JAPANESE SKIPJACK FISHERY AND RESEARCH ACTIVITIES IN THE INDIAN OCEAN

Miki Ogura

National Research Institute of Far Seas Fisheries

5-7-1, Shimizu-Orido, Shizuoka, 424-8633 Japan

ABSTRACT

Almost all Japanese skipjack catch in the Indian Ocean was obtained by purse seine fishery. Commercial purse seine fishery had been active from 1989 to 2001. The number of vessel was 10, at maximum, and variable. Annual skipjack catch increased from about total of 3,449 t in 1989 to nearly 31,390 t in 1992, and decreased to 1,121 t in 2002. Sets on FADs associated schools accounted for more than 85% of total sets. They visited seeded FADs one by one and observed fish aggregation. In addition to the commercial fishery, an experimental fishing has conducted using one purse seine vessel since 1978. In recent 3 years, total of 231 skipjack were tagged and released together with 535 yellowfin and 995 bigeye.

INTRODUCTION

There are kinds of fisheries targeting skipjack in Japan, purse seine, pole and line, and trolling etc., and now their operations are almost limited in the Pacific Ocean. In the Indian Ocean, Japanese fleets have not played a major role on skipjack fishery. Although two types of Japanese tuna fisheries, longline and purse seine, currently are operating in this area, purse seine has caught relatively large amounts of skipjack in Indian Ocean. Distinct characteristic of Japanese purse seine fishery in this region had been a high proportion of FADs sets. But due to the economical reason, commercial purse seiners had withdrawn fishing in this area, leaving only one Japanese experimental research purse seiner, in recent years. In this paper, recent trend of Japanese skipjack fishery, purse seine, in the Indian Ocean is summarized using recent data available to date and some related research activities are presented.

JAPANESE PURSE SEINE FISHERY IN THE INDIAN OCEAN

Commercial fishery

Japanese purse seine vessels in the Indian Ocean were the 350-500 GRT class (480-870 t carrying capacity) single purse seiner. The history of the Japanese commercial purse seine fishery in the Indian Ocean is relatively short. Two commercial vessels had entered into the fishery in the Indian Ocean in 1989. Ten commercial vessels started fishing with commercial licenses in 1991 in addition to one experimental research vessel. The number of licenses has remained at that level since then, but the number of actual vessels operated in the Indian Ocean was variable (Table 1). Number of vessels in active began to decrease at 1994 and in 2002 commercial vessel stopped fishing in this region and only one experimental research vessel operated.

At the beginning of the commercial fishery, the effort exerted in the tropical area of the western Indian Ocean (Figure 1). Until 1993, the area of fishing was limited to the western Indian Ocean. There are two distinct areas of fishing in the western Indian Ocean. One located in the tropical area, north of the Seychelles, at 10 °N-10 °S and 45 °E-70 °E, and the other located in the northeast of Madagascar. From the 4th quarter in 1993, fishing operations partly took place in the eastern Indian Ocean as well, and since the 4th quarter in 1994 the fleet shifted their main fishing ground from the western Indian Ocean to the eastern (as shown in the periodical skipjack catch distribution, Figure 2). From the 4th quarter in 1994 to present Japanese fleet has operated mostly in the eastern Indian Ocean. The area of fishing in the eastern Indian Ocean lies roughly between 3 °N-10 °S and 80 °E- 100 °E. Because of the low price of tuna, the fishermen needed to eliminate the cost of transshipment, and in the eastern Indian Ocean they did not need to transship because catches are unloaded at ports near canneries.

Total fishing effort (operation days + searching days) increased from 349 days in 1989 to 2,375 days in 1992, and then decreased to 129 days in 2002 (Table 1). From 1991 to 1993, all of ten licensed vessels operated in the area and the numbers of fishing days also peaked at more than 1,000 days during 1991 and 1995. The trend of total catch in weight is similar to that of effort, increasing from about total of 5,000 t in 1989 to nearly 50,000 t in 1992, and decreasing to 1,600 t in 2002. Of these, skipjack catch was 31,390 t in 1992 and 1,121 t in 2002. 60 – 70 % of these catches were composed by skipjack (Figure 3). The proportion of bigeye tuna has been slightly increased in the late 1990s and after.This increase in the catch of bigeye is probably caused by the change of fishing ground. Okamoto et al. (2000) discussed that bigeye may be more abundant or more vulnerable to the purse-seine fishery there than in the eastern Indian Ocean since the catch of bigeye in the western Indian Ocean appears to be distributed in almost all areas irrespective of season.

Japanese purse seine vessels in the Pacific have traditionally targeted fish associated with floating objects, especially log-associated schools. In the Indian Ocean, however, logs are few and free swimming schools are scarce, then they use fish-aggregating devices (FADs) extensively throughout their activity periods (Figure 4). Sets on FADs associated schools accounted for more than 85% of total sets, and with log sets, the percentage of sets on associated schools reaches nearly 100%.

Catch per fishing days by school types were calculated by two fishing areas, divided by 70 °E. The school type of a searching day was assumed to be the same as the school type of nearest operation day during 5 days after the searching day. From 1989 to 2001, the period when more than one commercial vessel and an experimental research vessel operated, CPUEs of FADs set in the western Indian Ocean were about 13 mt/day (Figure 5). Those in the eastern side were 10 – 8 mt/day and showed slightly decreasing trend. It seemed that there were an interaction of FADs use between other nations fleet and it made catch per a cruise of Japanese fleets less than before. CPUEs of natural log set in the western area were around 15 mt/day and those in the east were same level as westerns in the beginning and were less than 10 mt/day in recent years. Though there were little data for free swimming school operation, CPUEs were very low, one mt/day or less.

Size of skipjack caught

Majority of catches were unloaded at ports in Southeast Asian countries, then most of catches could not be sampled. Limited numbers of length-frequency measurements have been available from port sampling program in Japan. Figures 6 and 7 show catch-at-size of skipjack caught by two Japanese purse seine vessels in recent 5 years. The size of fish raged from 30 cm to 70 cm and there are, roughly, three modes at less than 40cm, less than 50cm, and less than 60 cm.

Experimental fishery

JAMARC (Japan Marine Fishery Resources Research Center) initiated pilot fishing in the Indian Ocean to develop a Japanese commercial fishery in the eastern Indian Ocean in 1978. They have been using a single purse seiner of about 760 GT (carrying capacity; 1700 t). At the first 6 years of the experimental fishing, efforts was put in the tropical waters of the eastern Indian Ocean. Then from 1983 fishing in the western side of the Indian Ocean started and efforts were distributed in the west-east area along the equator until 1989 (Figure 1). There were few free swimming schools to catch and anchored and floating FADs were introduced from 1981. Use of both anchored and floating FADs in the early 1980s was terminated in 1989 and all floating FADs have been used so far. Until 1994, some cruises were conducted under international cooperative research treaties with coastal nations.

Tagging

The experimental fishery vessel of JAMARC has continuously conducted tag release of skipjack and tunas. After summarized in Nishida et al. (2000), about 500 and more fish per a year were released in the eastern Indian Ocean including skipjack, yellowfin tuna, and bigeye tuna (Table 2). There is no new recovery information so far.

Observer program and fishing strategy

Japan sends routinely scientific observers on the Japanese purse seine vessels, four or five cruises once a year. Most of the observer program applied to the cruise in the Pacific Ocean, but one scientific observer was onboard a Japanese vessel operating in the Indian Ocean during May and June, 1999. The cruise was in the eastern Indian Ocean 9 °N – 1 °S, 76 °E – 97 °E. All 26 operations were of the FADs set. Most of FADs used had been released in the previous cruise and some were released during the cruise. The fishing strategy of the observed cruise, and most of the cruises in the Indian Ocean by Japanese vessels, was that having released FADs with radio buy and visiting the FADs one by one. After operation on one FADs and checking the FADs itself, they headed to next FADs. During the cruise, they retrieved some of the FADs and some were left after checking and fishing. One vessel had 20 to 30 FADs and group of Japanese vessels used FADs of each others. Once a vessel used FADs of others, she reported the operation with that FAD to the vessel owning that FADs to avoid re-use of that FADs in a short interval before fish re-aggregating.

LONGLIME

Very minor amount of skipjack were caught by also longline fishery.

REFERENCES

NISHIDA, T., M. OGURA, AND K. YANO (2000): Atlas of the conventional tag release-recapture information based on the Nippon-maru survey cruises (1980-2000). IOTC/WPTT/00/27. 5p.

OKAMOTO, H. AND N. MIYABE (1995): Review of Japanese tuna fisheries in the Indian Ocean. Document submitted to the 6th expert consultation on Indian Ocean tunas EC-601-06. 7pp.

Table1. Catch and effort statistics for Japanese purse seine fishery in the Indian Ocean. 2002 data are preliminary. The unit of catch is metric ton. Number of vessels include the experimental research vessel belonging to the JAMARC. Fishing day means days for searching and operation.

Year	Number of active vessels	Fishing days	Catch				
			SKJ	YFT	BET	Others	Total
1978	1	105	918	215	5	0	1138
1979	1	52	566	103	1	8	678
1980	1	50	421	122	8	4	555
1981	1	8	46	32	1	7	85
1982	1	45	453	120	21	11	605
1983	1	120	592	198	54	1	845
1984	1	129	696	242	215	28	1181
1985	1	45	315	75	168	12	570
1986	1	84	562	160	142	3	868
1987	1	166	884	260	122	18	1284
1988	1	175	2250	389	277	74	2990
1989	3	349	3449	883	581	73	4986
1990	4	815	11187	3222	1225	120	15754
1991	11	1343	15877	5061	1269	36	22242
1992	11	2375	31390	11736	1732	348	45206
1993	11	2171	31485	11086	1984	64	44618
1994	8	1608	20110	5343	4182	5	29640
1995	6	1670	16082	4751	3599	7	24439
1996	5	840	7515	4035	1386	15	12951
1997	3	623	6713	2612	1251	20	10596
1998	2	701	5748	1949	915	2	8614
1999	3	483	4588	1501	899	11	6999
2000	2	321	2332	953	747	10	4042
2001	2	261	1830	603	592	2	3027
2002	1	129	1121	182	328	2	1633

YEAR	SKJ	YFT	BET	Total
2000	52	196	437	685
2001	70	187	339	596
2002	109	152	219	480
2003	42	70	92	204

Table 2. Numbers of fish tagged-released by Nippon-maru (JAMARC) in the Indian Ocean from 2000 to 2003

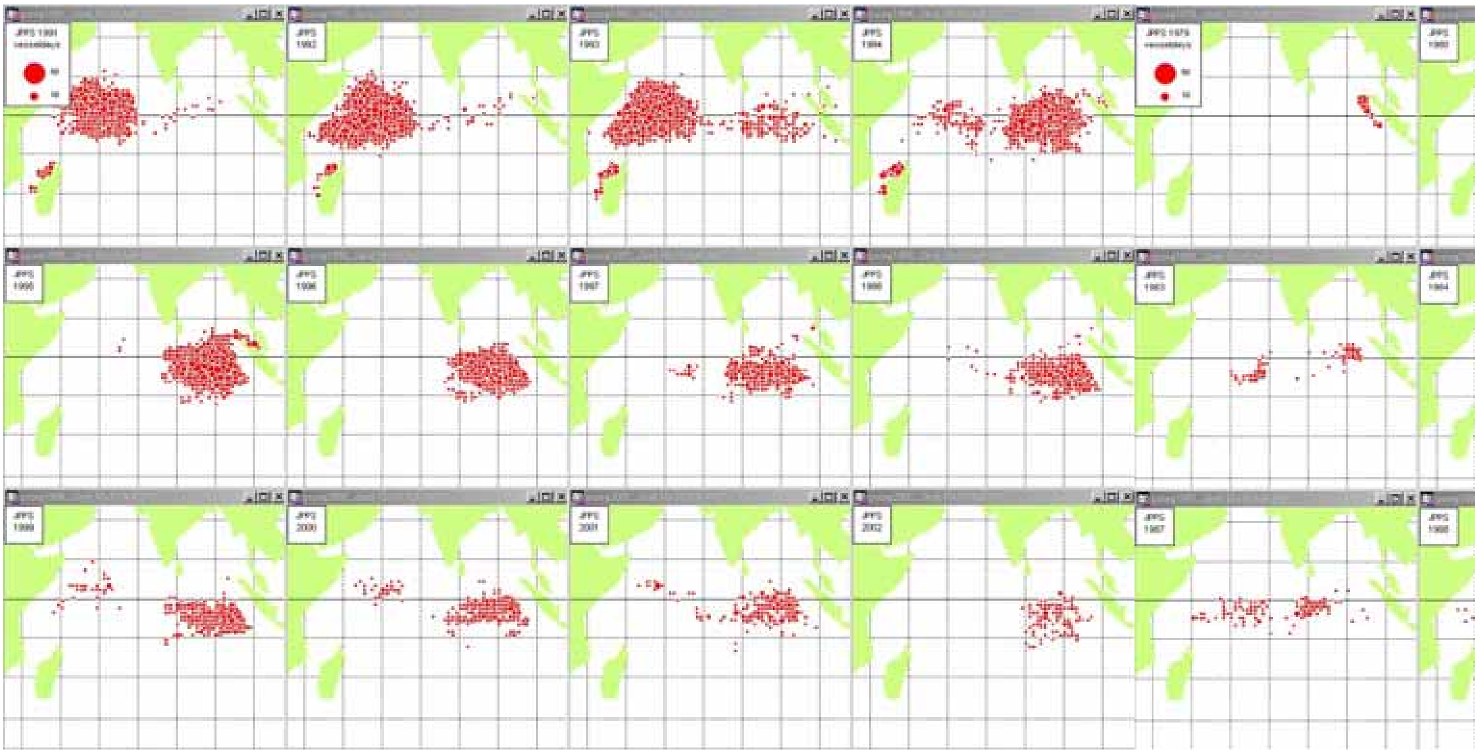


Figure 1. Geographical distribution of effort (fishing days including searching days) for Japanese purse seine fishery (commercia

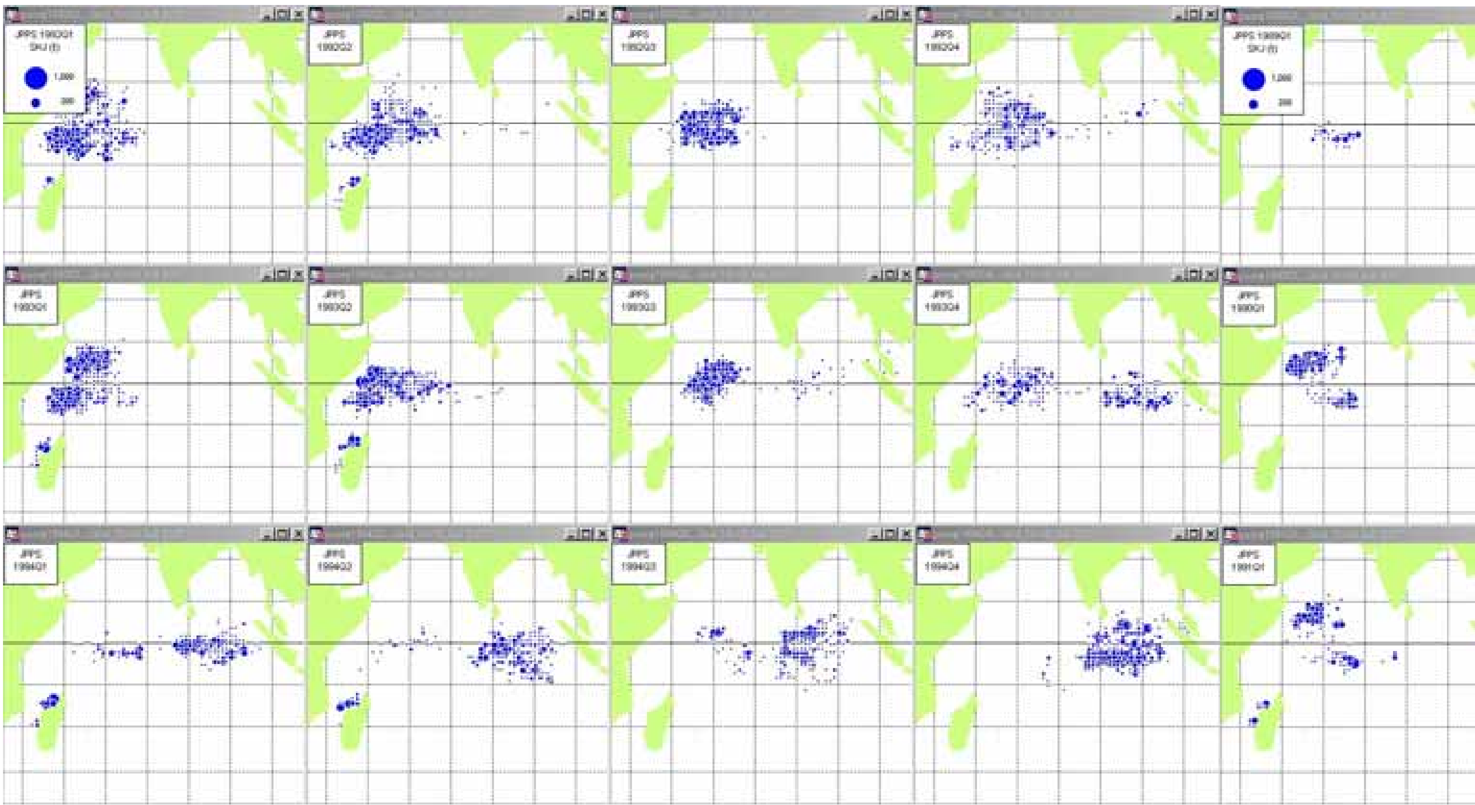


Figure 2. Seasonal geographical distribution of skipjack catch by Japanese purse seine fishery (commercial a

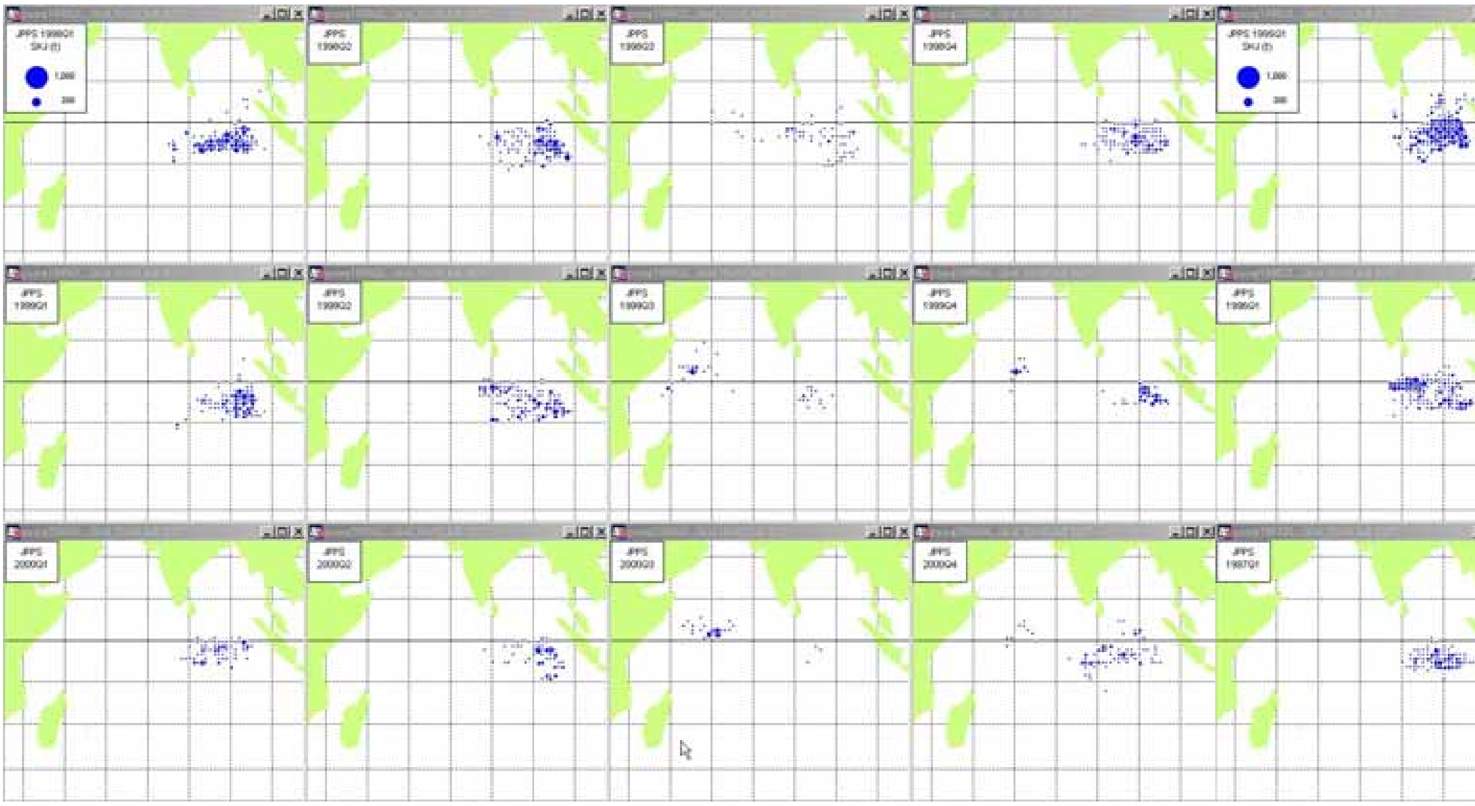


Figure 2. Continued (from 1995 to 2000).

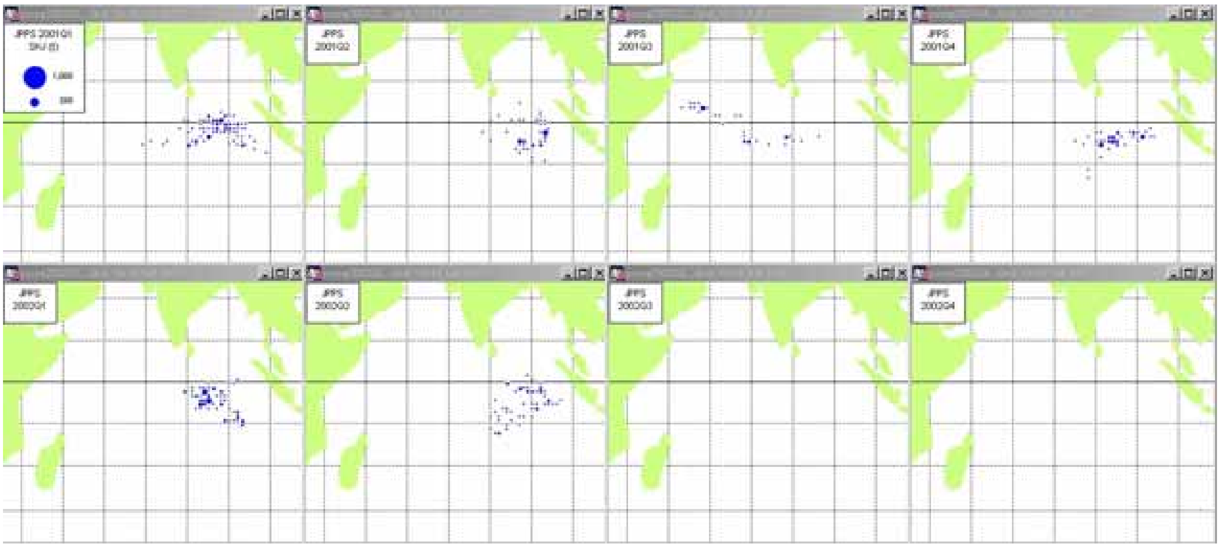


Figure 2. Continued (2001 and 2002).

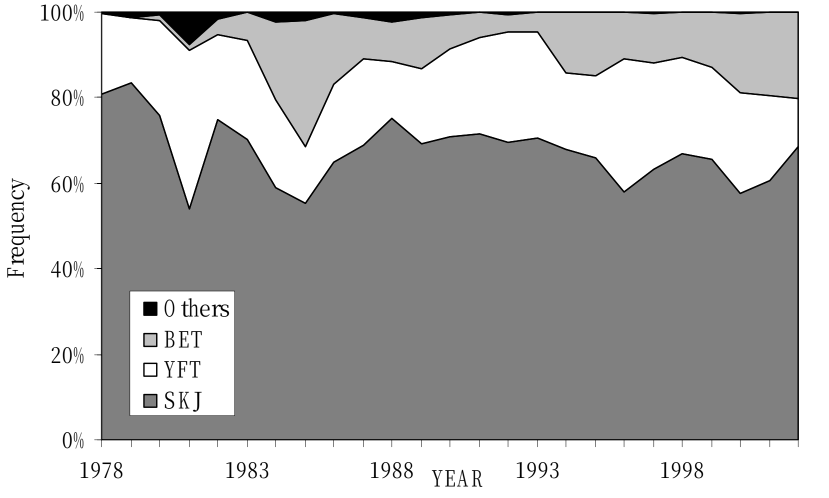


Figure 3. Species composition for Japanese purse seine fishery (commercial and experimental) in the Indian Ocean.

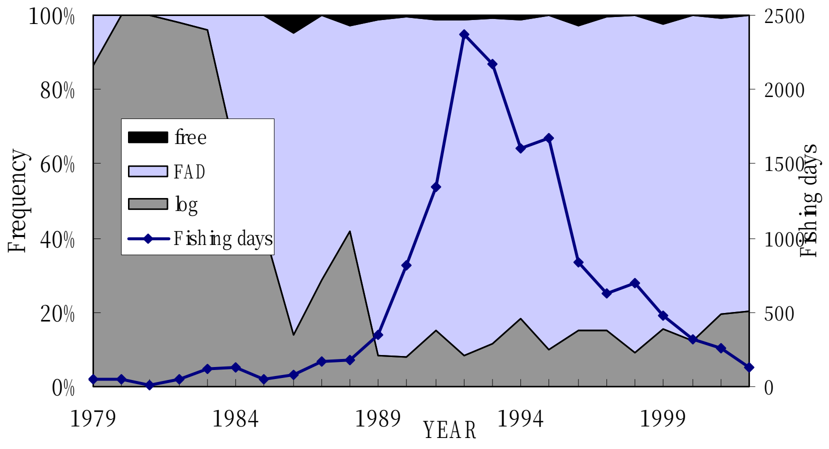
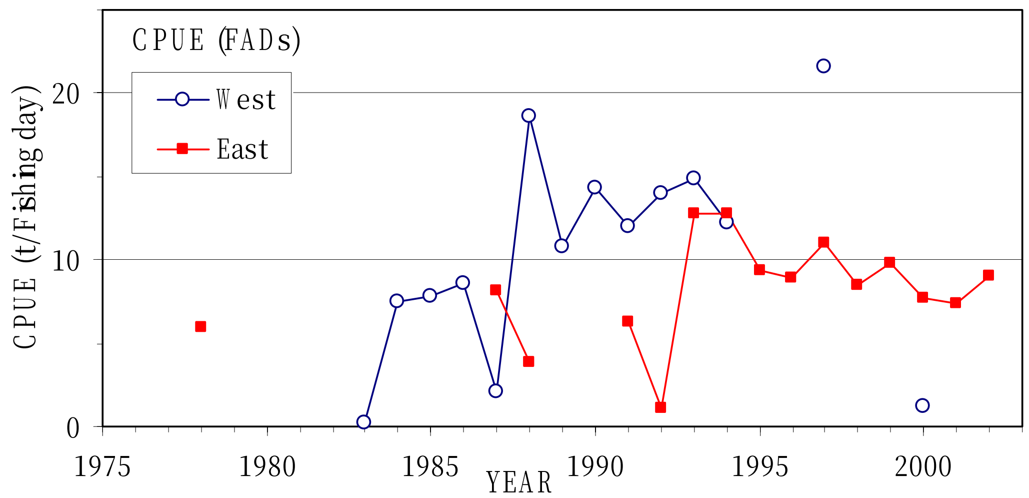


Figure 4. Change in the proportion of each fishing days by target school type to the total number of fishing days and the numbers of fishing days. Both commercial and experimental fisheries data were included.



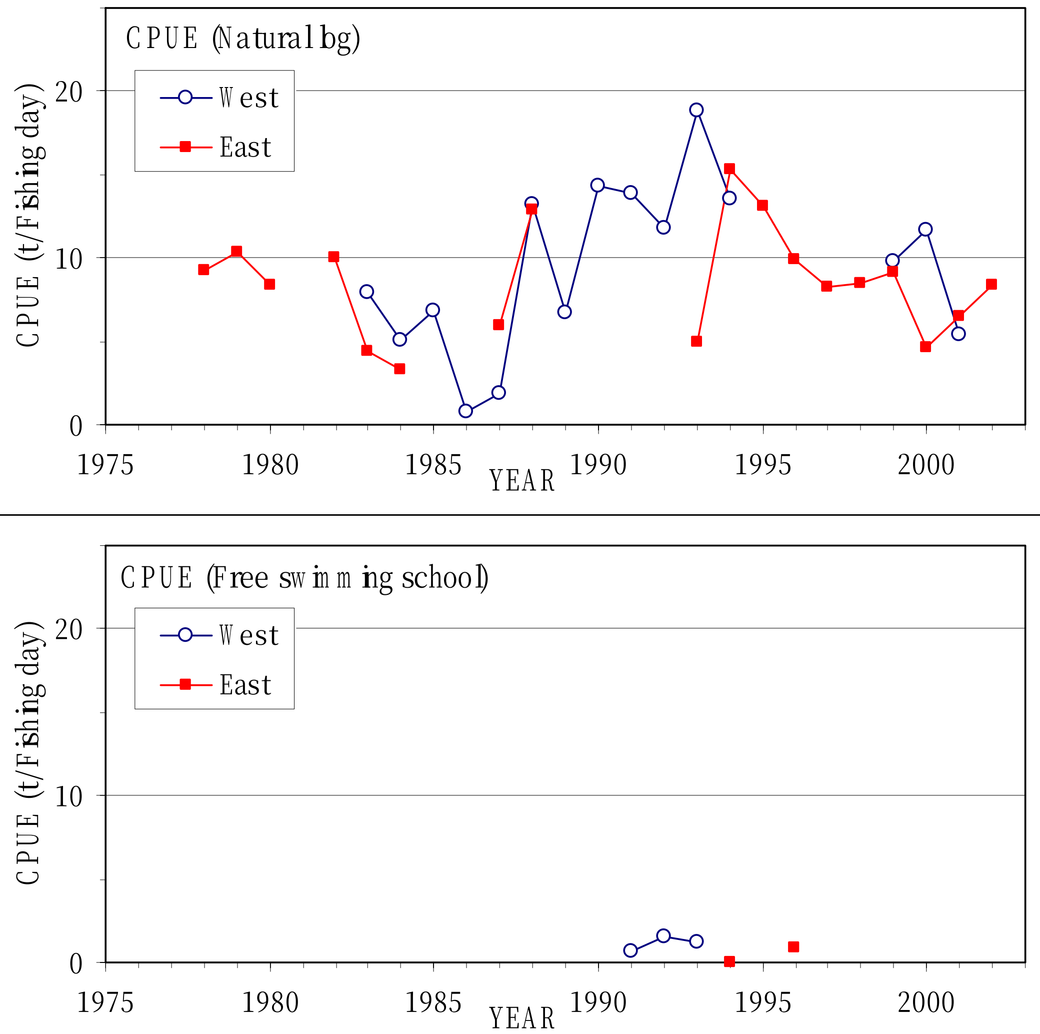


Figure 4. Trends of skipjack catch in mt by commercial and experimental fisheries per fishing day by school type (Top: FADs, middle: natural logs, bottom: free swimming school) and area (70E forms the boundary between west and east). Data with less than 10 fishing days were eliminated.

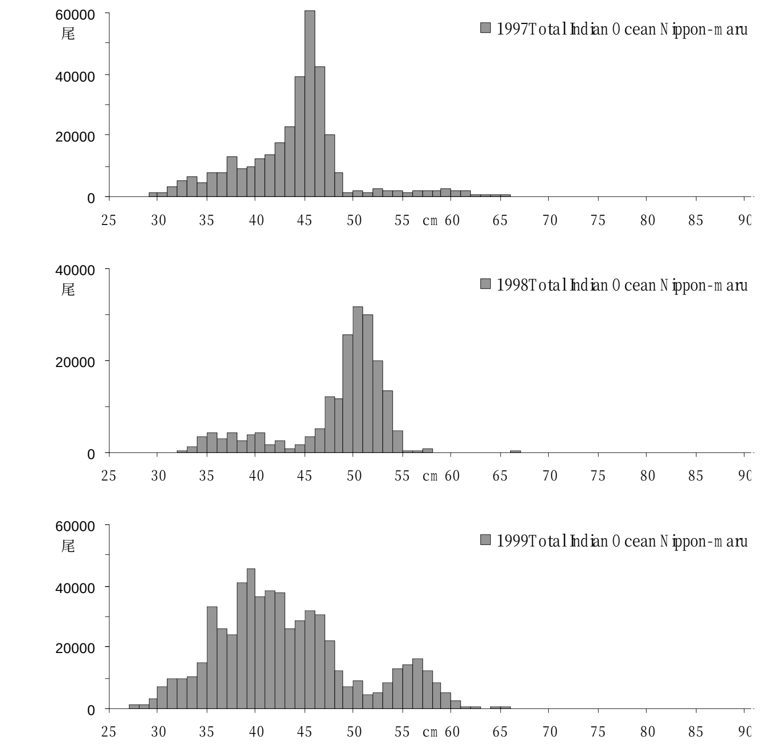


Figure 5. Length frequency distribution obtained from the Japanese experimental research purse seine vessel.

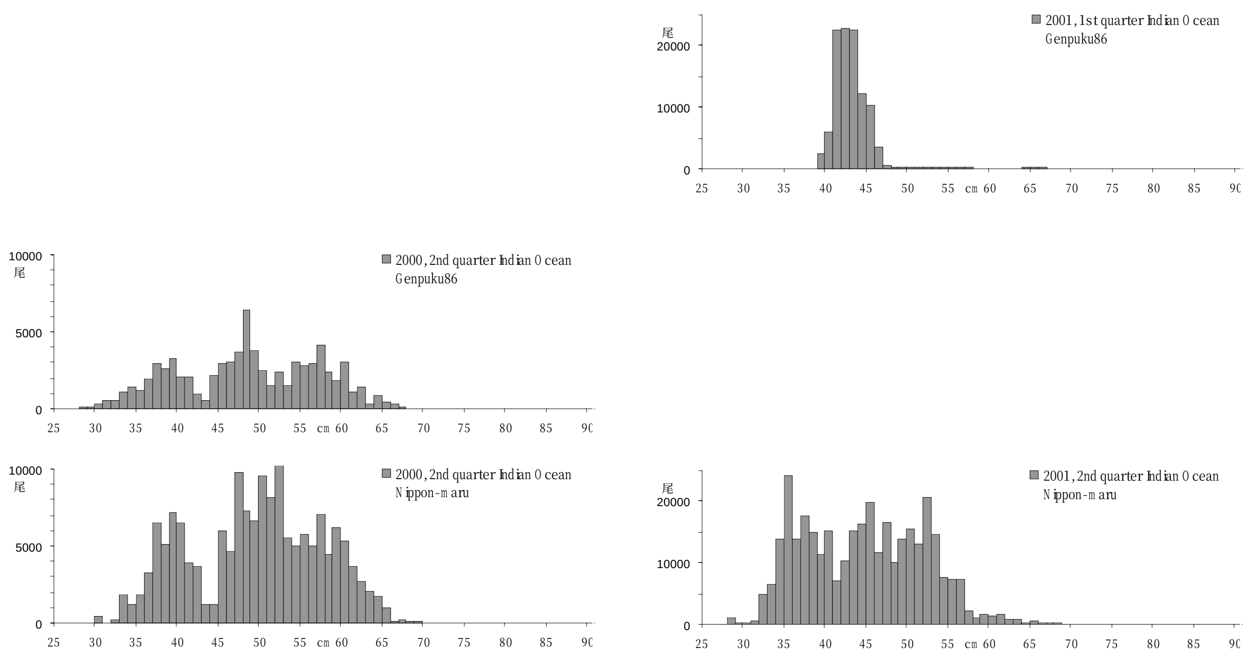


Figure 6. Length frequency distribution obtained from the Japanese experimental purse seine vessel and a commercial vessel.