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**Overview and availability of Japanese pole-and-line fisheries data
between 1960 and 1971**

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Kiyofuji H., Kinoshita J. and Aoki Y.¹

¹ National Research Institute of Far Seas Fisheries, Japan Fisheries Research and Education Agency

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Kiyofuji, H., Kinoshita, J. and Aoki, Y.

National Research Institute of Far Seas Fisheries, Fisheries Research and Education Agency
Shimizu, Shizuoka, Japan.

Abstract

In this document, data from the Japanese pole-and-line fisheries before 1972 was explored to apply to the future skipjack stock assessment in WCPO. Two data set were used in this study, one was derived from the official statistical reports by the Ministry of Agriculture, Forestry and Fisheries in Japan (MAFFJ) and the other was information derived from individual pole-and-line fleets (referred as pre-logbook data hereafter).

Introduction

Skipjack catch data in Japan has been officially reported based on the reports by the Ministry of Agriculture, Forestry and Fisheries in Japan (MAFFJ) since 1950, which also used in the WCPFC yearbook (WCPFC, 2016). Japanese pole-and-line data from logbook data after 1972 is used for stock assessment as standardized catch per unit effort (e.g. Kiyofuji, 2016; MacKechnie et al., 2016), which is an important information to estimate abundance trend in the stock assessment.

At present, Japanese pole-and-line fisheries are operating in wide areas between tropical and the waters around Japan. They started to expand fishing ground to south (subtropical and tropical) from Japanese waters with full-scale implementation after World War II. The beginning of southward expansion, their fishing ground was formed around Ogasawara and Mariana Islands in summer and autumn, and in winter around west of the Mariana Islands and northern Palau (north of 9°N). As these areas were often affected by frequent occurrences of typhoon, they were forced to move to more southern areas lower than 10°N, where is characterized calmer conditions leading to operate in a continuous way (Kasahara and Tanaka, 1968). At the same time, there were active discussions in terms of skipjack population structures in the Pacific Ocean (Kawasaki, 1964; Miyake, 1968). However, there are lack sufficient materials such as catch, positions and vessel size to describe their characteristics more in quantitative manner.

In this document, we explored the Japanese pole-and-line data before 1972 to describe skipjack catch trends and fishing ground formation, and to consider this data set can be applied to the

future skipjack stock assessment.

Data

Two different data sets were used in this document as described below.

- Annual report of catch statistics on fishery and aquaculture from 1960 to 1971 published by the statistics and survey division, Ministry of Agriculture and Forestry in Japan. This data set contains total skipjack catch and efforts (number of vessels) by different fisheries aggregated by vessel size. There are no detailed information such as date and catch position.
- Information derived from the individual pole-and-line vessel, including operated date, catch position, number of operations during cruise, total catch and mean weights of all species. This investigation was conducted originally by the scientists in the Tohoku National Fisheries Research Institute of Japan (TNFRI) at that time. As this data is similar format and predecessor of present logbook data, we defined hereafter as “pre-logbook” data.

Trends of skipjack catch and effort

Figure 1 shows number of vessels (a) and total skipjack catches (b) by the Japanese pole-and-line fisheries reported by the MAFFJ (red) and pre-logbook data (black). While number of vessels shows no significant changes throughout the study periods, gradual increase of skipjack catch were identified from 1960 to 1971. It should be noted that the highest catch was observed in 1966 from both data sets (**Fig.1** and **Tab.1**). Although skipjack catch shows similar trends as the MAFFJ reported catch (**Fig.1(b)**), actual amount of catch from the pre-logbook data was smaller than the MAFFJ (**Tab.1**) and its percentages were between 12% and 35%. This indicates that pre-logbook data did not cover all registered vessels.

Changes in fishing locations

Figure 2 shows fishing locations and skipjack catch aggregated by $1^{\circ} \times 1^{\circ}$ degree from 1960 to 1971 based on the pre-logbook data. Main fishing ground were found around Japan same as present days. Expansion of fishing ground to south was identified in 1964. They expanded across 10°N after 1965 (**Fig.2** and **Fig.3**). Their fishing locations were likely divided into three areas (1967 - 1971), lower than 10°N , between 10°N and 25°N , and temperate areas around Japan. This pattern is also similar as present days.

Summary and Future works

Similar data as the present log-book data before 1972 was explored and described skipjack catch trend and fishing locations with reported information by the MAFFJ. Following summaries and future works were raised prior to the future skipjack stock assessment.

- Inconsistency between WCPFC yearbook and MAFFJ data from 1969 to 1971 were iden-

tified that should be corrected. Further verification is necessary to check if any inconsistency is found in other years and different fisheries.

- Gradual increase of skipjack catch was identified from 1960 to 1971, while number of vessels shows no significant changes throughout the periods.
- Pole-and-line fishing ground expanded more southern areas from 1965 and skipjack catch increased accordingly, especially in the area lower than 10°N.
- Because reported rate of the pre-logbook was not 100%, further analysis is necessary to estimate reporting rates by appropriate way, leading to calculate weighting factors in each season and area. This would also be an important analysis to estimate standardized catch per unit efforts by this fisheries.

Acknowledgment

We thank Uosaki, K. of the National Research Institute of Far Seas Research (NRIFSF) for providing useful comments on data.

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Kawasaki, T. (1964) Population structure and dynamics of skipjack in the north Pacific and its adjacent waters. *Bull. Tohoku Nat. Fish. Res. Inst.* 24: 28-47. (in Japanese with English abstract)

Kiyofuji, H. (2016) Skipjack catch per unit effort (CPUE) in the WCPO from the Japanese pole-and-line fisheries. WCPFC-SC12-2016/SA-WP-05. 1-16.

Miyake, M.P. (1968) Distribution of skipjack in the Pacific Ocean, based on records of incident catches by the Japanese longline tuna fishery. *Bulletin (IATTC)*, 12: 511-539.

Table 1. Total skipjack catches (mt) between 1960 and 1971 from the WCPFC Yearbook, MAFFJ reports and the pre-logbook data. MAFFJ reported data was divided into three categories based on fisheries definition, and pre-logbook data was divided into three categories based on vessel size. Note that there are only combined PL data from 1960 to 1964 for the MAFFJ reports. Gray shaded cells represent that inconsistency between the WCPFC yearbook and MAFFJ.

Year	WCPFC Yearbook		MAFFJ				pre-logbook				
	PL	All PL	PLDW	PLOS	PLcoast	Total SKJ	<20grt	20-50	50-100	100-500	
1960	70,428	70,428	-	-	-	9,968	7	1,493	4,104	4,364	
1961	127,011	127,011	-	-	-	15,492	0	323	3,622	11,547	
1962	152,387	152,387	-	-	-	22,976	0	1,426	4,745	16,805	
1963	94,757	94,757	-	-	-	12,129	0	1,031	1,530	9,568	
1964	136,081	136,081	-	-	-	23,564	49	3,303	1,627	18,584	
1965	127,436	127,436	127,436	-	-	20,195	13	3,313	324	16,546	
1966	212,985	212,985	140,569	72,416	-	62,105	0	9,120	2,608	50,378	
1967	165,492	165,492	105,361	60,131	-	43,012	0	5,092	1,913	36,008	
1968	157,340	157,340	103,066	54,274	-	36,667	4	3,564	2,116	30,984	
1969	311,166	163,455	110,860	44,723	7,872	52,245	78	4,352	2,183	45,632	
1970	368,639	187,438	131,091	50,110	6,237	65,687	157	2,932	2,926	59,672	
1971	309,719	157,380	113,738	38,601	5,041	40,603	81	921	1,463	38,139	

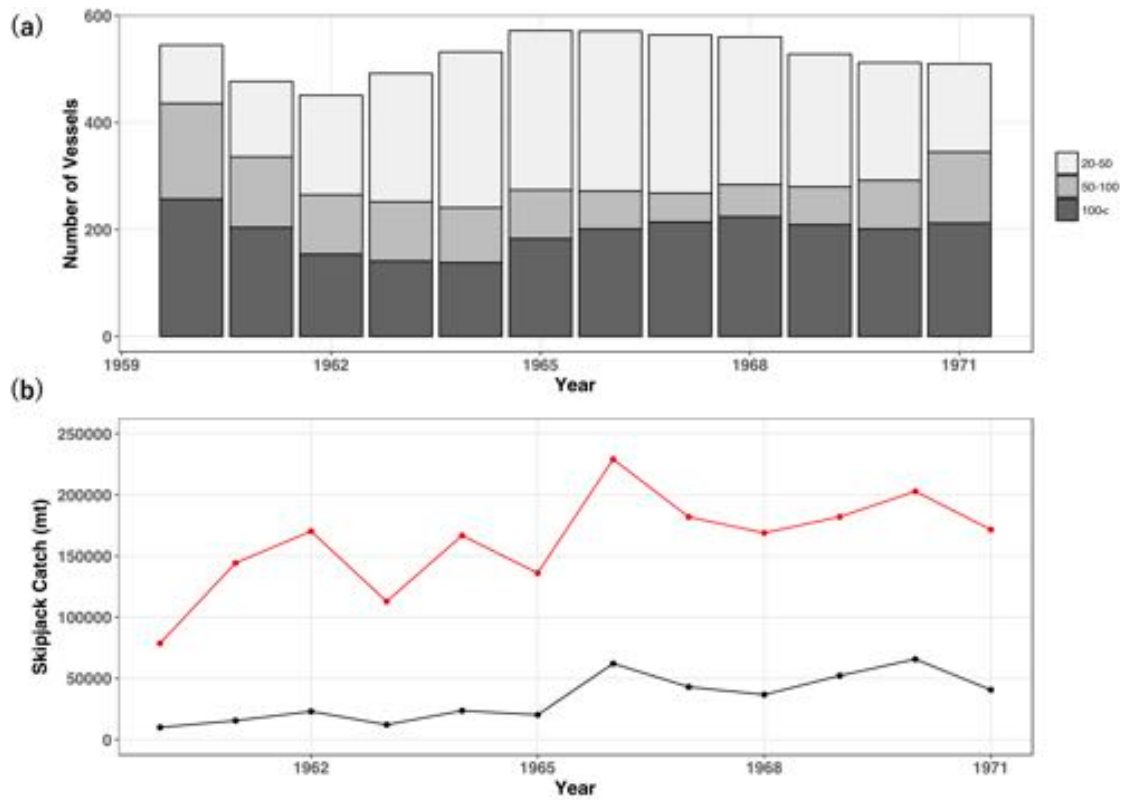


Figure 1. (a) Number of pole-and-line vessels from MAFFJ, and (b) Skipjack catch from 1960 to 1971 derived from MAFFJ (red) and pre-logbook (black).

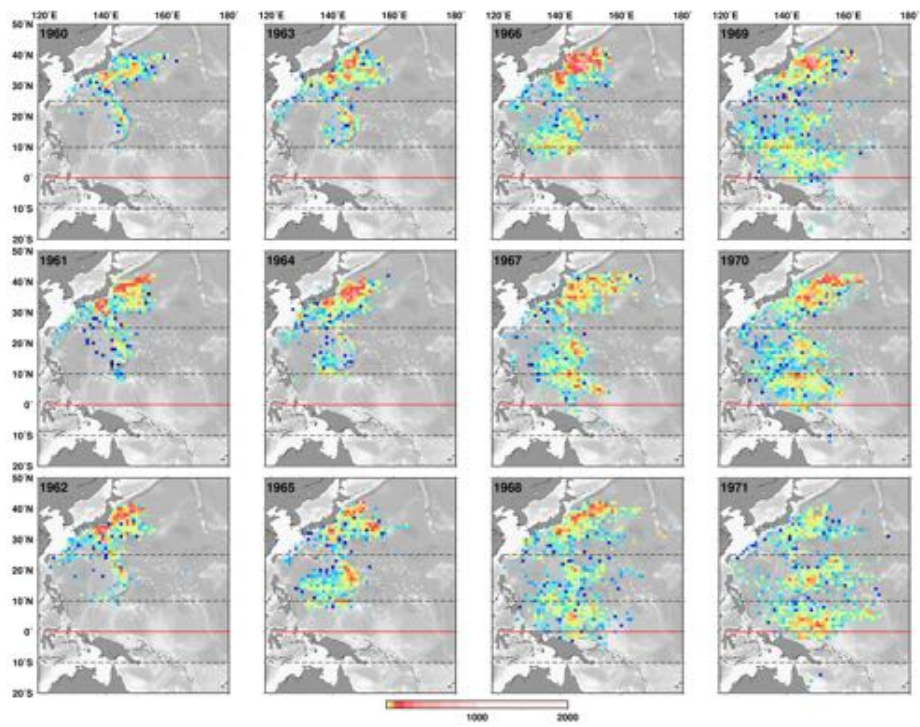


Figure 2. Fishing locations and skipjack catch aggregated by $1^\circ \times 1^\circ$ degree from 1960 to 1971 based on the pre-logbook data.

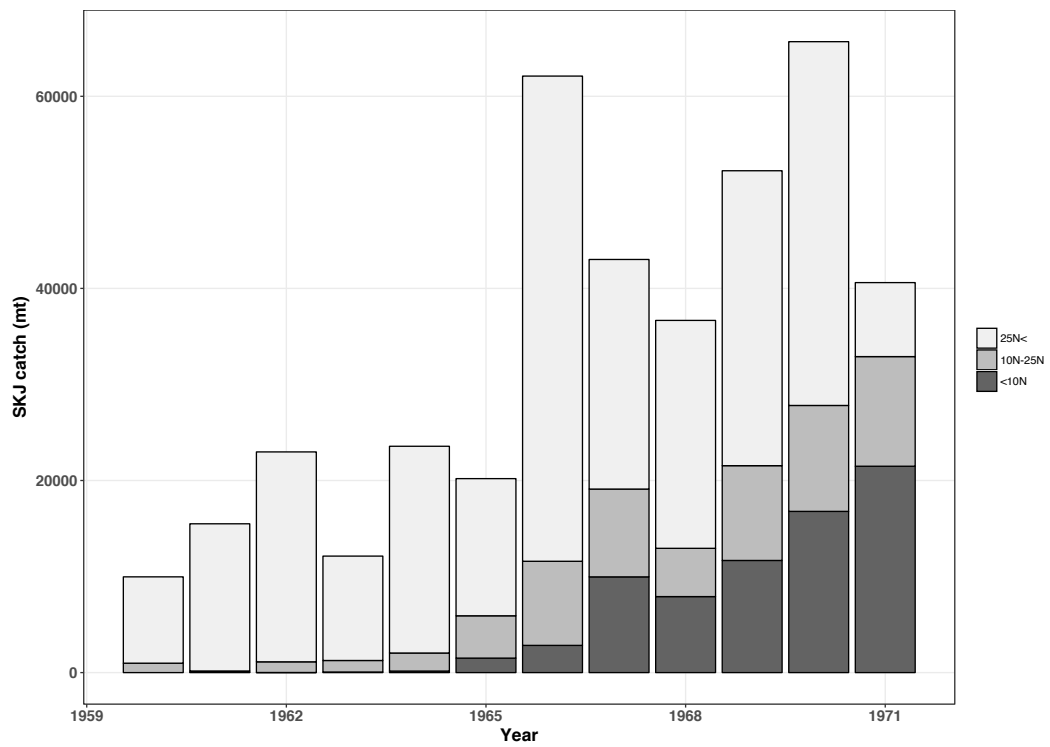


Figure 3. Skipjack catch in each area divided by latitude 10°N and 25°N derived from the pre-logbook data from 1960 to 1971.