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Recent status of Japanese skipjack fishery in the vicinity of Japan

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Summary

Japan's fisheries indices are reviewed for the skipjack in the vicinity of Japan. Although skipjack catch and nominal CPUE shows no sign of the decrease of skipjack population in the equatorial region in the WCPO, there was some signs possibly indicating decrease of the population in the vicinity of Japan. Those are (1) sharp decrease occurred in skipjack catch in 2009 at region northeast for the middle-sized pole-and-line and offshore purse seine fisheries, (2) The nominal CPUE for skipjack for the middle-sized pole-and-line fishery somewhat shifted from a high level during 2000-2006 to a lower level during 2007-2009, (3) end of fishing season became earlier for the middle-sized pole-and-line fishery in recent 3 years (2007-2009), and (4) the skipjack catch for the troll have been a low level at least since 2005. It is necessary to monitor fisheries indicator carefully for skipjack in the vicinity of Japan and to conduct stock assessment for the WCPO skipjack covering entire distribution of its population, so that population dynamics can be explained not only for the population in the equatorial region but for northern region.

1. Introduction

Japan has fished skipjack in the Western Central Pacific Ocean (WCPO) mainly by major two fisheyes, namely, pole-and-line and purse seine fisheries, as well as by small scale fishery such as troll fishery in the coastal area of Japan. The skipjack catch roughly ranged from 280,000 to 440,000 t in the WCPO since 1970s. Japan's catch of skipjack tuna drastically decreased in 2009 due to the decrease in the catch vicinity of Japan. In this paper, we reviewed Japanese skipjack fishery in recent years in the north of 20°N in the WCPO.

2. Data source

In this paper, two kinds of data were mainly used. One is the Annual Report of Catch Statistic on Fishery and Aquaculture published by the Statistics and Information Department, Minister's secretariat, Ministry of Agriculture, Forestry and Fisheries (MAFFJ). This report has published a comprehensive statistics for Japanese fisheries including catch by species and/or kind of fishery. The other is logbook database which has been compiled at National Research Institute of Far Seas Fisheries (NRIFSF) based on the logbook mandatory submitted by fishermen. The databases for the longline vessels larger than 20 gross register tonnages (GRT) and for the longline of 10-19 GRT are available for 1952-2009 and 1994-2009, respectively. A "raised" database, which was aggregated by month and 5X5° block, and then expanded with coverage rate of the logbook, is also available for the longline vessels larger than 20 GRT. The databases for the pole-and-line vessels larger than 20 GRT is available for 1972-2009, and that for the purse seine vessels larger than 40 GRT is available for 1968-2009. Both the logbook data for the pole-and-line and purse seine are not raised.

3. Overview

Table 1 shows Japan's skipjack catch by fishery in the north of 20°N in the WCPFC Statistical Area. The skipjack catch ranged from about 112,000 t to 183,000 t during 2000-2008, however the catch in 2009 decreased to 80,607 t which accounts for 60% of the catch in 2008 and is the lowest in this period, though the 2009 catch is provisional. The low catch in 2009 is due to the decline of the catches by the pole-and-line and purse seine fisheries in the vicinity of Japan. The catch by pole-and-line (by vessels larger than 20GRT) was 37,401 t in 2009 which account for 61% of the catch in 2008, whereas the catch by purse seine (by vessels larger than 40GRT) was 29,126 t in 2009 which account for 50% of the catch in 2008.

4. Pole-and-line fishery

The pole-and-line fishery can be categorized into distant water, offshore and coastal pole-and-line fisheries on the basis of license issued by the government of Japan. Those categories basically correspond to larger than 120 GRT, 20-120 GRT and less than 20 GRT in vessel size, respectively. The pole-and-line fishery can be also categorized into large, middle, and small (sized) vessels which correspond to larger than 200 GRT, 20-199 GRT and less than 20 GRT in vessel size until 1999. Since 2000, those limits of vessel size should be changed to 300 GRT and 20GRT because one vessel (220 GRT) were launched and start its operation as the same to the middle sized vessels.

Those vessels have different fishing strategy. Usually the large vessel primarily fishes albacore, secondary skipjack, from summer through autumn season in the waters north of 30°N, and skipjack tuna in winter and spring season in the waters south of 30°N (Figure 1). This type of vessel equips brine freezer, in which fish caught is immediately entered into a tank filled with cooled brine, and then unloads frozen fish in port. The middle-sized vessel primarily fishes skipjack tuna from spring through autumn off Pacific side Japan (Figure 1), and also fishes relatively small amount of albacore, yellowfin and bigeye tunas. This vessel stores fish in cooled water, and unloads fresh fish.

The following is the catch and the other fisheries indicator more in detail focused on the middle sized pole-and-line fishery, because the middle sized pole-and-line fishery highly tend to fish skipjack than the other tunas.

4.1. Recent status of the middle-sized pole-and-line skipjack fishing

Skipjack catch for middle-sized pole-and-line vessels in the north of 20°N in the WCPO is shown in Table 2. It was considered that the fishing ground was divided into three, regions Northeast, East, West and South (Figure 2). Region Northeast is most important for middle-sized fishery, accounts for 41%-66% during 2000-2009. In recent year, the skipjack catch in this region shows decrease trend during 2000-2009, and was lowest in 2009 (12,817 t) during 2000-2009, which is 44% of the catch in 2008 (29,443 t) (Figure 3). The fishing effort in day fishing also shows decrease trend in recent years.

In the beginning of the fishing season in the region Northeast in some years, a part of vessels try to catch albacore than skipjack. Therefore, it is better to discount the days targeting albacore when relative abundance of skipjack is considered. Here, in order to consider removing albacore effect, catch and data was adjusted by limitation the record of "skipjack trip" where skipjack represented at least 75% of the combined skipjack and albacore catch from the trip. Figure 4 shows nominal CPUE (catch/day) for skipjack in this region. The CPUE somewhat shifted from a high level during 2000-2006 to a lower level during 2007-2009.

Annual fishing grounds for the middle-sized pole-and-line for 2007, 2008 and 2009 is shown in Figure 5. During those 3 years, there is no apparent change in fishing ground.

4.2. Change of the end of fishing season

The offshore pole-and-line fishery start its operation from January or February at around 20°-25° N, gradually moves to northward, reached to around 40°N in June or July. Most of middle-sized pole-and-line vessel operates at north of 35°N in summer and autumn and then finishes their operation in November or December. Figure 4 shows how to define the end of fishing season. First, fishing effort, number of days fishing, was counted by each 5-day-block, for

north of 35°N. The 5-day-block is defined the period of 5 days from the begging of each month, for example, the period first to fifth of a month is defined as first 5-day-block and the period sixth to tenth of a month is defined as second 5-day-block of the month. Therefore, number of days in sixth 5-day-block changes between 3 days and 6 days. Second, the end of fishing season was defined that the latest 5-days-block that has positive number of days fishing in each year (Figure 6). Figure 7 shows yearly change of the end of fishing season for the middle-sized offshore pole-and-line fishery. The end of fishing season was between sixth 5-day-block in November and second 5-day-block in December during 2000-2005, and then became earlier, was between second 5-day-block in November and fourth 5-day-block in November in the latest 3 years (2007-2009). Shifting the end of the fishing season earlier like this may suggest decline of the population size that migrate to this fishing ground.

5. Troll fishery

The troll fishery fishes various pelagic species including tunas. The size of the troll vessels is generally small, mostly less than 10 GRT, 10-19 GRT as largest size, and mostly make one-day trip. Those vessels fish tunas in the coastal waters of Japan. Skipjack tuna is one of the most important species for the troll vessels which operates in the Pacific and the East China Sea. Because of small scale fishery, logbook system is not available for troll fishery.

The annual catch for skipjack for the troll fishery ranged from about 4,000 t to 15,000 t during 2000-2008, based on the statistics published the MAFFJ (Figure 8(A)). From this, the skipjack catch was 14,802 t at a peak in 2004, and then sharply decreased to 5,971 t in 2005, stayed at a low level during 2005-2008.

There is the other statistics collected by Wakayama Prefecture. Wakayama Prefecture is one of the largest unloaded places for the skipjack caught by troll fishery in Japan. In this statistics, the 2009 data is available, which is not available in that of the MAFFJ. Figure 8(B) shows skipjack catch by the troll fishery in the major port in Wakayama Prefecture. The skipjack catch decreased from about 2,000 t in 2000 to 500 t in 2004. After that the catch stayed at about 500 t for 6 years.

Overall, the decline of the catch by the troll fishery is more apparent than that of major fisheries such as the pole-and-line and the purse seine. The troll catch stayed at low level at least since 2005.

6. Discussion

Williams and Terawasi (2010) reviewed tuna fishery in the WCPO and showed skipjack fisheries indicator. It was reported that provisional skipjack catch in 2009 in the WCPO was 1,789,979 t and highest on record (nearly 120,000 t higher than previous record in 2007 and that purse seine skipjack (nominal) CPUE for all set type and fleets increased to record level in 2009. It is considered from those that general situation of fisheries indicator for skipjack did not indicate any sign of population decrease in the tropical waters in the WCPO. On the contrary, there are some signs possibly indicating decrease of the population in the vicinity of Japan. Although the skipjack stock in the WCPO is considered to be single one, some of fisheries indicators in northern region dose not necessarily coincide to that in the equatorial waters. It is necessary to monitor fisheries indicator carefully for skipjack in the northern region because there is tendency that some signals are seen in surrounding region rather than in main distributed region of animal when a depression of the stock of anima occurs.

The latest stock assessment results on the skipjack in the WCPO in 2008 concluded that overfishing is not occurring and the stock is not in an overfished state. But the stock assessment paper presented in the SC4 discussed that the stock status of skipjack for the northern region (north of 15 degree north) was uncertain. It is possibility that northern stock may be not abundant as shown in the equatorial region and that the sign represented from the fisheries indicators in the northern region may be the sign of the depression of the stock.

7. Conclusion

Although catch and nominal CPUE shows no sign of the decrease of skipjack population in the equatorial region in

the WCPO, there was some signs possibly indicating decrease of the population in the vicinity of Japan.

- Sharp decrease occurred in skipjack catch in 2009 at region northeast for the middle-sized pole-and-line and offshore purse seine fisheries.
- The nominal CPUE for skipjack for the middle-sized pole-and-line fishery somewhat shifted from a high level during 2000-2006 to a lower level during 2007-2009.
- End of fishing season became earlier for the middle-sized pole-and-line fishery in recent 3 years (2007-2009).
- The skipjack catch for the troll have been a low level at least since 2005.

It is necessary to monitor fisheries indicator carefully for skipjack in the vicinity of Japan and to conduct stock assessment for the WCPO skipjack covering entire distribution of its population, so that population dynamics can be explained not only for the population in the tropical regions but for northern region.

8. Reference

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Table 1. Skipjack catch by fishery in the north of 20°N in the WCPFC Statistical Area. LL = longline vessel larger than 20GRT, COLL = longline vessel less than 20GRT, PL = pole-and-line vessel larger than 20GRT, COPL = pole-and-line vessel less than 20GRT, PS = purse seine vessel larger than 80GRT, COPS = purse seine vessel less than 80GRT. Figures in 2009 are provisional.

Year	Longline		Pole-and-line		Purse seine		Gillnet	Troll	Setnet	Other	Total
	LL	COLL	PL	COPL	PS	COPS					
2000	8	0	111,844	8,926	34,998	49	819	14,528	395	868	172,435
2001	55	56	66,623	7,288	45,784	852	796	6,949	685	389	129,476
2002	35	19	56,545	6,901	39,980	1,025	488	6,376	576	317	112,261
2003	39	42	88,409	9,377	58,098	1,632	711	9,386	399	459	168,551
2004	35	21	69,916	9,990	38,736	716	721	14,802	224	311	135,472
2005	48	27	102,998	7,363	64,899	296	707	5,971	711	260	183,280
2006	11	13	69,964	6,213	57,999	564	311	3,624	330	186	139,215
2007	18	8	59,700	8,026	67,074	715	480	3,249	535	235	140,040
2008	44	15	61,573	8,651	58,228	364	332	4,178	315	217	133,918
2009	7	15	37,401	8,651	29,126	364	332	4,178	315	217	80,607

Table 2. Fishing effort (days fishing) and skipjack catch for the middle-sized pole-and-line fishery (vessels 20-300 GRT) by region in the north of 20°N in the WCPFC Statistical Area.

year	days				SKJ catch			
	Northeast	East	West	Total	Northeast	East	West	Total
2000	5,740	3,536	5,567	14,843	48,086	22,580	15,733	86,399
2001	5,932	3,229	4,359	13,520	37,842	11,258	8,188	57,288
2002	4,598	2,664	5,238	12,500	23,927	8,802	14,681	47,409
2003	5,155	2,706	4,561	12,422	35,522	16,136	16,234	67,892
2004	4,423	4,273	3,664	12,360	21,252	13,654	11,023	45,929
2005	5,589	3,046	3,899	12,534	49,294	16,304	10,161	75,758
2006	4,098	3,585	3,126	10,809	30,969	13,949	7,542	52,459
2007	3,884	3,471	3,493	10,848	18,400	12,650	8,279	39,328
2008	4,950	2,026	2,961	9,937	29,443	9,313	7,676	46,432
2009	3,166	2,774	3,702	9,642	12,817	7,645	10,507	30,970

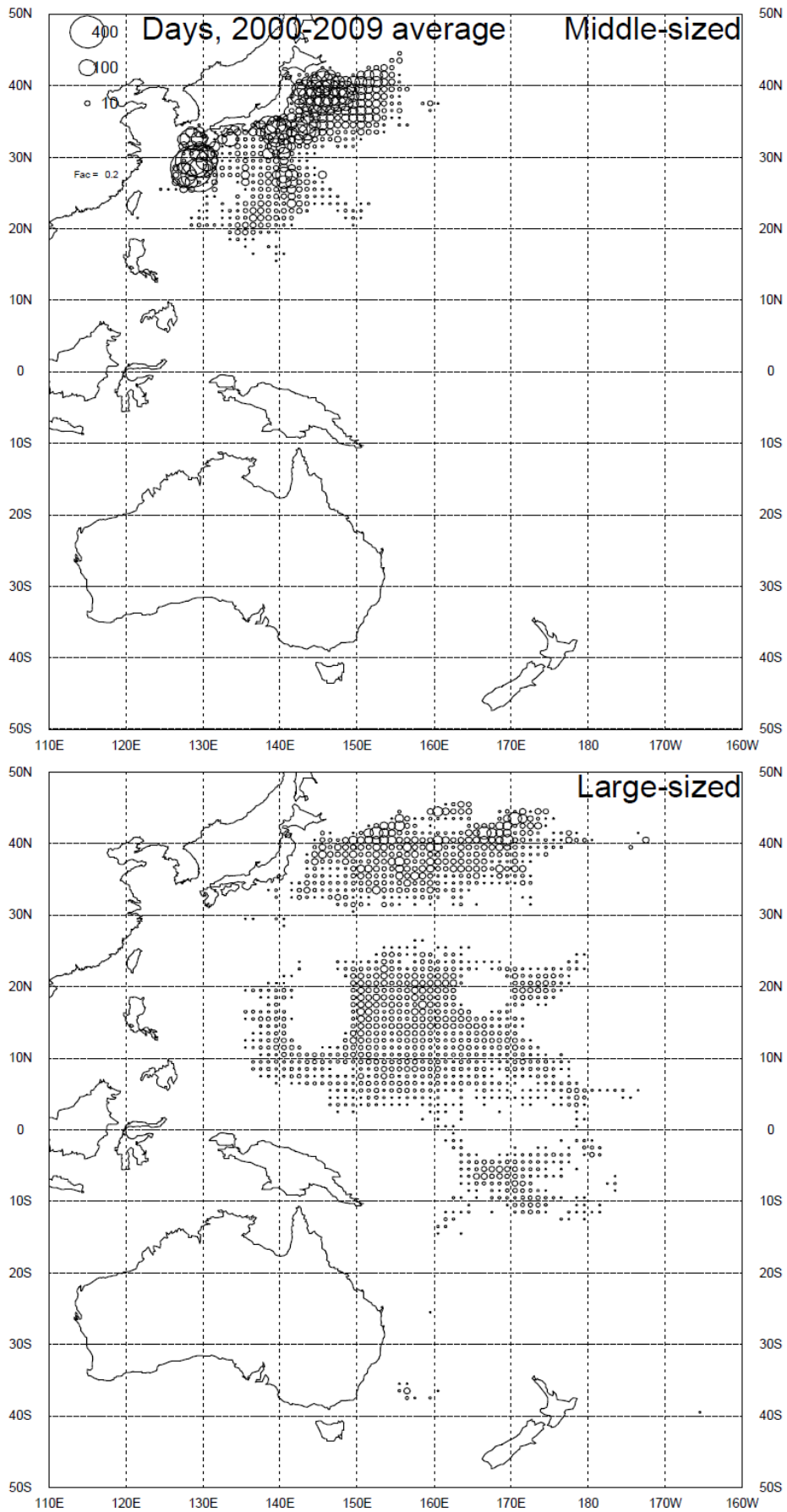


Figure 1. Distribution of fishing effort (days fishing) for the Japanese offshore pole-and-line (20-300 GRT vessels) and distant water pole-and-line (300- GRT vessels) fisheries in the Pacific, average of the last decade (2000-2009).

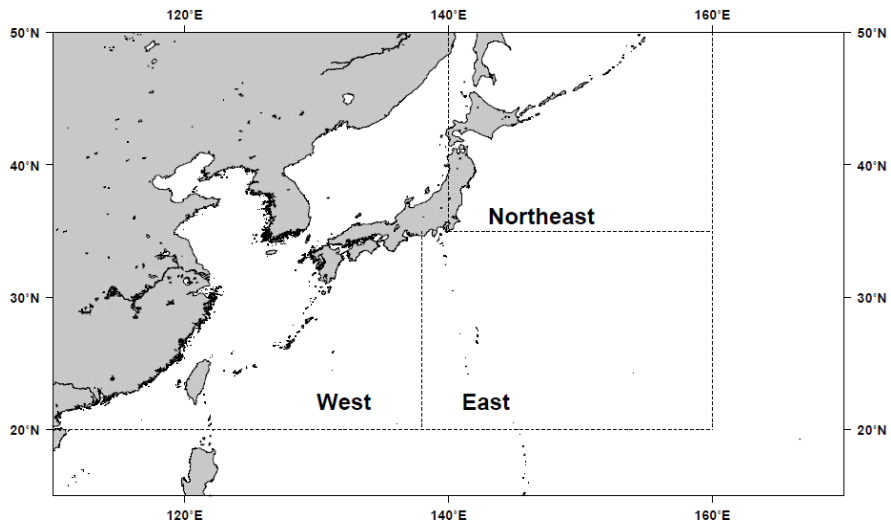


Figure 2. A classification of regions for the middle-sized pole-and-line.

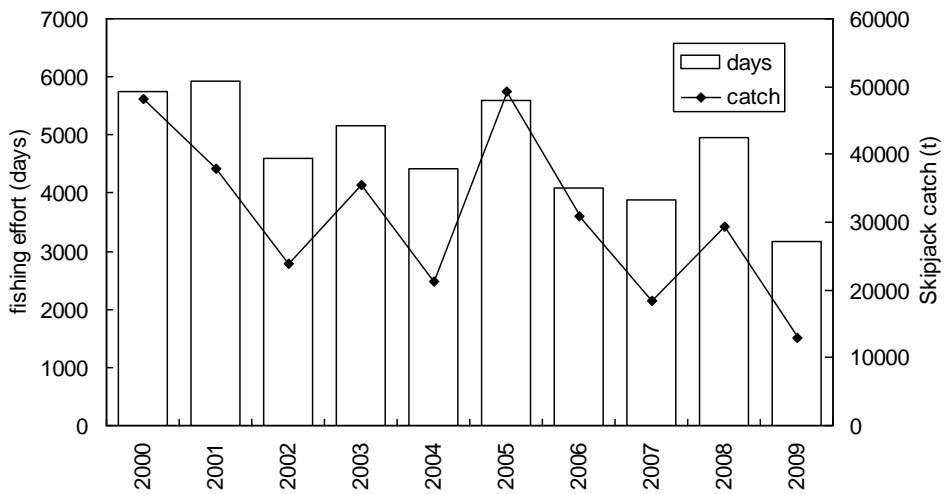


Figure 3. Annual fishing effort (days fishing) and skipjack catch for middle-sized pole-and-line fishery in Region Northeast (north of 35° N)

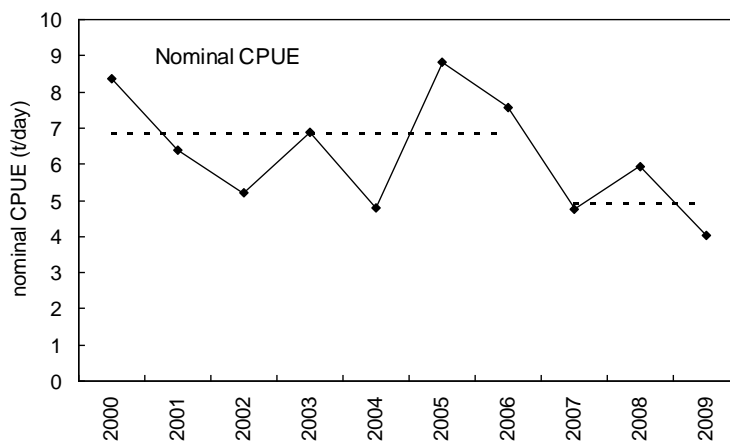


Figure 4. Nominal CPUE for skipjack for middle-sized pole-and-line fishery in region Northeast (north of 35°N). Dashed horizontal lines represent averaged CPUE during 2000-2006 and during 2007-2009.

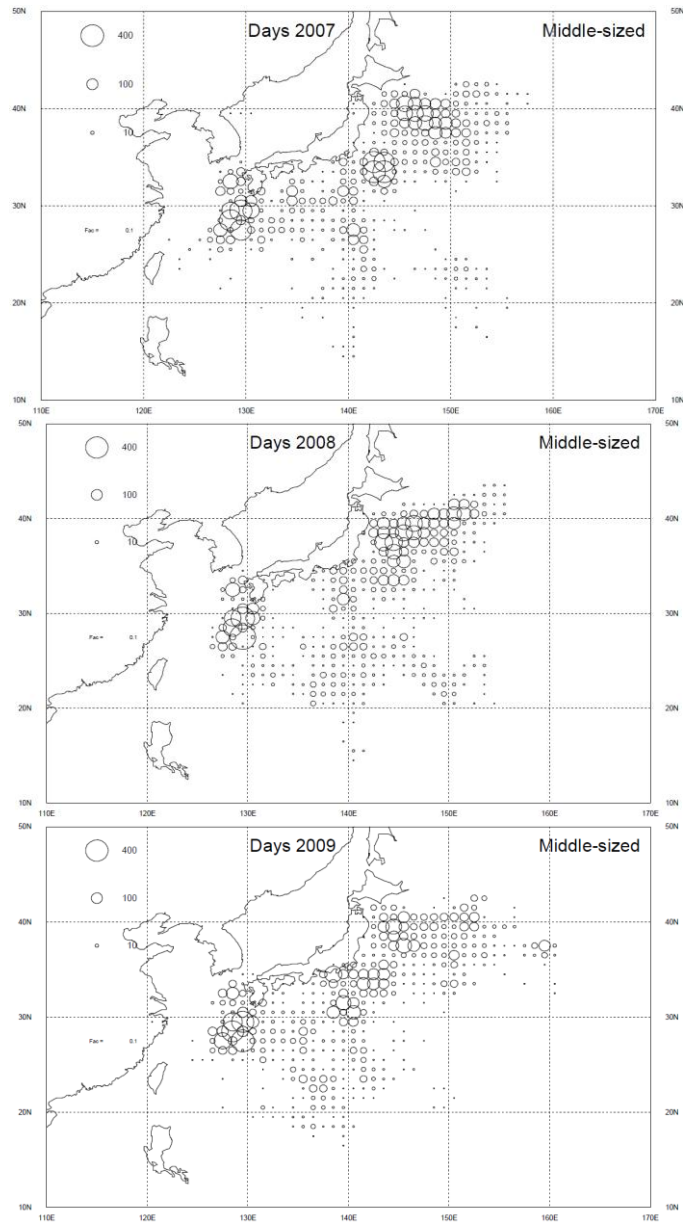


Figure 5. Distribution of annual fishing effort (days fishing) for the Japanese offshore pole-and-line fishery (20-300 GRT vessels) in the Pacific, 2007-2009.

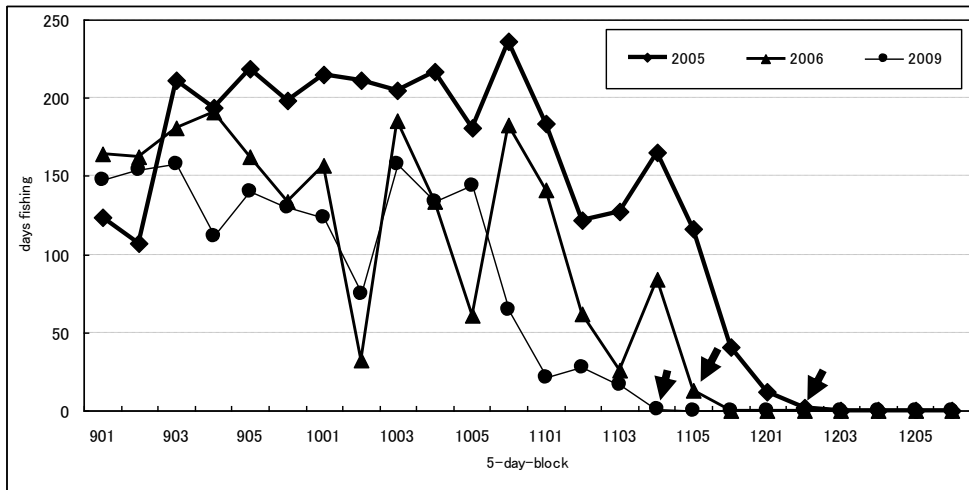


Figure 6. An example of showing end of fishing season for the Japanese offshore pole-and-line fishery (20-300 GRT vessels) in Region Northeast (north of 35°N). Each plot represents the number of days fishing in 5-day-block. The 5-day-block is defined the period of 5 days from the begging of each month, therefore 6th 5-day-block changes between 3 days and 6 days. In this Figure, for example, “901” on the x-axis represents first 5-day-block in September, 1 to 5 September. The end of fishing season was defined that the latest 5-days-block that has positive number of days fishing in each year.

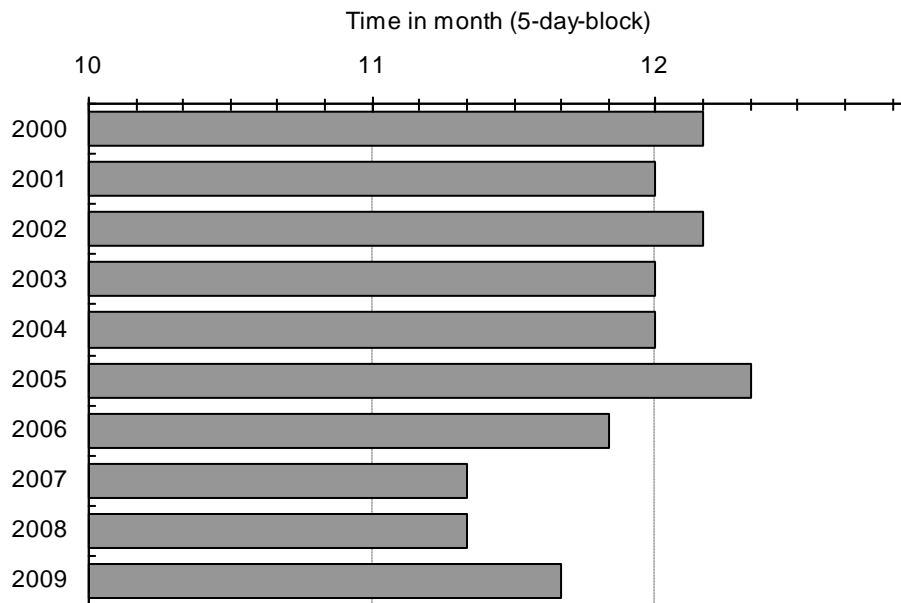


Figure 7. Yearly change of the end of fishing season for the Japanese offshore pole-and-line fishery (20-300 GRT vessels) in Region Northeast. The end of fishing season was defined that the latest 5-days-block that has positive number of days fishing in each year.

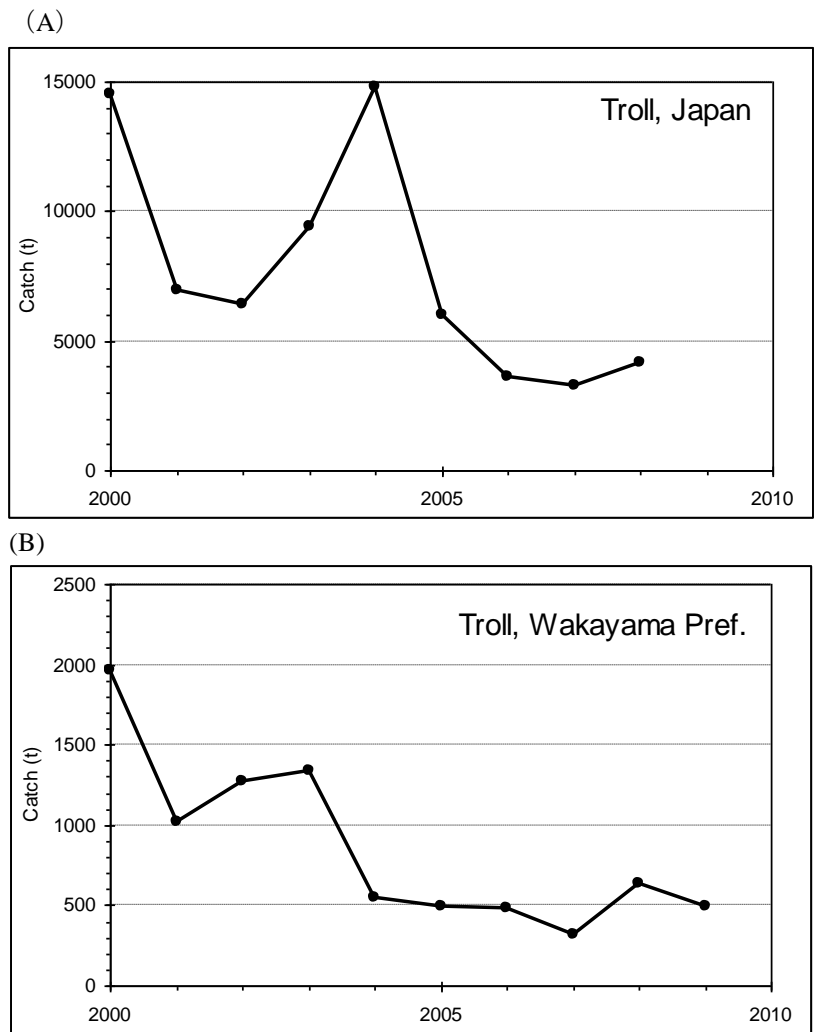


Figure 8. Skipjack catch by troll gear in entire Japan (A) and for the three main landing sites in Wakayama Prefecture (B). The horizontal line in (B) represents average during 1981-2009.