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National report of Japan[1]

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Summary

Japanese tuna fisheries consist of the three major fisheries, i.e., longline, purse seine, pole-and-line, and other miscellaneous fisheries like troll, drift-net, set-net fisheries. These fisheries occupy around 90 % of the total tuna catch of Japanese fisheries in recent years. This paper described the recent trend of the Japanese tuna fisheries in the north Pacific Ocean and updated the statistics given in the previous National Report for ISC8 (Yukio Takeuchi et. al., 2009). The total landing of tunas (excluding skipjack) caught by Japanese fisheries in the north Pacific Ocean in 2008 was 98,000 metric ton (t) and that in 2009 was 109,904 t which was 117% of the 2008 catch. The total landing of swordfish and billfishes (striped marlin, blue marlin and black marlin) was 12,506 t in 2008 and 10,753 t in 2009 which was 79% of the 2008 catch. The landing of skipjack tuna was 238,000 t in 2008 and 187,418 t in 2009 which was 86% of the 2008 catch. In addition to fisheries description, a brief description was given on Japanese research activities on tuna and tuna-like species in the Pacific Ocean in 2009.

1. Trends in fleet size

Table 1A shows the number of Japanese tuna vessels actually engaged in fishing by type of fishery and by vessel size class during 1980-2006 (Anonymous 1982-2010). From the statistics for 2007 the information of number of vessels became unavailable. .

The total number of longline vessels shows continuous declining trend since the early 1990s and the number of vessel in 2006 was 1,208 which is about 60% of the average of the one in the 1980s. The number of longline vessels of the largest size class (larger than 200 Gross Register Tonnage (GRT)) was near constant in the period between the late 1960s and the mid 1990s. In accordance with the agreement of the FAO's international action plan on fishing capacity, Japan decreased its large longline boats by 20% in 1998. The number of longline boats continued to decline thereafter. While the number of vessels for 20-49 GRT and 50-100 GRT showed a sharp decline since the late 1980s, the number of vessels of smallest size class (less than 20 GRT) fluctuated at around 700.

The number of purse seine vessels shown in Table 1 includes only the vessel mainly targeting tunas. The total number of purse seine vessel was 52 in 2006, and it was nearly 80% of that in the 1980s. The number of the smaller size (smaller than 200 GRT) purse seine vessels has decreased since the late 1980s. The larger vessels which operate mainly in the tropical waters were 35 and have been stabilized since 1995.

In the case of the pole-and-line boats, the number of vessels larger than 20 GRT declined to 121 in 2006 from

140 in 2005, which corresponds to almost one third of the average in the 1980s. The trend in the number of vessels smaller than 20 GRT also shows the general decreasing trend since the 1980s, and the number of vessels in 2006 was only 8% of the average of the 1980s.

Table 1B shows the number of Japanese tuna fishing vessels by fishery and vessel size class, which actually fished in the North Pacific during 2005-2009. This number of active vessels was estimated based on logbook data except for that for longline less than 10 GRT. Therefore some vessels who actuary operated but did not submit logbook were not included. The research and training vessels of longline and pole-and-line had been included in the number of vessels in Table1A, but these are not included.

As the recent trend, the declining trend for categories of larger size than 100 GRT are more remarkable, the number of vessels of 100-200 GRT and over 200 GRT in 2008 was 40 and 90 which is 67% and 75% of that in 2005, respectively. Furthermore, in March, 2009, the Government of Japan implemented the fleet reduction program for logline vessels, which was to meet the reduced catch quota for Japan and to reduce the excess fishing capacity resulted from the strengthened management measures that were agreed in the various tuna RFMOs. As the result, the number of longline vessel was 385 in 2009, 14% decrease from 448 in 2008. The large number of vessel reduction for distant water and offshore longliners in recent years has been mainly derived from high price of fuel especially since 2007 and this fleet reduction program in 2009.

The number of pole-and-line vessels, 50-200 GRT, decreased from 89 in 2005 to 68 in 2009, corresponding to 24% decrease. The number of largest size category (over 200 GRT) vessels also sharply decreased from 39 in 2005 to 28 in 2009 (28% decrease).

In contrast to longline and pole-and-line fishery, the number of purse seine vessels was relatively stable in the recent 5 years.

2. Catch and effort trends of the major fisheries

Catch and effort data used in this paper are mostly based on the logbook data compiled by the National Research Institute of Far Seas Fisheries, Fisheries Research Agency (NRIFSF). The data source of catch and effort for the coastal longline fishery are mainly derived from Statistics Department, Minister's Secretariat Ministry of Agriculture, Forestry and Fishery (Anonymous 1982-2010).

The total landing of tunas (excluding skipjack) caught by Japanese fisheries in the north Pacific Ocean in 2008 was 98,000 t and that in 2009 was 109,904 t which was 117% of the 2008 catch. The total landing of swordfish and billfishes (striped marlin, blue marlin and black marlin) was 12,506 t in 2008 and 10,753 t in 2009 which was 79% of the 2008 catch. The landing of skipjack tuna was 238,000 t in 2008 and 187,418 t in 2009 which was 86% of the 2008 catch.

2.1. Longline

Longline fisheries had been classified by the type of license issued by the Government, i.e., coastal (correspond to vessel smaller than 20 GRT), offshore (20-120 GRT), and distant water (larger than 120 GRT) until 2001. Since 2002, the categorization of the license was changed, and longline vessels of 10–20 GRT operating outside the Japanese EEZ were re-categorized as offshore license.

Total fishing effort (days at sea) for longline vessels less than 20 GRT has gradually increased since 1990 (Table 2). The same statistics for 2005 was 138,000 days which showed an 80 % increase over the average in the

1980s. Total tuna and billfish catch of these vessels fluctuated between 31,000 to 41,000 t in the most recent 10 years. Albacore occupies the largest portion corresponding to about a half of the total catch. Albacore catch has increased remarkably since 1993 and peaked at 25,000 t in 1997, but decreased to 14, 000 t in 2009.

The fishing effort of the longline vessels larger than 20 GRT remained stable at around 200 million hooks in the North Pacific in the 1980s, and then it decreased continuously to 100 million hooks in the early 2000s, and it has further decreased in the most recent years. The amount of effort was 65 million in 2008, 46 million in 2009, which is about 25%of the average in the 1980s.

Total catch of longline vessels larger than 20 GRT in the north Pacific were 27,000 t in 2009, which was the lowest value since 1980 (Table 3). Bigeye has been the dominant species for the north Pacific. The bigeye catch, were stable in the 1980s, but it showed a decreasing trend in the 1990s and thereafter. It was in the lowest level since 1980 in the most recent years. Pacific bluefin catch have been fluctuate since 1980s ranging from 313 t to 8 t. There are some peaks in the early 1990s, the early 2000s, and the early 2000. In the recent year, Pacific bluefin catch was in a bottom, 19 t in 2008, 8 t in 2009, which was the lowest since 1980. Albacore catch have been fluctuate as well as Pacific bluefin since 1980. The catch was relatively stable ranging from about 4,000 t to 5,000 t at a low level during the period 2003-2008, and then the catch decrease to 3,838 t in 2009, which was the lowest since 1980. The catch of swordfish appears to be relatively stable. In recent ten years, swordfish catch gradually decreased from 6,904 t in 2001 to 4,239 in 2009. The catch of striped marlin shows steady decreasing trend since the late 1980s. The situation was the same in the last decade, striped marlin catch decreased from 163 t in 2000 to 149 t in 2009.

The catch and effort by the Japanese distant water longline fishery is likely to decrease due to the economic circumstances (i.e. high fuel cost, low price of tuna, high labor cost). As most of these vessels have operated in the waters other than the North Pacific (more than 80%), the decline is likely to be more severe in those waters.

Annual distribution of fishing effort for longline vessels larger than 20 GRT in 2007, 2008 and 2009 are shown in Figure 1. In those years, the fishing grounds were located in east-west direction off Japan to Hawaii, equatorial area between 15 ˚S and 15 ˚N, off Australia and off Peru.

Length frequency distribution for tunas and swordfish caught in the Pacific, which was measured on board or at landing port, is shown in Fig. 2. The length of albacore ranged from 60 to 120 cm in fork length (FL). The length of bigeye and yellowfin had wider ranges approximately from 60 to 200 cm but fish larger than 90 cm formed a dominant part of the catch. The length of the swordfish measured ranged from 50 to 220 cm in eye-fork length.

2.2. Purse seine

There are two different types of purse seiners that target tunas in Japan, i.e., single and group purse seine fisheries. The group seiner consists of one net purse seiner (100-200 GRT) and one searching vessel and two carrier vessels, and operates in the temperate northwestern Pacific. New type of group seiner launched at March 2005, which consists of one relatively large seiner (300 GRT) than typical size of the purse seiner and one carrier instead of two carriers. The group purse seiner operates in the offshore waters off Japan. The carrier holds fish in chilled water with ice and unloads those catches. On the other hand, the single purse seiner (349-500 GRT) operates mainly in the tropical waters of the central and western Pacific, but seasonally operates in the temperate waters. This type of purse seine fishery is so called the distant water purse seine fishery.

The fishing effort of the purse seine in the North Pacific was high, around 9,000 sets in the late 1980s, and then decreased to about 6,000 sets in 1997 (Table 4). The fishing effort generally stayed at the level about 5,000-6,000 sets in the last decade. The skipjack catch dominant among species in this fishery, followed by yellowfin. The skipjack catch was relatively high about 150,000 t during the period 2005-2008, and then dropped to 120,000 t in 2009. Pacific bluefin catch was fluctuated ranging from about 2,500 to 1,000 t since 1980. In the last 5 years, the Pacific bluefin catch decreased from 4,061 in 2005 to 2,071 t in 2009.

The length of skipjack caught by the purse seine fishery in tropical area ranges from 30 to 70 cm in FL and bigeye ranges from 30 to 90 cm (Figure 4). Most of the yellowfin catch is also in the range from 30 to 70cm but there are some fishes larger than 80 cm.

2.3. Pole-and-line

The pole-and-line fishery is composed of three different categories, i.e., coastal (smaller than 20 GRT), offshore (20-120 GRT) and distant water (lager than 120 GRT) vessels in terms of the license of this fishery. The pole-and-line fishery can be also categorized into large, middle, and small (sized) vessels which correspond to larger than 230 GRT, 20-230 GRT and less than 20 GRT in vessel size. This categorization is useful to discriminate between those fisheries in terms of fishing ground and fishing strategy.

The middle-sized vessels generally operate in near shore waters of Japan and their trip is within 10 days. Southern most fishing area for these vessels, in recent years, is near 15˚N, but the important fishing ground is waters north of 25˚N around Japan and adjacent areas. These vessels primarily fish skipjack and albacore tunas from spring through autumn off Pacific side of Japan, and also harvest relatively small amount of yellowfin and bigeye. They hold fish in cooled water and unload it as fresh fish. The activity of the small pole-and-line vessels is more or less similar to that of the middle vessels but the area of fishing is limited to the coastal waters of Japan. On the contrary, the large vessels operate much more offshore waters and their trips are for two to three months. Usually they primarily fish for albacore from summer through autumn season in the waters north of 20˚N, and skipjack tuna in winter and spring in the waters south of 20˚N. These vessels equip a brine freezer, in which fish caught are immediately stored into a tank filled with cooled brine, and then unloads it as frozen fish.

Generally, fishing effort has been decreasing from about 1,100,000 poles in the early 1980s to 300,000 poles in the last 5 recent years. But in recent years, the skipjack catch showed much clear decrease trend, from 127,177 t in 2005 to 53,148 t in 2009. The catch of albacore in the north Pacific has fluctuated in the range of 6,000-49,000 without trend. The albacore catch was 32,386 in 2009 (Table 5), which is the lowest since 1980. Despite the substantial reduction of the fishing effort, the catch of skipjack in the north Pacific appears to be moderately decreased until the mid 2000s. The skipjack catch by the coastal pole-and-line fishery fluctuated ranging from about 6,000 t to 10,000 t in the last decade and was minor compared with that of the offshore and distant water pole-and-line fisheries.

Fishing grounds of the pole-and-line fishery are separated by latitude but more continuous than the purse seine fishing grounds (Figure 5).

The size of skipjack caught by this fishery is ranged from 40 to 60 cm FL and ranged from 50 to 90 cm for albacore. Several clear modes are obvious (Figure 6).

2.4. Other fisheries

There are miscellaneous small scale fisheries which catch tunas and tuna-like species in the Japanese coastal waters. Among them, the largest catch was made by the troll fishery for which the catch of tunas was 10,306 in 2008 and the catch of skipjack was 4,178 t (Anonymous 2009).

The large mesh driftnet fishery, that historically expanded its fishing ground covering areas of the temperate north and South Pacific in the 1980s, was suspended in 1991 in the South Pacific and in the high seas of the North Pacific in 1992 due to UN resolution implemented for this fishery. The catch of tunas for this fishery was 2, 043 in 2008 and of swordfish and billfishes was 1,982 t.

2.5. Recent trends for Pacific bluefin tuna, albacore and swordfish fisheries

Total annual catch of Pacific bluefin tuna (PBF) by Japan decreased from 17,137 t in 2008 to 13,332 t in 2009 with declines in the catches in all the fisheries (Oshima and Takeuchi 2010). In 2009, the tuna purse seine targeting large PBF older than 3 years-old recorded the second lowest catch since 2000. The annual catch of the small pelagic fish purse seine targeting young PBF decreased from 6,299 t in 2008, the fifth largest since 1988, to 5,353 t in 2009, although the catch in 2009 was larger than the mean catch of 5,101 t in the recent decade. The annual catch of the troll fishery targeting mainly age-0 PBF recoded the third smallest in 2009 over the recent decade.

Total catch of albacore in 2009 was 54,286 t, which was about 10,000 t larger than that in 2008 and was higher than average of past 5 years, though the value in 2009 is provisional. This increase is mainly based on increase in pole-and-line catch (32,421 t). Good fishing ground of pole-and-line fishery was developed at 32-34˚N, 142-143˚E from May through June in 2009. Albacore catch by the pole-and-line fluctuated largely, but catch by longline was comparatively stable. Catch by longline in 2009 (17,518 t) was smaller than the catch in 2008 (22,386 t). During the past 3 years, fishing efforts based on hooks that employed in north of 10˚ N by large-sized longline vessels (over 200 GRT) and middle-sized longline vessels (20-199 GRT) were stable except for recent years, whereas fishing effort by coastal longline (10-19 GRT) decreased.

Japanese catch of swordfish was reported by two newly defined stocks, the stock in the north western and central Pacific and the one in the eastern Pacific. Japanese catch for the stock in the north western and central Pacific increased in 2007 and then decreased in 2008 to the historical low. This observed up and down trend of catch observed more or less in the most of fisheries. For the eastern Pacific stock, Japanese catch decreased in 2007 and increased in 2008, but the level of total catch in 2008 is in the historical low one. The general decreasing trend of the total catch of swordfish observed in both two stocks mainly due to the decrease of the number of Japanese offshore and distant water longliners.

3. Compilation of basic fisheries data

The logbook systems have been in place for offshore and distant water longline, pole-and-line, and purse seine fisheries. From 1994, the logbook system was introduced to the coastal longline vessels (10-20 GRT) fishing both within and outside the Japanese EEZ and these vessels were included in the offshore category since 2002. Historical Category II data was compiled from those logbook data and submitted to the ISC Statistics Working Group in July 2010.

There are small scale fisheries in the coastal waters of Japan such as troll and set net which are not covered

by the current logbook system. Catches by these fisheries are covered by the landing statistics collected by the Statistics Department, Minister's Secretariat, the Ministry of Agriculture, Forestry and Fisheries (Anonymous 1982-2008). The Fishery Agency of Japan, in cooperation with the NRIFSF and local prefectural fisheries experimental stations, has run the nationwide port sampling project for collection of catch, effort and size data at the major landing ports since the early 1990s.

4. Research activities

Researches on tunas and tuna-like species in the Pacific Ocean have been carried out by the NRIFSF for broad scientific areas of basic biology, behavior, and stock assessment. In addition, there are cooperative works with prefectural fisheries experimental stations and universities. Several cooperative studies are also on going with foreign countries.

4.1. Research cruises

There have been several research cruises in 2009 conducted by the Fisheries Agency of Japan and the NRIFSF relating to tunas and billfish in the Pacific, in addition to the several short cruises for tagging.

Sampling cruises for larval Pacific bluefin tuna were conducted by R/V Shunyo-Maru in the subtropical waters around the Nansei Islands, where is known as one of the important spawning ground of Pacific bluefin tuna, during May and June 2009. The research cruises continued every year since 2004. A larval net which has 2 m diameter with 0.335 mm mesh size was used. Patches of bluefin tuna larvae were found and tracked with a drifter which was composed of GPS radio buoy and an 8 m drogue during May. Horizontal distribution during the early life history of bluefin tuna was investigated in the spawning area during June. Oceanographic observations were also carried out by using CTD and ADCP.

During October to December 2009, 19 longline operations were conducted by Shoyo-Maru at the temperate area of North Pacific Ocean, 25^{O}N-36^{O}N and 163^{O}E-127^{O}W, and 39 bigeye (92-144 cm FL) and 2 albacore (100-102 cm FL) caught were attached with popup-archival tag and released. Among those, 22 tags on bigeye and 1 tag on albacore were popped before the designated time (1 to 96 days after released, 27 days on average). For the remained individuals, PATs were popped up after more than three months after released. During this research cruise, it was also attempted to catch sub-adult to adult bigeye tuna (larger than about 100cm) by using deep-water trolling gear at Emperor Sea Mountain area. As a result, during 10 trials of three hours trolling, nine bigeye and 1 albacore were caught by this gear. which one bigeye was caught at depth of 193.6m (temperature: 16.3^{O}C).

To explore safe and effective designs of tori-line in the north Pacific, comparison of four types of tori-line were conducted, by two at-sea experiments. The designs of tori-line which used in this study were; 1) light streamer, 2) WCPFC long streamer, 3) hybrid streamer and 4) modified light streamer. Effectiveness of the different colored streamers was also tested. First experiment was conducted using 20 offshore commercial longliners with 567 sets, second experiment was conducted using a chartered longline boat with 24 longline fishing operations.

4.2. Tagging

The tagging using conventional tag has been conducted by research and training vessels as well as

commercial vessels. Some of these activities are opportunistic tagging. In addition to the conventional tagging, tagging using the archival tag and archival popup tag has been conducted for tuna and tuna-like species.

For conventional tagging activity in 2009, 722 tags on bigeye, 857 tags on yellowfin and 2,492 tags on skipjack were released. There were reported recoveries 23 for bigeye, 36 for yellowfin, and 98 for skipjack. In addition to conventional tagging, 8 tags to bigeye, 4 tags to yellowfin, and 73 tags to skipjack were tagged with electronic tags (archival and pop-up tags, including those dummy tags) and released. Of those, 3 archival tags attached on bigeye tuna and 3 dummy tags attached on skipjack were recovered.

4.3. Studies on biological parameter

Following is the studies on biological parameters recently carried out by the NRIFSF.

- Study on age determination, growth and natal origin of Pacific bluefin have started with focusing on larger fish in collaboration with National Taiwan University. The sex combined growth curve was estimated using otoliths collected, and this growth curve was used for the stock assessment of bluefin tuna conducted in May, 2008.

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Table 1A. Number of Japanese tuna fishing vessels operated in the Pacific Ocean by type of fisheries and vessel size based on Annoimous (1981-2009).

	Longline fishery[*1]						Purse seine fishery			Pole-and-line fishery					
Year	1-19 GRT	20-49 GRT	50-99 GRT	100-199 GRT	200- GRT	Total	50-199 GRT[*2]	200- GRT	Total	1-19 GRT[*3]	20-49 GRT	50-99 GRT	100-199 GRT	200- GRT	Total
1980	821	57	715	103	645	2,341	50	16	66	3,232	14	350	10	198	3,804
1981	774	55	706	100	661	2,296	50	23	73	3,064	10	353	6	179	3,612
1982	722	43	634	90	589	2,078	52	33	85	3,011	11	320	6	138	3,486
1983	561	38	589	93	550	1,831	59	36	95	3,021	12	297	9	116	3,455
1984	523	32	538	108	610	1,811	54	33	87	2,904	8	273	10	105	3,300
1985	620	28	512	131	628	1,919	47	35	82	2,754	8	244	9	95	3,110
1986	536	25	435	168	632	1,796	53	38	91	2,455	6	224	9	91	2,785
1987	661	23	348	197	649	1,878	47	34	81	2,404	6	210	9	89	2,718
1988	586	21	289	233	649	1,778	48	39	87	2,613	5	191	11	70	2,890
1989	650	20	248	238	653	1,809	43	37	80	2,254	3	187	12	67	2,523
1990	685	21	227	241	664	1,838	43	35	78	2,228	4	176	9	66	2,483
1991	768	19	199	222	682	1,890	38	35	73	2,277	3	166	10	63	2,519
1992	793	19	164	206	681	1,863	31	38	69	2,093	3	156	11	46	2,309
1993	790	18	138	201	682	1,829	27	36	63	1,927	3	147	10	43	2,130
1994	819	21	110	198	675	1,823	23	33	56	1,830	3	124	10	48	2,015
1995	738	20	92	187	667	1,704	20	31	51	481	3	104	20	46	654
1996	711	17	91	155	640	1,614	21	32	53	512	3	89	29	43	676
1997	698	11	88	145	631	1,573	20	35	55	436	2	76	39	45	598
1998	712	11	80	129	623	1,555	20	35	55	382	2	73	40	46	543
1999	703	6	78	119	567	1,473	22	36	58	416	1	62	54	46	579
2000	732	3	76	111	496	1,418	23	37	60	357	1	56	57	47	518
2001	777	4	76	110	494	1,461	19	36	55	285	1	49	59	47	441
2002	780	4	69	110	484	1,447	18	36	54	251	1	45	58	48	403
2003	764	3	64	99	460	1,390	17	36	53	292	1	44	56	44	437
2004	702	2	55	77	455	1,291	17	36	53	284	1	38	57	43	423
2005	694	2	46	59	432	1,233	17	36	53	247	1	36	58	45	387
2006	709	1	43	54	401	1,208	16	36	52	213	1	27	58	36	335

[*1] Longline vessels larger than 50 GRT include those operated in the area other than the Pacific

[*2] 50-199 GRT class vessels only include those operated in the Pacific side of northern Japan.

[*3] 1–19 GRT class vessels before 1995 include those engaged in trolling

Table 1B. Number of Japanese tuna fishing vessels operated in the North Pacific Ocean by type of fisheries and vessel size based on logbook. Value in 2009 is provisional.

	Longline fishery					Purse seine fishery				Pole-and-line fishery			
Year	10-49 GRT	50-99 GRT	100-199 GRT	200- GRT	Total	50-199 GRT[*2]	200-499 GRT	500- GRT	Total	20-49 GRT	50-199 GRT	200- GRT	Total
2005	260	45	60	120	485	31	35	0	66	1	89	39	129
2006	277	44	52	113	486	27	35	1	62	1	83	30	114
2007	279	42	48	89	458	34	35	1	69	1	77	29	107
2008	276	42	40	90	448	36	35	1	71	1	69	29	99
2009	237	38	32	78	385	35	34	3	69	1	68	28	97

Table 2. Catch in weight (t) by species and fishing effort (Number of days at sea) of longline vessels smaller than 20 GRT in the North Pacific. Catch of Blue marlin includes some catch of black marlin. The values in this table are derived from Anonymous (1982-2007) for years 1980 to 2007. The values of the catch by species for 2002 and after were estimated from both Anonymous (2004-2007) and the logbook data. PBF: Pacific bluefin, ALB: albacore, BET: bigeye, YFT: yellowfin, SWO: swordfish, MLS: striped marlin, BLZ: blue marlin, OTM: the other marlins. Value in 2009 is provisional.

Year	Days	PBF	ALB	BET	YFT	SWO	MLS	OTM	Total
1980	76,281	671	2,975	2,658	5,840	824	607	702	14,277
1981	77,644	277	2,908	2,523	5,123	675	259	820	12,585
1982	81,350	512	3,674	2,904	5,117	839	270	722	14,038
1983	75,735	130	3,808	4,201	6,207	955	320	1,058	16,679
1984	73,520	85	3,351	5,168	5,968	1,141	386	1,306	17,405
1985	82,600	67	4,045	4,607	6,229	980	711	1,037	17,676
1986	80,295	72	4,712	4,475	6,199	960	901	898	18,217
1987	81,915	181	5,503	4,023	7,148	819	1,187	1,526	20,387
1988	75,224	106	5,585	5,012	7,528	665	752	1,454	21,102
1989	74,443	172	4,711	6,101	7,685	742	1,081	1,261	21,753
1990	85,010	267	6,513	7,053	7,800	687	1,125	1,204	24,649
1991	97,304	170	6,664	7,025	8,034	799	1,197	1,342	25,231
1992	99,984	428	8,036	7,302	8,452	1,173	1,247	1,657	28,295
1993	104,173	667	16,591	6,889	7,950	1,394	1,723	2,092	37,306
1994	103,538	968	16,366	5,974	6,970	1,357	1,284	1,833	34,752
1995	101,658	571	17,497	5,532	6,886	1,386	1,840	1,687	35,399
1996	102,087	778	18,627	6,067	6,257	1,063	1,836	1,332	35,960
1997	108,097	1,158	24,926	5,442	6,079	1,213	1,400	1,023	41,241
1998	105,496	1,086	23,403	4,846	5,888	1,186	1,975	1,147	39,531
1999	107,304	1,030	21,219	5,805	5,500	1,047	1,551	1,063	37,215
2000	109,088	832	19,228	6,042	6,895	1,112	1,109	1,226	36,444
2001	110,638	728	17,539	5,587	5,944	899	1,326	1,215	33,238
2002	113,788	794	16,918	6,565	3,936	956	796	959	30,924
2003	114,344	1,152	16,309	8,402	6,385	1,058	842	1,263	35,411
2004		1,616	12,960	8,523	5,768	1,505	1,000	1,478	32,850
2005		1,818	15,208	9,173	5,642	1,289	668	1,152	34,948
2006		1,058	16,452	9,008	4,146	1,196	429	915	33,205
2007		2,225	18,319	11,597	5,011	2,014	860	1,277	41,304
2008		1,476	13,680	9,437	4,458	1,756	606	1,373	32,785
2009		1,476	13,680	5,696	3,710	1,055	452	973	27,042

Table 3. Fishing effort (1,000 hooks) and catch in weight (t) by species for the vessels greater than 20 GRT of Japanese offshore longline fishery and distant water longline fishery in the Pacific. Data in 2009 is provisional. PBF: Pacific bluefin, SBF: southern bluefin, ALB: albacore, BET: bigeye, YFT: yellowfin, SWO: swordfish, MLS: striped marlin, BLZ: blue marlin, BLM: Black marlin, BL2: sailfish and also includes spearfish. Value in 2009 is provisional.

	Hooks	PBF	SBF	ALB	BET	YFT	SWO	MLS	BLZ	BLM	BL2	Total
1980	215,102	140	0	11,706	44,651	44,827	6,005	5,872	5,613	388	532	119,734
1981	218,508	313	0	14,970	36,557	33,122	7,039	3,957	5,518	273	539	102,286
1982	200,830	206	0	13,040	44,655	28,539	6,065	5,211	6,051	206	891	104,863
1983	196,470	87	0	11,286	45,310	30,014	7,692	3,575	4,796	199	591	103,549
1984	201,106	57	0	11,702	41,347	26,403	7,177	3,335	6,248	227	337	96,831
1985	198,726	38	0	10,204	49,584	21,508	9,335	3,698	5,164	226	161	99,918
1986	189,379	30	0	8,187	48,445	24,340	8,721	5,178	5,922	124	211	101,158
1987	204,702	30	0	9,165	54,245	25,328	9,495	5,439	5,370	147	221	109,439
1988	206,675	51	0	9,103	39,193	19,880	8,574	5,768	5,054	146	293	88,062
1989	215,363	37	0	8,320	54,545	20,337	6,690	4,582	5,117	86	377	100,091
1990	198,126	42	0	9,272	55,286	22,963	5,833	2,298	4,116	75	117	100,001
1991	182,518	48	0	10,375	43,229	18,833	4,809	2,677	4,094	85	161	84,312
1992	172,732	85	0	11,006	49,136	21,688	7,234	2,757	3,721	111	128	95,867
1993	172,433	145	0	13,342	41,114	18,667	8,298	3,286	4,600	69	118	89,639
1994	153,197	237	0	13,199	36,133	16,239	7,327	2,706	4,321	95	36	80,292
1995	136,119	107	0	11,553	29,934	18,360	6,392	3,254	4,121	58	27	73,808
1996	120,522	121	0	13,813	23,469	16,999	6,878	1,731	2,163	52	14	65,240
1997	117,578	139	0	13,973	29,685	18,830	6,955	2,028	2,746	55	21	74,432
1998	116,146	169	0	12,352	33,099	12,618	6,203	1,685	2,349	57	23	68,554
1999	126,377	127	0	12,120	29,744	11,345	5,519	1,448	2,660	48	21	63,032
2000	116,864	121	0	10,767	24,935	14,224	6,135	1,063	2,398	59	40	59,741
2001	120,420	63	0	11,262	30,206	11,832	6,904	865	2,439	36	20	63,627
2002	109,045	47	0	6,667	29,050	8,570	6,187	690	2,123	58	12	53,405
2003	102,373	85	0	4,598	22,607	7,420	5,340	901	1,859	26	21	42,856
2004	92,945	231	0	4,381	22,760	6,355	5,350	620	1,838	26	8	41,568
2005	83,077	107	0	5,212	19,032	6,061	5,334	503	1,527	27	6	37,809
2006	79,571	63	0	4,575	17,777	5,488	6,105	545	1,429	23	16	36,020
2007	70,464	83	0	4,017	13,522	3,040	5,976	279	914	12	7	27,849
2008	62,790	19	0	5,521	10,652	2,830	4,335	364	952	11	8	24,691
2009	46,165	8	0	3,838	8,609	2,364	4,239	149	759	9	8	19,983

Table 4. Fishing effort (Number of set) and catch in weight (t) by species of the Japanese purse seine fisheries in the north Pacific. SKJ: skipjack, YFT: yellowfin, BET: bigeye, PBF: Pacific bluefin, ALB: albacore. Value in 2009 is provisional.

	Sets	SKJ	YFT	BET	PBF	ALB	Total
1980	4,725	45,251	19,033	527	11,327	329	76,468
1981	5,288	38,564	25,123	784	25,422	252	90,145
1982	5,815	53,024	21,965	867	19,234	561	95,651
1983	5,855	74,870	18,561	798	14,774	350	109,352
1984	9,303	109,541	26,959	609	4,433	3,380	144,923
1985	8,877	96,000	38,834	1,251	4,154	1,533	141,772
1986	8,965	111,776	35,437	1,397	7,412	1,542	157,564
1987	9,059	105,559	39,019	1,378	8,653	1,205	155,814
1988	9,185	169,192	27,422	576	3,583	1,208	201,980
1989	9,368	116,795	39,689	1,508	6,077	2,521	166,590
1990	7,789	129,004	35,795	1,920	2,834	1,995	171,548
1991	7,721	145,620	44,579	1,829	4,336	2,652	199,015
1992	5,913	105,223	41,300	1,767	4,255	4,104	156,649
1993	6,918	110,063	44,892	1,625	5,156	2,889	164,625
1994	4,778	114,997	26,441	1,359	7,345	2,026	152,168
1995	6,664	129,727	36,083	1,599	5,334	1,177	173,919
1996	7,058	142,423	22,319	1,447	5,540	581	172,311
1997	5,981	131,477	35,599	6,497	6,137	1,068	180,779
1998	5,272	165,496	23,311	1,258	2,715	1,554	194,333
1999	5,453	113,938	28,569	2,390	11,619	6,872	163,387
2000	5,415	120,173	17,324	2,798	8,193	2,408	150,896
2001	4,020	97,533	13,923	3,002	3,139	974	118,570
2002	4,716	117,829	12,829	2,921	4,171	3,303	141,053
2003	6,344	159,845	18,872	3,560	1,033	627	183,936
2004	5,424	119,872	15,328	3,129	4,844	7,200	150,373
2005	6,240	156,881	18,644	2,313	4,061	850	182,748
2006	5,091	151,292	17,550	2,508	3,962	364	175,676
2007	5,379	148,787	11,474	3,164	3,058	5,682	172,165
2008	5,545	146,529	13,402	2,746	2,954	825	166,456
2009	5,339	120,154	16,072	1,560	2,071	2,151	142,009

Table 5. Fishing effort (Number of poles·days) and catch in weight (t) by species and of Japanese offshore and distant water pole-and-line fisheries in the north Pacific. SKJ: skipjack, ALB: albacore, YFT: yellowfin, PBF: Pacific bluefin, BET: bigeye. Value in 2009 is provisional.

	Poles*days	SKJ	ALB	YFT	PBF	BET	Total
1980	1,133,547	220,815	46,242	5,904	698	1,918	275,576
1981	1,097,515	176,501	26,790	8,135	321	2,281	214,027
1982	1,007,846	177,764	28,918	8,613	1,511	3,451	220,258
1983	867,055	206,493	20,697	8,863	125	3,733	239,911
1984	832,838	261,847	25,593	8,309	390	3,196	299,334
1985	680,141	124,298	20,407	9,897	1,602	3,786	159,990
1986	664,585	195,167	15,737	8,216	962	2,481	222,562
1987	669,430	170,349	18,862	8,078	1,418	2,731	201,438
1988	560,661	189,834	5,834	8,027	817	3,627	208,139
1989	505,391	156,345	8,340	8,241	611	3,568	177,105
1990	467,445	105,788	8,353	5,953	514	3,265	123,873
1991	323,700	130,995	7,009	4,578	64	1,219	143,865
1992	342,661	108,299	13,715	5,530	24	1,025	128,593
1993	350,702	156,070	12,411	4,084	49	1,760	174,374
1994	324,950	95,652	26,141	3,906	90	1,873	127,662
1995	339,288	122,624	20,805	4,455	168	2,607	150,658
1996	315,060	88,213	20,014	4,848	34	2,537	115,647
1997	347,687	111,710	32,033	3,656	8	2,574	149,982
1998	372,668	123,014	22,778	3,051	19	1,341	150,204
1999	383,904	109,636	50,241	3,568	3	1,073	164,521
2000	425,805	138,082	21,246	3,474	55	1,792	164,649
2001	402,566	95,482	29,365	2,614	8	1,321	128,789
2002	375,455	80,620	48,308	2,473	19	1,687	133,108
2003	380,833	111,102	36,039	2,054	9	812	150,016
2004	351,123	87,530	32,086	2,221	9	3,299	125,145
2005	381,228	127,177	16,085	3,135	177	1,283	147,856
2006	293,637	85,787	15,322	2,623	61	3,701	107,495
2007	316,059	80,414	37,664	2,293	2	1,790	122,162
2008	294,378	77,737	19,025	2,478	1	1,444	100,684
2009	282,145	53,148	32,386	3,517	21	1,400	90,471

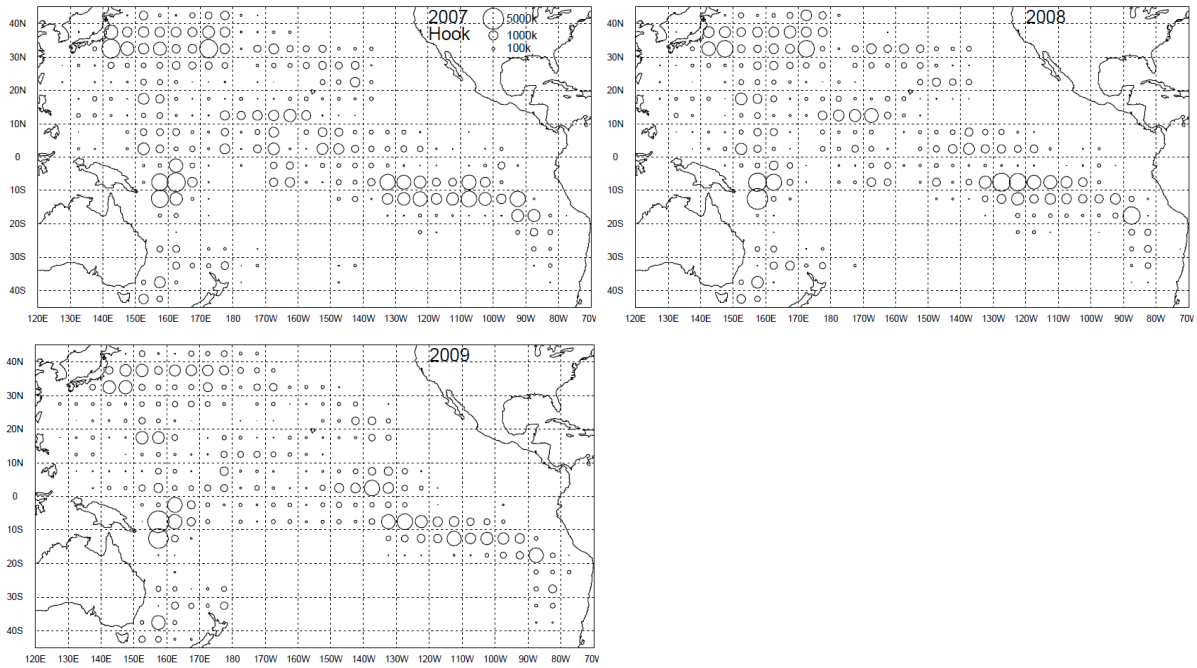

Figure 1. Distribution of fishing effort (Number of hooks) for the Japanese longline fishery (larger than 20 GRT vessels) in the Pacific, 2007-2009.

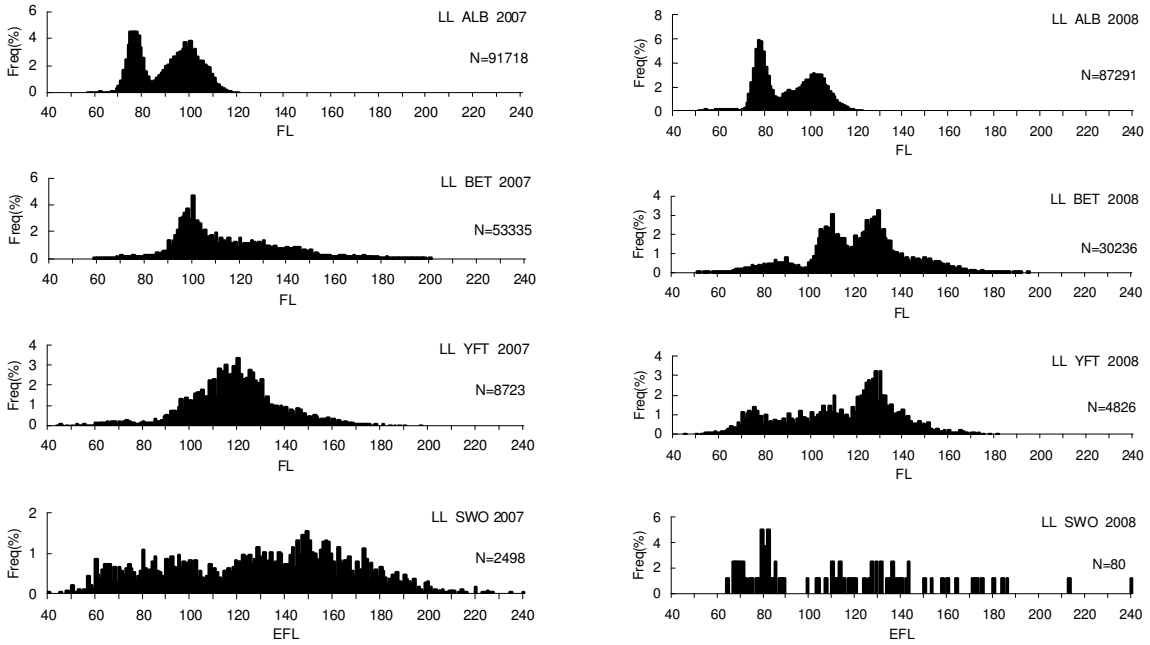

Figure 2. Annual length frequency distribution (simply summing up all measurements) for longline caught albacore, bigeye, yellowfin, and swordfish in 2007 (left) and 2008 (right). Texts in each graph indicate gear, species, year, and the number of fish measured.

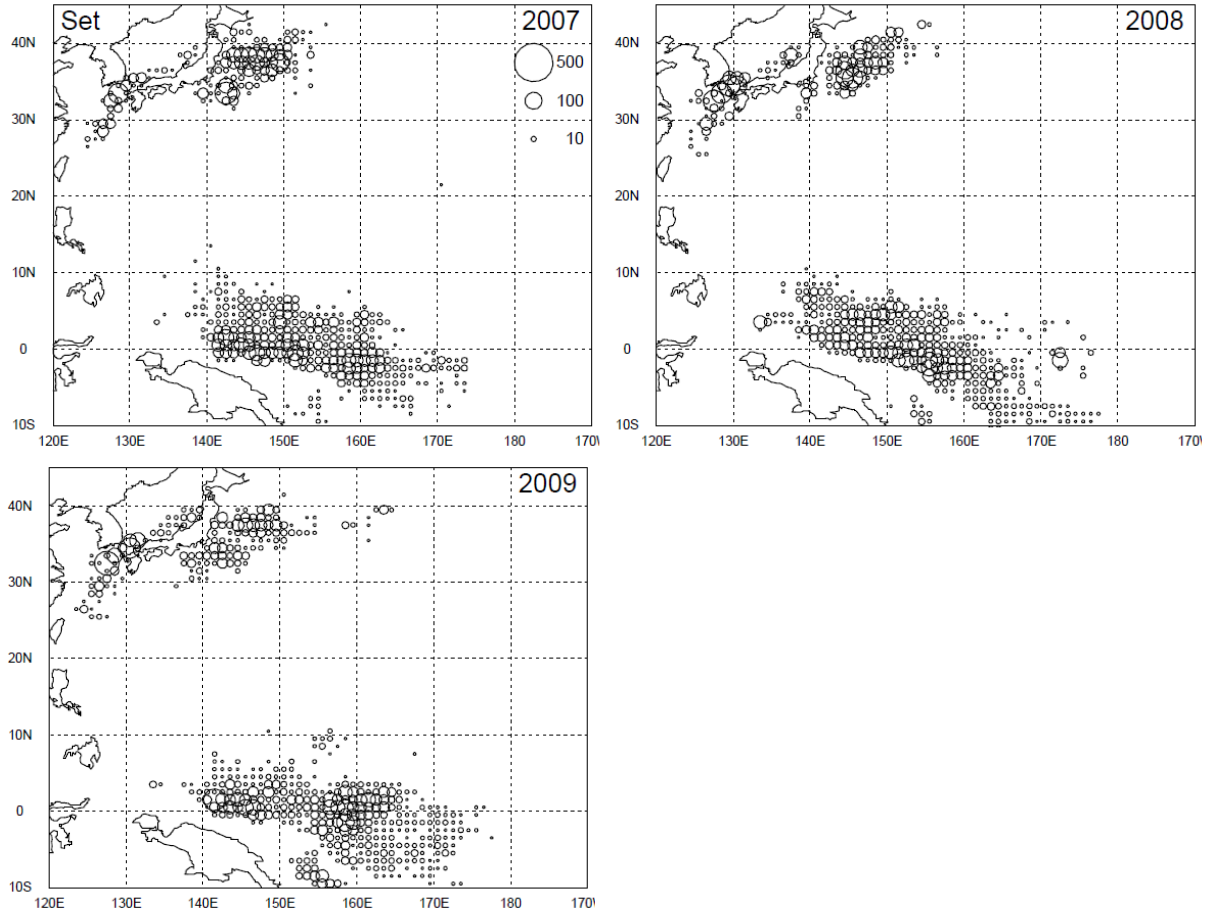

Figure 3. Distribution of fishing effort (number of sets) for the Japanese purse seine fishery in the Pacific, 2007-2009.

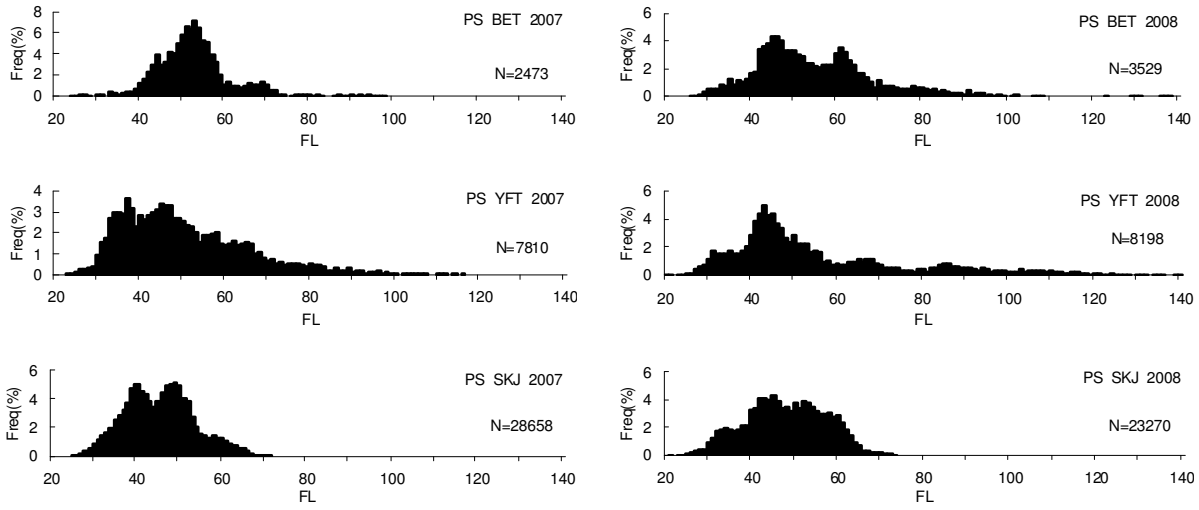

Figure 4. Annual length frequency distribution for distant water purse seine caught skipjack, bigeye, and yellowfin in 2006 (left) and 2007 (right). Texts in each graph indicate gear, species, year, and estimated number of fish caught by this fishery.

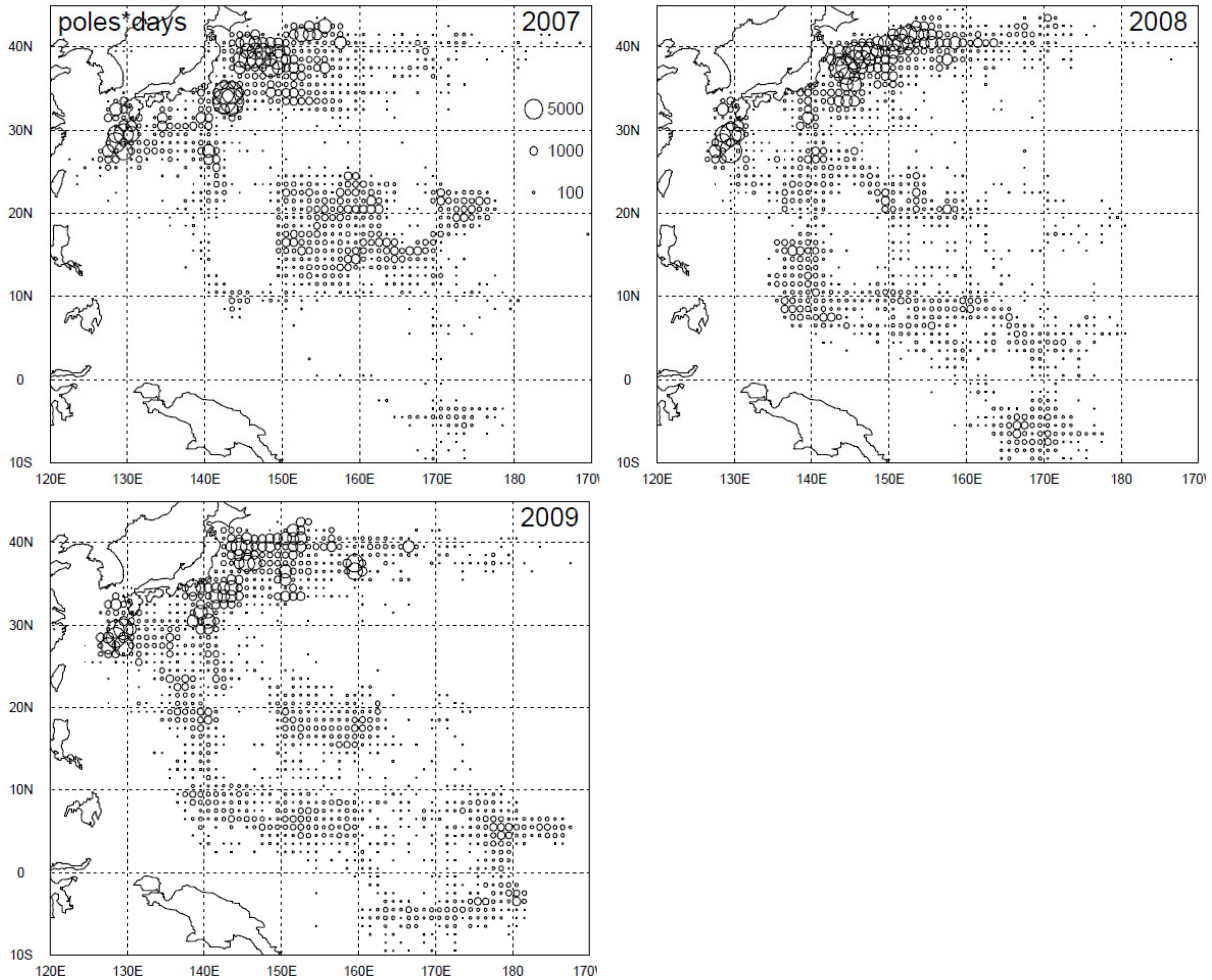

Figure 5. Distribution of fishing effort (number of poles･days) of the Japanese pole-and-line fishery (larger than 20 GRT vessels) in the Pacific, 2007-2009.

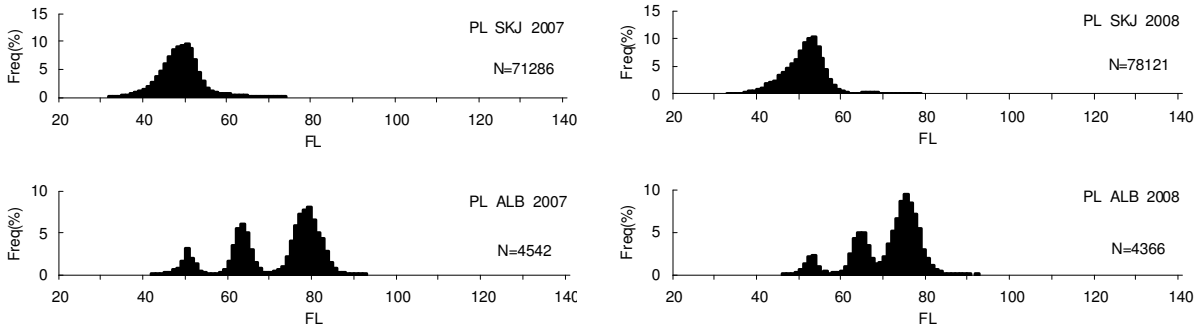

Figure 6. Annual length frequency distribution (simply summing up all measurements) for offshore and distant water pole-and-line caught skipjack and albacore in 2007 (left) and 2008 (right). Texts in each graph indicate gear, species, year, and the number of fish measured.

Attachment

(Preliminary translation)
Announcement
by the Ministry of Agriculture, Forestry and Fisheries (MAFF)
on
Actions toward effective conservation and management for Pacific bluefin tuna
(May 11, 2010)

I. Background

(1) In recent years, increasing international attention has been paid to the conservation and management of fishery resources, in particular bluefin tuna. At the 15th Conference of the Parties of CITES (COP15) last March, a proposal to ban the international trade in Atlantic bluefin tuna was presented from the perspective that ICCAT had been failing to ensure effective conservation and management measures for this species.

This proposal was rejected by a vote at COP15. A major reason for this result is that Japan successfully convinced other countries that ICCAT is the appropriate body for conserving and managing Atlantic bluefin tuna. At the ICCAT annual meeting last year, Japan took the leadership in working out the stringent conservation and management measures for rebuilding of Atlantic bluefin tuna stocks. Such Japanese leadership and positive attitude toward conservation of resources made the Japanese effort significantly more convincing and persuasive in the Doha CITES Conference.

On the other hand, there are still prevailing concerns in the international community that the conservation and management measures by RFMOs are not effective enough. It is likely that RFMOs will be required to further strengthen their conservation and management measures, not only for Atlantic bluefin tuna, but also for other species.

(2) With respect to Pacific bluefin tuna, Japan is the largest fishing nation as well as the almost exclusive consuming nation of this species, as shown below. Japan, therefore, has a special responsibility for the sustainable use of this species.
   (a) Over 70% of the total Pacific bluefin tuna catches are harvested by Japan;
   (b) Major Pacific bluefin tuna spawning grounds are around Japan; and
   (c) Most of the Pacific bluefin tuna harvested by other countries, such as Mexico and Korea, are exported to Japan.

A concern has been reported over the possible stock decline of Pacific bluefin tuna due to

increasing fishing pressure on juvenile fish. Addressing such a concern, the WCPFC, at its annual meeting last year, adopted a conservation and management measure for 2010 designed to freeze the total fishing effort and to reduce the fishing mortality of juvenile fish. This is a first step, and Japan will continue to take the leadership to promote the conservation and management of Pacific bluefin tuna. For these reasons, it is necessary for Japan to start domestic fishery management and strengthen research for this species even before other members of WCPFC take such actions so that the international conservation program can follow such Japanese initiative.

II. Direction and Actions to be taken

1. Direction

MAFF will promote conservation and management of Pacific buefin tuna by "reducing the juvenile catch" for future catch of bigger fish. MAFF will also take necessary measures to ensure that the Spawning Stock Biomass (SSB) of Pacific bluefin tuna, which fluctuates significantly, will be maintained within the appropriate range in the mid and long term (5-10 years), and to prevent the SSB from dropping from a level lower than the historically lowest level observed.

2. Actions

To realize the above direction, MAFF will implement the following measures regarding (1) domestic fisheries management, (2) international actions, and (3) research activities, starting this fiscal year:

(1) Domestic fisheries management

MAFF will consider introducing the following conservation and management measures. As a part of this effort, MAFF will establish "the Resource Recovery Plan for Pacific bluefin tuna" by the end this fiscal year for (a) and (b) below, so as to implement it from fiscal year 2011. Also, MAFF will consider the introduction of the Income Assurance System in the fishery sector, to promote the smooth implementation of the Resource Recovery Plan.

(a) Offshore fisheries

For large and medium scale purse seine fisheries, proper management measures in light of the nature of the actual fishing operations. MAFF will consider a closure period, a catch size limit, an individual quota system, and combination of such measures for this purpose.

(b) Coastal fisheries

For small scale coastal fisheries such as trolling, a vessel registration system, with a mandatory catch reporting requirement, will be introduced. This can be a basis for future introduction of a limited entry system.

(c) Aquaculture

For aquaculture, a new category, "bluefin tuna aquaculture" will be established in the aquaculture licensing system, and registration of bluefin tuna aquaculture sites will be required to local governments, with a mandatory reporting requirement from aquaculture farmers in order to obtain accurate information on such aquaculture activities.

(2) International actions

Japan will work with relevant countries at WCPFC to realize the following;

(a) Strengthening of the conservation and management measures

Japan will work to improve the WCPFC conservation and management measure on Pacific bluefin adopted last year, to reflect "Direction" in (1), and to expand the application of the measure to all the relevant areas.

(b) Cooperation with IATTC

Japan will, in close cooperation with IATTC, call on Mexico, which harvests bluefin tuna in the eastern Pacific and is a cooperating non-member to WCPFC, to ensure cooperation to effectively implement WCPFC conservation and management measures.

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(3) Research activities

The following scientific research activities will be expanded and strengthened, with a view to scientifically verifying and assisting "Direction" in (1) and "Actions" in (2) (a) and (b) and to reflecting the collected data on conservation and management measures expeditiously. These efforts will be organized by the newly established "Pacific Bluefin tuna Resources Division" of the Fisheries Research Agency, in cooperation and collaboration with related universities and prefectural governments:

(a) Acceleration of information collection

- A network will be established among relevant national and foreign scientists to assist scientific research.
- A system will be established for assessing a level of new recruitment of juvenile fish in a timely and accurate manner.

(b) Expansion of research on spawning grounds

- Research will be strengthened on spawning grounds and seasons.

(c) Technology Development

- To realize the complete culturing techniques and the stock enhancement methods, technology will be developed on seed production, expansion of seed production level, and enhancement of seed.

(4) Public relations

MAFF will continue sharing information on the sustainable use of Pacific bluefin tuna, not only with the fishing industry, but also with the general public, so that the situation will be broadly recognized and understood.

Background

of

"Actions toward effective conservation and management for Pacific bluefin tuna"

The Fisheries Agency of Japan (FAJ) on May 11th, 2010 announced "Actions toward effective conservation and management for Pacific bluefin tuna" (Direction and Actions). FAJ is now in the preparation for introducing domestic management measures to implement the announcement, while coordinating views among Japanese stake holders.

Basic concept of "Direction and Actions"

1. **It is considered that the PBF stock has fluctuated largely mainly due tothe oceanographic environmental factors. On the other hand, it is still unknown how and to what degree such environmental factors influence the PBF stock at least at this stage. Thus, close monitoring of the PBF stock condition along with timely management actions are keys to the sound PBF management.**

2. **Taking into account the current situation on the PBF fisheries, where the majority of catch is juvenile fish, it is critically important to control the juvenile catch. It is practical and effective to maintain Spawning Stock Biomass (SSB) within the historical range of the fluctuations by controlling the juvenile catch while maintaining the fishing mortality on adult catch.**

(Explanation)

(1) Characteristics of PBF stock

- In PBF stock, large fluctuations (ranging 20-150 thousand MT) have been repeatedly observed for the past 50 years. Because some fluctuations occurred even when there were no significant changes in the fisheries, PBF stock is considered to be largely influenced by oceanographic environmental factors, in particular whether environmental condition is preferable for the survive of eggs and larvae.

- PBF stock has experienced the lowest and close to the lowest SSB levels for long time-series. The stock repeatedly re-bounced from such low SSB levels to higher levels after high recruitments. The experience shows that the sustainability of PBF stock will be expected through management measures to maintain the stock within the range of the historically observed SSB.
- It is known that PBF is matured at a relatively younger age (+3). Naturally, mortality rates in this short period (0-3) in the PBF life history (0-20) directly result in the SSB level.

(2) Characteristics of the fisheries for PBF

- 70-80% of PBF are caught in the Japanese coastal and offshore waters by a variety of fisheries (e.g. large/small purse seine fisheries, offshore/coastal longline fisheries, set net fishery, troll fishery and poll-and-line fishery). Japanese coastal fisheries for PBF have continued sustainably for centuries. In introducing management measures for PBF, such history and existing realities of the coastal fisheries and local fishing communities need to be duly considered.
- The majority of PBF catch is juvenile fish, which is a unique and important feature of PBF fisheries. The situation is totally different in fisheries for Atlantic bluefin tuna, in which larger matured fish are the main target. Thus, management measure for PBF should be focused on the juvenile catch. As a matter of fact, based on a variety of simulation with SS model, projected effect of restriction of juvenile catch has a significant impact on SSB future projections.

(3) Issues of the current stock assessment

- It is recognized that stock assessment results by the SS model are heavily sensitive to biological parameters, in particular natural mortality rate (M), and therefore it is difficult to obtain reliable absolute SSB values. As such, management scheme highly sensitive to the biological parameters are not feasible for PBF stock.
- Scientific data and information used in stock assessment are still insufficient. In particular, CPUE indices rely solely on Japanese small longline fishery off the Yaeyama Islands in the spring season. However, given the high migratory nature of PBF and the geographically spread spawning grounds, varied sources of CPUE indices will contribute to more reliable and accurate stock assessment.
- The stock assessments and WCPFC management measures have been discussed based on the base year 2002-2004. However, given the large fluctuation of PBF stock, future consideration in view of longer time-series would be preferable.