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Documentation of Data Provision and Processing for the Japanese Tuna Fisheries in the Eastern Pacific Ocean

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1. Introduction

The catch and effort statistics for tuna fisheries in Japan before the World War II were very limited but available in the oceanographic reports in which the results of the experimental tuna fishing conducted by the local governments were given for 1934-1942 (Okamoto 2004). However, the information included was not uniform (such as species or species category and unit of effort). Tuna fisheries resumed soon after the World War II, and the catch and effort data collection was started by interviewing the fishermen at the unloading sites by the staff of the national and local research Institutes. A prototype of the current logbook was used at that time. The submission of logbook became mandatory for the larger boats (>20 GRT) in the early 1960s and this was the time when the statistical data processing for catch and effort data from the tuna fisheries were started. Among the tuna fisheries, we devoted the largest efforts in the longline fishery because of its characteristics (numerous boats, multi-species nature, wide area of fishing, long fishing trip, high economic value, etc). For other major tuna fisheries, the data processing has been simple (no raising was done because of high coverage of logbooks. The kind of data collected as well as data processing have changed during the course of time to meat the requirements taken place in the later years.

The biological data (e.g., size of fish, gonad weight, sex) were also collected mostly by the research organizations, and the fishermen to the lesser extent.

2. Type of Fisheries engaged in the Eastern Pacific Ocean

Longline Fishery

Japanese longline fishery has a long history in the eastern Pacific Ocean (EPO, east of 150°W) since the 1953 which was just after the lift of McArthur Line in 1952. This fishery expanded its operation towards the east along the equatorial waters year after year. It reached the American Continent in 1961, and further expanded to the north as well as to the south. During the late 1960s, its area of operation was the widest covering nearly the whole EPO between 40°N and 40°S. Since then, the fleet has started to show concentrations in the two east-west bands that located north (0°-10°N) and south (0°-15°S) of the equator. EPO has been one of the most important fishing grounds for this fishery, exerting roughly 20-40% of its total effort. Major target species has been bigeye tuna followed by yellowfin tuna (Fig. 1). Striped marlin and sailfish was also targeted in the waters close to the Latin American Coast. The Japanese longline data has been reviewed periodically by the series of joint studies conducted by the staffs of the IATTC and the NRIFSF (Suda and Schaefer 1965a and 1965b, Kume and Schaefer 1966, Kume

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and Joseph 1966, 1969a, 1969b, Joseph et al. 1974, Shingu et al. 1974, Miyabe and Bayliff 1987, Nakano and Bayliff 1992, Uosaki and Bayliff 1999, Okamoto and Bayliff 2003).

The size of longline boats operated in the EPO is generally large (>24m LOA or 200-500 GRT) but there have been minor amounts of fishing by 100-200 GRT boats. All these boats are categorized as "distant water" longline boats which have no area limitation on their operation. There are two other categories, "offshore" and "coastal", whose area of fishing is limited to mostly in the western and central Pacific Ocean (WCPO) and nearshore of Japan, respectively.

Purse Seine Fishery

Japanese tuna purse seine has also long history since 1967 when the fishing was started as a feasibility experiment in the tropical waters in the western Pacific. Such attempts were also made in the EPO from 1968 to 1976 by the Japan Marine Resources Research Center. However, no fishing was made on a commercial basis in this area.

3. Kind of Data Collected from Longline Fishery

Logbook data

Fishermen are obliged to submit their logbook within a month after their completion of each fishing trip. The duration of trip ranges from within a month to nearly a year depending on where the boat operates. The current data requirements to be provided by the fishermen in the logbook include daily position, amount of hooks used, information on gears (hooks between floats, material of main and branch lines), catches by species (number and weight), characteristics of fishing vessel (name, call sign, GRT).

Size data and other biological data

With regards to the size data, there are three main sources of data; on-board measurements by the fishermen, on-board measurements conducted by research vessels including high school training boats and port sampling. Because the catches are deep-frozen (-60°C) and the products must not be exposed on higher temperature in order to keep the meat quality, port sampling is not suitable for catches from this area. Therefore, we asked the fishermen to conduct on-board measurements. This on-board measurement was originally asked on voluntary basis but in more recent years it became obligatory although the data provided by this measurement went down considerably. More detailed information (size, sex, gonad weight) including size measurements have been collected by the high school training boats.

Data required for raising catch and effort

The coverage rate of logbook is not 100 % but it is quite high for distant water longline boats (nearly 90-95%), reasonably high (80-85%) for offshore longline boats, and relatively low (65-70%) for coastal longline boats. Therefore, it is necessary to conduct a "raising" to get the total catch and effort statistics. In order to do this properly, the information on the amount of fishing (such as area, time and number of sets) exerted should be collected in addition to the logbook data. So far, this information for raising has been accumulated from industry for distant water boats, and from Department of Statistics, Ministry of Agriculture, Forestry and Fisheries (MAFF), for offshore and

coastal boats. The industry information is more detailed and is given in number of days fishing by boat, area and month. The information from the Department of Statistics only provides the annual amount of fishing effort used in terms of days fishing and number of trips (but no information on the area of fishing) by prefecture where the boat owners were registered. Unfortunately, it requires nearly 2 to 3 years to compile this information from all the longline boats after the completion of a certain calendar year.

4. Methods used in the estimation of total catch and effort for longline fishery

The estimation of the total catch and effort has been done by multiplying the sample data with the raising factors. As stated above, the raising factors to be used for the estimation of total catch and effort are different between distant water and offshore longline boats. The raising factors for the former boats are prepared by size of boats (<200GRT and >=200GRT), month and area (20 areas in the world, 3 areas in EPO as shown in Fig. 2) while those of the latter boats are given as annual values but by size of boats (20-50 GRT, 50-100 GRT and 100-120 GRT) and prefecture.

5. Efforts towards the quicker and more complete reporting of longline statistics

Usually, the compilation of longline statistics requires much more time than other fisheries statistics, and hence they are not available until much later time. This also hinders the importance of the prompt stock assessment by not having the most recent longline data to be included in the analysis. The Fishery Agency of Japan and the NRIFSF are now jointly making further efforts to improve this situation. This was first taken up when it was noticed that some information necessary for the current raising will not be available in the near future due to the reconstruction of the data collection system at the Department of Statistics of MAFF. In response to this change, it has been discussed on possible ways to overcome it. One of which could be to develop a mechanism to enhance the coverage of logbook as close as to 100 % so that no raising is necessary. To reinforce this, we will soon start sending a reminder to the fishermen to urge their submission of logbook if no submission was made for a certain period of time from the previous submission. Another way discussed but not decided yet was to ask fishermen to provide an operation report within a month or so after the end of each year, separate from logbook, in which the necessary information for raising (dates of trip, number of days fishing, area of fishing) is described.

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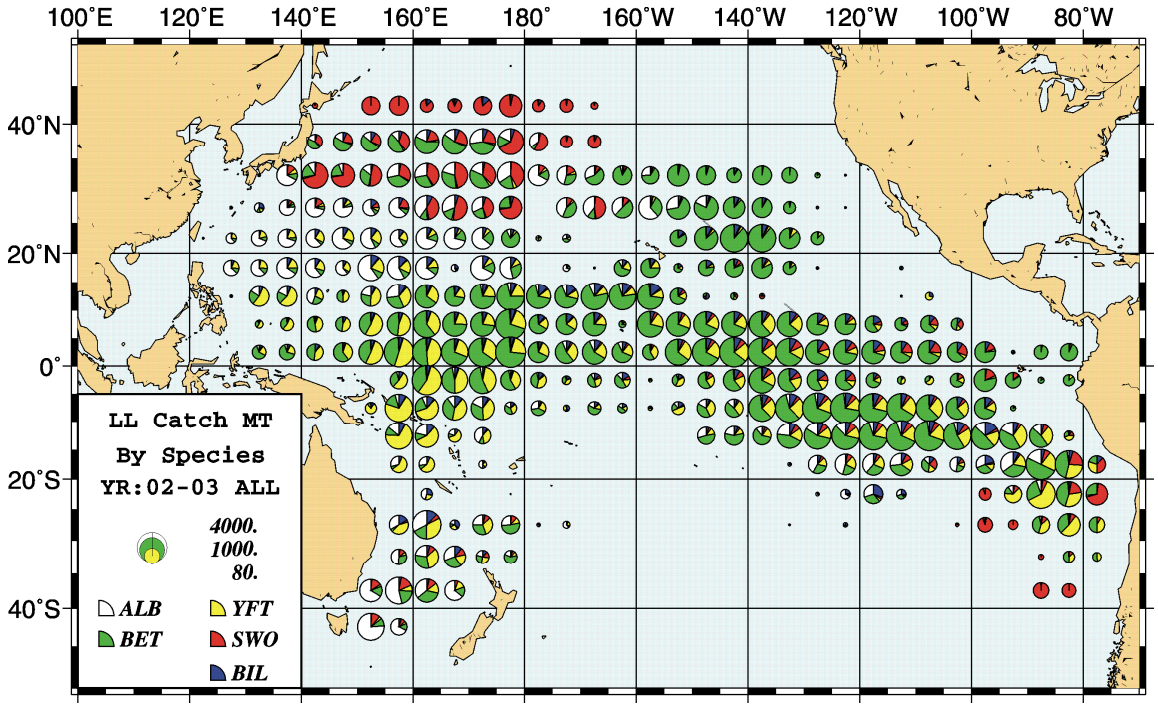

Figure 1. Species composition of the Japanese longline catch in the Pacific in recent years (2002-2003).

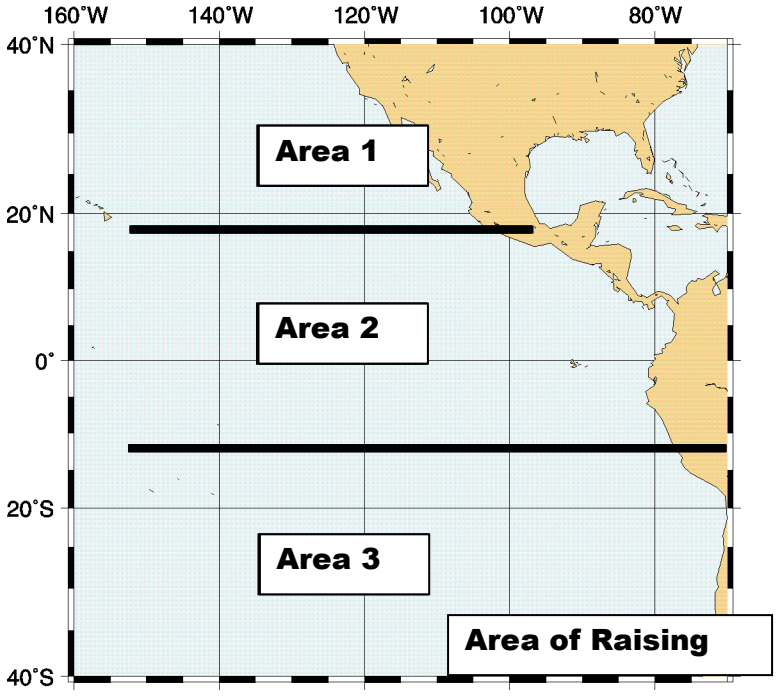

Figure 2. Area division used for raising longline catch and effort data.