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Review of size data and fish size for Indian Ocean albacore caught by Japanese longline fishery

by

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Summary

Status of data collection and fish size was summarized for the size of albacore caught by Japanese longline fishery operating in the Indian Ocean. Size sampling of albacore is mainly conducted on board of commercial vessels by fishermen, by training vessels and by scientific observers. Annual number of fish sampled and main sampling area differed depending on periods. The fish mainly ranged between 60cm and 120cm FL. Information on sex is not available for most of the fish, but the proportion of male increased between around 100cm and 115cm. Fish size became smaller as latitude got higher and large difference was observed between north of and south of 30S. There was no clear difference of fish size by sampling method.

1. Introduction

Longline is main tuna-fishing gear deployed by Japan at present in the Indian Ocean. Japanese longline in the Indian Ocean has long history started in 1952. Japanese longline had huge operation area in the Indian Ocean. In addition to catch and effort data from logbooks, size data including albacore is also collected by several methods.

Recently, Stock Synthesis model is mainly used in the stock assessment of Indian Ocean albacore. Size data are used in the integrated model. Therefore, it is necessary and useful to review size data and fish size to consider for input data of stock assessment models.

In this document, the status of size data and fish size for Indian Ocean albacore by Japanese longline fishery are compiled and reviewed to understand actual situation of the size data and for consideration for input data in the stock assessment models.

2. Data source and method

Size for albacore was measured on board of commercial vessels by crew members or scientific observers, on board of training vessels and by port sampling of commercial vessel catch. The data were collected and compiled at Fisheries Resources Institute (FRI, former National Research Institute of Far Seas Fisheries) and are available for 1965-2020. Data for 2020 are very preliminary. The information on the place of sampling (on board or at port) is available only from 1986. In a part of analyses, data for commercial vessels (before 1985, information of place is not available) were combined with the data for commercial vessels (from 1986 onward, on-board measurement). Size data in fork length or product weight (close to whole body weight) are available. Only the data in length were used to create length frequency of the fish. Several analyses are based on the area shown in Fig. 1, which is the same as those for fleet definition in the IOTC albacore stock assessment in 2019.

3. Results

The number of measurement (number of individuals) for albacore caught by the Japanese longline vessel by sampling method and by unit in each year is shown in Fig. 2. Annual number of samples largely differs depending

on years; was more or less 10,000 individuals before 1990, and was usually less than 10,000 individuals after that. On-board measurements by training vessels had been main data source before 1990. Scientific observers have been measuring fish since 1992, and that is almost only data source in recent years. Majority of measurement is by length at 1cm interval, although some fish were measured by weight.

Fig. 3-Fig. 5 show geographical distribution of the number of albacore size data for entire period, by decade and by quarter, respectively. More fish were measured in the subtropical area in the eastern Indian Ocean and in the temperate area in the eastern and western part. During 1970s-1980s, size data were mainly collected in the subtropical area in the eastern Indian Ocean. After that, sampling is mainly conducted in the temperate area. Fig. 6 shows geographical distribution of the number of albacore size data by sampling method. Size data comparatively equally distribute for commercial vessels. Size measurement was mainly conducted in the eastern subtropical area and in the temperate area by training vessels and scientific observer, respectively.

Fig. 7 shows length frequency of albacore in the Indian Ocean caught by Japanese longline by sex. The fish mostly ranged between 60cm and 120cm FL, and the mode was around 100cm. Sex is unknown for most of the individuals mainly because albacore is usually not guiled and gutted on board, and so it is not easy to determine sex. Seeing the individuals only with the information of sex, the proportion of male increased between around 100cm and 115cm, and over the half of the fish were male for that range, while the proportion of male is approximately 50% for the fish smaller than 100cm. The trend is not clear for the fish larger than 120cm probably because of small sample size.

Fig. 8 shows geographical distribution of mean length of albacore by five-degree latitude and longitude blocks. Generally, fish size became smaller as latitude got higher. Also, the fish was larger in the eastern part than in the western part. Mean length is usually smaller than 90cm FL south of around 30S.

Fig. 9-Fig. 10 show length frequency of albacore stratified by latitude (10 degree interval), area and quarter, respectively. Fig. 9 also indicates that fish size became smaller as latitude got higher and large difference was observed between north of and south of 30S. Difference of fish size by area and quarter was also observed.

Fig. 11 shows annual change in average length of the fish in each area. There is some difference of fish size in the same area. For example, slight increasing trend is observed in the area 2, and recent decreasing trend with fluctuation is observed in the area 4. Fig. 12 shows annual change in average length of the fish by sampling method and area. Usually there is not large difference of fish size by sampling method in the same area.



Fig. 1. The geographical range to compile size data for albacore caught by the Japanese longline fishery.



Fig. 2. The number of albacore measured by sampling category (upper) and measurement unit (lower).



Fig. 3. The geographical distribution of the number of albacore size data.



Fig. 4. The geographical distribution of the number of albacore size data by decade.



Fig. 5. The geographical distribution of the number of albacore size data by quarter.



Fig. 6. The geographical distribution of the number of albacore size data by sampling method.



Fig. 7. Length frequency of albacore in the Indian Ocean caught by Japanese longline by sex. Top: all fish, middle: excluding unknown sex, bottom: proportion of male and female.



Fig. 8. The geographical distribution of mean length of albacore by five-degree latitude and longitude blocks.



Fig. 9. Length frequency of albacore in the Indian Ocean caught by Japanese longline by latitude.



Fig. 10. Length frequency of albacore in the Indian Ocean caught by Japanese longline by area shown in Fig. 1 divided by quarter.



Fig. 11. Annual change in mean length of albacore in the Indian Ocean caught by Japanese longline by area shown in Fig. 1.



Fig. 12. Annual change in mean length of albacore in the Indian Ocean caught by Japanese longline by area shown in Fig. 1 and by sampling method.