Global warming changes the species richness of marine fish in the eastern North Atlantic Ocean

B1-6078

Remment ter Hofstede, Jan Geert Hiddink, Adriaan Rijnsdorp

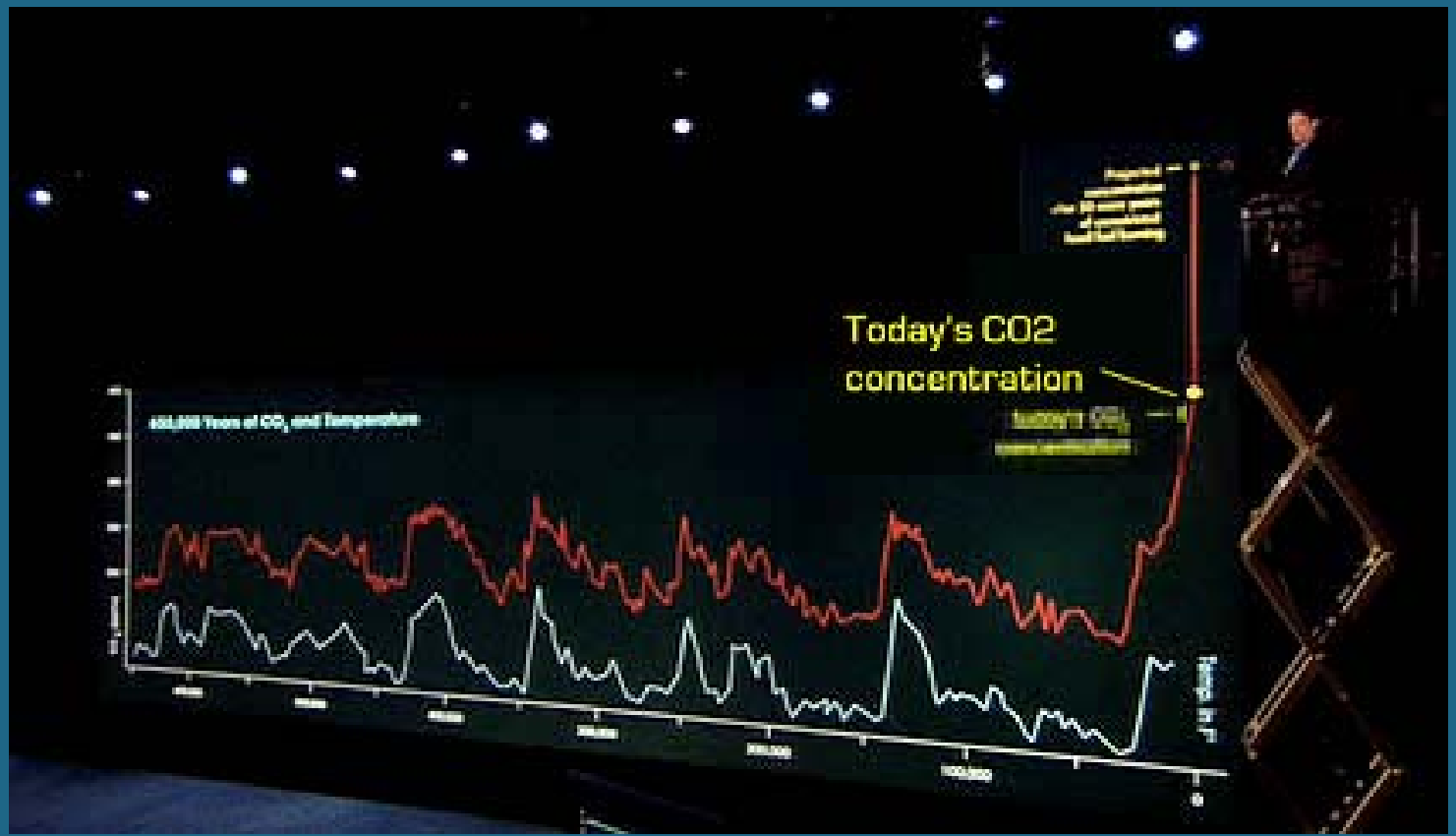
27 April 2010, Sendai, Japan

IMARES
Institute for Marine Resources and Ecosystem Studies

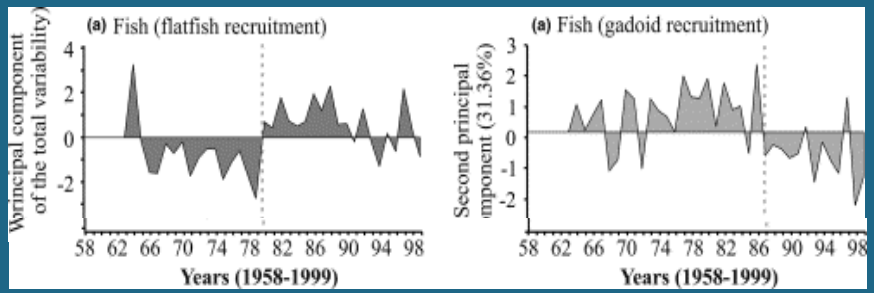
WAGENINGEN UR

Global warming

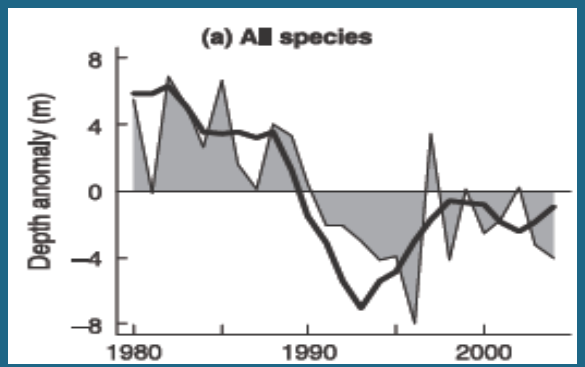
An inconvenient truth



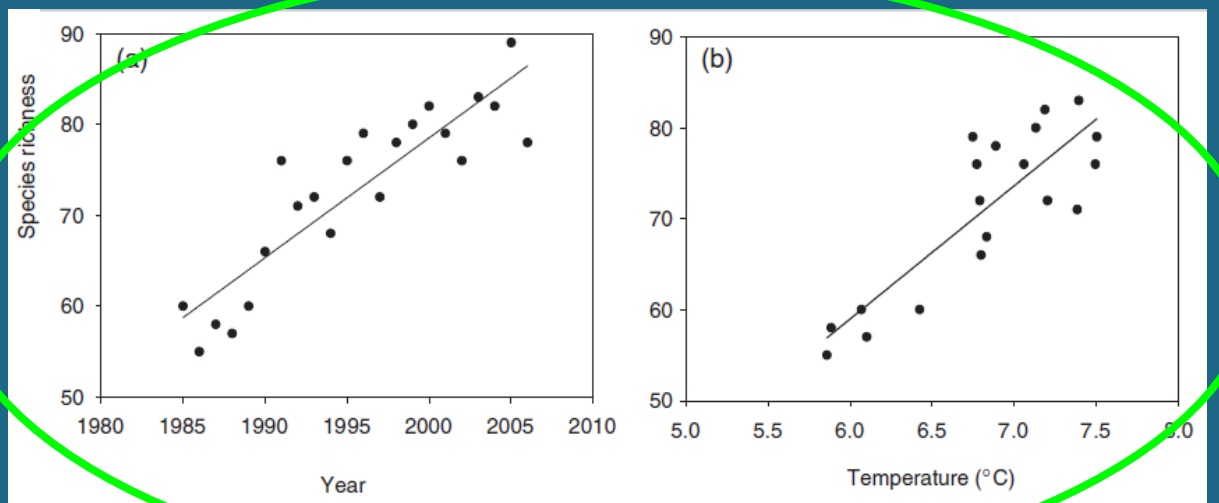
Effects of global warming on fish



Beaugrand 2004



Dulvy *et al* 2008

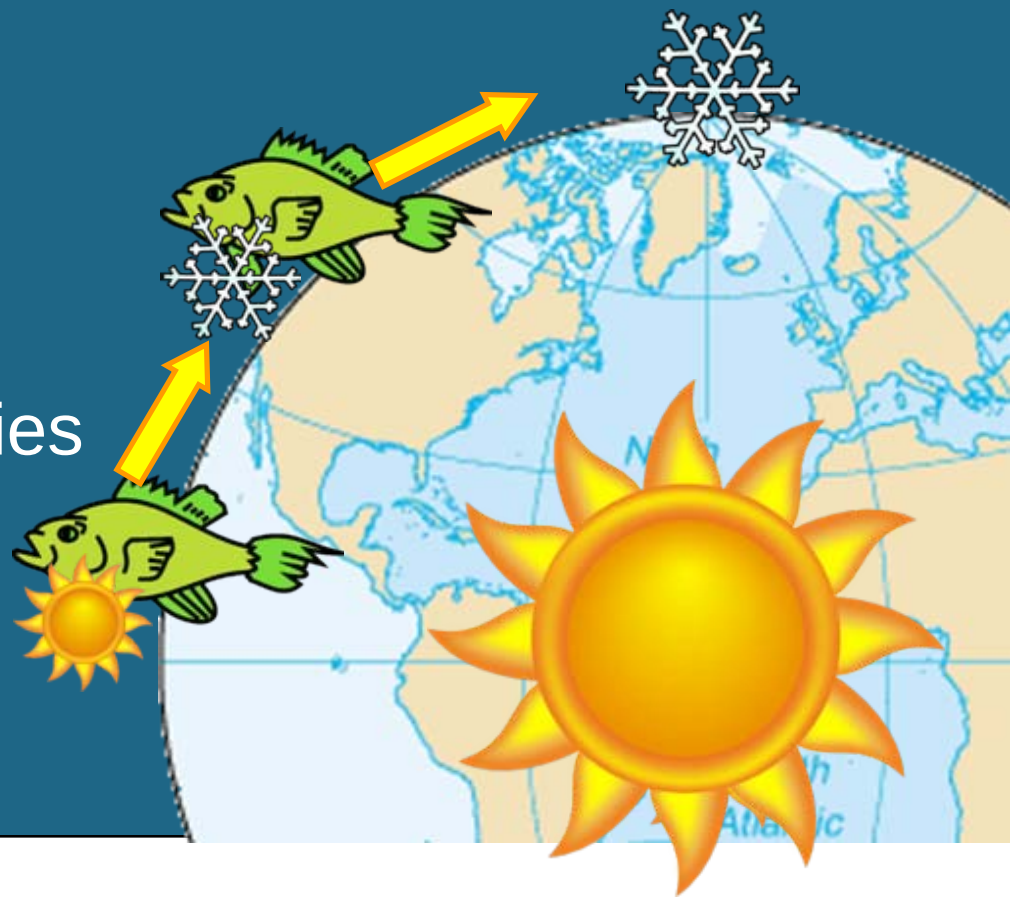


Hiddink & ter Hofstede 2008

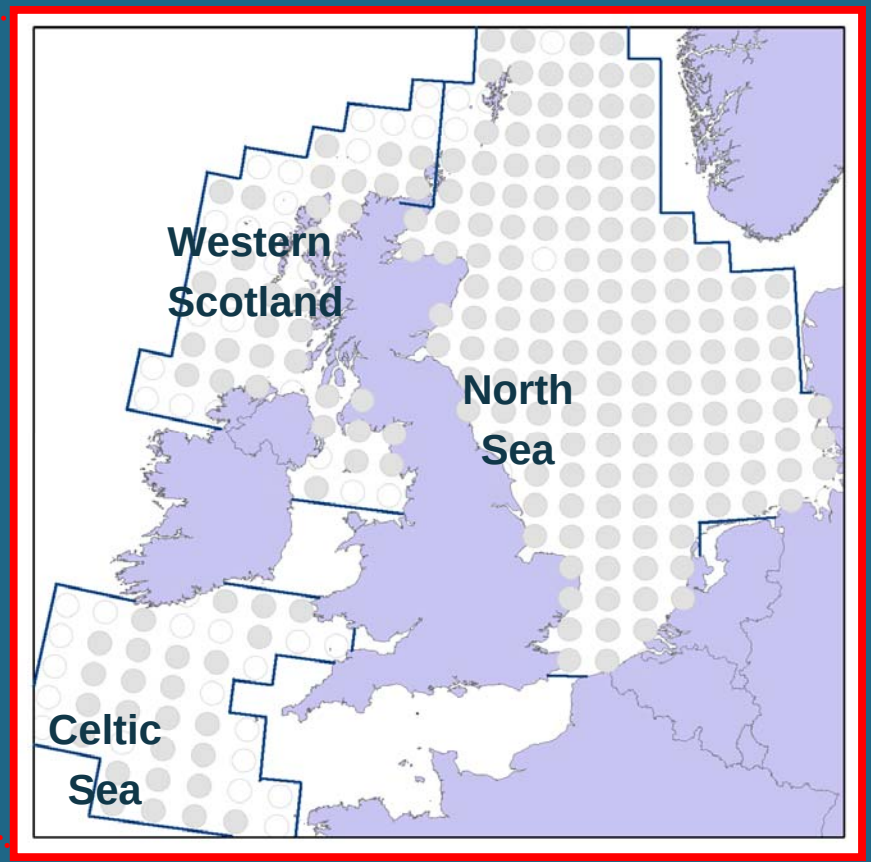
Shifts in species distribution

Boreal: northerly species (cold-favouring)

Lusitanian: southerly species (warm-favouring)



Objectives



- regional warming?
- effect on species richness?
- relation with biogeography?

Data

Warming:

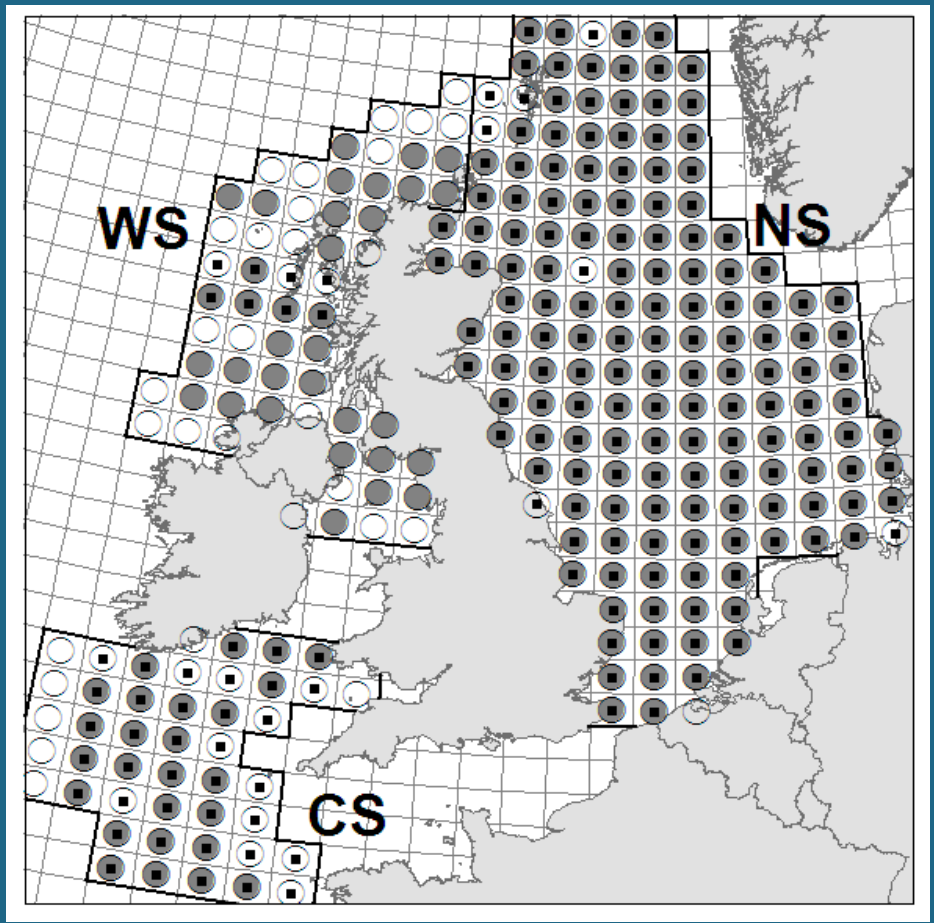
bottom temperature:

ICES-Oceanographic Database and Services

Fish:

survey catches

ICES-DATRAS



ICES bottom trawl surveys

SWGF
Scottish Western Division Groundfish Survey

EVHOE
French Groundfish Survey

NSIBTS
North Sea International Bottom Trawl Survey

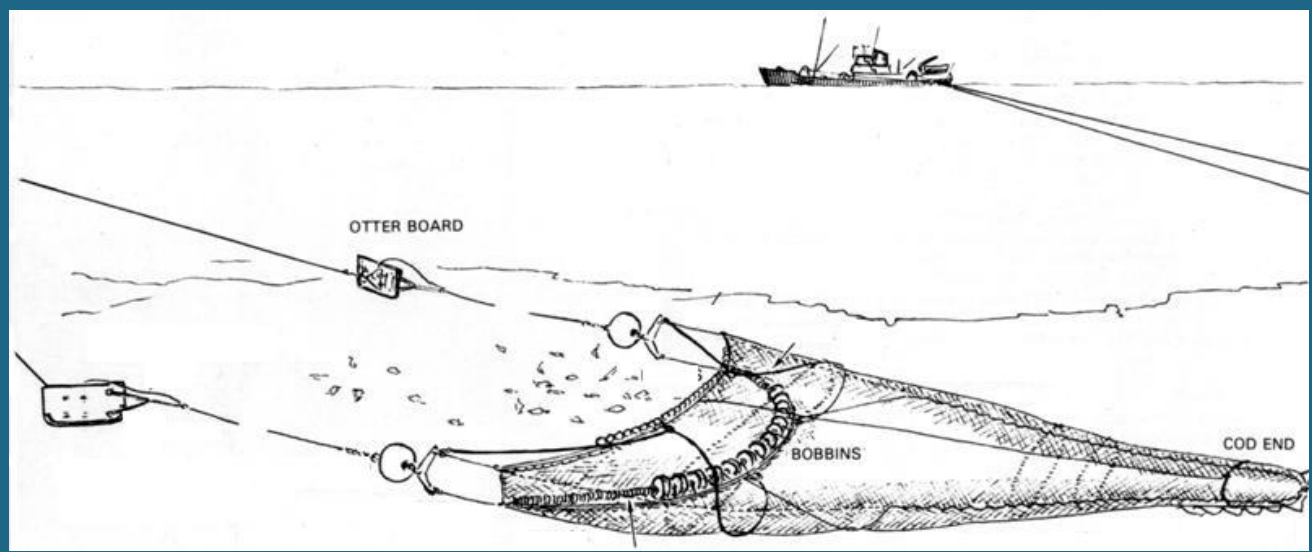
IMARES
Institute for Marine Resources and Ecosystem Studies

ICES IBTS
INTERNATIONAL-BOTTOM-TRAWL-SURVEYS

ICES bottom trawl surveys

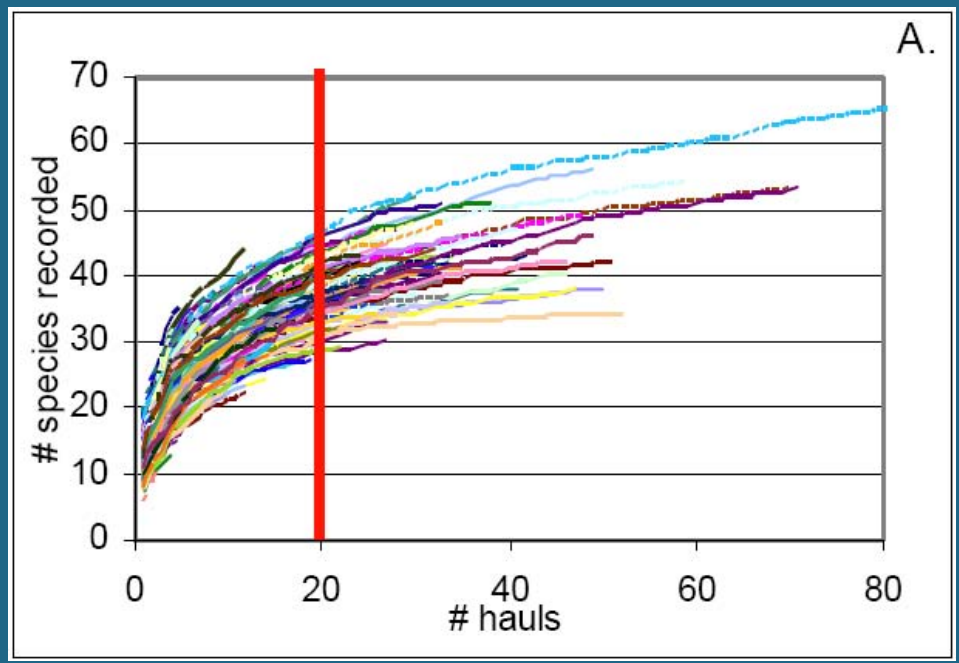
GOV-trawl (Grand Ouverture Verticale):

- semi-pelagic net
- netopening 30 x 5 m, sweep 70m
- mesh size cod-end 20 mm



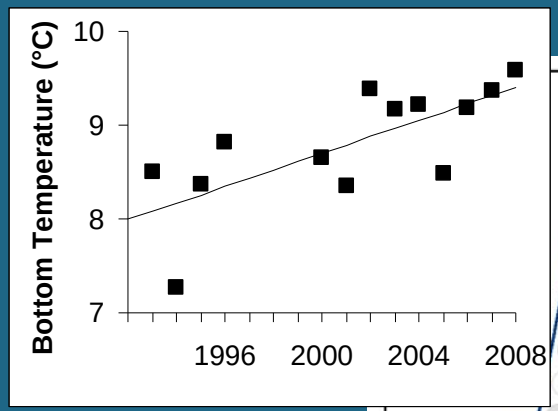
Data treatment

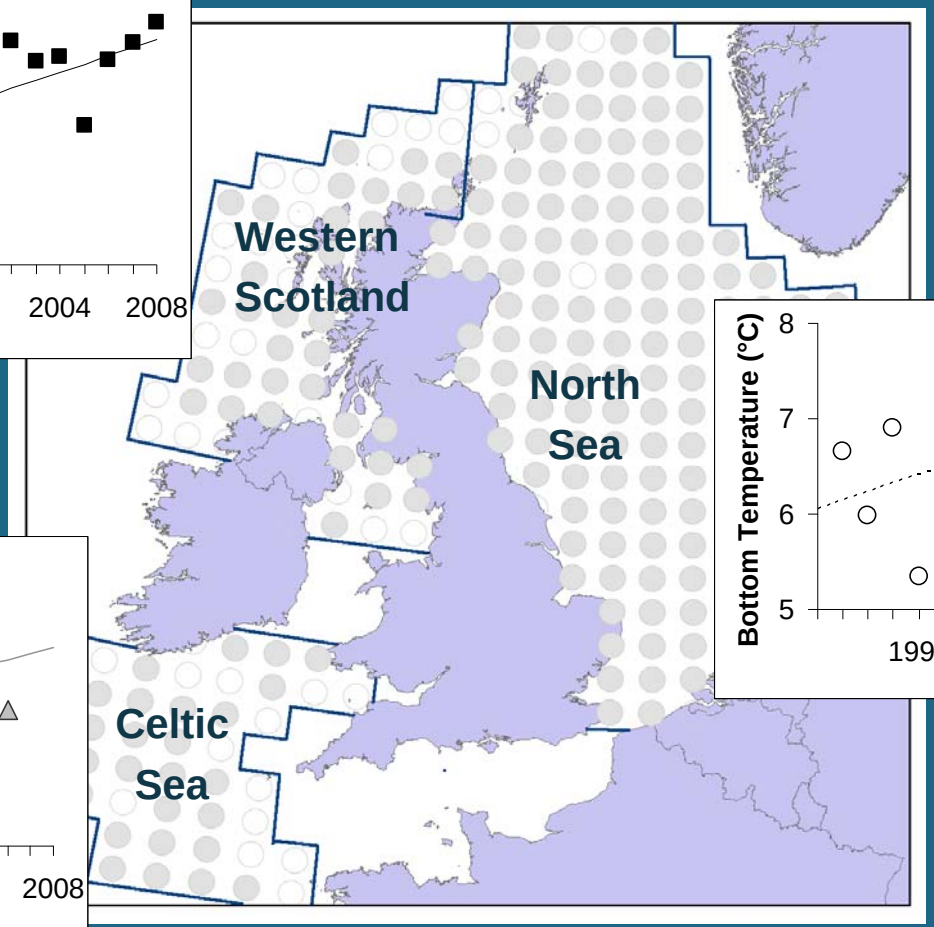
- quality: e.g. taxonomic corrections
- resampling: balance the uneven distribution of hauls

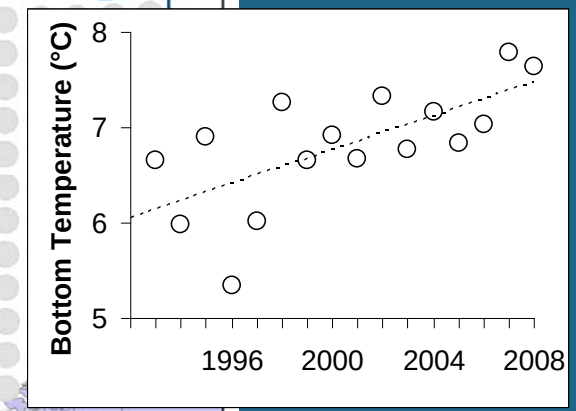


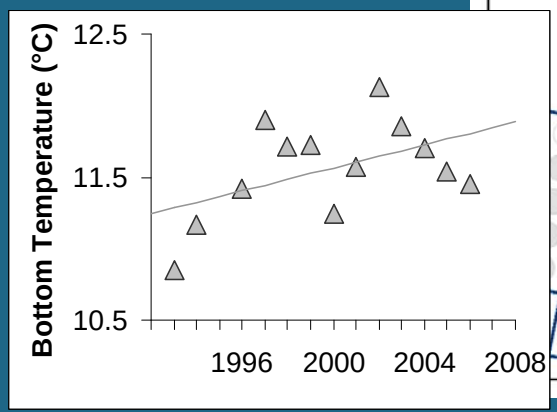
Daan *et al*. (2006)

Increase in bottom temperature



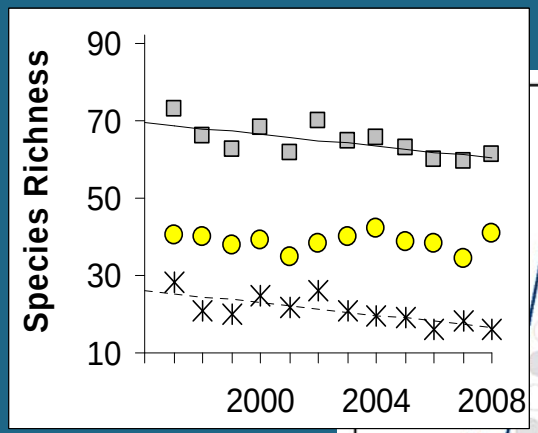


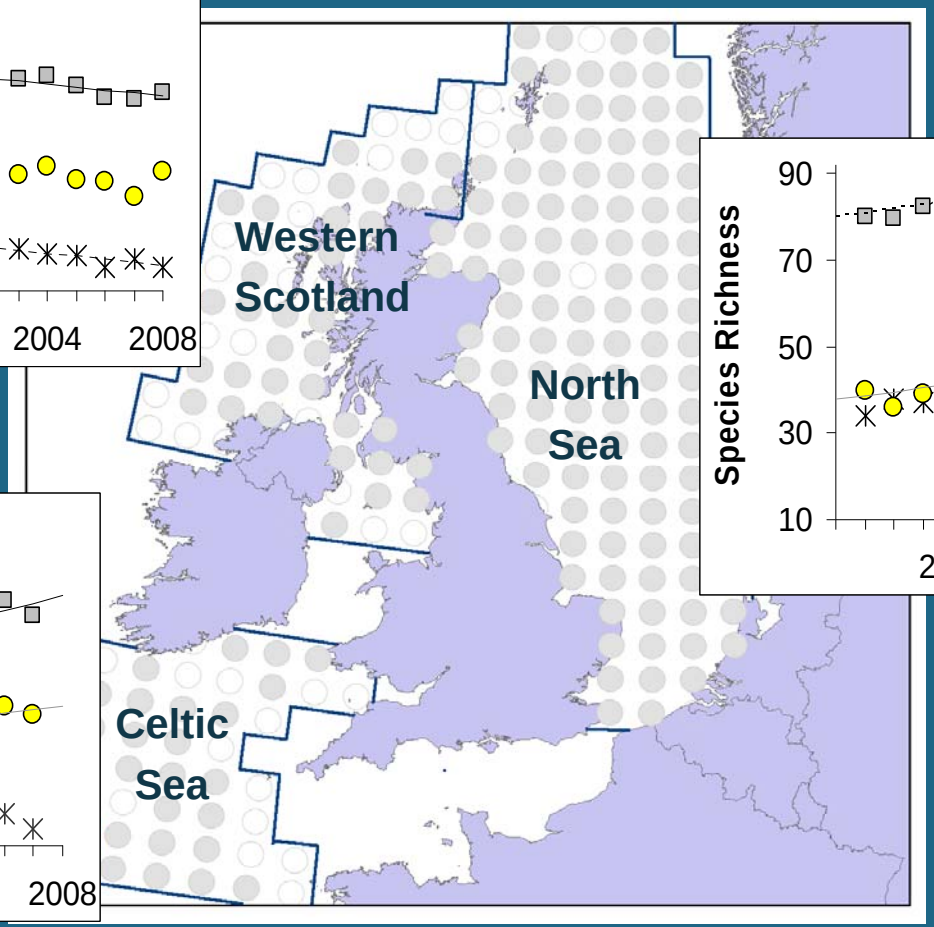


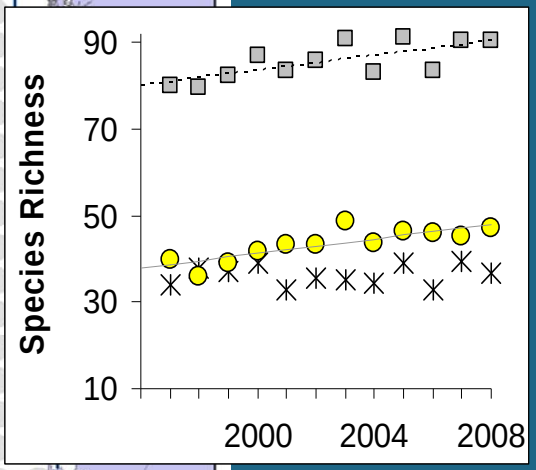


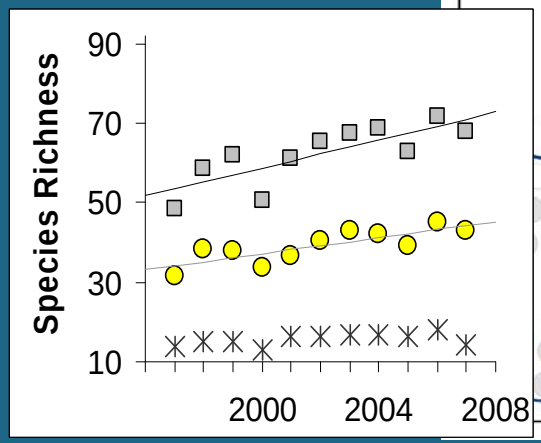
1993-2008

Change in Species Richness





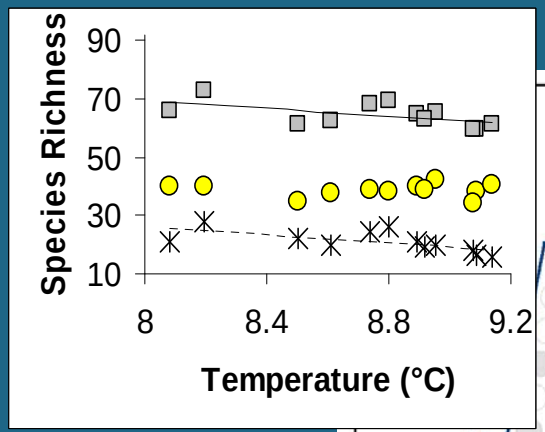


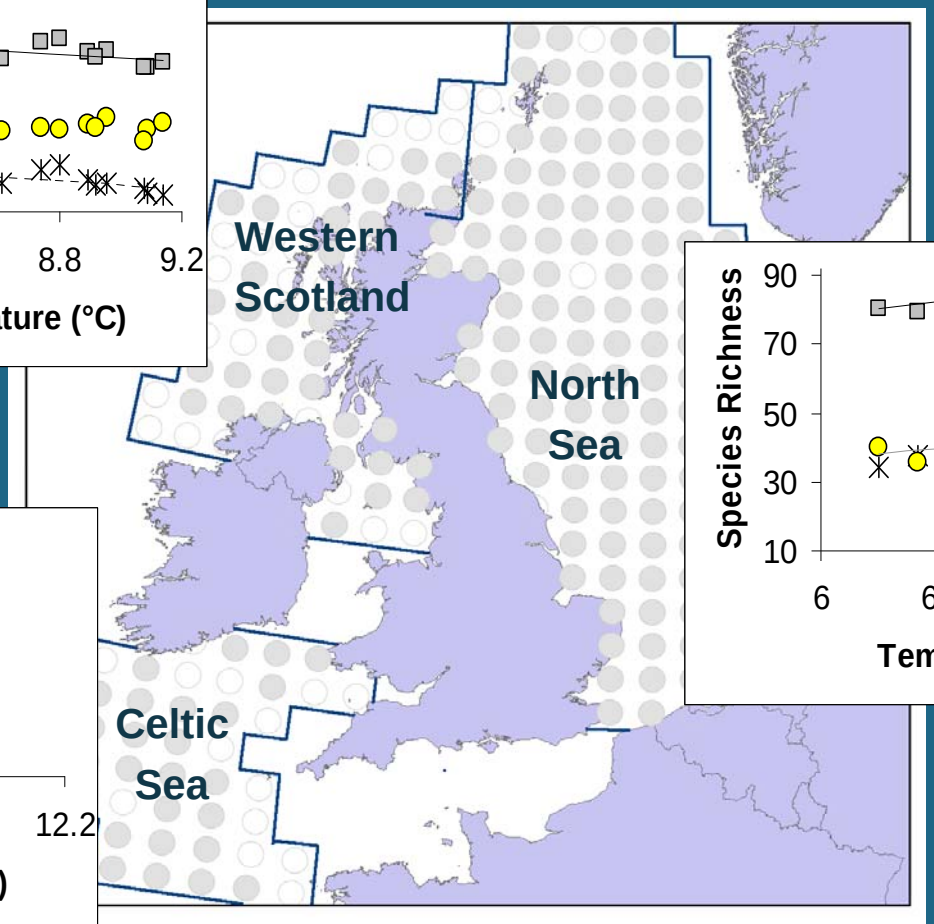


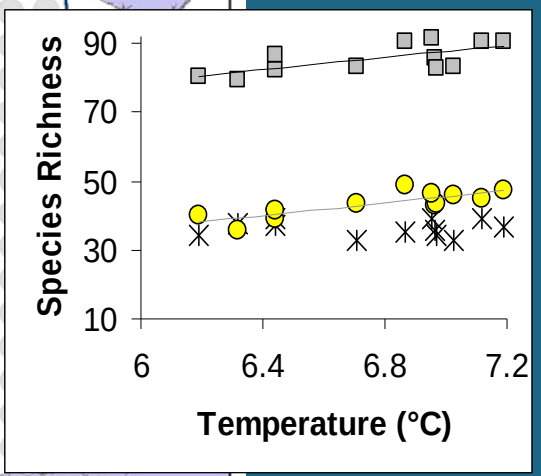
1997-2008

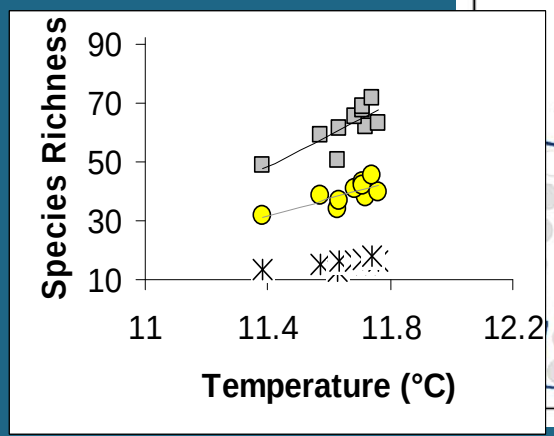
all
Boreal
Lusitanian

Species Richness – Bottom Temperature









1997-2008

all
Boreal
Lusitanian

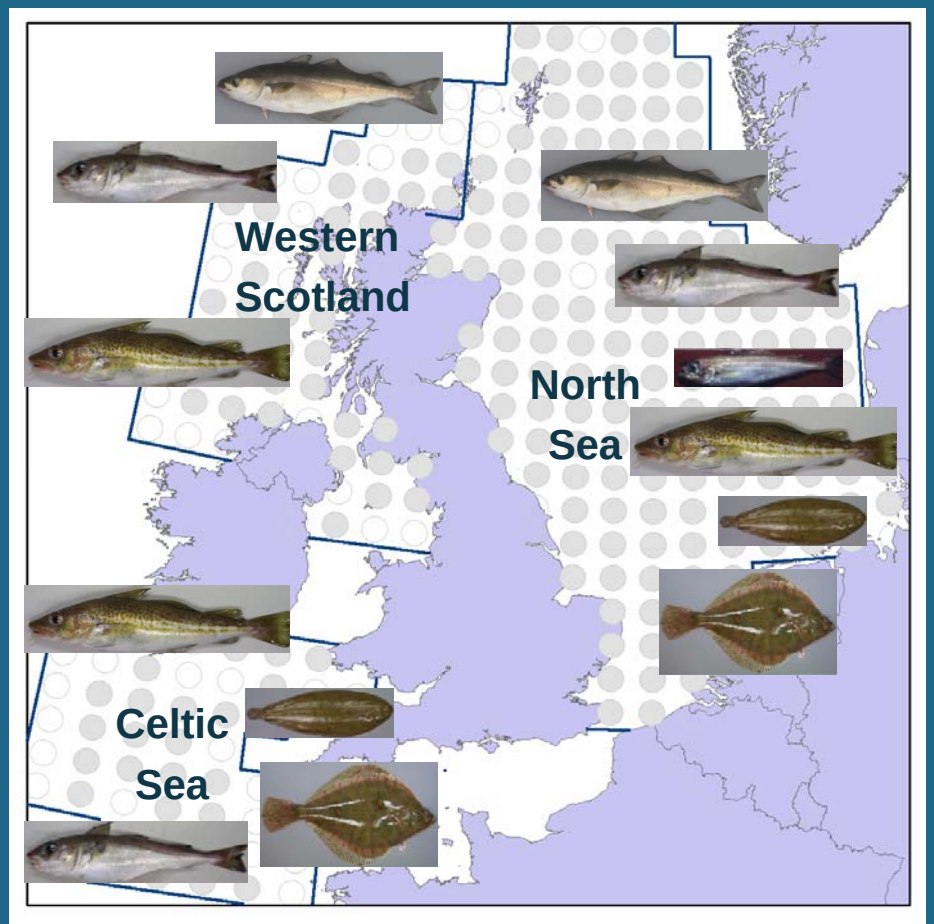
IMARES
Institute for Marine Resources and Ecosystem Studies

WAGENINGEN UR

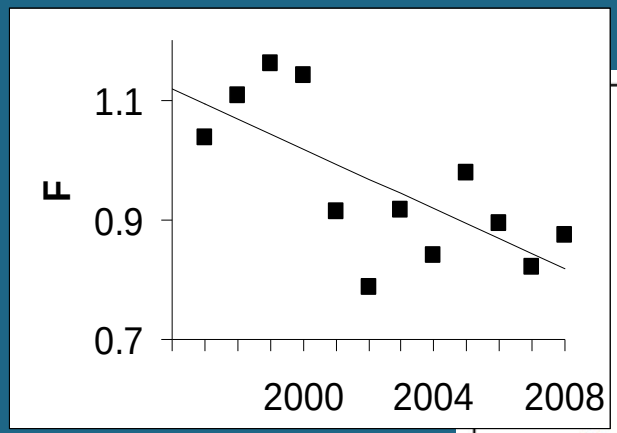
Fishing effect?

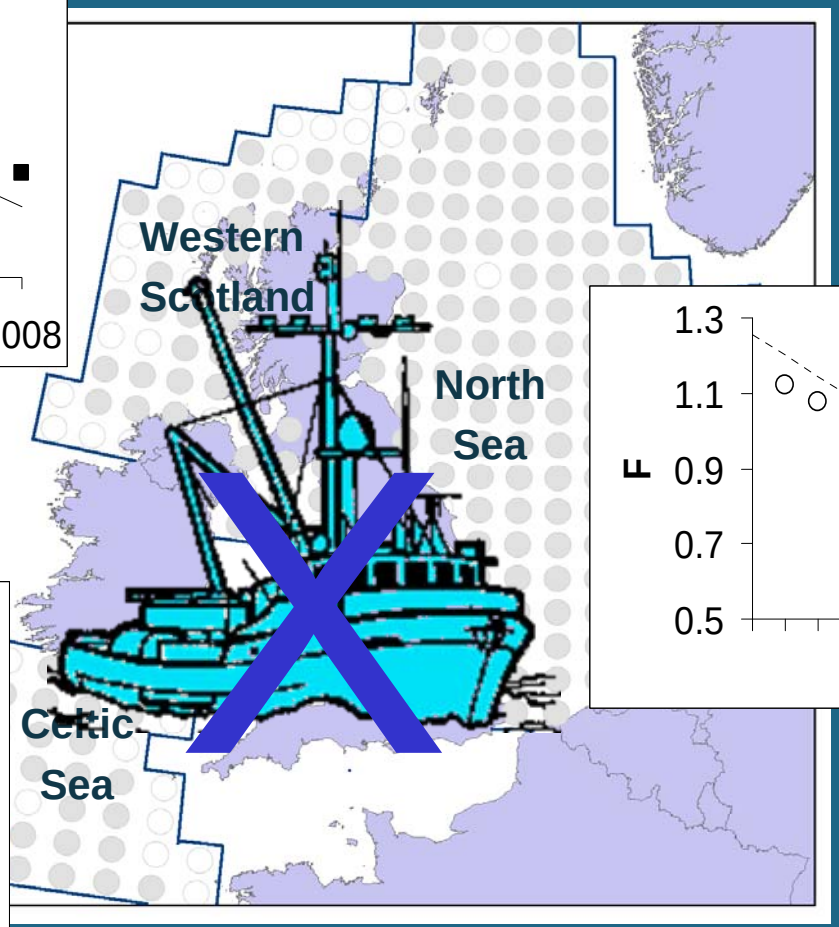
Average fishing mortality of main stocks

ICES assessment WG's

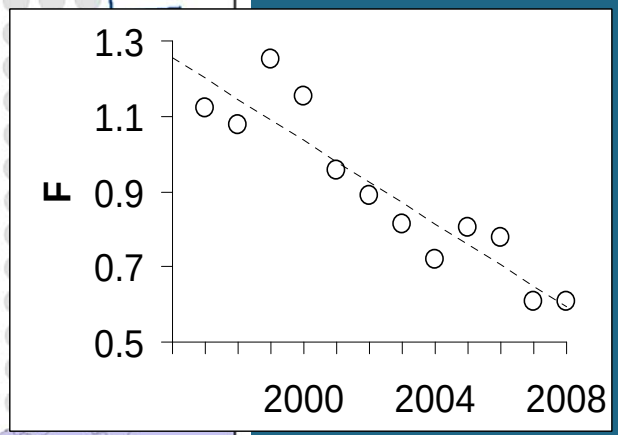


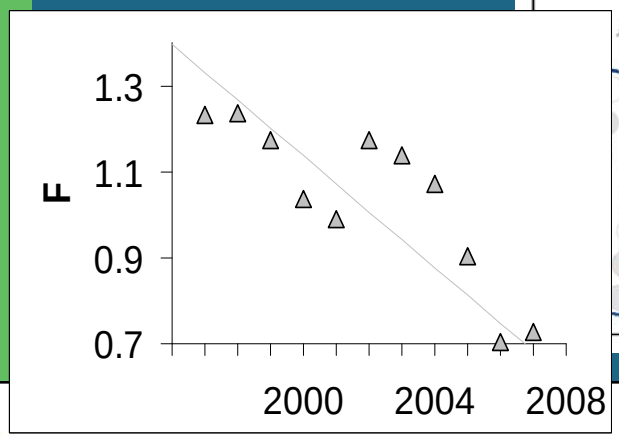
Decrease in Fishing





1997-2008



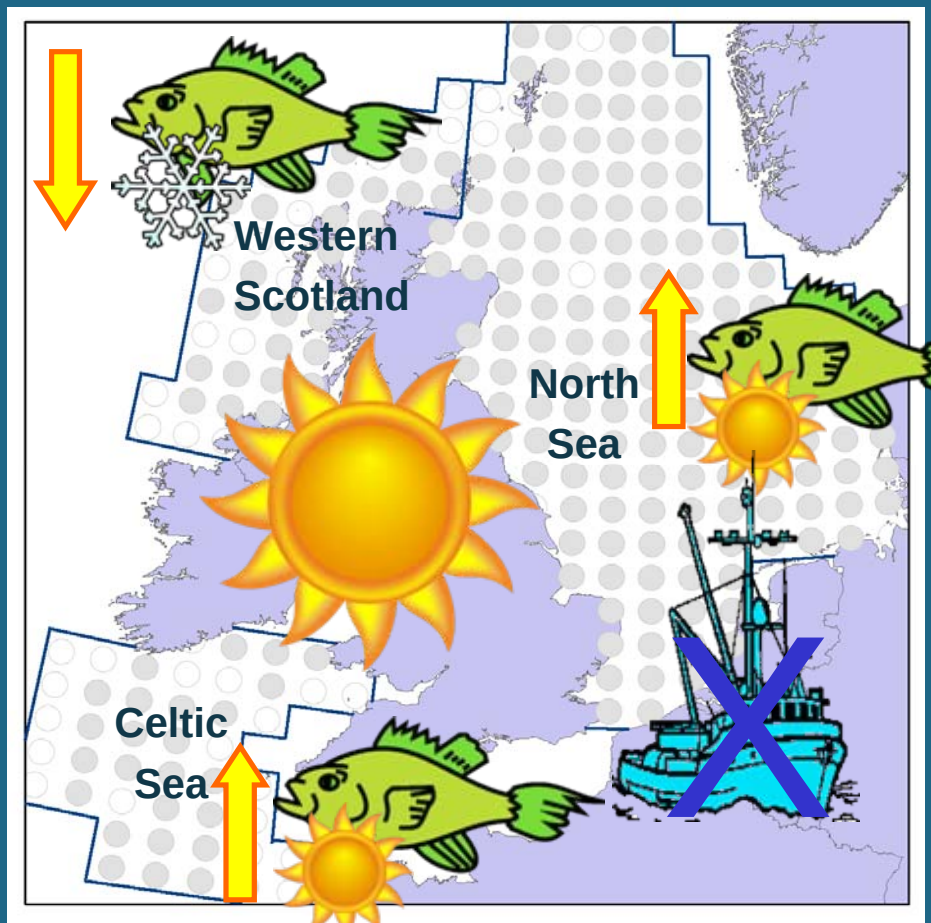


IMARES
Institute for Marine Resources and Ecosystem Studies

WAGENINGEN UR

In summary

- Regional warming
- Change in species richness related to biogeography
- No relation to 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