

Pacific bluefin tuna

Treasure box for scientific studies
or Pandora's Box ?

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Contents of presentation

There are many important unknowns or uncertainties for this stock which need to be investigated urgently: e.g.,

- Early life history
- Difference in age at spawning by area and its implication to stock structure
- Migration patterns
- Farming and complete aquaculture, its impact to fisheries
- Most of the fisheries exploit juvenile

Studies on early life history

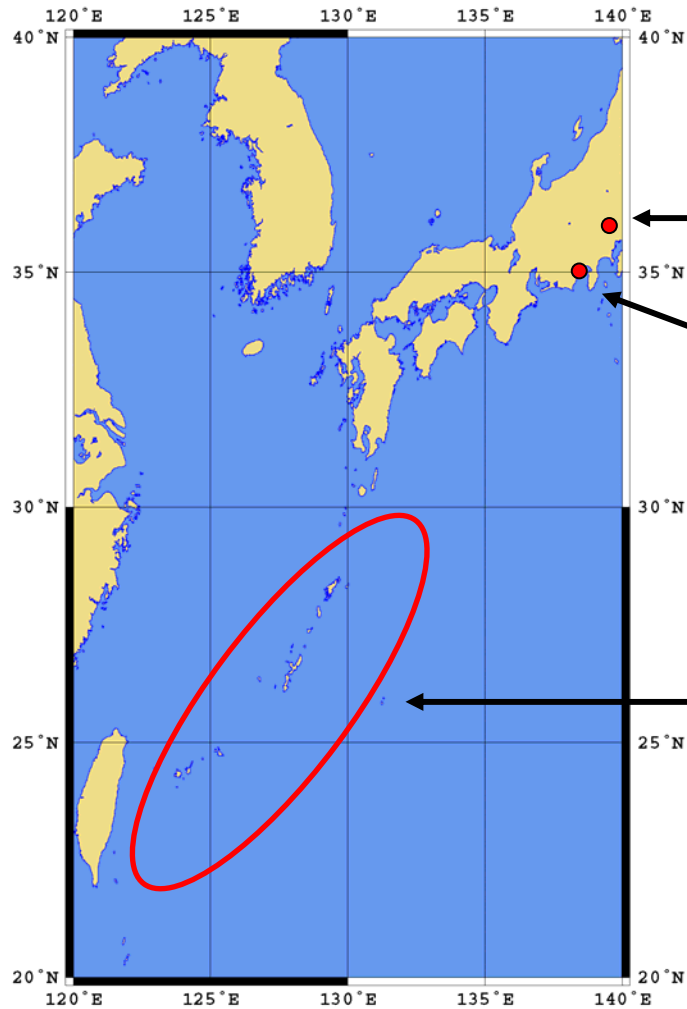
Largest fluctuation of recruitment strength in tunas(relatively restricted spawning time/area, where is “critical period(s)” and how survival is determined)

** Abundance index for age 0 fish is available*

Initiative to investigate source of the fluctuation has been taken under the CLIOTOP WG1, here some preliminary findings of Japanese works are introduced: those indicate many difficulties to overcome

- Establishment of sampling method, then identify major factors both biotic and abiotic ones
- Mortality
- Growth

Need for more field studies compared with experiments in restricted artificial condition



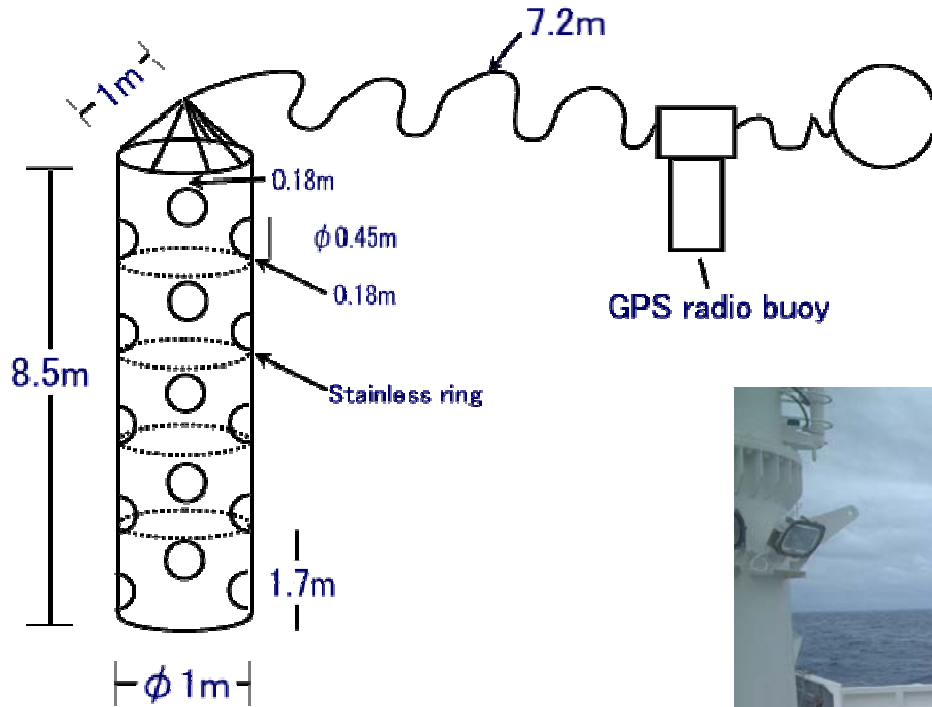
Tokyo

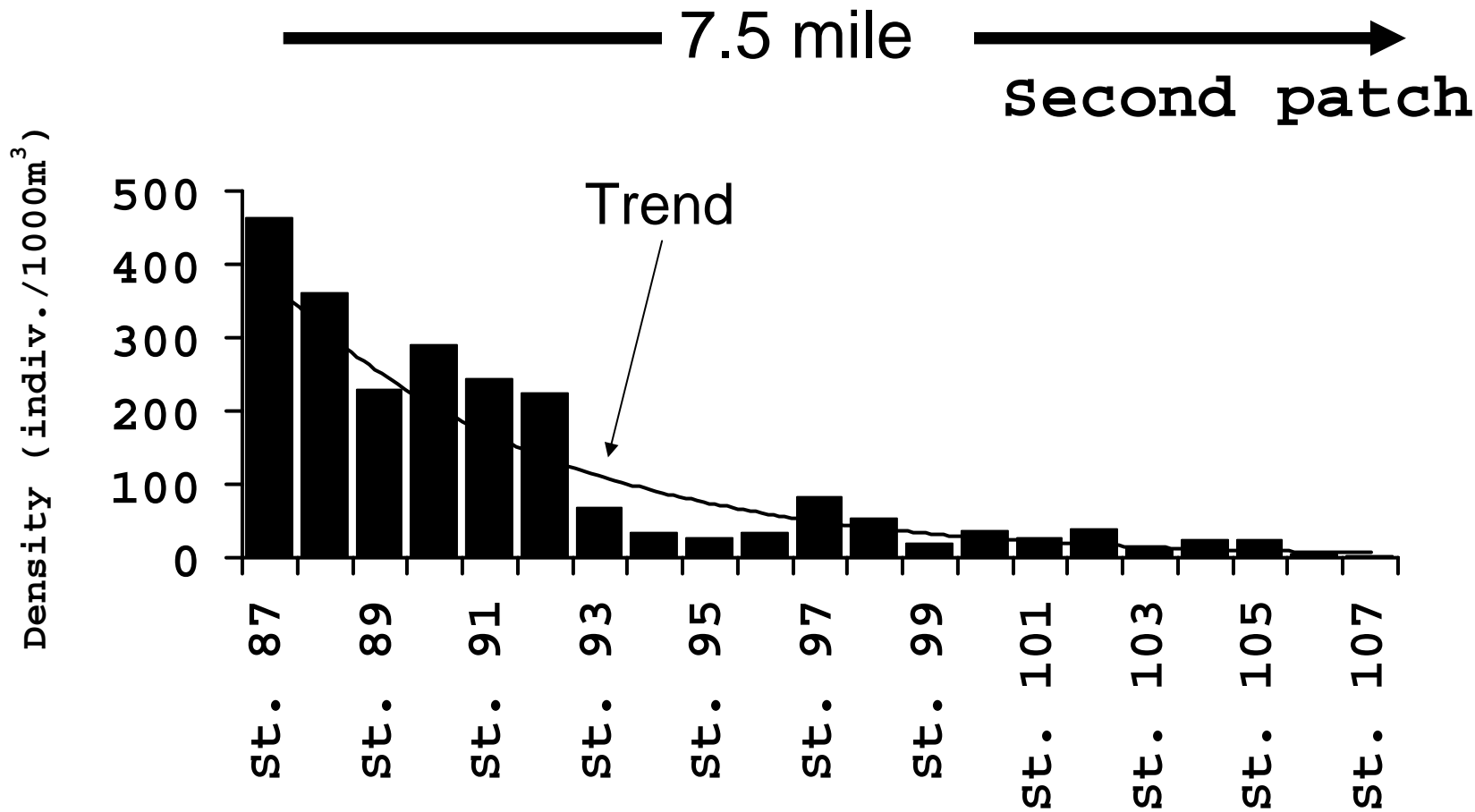
Shimizu

Research area (Nansei islands)

From 10 May to 10 June 2004

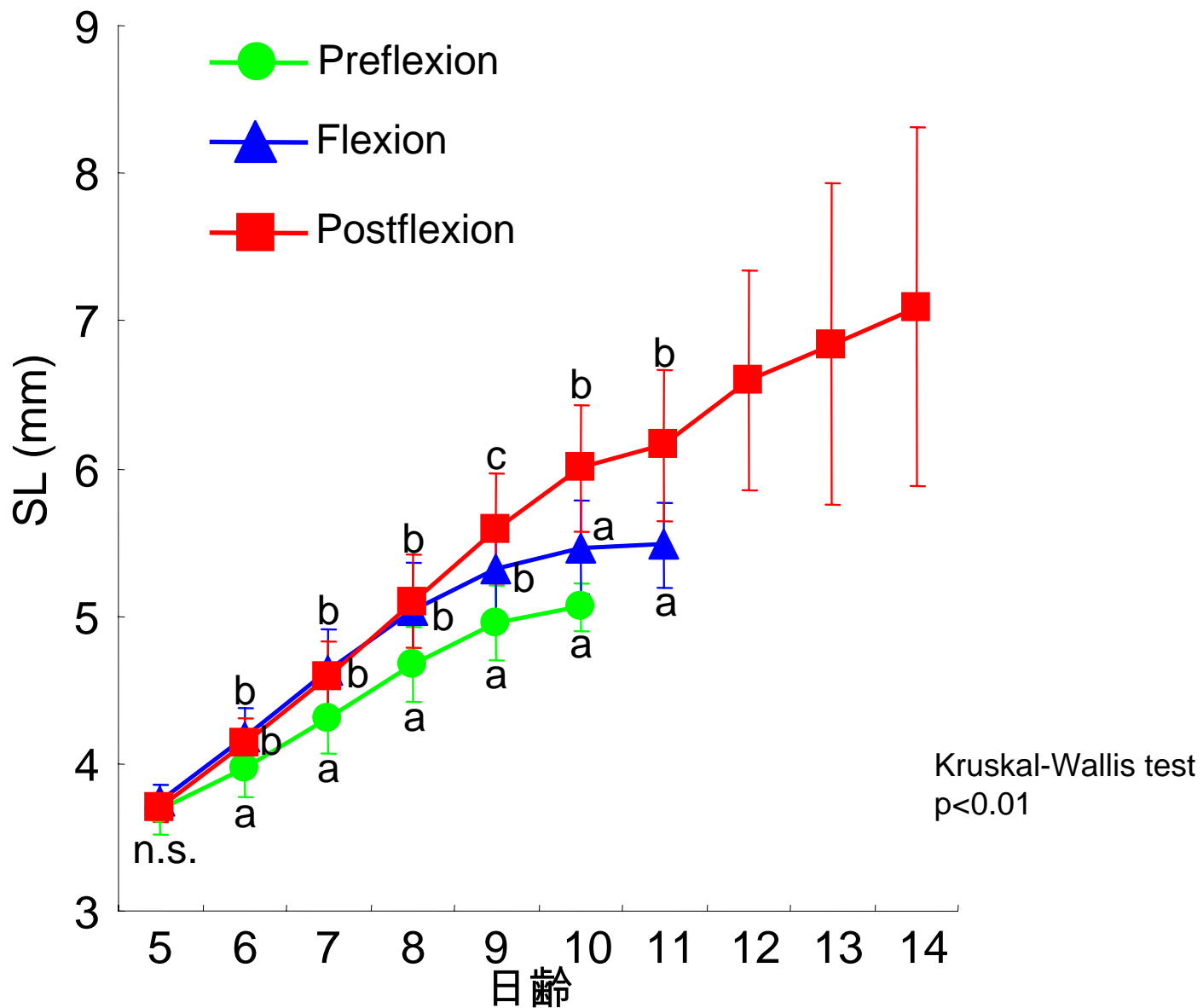
Outline of the tracking buoy





Horizontal distribution of bluefin tuna larva observed with transect of 20 times 5-min surface tows

Back-calculated SL of PBT larvae in three developmental phase at catch

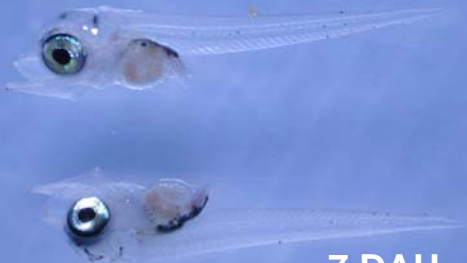




Morphological changes in process of growing in tank (photographed in 2004)



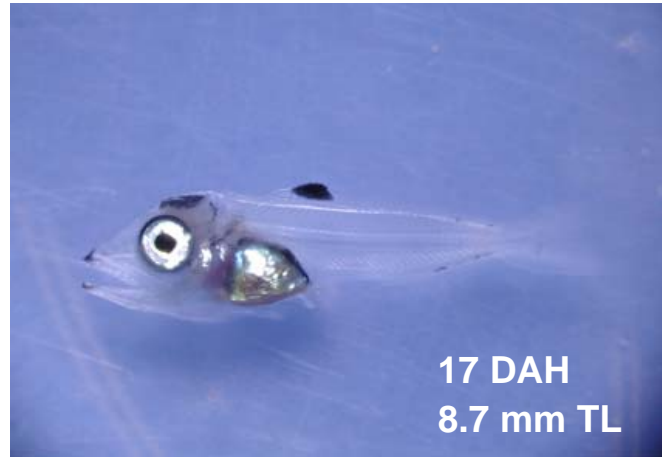
Hatching
3.7 mm TL



7 DAH
4.6 mm TL



14 DAH
7.2 mm TL

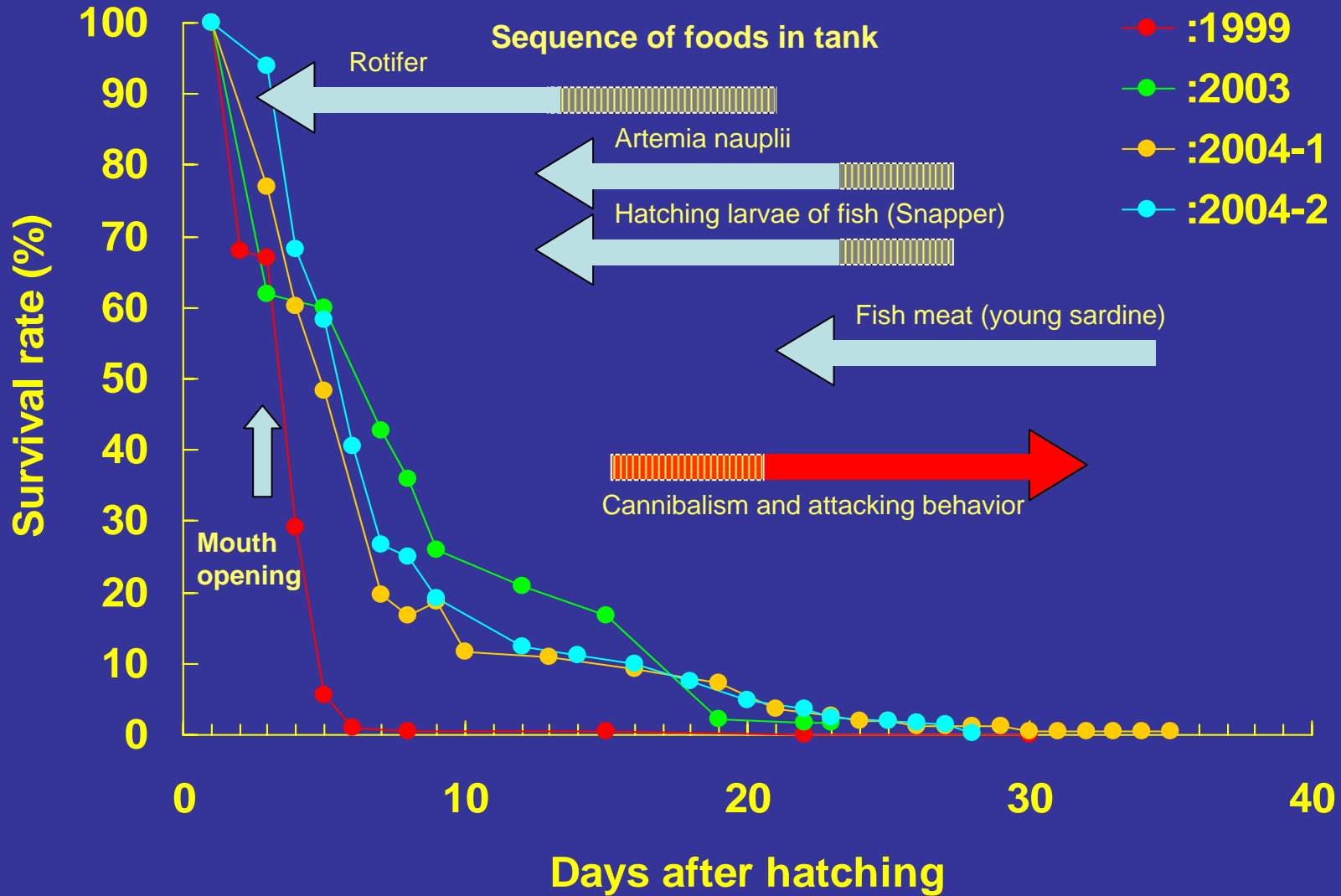


17 DAH
8.7 mm TL



24 DAH
27 mm TL

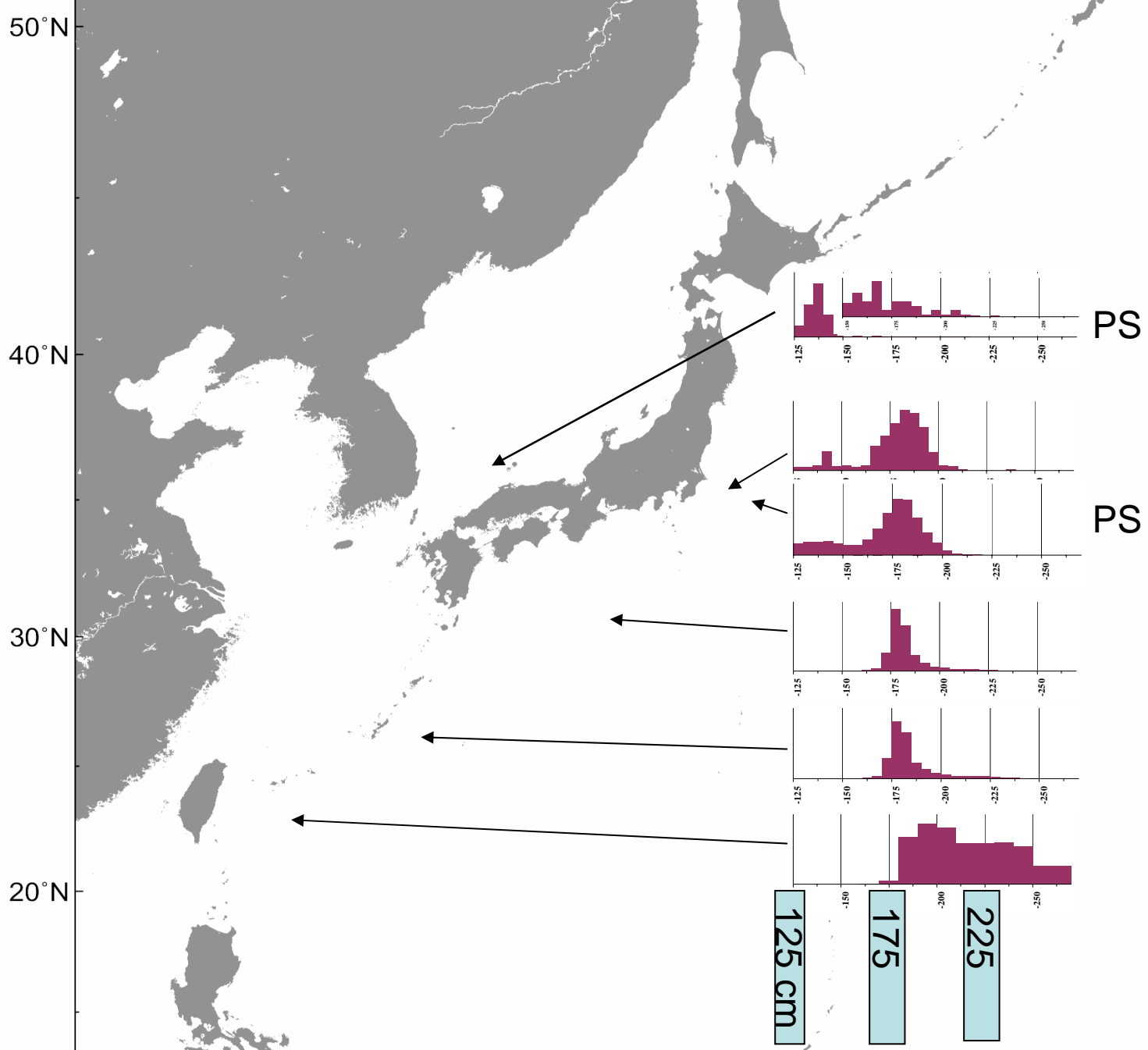
Survival rates of artificially raising bluefin larvae in tank



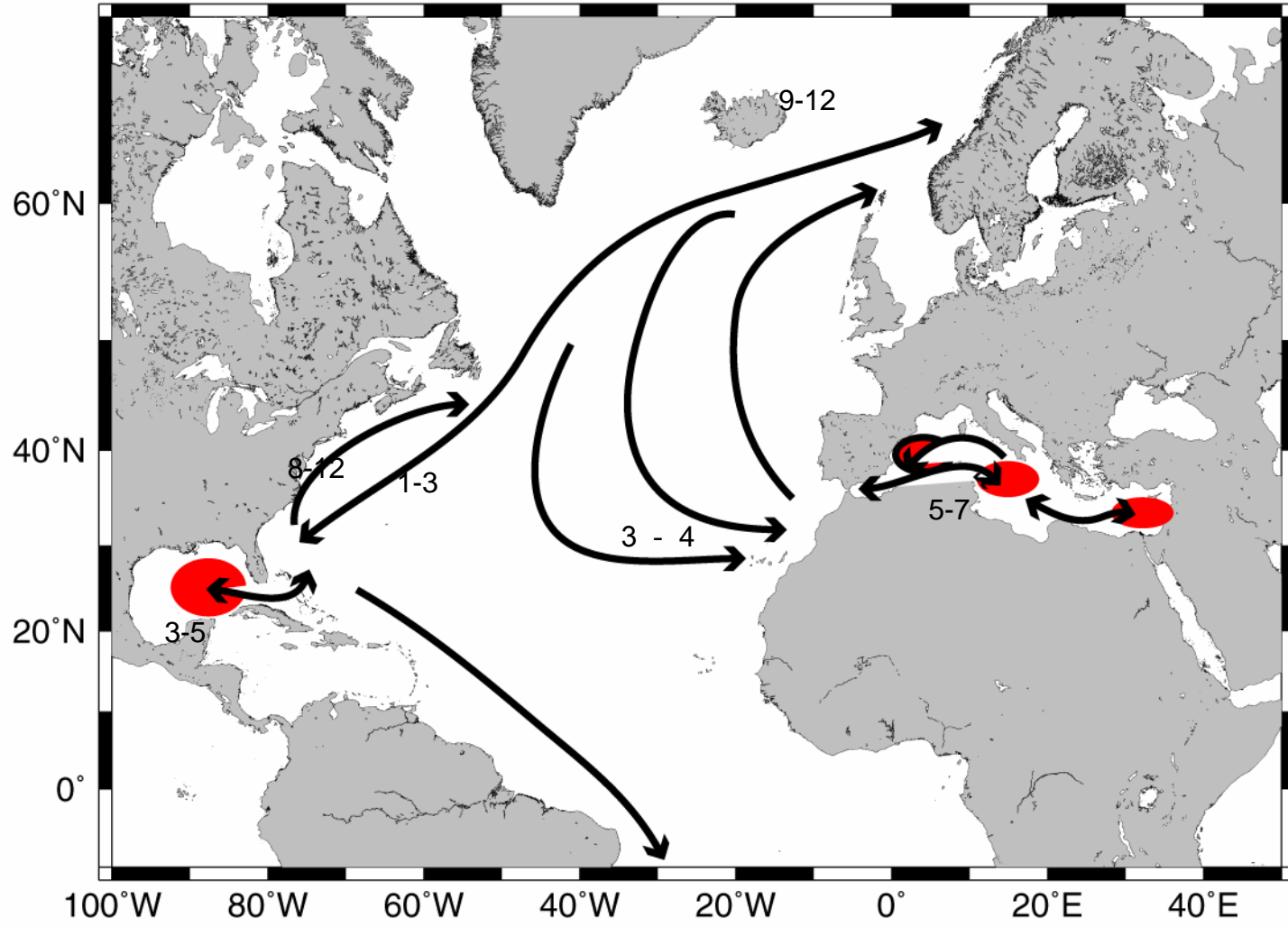
Difference in age at spawning by area and its implication to stock structure

The observed difference could have important implication to stock structure and management for Pacific and Atlantic stocks

- Age at spawning differs significantly by area: how to estimate spawning potential by size ?
- There seems to be a general rule as for timing and area for spawning: spawning begins earliest in the south with large sized fish and late in the north areas with small fish
- Implication to stock structure: Pacific and Atlantic
- Need for genetic/micro-constituent element studies and physiological/histological studies on spawning size



Schematic migratory pattern of adult ABFT

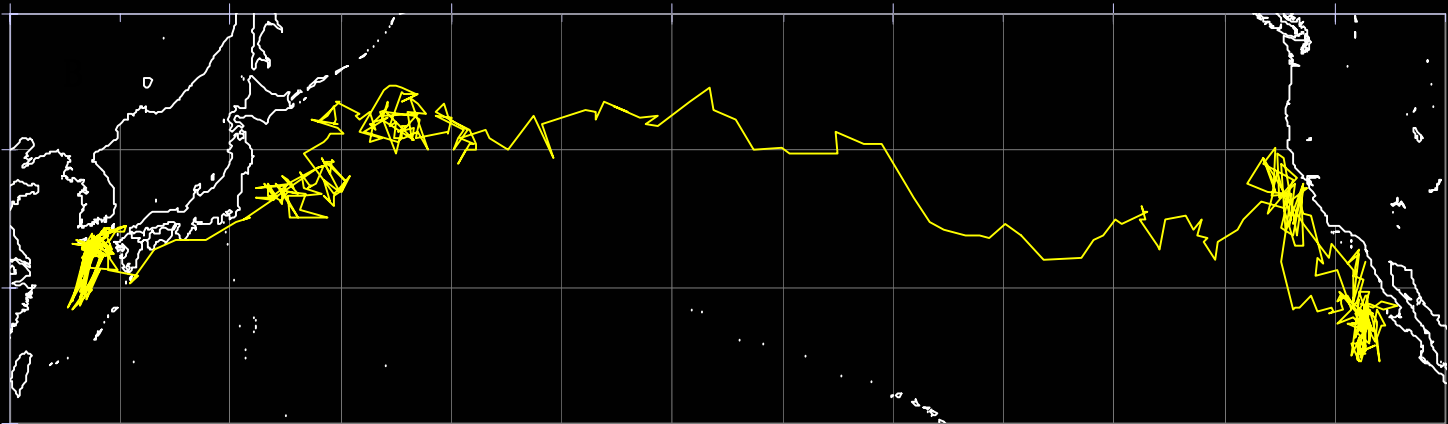
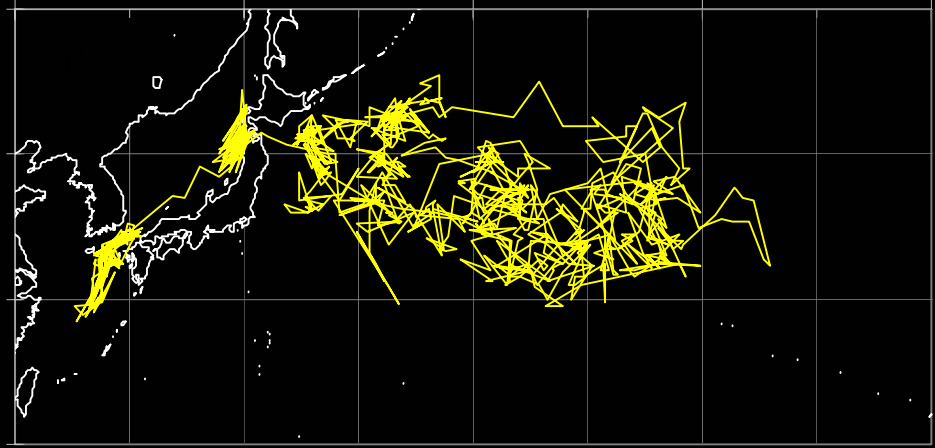
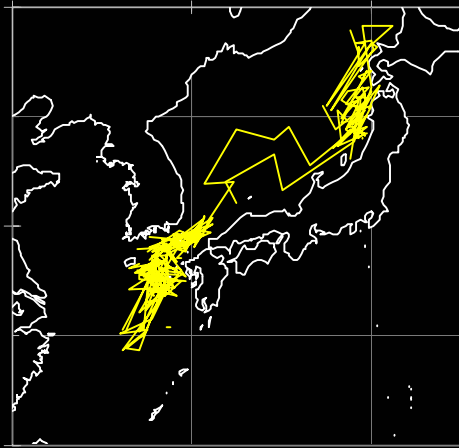


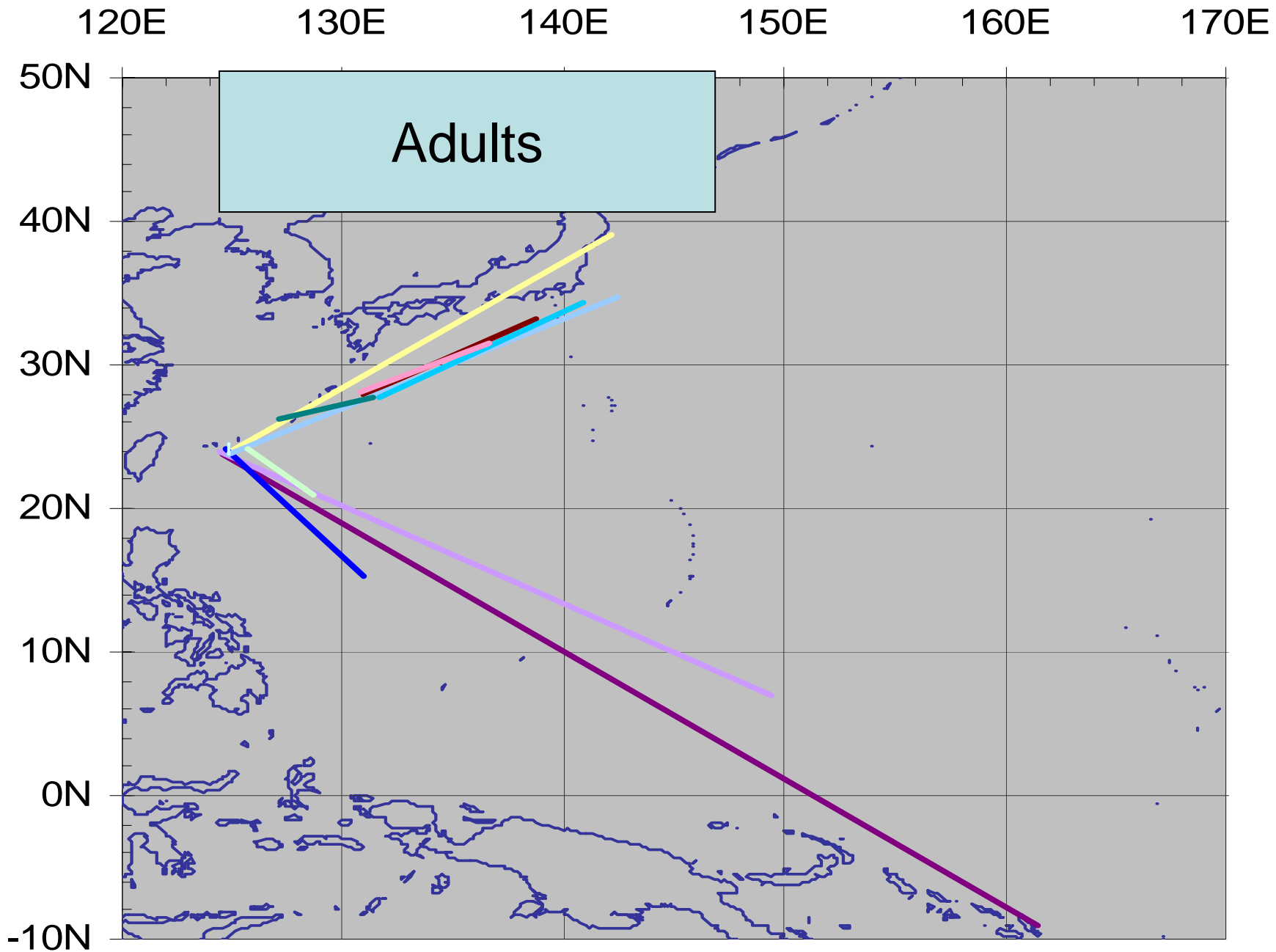
Migration pattern

There are strikingly high similarity between Pacific and Atlantic stocks

- Three major patterns ?
- Why seemingly same members of a group show different migratory pattern: instinct vs opportunity
- . Need for more electronic tagging and IBM type of approach as well as environments

Major patterns: juveniles





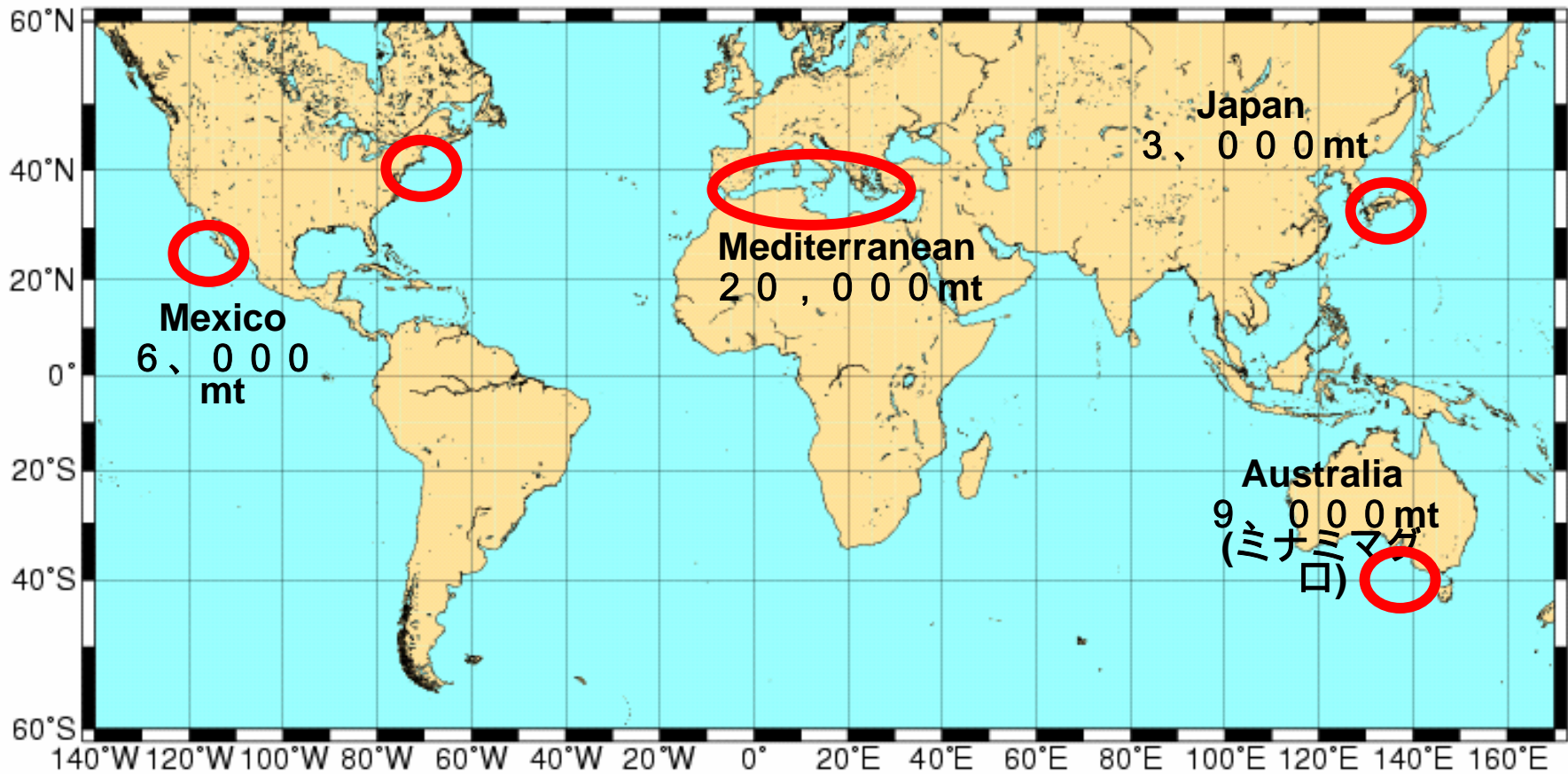
Farming and complete aquaculture, its impact to fisheries and management

Farming poses a number of issues but could potentially revolutionize the tuna fisheries and market if it match with other emerging factors

- Trend in farming activity
- Other emerging factors: Complete aquaculture and increase of *sashimi* market other than Japan; especially China
- Need for economic analyses for tuna farming with fisheries

養鯊クロマダロ、ミナミマダロの生産 - 2

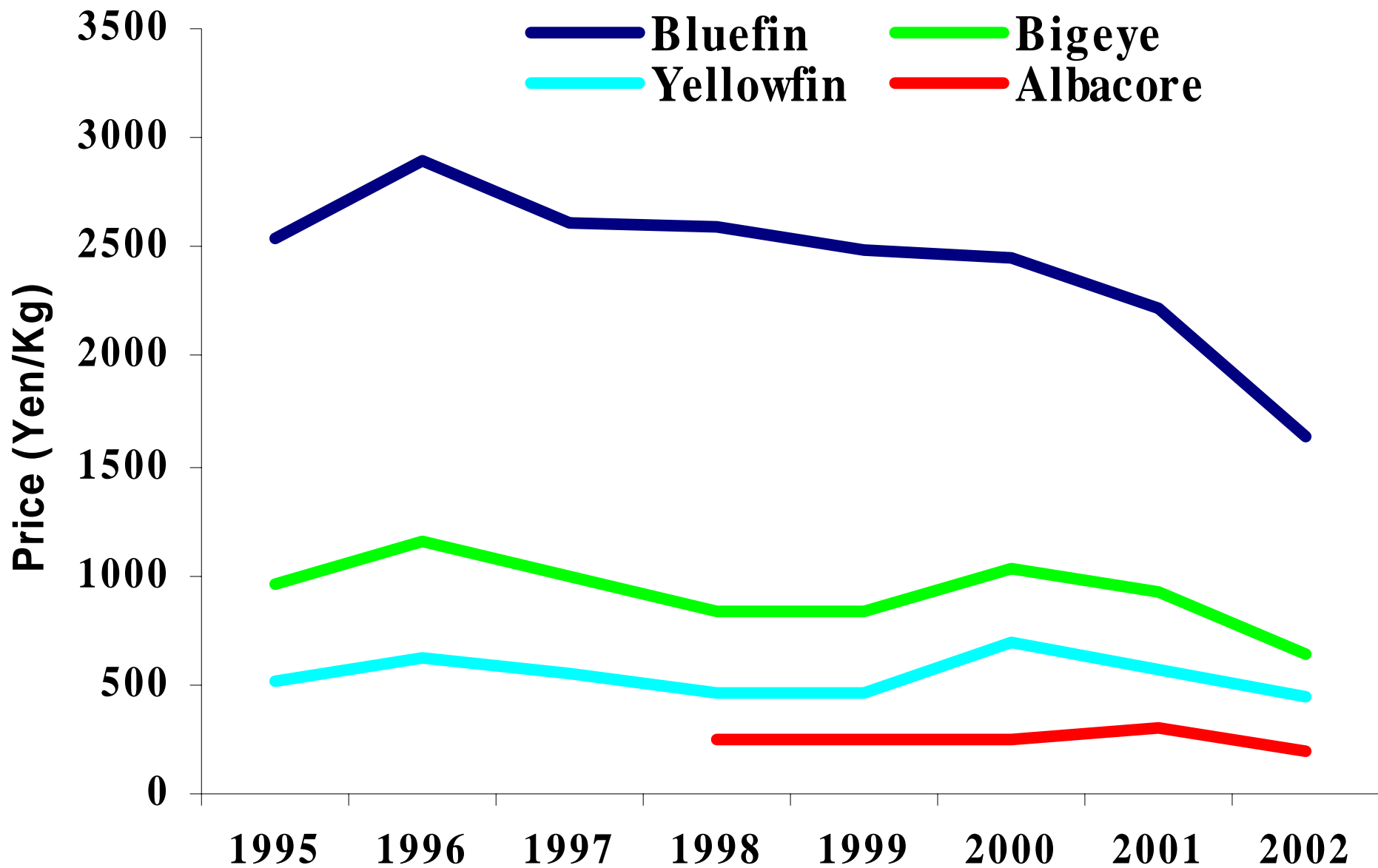
Production of farmed Northern and Southern bluefin tunas in 2004



Bluefin tuna farming in the Mediterranean



Average ex-vessel price of Japanese catch (frozen) by species



Some of management issues

The stock status appears relatively healthy compared with other heavily exploited species but not without issues, of course:

- . Massive catch of juvenile fish

More than 95 % of catch in number is juvenile less than 3 years old.

Trade-off between increase in Y/R by taking larger fish and putting burden to change the fisheries

Importance of keeping the recommendation from the ISC to cap the fishing effort at current level

- . Uncertainties *Recruitment fluctuation, M vector, Longevity*