



North Pacific Fisheries Commission

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Information Paper submitted by Japan

Japan Blue Mackerel Stock Assessment

Abstract

Japan is sharing four domestic stock assessments - blue mackerel (IP03), chub mackerel (IP04), Japanese flying squid (IP05), and Japanese sardine (IP06) for information sharing purpose.



Blue mackerel (Pacific stock)

Blue mackerel are widely distributed around Japan, and this stock is the group distributed in the Pacific Ocean. A fishing year starting from July and ending in June of the following year is applied to the stock assessment.

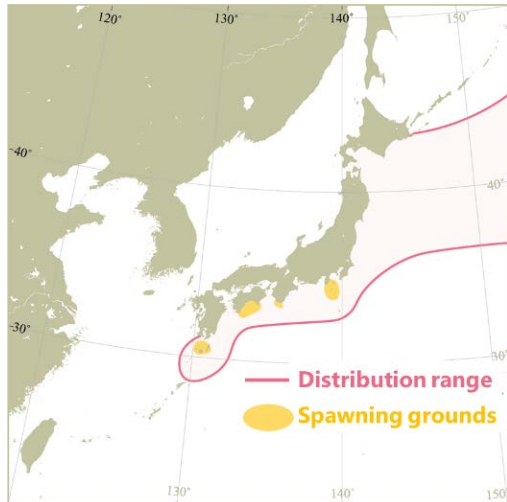


Figure 1 Distribution

The center of distribution is on the Pacific side of Japan. Spawning grounds are formed in the area around the Kuroshio Current on the southern coast of Japan.

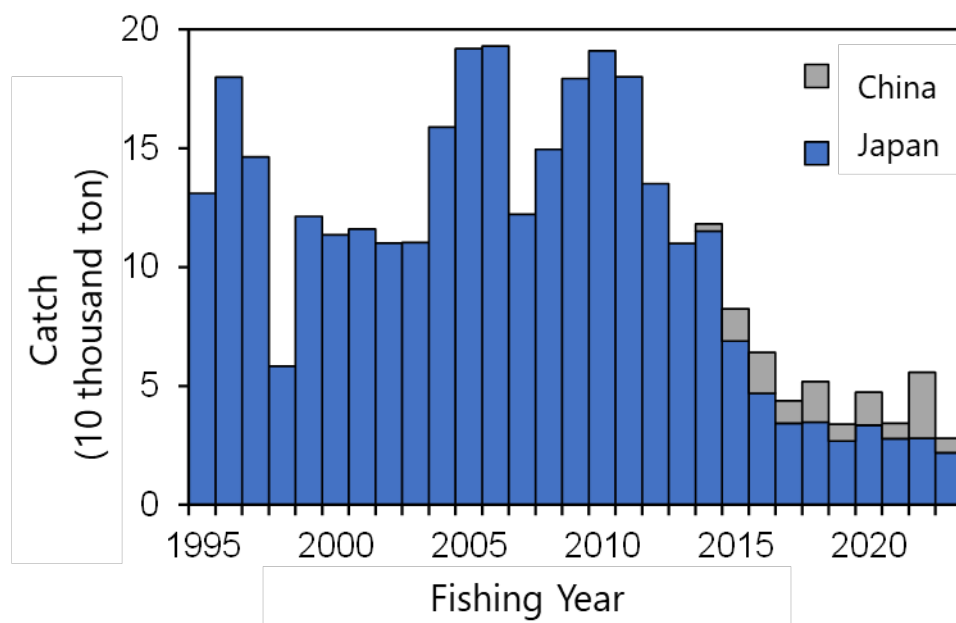


Figure 2 Total catch

Japanese catch remained at a high level during the 2005–2011 fishing years, but showed a downward trend after the 2011 fishing year, recording 22 thousand tons in the 2023 fishing year. Chinese catch in the terminal was 6 thousand tons. Catch from China has been included since 2014.

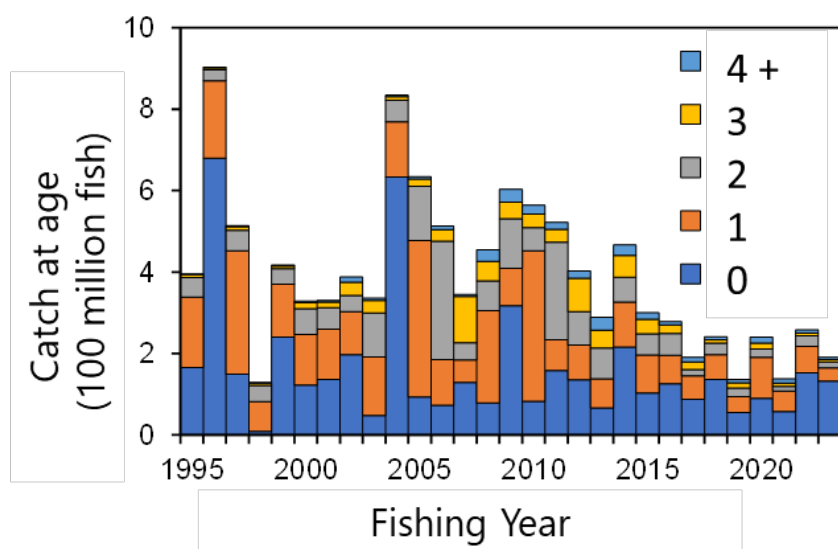


Figure 3 Catch at age

Despite the yearly fluctuation of age composition, the majority consists of ages 1 and 2 fish. In addition, larger catches were observed in the 1996, 2004 and 2009 fishing years, when strong year classes occurred, and subsequent age 1 fish catches were prominent in the following years.

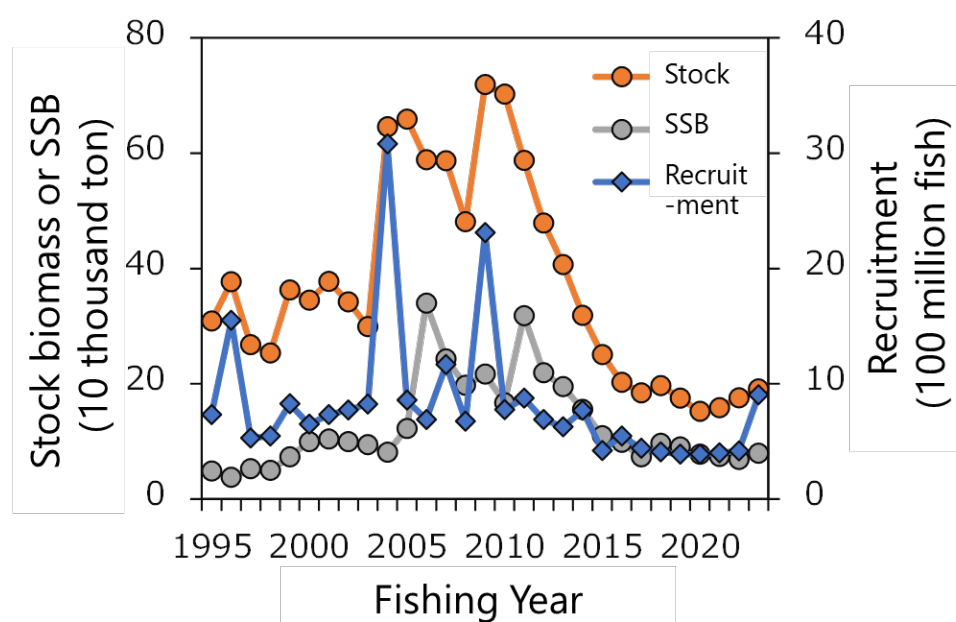


Figure 4 Trends in stock biomass, spawning stock biomass (SSB), and recruitment

The abundance of stock biomass remained high during the 2004–2011 fishing years, but declined sharply after the 2011 fishing year, recording 191 thousand tons in the 2023 fishing year. SSB showed a similar trend as the stock biomass, with a decreasing trend over the most recent five years (2019–2023 fishing years), and was 79 thousand tons in the 2023 fishing year. Recruitment (number at age 0) was relatively stable except for high values in the 1996, 2004, and 2009 fishing years, but has been low since the 2015 fishing year. In the 2023 fishing year, recruitment showed relatively higher value than that in recent years.

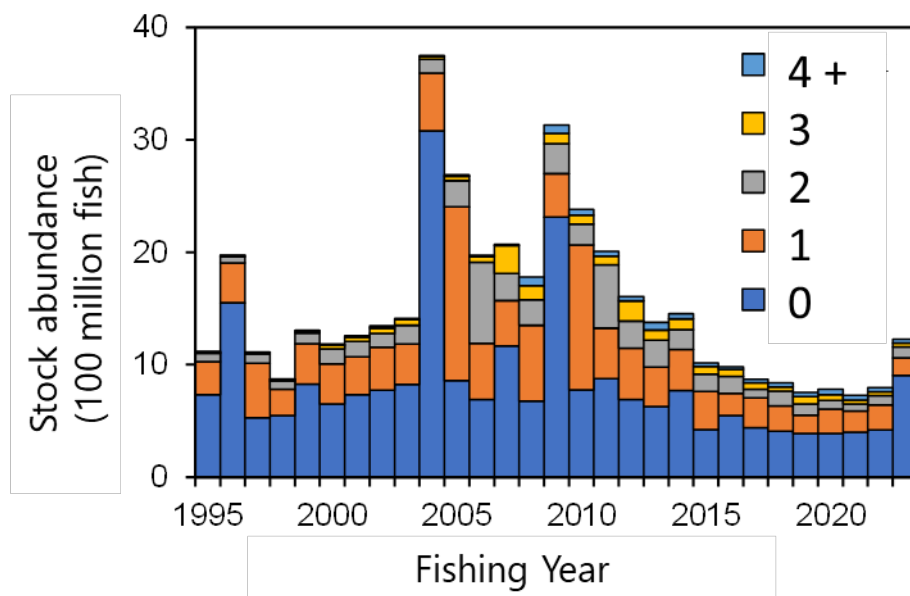


Figure 5 Numbers at age

The age composition of the stock, in terms of fish number, consists mainly of ages 0 (blue) and age 1 (orange) fish, with a small proportion of age 2 or older fish.

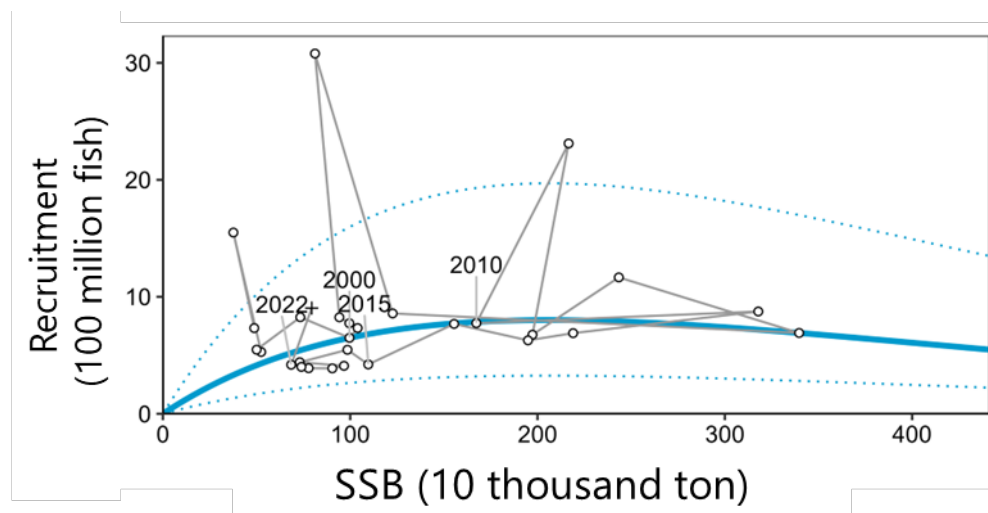


Figure 6 Spawning biomass-recruitment biomass

Ricker model (blue bold line) was applied to stock–recruitment relationship (white circles) for the 1995–2022 fishing years. The blue dotted line in the figure is the range estimated to contain 90% of the observed SSB and recruitment. The cross in the figure represents SSB and recruitment for the 2023 fishing year.

Table 1 Reference points, estimated values and total catch

In 2023 fishing year (FY), the target reference point (TRP) was estimated at 167 thousand tons, and the limit reference point (LRP) at 54 thousand tons. The fishing ban level was estimated at 7 thousand tons. Spawning stock biomass (SSB) was estimated at 79 thousand tons, and the maximum sustainable yield (MSY) at 72 thousand tons. The total catch in 2023 FY was 31 thousand tons.

TRP	LRP	Ban level	SSB in 2023	MSY	Total catch in 2023 FY
167 thousand t	54 thousand t	7 thousand t	79 thousand t	72 thousand t	31 thousand t

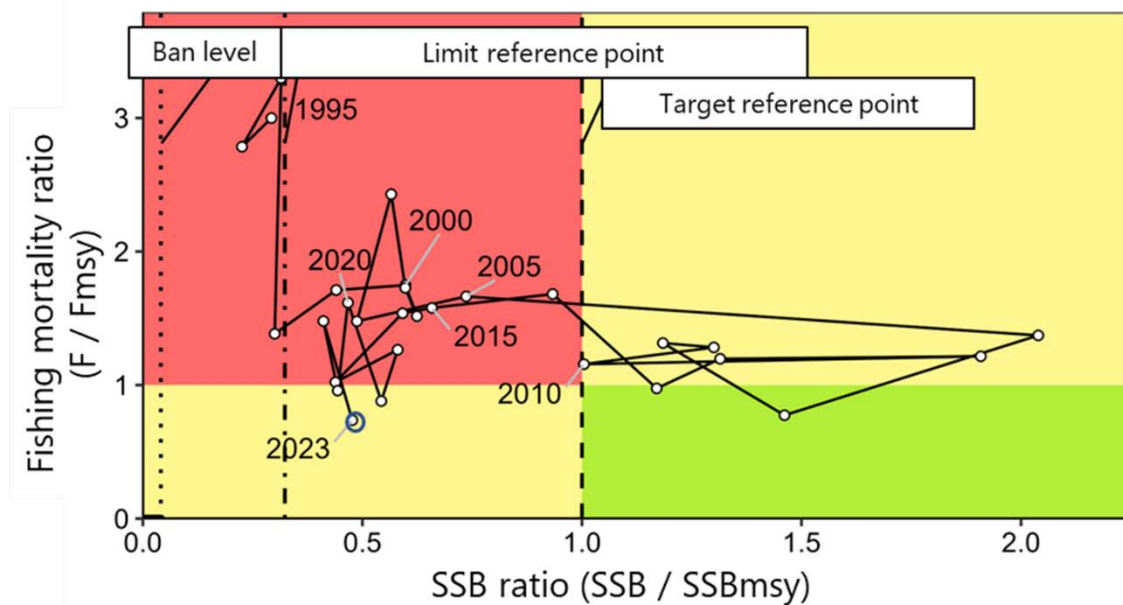


Figure 8 Kobe plot

The SSB was above the SSB that would achieve maximum sustainable yield (SSB_{msy}) in the 2006–2013 fishing years, but below prior to the 2005 fishing year and after the 2015 fishing year. Fishing mortality (F) was below F_{msy}, corresponding to the fishing mortality to sustain SSB_{msy}, in the 2007, 2013, 2019, 2021, and 2023 fishing years, but above in other years.