

The role of plankton time-series in managing our seas in a climate of macroecological change

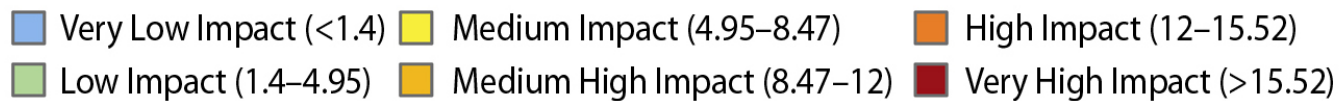
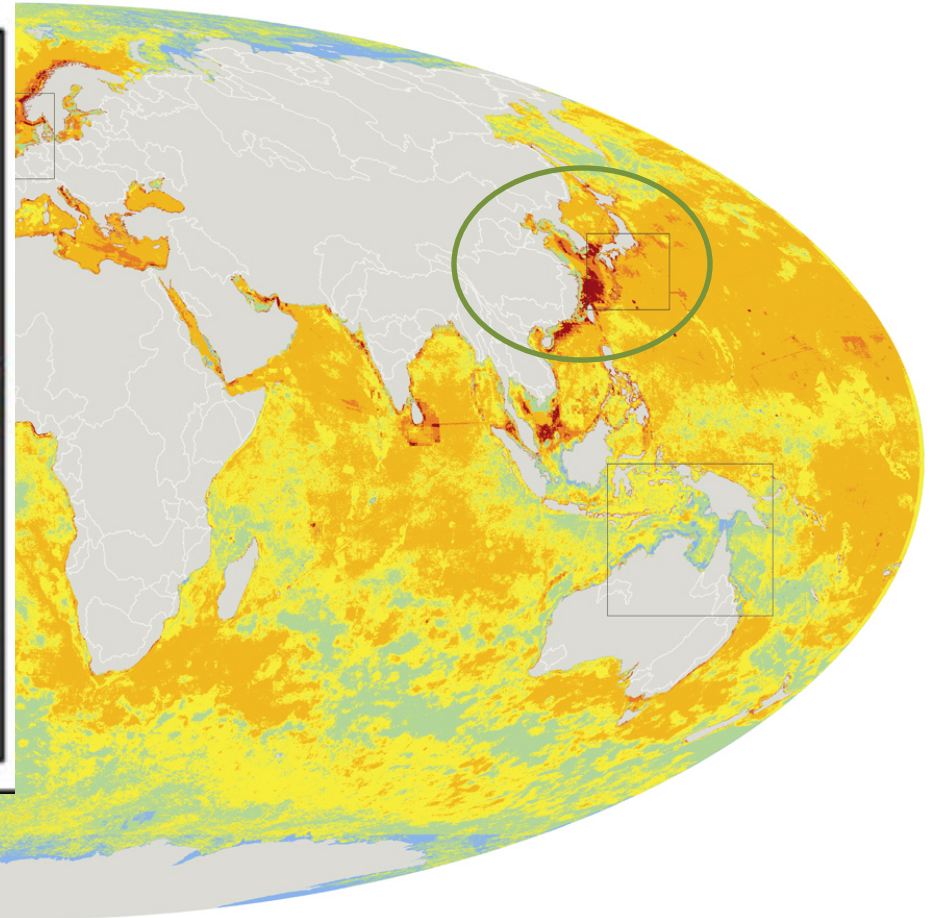
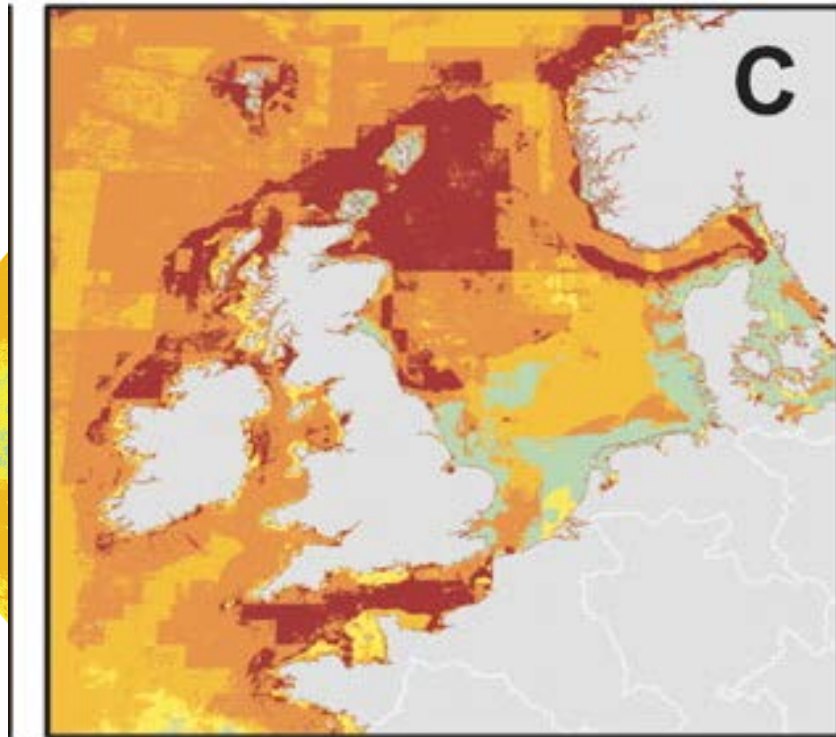
Abigail McQuatters-Gollop



NERC

SCIENCE OF THE
ENVIRONMENT

Human impact on marine ecosystems



We want to go from here...to there



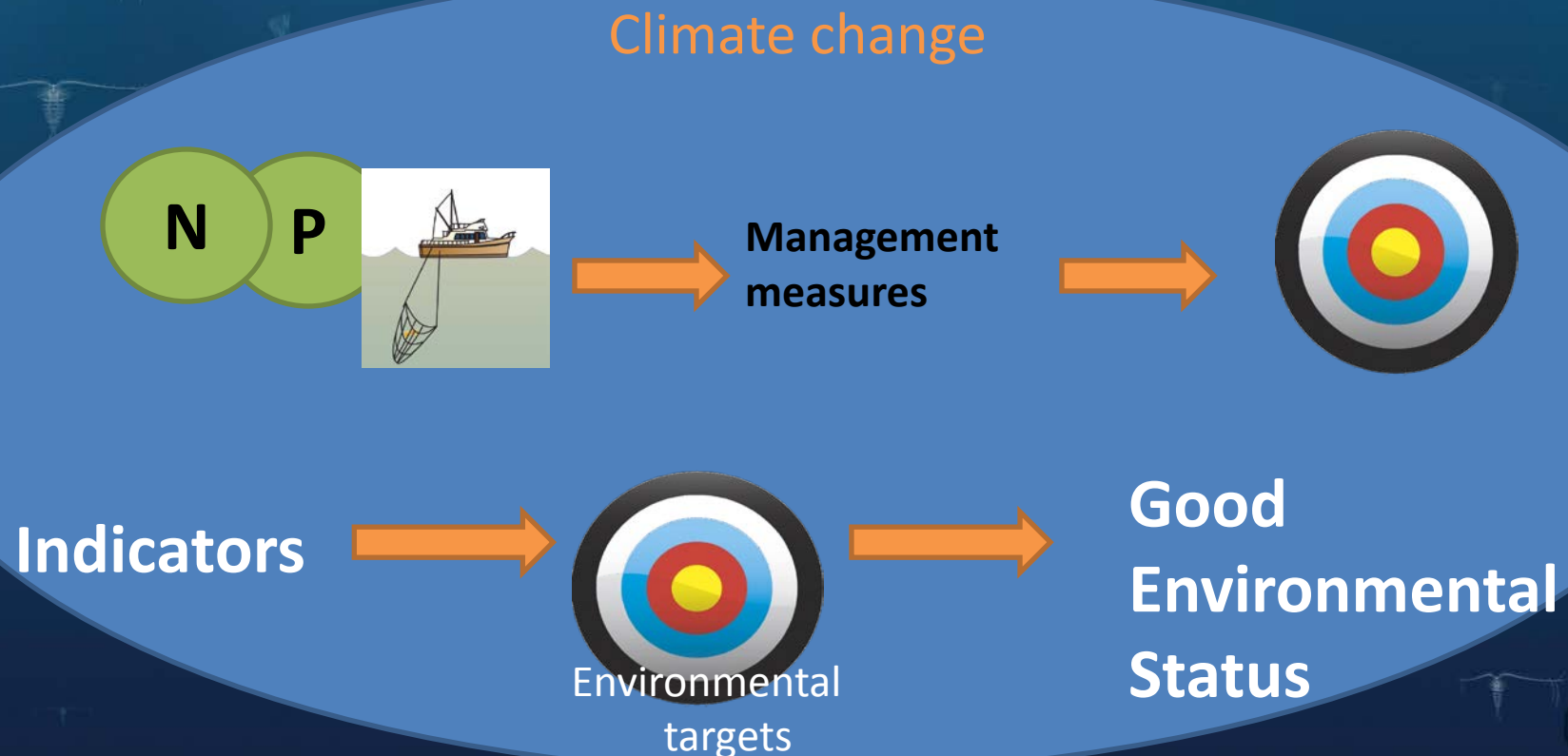
Marine Strategy Framework Directive (MSFD)

Objective: to achieve Good Environmental
Status (GES) of Europe's seas by 2020

1. Biodiversity
2. Non-indigenous species
3. Fisheries
4. Marine food webs
5. Eutrophication
6. Sea floor integrity
7. Hydrographical conditions
8. Pollution
9. Contaminants
10. Marine litter
11. Energy and noise

Challenge:

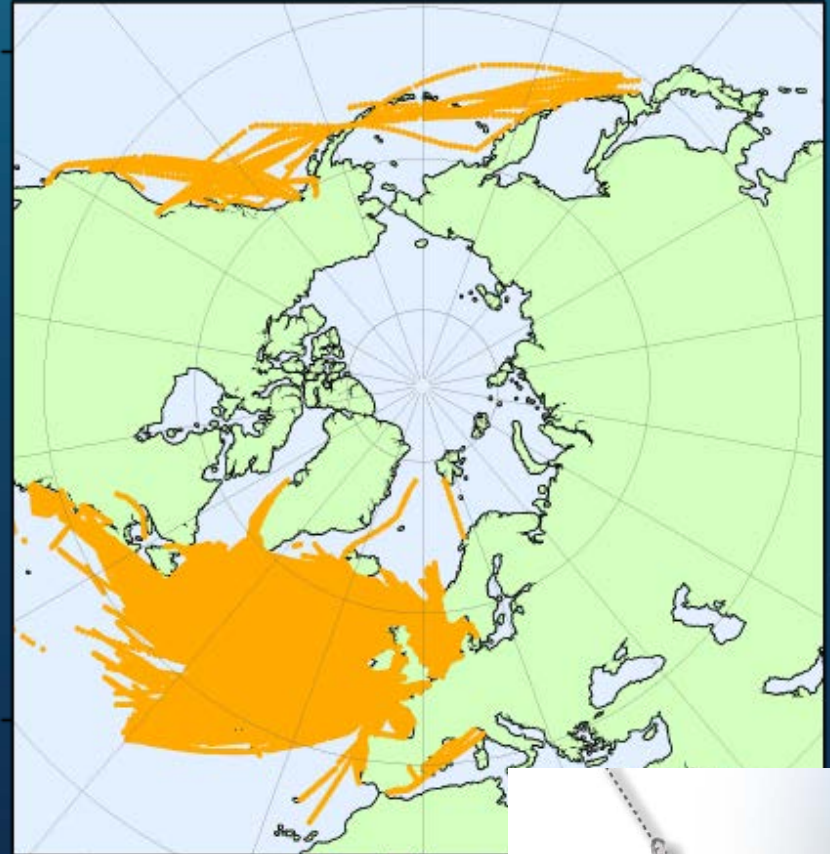
- To manage human pressures on the marine ecosystem while considering climate change



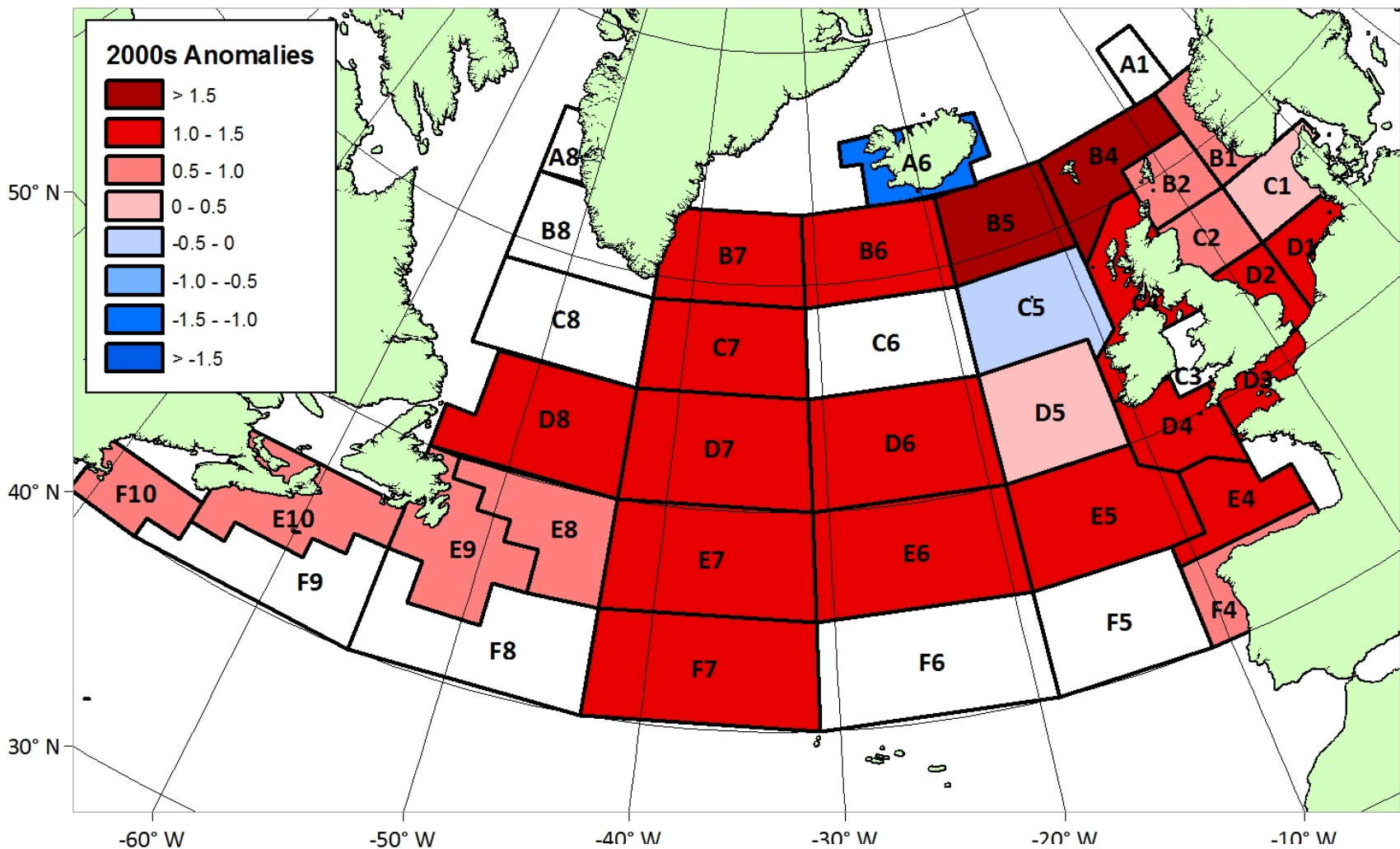


The Continuous Plankton Recorder (CPR)

- SAHFOS, Plymouth, UK
- Longest, most spatially extensive oceanic monitoring program in the world (est. 1931)
- >500 plankton taxa, microplastics



Challenge: Regime shifts

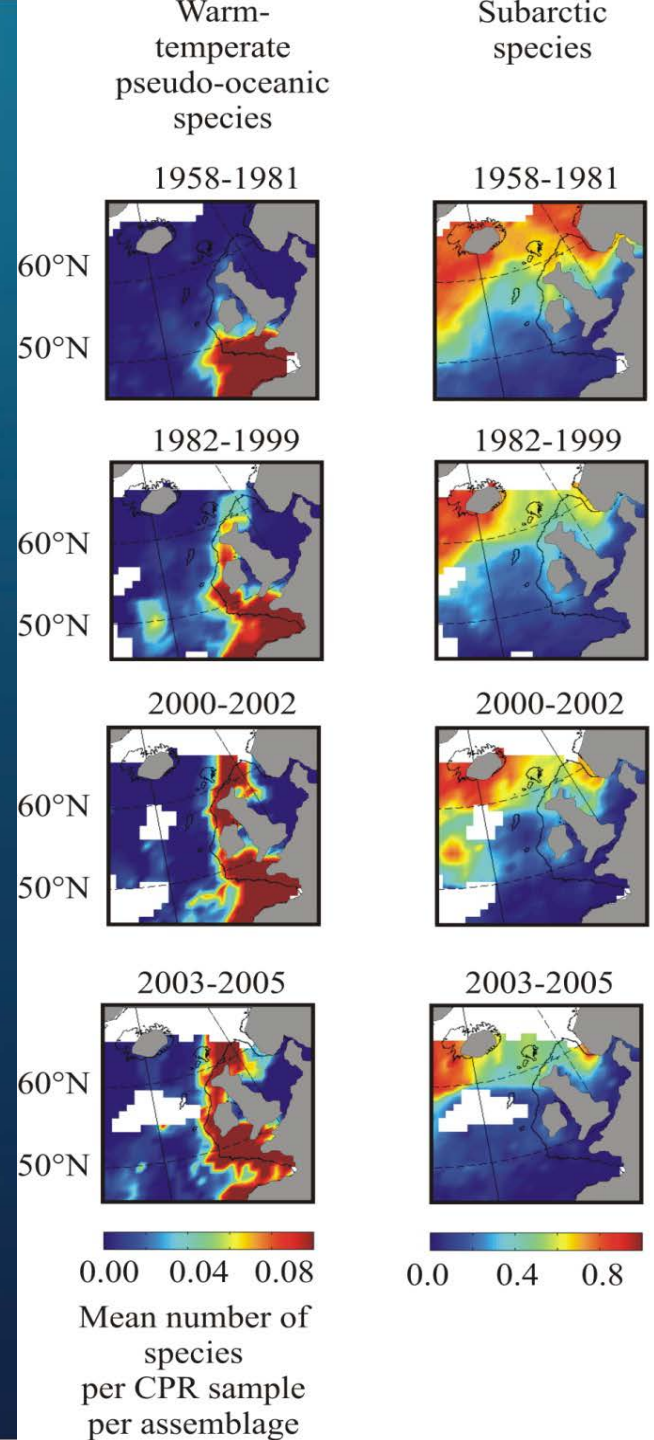


McQuatters-Gollop et al 2011 Nature

Challenge: Biogeographical shifts

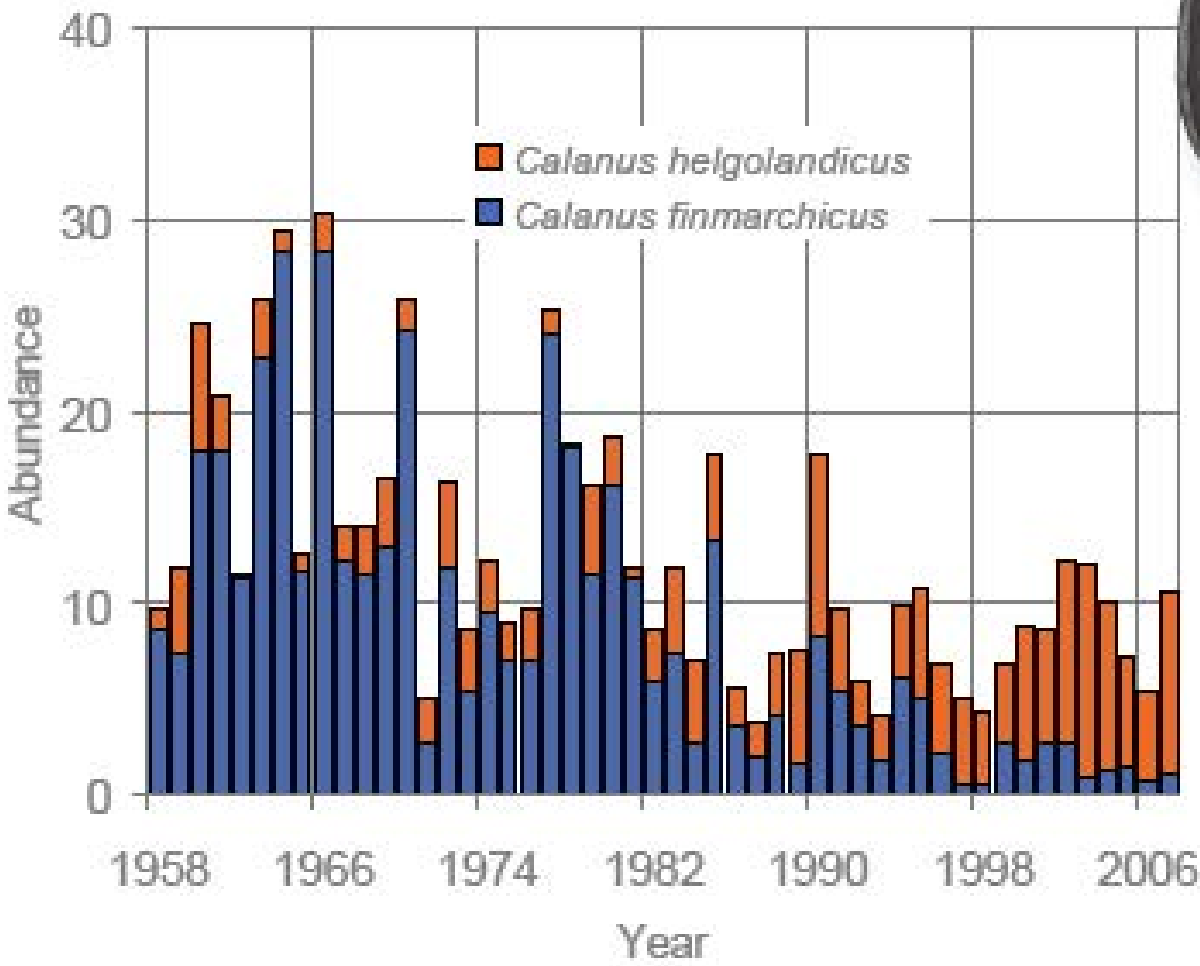


Northward shifts
~1000 km!



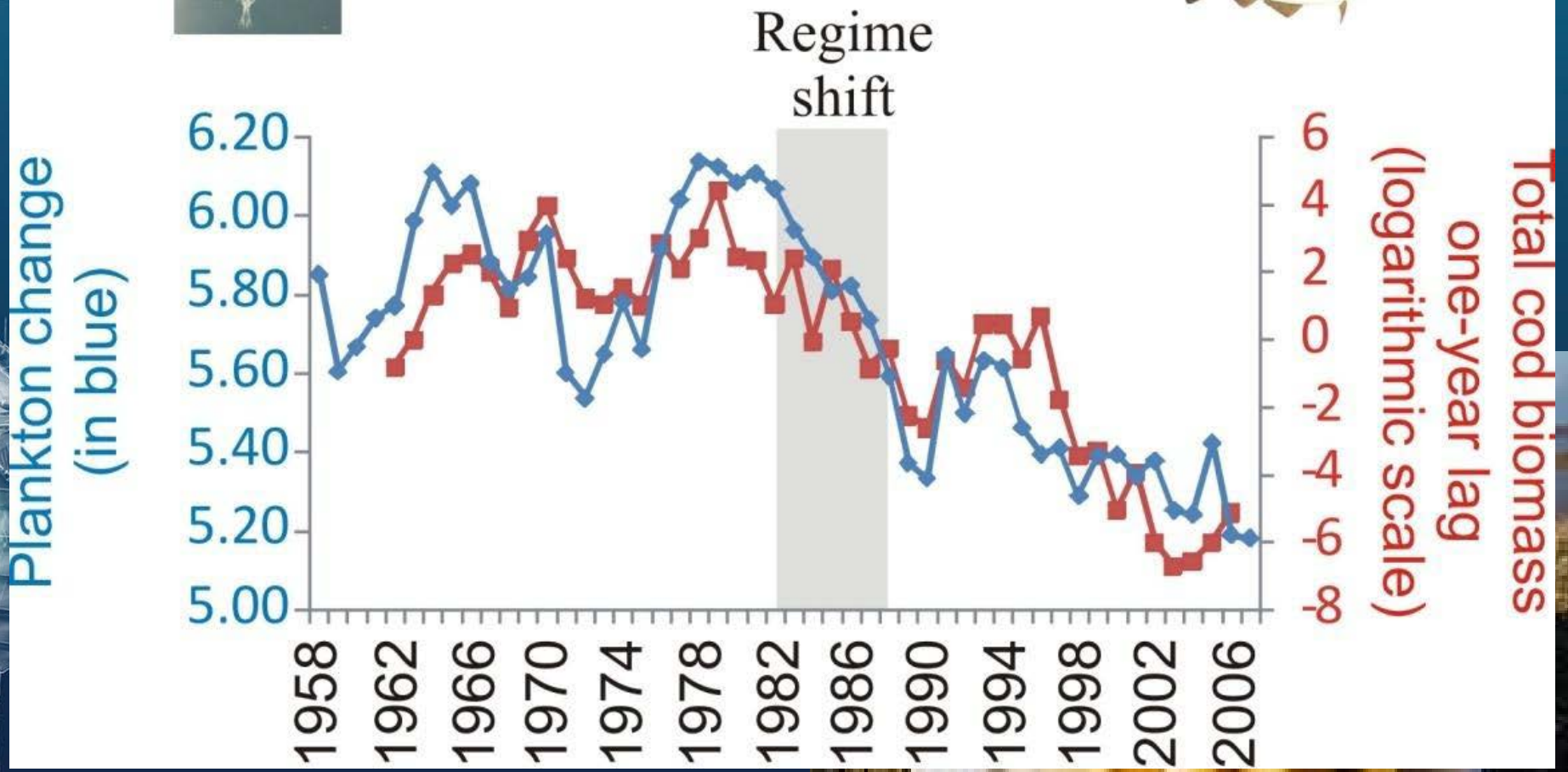
Challenge: Multiple pressures

% *Calanus helgolandicus*

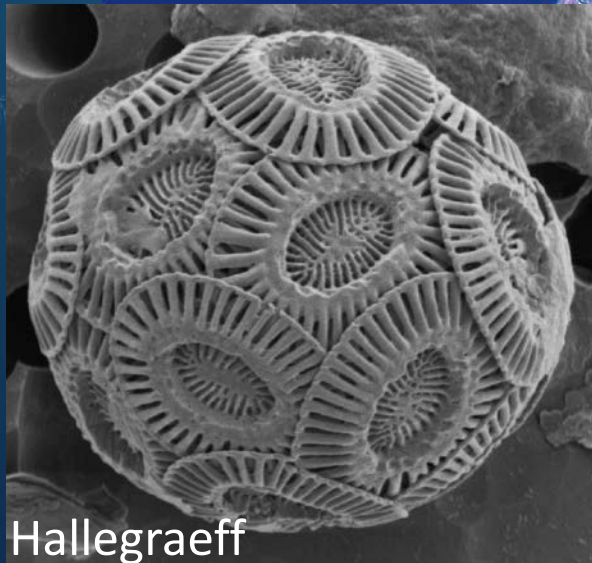


- C.
- C.

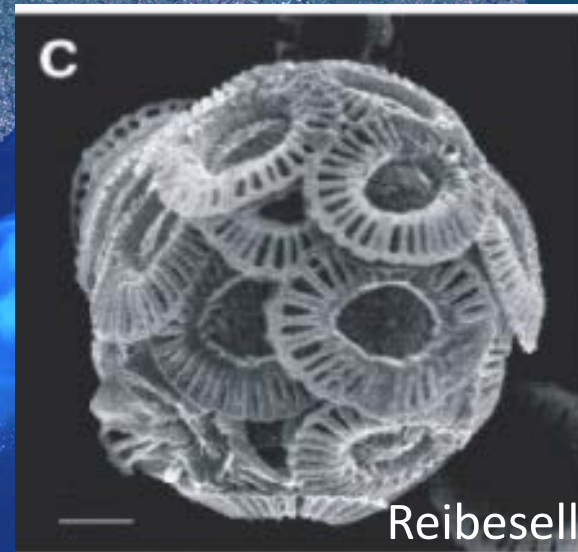
Challenge: Multiple pressures



Challenge: Scientific uncertainty



Hallegraeff

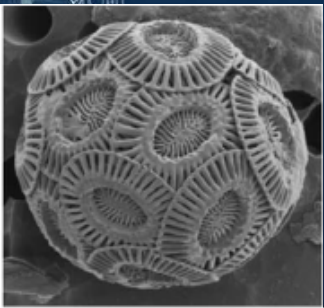
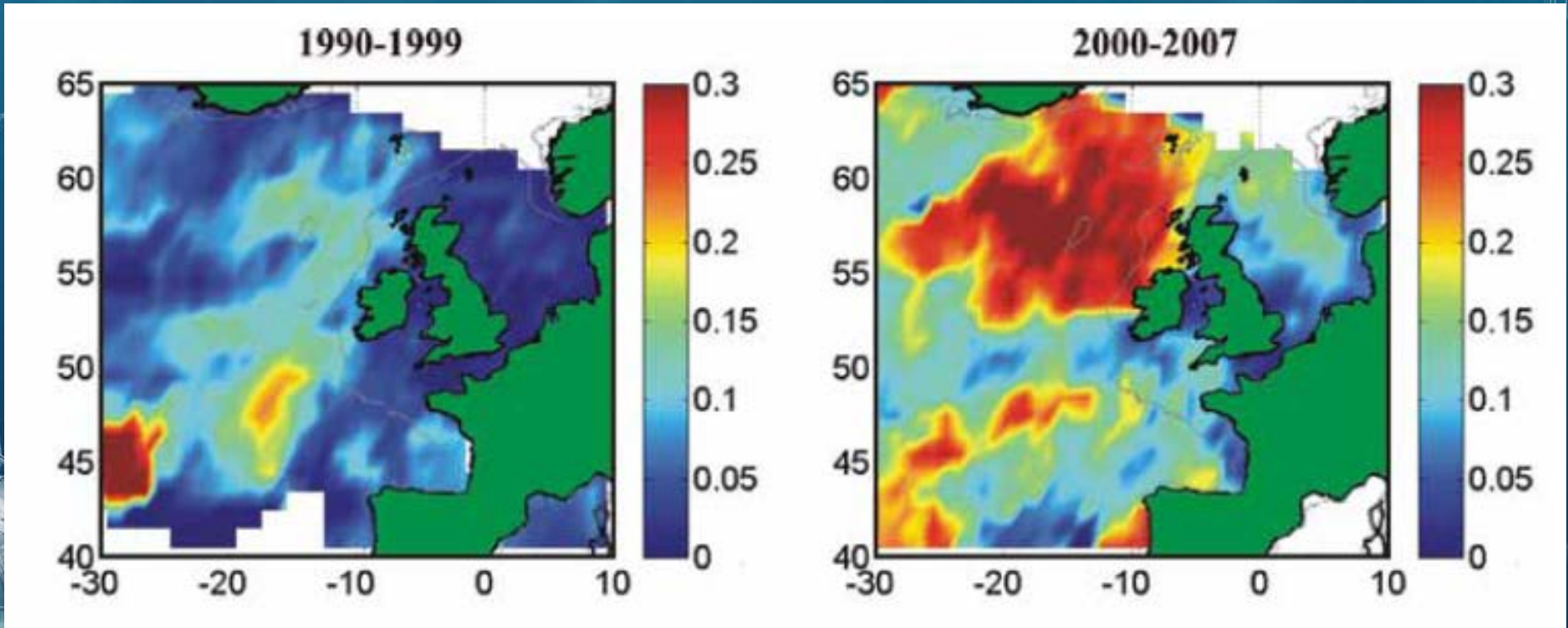


Reibesell



PML

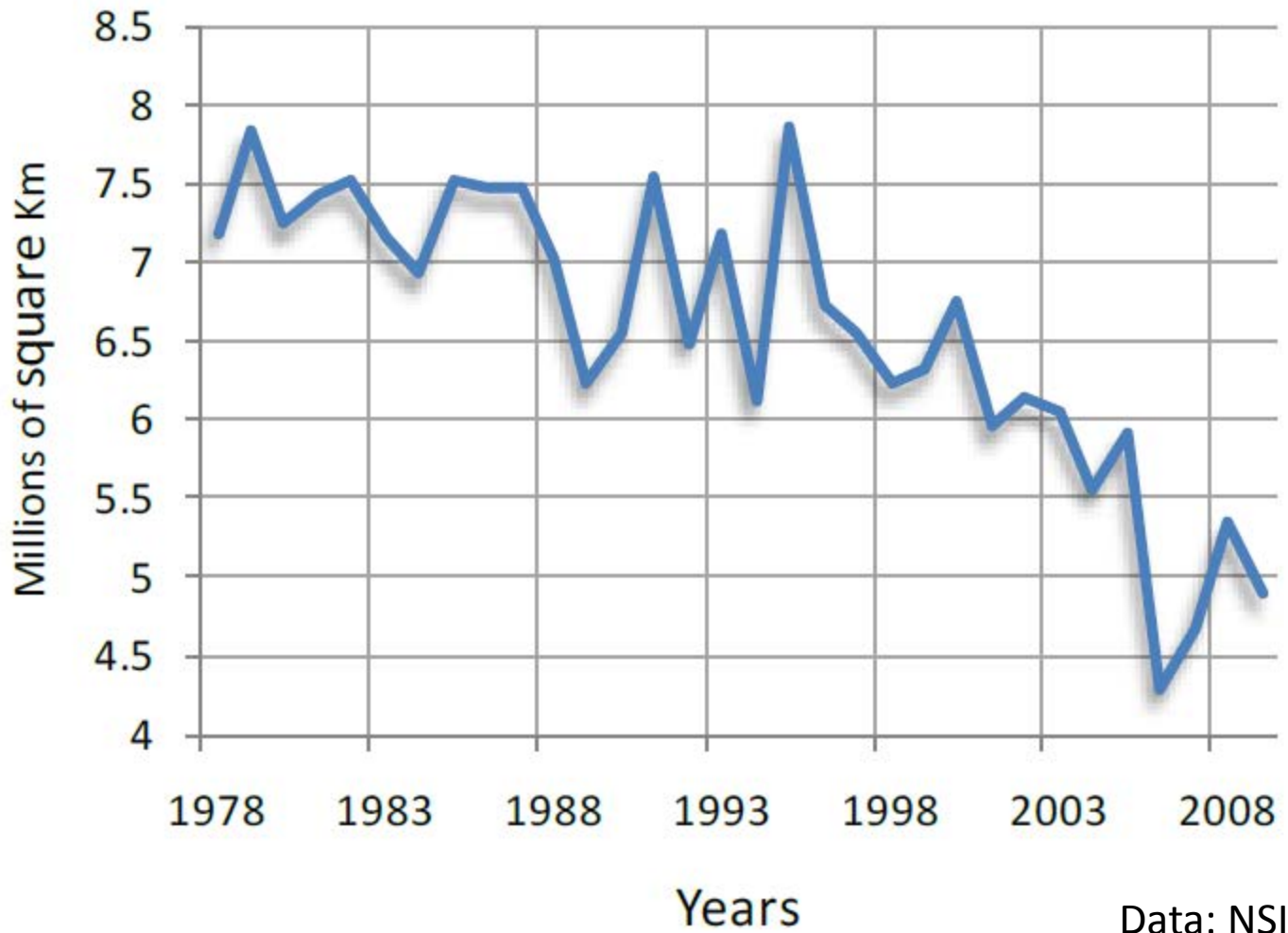
Challenge: Scientific uncertainty



Beaugrand, McQuatters-Gollop, et al NCC
Beare, McQuatters-Gollop, et al PLOS ONE

Challenge: Unpredictability

Arctic ice extent



Data: NSIDC



Neod



eminae

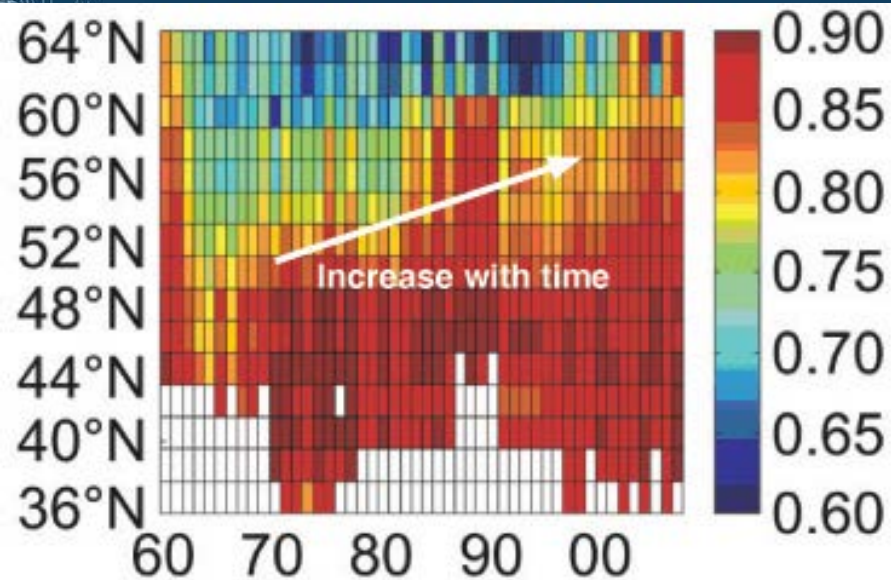
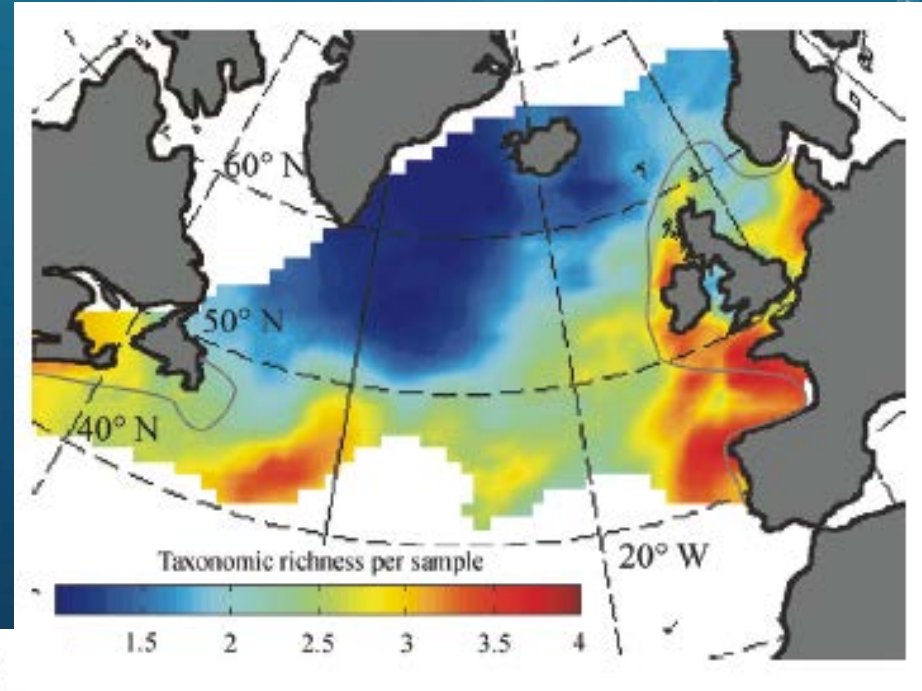
2004
2005
2006
2007
September 1998



80° W 60° W 40° W 20° W 0° N 20° N 40° N 60° N

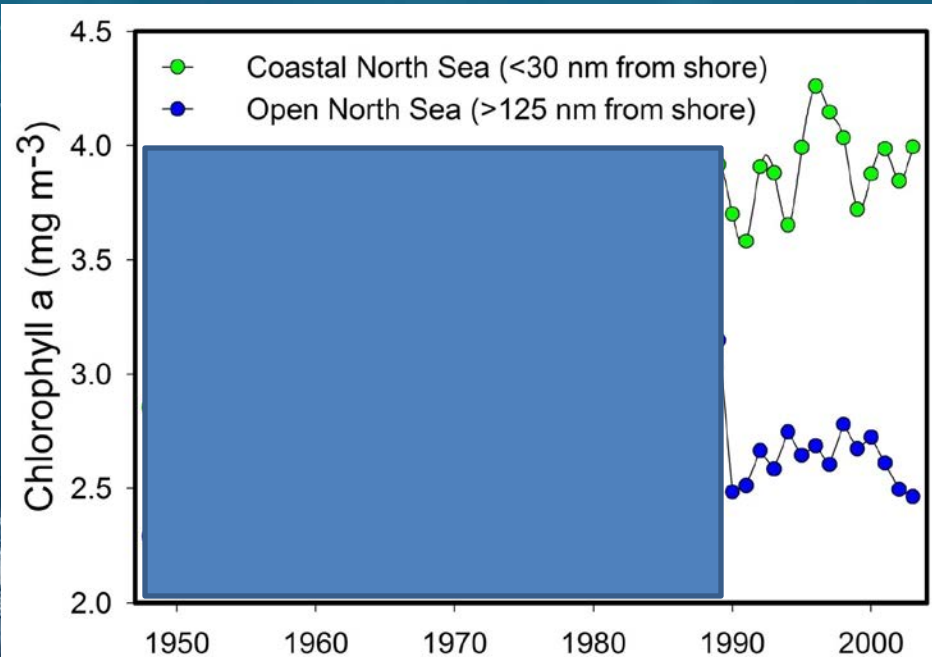
Challenge: subjectivity

Increasing
biodiversity...
Good or bad?



Diversity

Time-series are KEY



- Helps detect change
- Baseline selection
- Separate long-term signal from natural variability


Key messages

- Development of biodiversity indicators challenging
- Indicators and targets must be constructed which account for CC but trigger management action if change is anthropogenically-driven
- Preservation of multi-decadal biological t-s should be a priority

Thank you!



Ecological time series are the Cinderellas of ocean science: long-neglected drudges, eking out their existence at the edge of what is in fashion, they now find themselves in favour at the climate change ball - Koslow and Couture, Nature 2013

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