Japanese-type marine protected areas (MPAs) and their contributions to biodiversity and fisheries in Tosa Bay, southern Japan

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Outline

- **Background**
- **Fisheries Management Measures in Tosa Bay**
- **Contribution to Fisheries Resources**
- **Contribution to Biodiversity**
- **Conclusion and Future Issues**

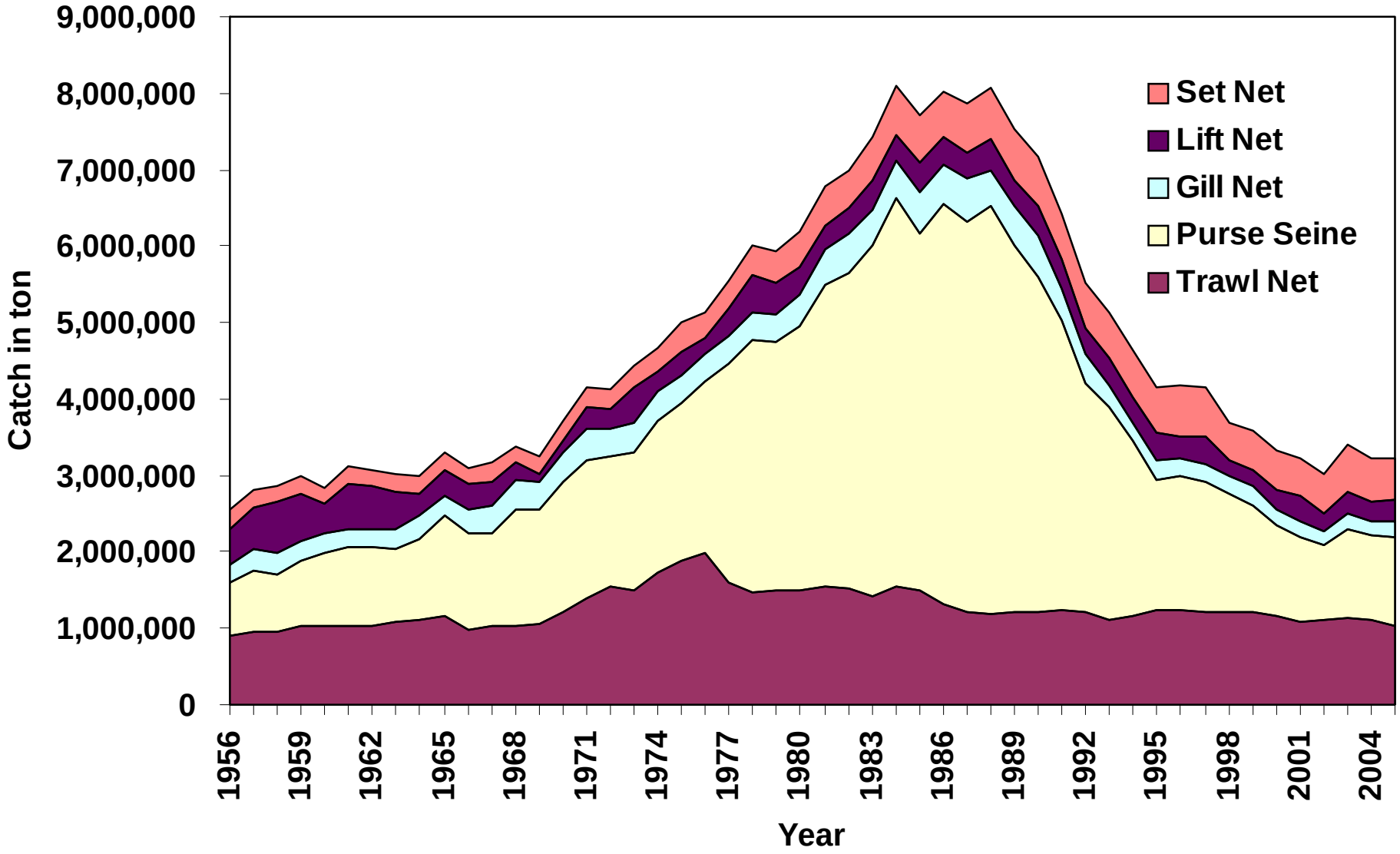
Background

- Marine Protected Areas (MPAs) have been of global interest in recent years, partly due to the failure of the traditional fisheries managements.

- Even in Japan, various fisheries management measures are taken in many locations and some of these measures are considered as MPAs.

- However, their contribution to fisheries resource conservation and maintenance of biodiversity are not well reported.

Catch by Fisheries



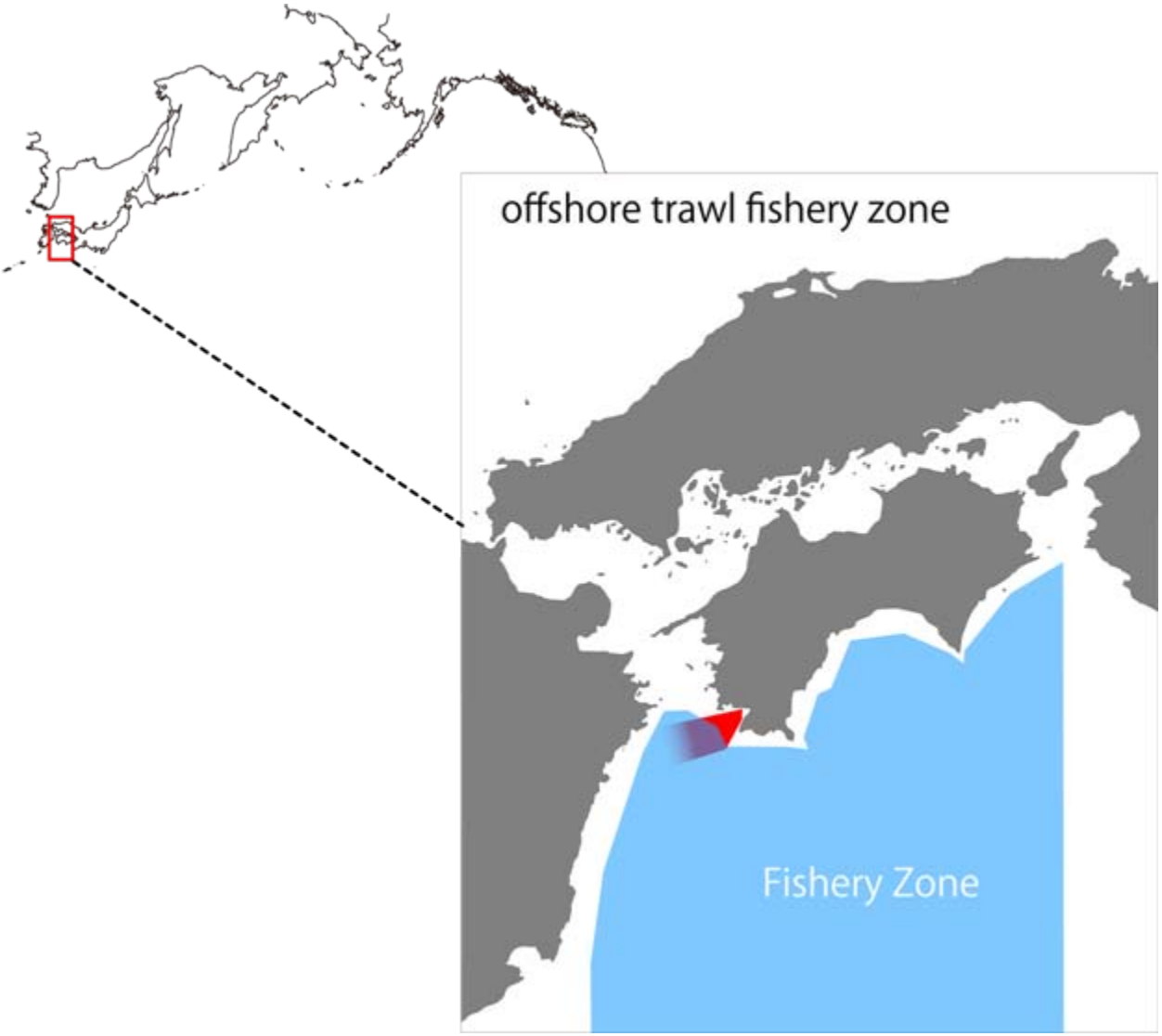
Catch by Fisheries

- Catch by purse seine fisheries comprise about 50%, followed by trawl net fisheries about 30% and set net fisheries about 10%.

- So, fisheries management measures for the purse seine and trawl net fisheries are important and already taken in Japan including Tosa Bay in Kochi Prefecture.

- **Fisheries Management Measures in Tosa Bay**

Fishing Area for Purse Seine and Offshore Trawl Net Fisheries



Purse Seine

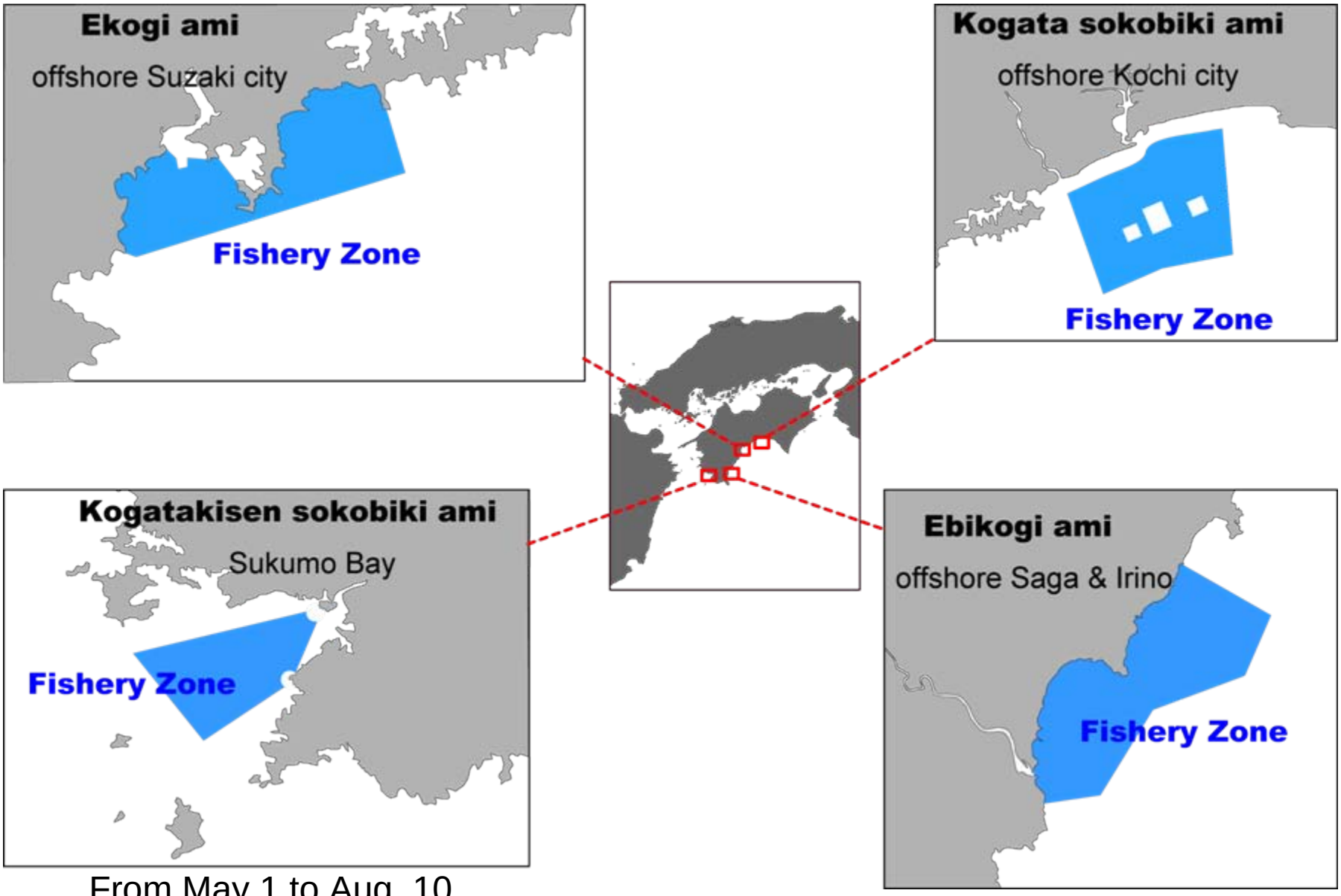
Offshore Trawl

Fishing Season

from Oct.1 to April 30

There are other specific fishing area and fishing season regulation within the fishery zone.

Fishing Area for Coastal Trawl Net Fisheries



From May 1 to Aug. 10

From Sept. 1 to Dec. 20

From April 1 to Dec. 31

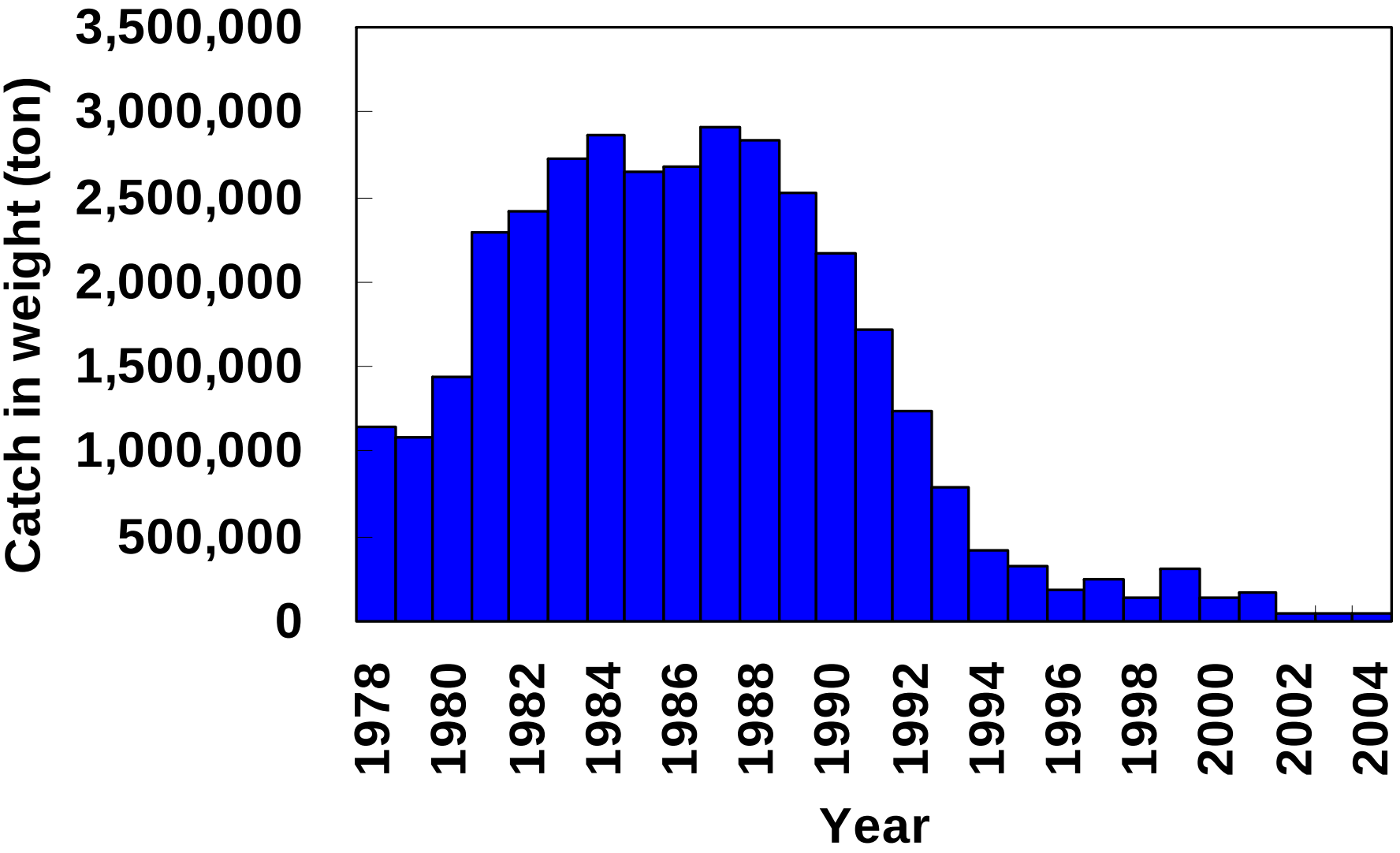
Management Measures for Purse Seine and Trawl Fisheries

- Purse seine fisheries are limited in Sukumo Bay based on fisheries coordination to avoid conflicts with set net and other coastal fisheries.

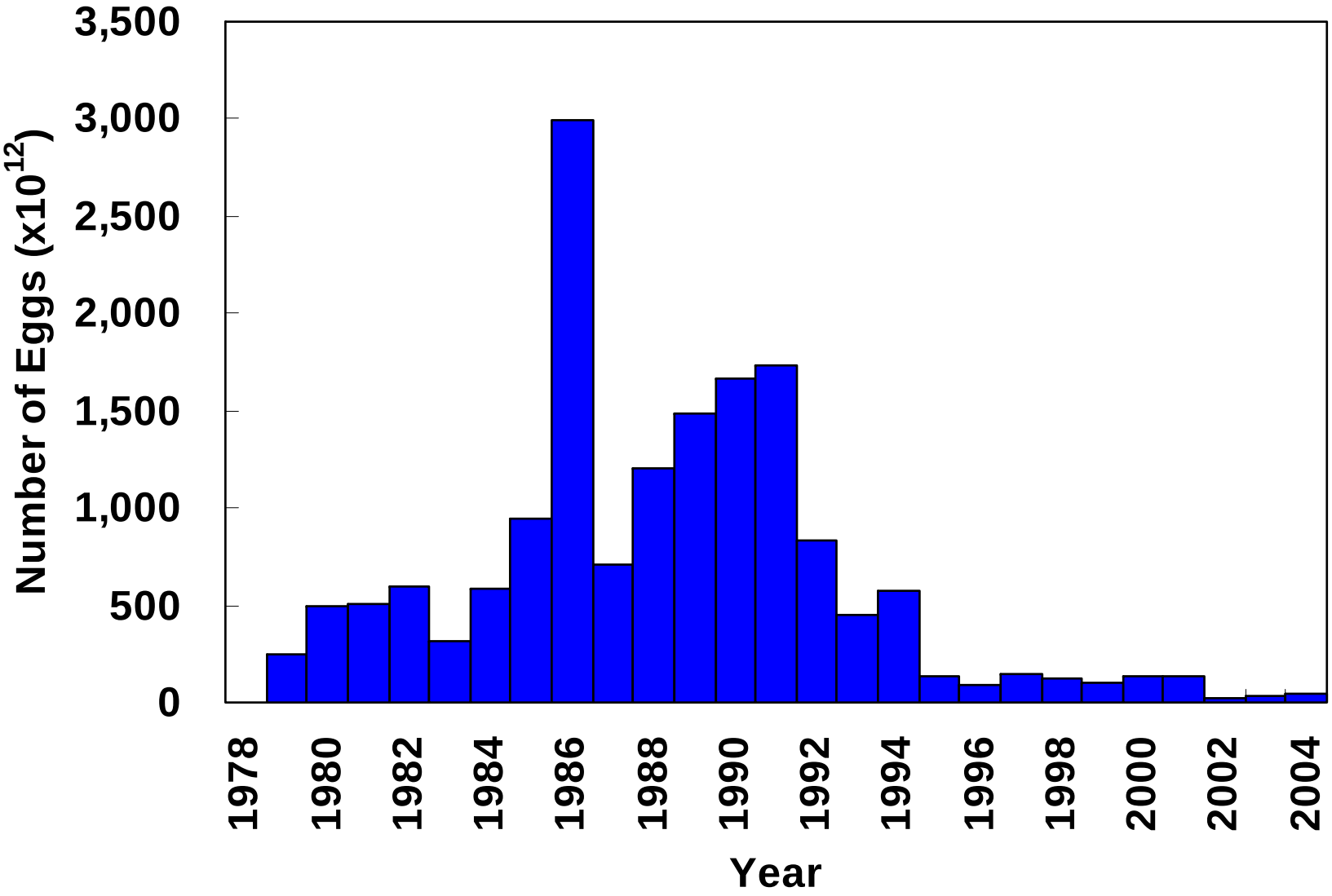
- Trawl fisheries are limited in offshore and specific fishing areas along the coast based on fisheries coordination to avoid conflicts with other fisheries.

- **Contribution to Fisheries Resources**

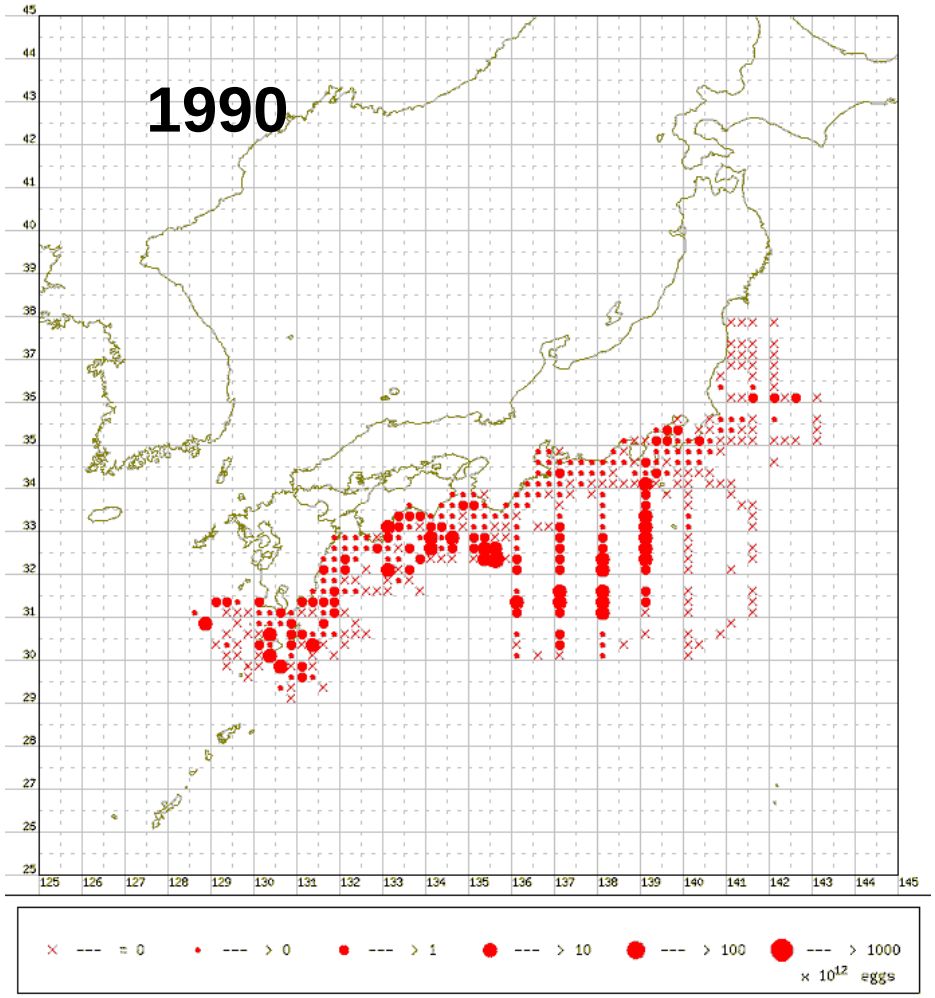
Catch of Japanese sardine

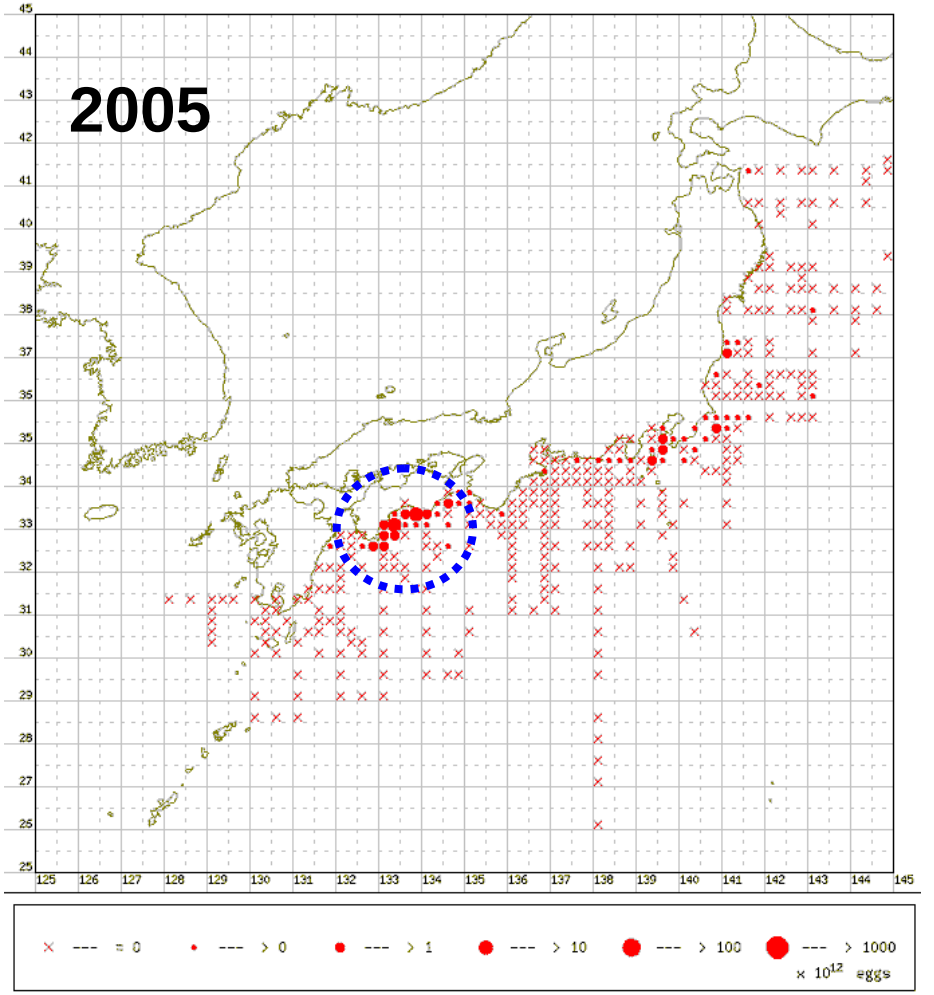


Annual Egg Abundances of Japanese sardine



Japanese sardine egg distributions in the western North Pacific

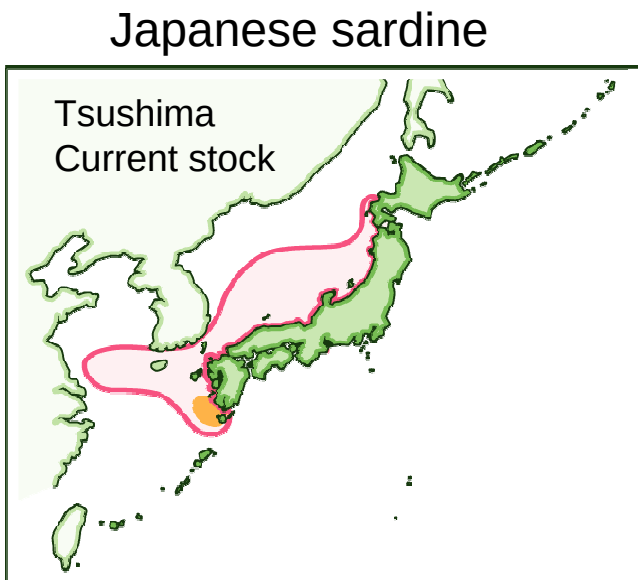


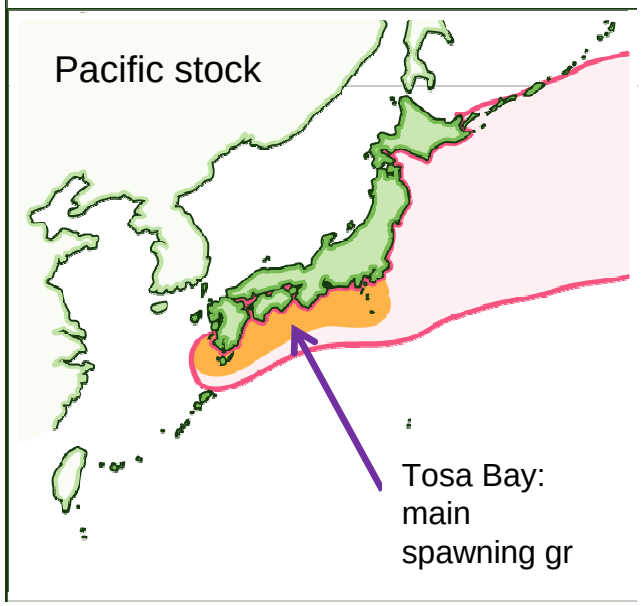


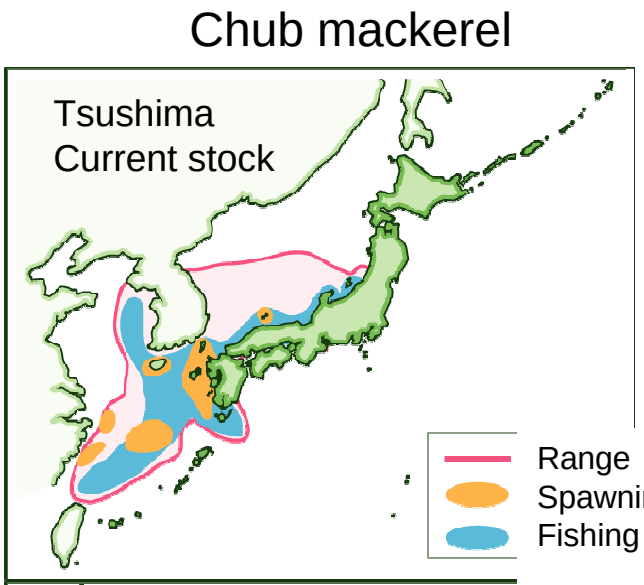
Protection of Fish Population

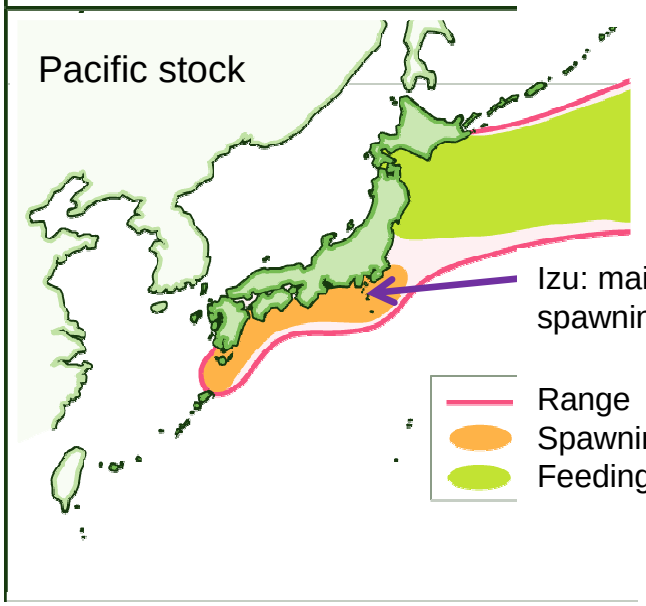
- The spawning population of Japanese sardine Pacific stock is protected in Tosa Bay and contributes greatly to the egg production in Japan during the period of low stock abundance.
- So the fisheries management measures in Tosa Bay are thought to contribute to the protection for fisheries resources such as Japanese sardine population.

Comparisons of distribution of two stocks of Japanese sardine and chub mackerel (source: Japanese stock assessment report)





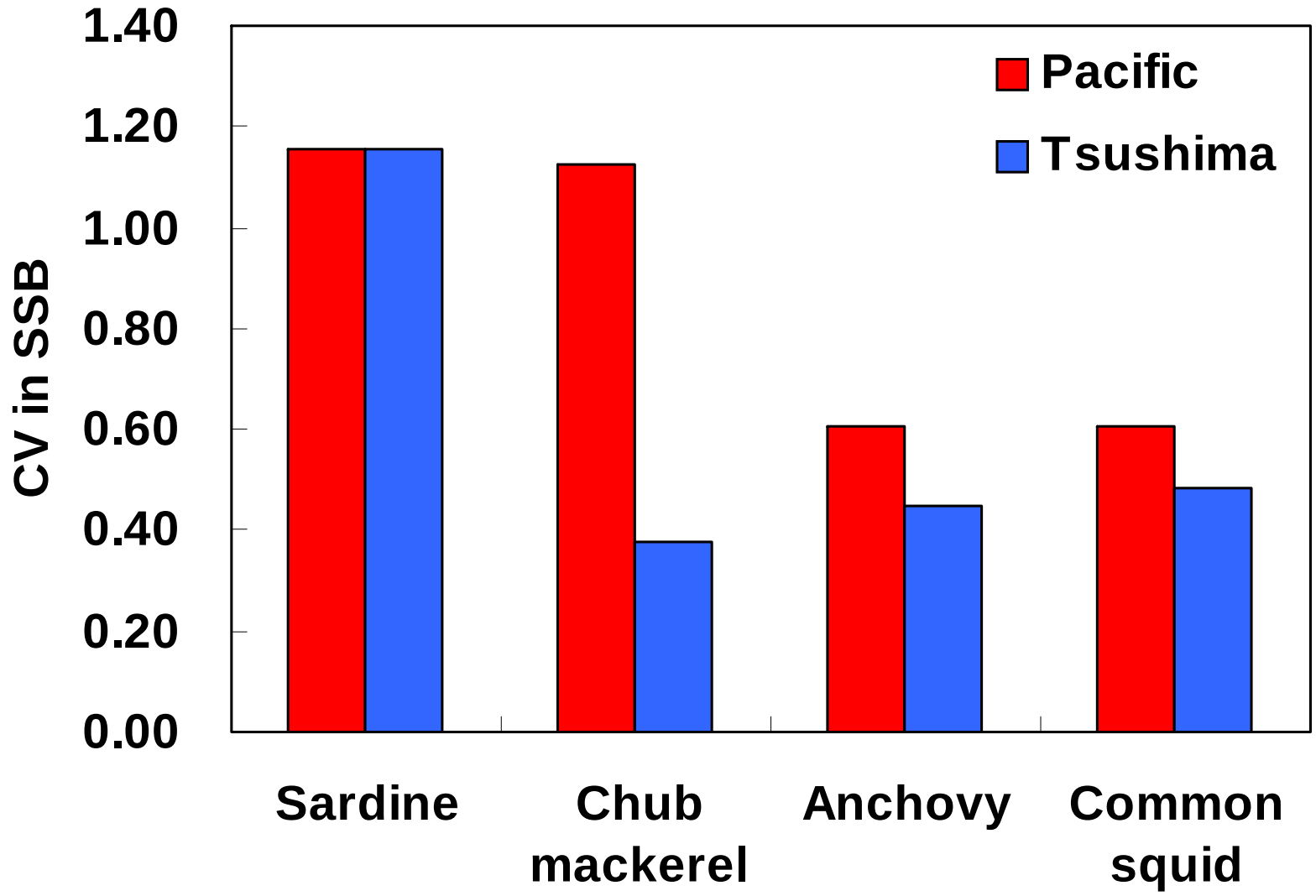




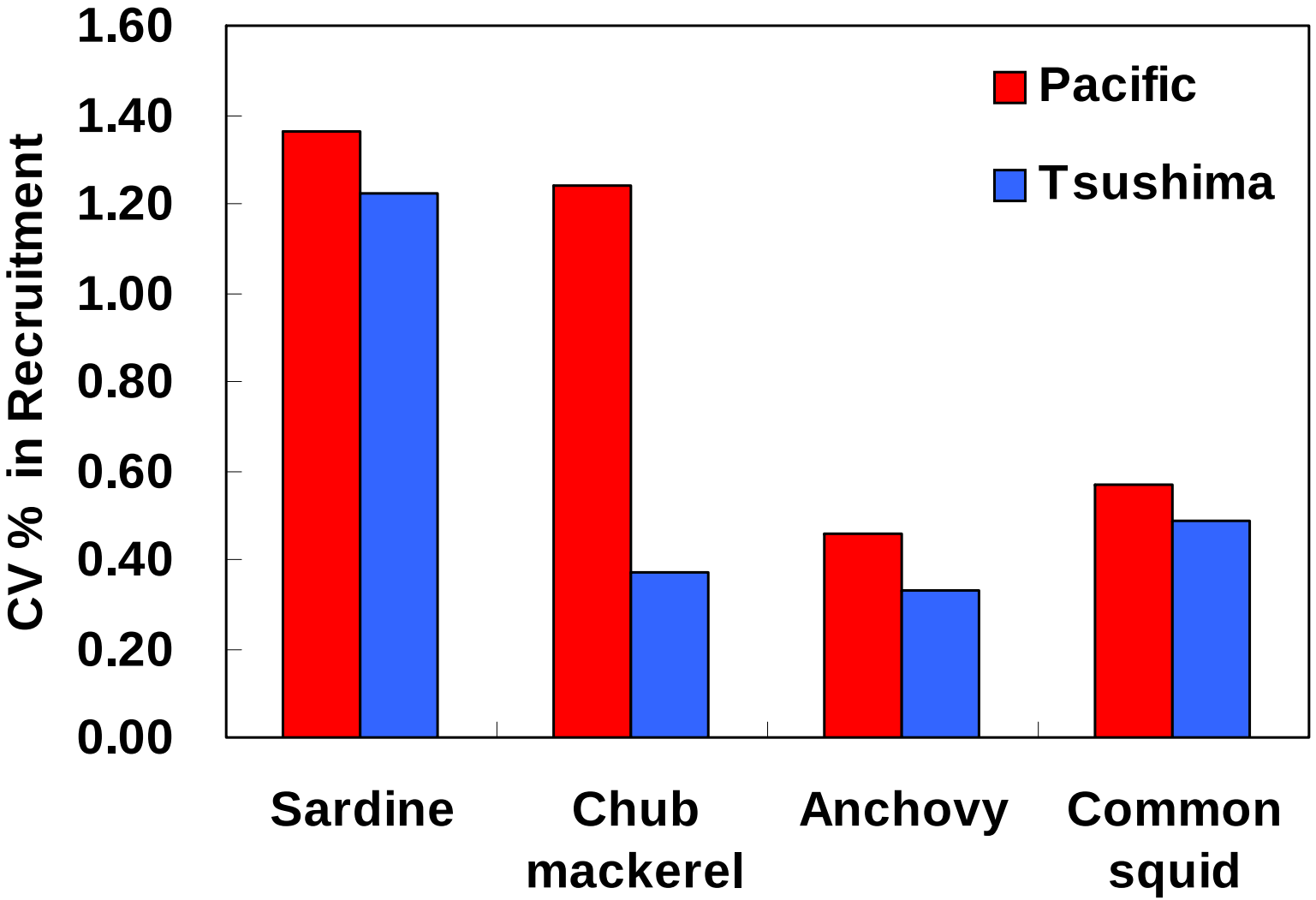
Distribution of Tsushima Current stock is limited to TC area from East China Sea to southern Japan Sea

Distribution of Pacific stock extends from Kuroshio to Oyashio and also to high seas of North Pacific

Coefficient of Variation in SSB



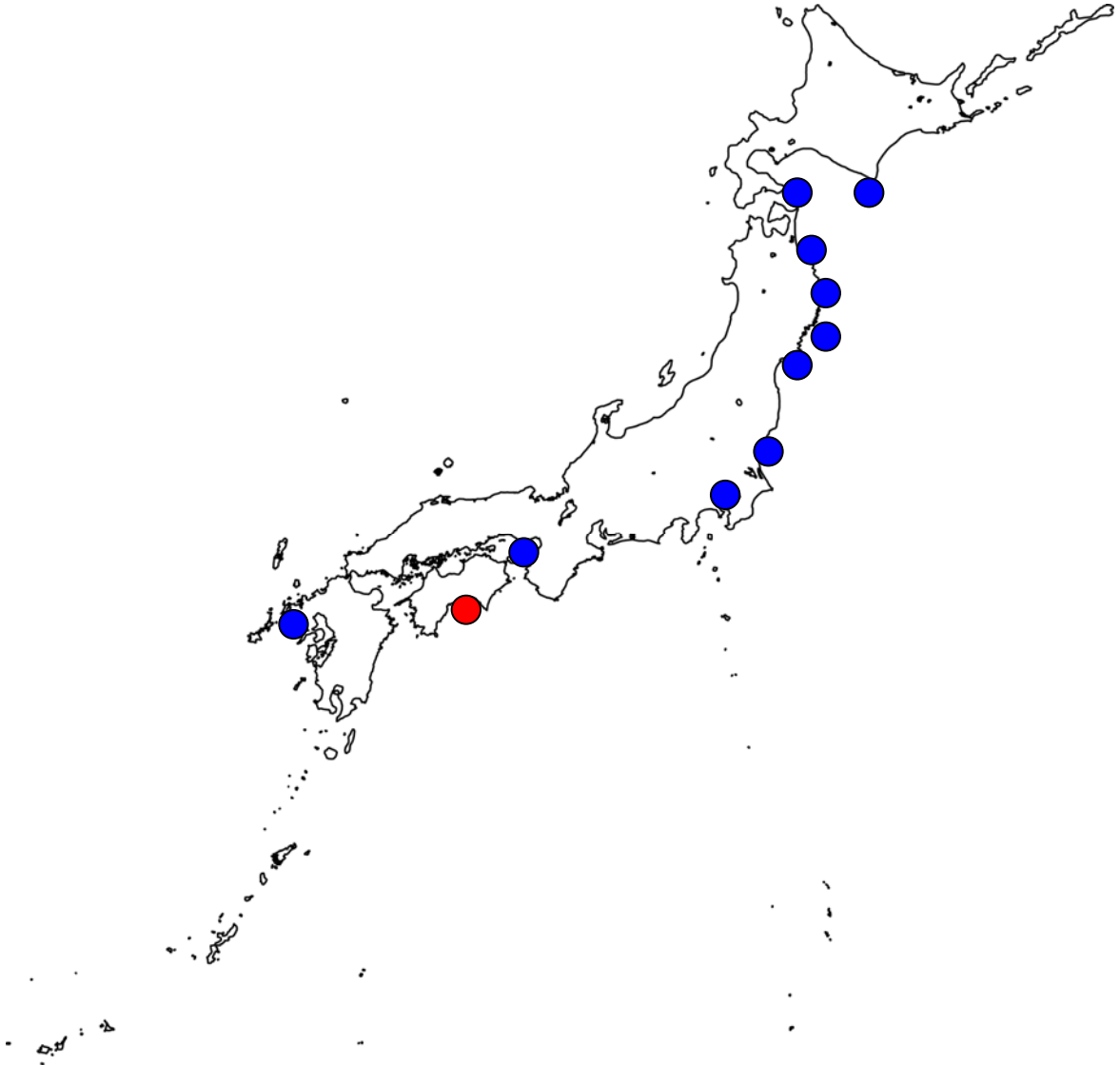
Coefficient of Variation in Recruitment



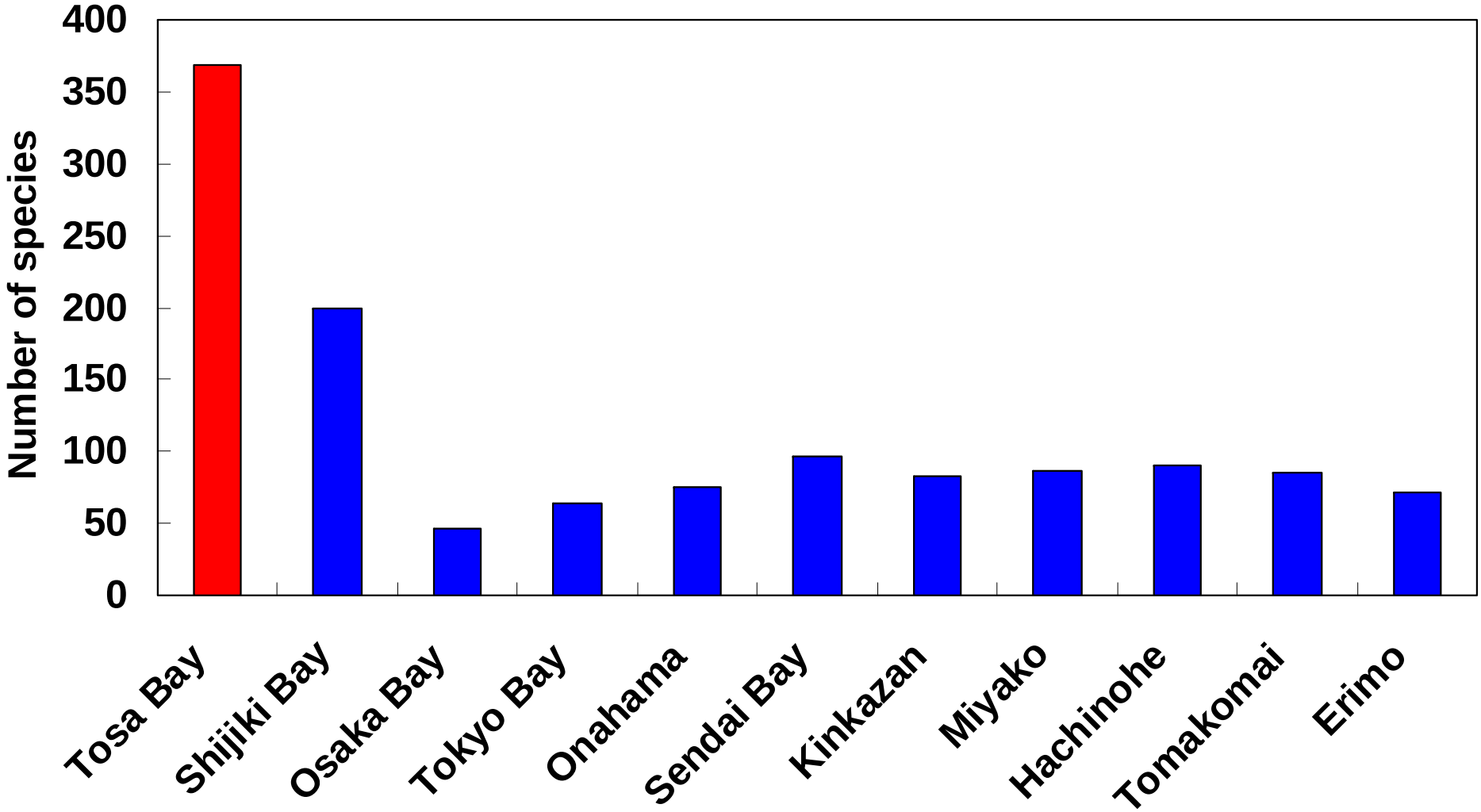
- **The fisheries management measures in Tosa Bay contribute to the stability for Japanese sardine Pacific stock.**

- **Contribution to the Biodiversity in Tosa Bay**

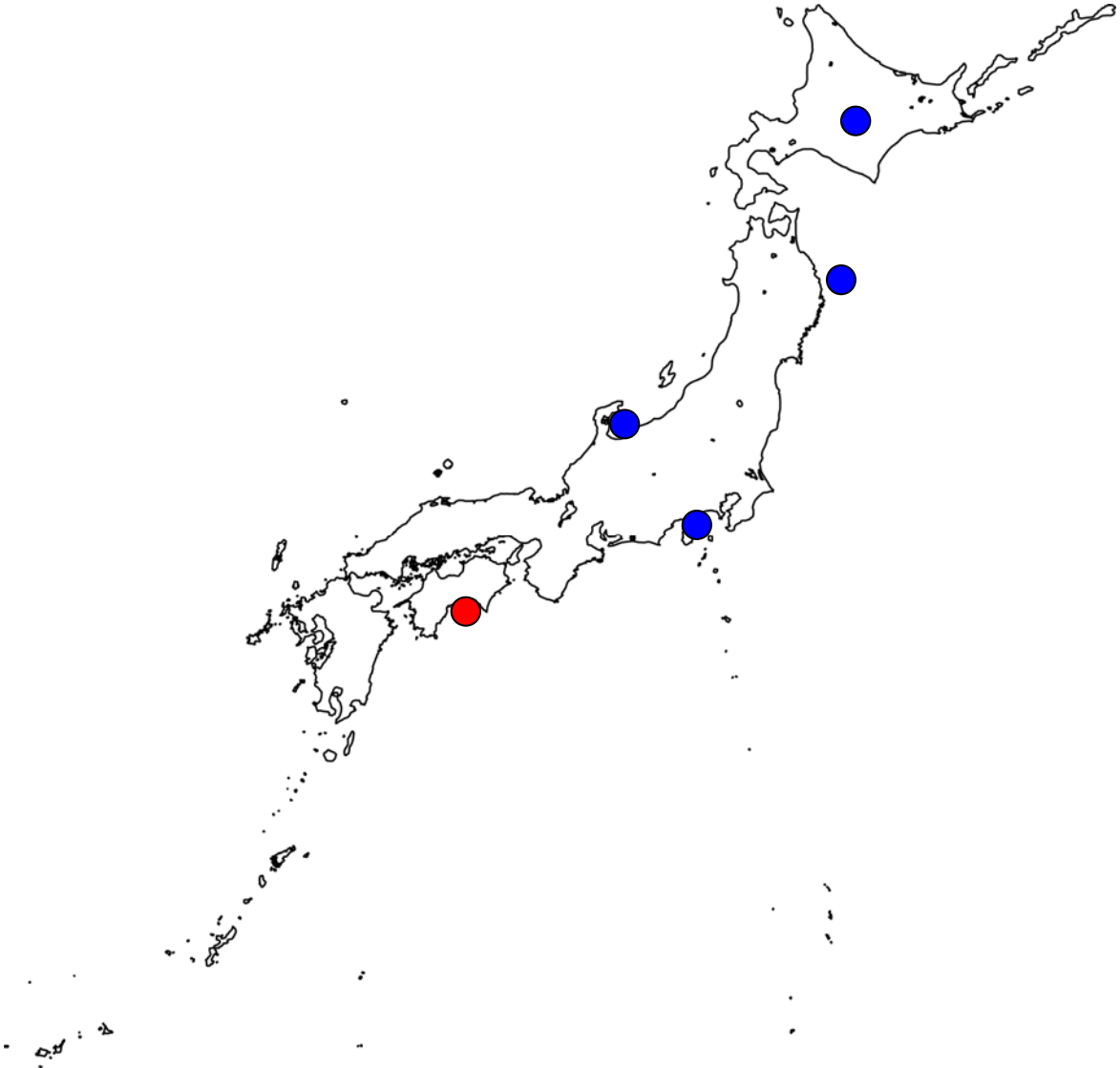
Locations of Demersal Fish Survey



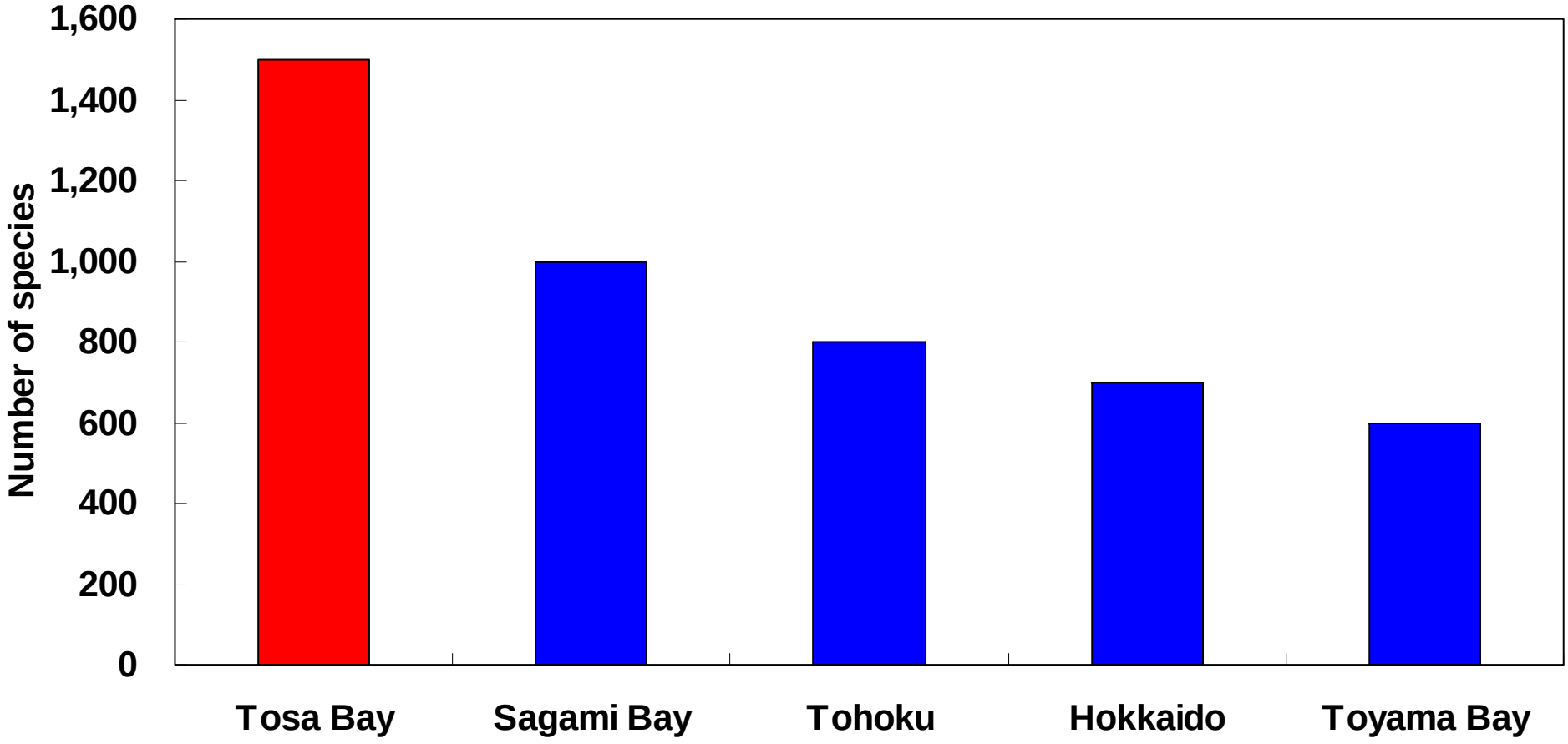
Species Diversity of Demersal Fishes



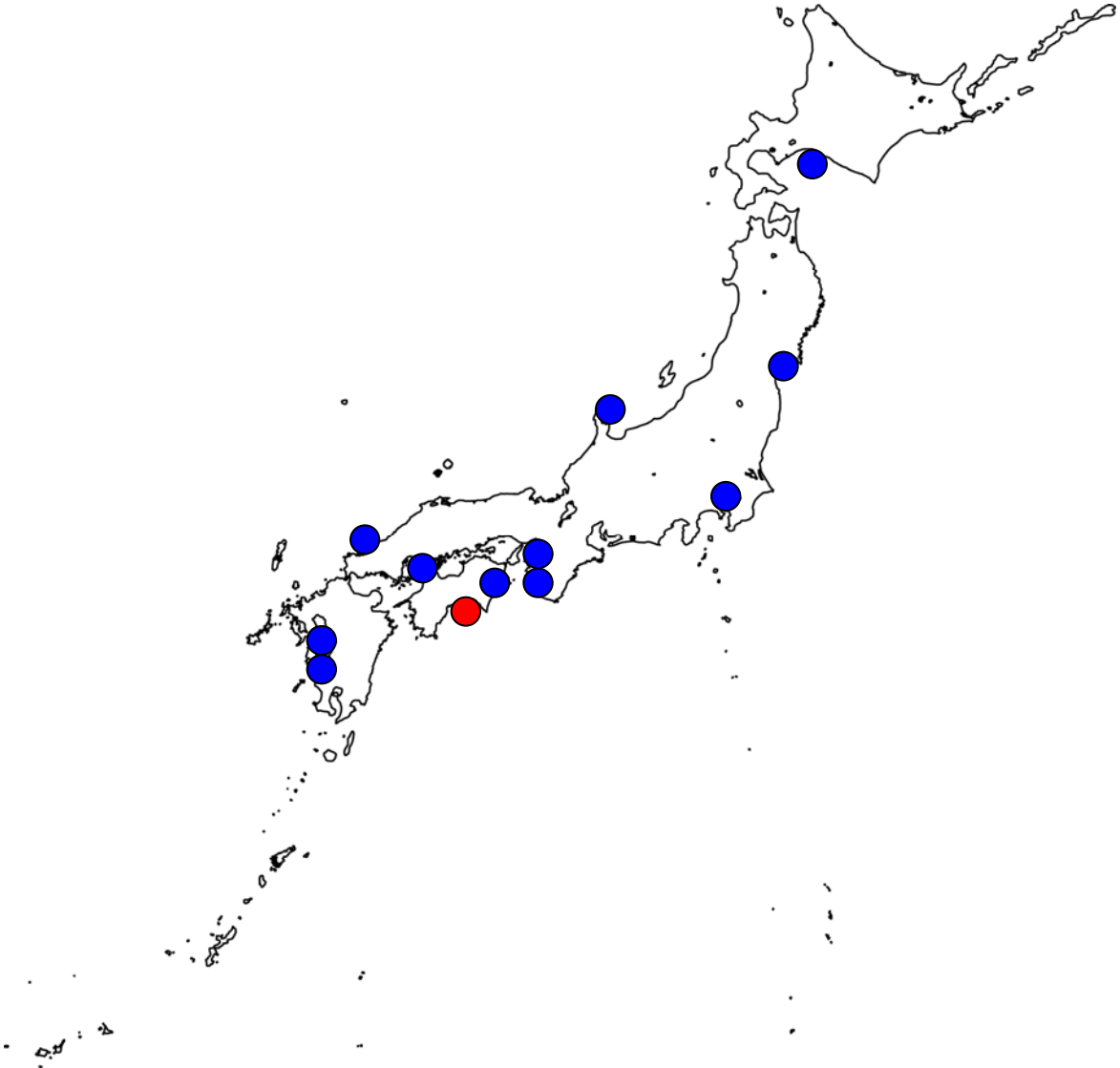
Locations of Fish Survey



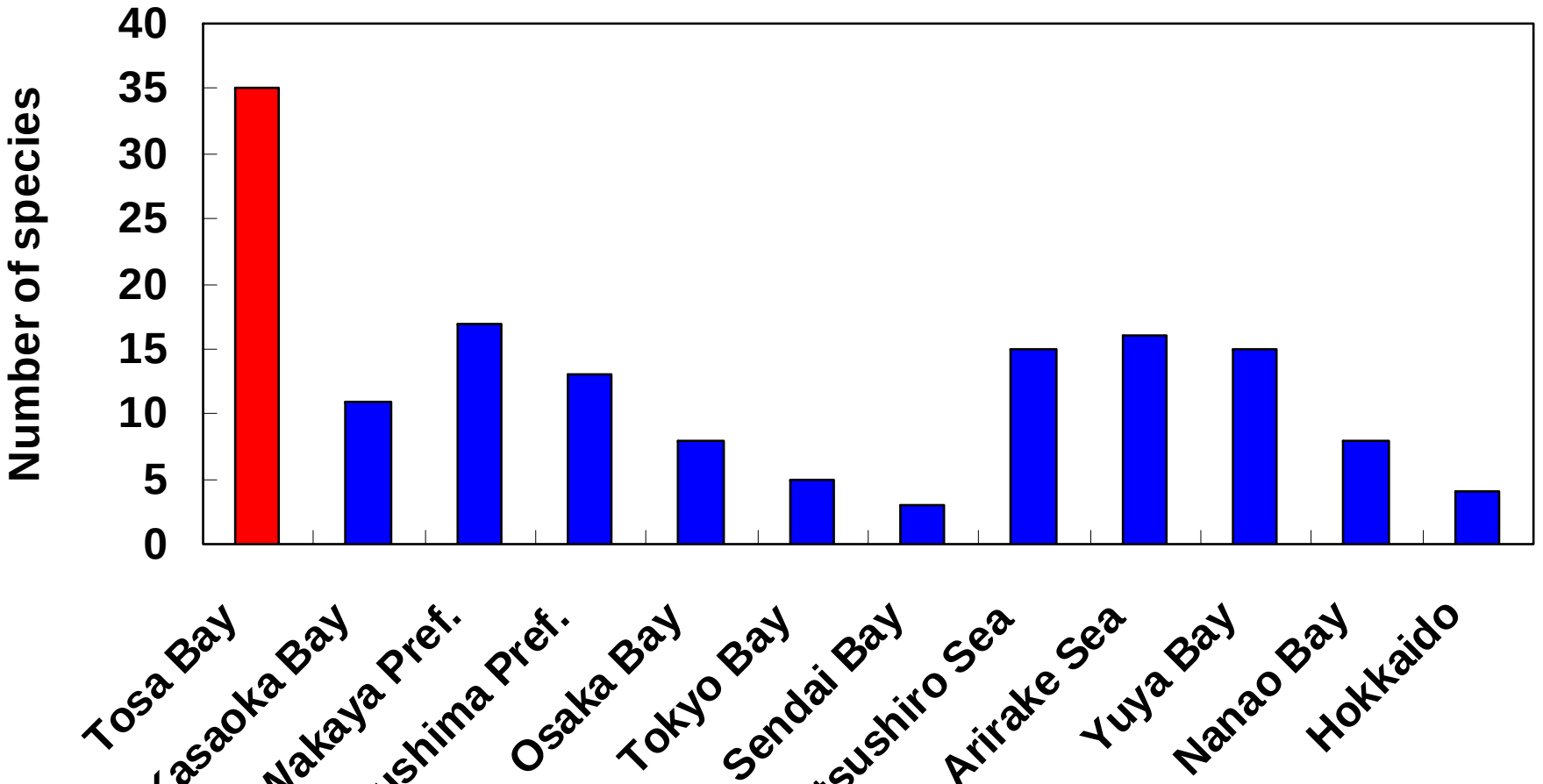
Species Diversity of Fishes



Locations of Shrimp Survey

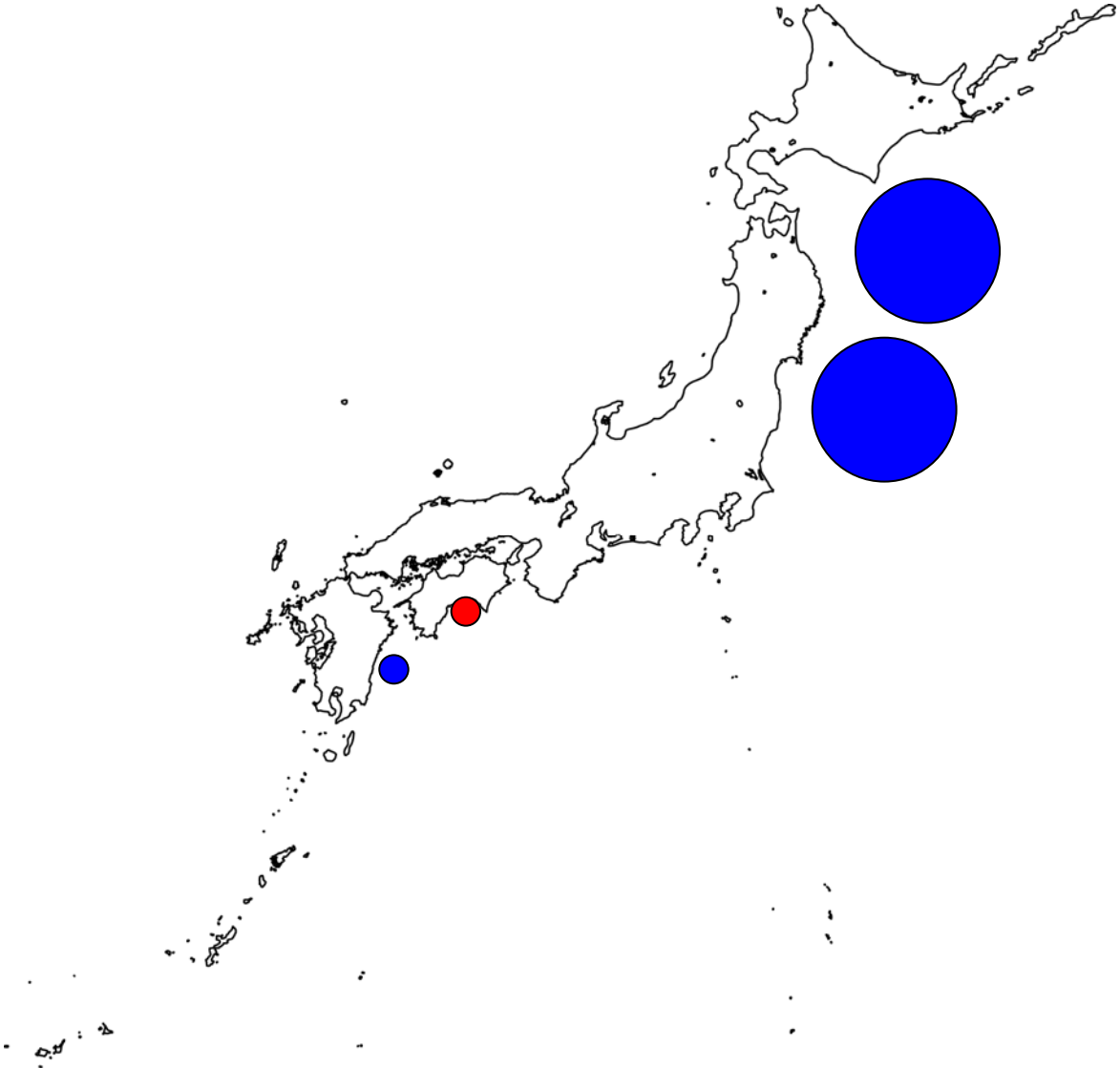


Species Diversity of Shrimps

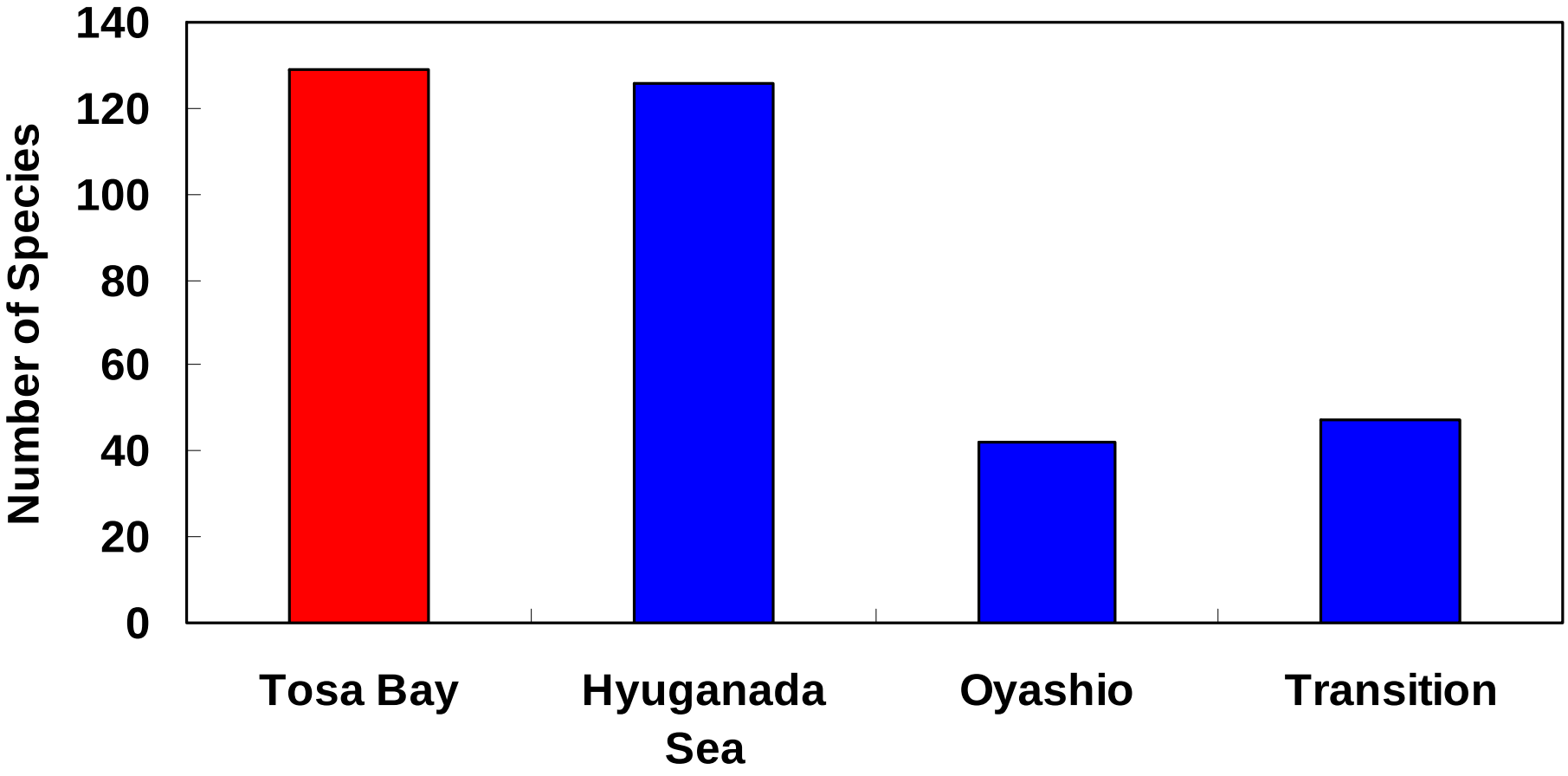


Sakaji (2003)

Locations of Copepoda Survey



Species Diversity of Copepoda



High Fish Species Diversity and Its Possible Factors in Tosa Bay

- North-south cline in number of species
- Oceanographic variation and transportation by Kuroshio Current
- Topographic variation in Tosa Bay
- Human related factors such as high research frequency
- Fisheries management measures for the fisheries resources and the maintenance of biodiversity.

Conclusion

- Fisheries management measures including MPAs in Tosa Bay are thought to work well and to contribute to the maintenance of biodiversity and fisheries resources such as Japanese sardine.

However,

- Among 52 species and 84 fisheries stocks assessed around Japan, 37 stocks (44%) are at a low stock abundance level.

- Also among 8 species and 19 stocks for TAC management, 8 stocks (42%) are at a low stock abundance level including sardine.

Future Issues

- Continue to monitor the fisheries resources and the biodiversity

- Assess the effects of various fisheries management measures including MPA on the fisheries resources and the biodiversity

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