



North Pacific Fisheries Commission

NPFC-2026-COM10-IP06

Submitted by Japan

Japanese Sardine 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.

Japanese sardine (Pacific stock)

Japanese sardine is widely distributed around Japan, and this stock is the group that is distributed in the Pacific Ocean.

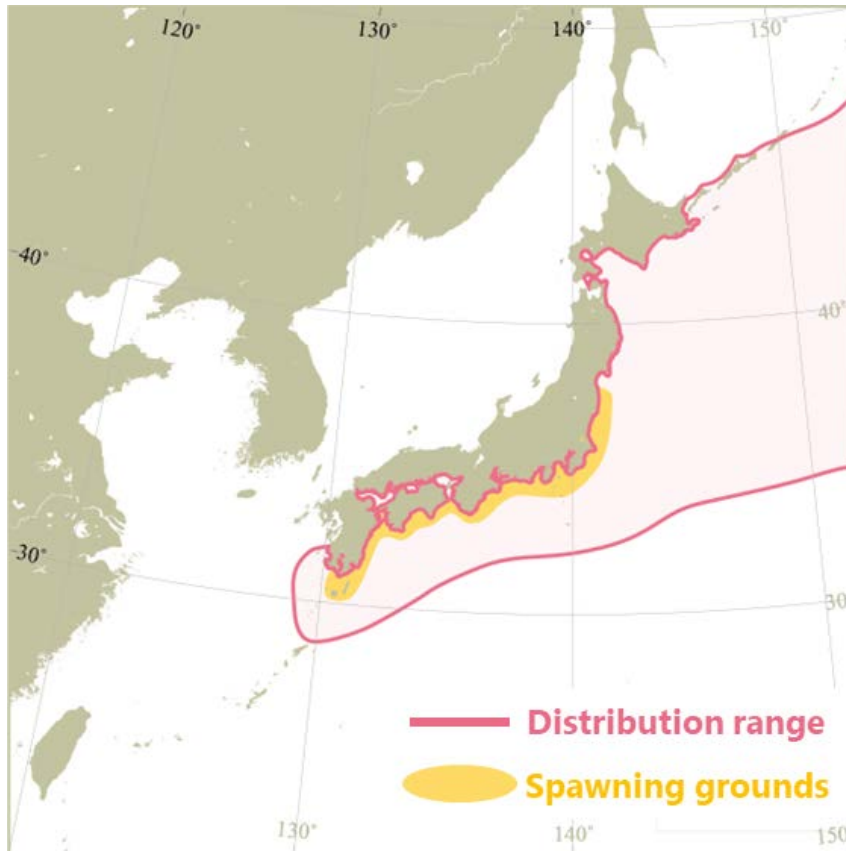


Figure 1 Distribution

Japanese sardine is distributed widely along the Pacific coast of Japan. Since the 1990s, spawning grounds have been formed in the inner Kuroshio region in various areas from off Shikoku Island to the Kanto area.

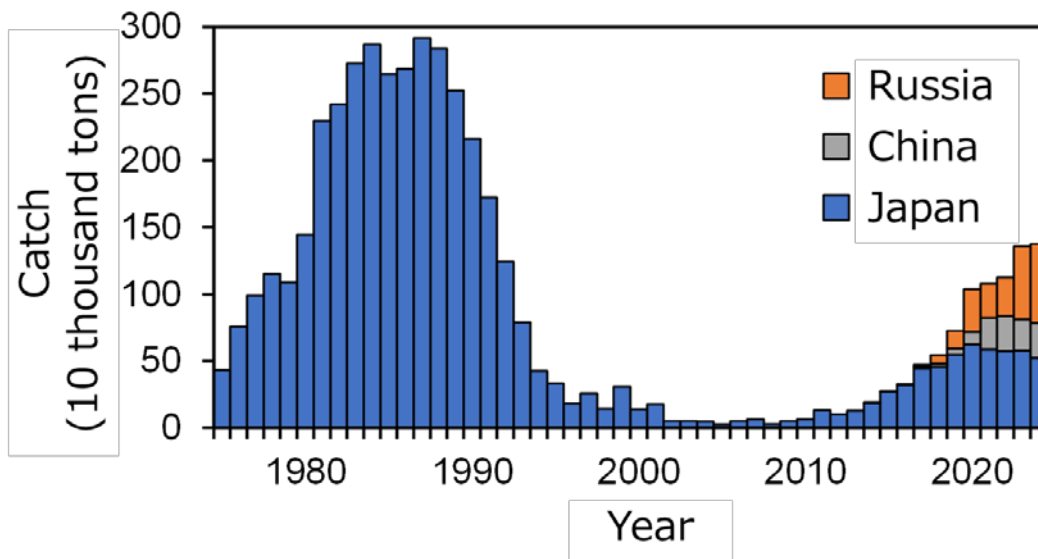


Figure 2 Total catch

The total catch increased in the late 1970s and remained at a high level of over 2.5 million tons in the 1980s; it declined sharply in the 1990s and remained at a low level in the 2000s; it turned upward in the 2010s, with Japan's catch reaching 522 thousand tons in 2024. In recent years, catches by foreign vessels have been increasing, with Chinese and Russian catches of 261 thousand and 593 thousand tons, respectively, in 2024. The total catch in 2024 was 1,376 thousand tons. Catch data from China and Russia have been included since 2017 and 2014, respectively.

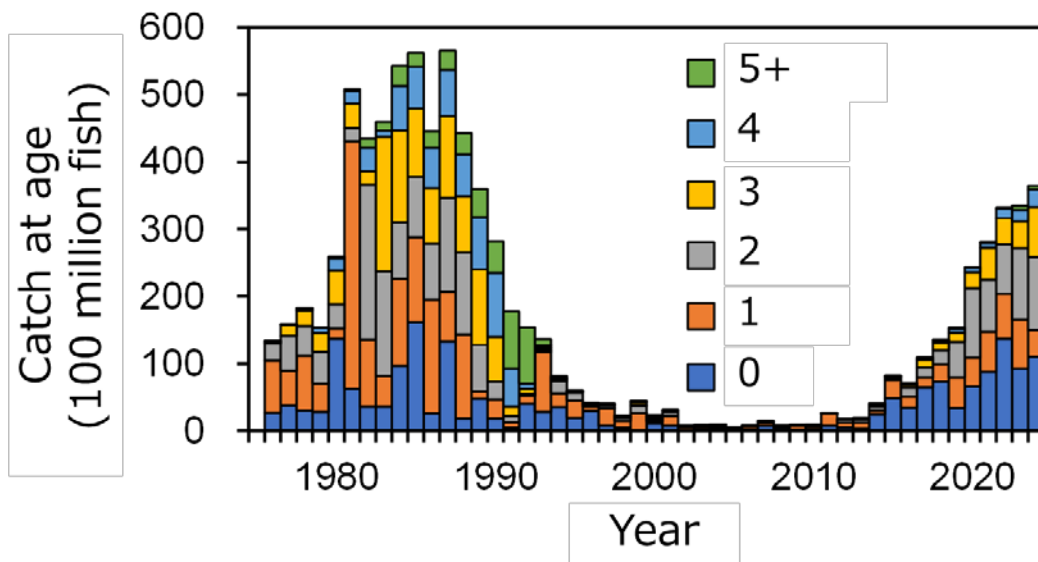


Figure 3 Catch at age

The majority were age-0 and age-1 fish, but the proportion of fish aged 2 and older has increased since 2016. Chinese catch-at-length data were also used in the input data preparation.

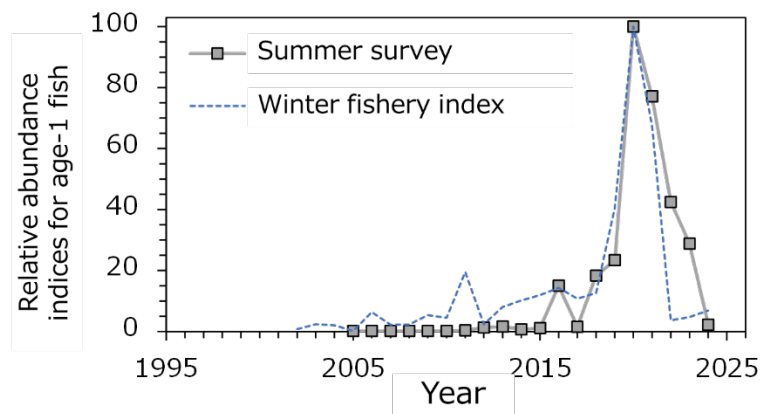
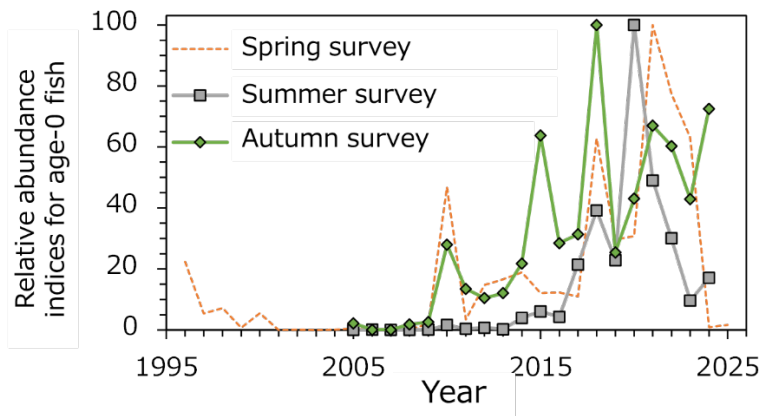
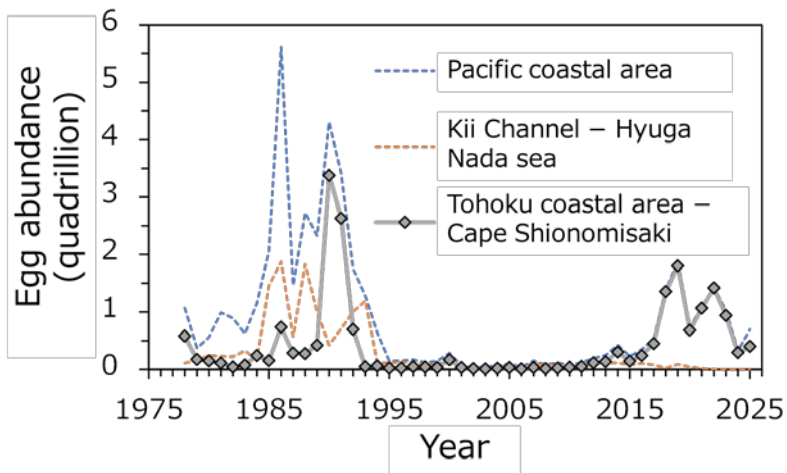


Figure 4 Abundance indices

Egg abundances (top panel), regarded as a spawning stock biomass index, were at a low level in the early 2000s. In recent years, egg abundance has increased, reflecting the increase in spawning stock biomass, and the increase is particularly noticeable in East Japan. All abundance indices for recruitment (age 0, middle panel) and age 1 (bottom panel) fish from summer and autumn surveys show relatively high values for the 2010 year class and subsequent year classes in recent years.

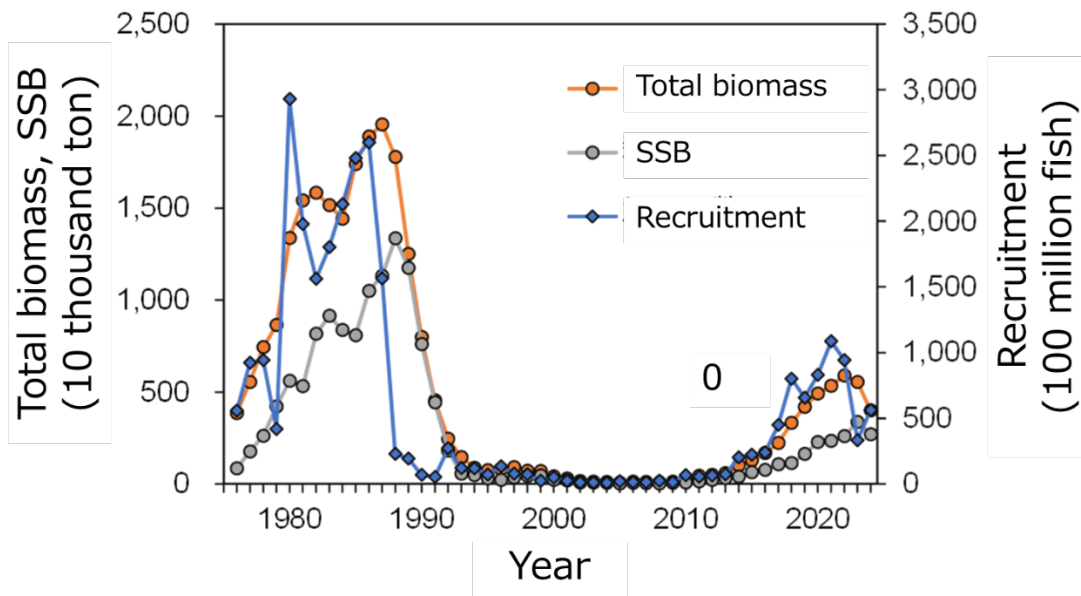


Figure 5 Trends in total biomass, spawning stock biomass (SSB), and recruitment. Total biomass showed increasing trend since 2009, exceeding 5 million tons in 2021. Subsequently, it declined after 2021 in parallel with decrease in recruitment and was estimated to be 3,998 thousand tons in 2024. Although SSB was increased since 2009 and exceed 2 million tons in 2000, it, then, ranged between 2 million and 3 million tons and was 2,699 thousand tons. Recruitment (numbers at age-0) remained at higher level in last decade but showed decreasing trend since 2022. It was estimated to be 56,400 million fish for 2024.

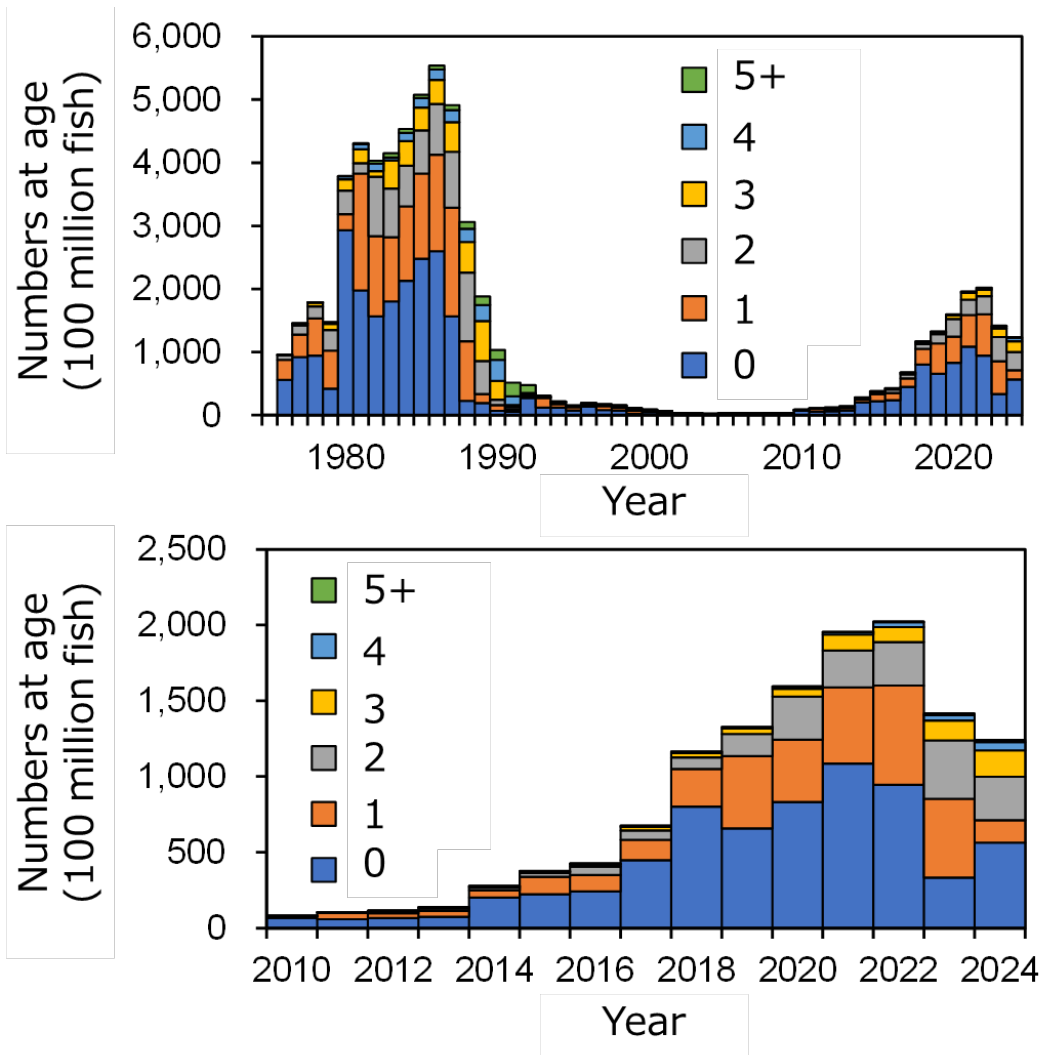


Figure 6 Numbers at age in whole stock assessment period (upper panel) and last 15 years (lower panel)
 Fish at ages 0 and 1 dominated the population throughout the time series, while the proportion of fish ages 2 and older has increased in recent years.

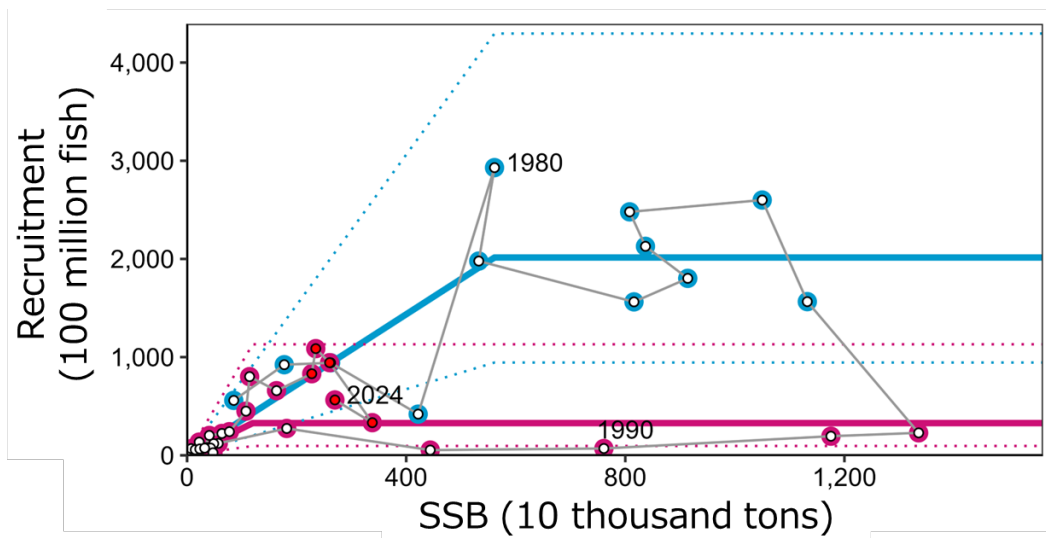


Figure 7 Stock–recruitment relationship (red line: ordinary productivity period; blue line: high productivity period)

A hockey-stick type stock-recruitment relationship was applied to two different stock productivity periods as follows: a high productivity period, 1976-1987 (blue line), and an ordinary productivity period, 1988-2024 (red line). The blue and red dotted lines indicate ranges that include 90% of observed recruitment and SSB for each productivity period. Red and blue circles indicate observed values of recruitment and SSB, which were used for estimating the stock-recruitment relationship in the 2025 stock assessment. Red circles with outer black circles show observed recruitment and SSB for the last five years (2000–2024).

*Reference points were estimated with stock–recruitment relationships for the ordinary productivity period.

Table 1 Reference points, estimated values and total catch

Maximum sustainable yield (MSY) was estimated at 470 thousand tons. SSB achieving MSY (SSB_{msy}) was estimated at 1,432 thousand tons, applied as the proposed target reference point (TRP). The proposed limit reference point (LRP), corresponding to the SSB yielding 10% of MSY, was estimated at 530 thousand tons. The proposed fishery closure threshold (SSB_{ban}) was estimated at 53 thousand tons. SSB in 2024 was estimated at 2,699 thousand tons. The total catch in 2024 was 1,376 thousand tons.

Proposed TRP	Proposed LRP	Proposed SSB _{ban}	SSB in 2024	MSY	Total catch in 2024
1,432 thousand tons	530 thousand tons	53 thousand tons	2,699 thousand tons	470 thousand tons	1,376 thousand tons

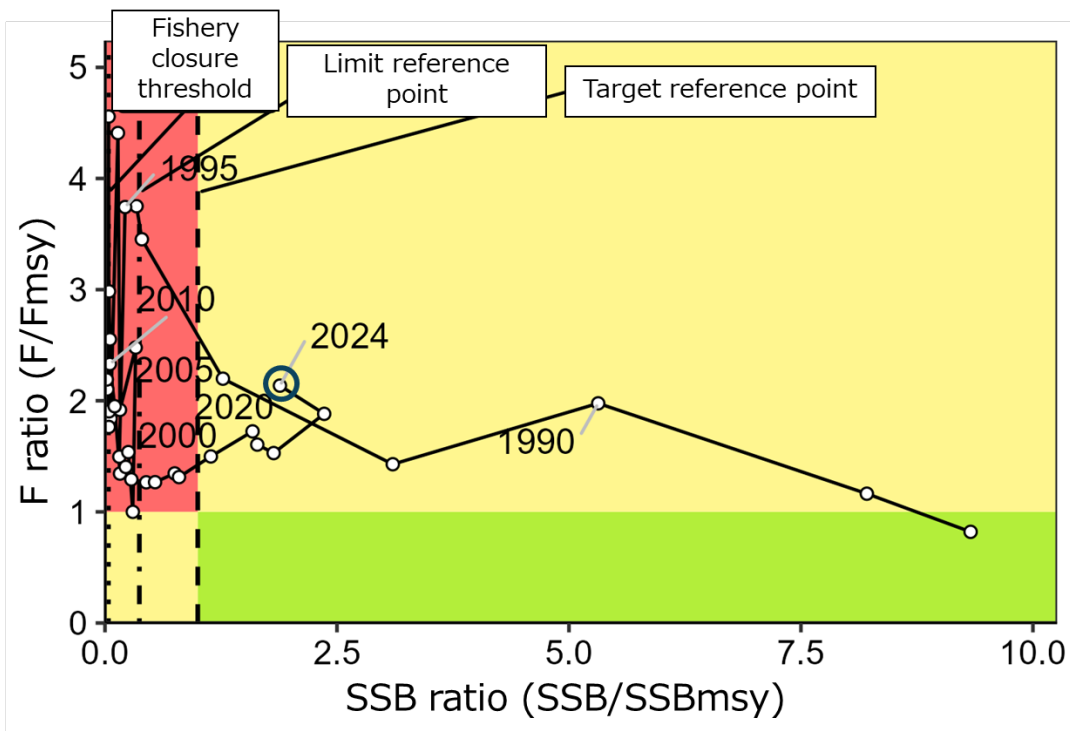


Figure 8 Kobe plot

Since 1988, in many years SSB has been below SSB_{msy} and fishing mortality (F) has been above the fishing mortality that maintains SSB_{msy} (F_{msy}). In recent years, SSB and fishing mortality have shown an increasing trend, corresponding to 1.89 SSB_{msy} and 2.14 F_{msy}, respectively, in 2024.

*Reference points from the ordinary productivity period (1988–2024) were applied.