

Disentangling the effects of fisheries and climate change on fish communities

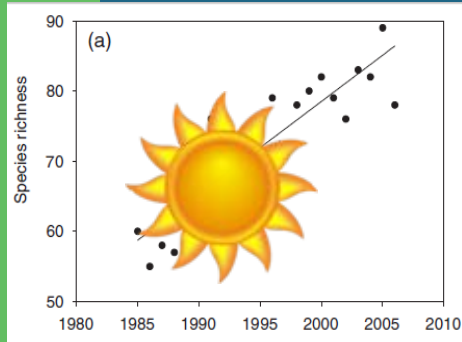
A2-6080

Remment ter Hofstede, Adriaan Rijnsdorp
26 April 2010, Sendai, Japan

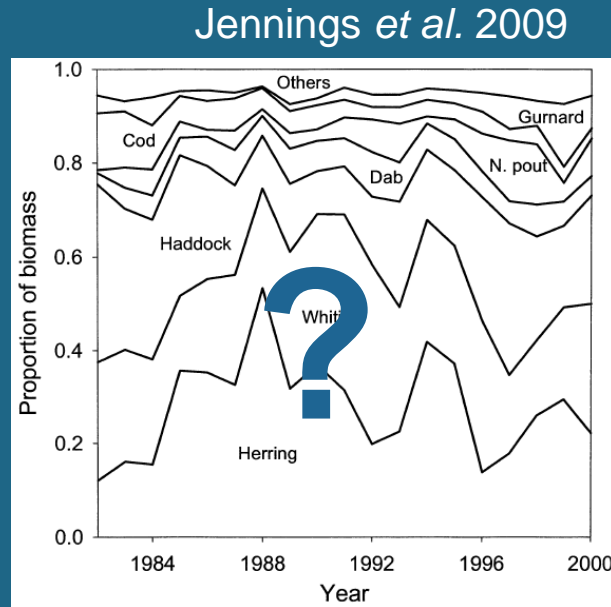


Changing fish communities

Daan *et al* 2005



Hiddink & ter Hofstede 2008



Beaugrand 2004

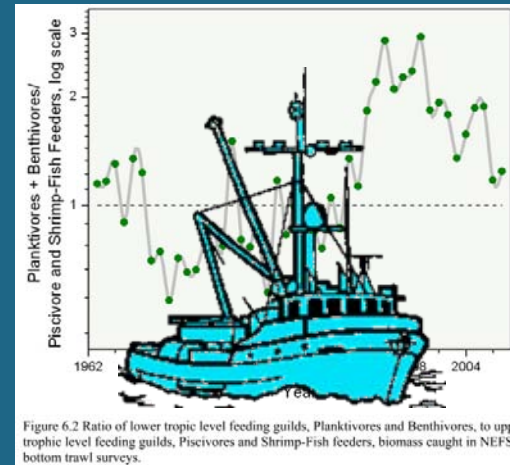
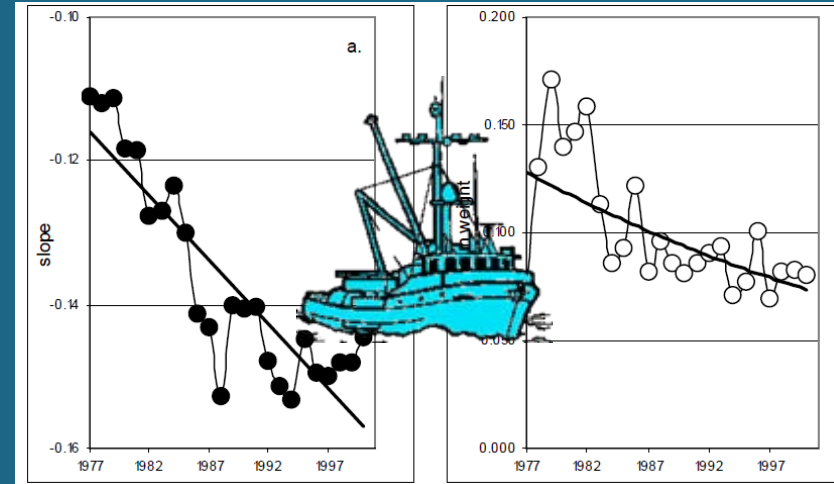
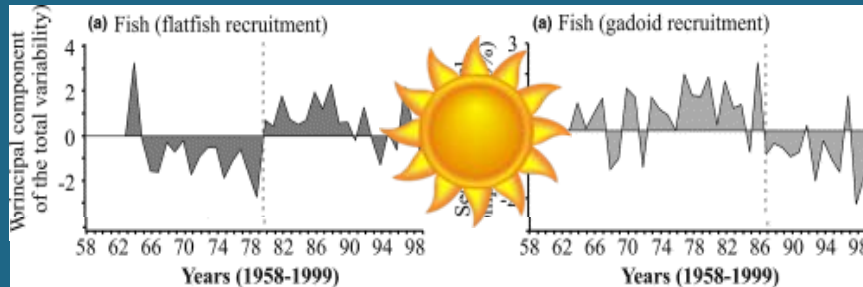
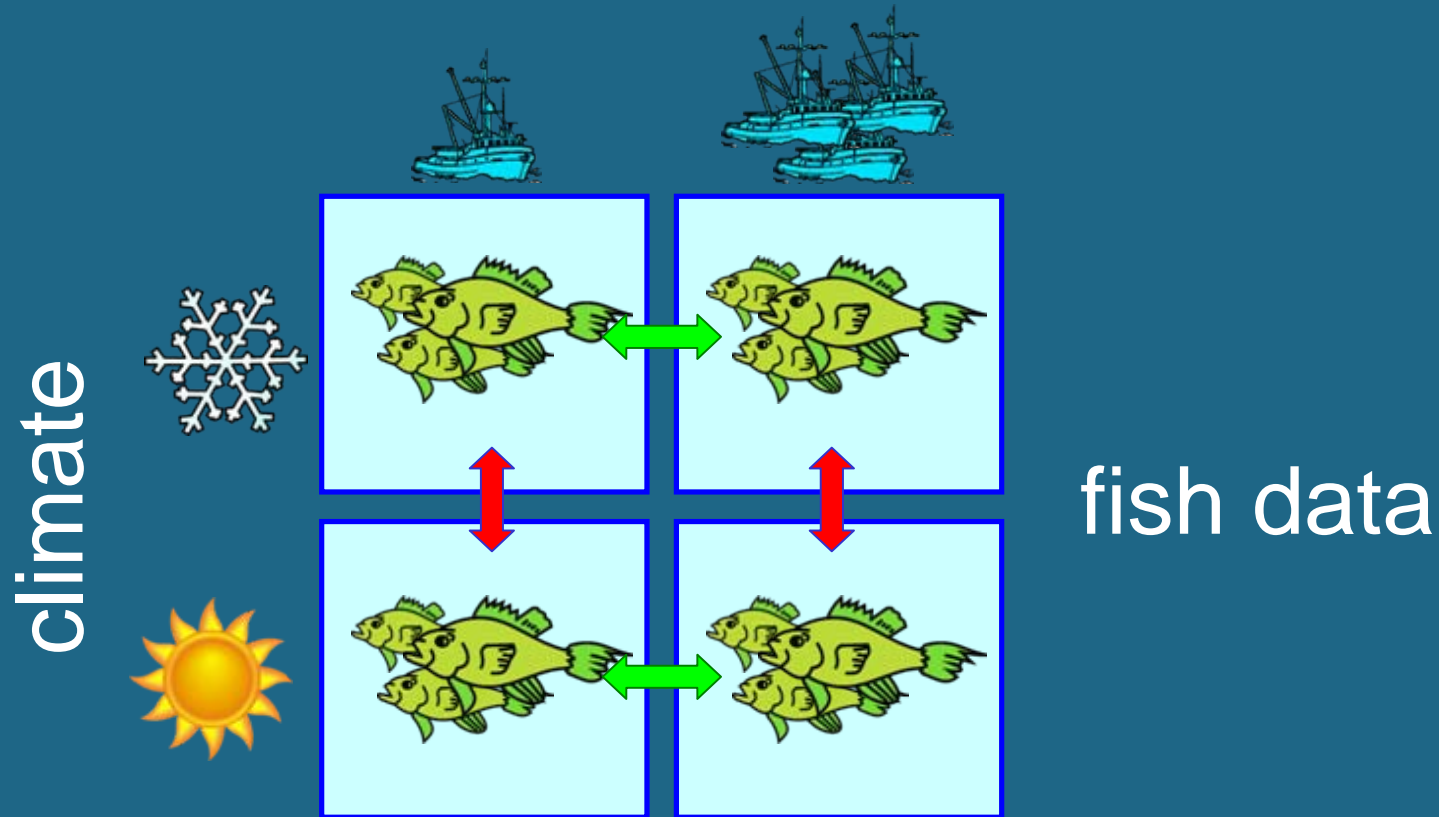


Figure 6.2 Ratio of lower trophic level feeding guilds, Planktivores and Benthivores, to upper trophic level feeding guilds, Piscivores and Shrimp-Fish feeders, biomass caught in NEFSC bottom trawl surveys.

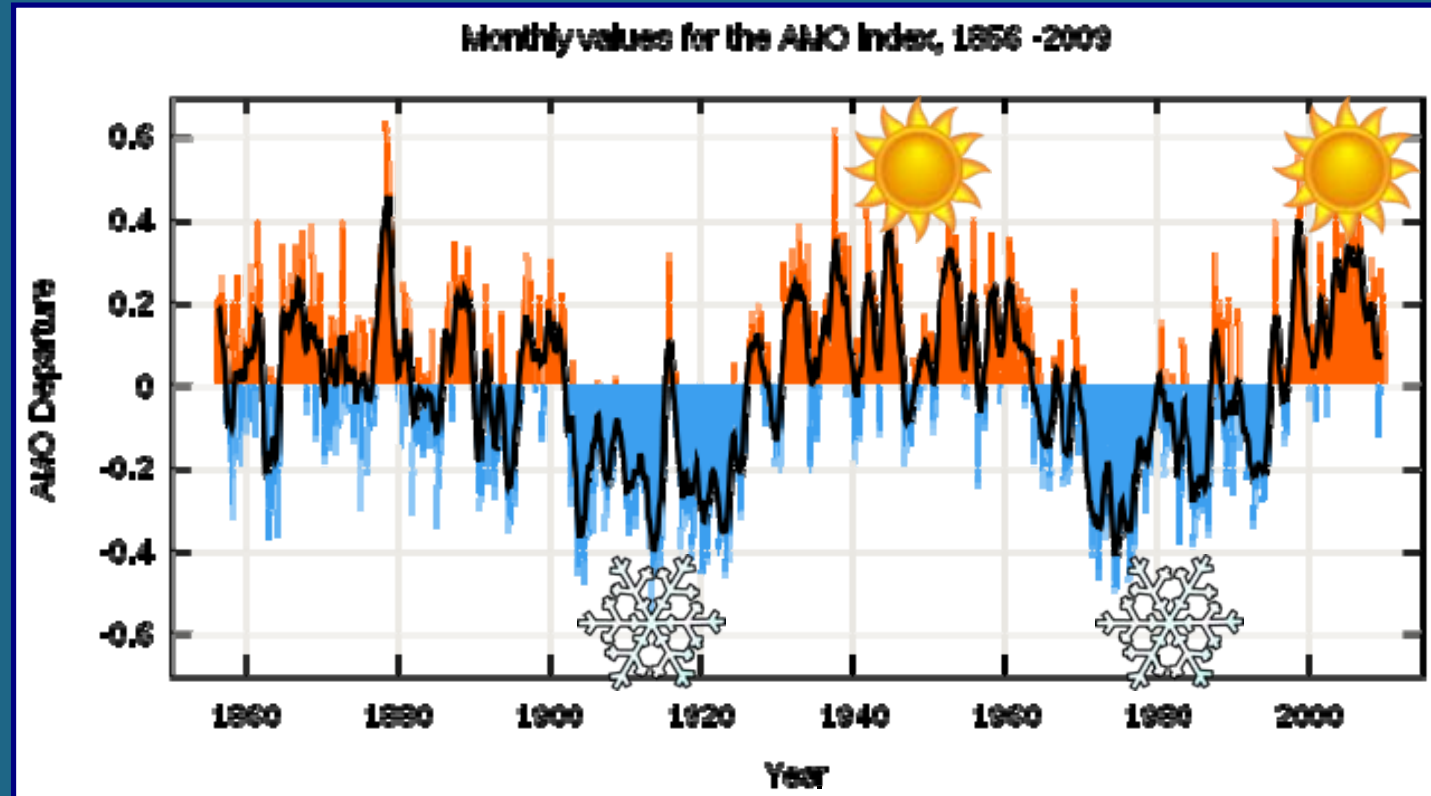
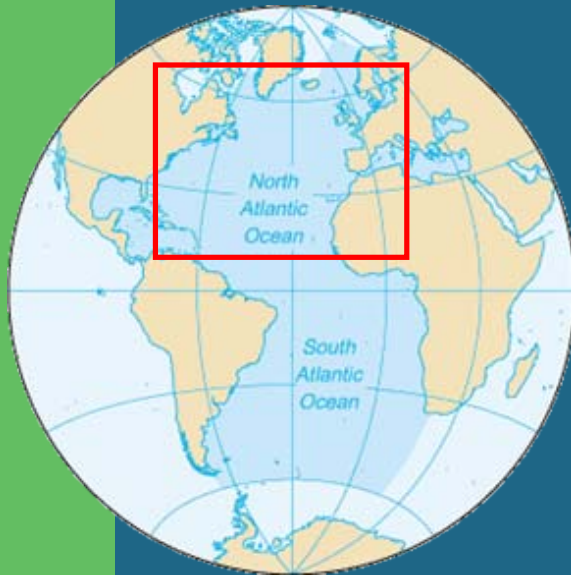
NOAA 2009

Disentangling effects fisheries

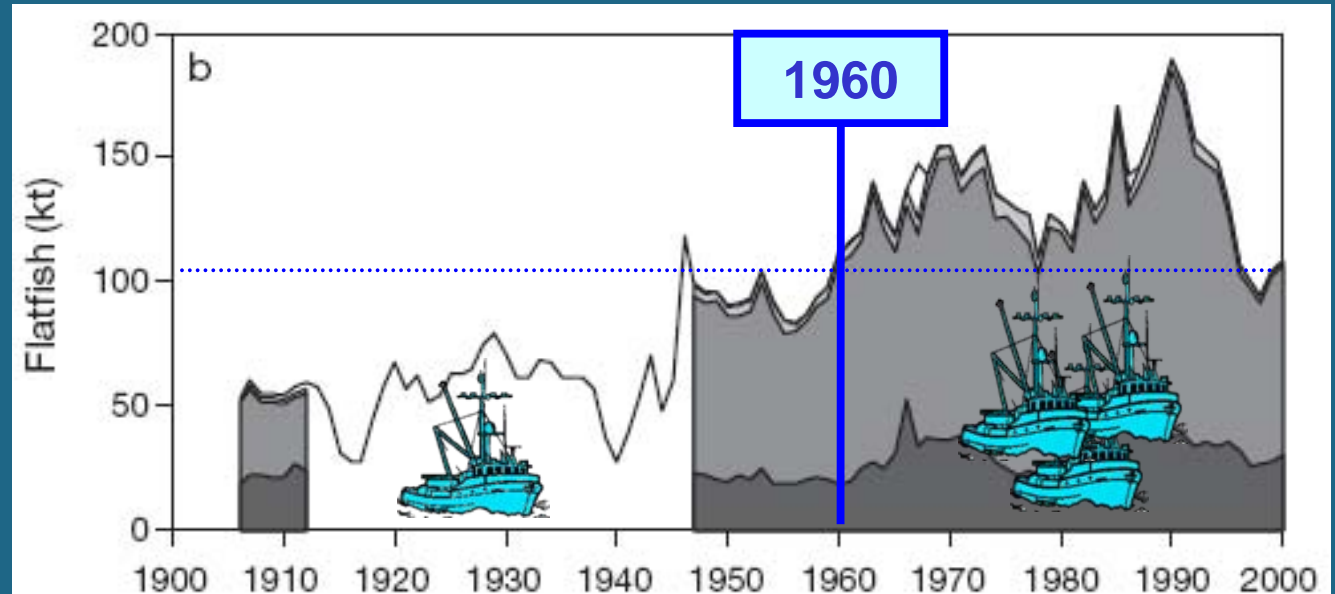
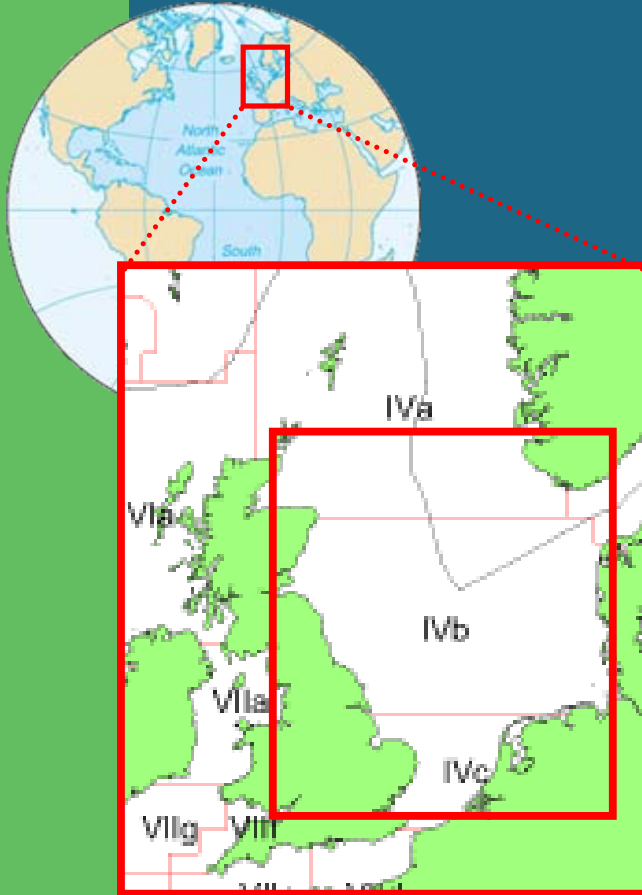


Climate data

Atlantic Multidecadal Oscillation (AMO) 1856–2009

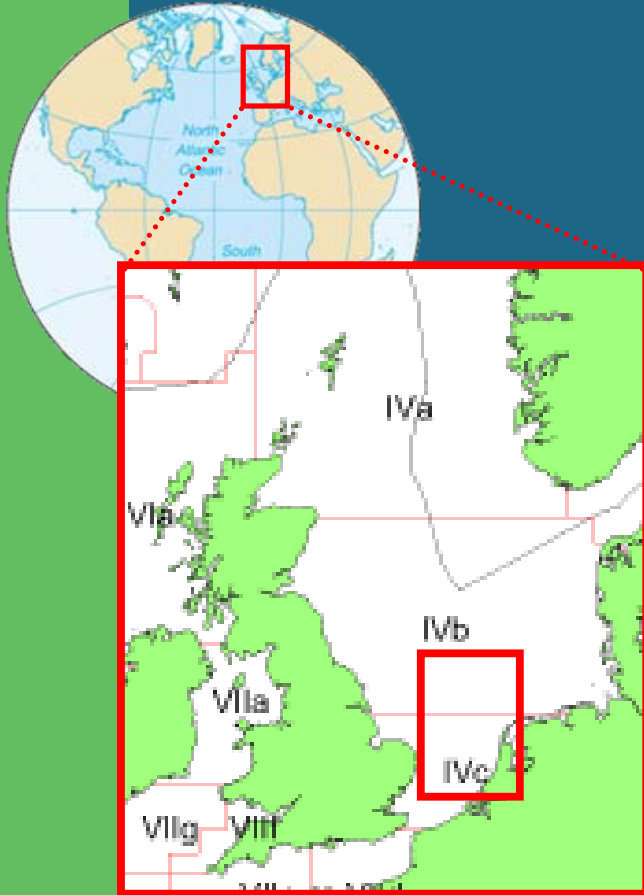


Fisheries data North Sea

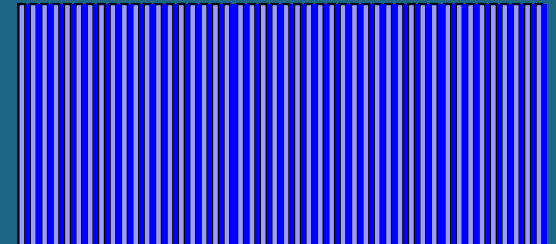
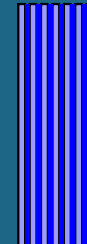
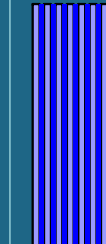
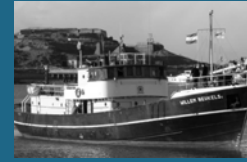


Callaway *et al.* 2007

Fish data

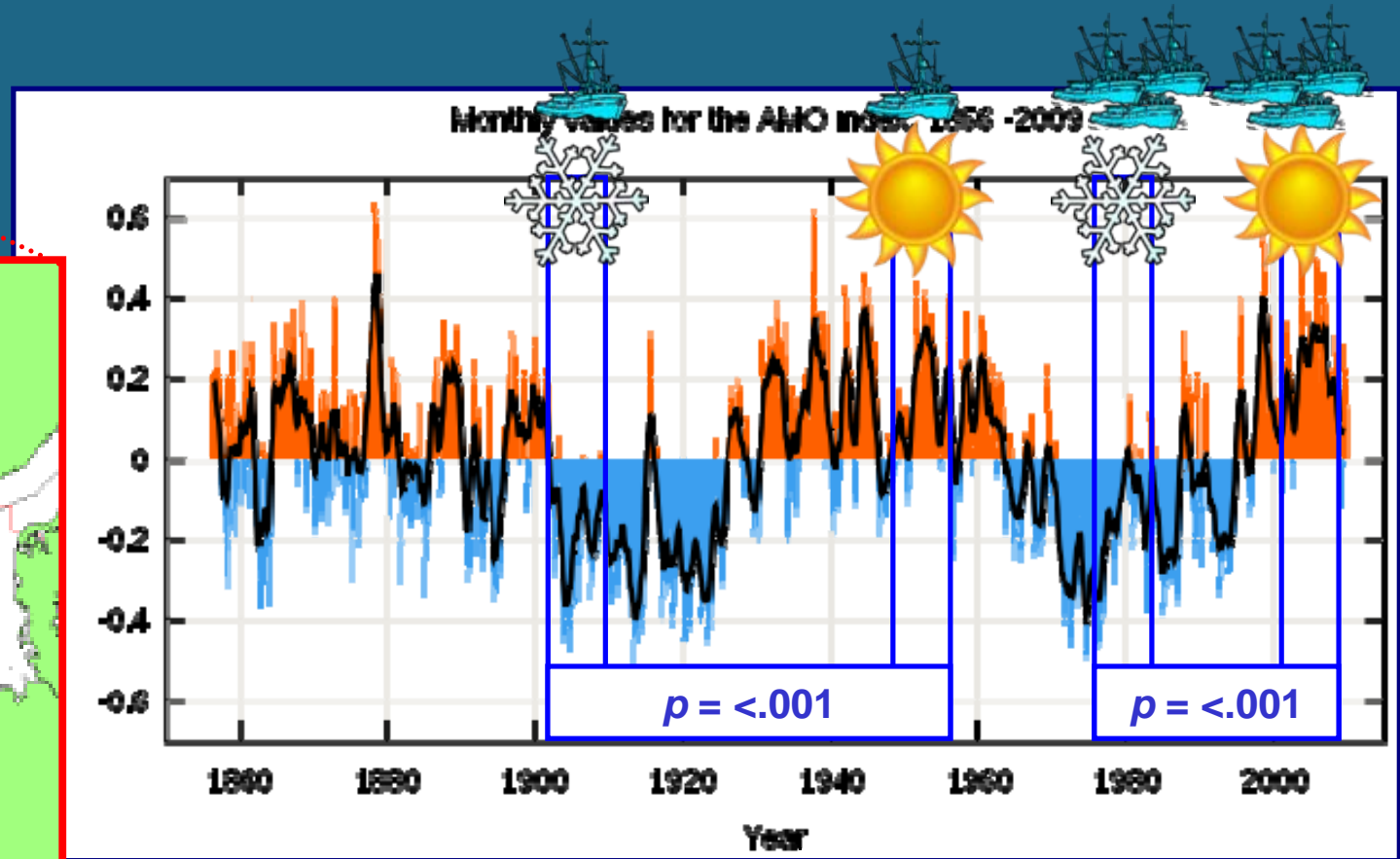


Southern North Sea
>100 years of survey data



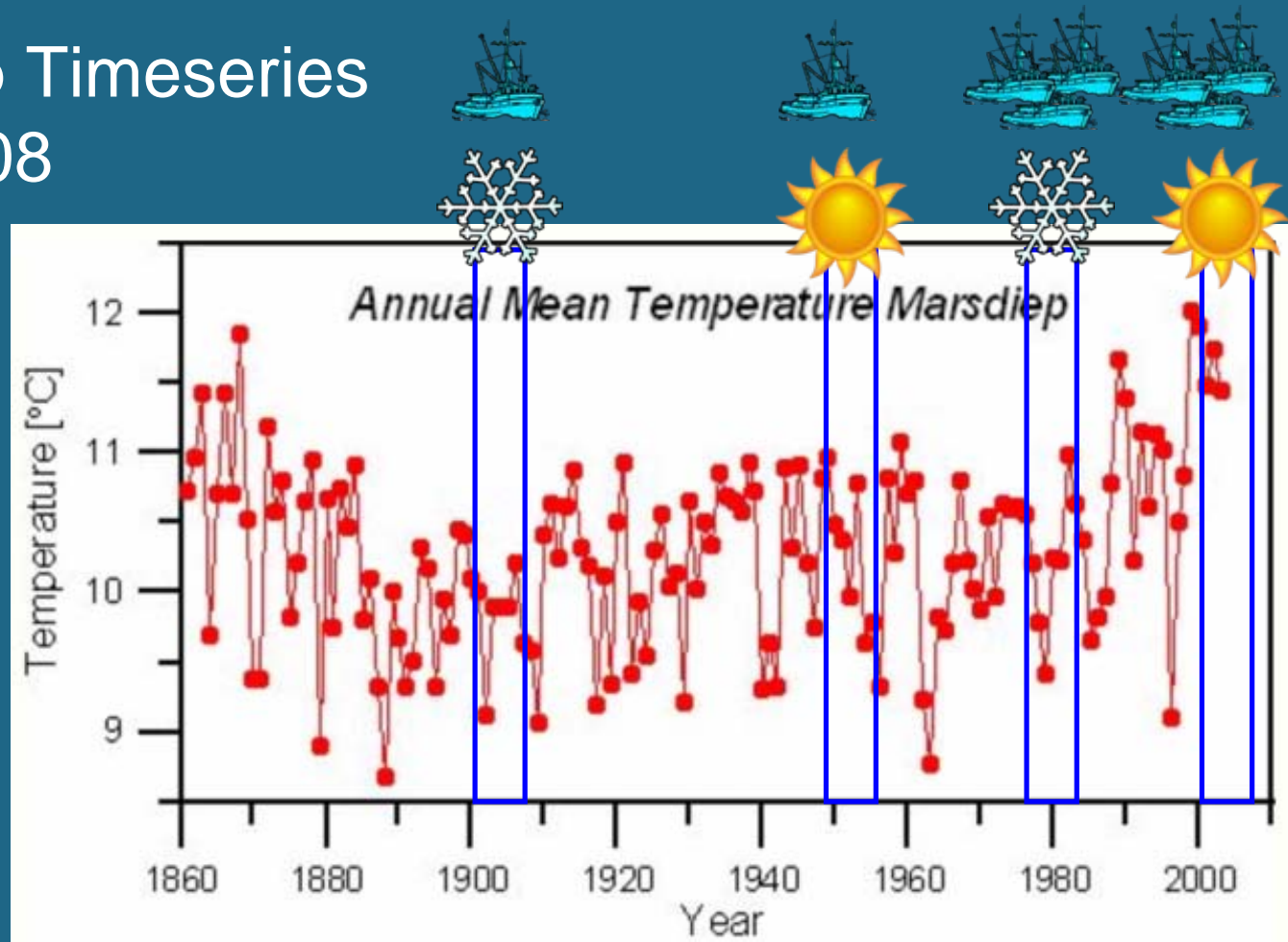
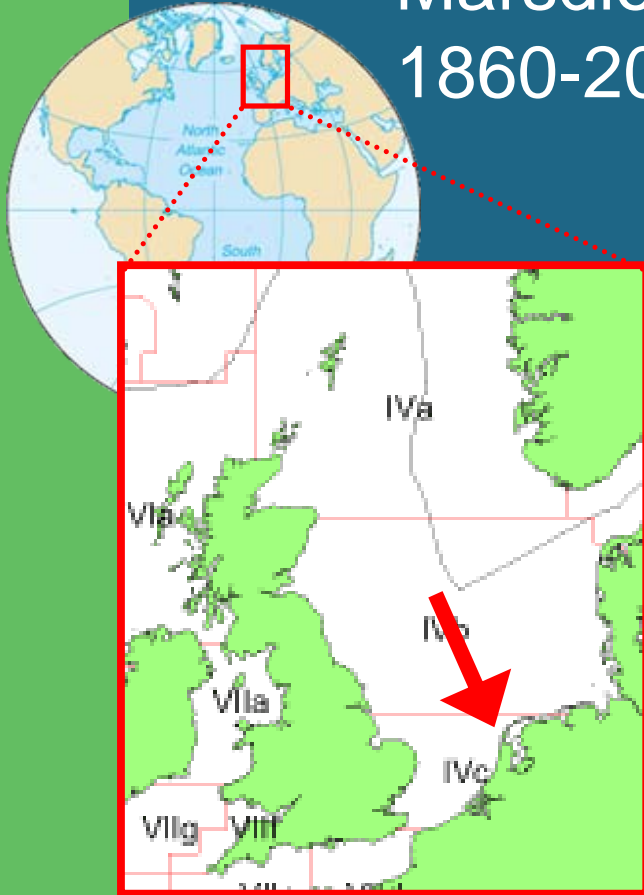
1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010

Defining distinct periods



Defining distinct periods

Marsdiep Timeseries
1860-2008



Distinct periods

fisheries



climate



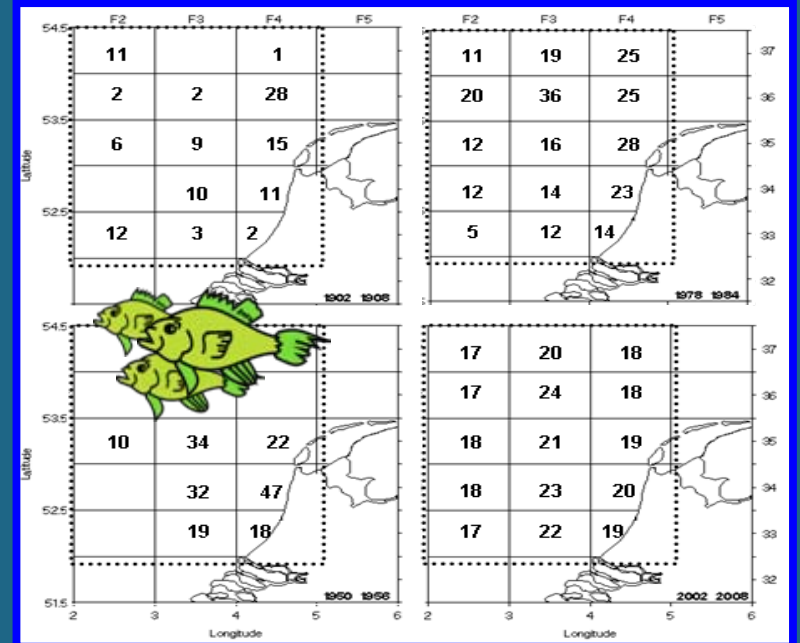
1902-1908

1978-1984

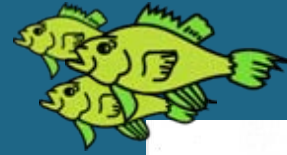


1950-1956

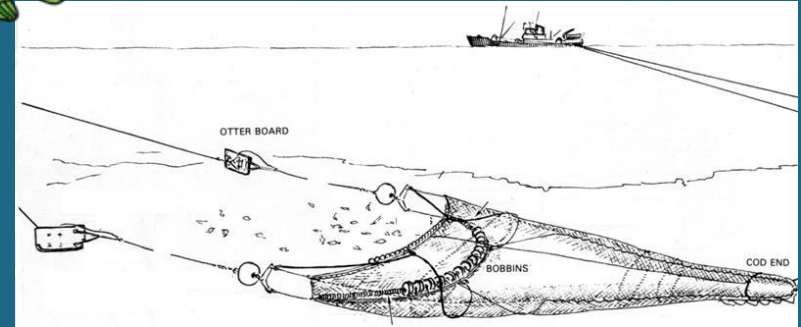
2002-2008



Data standardisation



- area overlap
- winter (November-March)
- ottertrawls → correction for catch efficiency (Rijnsdorp *et al.* 2009)
- species:
 - taxonomic corrections
 - excluding pelagics
 - overlap in species-id during 4 periods



Indicators



Climate effects

Ratio **Lusitanian/Boreal** species richness

L/B

- Lusitanian: southerly species (warm-favouring)
- Boreal: northerly species (cold-favouring)



Fisheries effects

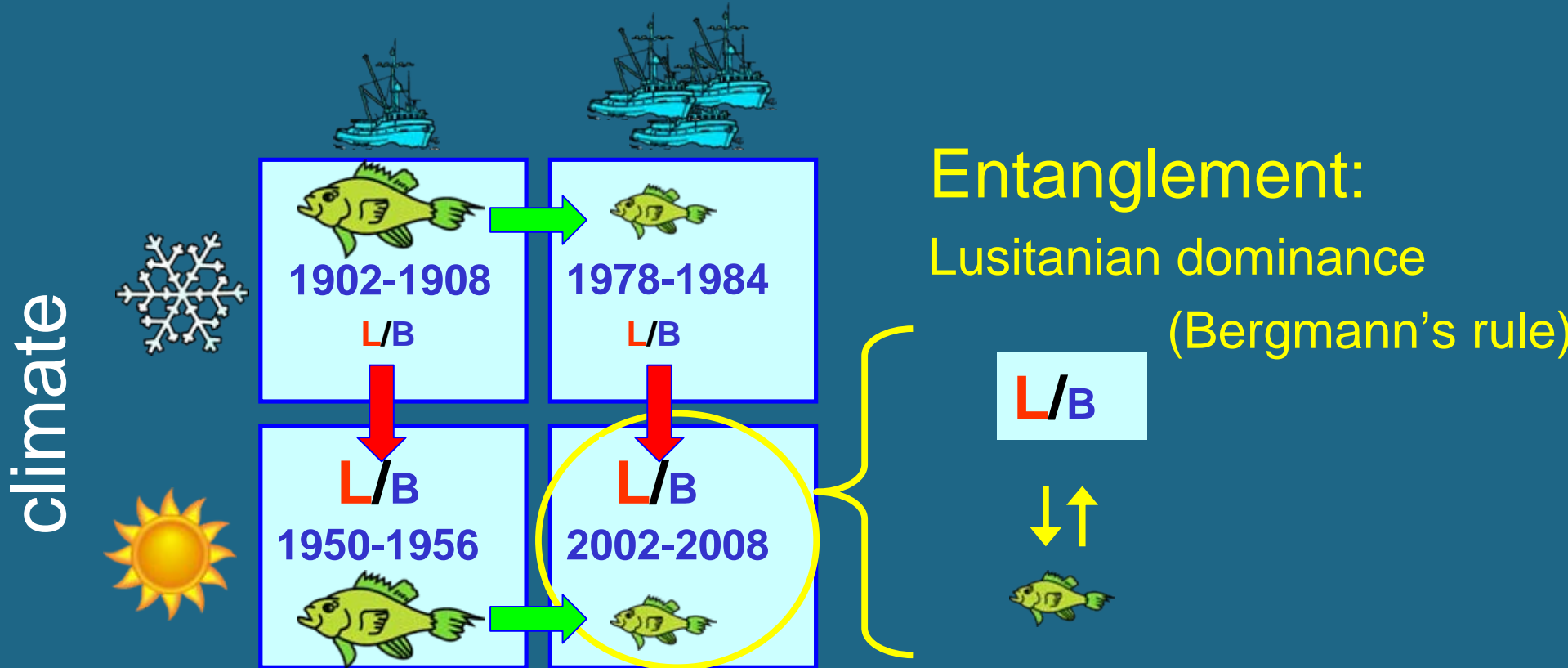
Size of fish

- mean Lmax



Hypothesis

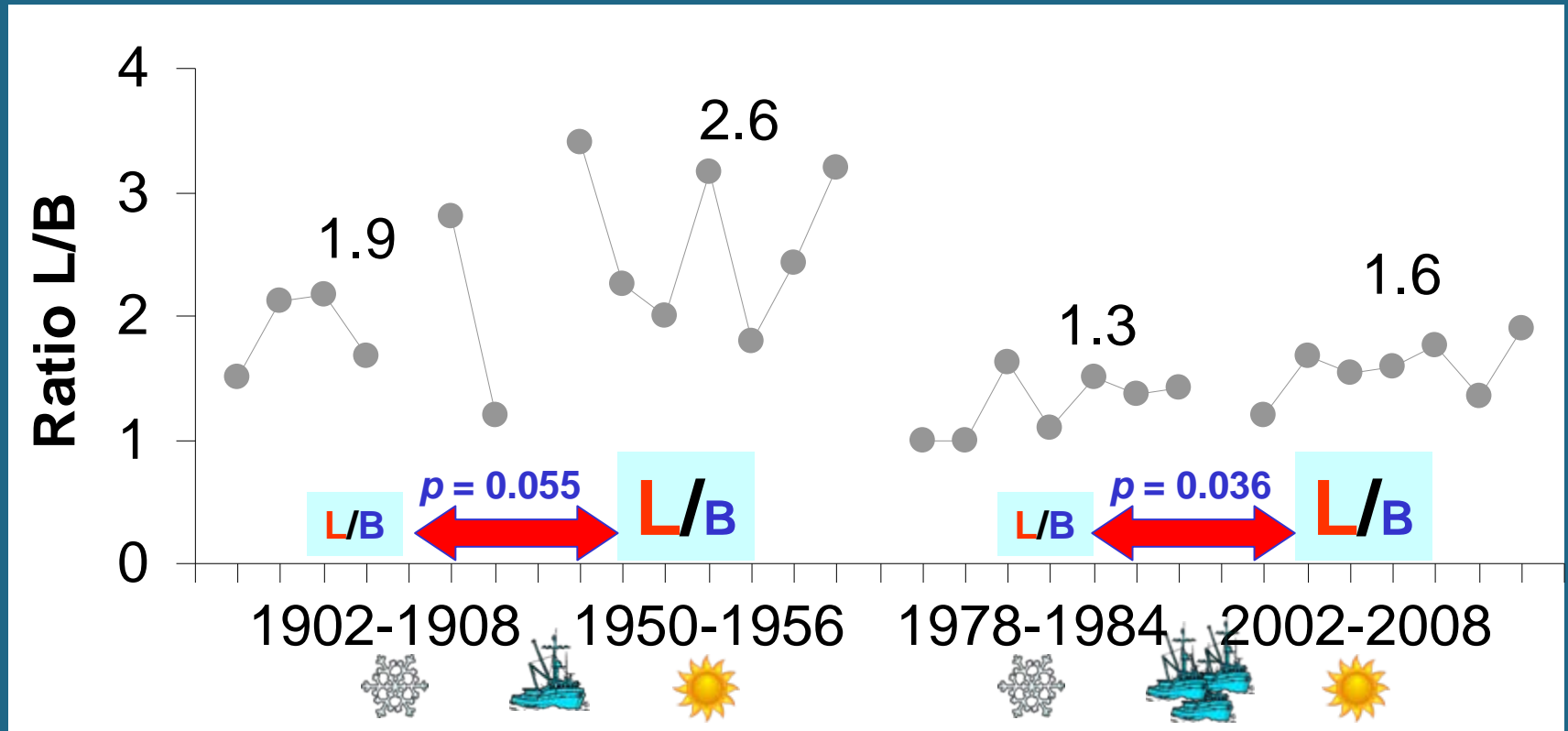
fisheries



Climate effect



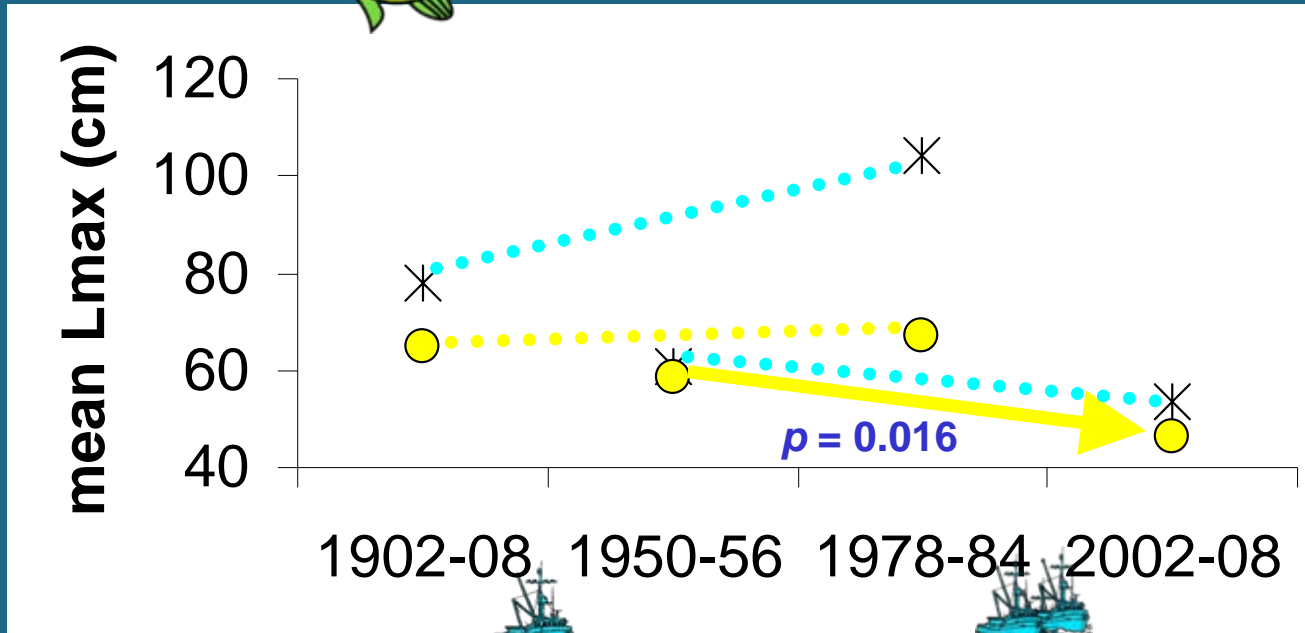
Ratio Lusitanian/Boreal Species Richness



Fisheries effect

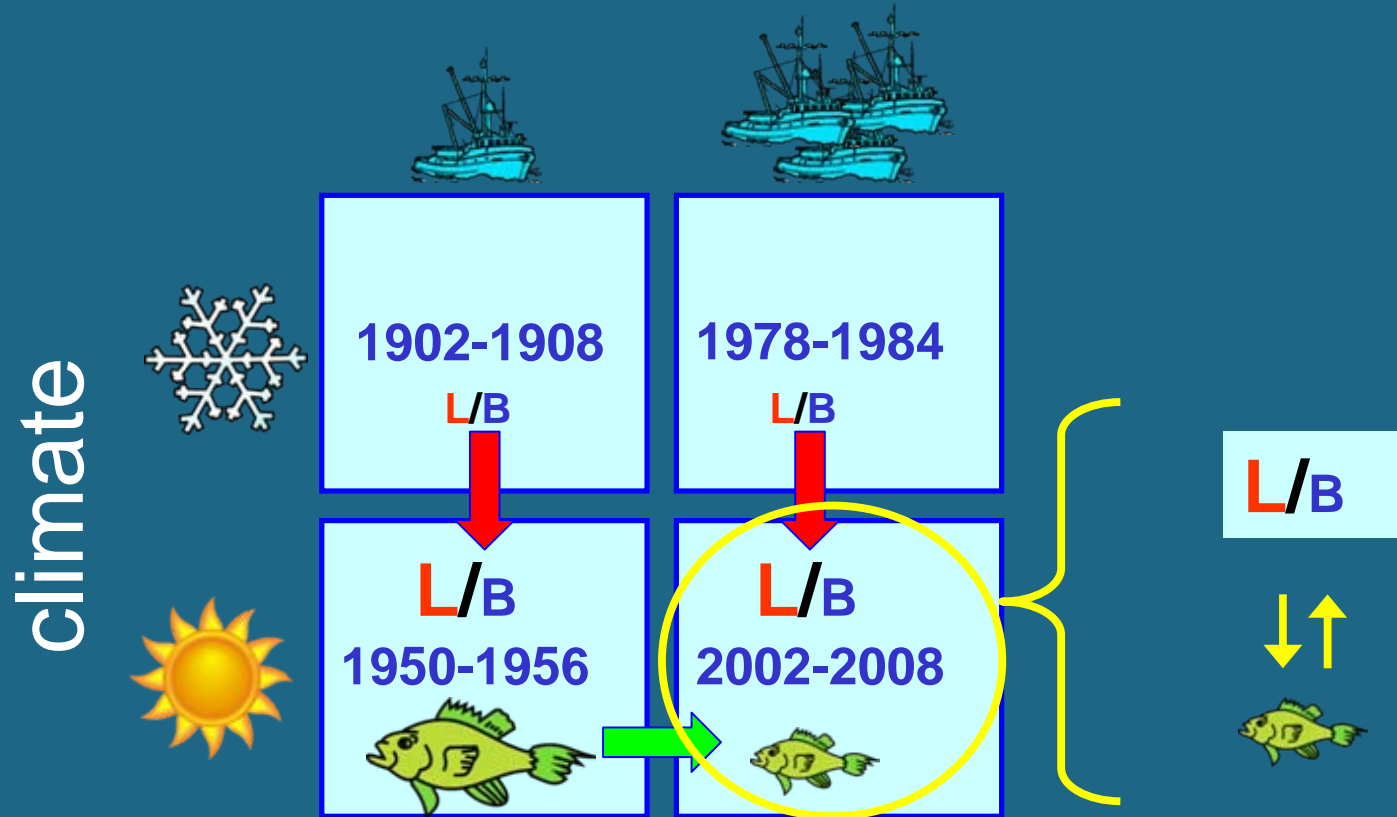


Size of fish



Conclusion

fisheries



Acknowledgements

➤ EU FP6: RECLAIM

REsolving CLimAtic IMpacts on fish stocks



➤ BSIK program, project A06

Climate related adaptations of the North Sea ecosystem at the Dutch continental shelf and its potential consequences for spatial planning



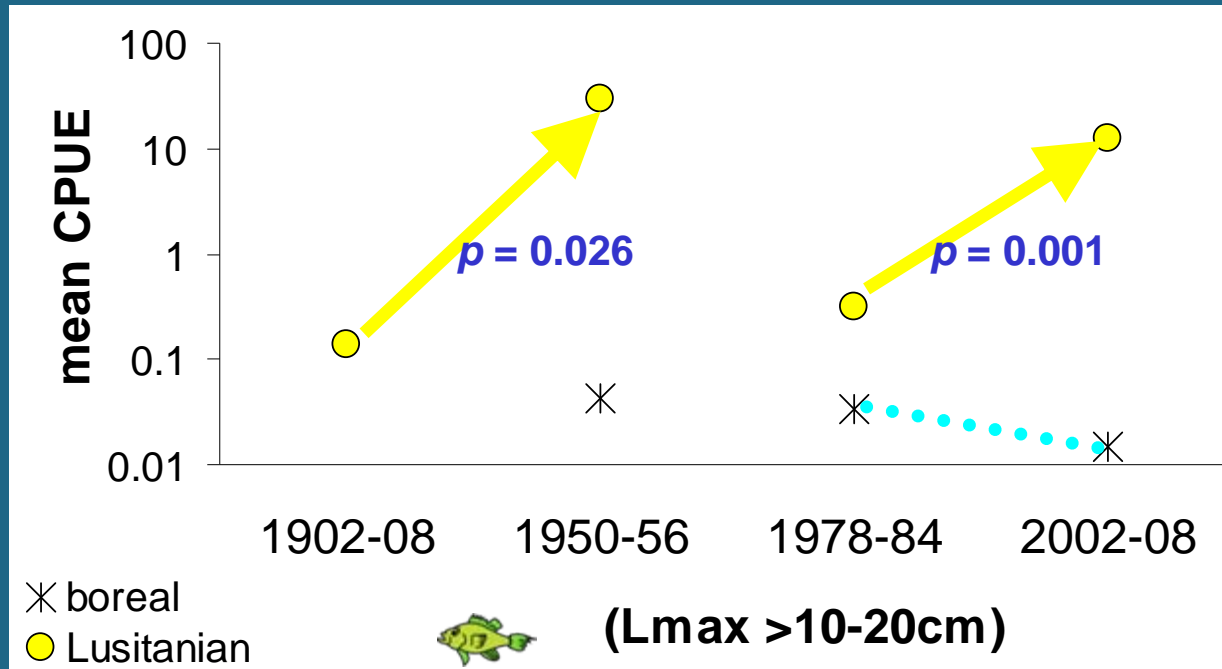
Thank you for your attention



Climate effect



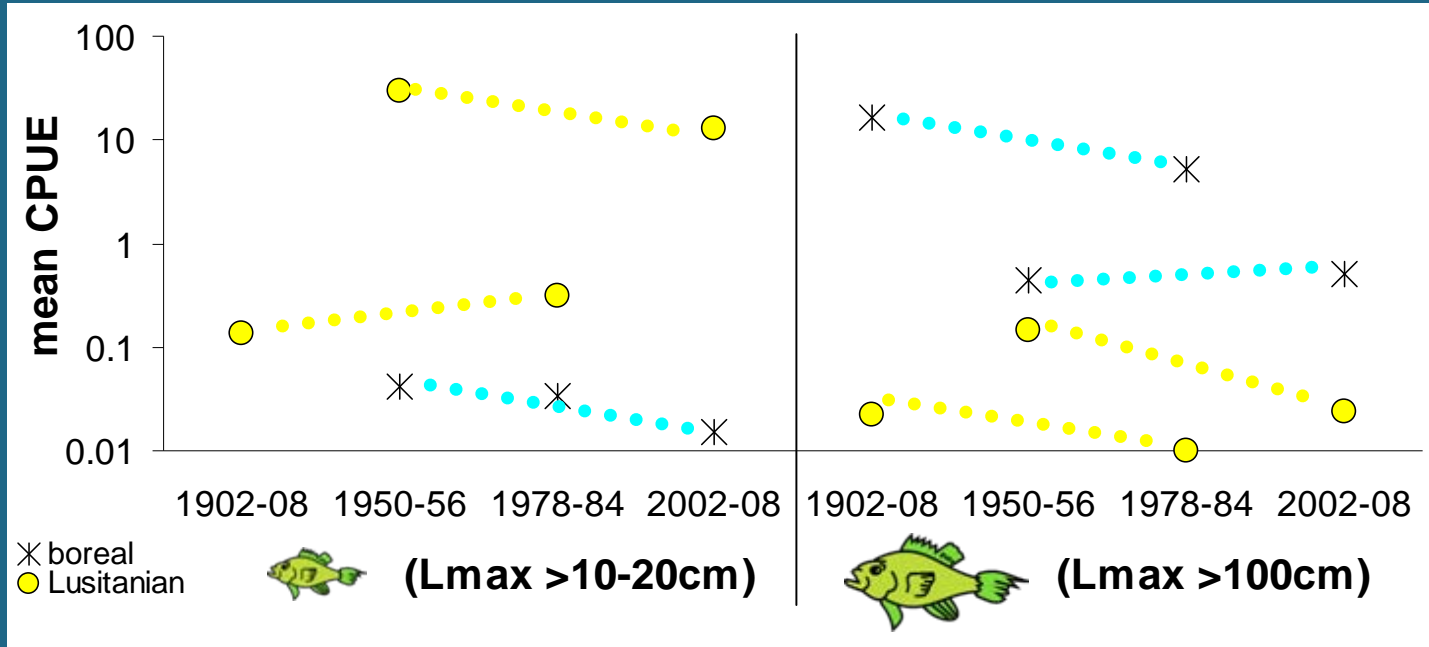
Size of fish



Fisheries effect



Size of fish

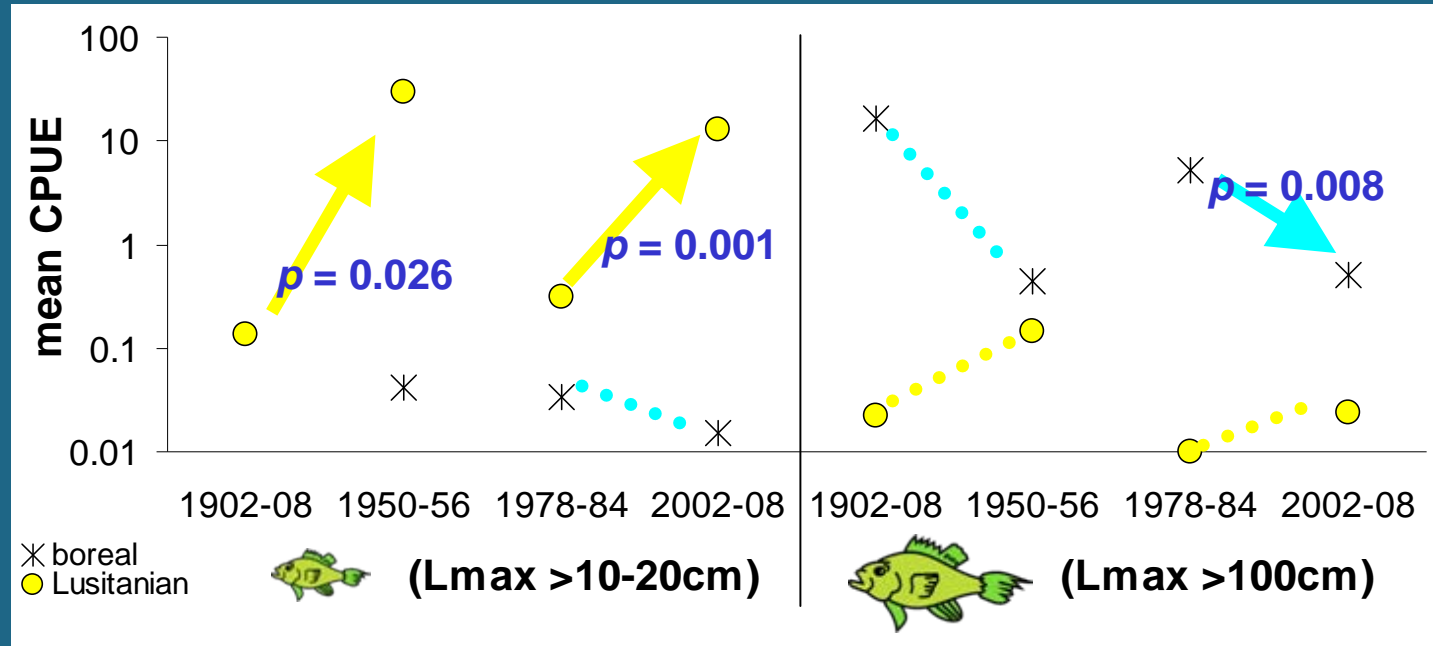


→ : Lusitanian ●●●●● Boreal ●●●●●

Climate effect



Size of fish



Lusitanian



Boreal

