Recent variations in the catch of Pacific bluefin tuna by Korean domestic purse seiners

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Abstract

Pacific bluefin tuna (PBF) in Korean waters are caught by Korean domestic purse seiners as non-target species. While the annual catch of PBF tended to increase after 1994, the size of the offshore purse seine fleet has decreased since 1994. The quarterly catch ratios of PBF from 2000 to 2009 were highly variable from year-to-year. Length composition of PBF from the offshore purse seiners showed several modes between 30 and 80 cm fork length, and a weak but noticeable mode at > 100 cm FL in 2008 and 2009. Annual mean fork length of PBF gradually increased from 2000 to 2009. The large fish > 100 cm FL observed in 2008 and 2009 were caught in late winter and spring and were generally larger compared to other seasons. The fishing ground of PBF is mainly formed around Jeju Island and the main fishing season was spring in 2008 and 2009.

Introduction

Pacific bluefin tuna (PBF), *Thunnus orientalis*, inhabit Korean waters during migration. While the species have not been targeted by domestic fisheres, a small amount of them have been recently caught by Korean domestic offshore purse seiners. The Korean domestic purse seiner is historically one of prime commercial fisheries that targets in main the large pelagic species such as mackrels and sardines which comprise the largest part of domestic fish catch. Most of PBF caught by the offshore purse seiners have been exported to Japanese markets.

In recent years, the information on the catch of PBF in Korean waters was requested by the ISC. This paper describes more recent temporal and spatial variations in the catch of PBF by offshore purse seiners in Korean waters.

Materials

The catch level of PBF in Korean waters during 1982-1999 were estimated from Japanese import records of Korean bluefin tuna, and those of 2000-2004 and 2006 were estimated from the monthly sales slips of the Korean domestic purse seine fisheries cooperatives. The record of sale slips is accounted for about 90% of the catch of PBF by the offshore purse seine. Since 2005 (except 2006), the monthly catch data of PBF have been compiled into the database system (named OFIRIS) of National Fisheries Research & Development Institute (NFRDI) of Korea. The catch data used in this paper are referred to the OFIRIS. The quantities of catch of 2000-2004 and 2006 are round weight in metric tons and those of 2005 and after 2007 are whole weight in metric tons. The unit of fishing effort is the official number of fleets permitted by the Korean government. Size frequency of PBF were obtained from port sampling by observers.

Results and Discussion

Figure 1 shows the proportion of fish species caught by offshore purse seiners in Korean waters. Most of fish caught by the offshore purse seiners was *Scomber* sp. Of them, tunas are less than 2 percent both in catch (M/T) and value (₩, Korean won). The number of fleets of the offshore purse seiners has been gradually decreased since 1994 (Table 1). The number of fleets in 2009 was 27 (Table 1). Gear types during 1982- 1999 were unknown, but the major gear was probably purse seine. The annual catch of PBF after 1994 tended to increase with large annual fluctuation. The catch peaked at 2,141 tons in 2003 (Table 1). In addition, it was observed that the PBFs were caught through the season. (Table 2, Fig. 2).

The quarterly catch ratios from 2000 to 2009 were estimated from the monthly catch data of purse seiners (Table 2 and Fig. 2). They greatly differed year by year. It was

assumed that Pacific bluefin tuna is not a target species by the Korean domestic purse seine fishery. Due to such much difference of the quarterly catch ratios by year, extrapolation of the quarterly catch before 2000 by using quarterly mean catch ratios since then as suggested by Oshima *et al*.(2008) is not applicable to the case of Korea.

The fork length of PBF caught by the offshore purse seiners in Korean waters ranged from 20 cm to 187 cm during 2000-2008 (Fig. 3). A strong mode at 27 cm in 2000 progressed to about 50 cm by 2002 (Fig. 3). Length-frequency distribution in 2003 had dominant modes at 30 cm, 40 cm and 64 cm, and then had several modes between about 30 to 80 cm in fork length (Fig. 3). Further, after 2008, some weak modes in larger length classes appeared in the length-frequency distribution (Fig. 3). Annual mean fork length of Pacific bluefin tuna during 2000-2009 tended to increase, reaching a peak at 57.8 cm in 2009 (Fig. 3).

Figure 4 shows monthly mean fork length (cm) in the catch of PBF by the offshore purse seiners in 2008 and 2009. The fork length from late winter to spring was generally larger than that of other seasons, implying that the larger PBF may migrate toward the Korean waters during late winter-spring.

On the other hand, the main fishing ground of PBF generally was around Jeju Island (Fig. 5). Although additional fishing grounds tended to form around Tsushima Island, monthly changes of the fishing ground was large (Fig. 5). The fishing ground around Jeju Island in 2008 and 2009 was generally formed during spring-summer and in spring, respectively (Fig 5).

Our research activities

There have been very few studies on PBF in Korea. NFRDI established a research project on biological and ecological research and stock assessment of PBF for the next five years in response to the recent increase of PBF catch in Korean waters. The results obtained from our research in 2010 will be introduced in PBF working group in next year.

References

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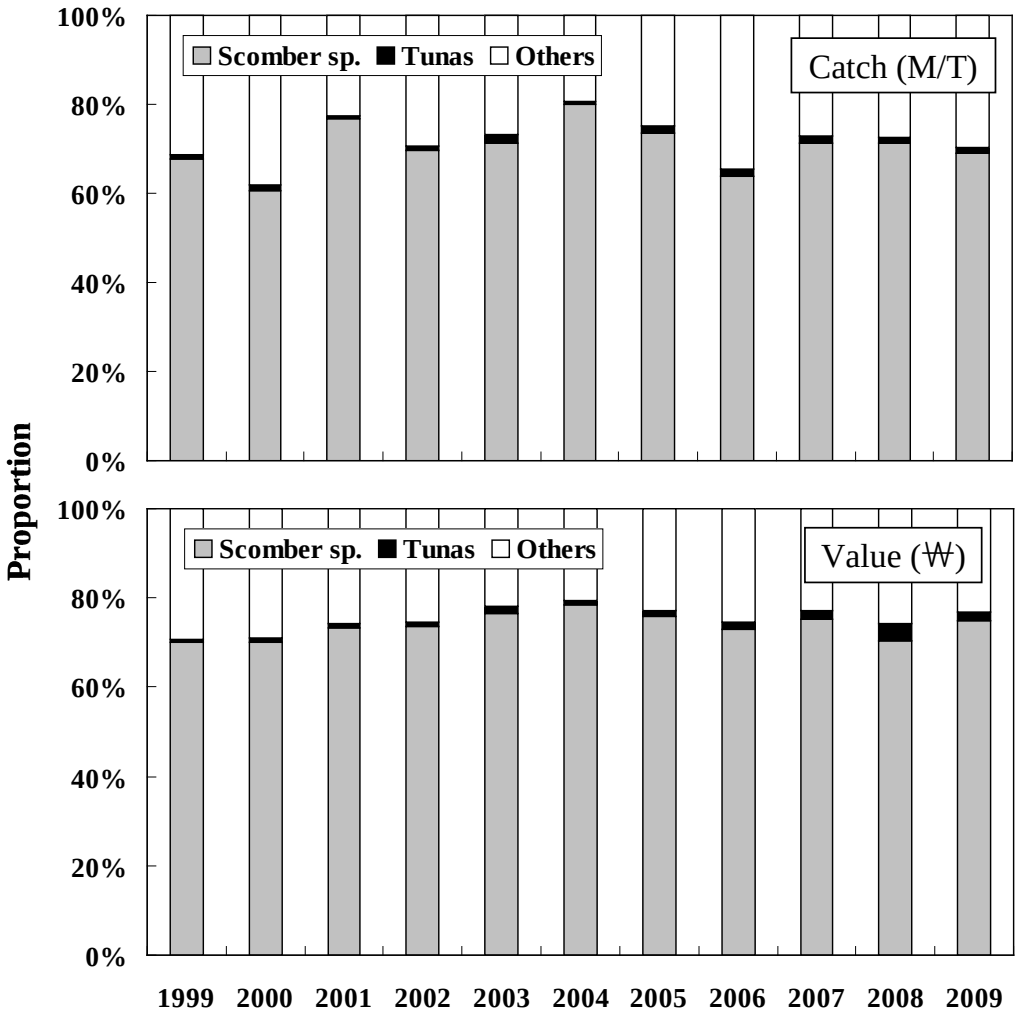

Fig. 1. Proportion of catch (M/T) and value (₩) of fish species caught by offshore purse seiners in Korean waters.

Table 1. Annual catch of PBF by offshore purse seiners in Korea.

(unit : tons)

Year	Gear type	Catch	Permitted number of fleets
1982	(ps)*	31	48
1983	(ps)	13	48
1984	(ps)	4	48
1985	(ps)	1	48
1986	(ps)	344	48
1987	(ps)	89	48
1988	(ps)	32	48
1989	(ps)	71	48
1990	(ps)	132	48
1991	(ps)	265	48
1992	(ps)	288	48
1993	(ps)	40	48
1994	(ps)	50	48
1995	(ps)	821	36
1996	(ps)	102	36
1997	(ps)	1,054	36
1998	(ps)	188	36
1999	(ps)	256	36
2000	ps	1,976	32
2001	ps	968	32
2002	ps	767	32
2003	ps	2,141	29
2004	ps	636	29
2005	ps	1,085	29
2006	ps	949	29
2007	ps	1054	29
2008	ps	1536	29
2009	ps	794	27

※ Gears were unknown during 1982-1999, but probably purse seine.

Table 2. Monthly catch of PBF by offshore purse seiners in Korea.

Year	Quarter	Month	Permitted number of	Catch (ton)
2000	1	1	32	100
2000	1	2	32	128
2000	1	3	32	386
2000	2	4	32	555
2000	2	5	32	100
2000	2	6	32	660
2000	3	7	32	23
2000	3	8	32	2
2000	3	9	32	0
2000	4	10	32	11
2000	4	11	32	7
2000	4	12	32	4
2001	1	1	32	29
2001	1	2	32	279
2001	1	3	32	482
2001	2	4	32	85
2001	2	5	32	54
2001	2	6	32	5
2001	3	7	32	3
2001	3	8	32	0
2001	3	9	32	2
2001	4	10	32	10
2001	4	11	32	5
2001	4	12	32	13
2002	1	1	32	8
2002	1	2	32	40
2002	1	3	32	83
2002	2	4	32	91
2002	2	5	32	28
2002	2	6	32	26
2002	3	7	32	375
2002	3	8	32	22
2002	3	9	32	23
2002	4	10	32	71
2002	4	11	32	1
2002	4	12	32	1
2003	1	1	29	31
2003	1	2	29	90
2003	1	3	29	75
2003	2	4	29	210
2003	2	5	29	62
2003	2	6	29	52
2003	3	7	29	21
2003	3	8	29	20
2003	3	9	29	31

2003	4	10	29	1,472
2003	4	11	29	74
2003	4	12	29	2
2004	1	1	29	15
2004	1	2	29	5
2004	1	3	29	23
2004	2	4	29	16
2004	2	5	29	135
2004	2	6	29	306
2004	3	7	29	23
2004	3	8	29	12
2004	3	9	29	13
2004	4	10	29	42
2004	4	11	29	1
2004	4	12	29	44
2005	1	1	29	218
2005	1	2	29	70
2005	1	3	29	304
2005	2	4	29	145
2005	2	5	29	58
2005	2	6	29	15
2005	3	7	29	60
2005	3	8	29	98
2005	3	9	29	23
2005	4	10	29	52
2005	4	11	29	12
2005	4	12	29	30
2006	1	1	29	84
2006	1	2	29	17
2006	1	3	29	98
2006	2	4	29	248
2006	2	5	29	11
2006	2	6	29	21
2006	3	7	29	3
2006	3	8	29	370
2006	3	9	29	1
2006	4	10	29	90
2006	4	11	29	0
2006	4	12	29	6
2007	1	1	29	106
2007	1	2	29	143
2007	1	3	29	61
2007	2	4	29	4
2007	2	5	29	0
2007	2	6	29	6
2007	3	7	29	59
2007	3	8	29	27
2007	3	9	29	12

2007	4	10	29	8
2007	4	11	29	9
2007	4	12	29	619
2008	1	1	29	161
2008	1	2	29	116
2008	1	3	29	201
2008	2	4	29	497
2008	2	5	29	276
2008	2	6	29	52
2008	3	7	29	37
2008	3	8	29	4
2008	3	9	29	10
2008	4	10	29	32
2008	4	11	29	31
2008	4	12	29	118
2009	1	1	27	88
2009	1	2	27	162
2009	1	3	27	198
2009	2	4	27	159
2009	2	5	27	18
2009	2	6	27	5
2009	3	7	27	3
2009	3	8	27	51
2009	3	9	27	21
2009	4	10	27	51
2009	4	11	27	9
2009	4	12	27	30

※ The catch data of PBF since 2005 was extracted from OFIRIS.

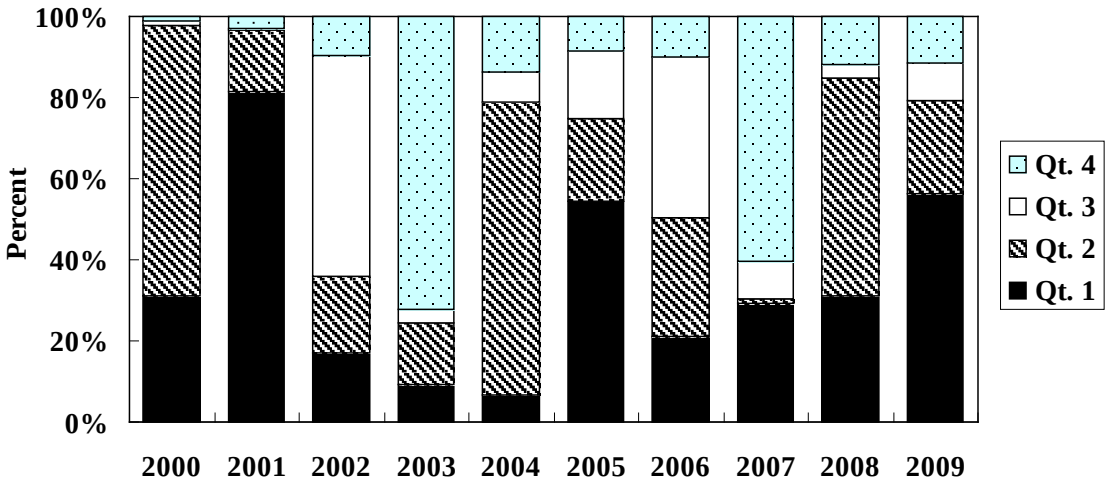

Fig. 2. Annual changes of quarterly catch ratios of PBF in Korea.

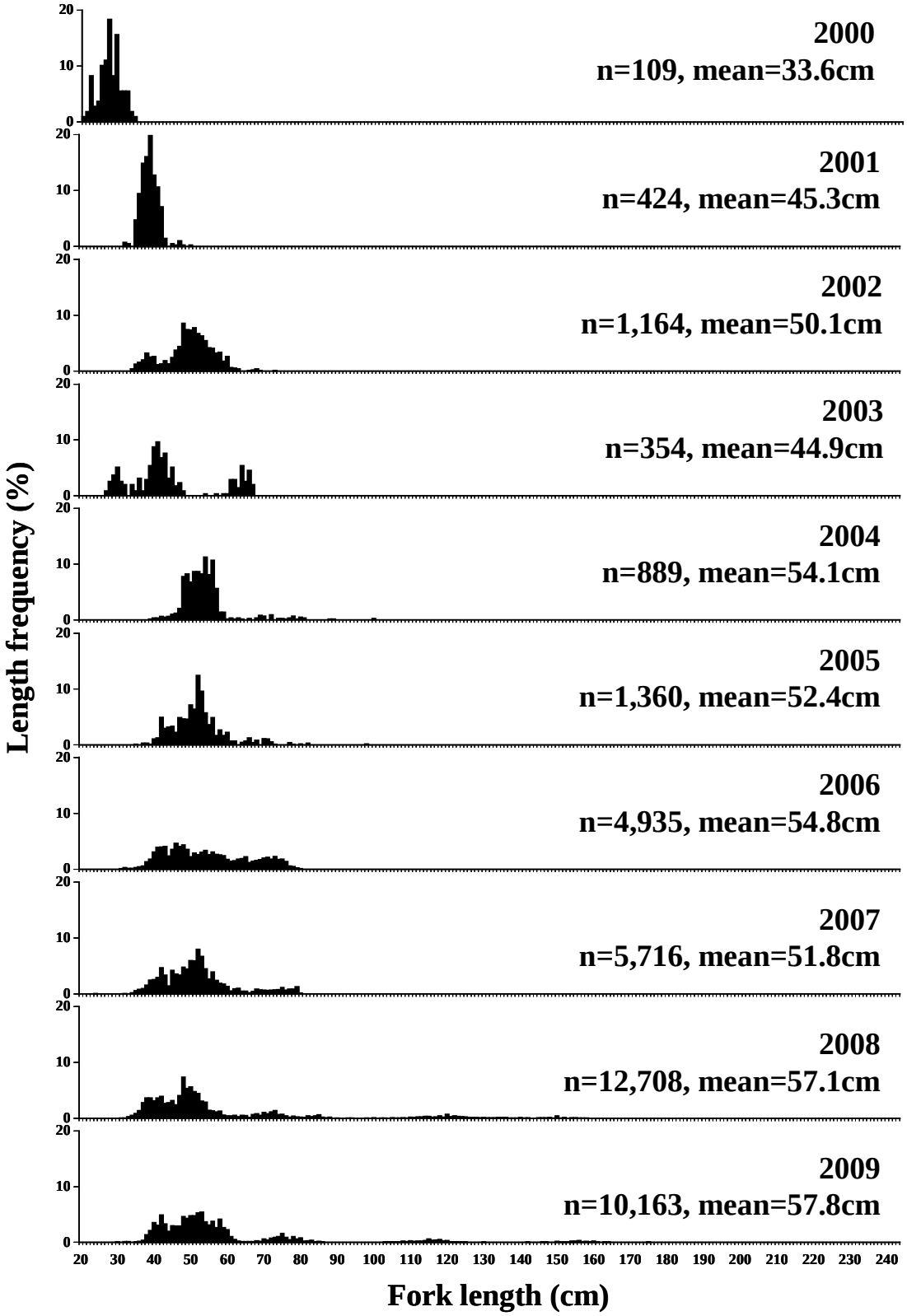

Fig. 3. Length-frequency distributions of PBF landed by the Korean domestic purse seine fishery from 2000 to 2009.

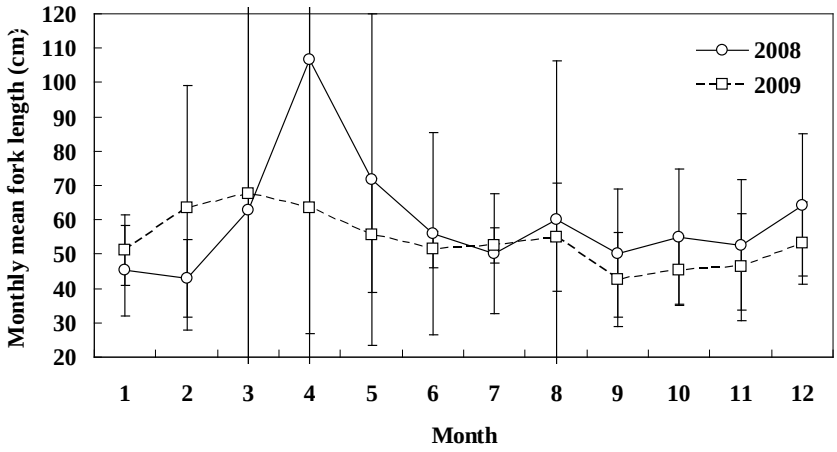

Fig. 4. Monthly mean fork length (cm) of PBF caught by offshore purse seiners in Korean waters, 2008-2009.

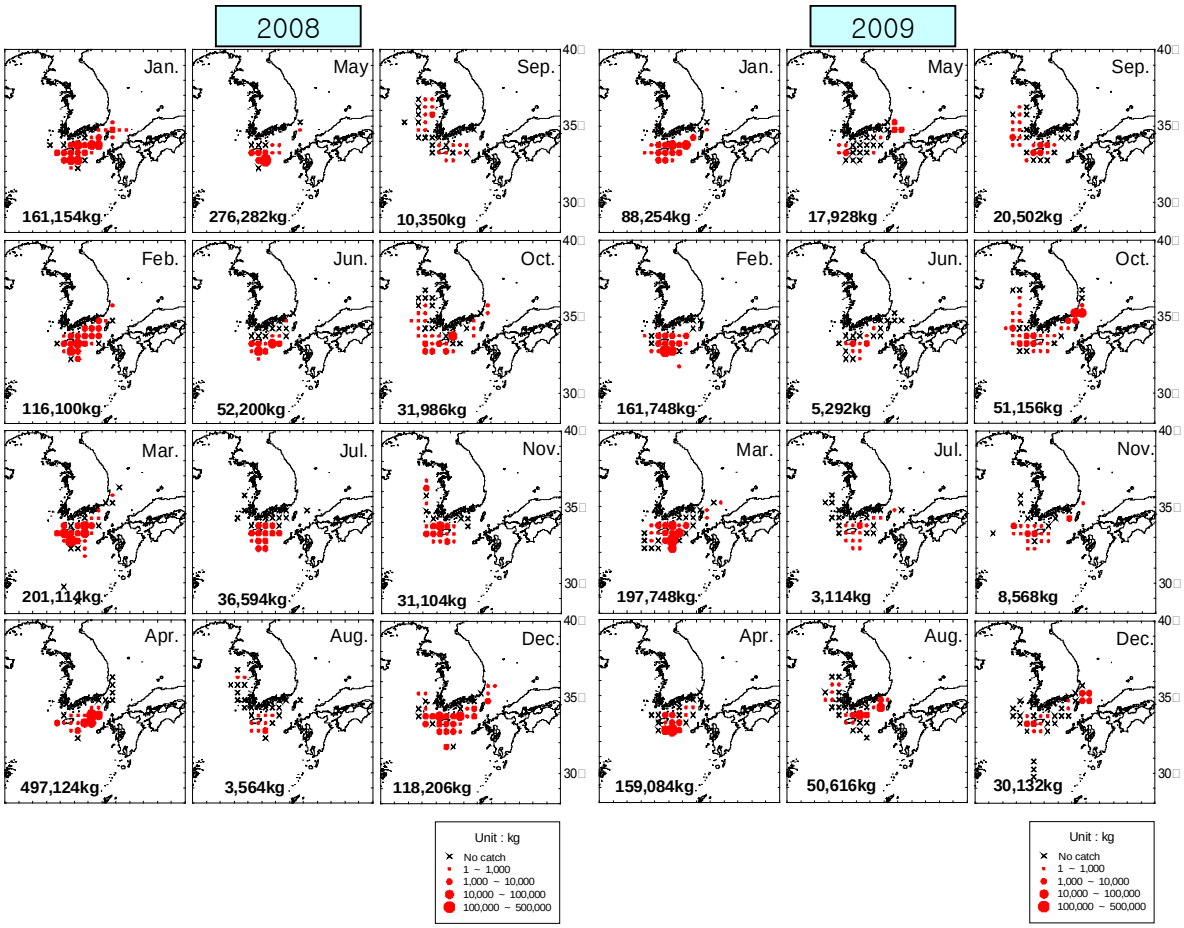

Fig. 5. Monthly horizontal distributions of PBF caught by offshore purse seiners in Korean waters from 2008 to 2009.