

# THE TUNA STATISTICS PROCEDURES OF TAIWAN LONGLINE AND GILLNET FISHERIES IN THE INDIAN OCEAN

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## ABSTRACT

*At the beginning of the 1960s, the Taiwanese tuna longliners started harvesting the tuna resources in the Indian Ocean, but the catch and effort data collection system was not ready until 1967. The Taiwanese tuna longliners have two types of vessel: the regular or conventional longliner that targets albacore, and the deep longliner that mainly targets bigeye and yellowfin tunas in the Indian Ocean. The Taiwanese large-scale gillnet fishery was operational only from 1983 to 1992 in the Indian Ocean, but the catch and effort data collection system were not ready until 1986.*

*The logbook collection and the catch and effort data compilation were undertaken by the Taiwan Fisheries Bureau and the Tuna Research Center of the Institute of Oceanography, National Taiwan University. The original logbook data are carefully checked before compilation. The resultant output of monthly blocks catch and effort statistics by 5° x 5° square compiled from recovered logbooks are then raised by a factor obtained from the ratio of the fishing effort reported by the Fishery Radio Station to the effort shown by the logbooks.*

*The collection of size measurement data has two channels, onboard measurement and port sampling. The onboard measurement is done by asking fishermen to measure the first 30 fishes caught at each operation, and is mainly applicable to the longline fishery. On the other hand, the port sampling survey is mainly applicable to the gillnet fishery*

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## INTRODUCTION

The Taiwanese distant-water tuna longline fishery has exploited the Indian Ocean's tuna resources for over 30 years, since the beginning of the 1960s, but the catch and effort data collection system was not established until 1967. The Taiwanese tuna longliners have two types of vessel the regular or conventional longline fishery that targets albacore, and the deep longline fishery that targets bigeye and yellowfin tunas in the Indian Ocean. Recently some chartered Taiwanese small tuna longliners have also operated in the Indian Ocean; however, their catch data is not included in this distant-water longline fishery's data collection system, and should be reported by the chartering nations.

The Taiwanese large-scale gillnet fishery operated in the Indian Ocean from 1983, but the catch and effort data collection system were not established until 1986. However, this fishery was closed by a ban of the United Nations in 1992.

The catch statistics have been prepared by the Institute of Oceanography, National Taiwan University, and routinely submitted to the pertinent organizations, including the IPTP.

## DATA PROCESSING PROCEDURES

The data collection system consists of two parts, logbook collection and data compilation. The former was carried out by the Taiwan Fishery Bureau, Department of Agriculture and Forestry, Taiwan Province Government before 1990 and by the Fisheries Department, Bureau of Reconstruction, Kaohsiung Municipal Government after 1990. The data collection system for the longline fishery and the gillnet fishery will be described.

### LONGLINE FISHERY

The logbook collection includes catch and effort data and size measuring data. The logbooks have two parts: one is the basic data of a vessel, including vessel name, tonnage, company, captain's name, total fishing days, *etc.*, and the other is the data of fishing records including fishing time, fishing area, water temperature, fishing effort, baits used, catch species in number and in weight, and the measured size of the initial 30 fishes.

When the vessels return to the domestic harbor, *e.g.* Kaohsiung, they should deliver the logbooks of every voyage to the United Service Center of the Government in Kaohsiung. When they return to a foreign base, they should mail the logbooks to Taiwan Fishery Bureau, Department of

Agriculture and Forestry, Taiwan Province Government (before 1990), or to the Department of Fishery, Constructive Bureau, Kaohsiung Municipal Government (after 1990).

### **1. Catch and effort data**

When the logbooks are received at the Tuna Research Center at the Institute of Oceanography, National Taiwan University, the data is checked and compiled. The logbooks are checked with the daily report of Kaohsiung Fishery Radio Station for verifying the location of sets, including checking such unrealistic data as the boat moving too far each day or operating on land, great discrepancies of catch between logbooks and daily report of Kaohsiung Fishery Station, too many hooks set on each operation, *etc.* After that, the monthly catch and effort by 5° x 5° square block are computed by summing up the catches and effort with similar fishing time and area. Finally, the catches are raised by the ratio of the effort of Fishery Radio Station Report to the logbook effort each month and each 5° x 5° square block. In the future, the Tuna Research Center will gradually transfer the work of tuna statistics to the Overseas Fisheries Development Council of the Republic of China.

Recently, the fishing patterns for the Taiwanese tuna longline fishery have changed greatly. In the early 1980s the Taiwanese tuna longliners usually focused on the target species during the whole fishing voyage: the regular longliners usually targeted albacore, and the deep longliners usually targeted bigeye and yellowfin tunas. However, many vessels recently operate according to the captain's decisions rather than to registered fishing pattern: for instance, a registered longliner with super freezer, *i.e.*, a deep longliner, maybe possibly operate like a regular longliner. In other words, a deep longliner targets bigeye and yellowfin tunas some days, and changes to target albacore other days like a regular longliner in the same voyage, and *vice versa*.

At the same time, two apparent changes in obtaining fishery information have resulted in discrepancies of catch estimates, and the fishing pattern change combined with fishery policy changes have resulted in a decline of logbook recoveries and incomplete statistics of tuna trade reports since 1987. First, the tuna trade reports are provided to the proper fishery authorities by commercial tuna transshipping agencies, but recently tuna trades have been made by boat owners themselves rather than by the customary transshipment. Therefore, the trade reports by agencies may or may not include entire catches of all species according to type of fishing vessel and species traded. Secondary, the change of daily report and communication between boats and the Fishery Radio Station. A boat is not required to submit the logbooks in prior and can also report the daily fishing position by SSB rather than in the usual way by radio. Therefore, the recovery of logbooks decreases significantly and the daily real fishing position and catches of target species are hardly known.

As a result of changing fishing patterns and these poor recovery conditions, the more fundamental data used to estimate monthly catches by 5° x 5° square block become

needed from all possible sources. This has been pursued mainly by Dr. C. C. Hsu. Initially vessel logbooks, daily reports of Kaohsiung Fishery Radio Station, and trade reports of transshipped agencies were used,; additional data included reports on Japanese imports of commodities by country, the catch statistics of the Tuna Association, and the number of boats operating in Indian Ocean by month. The unloaded measures by Shin Nippon Kentei Kaisha by boats have also been collected since 1994. All the modifications above are to estimate the correct and true monthly catches by 5° x 5° degree square block.

### **2. Size frequency**

Size data are collected in two ways: on-board measurement and port sampling. The on-board measurement is done by fishermen on the initial 30 fishes from each operation. We classify this measurement as low-reliability data, so a very careful review and check are absolutely required. Port sampling is carried out when fishing vessels return to domestic harbors, usually Kaohsiung. Nevertheless, the quantity of fish measured in port sampling is much less than that of on-board sampling.

## **GILLNET FISHERY**

### **1. Catch and effort data**

The statistical methods for the monthly catch and effort data by 5° x 5° square block of the Taiwanese gillnet fishery are similar to those of the longline fishery. However, the catch weight is estimated by the catch number multiplied by the average weight for each species. The latter comes from the port sampling.

### **2. Size frequency**

Because most catches of the Taiwanese gillnet fishery are delivered to domestic harbors, size was usually determined by port sampling from 1986 to 1992.

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