The effects of climate change on fisheries and aquaculture in Japan: A review

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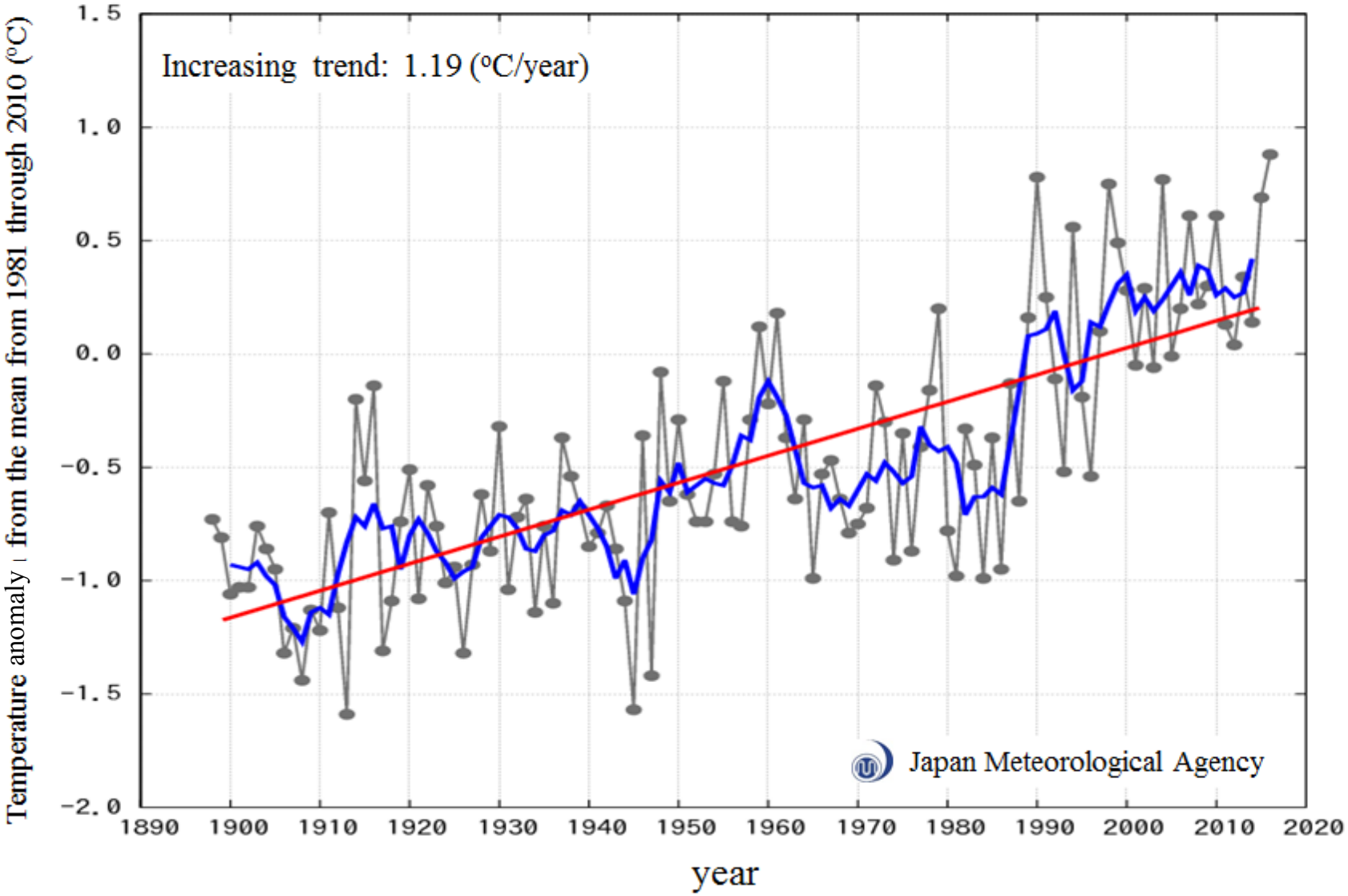
Société franco-japonaise d'Océanographie

Today's Talk

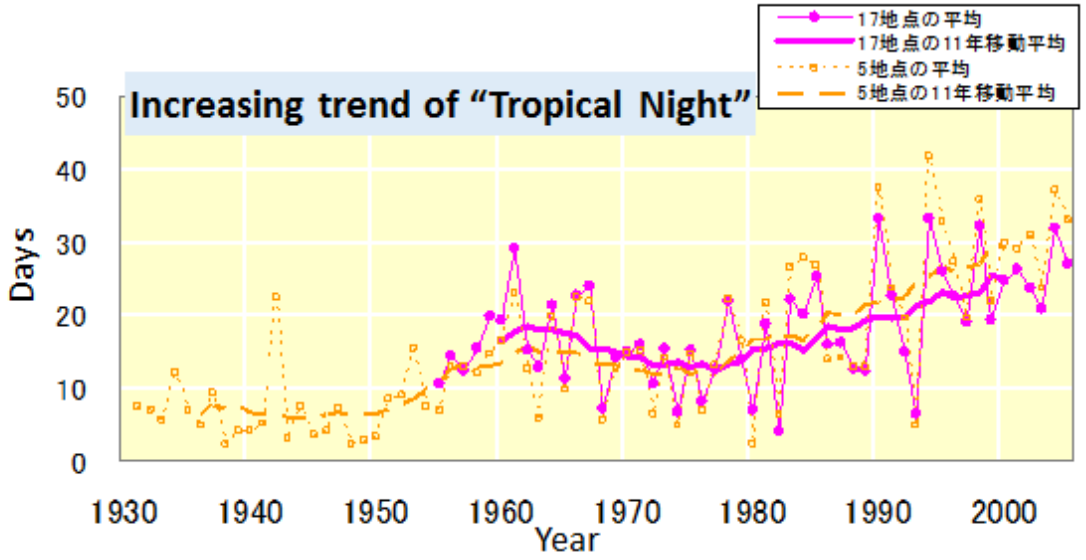
1. Global warming , current situation in Japan
2. What is happening on land?
3. What is happening in the ocean around Japan?
4. Characteristic of Japanese fisheries
5. What is happening to commercially important fishes?
6. What can we do?

Air-Temperature Trend in Japan During the Past 100 Years



"Tropical Night"

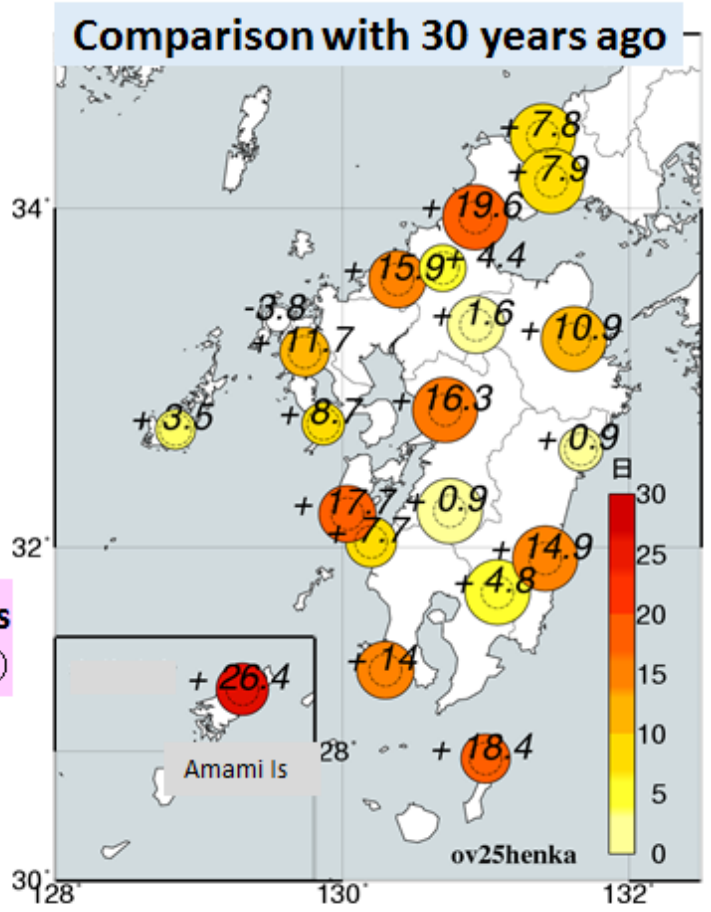
Daily lowest temperature stays higher than 25 °C



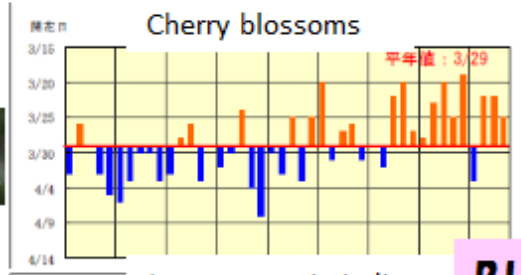
Number of Tropical Night in Kyushu almost doubled during 30 years

At present（10year mean 1996-2005）: 30years ago(10year mean 1966-1975)

Source: Japan Meteorological Agency

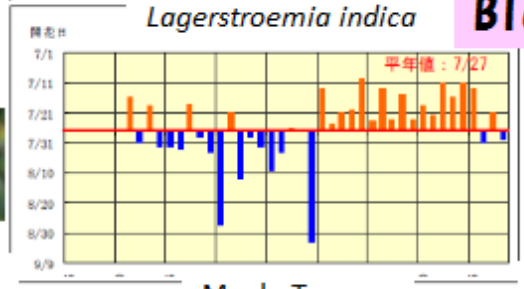


Change is Easily Seen in the Terrestrial Habitat

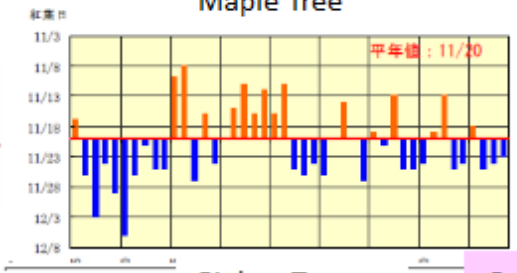


Lagerstroemia indica

Blossoms Early

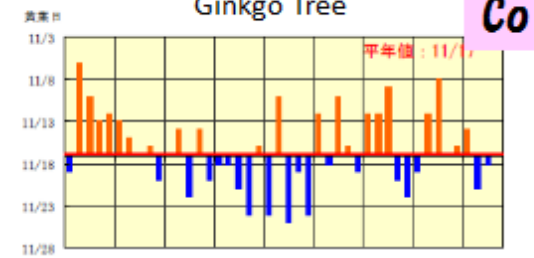


Maple Tree



Ginkgo Tree

Coloring late



1965 1975 1985 1995 2005

Observation in Hiroshima, Japan
Source: Hiroshima Prefecture

After Yoshi & Ishii (1998)
Appl. Entomol. Zool., 33:281-288

Papilio Memnon Moving North

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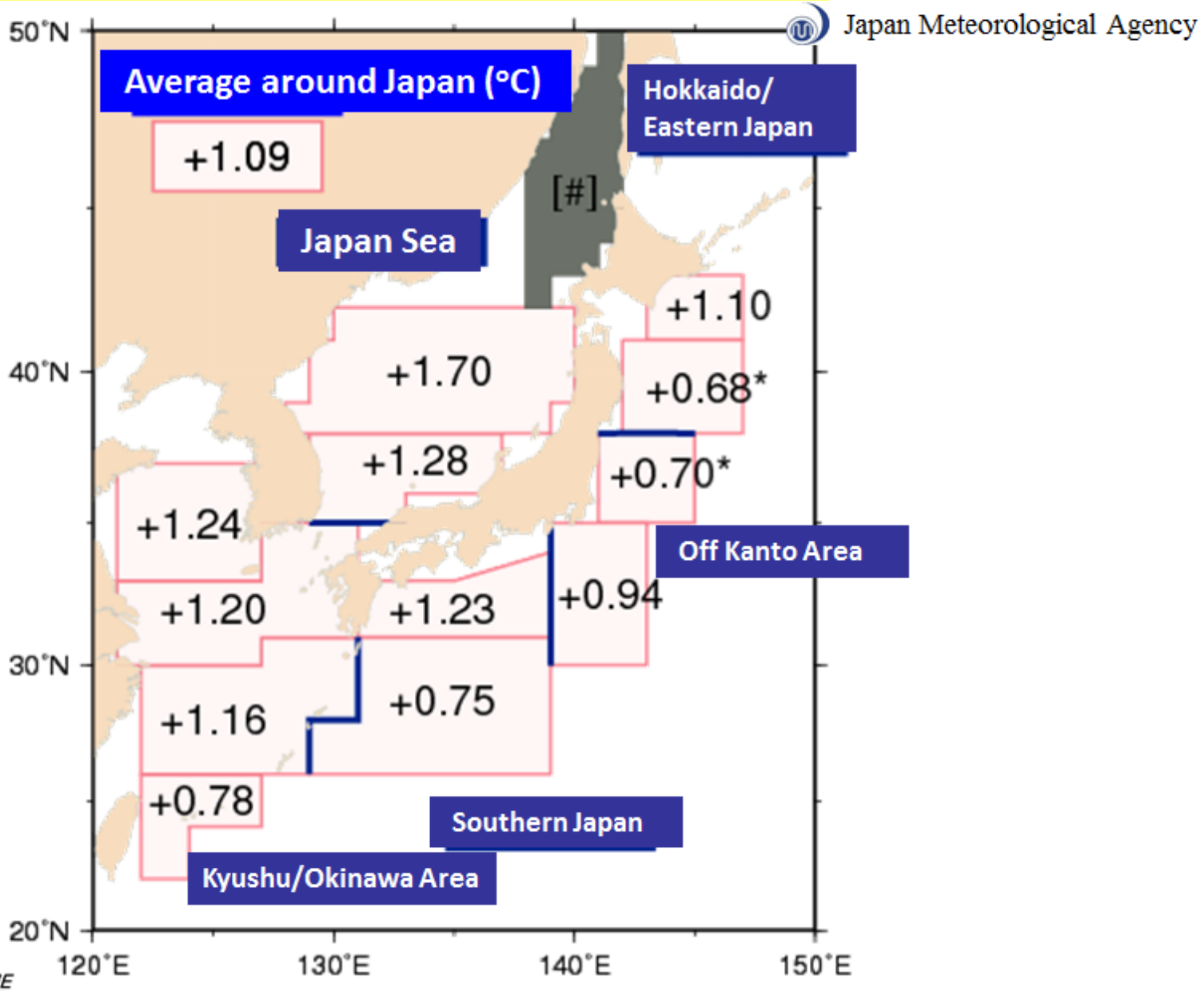
Surface Seawater Temperature Increase around Japan



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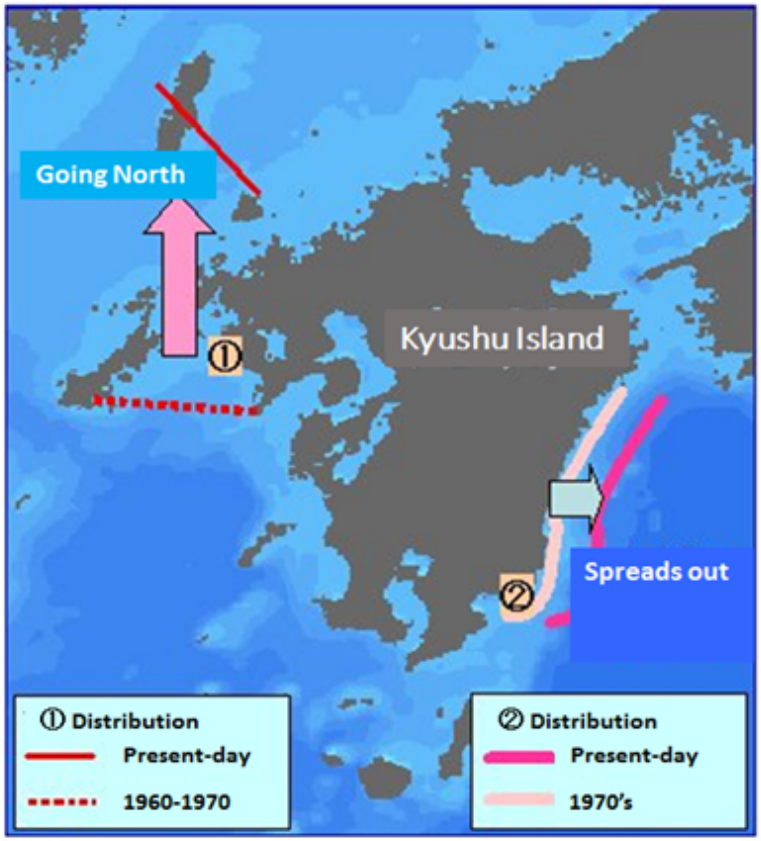
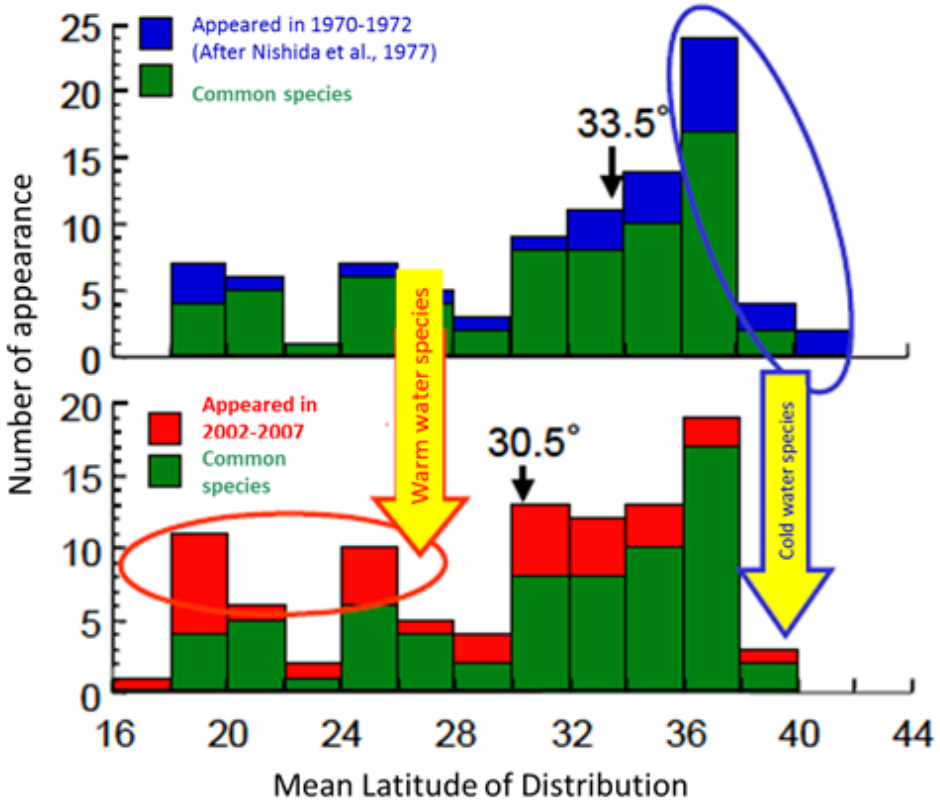
To Detect a Change in the Water is Hard and Time Consuming

Response to Temperature Change, Seaweed and Fish



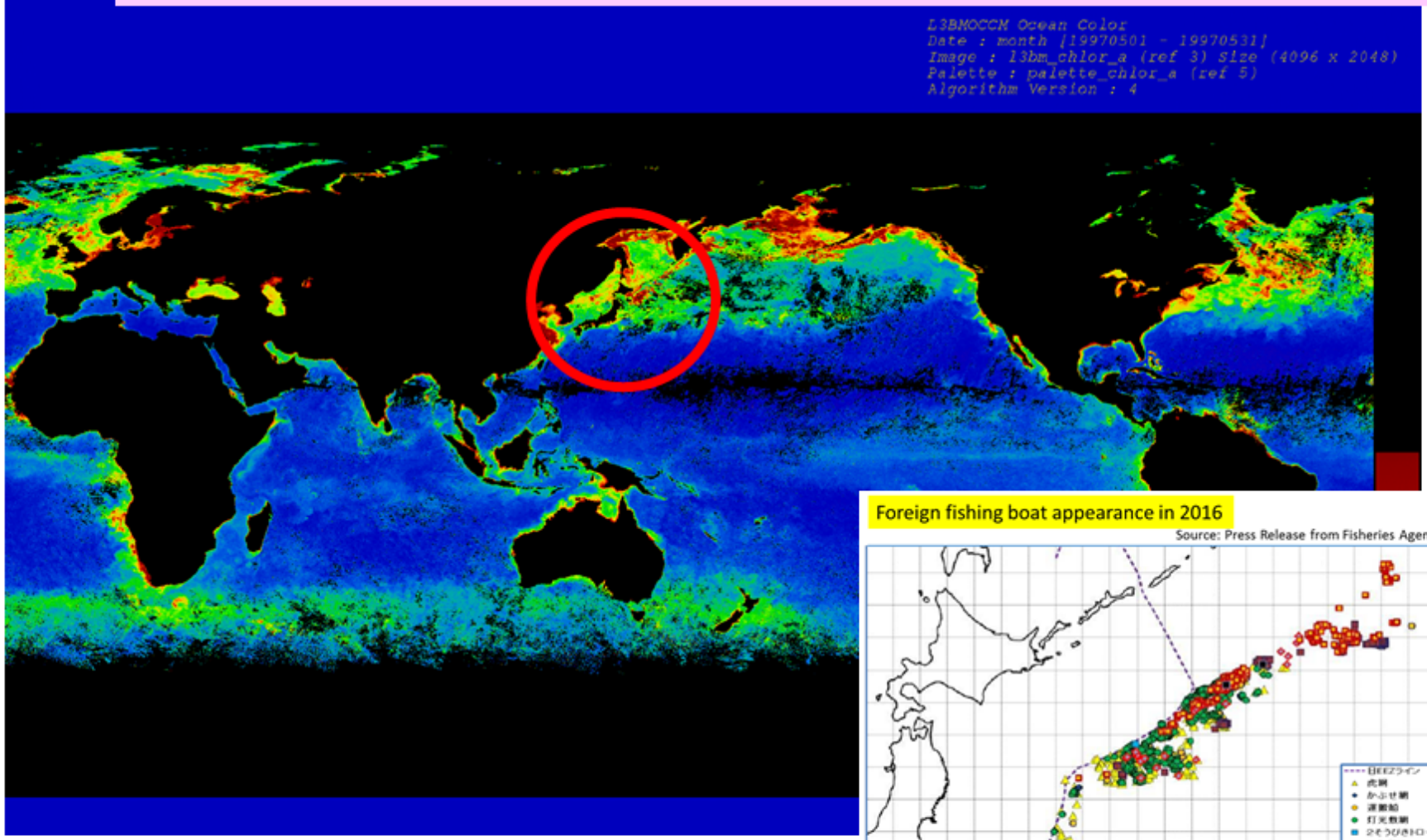


Change in the distribution of warm water Sargassum
30 years of change
Source: Seikai National Fisheries Research Institute, FRA

Change in appearance of fish in Wakasa Bay
30 years of change
Source: Masuda, R. (2007) Environ.Biol. Fish. 82, 387-399 and FRA

The Location of Japan, Very Productive around Japan

OCTS Global Chlorophyll-a Map. Monthly Binned from 1May1997 to 31May1997 produced by NASDA (JAXA)



Foreign fishing boat appearance in 2016

Source: Press Release from Fisheries Agency, 2017.01.24

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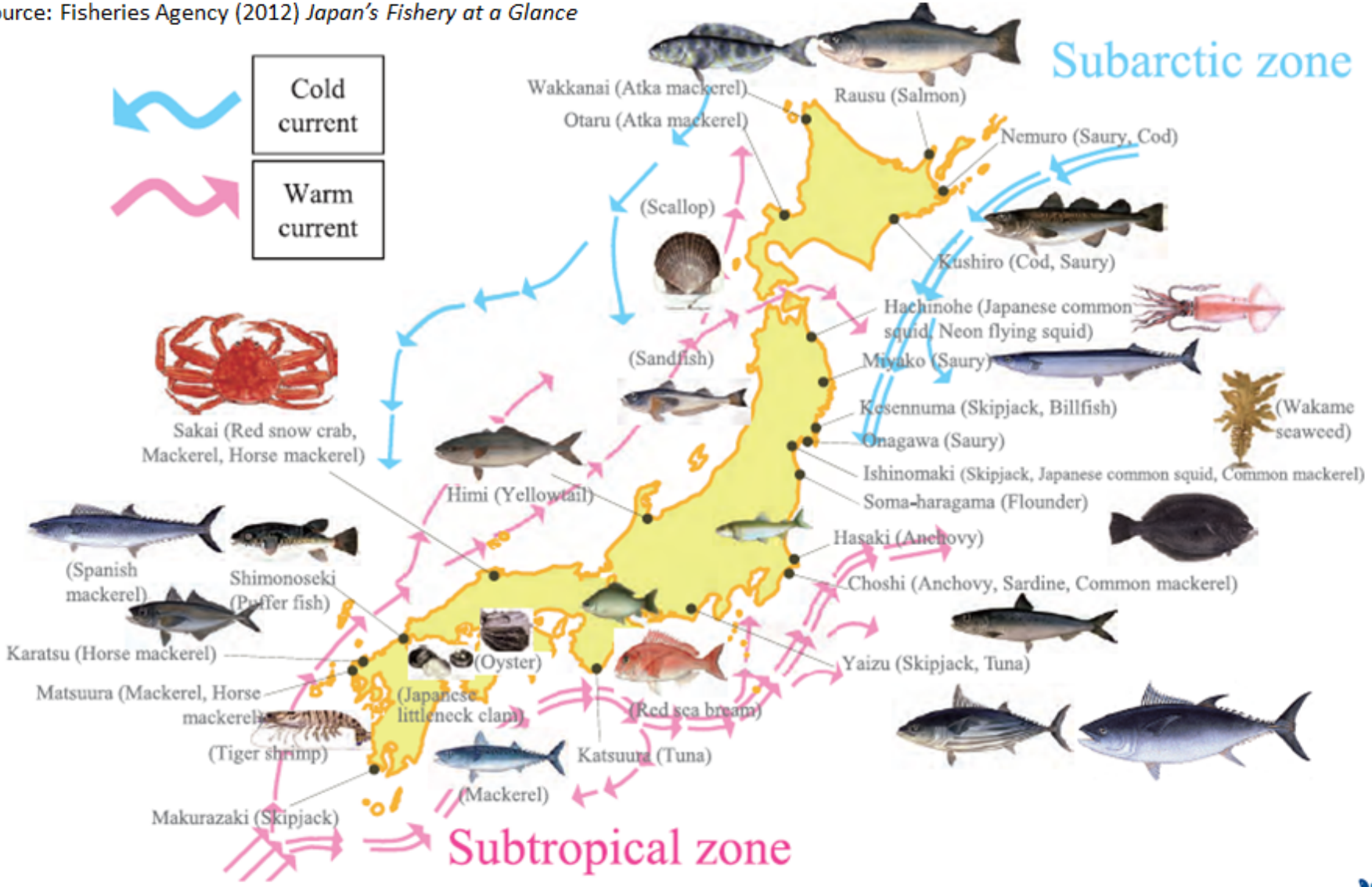
Wide Variety of Fish and Shellfish can be Caught in Japanese Waters

Source: Fisheries Agency (2012) *Japan's Fishery at a Glance*



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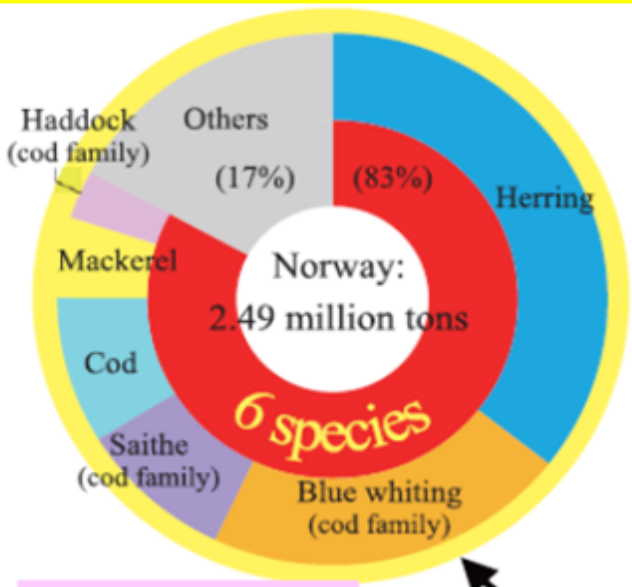
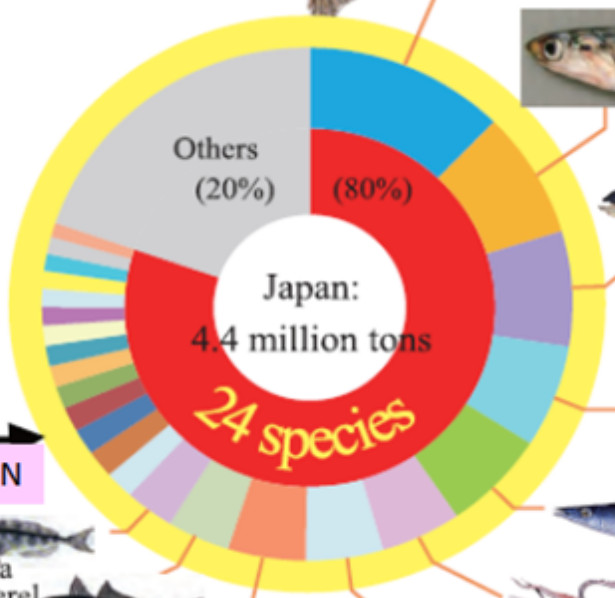
Diversity of Fish Species -High Latitude vs Mid Latitude-



Oslo, Norway 59.9 N

Tokyo, Japan 35.7 N



Source: Fisheries Agency (2012) Japan's Fishery at a Glance. Data are taken from FAO's *Fishstat* and MAFF's *Annual Statics of Fishery and Aquaculture Production*. The figure are 3 year average for 2005-2009.

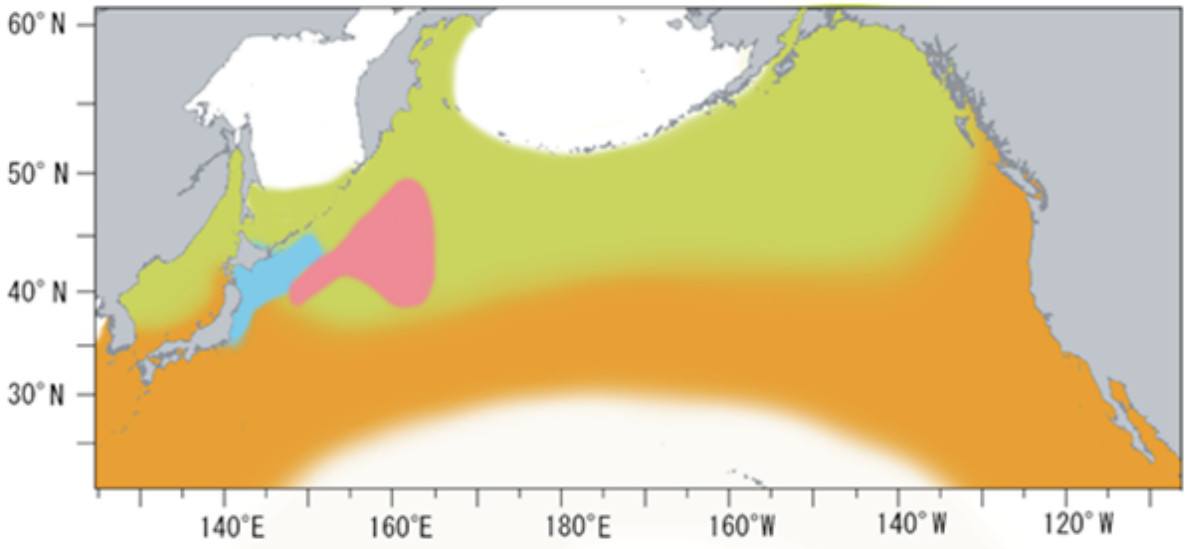
☆More fish species in the mid latitudes

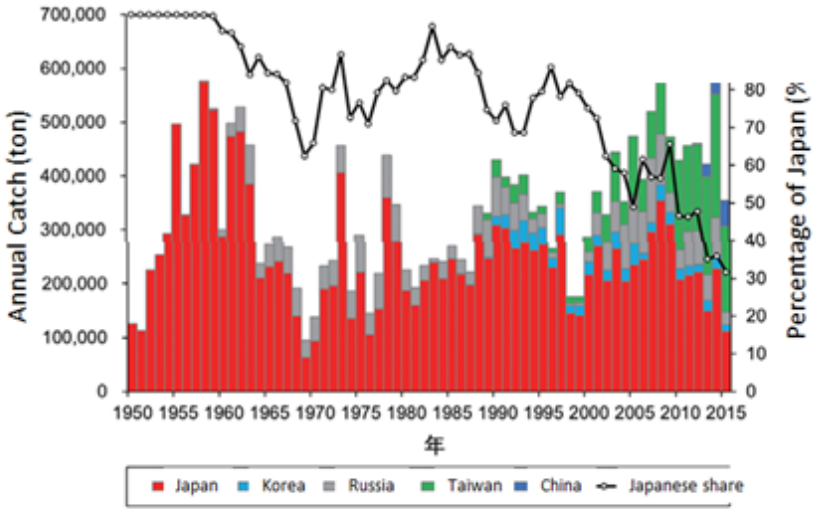
→ Seasonality, Locality, Diverse in fishing gears, Diverse in fish processing

In the Case of Pacific saury

Pacific saury, *Cololabis saira*

10 ~ 24 °C





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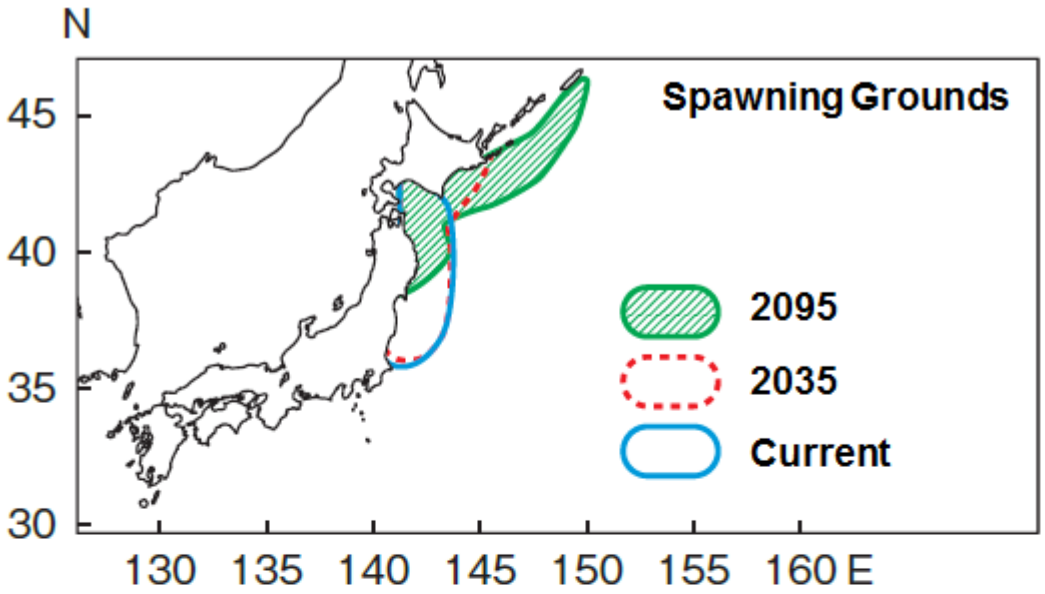
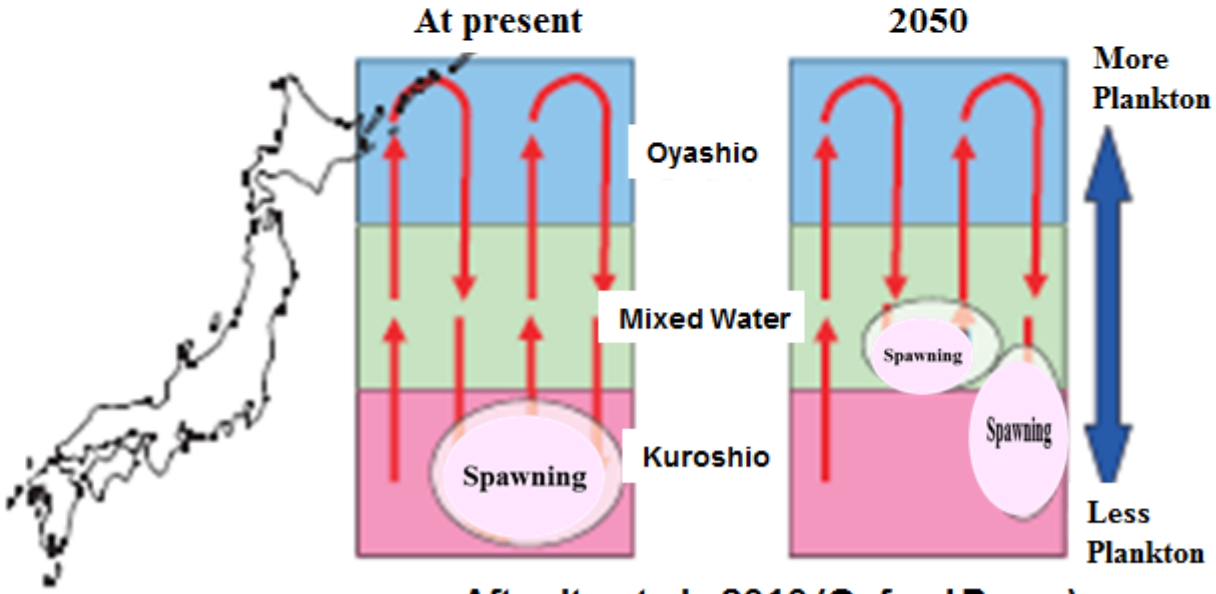
Pacific saury, *Cololabis saira*



Predicted



After Ito et al., 2010 (Oxford Press)

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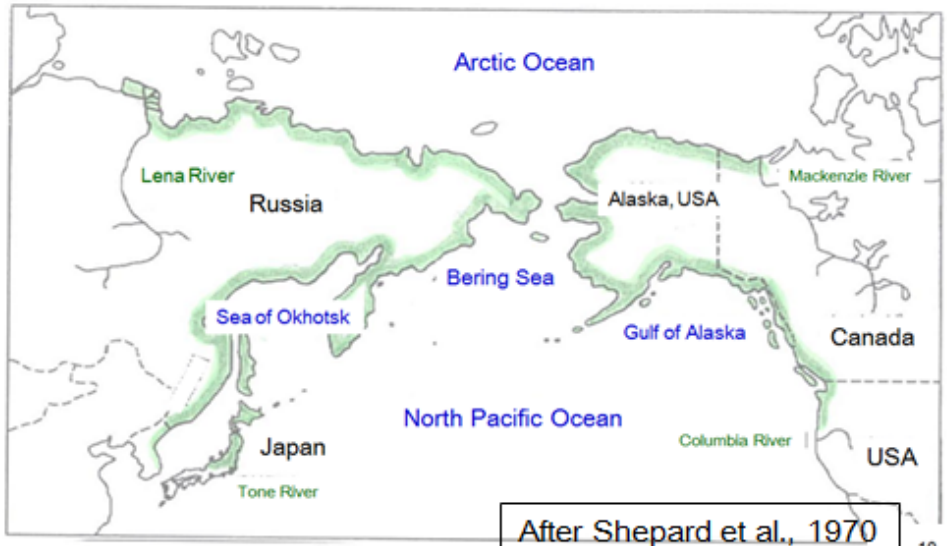
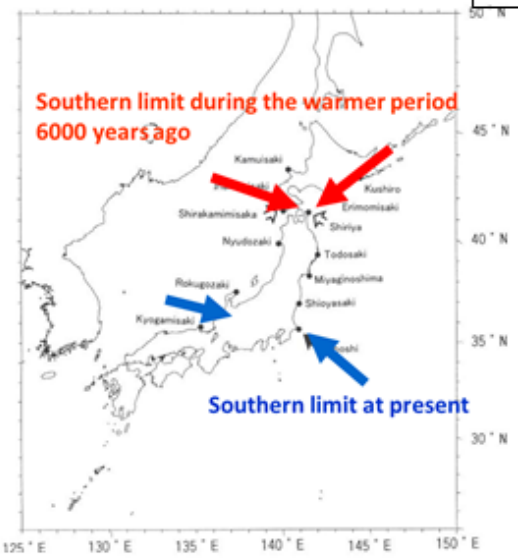
In the Case of Chum Salmon



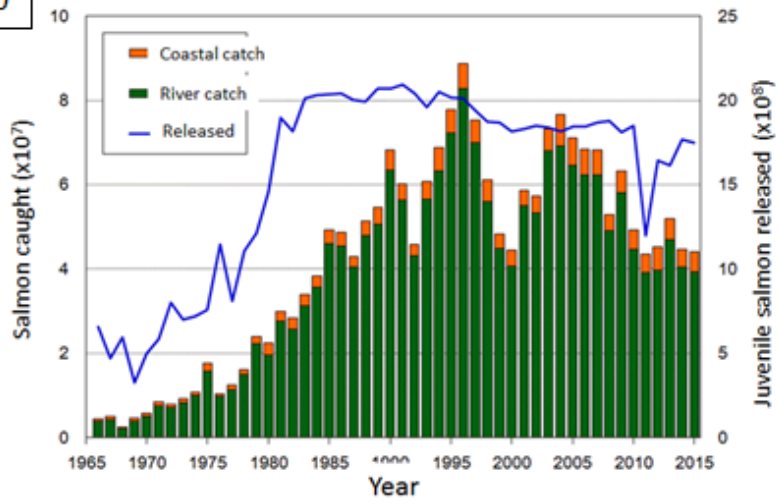
After Shepard et al., 1970

1 ~ 15 °C

Chum salmon, *Oncorhynchus keta*



Predicted



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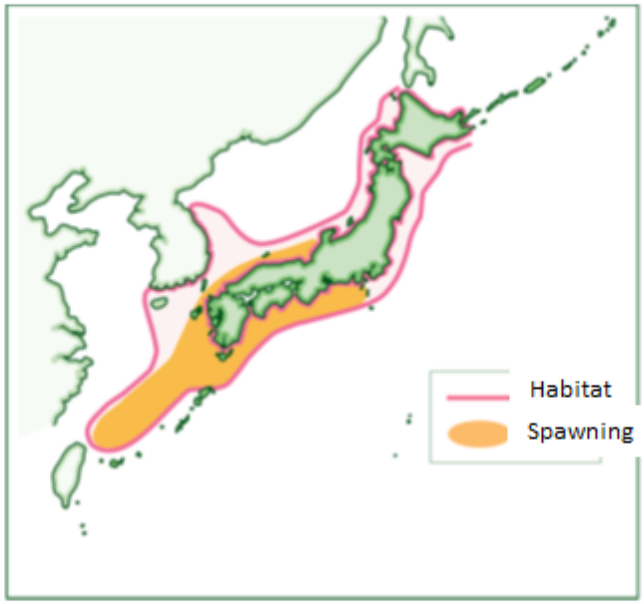
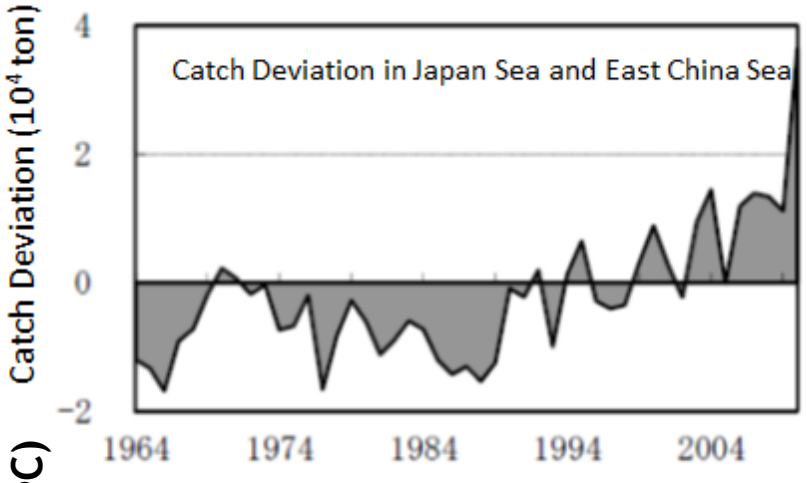
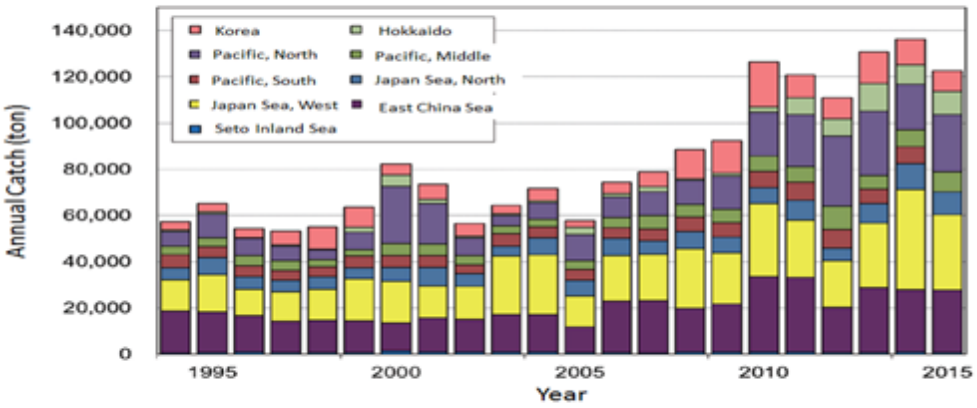
In the Case of Yellowtail

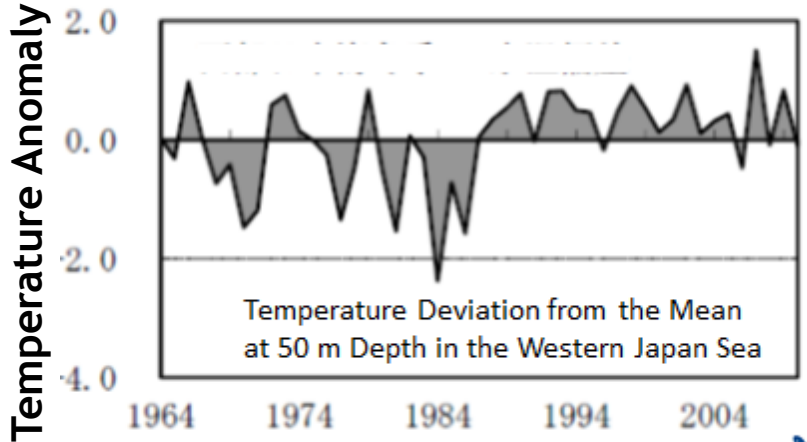
12 ~ 28 °C

Yellowtail, *Seriola quinqueradiata*









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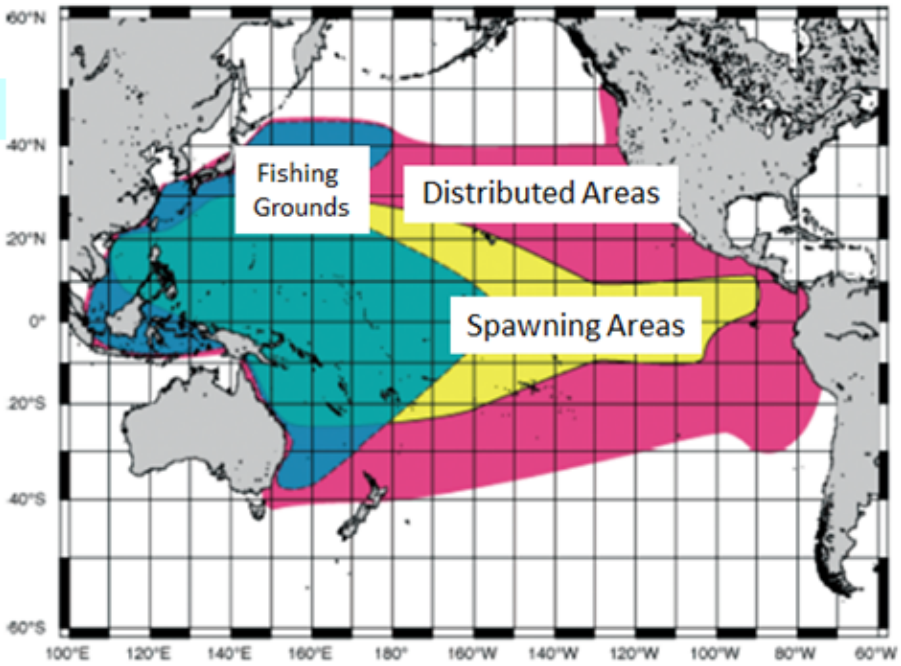
In the Case of Skipjack

Skipjack, *Katsuwonus pelamis* 17 ~ 28 °C



FISHERIES OCEANOGRAPHY Fish. Oceanogr. 12:475, 474–482, 2003

Potential changes in skipjack tuna (*Katsuwonus pelamis*) habitat from a global warming scenario: modelling approach and preliminary results

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[1]Institut Pierre Simon Laplace, Case 101, U.P.M.C, 4 place Jussieu, 75252 Paris cedex 5, France
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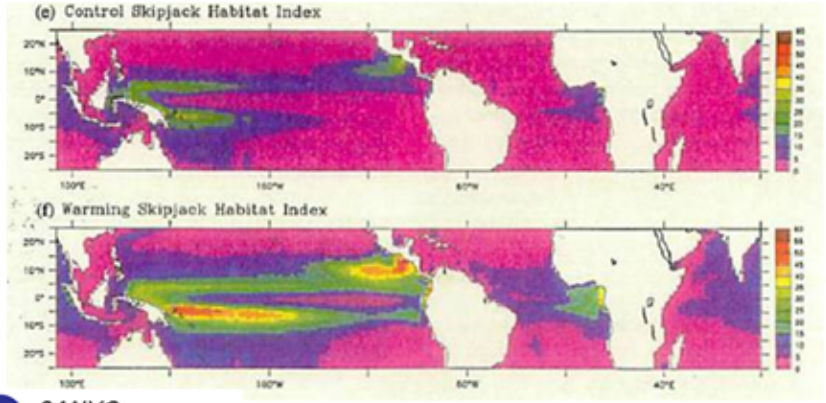

Predicted

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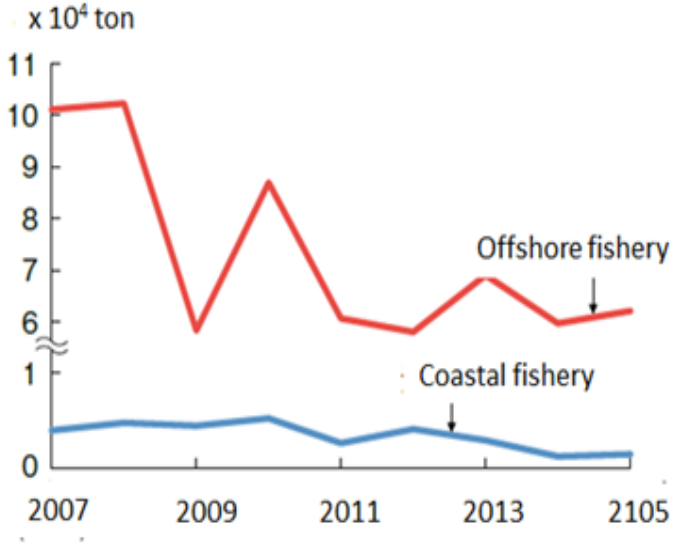
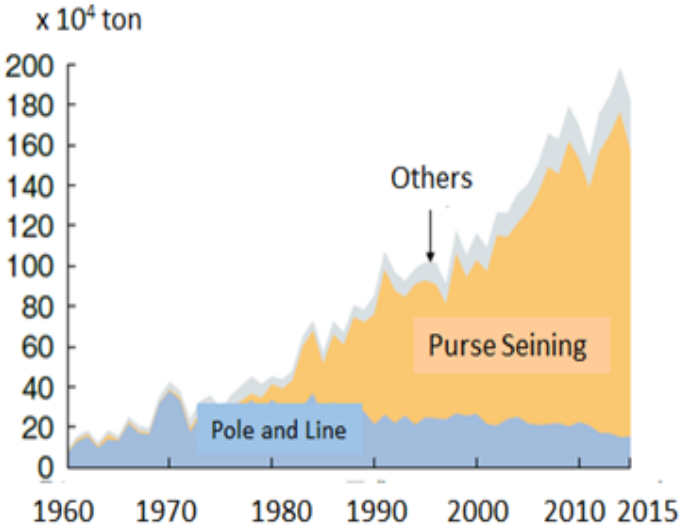
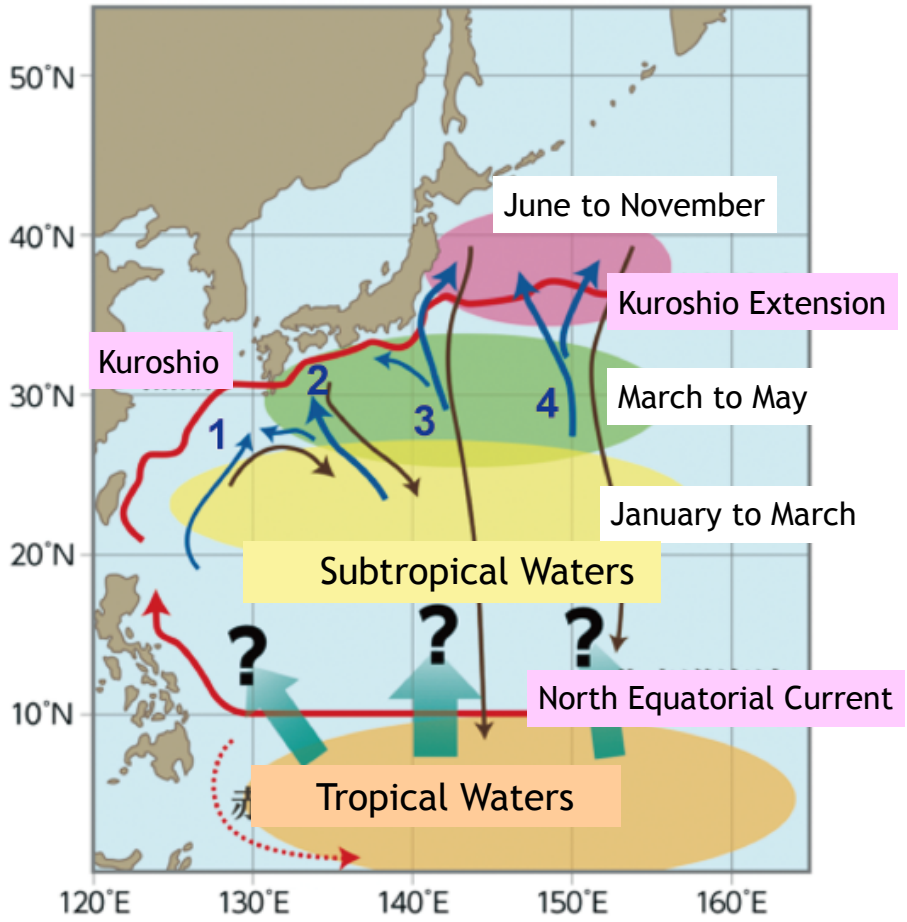
Skipjack, *Katsuwonus pelamis*



From Fisheries Research and Education Agency, Japan





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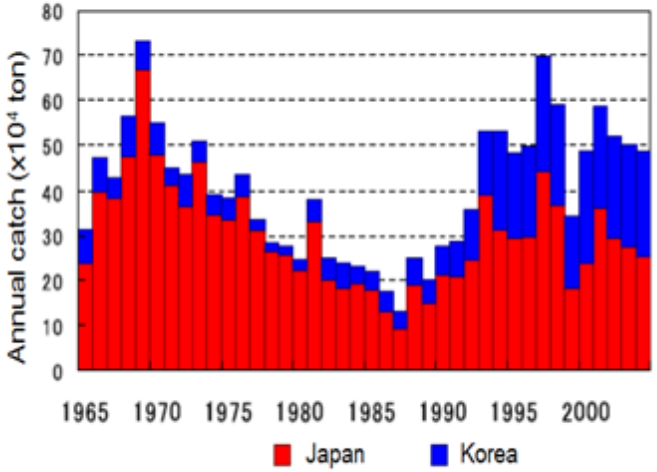
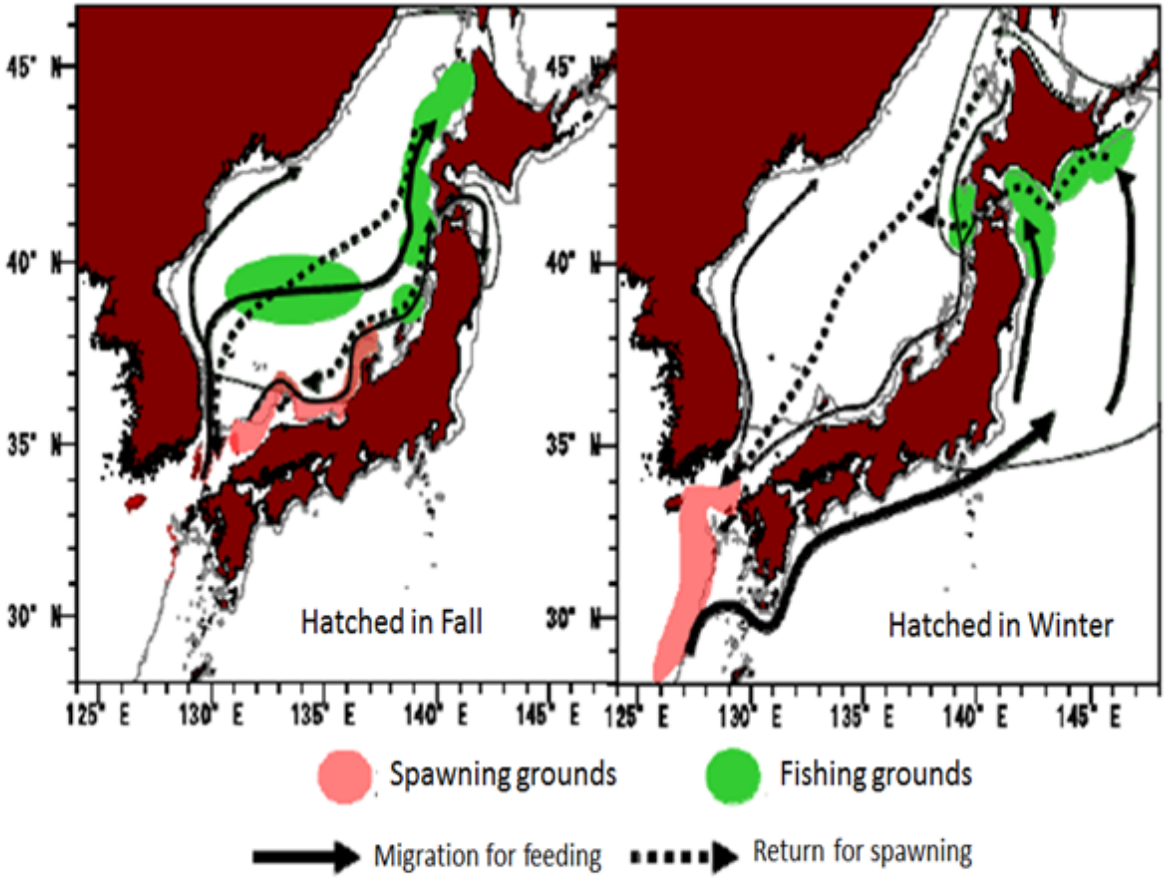
In the Case of Squid

Squid, *Todarodes pacificus*





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Let’s think it together.

It is certainly need to stop global warming.

We need to adjust our life style to our changing environment.

Thank you for your attention

Many thanks to the members of the MAFF project "Development of Mitigation and Adaptation Technologies to Climate Change in the Sectors of Agriculture, Forestry and Fisheries".
Thanks also go to the Fisheries Agency of Japan and Japan Fisheries Science and Education Agency.

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