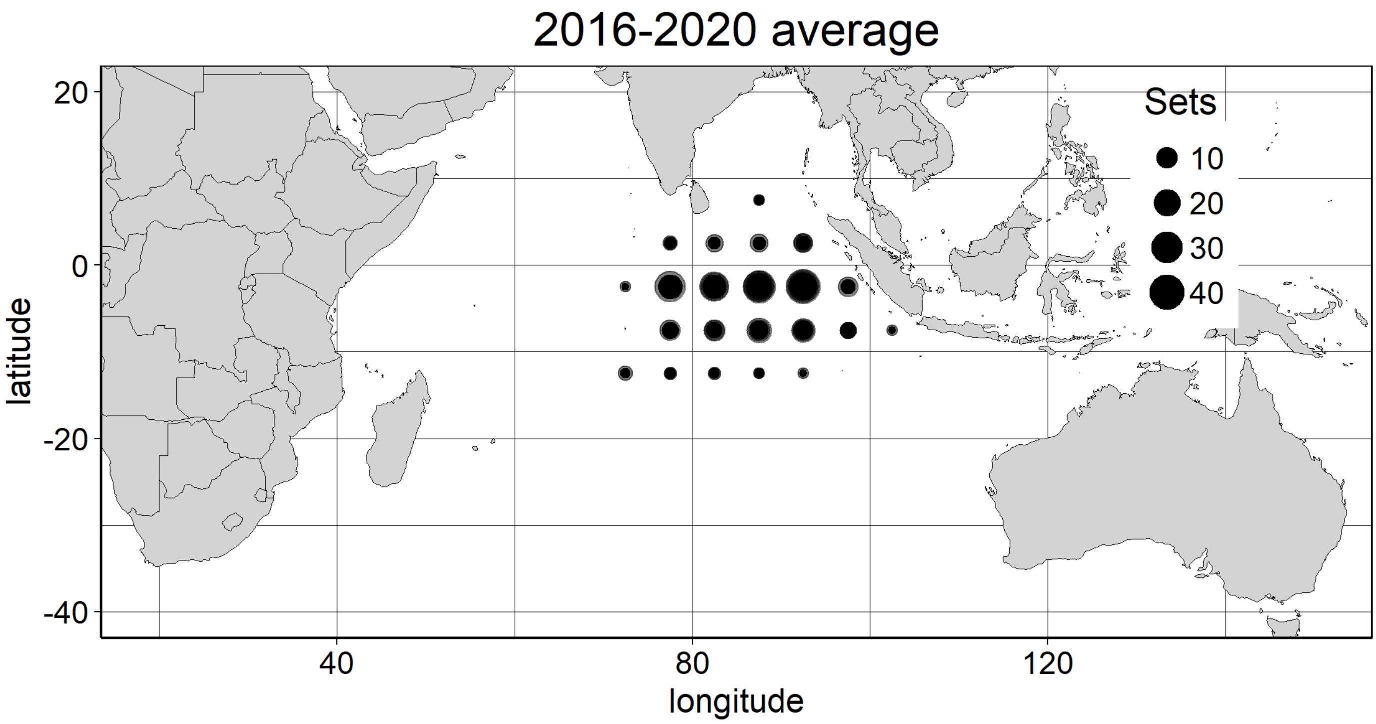


Fig. 2b. Distributions of purse seine fishing effort (number of sets) in the Indian Ocean in 2020 (upper) and average of 2016-2020 (lower) *(2020 is provisional).*

Catch

During 1972-1987, the total catch was low (< 1,000 MT except 3 years), afterwards increased rapidly to about 45 thousand MT in 1992 and 1993 (the highest record), then decreased sharply to 11 thousand MT in 1997 and 7 thousand MT in 1999 (Fig. 1b). Thereafter it had fluctuated between 2.2 and 6.2 thousand MT until 2012 and the total catch in 2013 and 2014 decreased to approximately 1 thousand MT. Total catch in 2015 increased to 2.8 thousand MT because of increase in the number of vessels operated, and further increased until 2017 (4.3 thousand MT in 2017). The catch drastically decreased in 2019 due to decrease in fishing effort as explained. Catch in weight of skipjack, yellowfin and bigeye in 2020 (2019) was 494 (187) MT, 58 (24) MT and 68 (24) MT, respectively.

Geographical distributions of catch in 2020 and average of 2016-2020 for major tuna species are shown in Fig. 3b. The main component of the catch was usually skipjack tuna in all the areas then yellowfin and/or bigeye tuna followed.

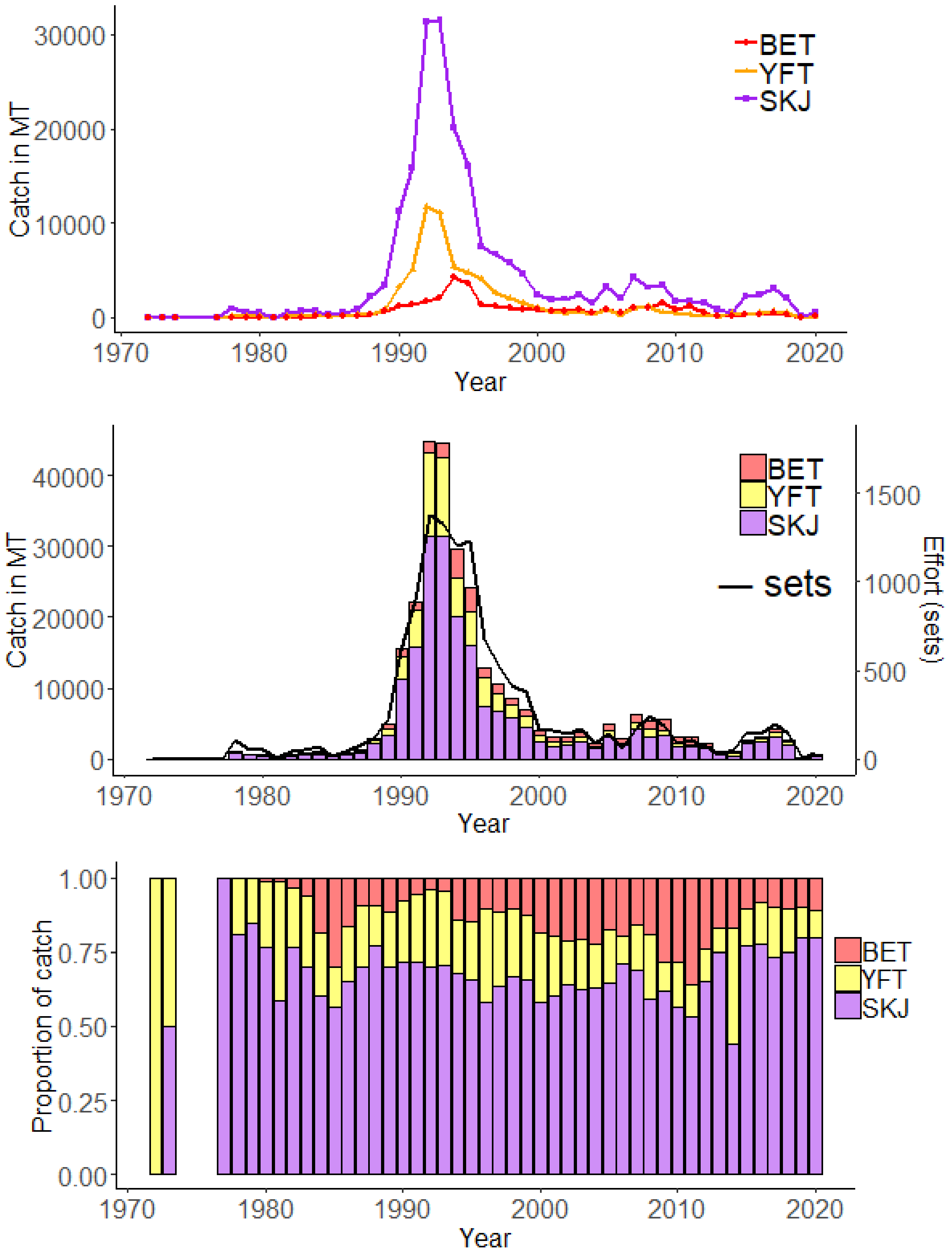


Fig1b. Trends of SKJ, YFT and BET catch *(top: actual and middle: cumulative with number of sets*) **and trends of species compositions of catch** *(bottom)* **exploited by Japanese purse seiners (1972-2020)** *(2020: provisional)*

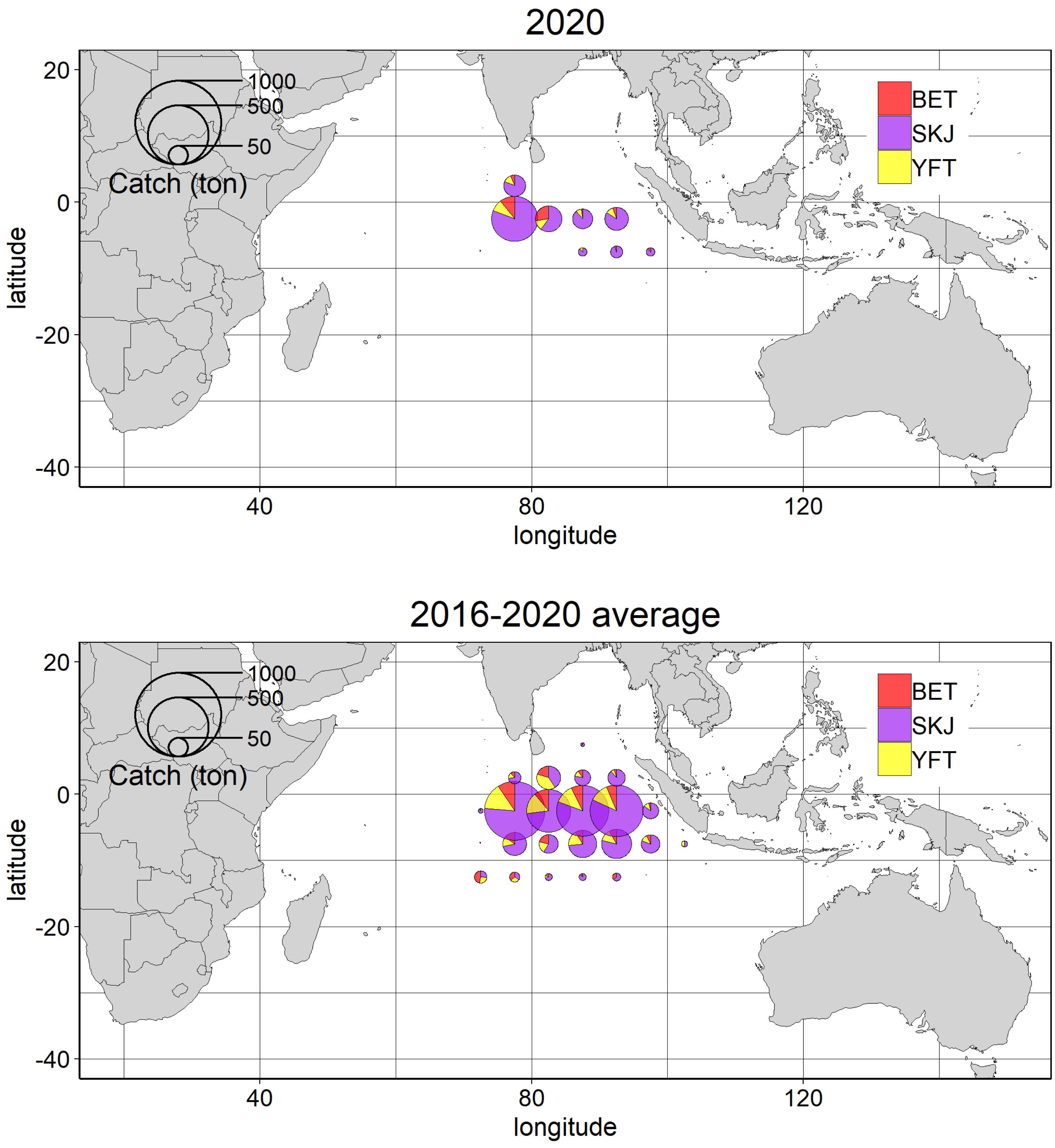


Fig. 3b. Geographical distributions of purse seine catch of SKJ, YFT and BET in 2020 *(upper)* **and average of 2016-2020** *(lower) (2020 is provisional)*

4. RECREATIONAL FISHERY

No recreational fishery in the Indian Ocean.

5. ECOSYSTEM AND BYCATCH ISSUES

In accordance with FAO International Action Plans on sharks and seabirds, Japan established the National Action Plans on sharks and seabirds in 2001 then revised in 2009 and 2016. In addition, Japan has been taking actions in accordance with the FAO Guidelines on sea turtle by-catch and also taking actions in accordance with IOTC conservation and management measures on by-catch of sharks, sea turtles and seabirds.

5.1 Sharks

5.1.1. NPOA sharks

Japan's National Plan of Action for Conservation and Management of Sharks was established in February 2001 and then revised in 2009 and 2016.

5.1.2. Sharks finning regulation

Japan complies with Resolution 17/05 (IOTC) including the ban of shark finning for Japanese fleet operating in the Indian Ocean under ministerial ordinance of Fisheries Act since 2008.

5.1.3. Blue shark

The Japanese longline fishery in the Indian Ocean catches blue shark. Catch data (in number and weight) of blue shark has been collected since 1994. Details of logbook data collection and verification is described in 6.1. Historical catches of three major shark species including blue shark in weight (MT) between 2016 and 2020 are shown in Table3.

As described in 6.3., scientific observers deployed to the Japanese tuna longliners have collected catch (in number and weight), biological and other information including body size, sex, fate of blue shark caught in the Indian Ocean since 2010.

Table 3 **Annual catch in weight (MT) of three major shark species caught by Japanese tuna longliners in the Indian Ocean (2016-2020)** *(2020 is provisional).*

Year	Blue shark	Porbeagle	Shortfin mako
2016	495	4	99
2017	592	12	102
2018	455	2	102
2019	449	2	55
2020	380	0	6

5.2 Seabirds

National strategies, NPOA-seabirds and recovery plan

In order to reduce incidental catches of seabirds, in 2001, Japan instituted the effective and practical National Plan of Action for reducing incidental catch of seabirds in Japanese longline fishing operations to suit the NPOA-Seabirds adopted in 1999. Japan's NPOA was developed based on (a) impact analyses based on the information from the Japanese longline operations and (b) consideration of the effective and practical methods to reduce incidental catch of seabirds. After instituting NPOA-Seabirds, Japan has revised it with the aim to effectively coping with the changes of the situation surrounding this issue. The newest revision was made in 2016.

Furthermore, FAJ has been mandating fishers to comply the domestic laws on relevant measures to reduce incidental catch of seabirds, which are based on various resolutions adopted by RFMOs.

Current seabird mitigation measures used by the national longline fleet

Seabird bycatch mitigation measures stipulated in accordance with the IOTC Resolution 12/06 have been in force under a national notice on bycatch mitigation measures.

Data collection

Japan has been collecting relevant scientific information for analyses (especially ecology and population status of seabirds) by sources such as observers onboard and logbooks.

The interaction of seabirds was examined by the Japanese observer data from 2016 to 2020. The data for the year 2020 is a provisional value. Results are described as follows:

Eastern Indian Ocean

The BPUE was relatively higher in the second quarter (April to June) than that in the other quarters. On the other hand, BPUE in the third quarter (July to September) was relatively low with highly observed hooks in around latitude 30-35ºS.

Western Indian Ocean

The BPUE was relatively high during the second quarter and low during the fourth quarter. The BPUEs of the first and third quarters were the middle of the value. This might be caused by the observed effort located in high latitude during the second quarter.

5.3 Marine Turtles

National Strategies and recovery plan

FAJ has developed guidelines for fishers to reduce sea turtle mortality in accordance with the FAO voluntary guidelines to reduce sea turtle mortality in fishing operations.

Interaction

The interaction of sea turtles was examined by the Japanese observer data from 2016 to 2020. The data for the year 2020 is a provisional value. Results are described as follows:

Eastern Indian Ocean

No BPUE (number of sea turtle bycatch/1000 hooks) was observed in the second quarter and the BPUEs in the other quarters were relatively low (less than 0.02).

Western Indian Ocean

No BPUE (number of sea turtle bycatch/1000 hooks) was observed in the second quarter and the BPUEs in the other quarters were relatively low (less than 0.02).

Table 4. Observed annual catches (number of individuals) of species of special interest by species by longliner for the Japanese fleet, in the IOTC area of competence in 2016-2020. Data for the year 2020 is a provisional value.

FAO code	English name	2016	2017	2018	2019	2020
Seabirds						
Aves	Unidentified birds	0	0	2	0	0
AG42	Large albatrosses	0	1	0	0	0
AG42	Other albatrosses	0	0	0	4	0
KPY	King penguin	0	0	0	0	2
AG42	Black-browed albatross	0	0	11	4	0
TQW	Campbell albatross	1	0	0	0	0
TQH	Indian yellow-nosed albatross	25	1	4	25	1
DIX	Wandering albatross	6	1	4	17	2
DBN	Tristan albatross	1	0	0	0	0
DIP	Southern royal albatross	0	0	0	1	0
AG42	Unidentified albatrosses	7	4	2	41	0
AG42	Black-browed albatross group	7	0	2	2	1
AG42	Shy-type albatrosses	30	0	5	13	2
AG42	Yellow-nosed albatross group	1	0	0	0	0
DIC	Grey-headed albatross	3	3	8	10	8
PHU	Sooty albatross	14	0	0	17	0
PHE	Light-mantled albatross	13	0	0	8	0
MAH	Northern giant petrel	0	1	2	9	2
MAI	Southern giant petrel	1	0	1	3	4
PRX	Unidentified petrels	0	0	0	11	0
PCI	Grey petrel	0	0	0	1	5
PRO	White-chinned petrel	6	0	1	49	0
PRX	Spectacled petrel	0	0	0	1	0
PFC	Flesh-footed shearwater	5	0	1	5	0
PUG	Great shearwater	0	0	1	0	0
Sea Turtle						
AG50	Unidentified sea turtles	3	7	1	0	0
TTL	Loggerhead turtle	1	0	2	2	0
TUG	Green sea turtle	0	0	0	1	0
LKV	Olive ridley turtle	6	27	3	5	0
DKK	Leatherback turtle	2	3	2	3	0
Mammals						
Pinnipedia	Unidentified pinnipeds	0	0	0	4	0
ODN	Unidentified tooth whales	3	0	5	2	0

6. National data collection and processing systems

6.1. Logsheet data collection and verification (including date commenced and status of implementation)

Longline

The logbook of longline, which started in 1952 and the format has changed several times afterwards, includes set by set data on catch number and weight in each species, and other information such as fishing date and location, fishing effort (the number of basket and hooks used), water temperature and starting/setting time of the gear. The number of hooks per basket is the important information as it is the proxy of the depth of the gear and target species. As for tuna and tuna-like fishes, six tunas (bluefin, southern bluefin, albacore, bigeye, yellowfin and skipjack), and six billfishes (swordfish, striped marlin, blue marlin, black marlin, sailfish and shortbill spearfish) are recorded by species in the logbook. In addition, information on the cruise (departure/arrival date and port names), vessel (name, size, license number and call sign), the number of crew and the configurations of the fishing gear (material of main and branch lines) are required to fill in the top part of the logbook sheet for each cruise. Japan revised the logbook format for distant water fishing vessels in accordance with IOTC Resolution 12/03,13/03 and 15/01.

Submitted logbooks are processed into electronic data files in the Fisheries Resources Institute (FRI) (former National Research Institute of Far Seas Fisheries (NRIFSF)). Various error checks such as date, location, fish weight, CPUE are also conducted by FRI before these data are finalized. Vessel characteristics (call sign, name, license number, etc.) are verified with registered persons.

Purse seine

The logbooks of purse seiners, which started in 1967, are required to be submitted to the Japanese government every month. The reported catch by species could be verified by comparing with the landing data, which are obtained from market receipts of three major unloading ports (Yaizu, Makurazaki and Yamagawa).

6.2. Vessel Monitoring System (including date commenced and status of implementation)

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

6.3. Observer scheme (including date commenced and status; number of observer, include percentage coverage by gear type)

In accordance with Resolution 11/04 (Regional Observer Scheme), Japan started to deploy observers in July 2010. The number of the trained observers onboard deployed in the IOTC area in 2016-2020 was 9, 11, 12, 12, and 4 respectively. Table 5 and Figure 4 show the observer coverages based on hooks in 2016 – 2020. The data for the year 2020 is a provisional value. The observer coverages are more than 5% in 2016-2019, which satisfies the compliance level stipulated in Resolution 11/04. Japanese observer coverage in 2020 was below 5% because most of the observer activities in 2020 were stopped because of the COVID-19 pandemic.

Figure 5 is the heat map in the IOTC convention area showing the observer coverages deployed by Japanese longline fisheries. The effort of observer data spreads evenly both in the western and eastern areas.

Table 5. Annual observer coverage by longline hooks from 2016 to 2020. The data for the year 2020 is a provisional value.

Based on number of hooks			
Year	**[A]Total hooks**	**[B] Observed hooks**	**coverage (%) = [B]*100/[A]**
2016	**27,049,581**	**1,610,030**	**6.0%**
2017	**23,377,667**	**2,248,967**	**9.6%**
2018	**22,207,349**	**2,462,475**	**11.1%**
2019	**19,950,030**	**2,560,408**	**12.8%**
2020	**21,669,624**	**496,687**	**2.3%**

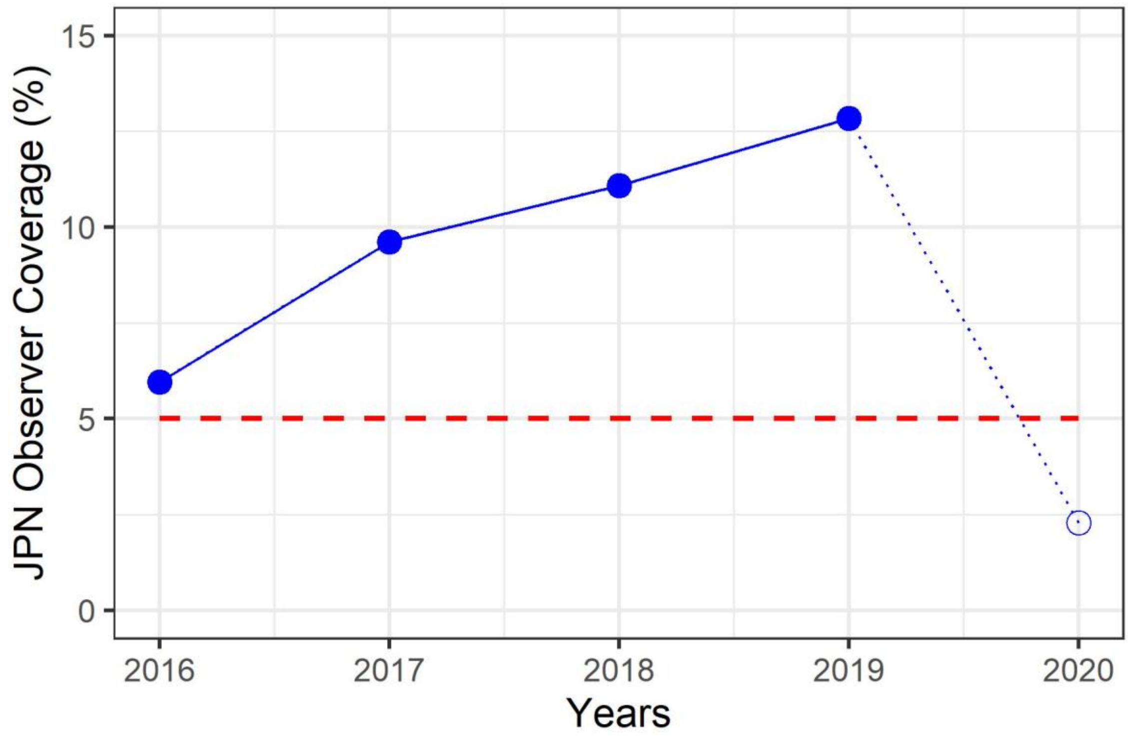


Figure 4 The Blue line indicates observer coverage of the Japanese tuna longline fisheries from 2016 to 2020. The Red line indicates a 5% coverage line. The data for the year 2020 is a provisional value.

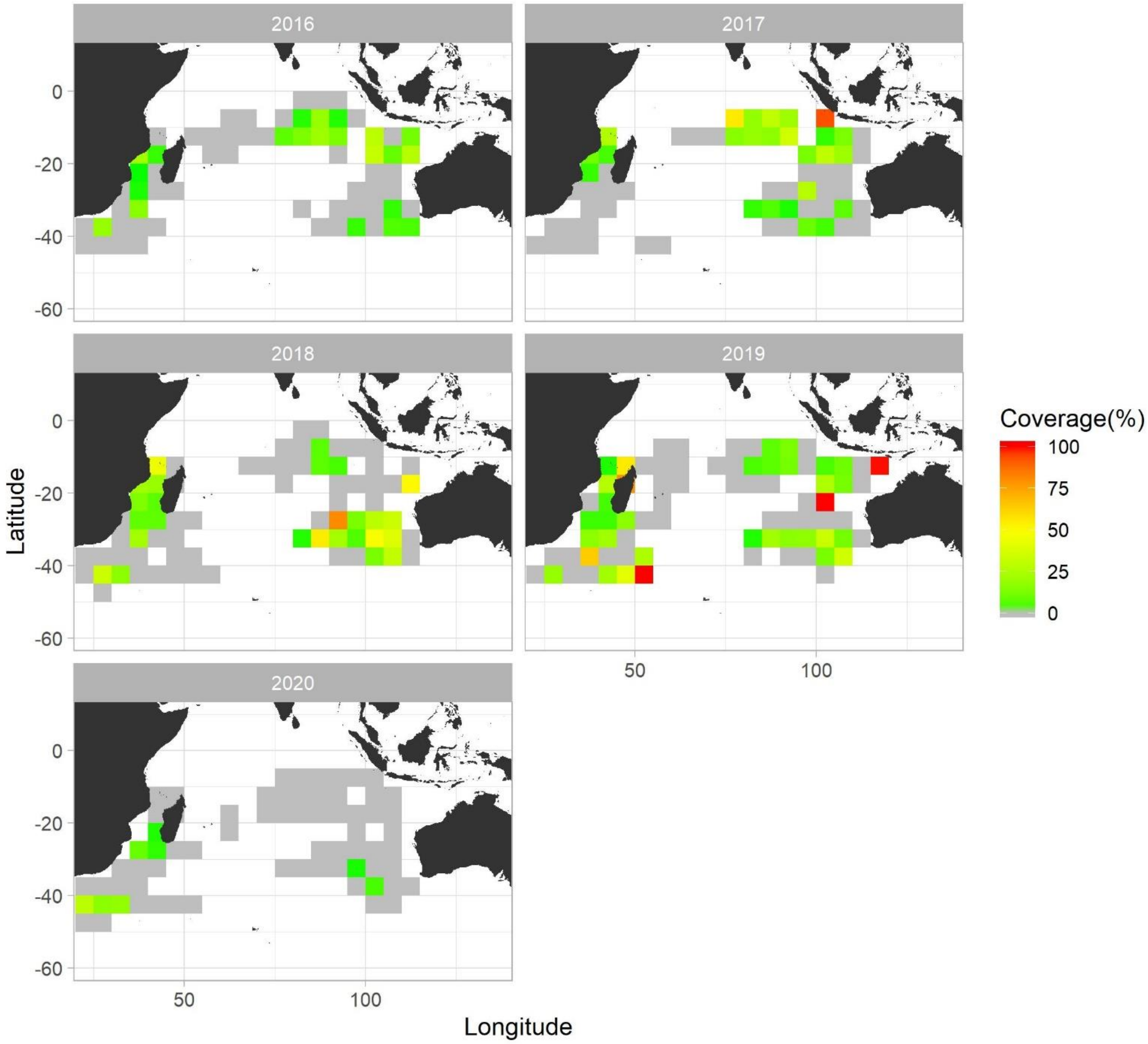


Figure 5 Map showing the spatial distribution of observer coverage from 2016 to 2020 in Japanese longline. The data for the year 2020 is a provisional value. The Grey tile indicates no observer deployments, and Green to Red tiles indicate levels of observer coverages (low to high).

6.4. Port sampling programme

Longline

Port samplings for longline catch were only occasionally conducted (mainly at Tokyo, Shimizu and Yaizu). The date commenced is not known because there is no information of place and method for measurement in the database before 1985.

Purse seine

Japan has been conducting purse seine catch port sampling program since 1995 in the major Japanese landing ports. Because the catch in the Indian Ocean is mainly unloaded abroad, port samplings at Japanese ports have been conducted only nine years during 1995-2020 at Makurazaki port as shown in Table 6. There are more sampling frequencies for the catch from the equatorial area of Pacific Ocean.

Table 6. Number of vessel trips or vessels active monitored, by species and gear

Longline
(Not available by trip or vessel number base)

Purse seine

Year	Number of trips
1995	1
1996	1
1997	1
1998	1
1999	3
2000	2
2001	2
2002	1
2006	1

Table 7. Number of individuals measured, by species and gear

Longline

Year	SBT	ALB	BET	YFT	BLM	BLZ	SFA	SPF
1986	15	6	284	215	130	107	89	5
1987	93	20	130	116	35	53	31	21
1988	102	22	455	198	41	133	60	0
1989	59	9	532	364	83	86	71	0
1990	0	0	0	87	8	12	6	0
1991	0	0	21	47	0	0	0	0
1993	0	0	47	21	0	0	0	0
1994	0	0	0	0	2	4	1	0

Purse seine

Year	SKJ	YFT	BET
1995	1,842	1,571	2,181
1996	1,255	1,129	3,159
1997	1,093	968	460
1998	1,122	793	370
1999	2,474	1,235	848
2000	1,547	924	655
2001	1,648	787	713
2002	894	359	506
2006	896	472	783

6.5. Unloading/Transhipment of flag vessels [including date commenced and status of implementation]

Unloading

The fishers are required to submit relevant documents to FAJ 10 days before the planned landing date including unloading abroad. When unloading abroad the owner of fishing vessels are required to obtain approval from FAJ in advance.

Transshipment

Japan controls at sea transshipments by its vessels in accordance with the Resolution 19/06 on Establishing a Programme for Transhipment by Large-Scale Fishing Vessels. The fishers are required to obtain approval from FAJ in advance for at port transshipments. To apply for at port transshipment, owners must submit relevant documents to FAJ 10 days before the planned transshipment date. Fishers shall complete the IOTC transshipment declaration and inform to the FAJ no later than 15 days after the transshipment.

Table 8. Quantities by species and gear landed in ports located in the IOTC area of competence

(in tonnes)

Year	Gear	SBT	ALB	BET	YFT	SWO	MLS	BLZ	Others	Total
2020	LL	0	0	0	0	0	0	0	10.5	10.5
2020	PS	0	0	0	0	0	0	0	0	0

(Note) SBT (Southern bluefin tuna), ALB (albacore), BET (bigeye tuna), YFT (yellowfin tuna), SWO (swordfish), MLS (striped marlin), BLZ (blue marlin)

Table 9. Quantities by species and gear transhipped in ports located in the IOTC area of competence

(in tonnes)

Year	Gear	SBT	ALB	BET	YFT	SWO	MLS	BLZ	Others	Total
2020	LL	0	0	0	0	0	0	0	0	0
2020	PS	0	0	0	0	0	0	0	0	0

(Note) SBT (Southern bluefin tuna), ALB (albacore), BET (bigeye tuna), YFT (yellowfin tuna), SWO (swordfish), MLS (striped marlin) and BLZ (blue marlin)

6.6. Actions taken to monitor catches & manage fisheries for Striped Marlin, Black Marlin, Blue Marlin and Indo-pacific Sailfish

Japan has been monitoring marlin catch by logbooks and observer program. As marlins are not main target species by Japanese fisheries, the catch level is low especially in recent years (see Table 2a).

6.7. Gillnet observer coverage and monitoring

Not applicable. Japan is not operating gillnet fishery in the Indian Ocean.

6.8 Sampling plans for mobulid rays

Japan has been monitoring incidental catch of mobulid rays through the observer program.

7. National research programs [Desirable]

7.1. National research programs on blue shark

7.2. National research programs on Striped Marlin, Black Marlin, Blue Marlin and Indo-pacific Sailfish

7.3. National research programs on sharks

7.4. National research programs on oceanic whitetip sharks

7.5. National research programs on marine turtles

7.6. National research programs on thresher sharks

No information is prepared for 7.1-7.6

7.7. Others

(1) Updated report of trilateral collaborative study among Japan, Korea and Taiwan for producing joint abundance indices for the yellowfin tunas in the Indian Ocean using longline fisheries data up to 2020 (Toshihide Kitakado, Keisuke Satoh, Takayuki Matsumoto, Hiroki Yokoi, Kei Okamoto and others).

The summary quoted from IOTC–2021–WPM12–18: Three distant-water tuna longline countries, Japan, Korea and Taiwan, have started a collaborative study since December 2019 for producing the joint abundance indices using integrated fishery data of these fleets to contribute to the upcoming stock assessments of yellowfin tuna in the Indian Ocean. The intention is to produce reliable indices by increasing the spatial and temporal coverage of fishery data. In this paper, results using data up to 2020 fisheries were provided to update the WPTT on the progress of this activity. As an underlying analysis, a clustering approach was utilized to account for the inter-annual changes of the target in each fishery in each region. For this purpose, a hierarchical clustering method with "fastcluster" was used, and the outputs of the finalized cluster were then used to assign the cluster label on fishery target to each catch-effort data. For standardizing the catch-per-unit-effort data, the conventional linear models and delta-lognormal linear models were employed for data of monthly and 1° grid resolution in each region. In addition to the implicit target species through the clustering, geographical and temporal covariates were used in the regression structures. The models were diagnosed by the standard residual plots and influence analysis.

(2) Development of the SCAS (Statistical-Catch-At-Size) (Nishida, Kitakado and Iwasaki)

*The summary quoted from IOTC-2021-WPTT23(AS)-INF03***:**We have been developing Statistical-Catch-At-Size (SCAS) software since 2019 to improve our previous joint Age Structured Production Model (ASPM)/Statistical-Catch-At-Age (SCAA) software because of problems of uncertainties in the estimated CAA and usage of model-free selectivity. SCAS is integrated age-structured stock assessment model based on abundance indices and size composition data, and implemented by an AD Model Builder like Stock Synthesis 3 (SS3) and the ASPM/SCAA software. This SCAS software uses simpler specifications than in SS3, i.e., the season aggregated model without spatial components, thus requires less numbers of inputs and parameters to be estimated. The SCAS software has two parts, [Part I] Point estimation and [Part II] Uncertainties and Risk assessments. In each Part, there are three menus, i.e., [Part I]: (a) Grid search, (b) Initial graphs, (c) Diagnoses (retrospective analyses) and [Part II]: (d) Markov Chain Monte Carlo (MCMC), (e) Diagnoses (hindcasting), and (f) Final graphs. As this software is based on the simpler specification than in SS3 and driven by menus thus no programming is required. Hence this software is suitable for those who wish to run the simpler integrated stock assessments. This document describes the progress on menus (a) and (b) and the plans for the remaining menus, which are due for completion in 2022.

(3) IOTC-OFCF projects (2002-2020)

The IOTC-OFCF joint project to improve tuna fisheries statistics in the developing countries in the IOTC waters have been implemented for last 20 years in six phases, i.e., 1st phase (5 years: 2002-2006), 2nd phase (3 years: 2007-2009), 3rd phase (3 years: 2010-2012), 4th phase (1st 3 years :2013-2015 and last 1 year: follow up activities for 3 years in 2016), 5th phase (3 years: 2017-2019) and 6th phase (2020-). The IOTC and OFCF have been engaging the 6th phase of the project since 2020. The objective of the Project is to contribute to the sustainable utilization of tuna resources, by improving the systems of collecting and processing data on resources related to tuna fisheries in the Indian Ocean. The project will be providing technical guidance and assistance for strengthening data collection and the production of statistics in target countries

(4) Research cruises by Marine Fisheries Research and Development Center (JAMARC), Japan Fisheries Research and Education Agency (2016-2020)

During 2016 to 2020, JAMARC conducted experimental purse seine fishing cruises in the eastern Indian Ocean. RV Taikei Maru No.1 was used for the study. The main objective of the research program is to mitigate bycatch of juvenile yellowfin and bigeye tunas in purse seining with FADs. Two kinds of study have been conducted; (a) Study on how large mesh size affect the catch size distribution of skipjack, yellowfin and bigeye tunas, and (b) Study on preset estimation of species and size composition of schools associated with FADs using wide band echo sounder. With the more accurate estimation, sets on FADs with larger concentration of juvenile tunas could be avoided and would lead to the protection of juveniles. From 2020 fiscal year research activity in Indian Ocean has been suspended as JAMARC shifted the research field to the Pacific Ocean.

8. Implementation of Scientific Committee Recommendations and Resolutions of the IOTC relevant to the SC.

Table 10. Scientific requirements contained in Resolutions of the Commission, adopted between 2012 and 2020.

Res. No.	Resolution	Scientific requirement	CPC progress
11/04	On a regional observer scheme	**Paragraph 9**. CPCs shall **report** of the number of vessels monitored and the coverage achieved by gear type in accordance with the provisions of this Resolution.	Japan has complied with requirement.
12/04	On the conservation of marine turtles	**Paragraphs 3-10**. CPCs shall collect and provide all data on interactions including estimation of **total mortality**, to report successful mitigation measures, deterioration of nesting sites and swallowing of marine debris, for fishermen to foster its recovery and use de-hooking technique. All LL shall carry line cutters and de-hookers, use of whole **finfish** bait. PS shall avoid encirclement, conduct safely release, to encourage to adopt FAD designs that reduce the incidental catch. CPCs undertake research trials of **circle hooks**, whole finfish for bait, alternative FAD design.	Japan has complied with the requirements under the Resolution except for estimation of total mortality. With regard to data on interaction with marine turtles, additional data (Form1DI) has been submitted on 28 September 2020.
12/06	On reducing the incidental bycatch of seabirds in longline fisheries.	**Paragraphs 3-7.** CPCs shall provide the information on how they are implementing this measure and achieve reductions in levels of seabird bycatch across through the use of effective mitigation measure. In the south of 25°S, CPCs shall ensure that all LL use at least **two of the three mitigation measures.** The design and deployment for **bird scaring lines** should meet the specifications.	Japan has complied with the requirements.
12/09	On the conservation of thresher sharks (family alopiidae) caught in association with fisheries in the IOTC area of competence	**Paragraphs 4-8.** CPCs shall encourage their fishers to record and report incidental catches as well as **live release** and implement research to identify potential nursery areas. Scientific observers shall be allowed to collect biological samples.	Japan has complied with the requirements under the Resolution.
13/04	On the conservation of cetaceans	**Paragraphs 7-9.** CPCs shall report the information and data collected through logbooks, or observer programs. CPCs shall report, in which cetaceans have been encircled by PS. For CPCs having national and state legislation for protecting these species shall be exempt from reporting.	Japan has submitted by-catch information in the national report. Additional data (Form1DI) has been submitted on Sep 28 2020.
13/05	On the conservation of whale sharks (*Rhincodon typus*)	**Paragraphs 7-9.** CPCs shall report the relevant information through logbooks, or observer programs. CPCs shall report any instances in which whale sharks have been **encircled by PS.**	No catch or encirclement was reported in 2020.

Res. No.	Resolution	Scientific requirement	CPC progress
13/06	On a scientific and management framework on the conservation of shark species caught in association with IOTC managed fisheries	**Paragraph 5-6.** CPCs shall encourage their fishers to record incidental catches and live releases of **oceanic whitetip sharks.** CPCs shall implement research on oceanic whitetip sharks.	Japan has complied with the requirements.
15/01	On the recording of catch and effort by fishing vessels in the IOTC area of competence	**Paragraphs 1–10** Record **minimum information** on vessel, trip, gear configuration, operations, catch & effort then provide by June 30th of the following year.	Japan has complied with the requirements.
15/02	Mandatory statistical reporting requirements for IOTC Contracting Parties and Cooperating Non-Contracting Parties (CPCs)	**Paragraphs 1–7.** CPCs shall provide Total catch, Catch and effort data, bycatch, **Size (1 fish/ton),** FADs data (PS) and others.	Japan has complied with the requirements except size data for some past years
17/05	On the conservation of sharks caught in association with fisheries managed by IOTC	**Paragraphs 6, 9 and 11** CPCs shall report data for catches of sharks including all available historical data, estimates and life status of discards & size. CPCs shall undertake research to: a) effectiveness of prohibiting **wire leaders**; b) improve knowledge on key biological/ecological parameters, c) identify key shark mating….	Japan has complied with the Resolutions. The number of measured Shortfin mako individuals did not reach the IOTC standard in 2017, but the sampling rate has been improved and achieved the IOTC standard in 2018.
18/02	On management measures for the conservation of blue shark caught in association with IOTC fisheries	**Paragraphs 2-5.** CPC shall record catch, effort, **size** and discard data. CPCs are encouraged to undertake scientific research.	Japan has complied except for numbers of size for some past years.
18/05	On management measures for the conservation of the Billfishes: Striped marlin, black marlin, blue marlin and Indo-Pacific sailfish	**Paragraphs 7-11**. CPCs shall collect and report information of **5 billfish species** (*Striped Marlin, Black Marlin, Blue Marlin and Indo-pacific Sailfish)*, i.e. catches, released alive and/or discarded, together with effort, size and discard.	Japan has complied with the requirements.
18/07	On measures applicable in case of non-fulfilment of reporting obligations in the IOTC	**Paragraphs 1 and 4.** CPCs shall include information in their Annual Reports on actions taken to implement their reporting **obligations** including shark species in particular steps taken to improve their data collection for direct and incidental catches.	Japan has complied with the requirements.

Res. No.	Resolution	Scientific requirement	CPC progress
19/01	On an Interim Plan for Rebuilding the Indian Ocean Yellowfin Tuna Stock in the IOTC Area of Competence	**Paragraph 22.** CPCs shall set their gillnets at 2m depth from the surface in **gillnet** fisheries by 2023 to mitigate ecological impacts.	Not applicable. Japan has no gillnet fisheries.
19/03	On the Conservation of Mobulid Rays Caught in Association with Fisheries in the IOTC Area of Competence	**Paragraph 11.** CPCs shall develop sampling plans for the monitoring of the mobulid rays catches. The sampling plans, including their scientific and operational rationale, shall be reported in the national scientific reports to the SC **starting in 2020.**	Not applicable. Requirement in paragraph 11 is limited to mobuild ray catches by the subsistence and artisanal fisheries. Japan has no such fisheries.

9. LITERATURE CITED (DOCUMENTS SUBMITTED) (TOTAL:18)

WPNT10 (Neritic tuna) (Online) (July 2021) (1)

IOTC–2021–WPNT11–INF01 Stock and Risk Assessments of Kawakawa (Euthynnus affinis) and Longtail Tuna (*Thunnus tonggol*) Resources in the Southeast Asian Waters Using ASPIC (Nishida et al)

WPEB17(DP) (Online) (April 2021) (2)

IOTC-2021-WPEB17(DP)-INF07 Update of Age and sex specific Natural mortality of the blue shark (Prionace glauca) in the North Pacific Ocean (Semba Y and Yokoi H)

IOTC-2021-WPEB17(DP)-INF08 Reproductive biology of the blue shark (Prionace glauca) in the western North Pacific Ocean (Fujinami Y, Semba Y, Okamoto H, Ohshimo S and Tanaka S)

WPTT23(DP) (Tropical tuna：data preparation) (Online) (May 2021) (5)

IOTC-2021-WPTT23(DP)-08 Draft review of size data from Indian Ocean longline fleets, and its utility for stock assessment. (Simon D. Hoyle, Shu-Ting Chang, Dan Fu, James Geehan, Tomoyuki Itoh, Sung Il Lee, Juliette Lucas, Takayuki Matsumoto, Yu-Min Yeh and Ren-Fen Wu)

IOTC–2021-WPTT23(DP)-14 Report of trilateral collaborative study among Japan, Korea and Taiwan for producing joint abundance indices for the yellowfin tunas in the Indian Ocean using longline fisheries data up to 2019 (Toshihide Kitakado, Sheng-Ping Wang, Keisuke Satoh, Sung Il Lee, Wen-Pei Tsai, Takayuki Matsumoto, Hiroki Yokoi, Kei Okamoto, Mi Kyung Lee, Jung-Hyun Lim, Youjung Kwon, Nan-Jay Su, Su-Ting Chang and Feng-Chen Chang)

IOTC–2021–WPTT23(DP)-INF01 Review of Japanese fisheries and tropical tuna catch in the Indian Ocean (Matsumoto T)

IOTC–2021–WPTT23(DP)-INF02 Japanese longline CPUE for yellowfin tuna in the Indian Ocean standardized by generalized linear model which includes cluster analysis (Matsumoto T et al.)

IOTC–2021-WPTT23(DP)-INF04 On-going investigation of Japanese longline CPUE for yellowfin tuna in the Indian Ocean standardized by vector-autoregressive spatiotemporal model (Satoh K, Matsumoto T, Yokoi H, Okamoto K and Kitakado T)

WPEB17 (Ecosystem and Bycatch) (Online) (September 2021) (2)

IOTC-2021-WPEB17(DP)-INF07 Update of Age and sex specific Natural mortality of the blue shark (Prionace glauca) in the North Pacific Ocean (Semba Y and Yokoi H)

IOTC-2021-WPEB17(DP)-INF08 Reproductive biology of the blue shark (Prionace glauca) in the western North Pacific Ocean (Fujinami Y, Semba Y, Okamoto H, Ohshimo S and Tanaka S)

WPB19 (Billfish) (Online) (September 2021) (2)

IOTC-2021-WPB19-25 Japanese Longline CPUE Standardization (1979-2019) for striped marlin (Tetrapturus audax) in the Indian Ocean using Bayesian hierarchical spatial model (Taki K, Ijima H, and Kai M)

IOTC-2021-WPB19-26 Japanese Longline CPUE Standardization (1979-2019) for black marlin (Makaira indica) in the Indian Ocean using Bayesian hierarchical spatial model (Taki K, Ijima H, and Kai M)

WPM12 (Working Party on Methods) (Online) (October 2021) (1)

IOTC–2021–WPM12–18 Updated report of trilateral collaborative study among Japan, Korea and Taiwan for producing joint abundance indices for the yellowfin tunas in the Indian Ocean using longline fisheries data up to 2020 Toshihide Kitakado , Sheng-Ping Wang , Keisuke Satoh , Sung Il Lee , Wen-Pei Tsai, Takayuki Matsumoto, Hiroki Yokoi, Kei Okamoto, Mi Kyung Lee, Jung-Hyun Lim, Youjung Kwon, Nan-Jay Su, Su-Ting Chang, and Feng-Chen Chang.

WPTT23 (Working Party on Tropical Tunas) (Online) (October 2021) (4)

IOTC–2021–WPTT23–07 Review of size data from Indian Ocean longline fleets, and its utility for stock assessment (Hoyle S, Chang S-T, Fu D, Itoh T, Lee SI, Lucas J, Matsumoto T, Yeh Y-M, Wu R-F, Lee MK)

IOTC–2021–WPTT23–11 Updated report of trilateral collaborative study among Japan, Korea and Taiwan for producing joint abundance indices for the yellowfin tunas in the Indian Ocean using longline fisheries data up to 2020 Toshihide Kitakado1, Sheng-Ping Wang , Keisuke Satoh , Sung Il Lee , Wen-Pei Tsai, Takayuki Matsumoto, Hiroki Yokoi, Kei Okamoto, Mi Kyung Lee, Jung-Hyun Lim, Youjung Kwon, Nan-Jay Su, Su-Ting Chang, and Feng-Chen Chang.

IOTC–2021–WPTT23–INF02 Preliminary stock assessment of Indian Ocean yellowfin tuna using Statistical Catch-At-Size (SCAS) (1950-2020) (Nishida T and Kitakado T)

IOTC–2021–WPTT23–INF03 Development of Statistical-Catch-At-Size (SCAS) software (Nishida, Kitakado, and Iwasaki)

SC24 (Scientific Committee) (Online/Virtual) (December 2021) (1)

IOTC-2021-SC24_NR__ National Report of Japan (Matsumoto, T., Inoue, Y., Nishida, T. and Semba, Y.)