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Review of changes for the Korean tuna purse seine fleet and fishing methods

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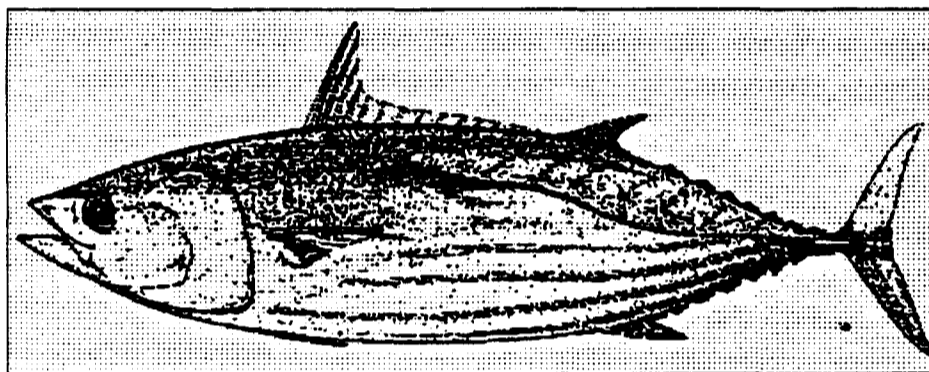
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Abstract

The number of Korean tuna purse seiners increased rapidly every year from 1985 and reached peak at 39 vessels in 1990, followed by a steady decrease to 27 vessels in 1997. The Korean purse seine fishery has not shown significant changes in fishing methods and fishing gear. However, it is notable that in recent years, the proportion of log-school catch has shown a decreasing trend but that of free-school catch increased and the proportion of purse seiners carrying a helicopter has shown an increasing trend.

Introduction

The Korean tuna purse seine fishery began its commercial operation in the western Pacific in the early 1980s, about 20 years after the introduction of Korean tuna longline fishery into this region. Purse seine fishery targeting mainly skipjack and yellowfin tuna for export and domestic canning industry has developed rapidly from year to year and annual catches by this fishery increased to over 200,000 mt and reached a peak in 1991 at 227,000 mt. Since then catches fluctuated widely between 200,000 mt and 130,000 mt, which mainly depend on the number of vessels operated.

This paper was to review an overall trend in Korean tuna purse seine fleet, fishing methods and gear based on the data collected from fishing vessels.

Data collection

Fishery data on catch and fishing effort statistics for Korean tuna purse seiners have been collected by the National Fisheries Research and Development Institute (NFRDI) during the period 1980-1996. Historical data on log-school statistics have been accumulated since the early 1980s. Usually, Purse seine sets are made on a variety of schools either associated with floating objects or not. Until 1991, however, the logbook data were not classified for each school type. Thus we considered it as log-school fishery when setting was done before 6 a.m. (sunrise) since setting is usually started before sunrise for log-school of tunas (Park, 1984).

To collect information on the artificial floating objects such as fish aggregating device (FAD) or payao-like logs, vessel captains were interviewed when they made a visit to NFRDI and the results of interviews were presented here. Information on the changes in fishing gear or fishing method were also obtained by using the same method.

Fleet

In the experimental phase of this fishery, very few purse seiners were operating annually but the number of purse seiners increased rapidly every year and reached peak at 39 vessels in 1990., followed by a steady decrease to 27 in 1997 (KDFA, 1981-1997). The size of purse seiners ranged from 400 GRT to 1,500 GRT but most of annual fleet consisted of those vessels over 900 GRT. Until the late 1980s purse seiners built in 1970s comprised almost half of the fleet but some of them have been replaced gradually by modern ones. In recent years, most of the vessels operating are those constructed in 1980s.

Catches and species composition by school type

In general, purse seining targets skipjack and yellowfin tunas which are fished from two major school types, free-school gathering around preys at the surface and log-school around floating objects (logs) (Hallier, 1994).

In the early 1980s purse seine sets were made on mainly tuna schools around logs or other floating objects, which were detected by sonars and more easily captured than tuna schools not associated with any other objects. The proportion of log-school catch accounted for more than 90% of the total catch during early phase of purse seine fishery, but decreased every year to 28.3% in 1989 (Fig. 1). Comparatively the proportion of free-school catch has shown a increasing trend until recent years. During the period of 1990~1995, log-school fishery contributed to commercial catch each year from a minimum of 19% to a maximum of 53% with an average of 34.6% of the total Korean purse seine catch in the western Pacific region.

Fig. 2 shows the species composition of log-school and free-school catches during the period of 1981-1995. Log-school catch composition averaged 80%, 19% and 1% for skipjack, yellowfin, and other species including bigeye, respectively. On the other hand, free-school catches are made of 63.4% skipjack, 31.4% yellowfin, and 0.6% other species. It is noteworthy that the proportion of skipjack tuna tended to increase from 74% in 1992 to 88% in 1995 in log-school (Fig. 2A) and from 55% in 1993 to 91% in 1995 in free-school (Fig. 2B), while yellowfin decreased from 26% in 1992 to 12% in log-school and 45% in 1993 to 9% in 1995 in free-school. From free-school catch figure (Fig. 2B), yearly proportion of yellowfin to total catch was higher than that from log-associated school during the study period. In fact, it in 1993 accounted for about 45% of the total catch, which is more than two times compared with the catch proportion from log-school fishery.

Fig. 3 shows annual variation in CPUE, expressed in mt/set, of log- and free-school fisheries. Despite fluctuation of wide range, it is apparent from the figure that log-school CPUE is higher than free-school CPUE during whole study period.

Artificial floating objects

From interview with vessel captains, it was noted that they have rarely used artificial floating objects called FAD, but some purse seiners deployed payao-like artificial logs made of bamboos, drums and other materials to aggregate tunas around them. Although the exact number of vessels are not known, still some of them use artificial logs which manufactured on board at captain's convenience. The efficiency of such artificial logs in attracting tunas or catches has not been known since captains did not fill logsheets by log type. However, from 1997 we encouraged vessel captains to fill out their fishing activities by each school type associated with floating objects so that we can monitor which school set produce higher catch.

Helicopters in purse seine fishery

Korean tuna purse seiners usually carry a helicopter on board with a view to locating tuna schools. Purse seiners carrying helicopters were only about 20-25% of the total operated until the mid-1980s but the proportion began to increase from 1986 onward, accounting for about 70-90% in 1990s (Fig. 4). CPUE (mt/set) by helicopter-carried purse seiners appeared to be higher than that by purse seiners not carrying a helicopter during 1985-1995 (Fig. 5). The effect of helicopters on catch rate was more obvious in skipjack than in yellowfin.

Changes in fishing gear

Since historical data for purse seine fishing gear were not available for this study, we interviewed with vessel captains and noted that no significant changes were observed in purse seine net as well as in other equipments. In these days, the length of net used by Korean purse seiners are in the range of 1,100-1,200 fathoms (fm) (2,000-2,200 m) and the depth reaches to 280 m. There observed some changes in mesh size. It has increased from 5"(127 mm) to 8-10" (203-254 mm). The pursing time took about 40-50 minutes by using conventional purse winch (10 ton x 25 m/min) in the early phase of the fishery but now takes only 15-20 minutes with advanced ones (14 ton x 80 m/min) in recent years.

References

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Park, S.W. (1984). On the tuna schools associated with the drift objects or animals in the western equatorial Pacific waters. Bull. Kor. Fish. Soc. 17(1), 47-54.
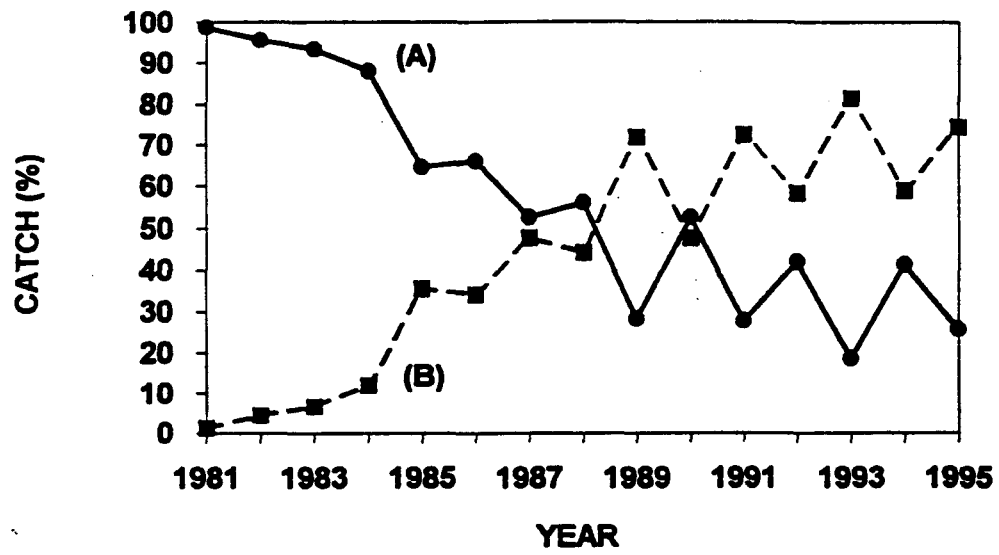
Fig. 1. Comparison of catch (%) between log-associated school
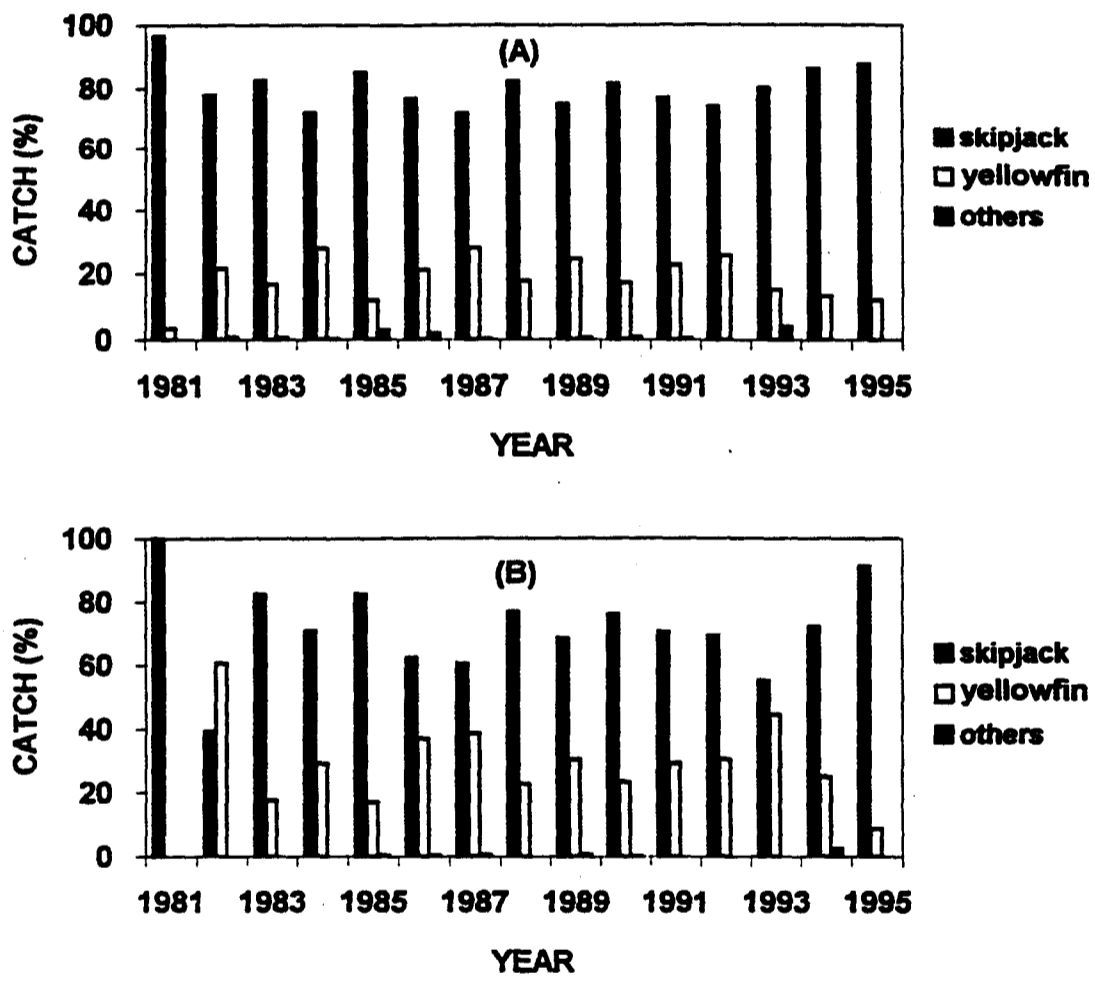(A) and free-school (B) fisheries, 1981-1995.

Fig. 2. Species cmpositions of log-associated school (A) and
free-school (B) catches by Korean tuna purse seiners,
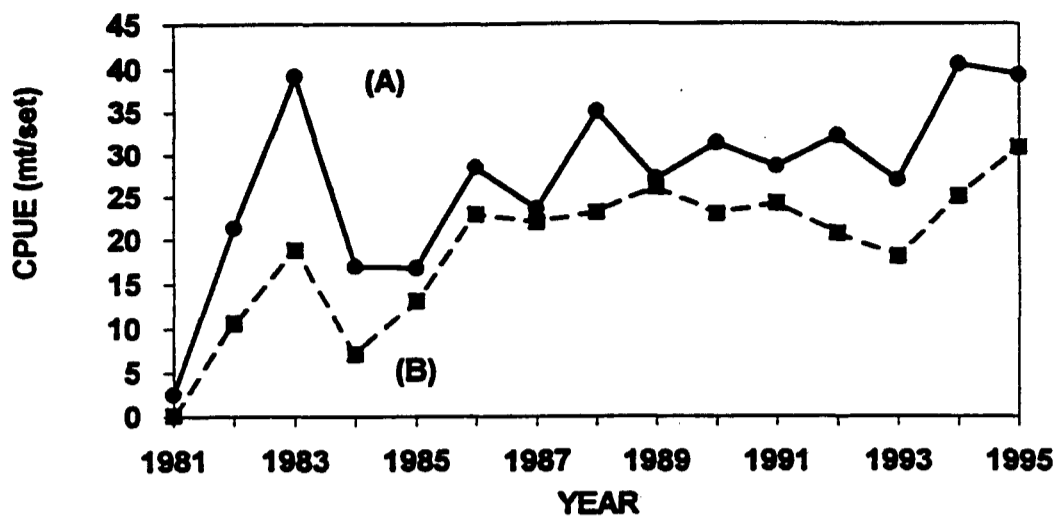1981-1995.

Fig. 3. Annual changes in CPUE (mt/set) on log-associated
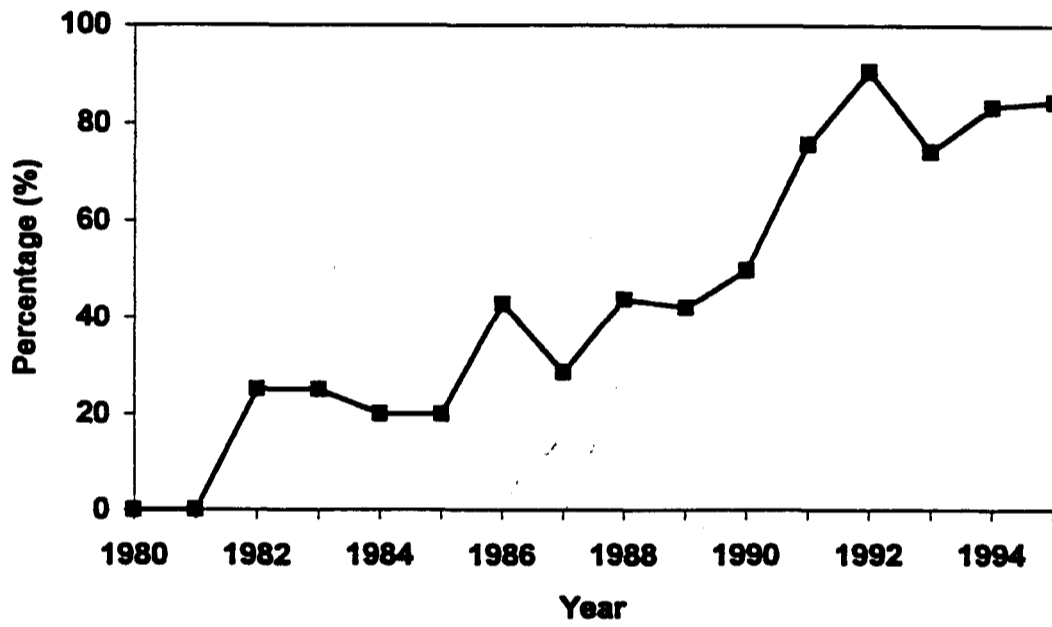school (A) and free-school (B) fisheries.

Fig. 4. Annual changes in the number (%) of Korean purse seiners
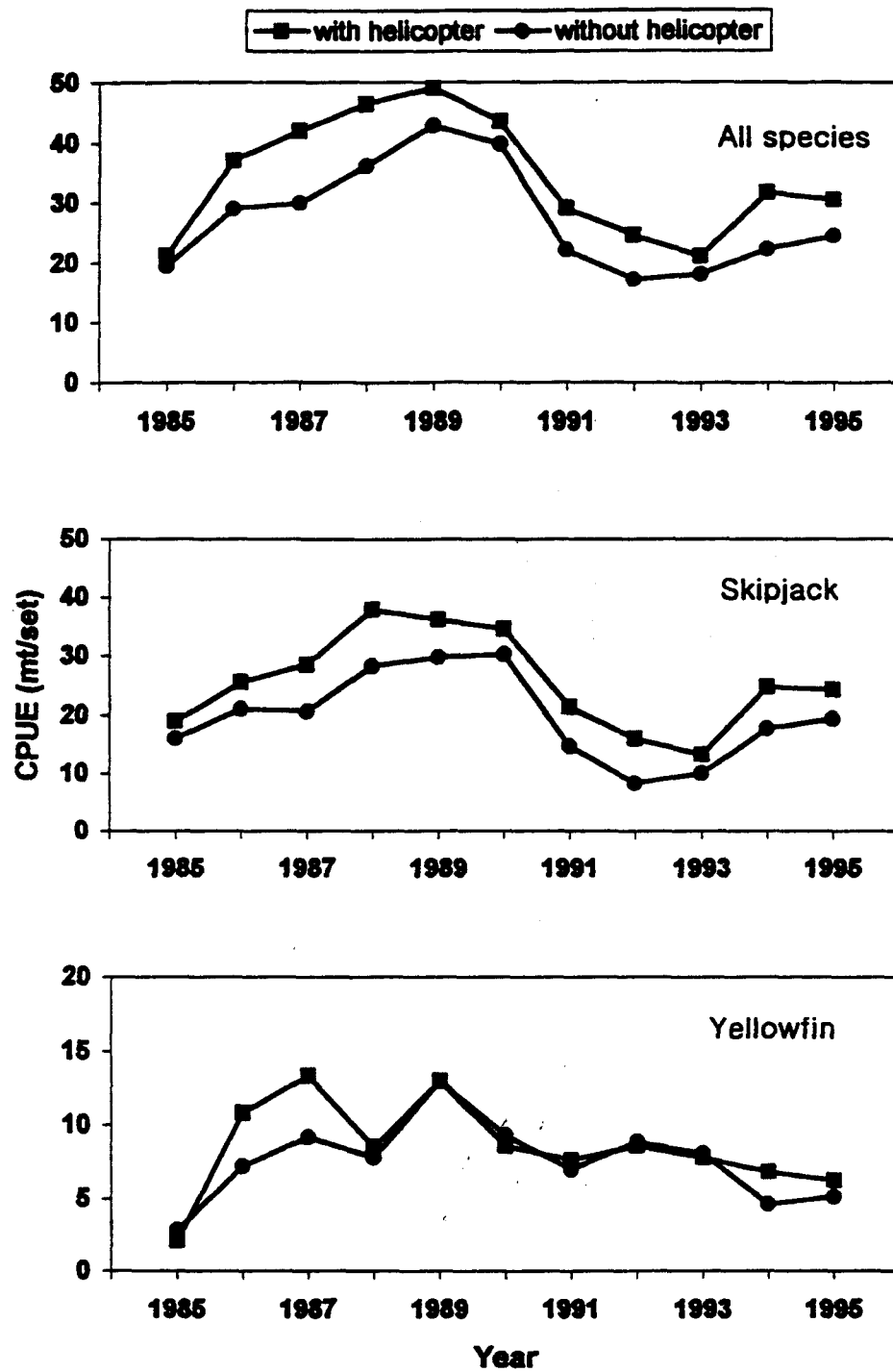carrying helicopter.

Fig. 5. Annual CPUE of tunas by Korean tuna purse seiners with helicopter and without helicopter in the western tropical Pacific, 1985~1995.