Interannual changes in the timing of walleye pollock spawning migration and their impacts on gill-net fishery in the southwestern Pacific coast of Hokkaido, Japan

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Distribution and spawning grounds of the JPS

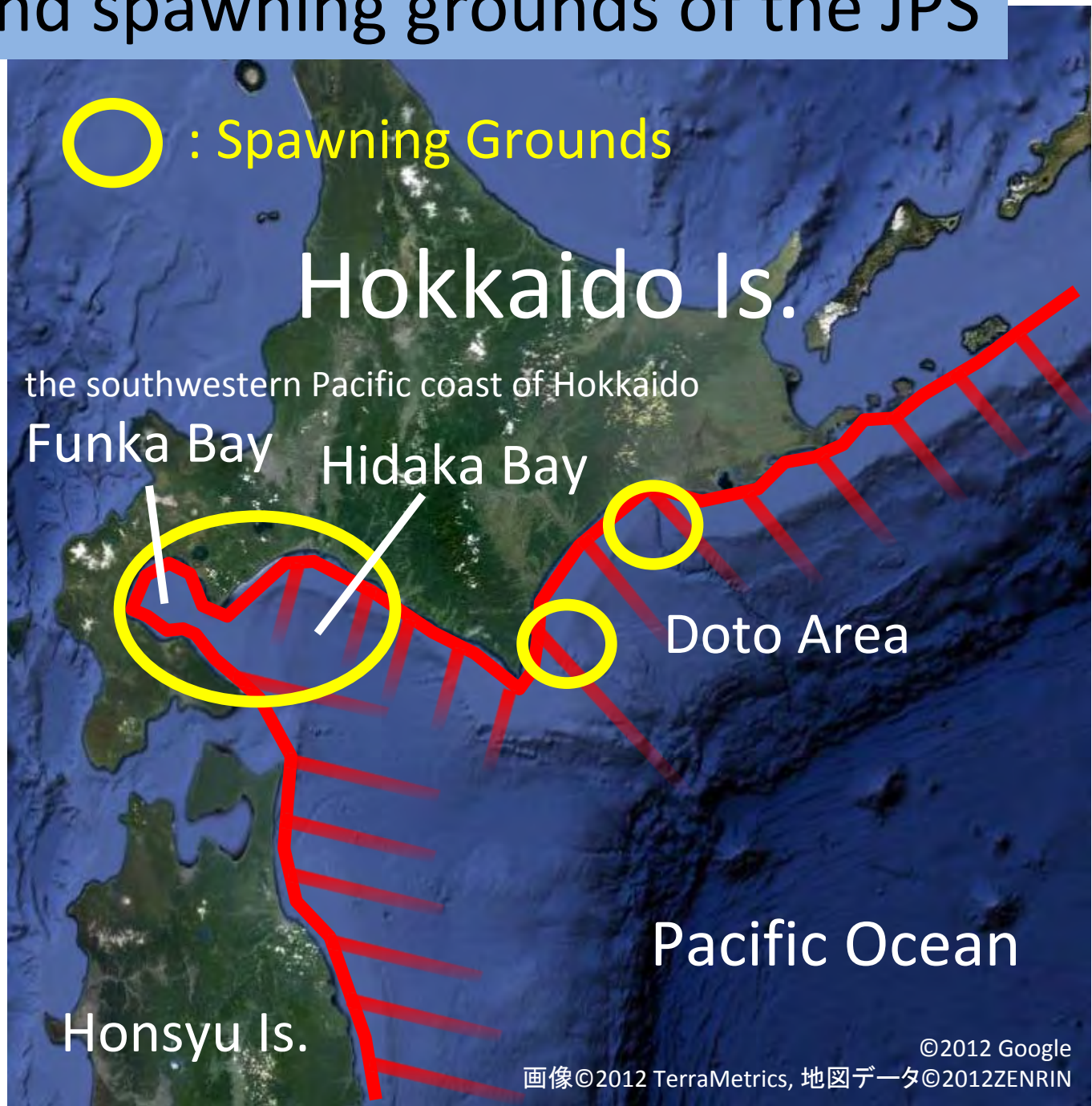
About

Japanese

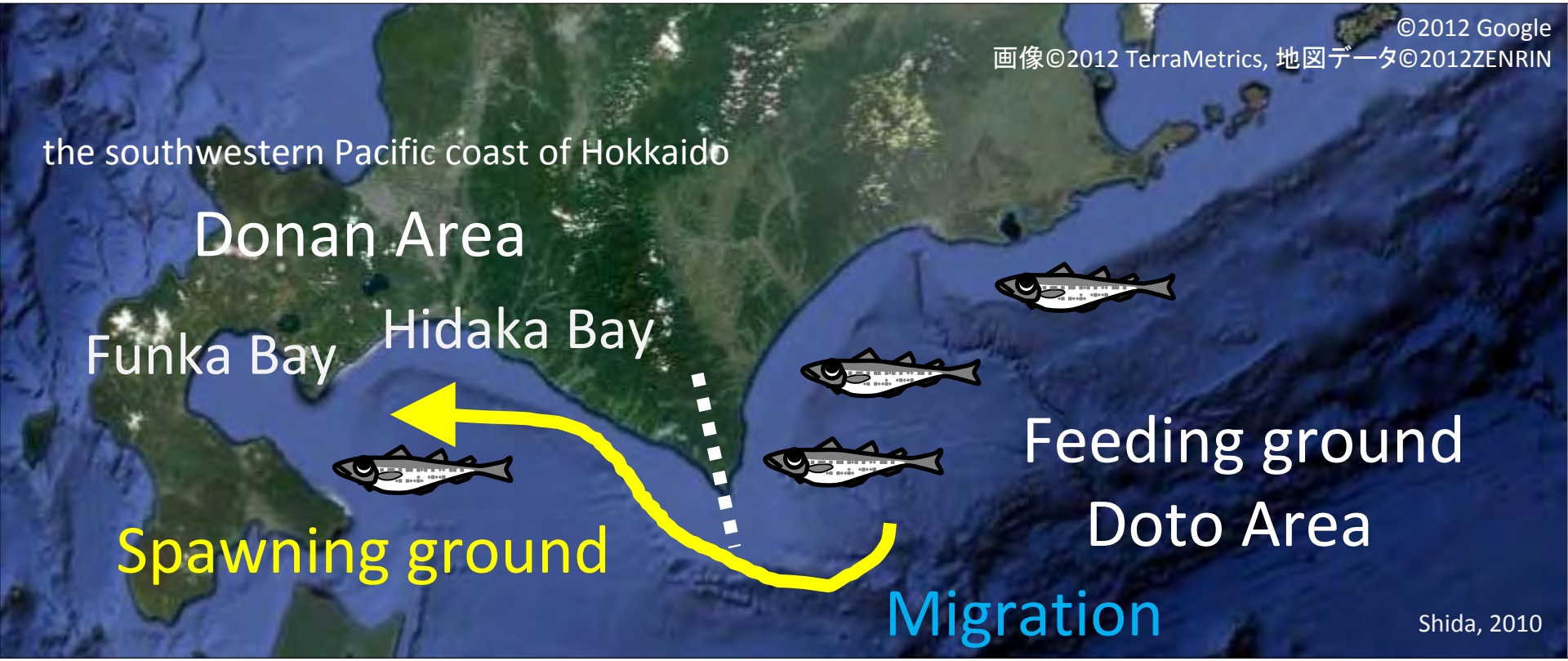
Pacific

Stock

The largest stock of WP in Japanese waters



Migration of adult pollock



Feeding Period : May – October

Transition period : November

Spawning migration

Spawning period : December – March

Transition period : April

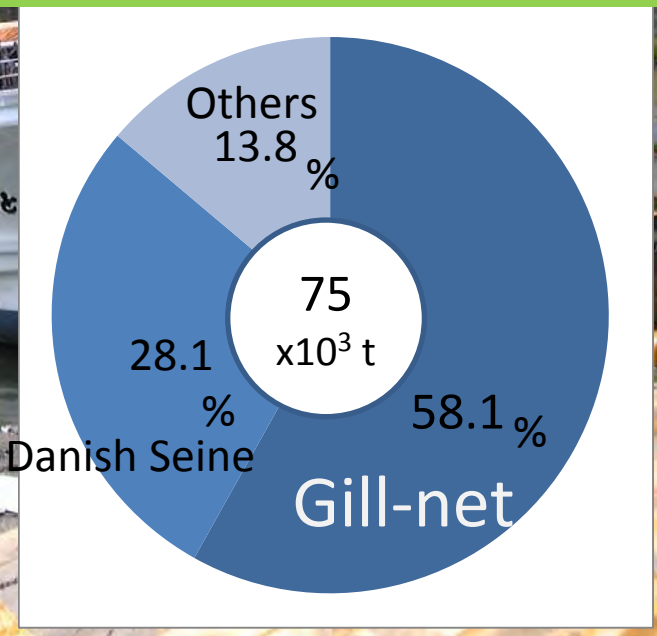
Maeda, 1981

Gill-net fishery in Donan Area

Under TAC control

- **Governor licensed fisheries**
- **The number of boats: > 800**
- **The size of boats: 4.9 – 19.9 t**
- **Target: Adult pollock**
- **Fishing season:**
  October to March
  (mainly October to January)

WP Catch in this area
36 – 96 x 10^3 t



Average values from 2001-2010

We are waiting for migration of pollock

The timing of migration

When do they migrate to this area ?

"Is the migration timing stable ?"

"The JPS shows interannual variations in the timing of spawning."

(Maeda *et al*., 1976)

Questions

- Are there any changes in the timing of spawning migration in this area?
- Do they have any relation to climate changes ?
- Do they have any impacts on gill-net fishery ?

Materials and methods

- To find changes in the timing of spawning migration

  acoustic surveys to estimate abundance of WP in spawning ground.

- To examine effects of changes in the migration timing on gill-net fishery

  Comparison between acoustical estimation and monthly catch by GN

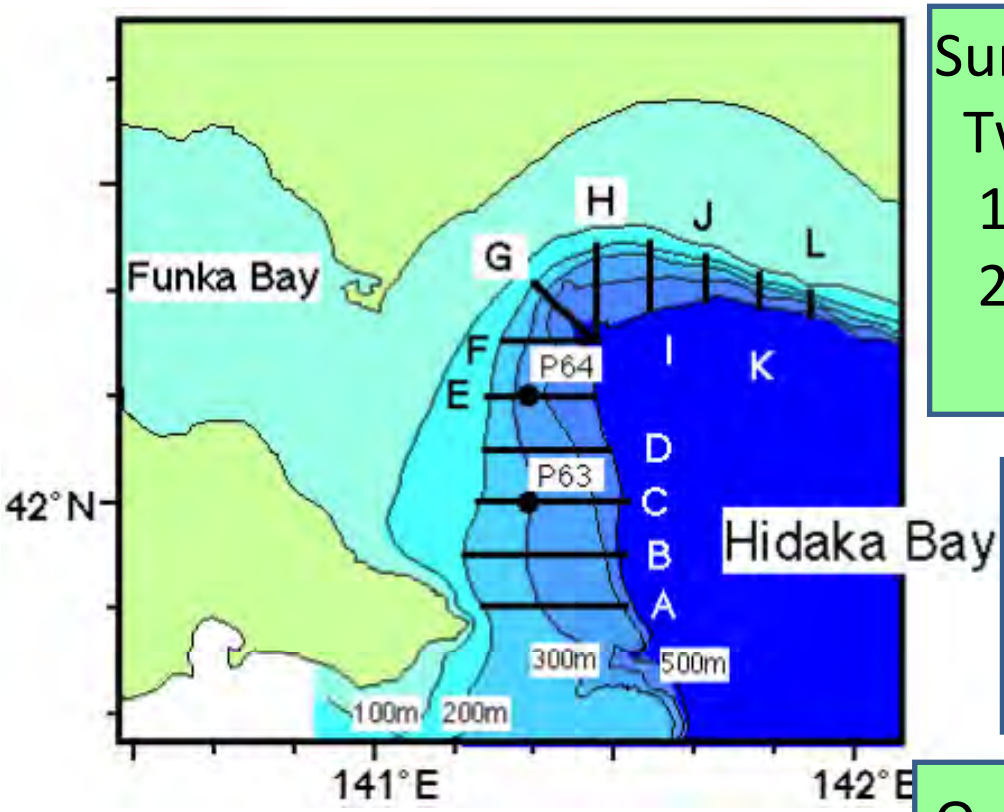
- To find long term changes in the migration timing

  monthly catch data by GN for 26 years, from 1980 to 2005

- To find impacts of migration timing on GN fishery

  Unit prices and catch in each sub-areas

Materials and methods Acoustic surveys



Survey years: 1998 – 2005
Twice a year
1st : September or October
2nd : late November or early December

Echo-integration
: 12 fixed lines (A – L)
Interval between lines: 5miles

Quantitative echo-sounding system
FQ-70(Furuno) 50kHz (1998-2000)
EK-60(Simrad) 38kHz(2001-2005)

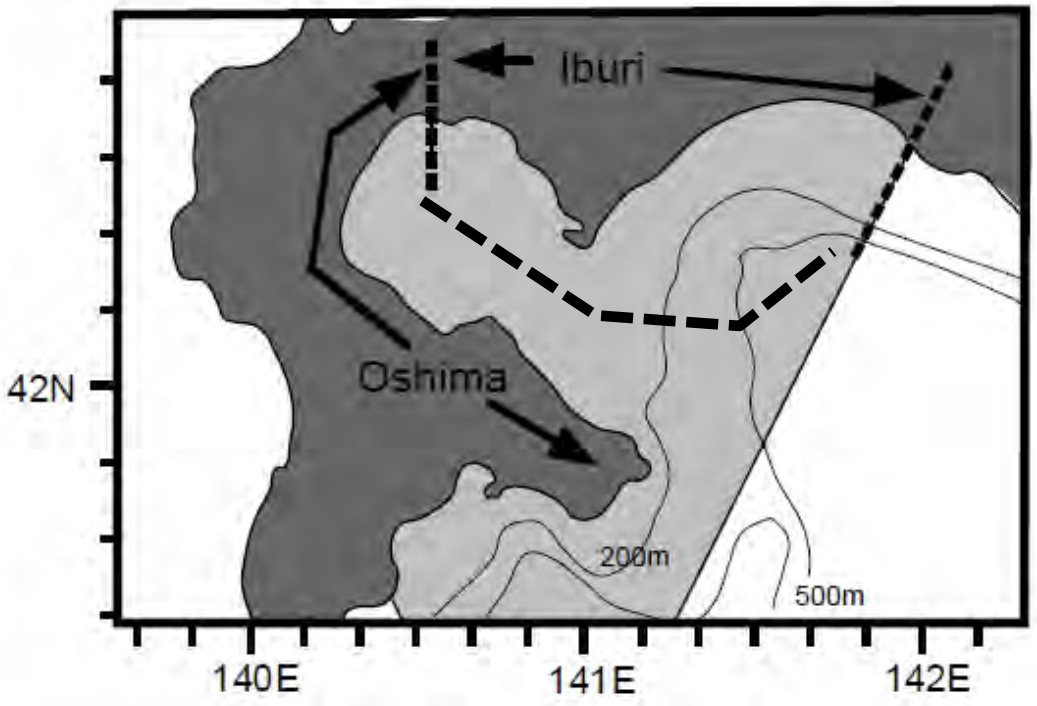

Research Vessels

Oyashio maru: 1998-2000
Kinseimaru: 2001-2005

Pollock abndance
mean nautical area scattering coefficient (NASC)

Gill-net fisheries

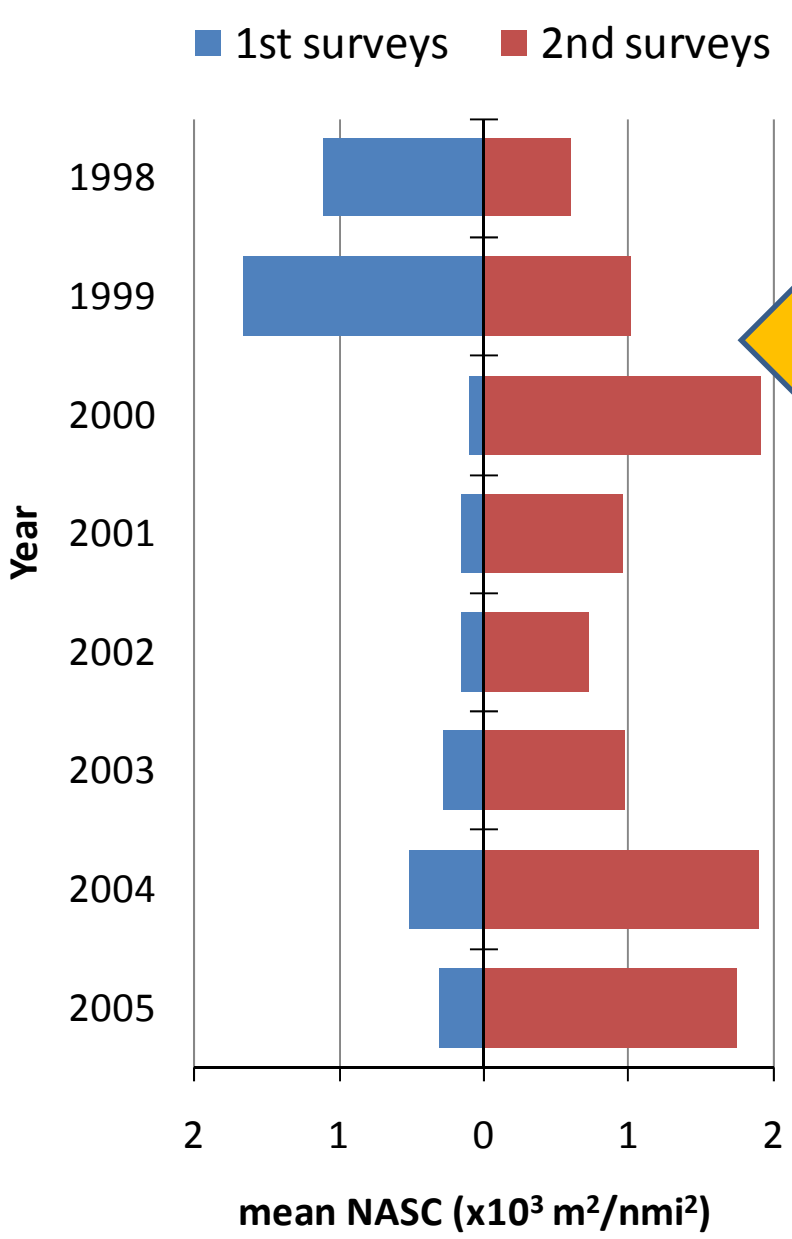
Catch data
- 1980-2005
- Monthly Catch (kg)
- Monthly Value (Yen)
- Unit price =
  - monthly value/ monthly catch



Fishing Ground:

Source:
- Fishery statistics
  - by Hokkaido government
  - Department of Fisheries and Forestry

Results of acoustic surveys



Abundance of walleye pollock

1998-1999

1st surveys > 2nd surveys

Change !!

After 2000

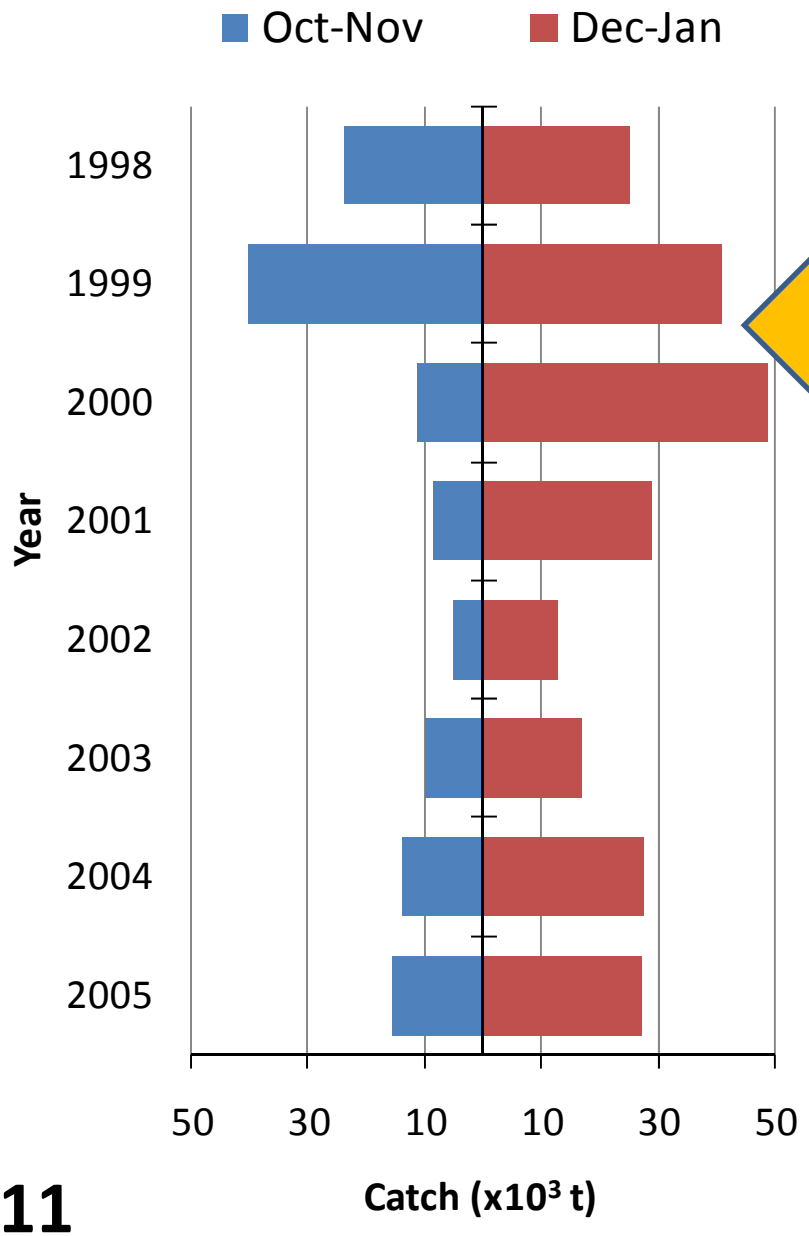
1st surveys < 2nd surveys

Migration timing

Early: 1998-1999

Late: after 2000

Monthly catch by gill-net fishery



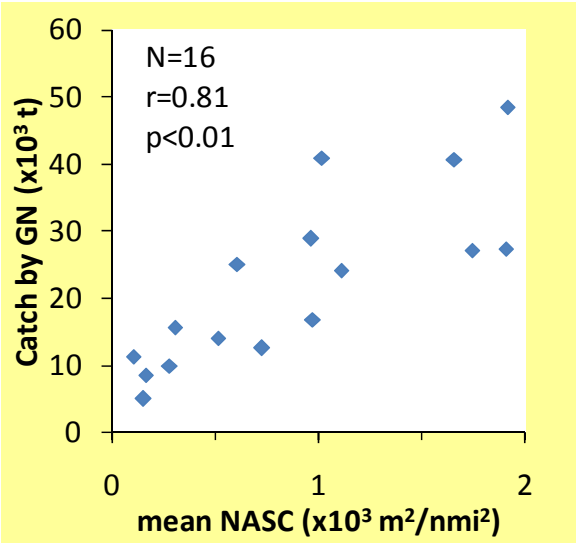
1998-1999

Oct-Nov = Dec-Jan

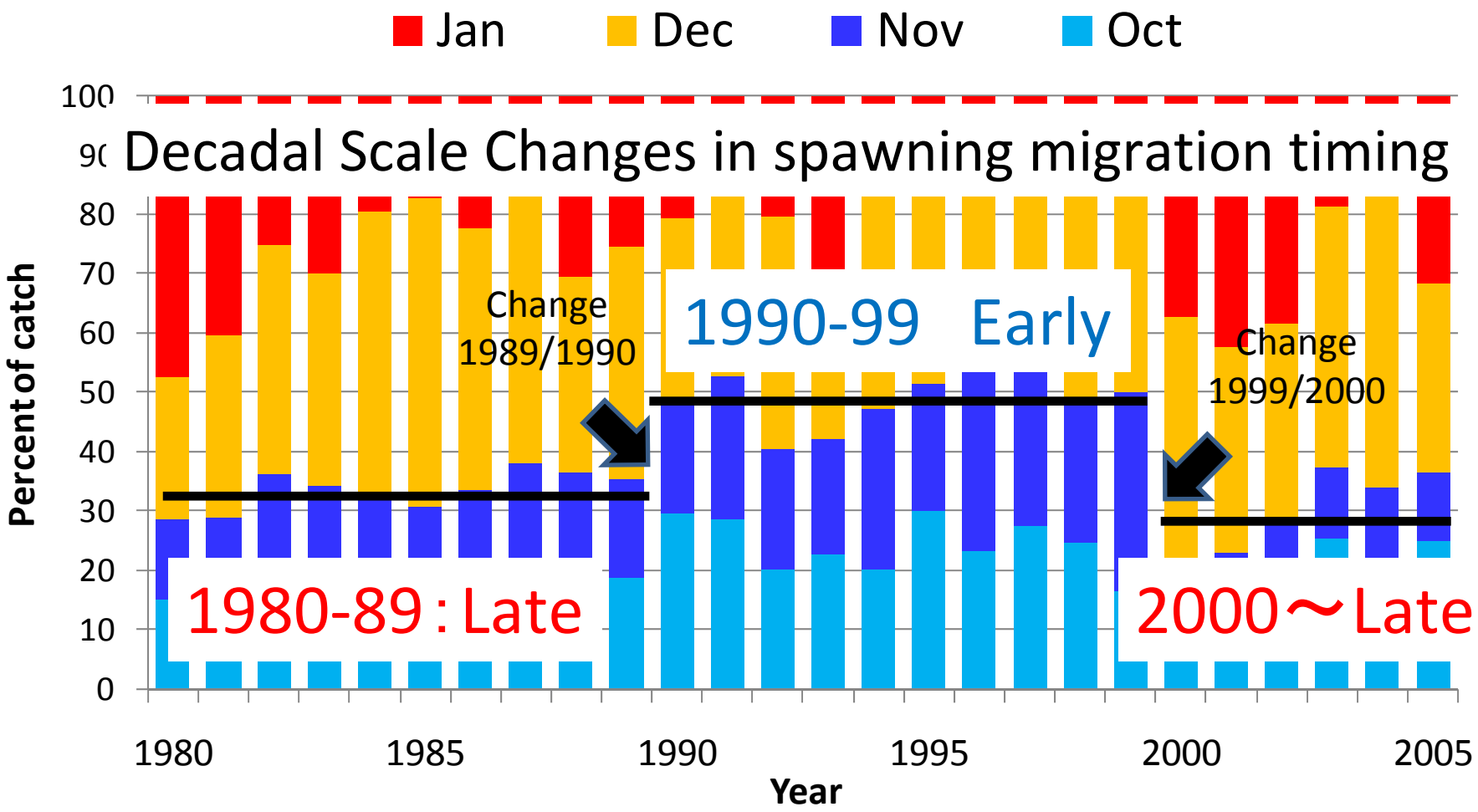
Change !!

After 2000

Oct-Nov < Dec-Jan

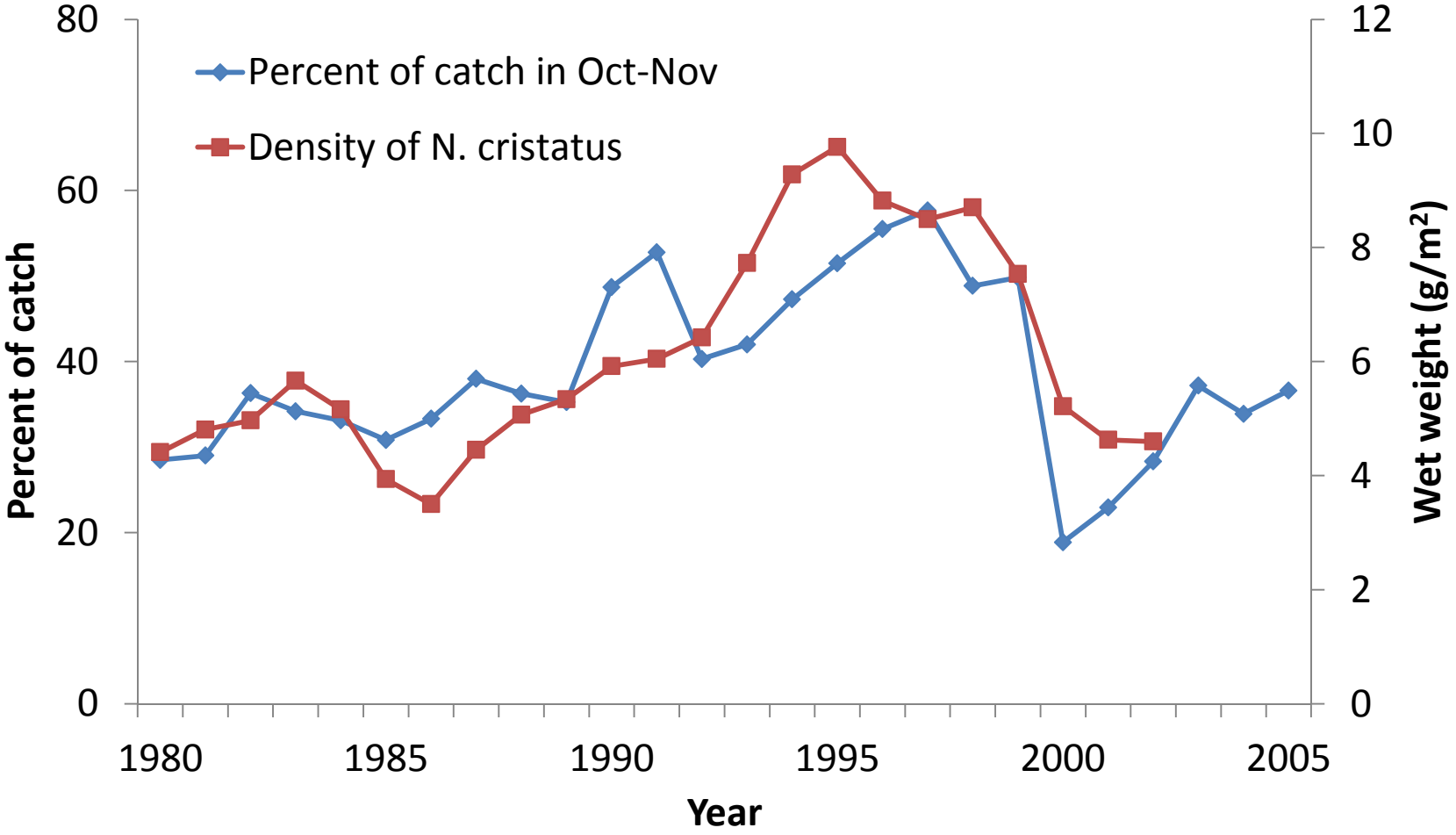


Interannual changes in monthly catch by GN fisheries for 26 years



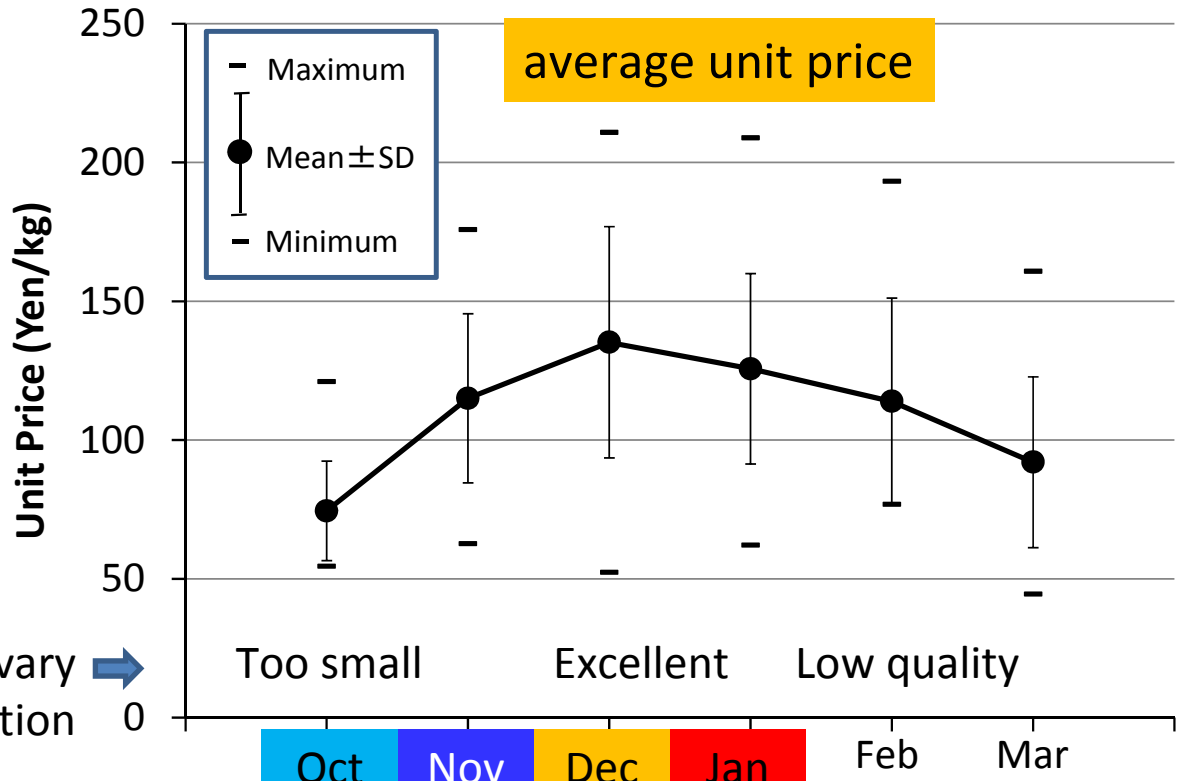
Climate changes ?

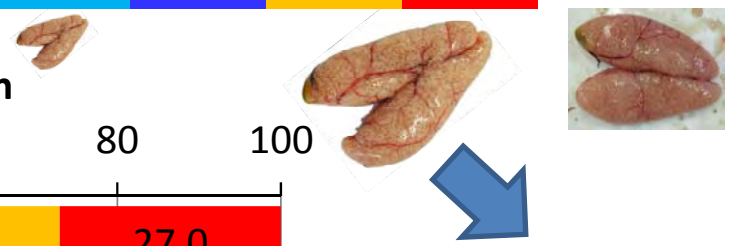
Mesozooplankton biomass decreased and increased synchronously with the climatic regime shifts. (Tadokoro *et al*., 2005)



Interannual changes in density of *Neocalanus cristatus* in the Oyashio water (Tadokoro *et al*., 2005) and percent of walleye pollock catch from October to November.

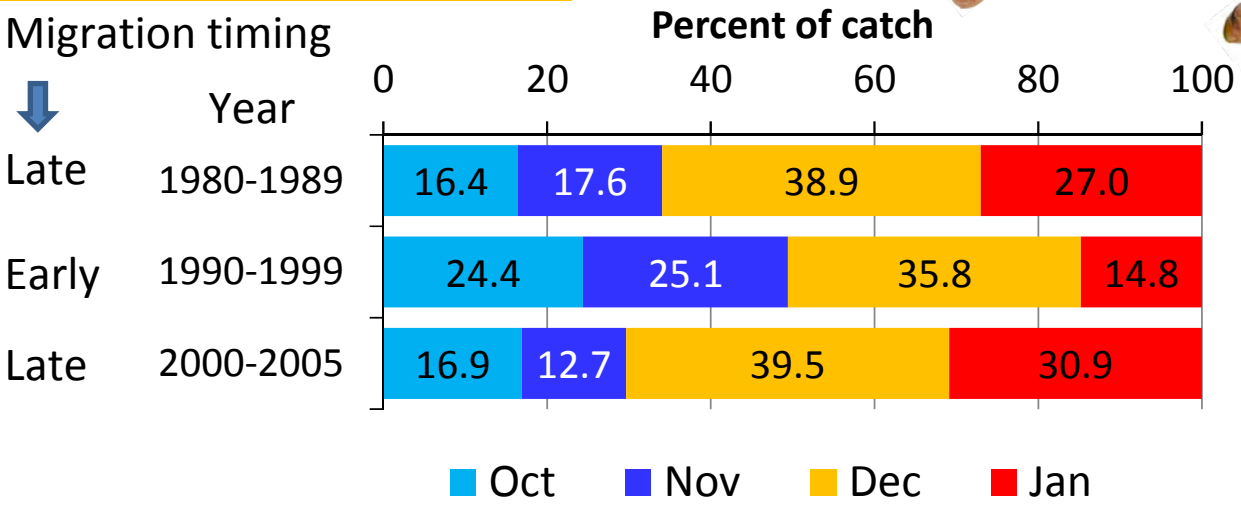
Unit price



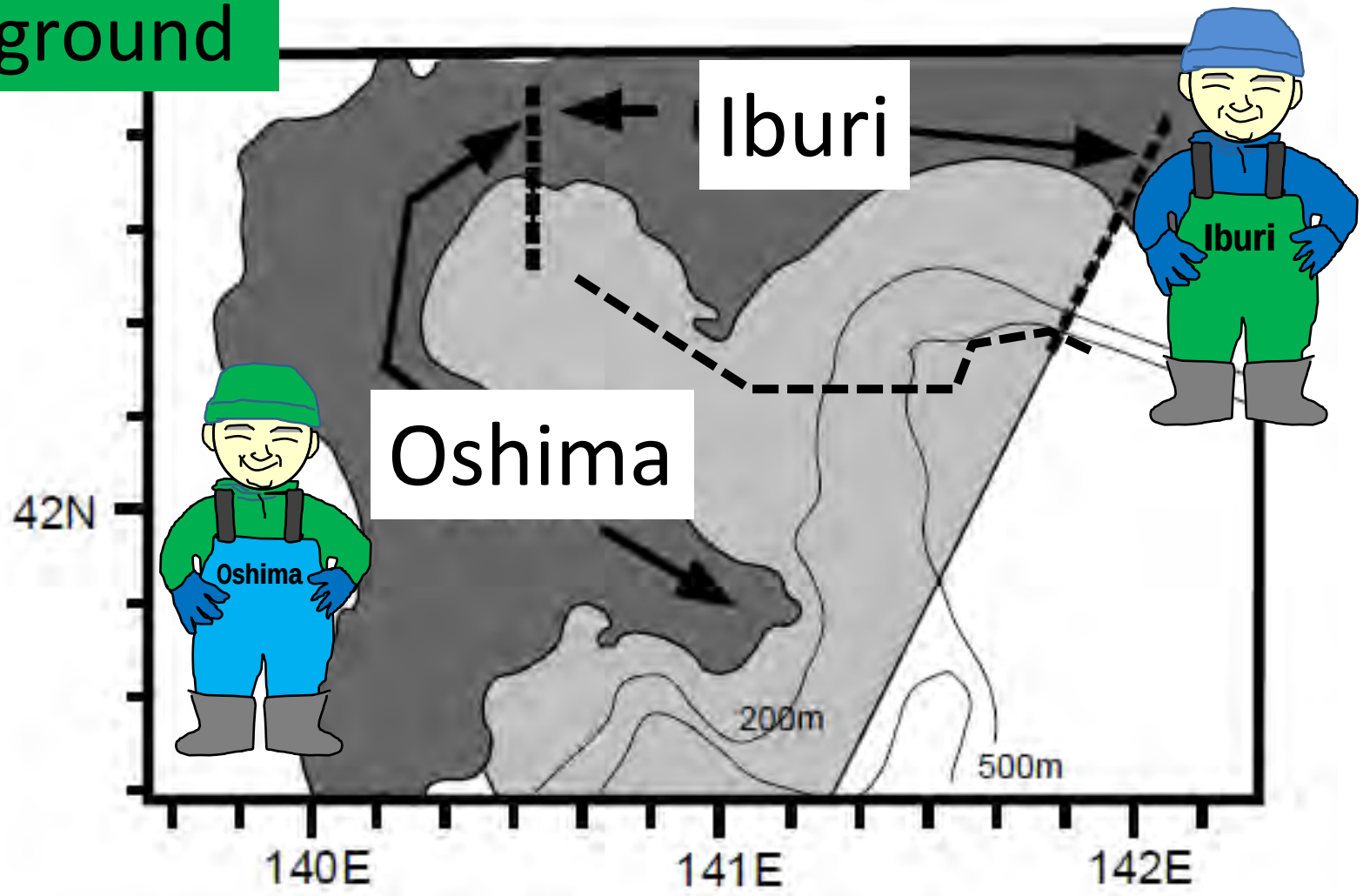


Salted roe "Tarako"

Percent of monthly catch

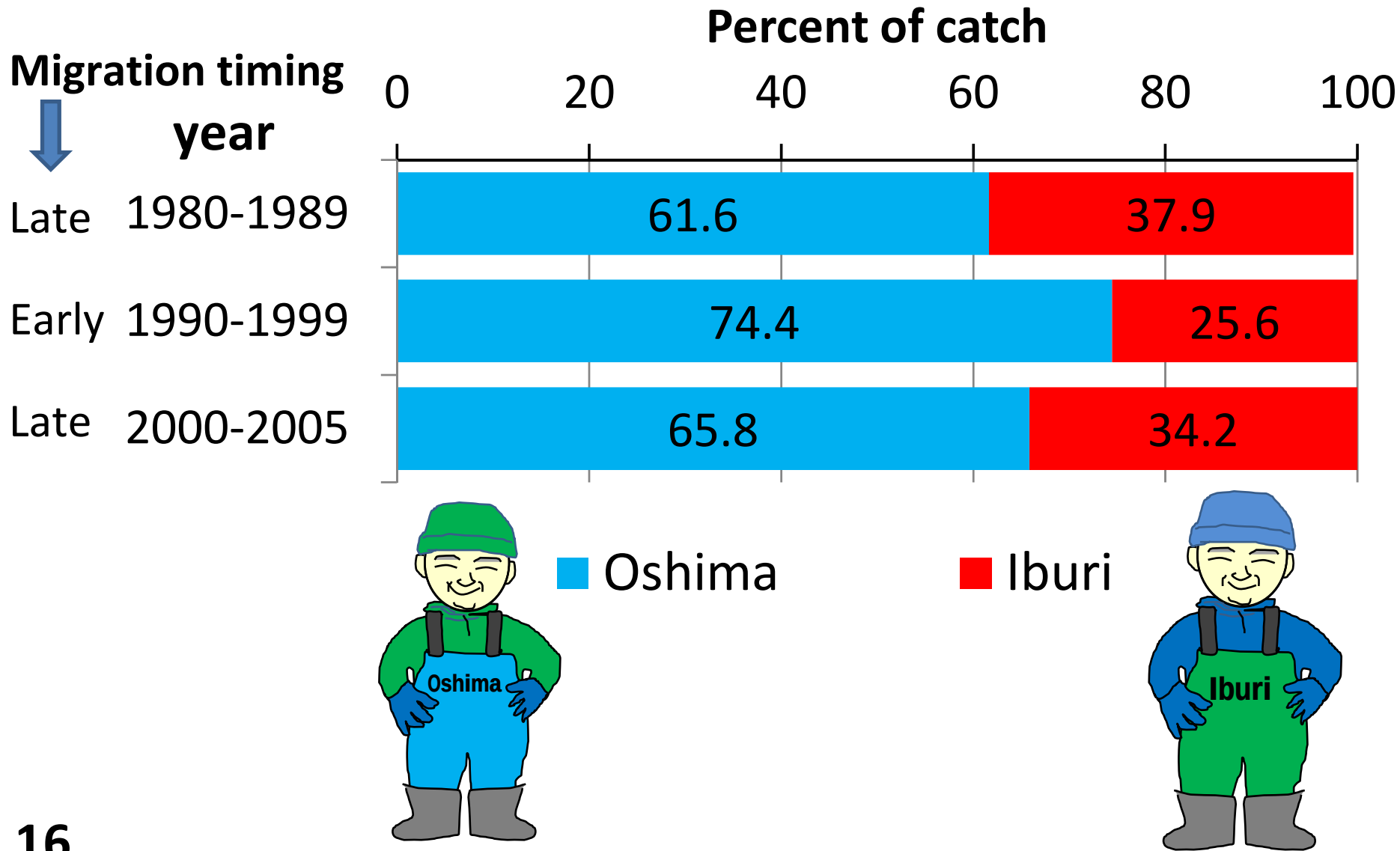


Fishing ground



	Sub-prefecture	
	Oshima	Iburi
Location	South-west	North-east
No. of licensed boats	617	212

Fishing ground and catch

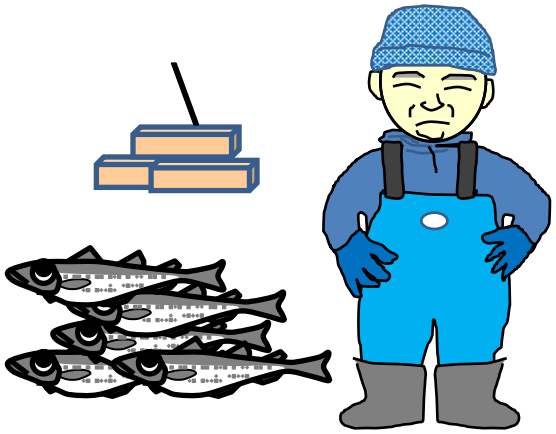


Migration timing and gill-net fishery

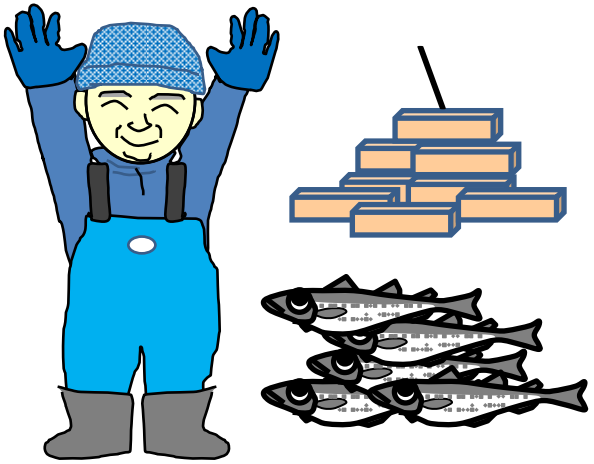
Migration Timing

Early

Late



Unit price



Fishing ground

Conclusions

- Decadal scale changes in the timing of spawning migration have occurred.
- These changes were possibly affected by the climatic regime shifts.
- These changes largely affected on the gill-net fishery in this area.

Thank you for your attention

Commercial catch record analyses and a part of the survey cruises were conducted as part of Marine Fisheries Stock Assessment and Evaluation for Japanese Waters founded by Fishery Agency of Japan.