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Estimation of Korean Purse Seine Catch of Bigeye Tuna in the Western Pacific

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Introduction

Bigeye tuna, fished by various types of fishing gear, is one of the primary target species for Korean tuna longline fishery operating in the whole Oceans including the SPC area. It is known that some amount of small-sized fish of this species are being incidentally harvested by the Korean purse seine fishery in the western tropical Pacific. However, species composition of bigeye tuna from this fishery has seldom reported because fishermen some times put the catch of this species into other species' catch such as skipjack and yellowfin, which are the target species of the purse seine fishery. Despite small quantity, bigeye tuna are as much important as target species in terms of economic point of view in Korea. Fishery data on the catch of bigeye tuna are vital to understand the stock status of this species with target species of this fishery. This report provides information on catch composition of bigeye catch and distribution patterns based on fishery statistics data sampled from the Korean purse seiners in the western Pacific.

Data collection

Fishermen's logbook data were collected to observe the Korean purse seine catch of bigeye tuna for the period from 1988 to 1995. According to scientific observers and interviews with fishermen, purse seiners set not only for tuna schools gathered around floating objects such as logs and rafts but also for free schools surfacing for their prey. But it is reported, in general, that higher catch is from tuna schools around floating objects rather than that from surface schools. Most of the bigeye catch dealt with in this report was from the sets for the schools formed around floating objects. Table 1 shows the number of purse seiners sampled, bigeye catch and catch per set etc. for this work.

Estimation of bigeye catch composition

A few vessels have reported their catch of bigeye tuna every year. As shown in Table 1, bigeye are not caught in every sets for log-associated school of tunas and usually showed small quantity as compared with two target species. Percentage sets of which bigeye fished to the whole sets exerted for catching tunas varied between 0.6% and 4.0% with an average of 1.8% (2.1% averaged from 1988 to 1995), with the exception of the 1988 case whose value was 13.8%.

The proportion of this species to the total catch was lower than 1.0% except for years 1988 and 1990 that accounted for 1.1%, respectively, with an average of 0.7%. Recent years, catch compositions of bigeye tuna were less than 0.5%. It was assumed that such a low proportion of bigeye may be usual in purse seine fishery, taking into account the fact that skipjack and yellowfin tunas swim at upper layer of water and bigeye distribute in deep area as results obtained from vertical distribution patterns.

Trend and distribution of catch per unit effort (CPUE)

CPUE's value of bigeye catch showed much fluctuations between years. Its value was peaked in 1991 at 20.8 mt per set during 1988~1995. After then, yearly estimates kept a decreasing trend and showed the lowest value in 1995 to be 2.5 mt per set. But the variation of the yearly CPUE's value does not match exactly with that of all species, for instance, the bigeye CPUE in 1991 was the highest among the others' but CPUE from all species did not have high value (Table 1). It should be mentioned that unreported catch of bigeye tuna from purse seine fishery may be due to either difficulties in

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fishermen's experience to identify small-sized bigeye among catches mixed with yellowfin or ignorance of the catch of this species, which usually accounts for small portion in quantity as by-catch. Therefore, it is required in near future to develop a special data collection system for this fish species.

Fig. 1 shows the distribution of bigeye CPUE obtained from Korean purse seine fishery for the years between 1988 and 1995. Although the figures do not indicate any pattern of changes through the whole years due to the lack of data, it may be said that the catch of bigeye tuna occurs more frequently in the area, east of $150^{\circ}E$.

| Year | Vessel ¹ | Total | | | / Bigeye tuna | | | | | |
|---------|---------------------|-------|---------------|-------------------|---------------|-------|-------------------|------|-------|--|
| | | Set | Catch (mt) | CPUE ² | Set | Catch | CPUE ² | * | | |
| | | | | | | (mt) | | Set | Catch | |
| 1988 | 1 | 87 | 2,902 | 33.4 | 12 | 33.0 | 2.8 | 13.8 | 1.1 | |
| 1989 | · 2 | 215 | 7,847 | 36.5 | 3 | 45.0 | 15.0 | 1.4 | 0.6 | |
| 1990 | 7 | 776 | 35,202 | 45.4 | 31 | 394.0 | 12.7 | 4.0 | 1.1 | |
| 1991 | 4 | 911 | 26,649 | 29.3 | 9 | 187.0 | 20.8 | 1.0 | 0.7 | |
| 1992 | 3 | 258 | 7,781 | 30.2 | 3 | 25.0 | 8,3 | 1.2 | 0.3 | |
| 1993 | 3 | 551 | 14,108 | 25.6 | 10 | 67.0 | 6.7 | 1.8 | 0.5 | |
| 1994 | 3 | 630 | 17,187 | 27.3 | 8 | 37.0 | 4.6 | 1.3 | 0.2 | |
| 1995 | 1 | 361 | 4,330 | 12.0 | 2 | 5.0 | 2.5 | 0.6 | 0.1 | |
| Average | | | | 30.6 | | | 10.2 | 2.1 | 0.7 | |

Table 1. Catch composition of bigeye tuna of the Korean purse seine fishery in the western Pacific

Vessel : Number of purse seiners from which data of bigeye tuna were obtained.
CPUE : mt/set

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Fig. 1. Distribution of CPUE (mt/set) of bigeye tuna for Korean tuna purse seine fishery in the Pacific, during 1988~1995.