

PROBLEMS IN SWORDFISH STOCK ASSESSMENT IN THE INDIAN OCEAN

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BACKGROUND

In 2-4 of October 2000, first IOTC billfish working group meeting was held in Seychelles. During meeting, both standardized/nominal CPUE of swordfish caught by longliners of Japan, Taiwan, Spain, France (Reunion), and Seychelles were reported and discussed. Among 5 CPUE series, Japanese and Taiwanese ones were standardized in several ways (Uozumi 1999, Yokawa 2000, Campbell 2000). Though Japanese and Taiwanese longline fisheries have relatively longer history and wider coverage, they caught swordfish as by-catch, except for some Taiwanese longliners operated in the southwestern Indian Ocean in 1990's. Spanish, French and Seychelles longliners targets swordfish but they started after 1990 and their fishing ground was limited in the western side of the Indian Ocean.

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Stock Structure

Yokawa (2000) reported that standardized CPUE of Japanese longliners showed different trend between western and eastern side of the Indian Ocean. ICCAT (2000) reported the possibility of unidirectional movement of swordfish from the Indian Ocean to the South Atlantic in the area of off South Africa waters. These reports indicate that swordfishes belonging to different stocks/units are being caught in the Indian Ocean. To identify these possibilities, broad programs of tissues sampling for genetic analysis and tagging study would be necessary.

Targeting of fishery

Yokawa (2000) indicated that drastic increases of catches by Taiwanese longliners in 1990's would be caused by the shift of target species of them. One of the ways to identify the swordfish targeting operation is to examine the number of hooks between floats which longliners used.

In Yokawa (2000), CPUE of Japanese longliners were used as abundance index in the production model analysis. As target species of Japanese longliners changed from albacore/yellowfin tuna up to the middle of 1970's to bigeye/southern bluefin tunas after mid 1970's, and the operation pattern was also changed. With these influences, vertical and horizontal coverage of effort of Japanese

longliners on the distribution area of swordfish would be changed. The effect of these changes should be closely evaluated in the CPUE standardization process.

Effect of area stratification

Two historical trends of standardized swordfish CPUE of Japanese longliners in the study by Uozumi (1999) and Yokawa (2000) showed different ones. One of the main differences between two studies is the way of area stratification. Former study only used areas where historical observations were available, while latter one used much wider area with relatively finer area stratifications. The effect of area stratification in the analysis of CPUE standardization should be evaluated to obtain more exact index.

Production model

In study by Yokawa (2000), ASPIC analysis with total catches weight and the standardized CPUE (in number) of Japanese longliners was failed to estimate realistic K and r value. This suggests the fact that the production model type analysis would not be applicable to the case in the swordfish stock in Indian Ocean, which a drastic increase of catch occurred in short period. Another five or ten years of data series should be necessary to evaluate the impact of catch on the stock with the production model analysis.

CONCLUSION

Further assessment of swordfish stock in the Indian Ocean should be conducted when the information about targeting for the Taiwanese is available.

Taking into account the drastic increase of catch amount of swordfish in 1990's and low and rather stabilized catch level before 1990's, it might take another five or ten years that the production type analysis, such as ASPIC, can provide reliable estimates. Even if so, further increase of catch amount from current level have to be carefully controlled to prevent a drift to a higher level of exploitation. In the mean time, collection of biological data such as length frequencies of catch by sex, and propulsion of biological study about such as age and growth, stock structure, maturity, migration, and behavior. These information are useful in the evaluation of the result of production type analysis, and also make feasible to conduct age structured type analysis.

References

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