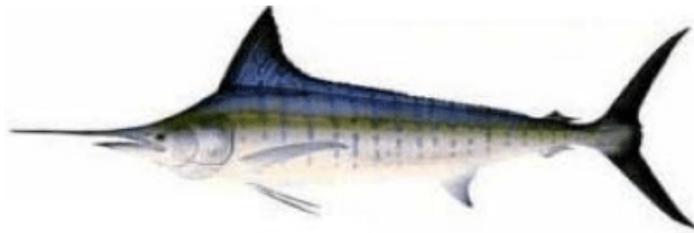


# Japanese catch statistics of Western Central North Pacific Striped Marlin (*Kajikia audax*).<sup>1</sup>

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## Abstract

This paper compiled Japanese catch data for use in the stock assessment for striped marlin in the Western and Central North Pacific Ocean. I used the yearbook and the logbook data to create catch data. Aggregation was done based on the fleet definition for Stock Synthesis 3. Japanese offshore and distant water longline catch amount decreased because the area of stock assessment was scaled down. In addition, some of the catch of the Japanese driftnet fleet before the moratorium needed to be excluded because the early period data included some catch from the South Pacific. The influence of the excluded catch on the stock assessment was considered to be important because the driftnet catches were relatively large and the average fish size was also relatively large.

## Introduction

ISC Billfish working group (BILLWG) have used stock synthesis 3 (SS3) for the stock assessment of striped marlin in the Western Central North Pacific Ocean (WCNPO) (ISC 2015). SS3 requires biological information and fishery data. Fishery data includes catch amount, standardized catch per unit effort (CPUE), and the length frequency data. The BILLWG will address a benchmark assessment. In this assessment, the evaluation area will change that boundary moves to 140W to 150W. Here, this paper compiled the catch data of Japan used in the SS3.

## Material and methods

### Data source

Japanese two catch statistics are the logbook and yearbook (Table.1). The logbook is available for longline and a driftnet fishery, and that data have high area resolution. From 1975 to 2017, the reporting rate of two longline logbooks (Offshore and Distant water) is 100%. Regarding coastal longline fishery, the logbook is available after 1994. However, the small-scale longline has no obligation to report, and the reporting rate is not 100%.

There is two longline logbook that area resolution is  $1^{\circ} \times 1^{\circ}$  and  $5^{\circ} \times 5^{\circ}$  degrees respectively. In both cases, the number of fish catches and the catch amount are described, but  $1^{\circ} \times 1^{\circ}$  grid data logs semi-dress weight, thus  $1^{\circ} \times 1^{\circ}$  grid data converted to the whole weight data ( $5^{\circ} \times 5^{\circ}$  grid data) and submitted to each RFMO. The accuracy of the longline logbook data varies with the period. For example, there is a possibility that catch amount data partially includes estimation values before 1994. Considering the accuracy problem of these data, I propose to use number base  $5^{\circ} \times 5^{\circ}$  grid data for the SS 3. Number base longline data was used the previous stock assessment as well (Yokawa, Kimoto, and Shiozak 2015). The period of the logbook of the driftnet is from 1978 to 1993. However, the reporting rate is not 100%. Therefore, The BILLWG need to use the yearbook.

The yearbook is available from 1975 to 2016. The yearbook is the Japanese official statistics based on weight and summarizes the amount of landing at each port. However, this data set does not contain detailed information such as catch date and location. Fisheries for striped marlins records on the yearbook are offshore and distant water longline, coastal longline, another longline, squid driftnet, driftnet, bait fishing, net fishing, and others. As for driftnet, striped marlin had been caught in the southern hemisphere before the moratorium in 1992. Thus I confirmed the official statistics submitted to WCPFC. WCPFC follows ISC statistics, but this data set has not removed catches in South Pacific. In the EPO, catch of striped marlin is also not described in the logbook.

## Make input catch data for SS3

The input data for the SS 3 was compiled by twelve longline fleet, 2 types of driftnet fleet, and other fisheries (Table.2). The longline fishery definition follows the analysis result of flexmix (Figure.1). Other fisheries include squid driftnet, bait fishing, net fishing, trap net, and other fishery. Driftnet fishery where the yearbook is the data source, other long lines, and other fisheries need to estimate catch by quarter. For driftnet, quarterly catch ratio was estimated by logbook data that catch number (Figure.2). I also calculate the ratio of North and South Pacific catch (Figure.3). Other longlines and other fisheries simply reduced the annual catch by a quarter. The yearbook data between 2016 is preliminary, and 2017 is not available. Thus, I carried over 2016 catch data to 2017.

## Result and discussion

Total catch decrease compared to the catch data of previous stock assessment because the catch of longline reduced. In the longline, the area of the stock assessment will shrink, and catches of striped marlin will fall over the whole period (Figure.4). Catches of driftnet before the moratorium (1992) have to decrease because the yearbook contained catches in the Southern Hemisphere. Because Japanese yearbook is a port landing statistics, there is no information on the fishing ground. Thus, it is necessary to exclude catches other than WCNPO for driftnet and longline. However, it is difficult to divide driftnet catches in South Pacific. On the other hand, it is not necessary to consider the operating position because the other fishery operates in the EEZ of Japan. It was confirmed that striped marlin catches by the Japanese longline are high variated depending on the year and season (Figure.5). Although there may be such a tendency in driftnet and other fishery, because there is no information at present, the accuracy of the catch amount data for each quarter is lower than the longline. Thus, because there is a difference in the accuracy of catch data for each fleet, it may be necessary to reflect the accuracy of the catch to the setting of SS3.

## Summary and suggestions

This paper compiled the Japanese catch data input to the SS3. The points to pay attention to are as follows.

- The yearbook data of the driftnet has to use for the SS3 because the reporting rate of logbook was not 100%. However, the yearbook data that was summarized before the moratorium includes data of the Southern Hemisphere.
- The yearbook data of 2016 are preliminary, and data of 2017 is not available. Catch of 2016 carried over to 2017.
- Japanese longline fleet definition follows flexmix analysis result and uses the number of the catch from logbook data that accuracy is high.
- To estimate quarterly catch, driftnet catch from the yearbook multiplied by seasonal catch ratio calculated from the logbook.

## References

- ISC (2015). Stock assessment update for striped marlin (*kajika audax*) in the western and central north pacific ocean through 2013.

Yokawa, K., A. Kimoto, and K. Shiozak (2015). Abundance indices of albacore caught by Japanese longline vessels in the north Pacific during 1976-2015. *ISC/15/BILLWG-1/11*.

Table 1: Data source of Japanese catch statistics.

Data source	Fishery	Unit	Resolution	Period
Logbook <sup>1</sup> (5x5)	Offshore and	mt, n	Area, Year, Month	mt (1971-1993, 1994-2017)
	Distant water LL			n (1952-1993, 1994-2017)
	Coastal LL <sup>2</sup>	mt, n	Area, Year, Month	1994-2017
	Drift net <sup>3</sup>	mt, n	Area, Year, Month	1978-1993
Yearbook	Offshore and	mt	Year	1951-2016 <sup>5</sup>
	Distant water LL			
	Coastal LL	mt	Year	1951-2016 <sup>5</sup>
	Other LL	mt	Year	1951-2016 <sup>5</sup>
	Squid driftnet	mt	Year	1951-2016 <sup>5</sup>
	Driftnet <sup>4</sup>	mt	Year	1951-2016 <sup>5</sup>
	Bait fishing	mt	Year	1951-2016 <sup>5</sup>
	Net fishing	mt	Year	1951-2016 <sup>5</sup>
	Trap net	mt	Year	1951-2016 <sup>5</sup>
	Others	mt	Year	1951-2016 <sup>5</sup>

Table 2: Summary of Japanese catch data for stock synthesis 3.

No	Fleet name	Unit	Data source	Resolution	Period
1	JPNLL qt1 area1	Number	Logbook	Quarter	1975-2017
2	JPNLL qt1 area2	Number	Logbook	Quarter	1975-2017
3	JPNLL qt1 area3	Number	Logbook	Quarter	1975-2017
4	JPNLL qt1 area4	Number	Logbook	Quarter	1975-2017
5	JPNLL qt2 area1	Number	Logbook	Quarter	1975-2017
6	JPNLL qt2 area2	Number	Logbook	Quarter	1975-2017
7	JPNLL qt3 area1	Number	Logbook	Quarter	1975-2017
8	JPNLL qt3 area2	Number	Logbook	Quarter	1975-2017
9	JPNLL qt4 area1	Number	Logbook	Quarter	1975-2017
10	JPNLL qt4 area2	Number	Logbook	Quarter	1975-2017
11	JPNLL qt4 area3	Number	Logbook	Quarter	1975-2017
12	JPNLL other <sup>6</sup>	Weight	Yearbook	Year <sup>8</sup>	1975-2017
13	JPNDF qt14	Weight	Yearbook	Year <sup>9</sup>	1975-2017
14	JPNDF qt23	Weight	Yearbook	Year <sup>9</sup>	1975-2017
15	JPN others <sup>7</sup>	Weight	Year book	Year <sup>8</sup>	1975-2017

<sup>1</sup>5x5 logbook is made by 1x1 logbook that semi-dress weight convert to whole weight.

<sup>2</sup>It was not include small-scale longline catch.

<sup>3</sup>Reporting rate is not 100%.

<sup>4</sup>South hemisphere catch was included.

<sup>5</sup>2016 data is preliminary and it is not available 2017. Thus, 2016 catch data carried over to 2017.

<sup>6</sup>JPNLL other = Coastal LL(yearbook)+ Other LL(yearbook) - Coastal LL(Logbook)

<sup>7</sup>JPN others include Bait fishing, Net fishing, Squid drift net, Trap net, and Others.

<sup>8</sup>The quarter catch is used by annual catch divides four.

<sup>9</sup>The quarterly catch rate from logbook data is available.

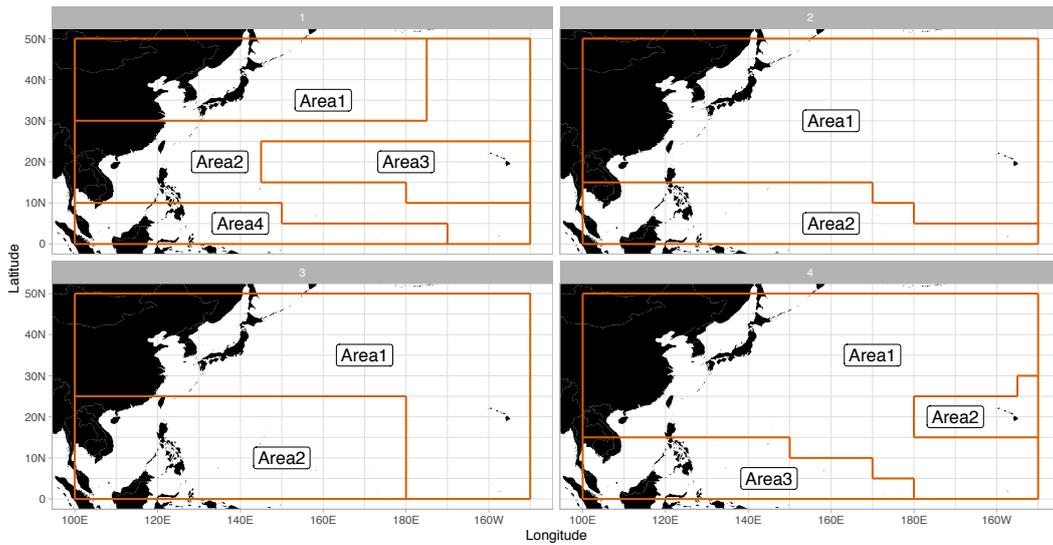


Figure 1: Area-seasonal fleet definition of Japanese longline fishery that was defined by finite mixture model analysis.

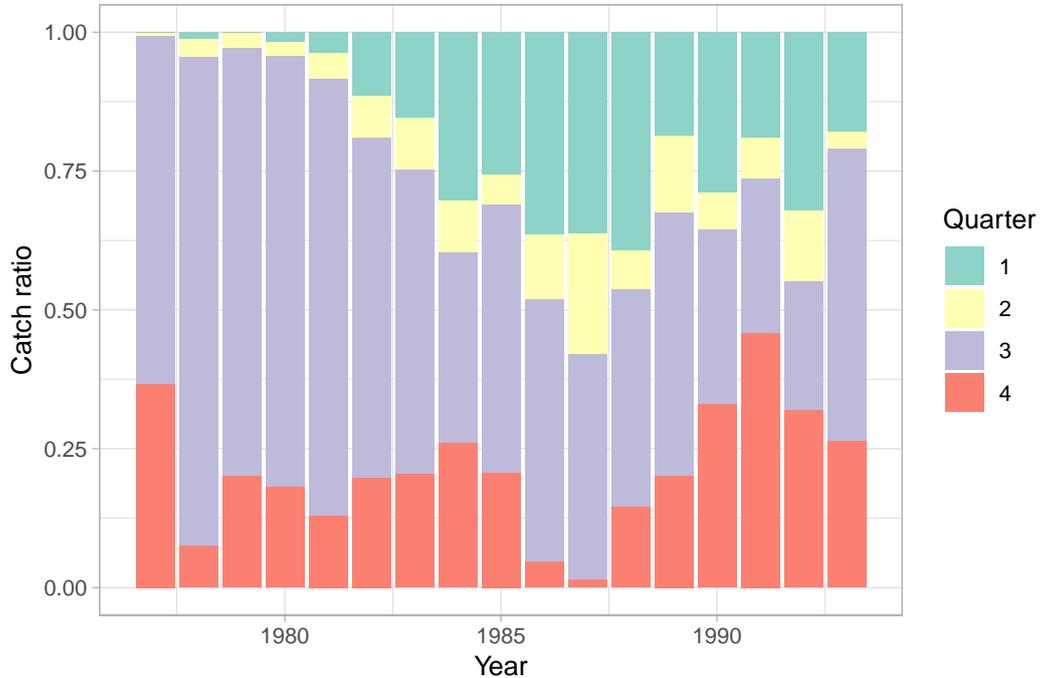


Figure 2: The seasonal catch rate of Japanese offshore drift net calculated by logbook data (1977-1993\*). \*Since 1993, Japanese driftnet fishery has been operated inside of Japanese EEZ because of the moratorium.

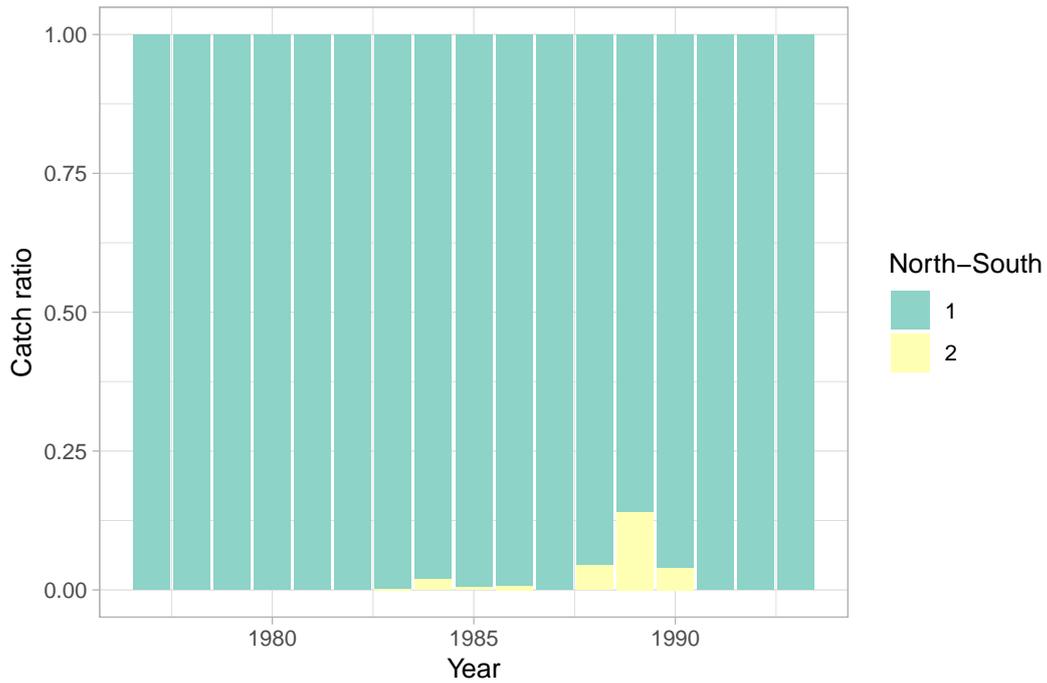


Figure 3: Catch ratio of driftnet fishery from logbook data. 1: North Pacific. 2: South Pacific. The reporting rate of logbook of driftnet fishery is very low.

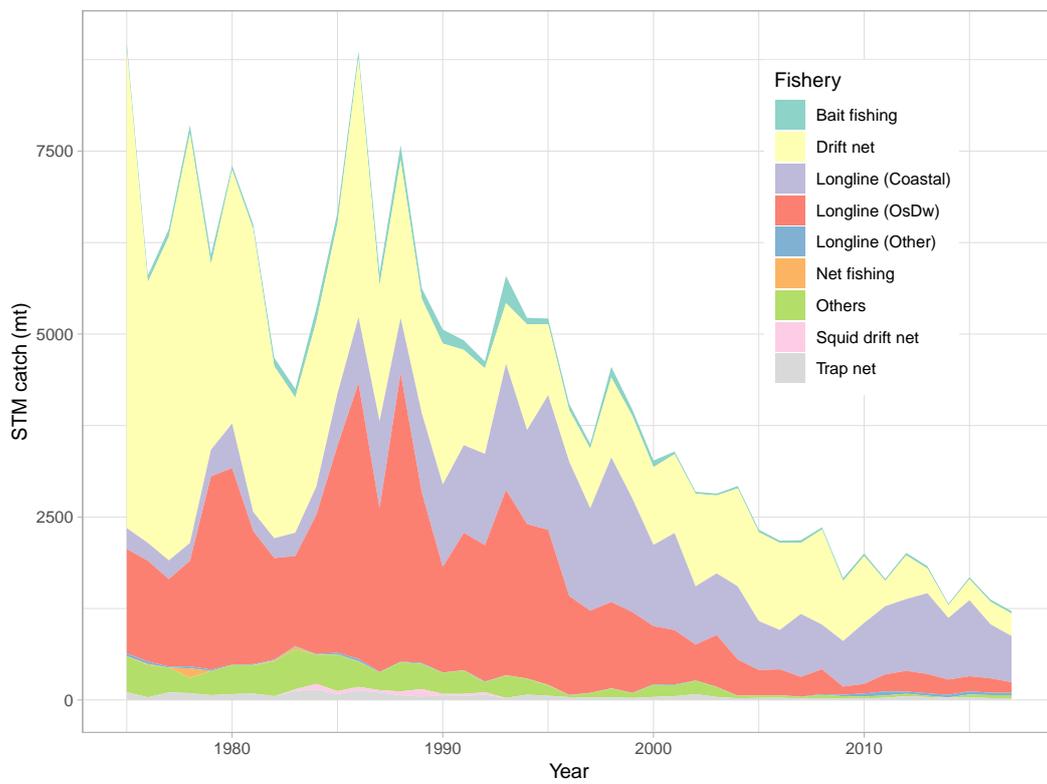


Figure 4: Total catch weight of the striped marlin in the WCNPO caught by Japanese fishery (1975-2017).

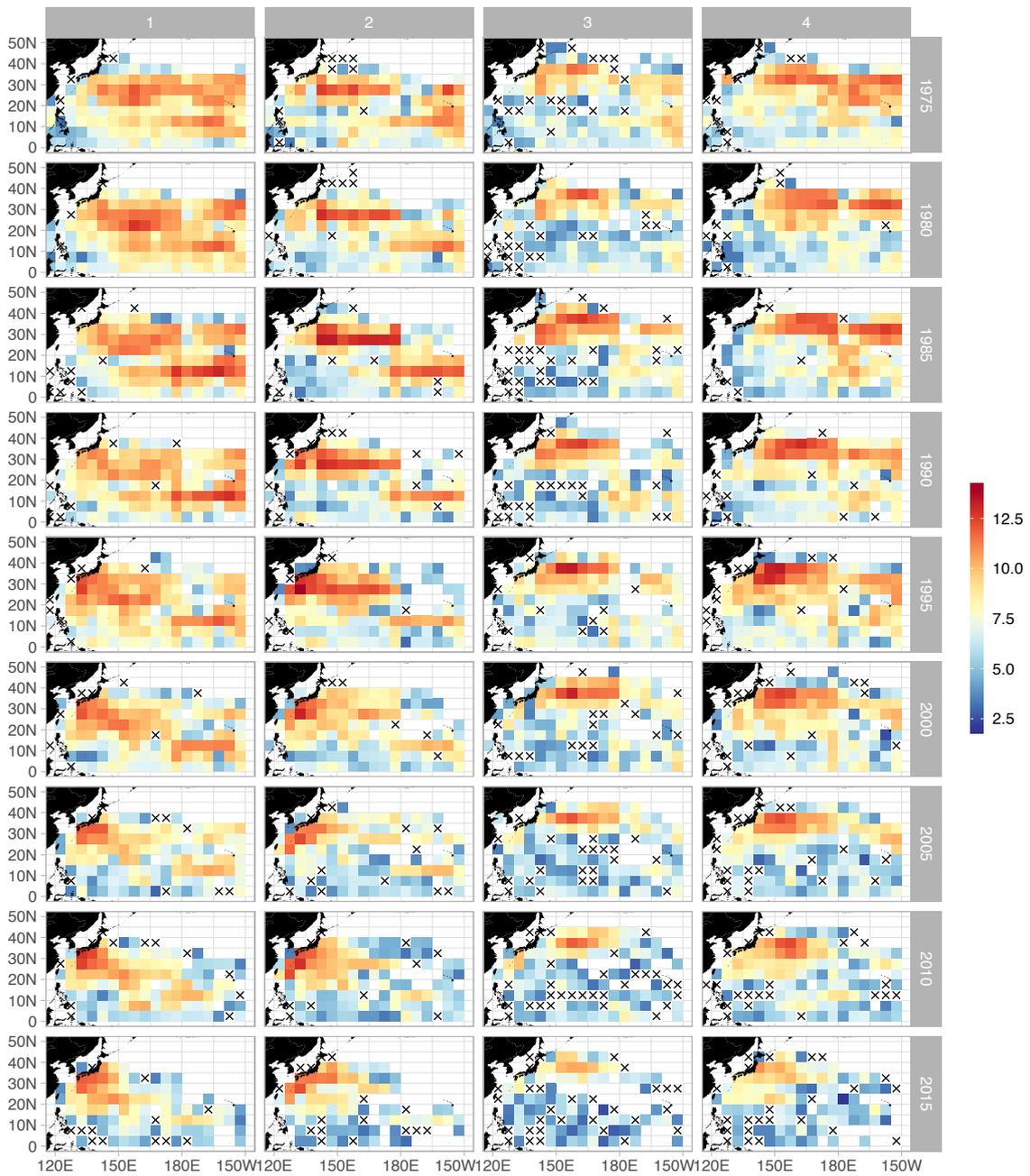


Figure 5: Time spatial trends of Japanese longline summarized by logbook data (log scale).