Update on SW plankton

Abigail McQuatters-Gollop, David G. Johns, George Graham, Rowena F. Stern

NERC
SCIENCE OF THE ENVIRONMENT

CONTINUOUS PLANKTON RECORDER SURVEY
SAHFOS

Why monitor plankton?

- Produce 50% of world's oxygen
- Key role in carbon cycle
- High diversity

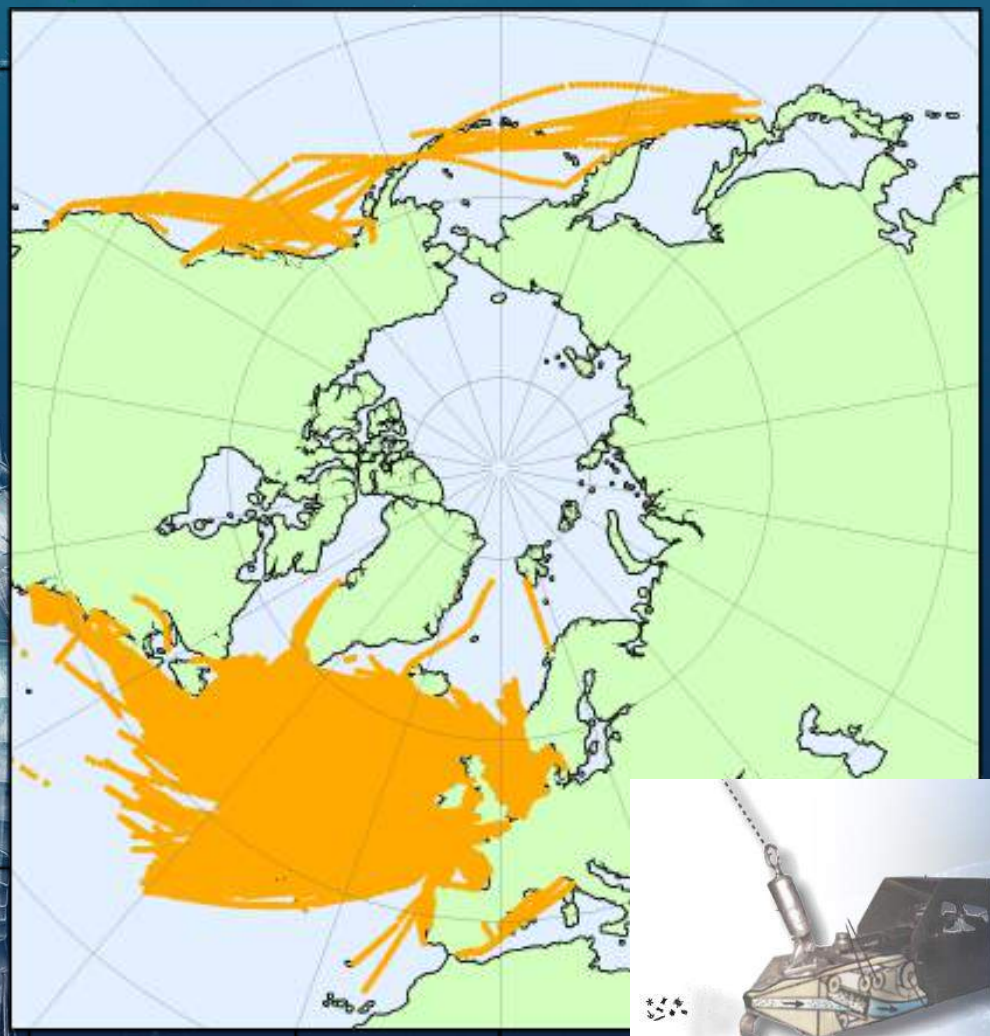
Crucial to ecosystem functioning

- Sensitive to climate change
- Base of marine food web
- Respond quickly to changes in env.

Clear links to humans

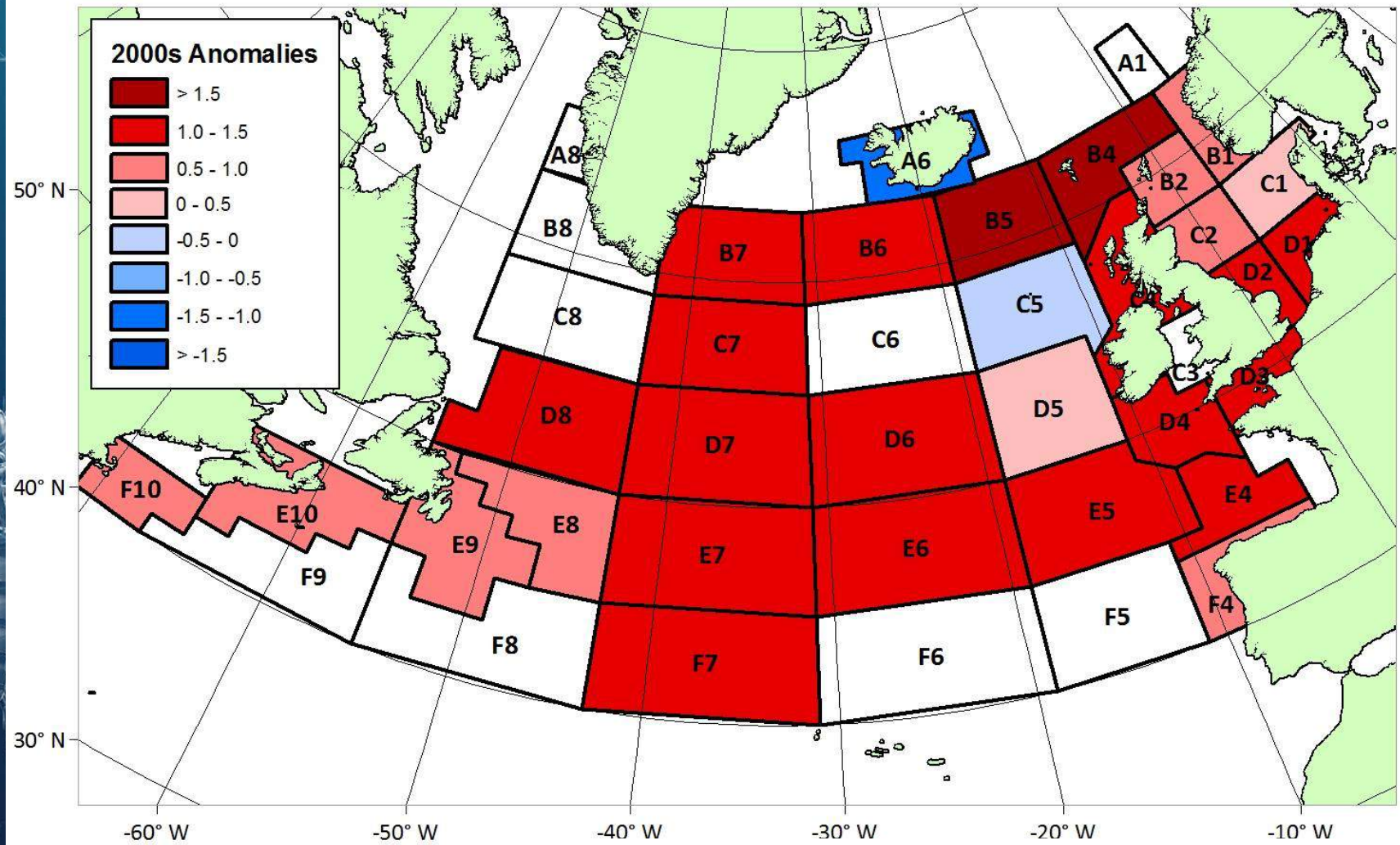



The Continuous Plankton Recorder (CPR)



- SAHFOS
- Ships of Opportunity
- Unchanged methodology (>80 years)
- Longest, most spatially extensive oceanic monitoring program in the world
- ~ 1 million samples
- 6 million nm of ocean
- 500 plankton taxa + indicator of phyto biomass
- Microplastics
- Sample archive

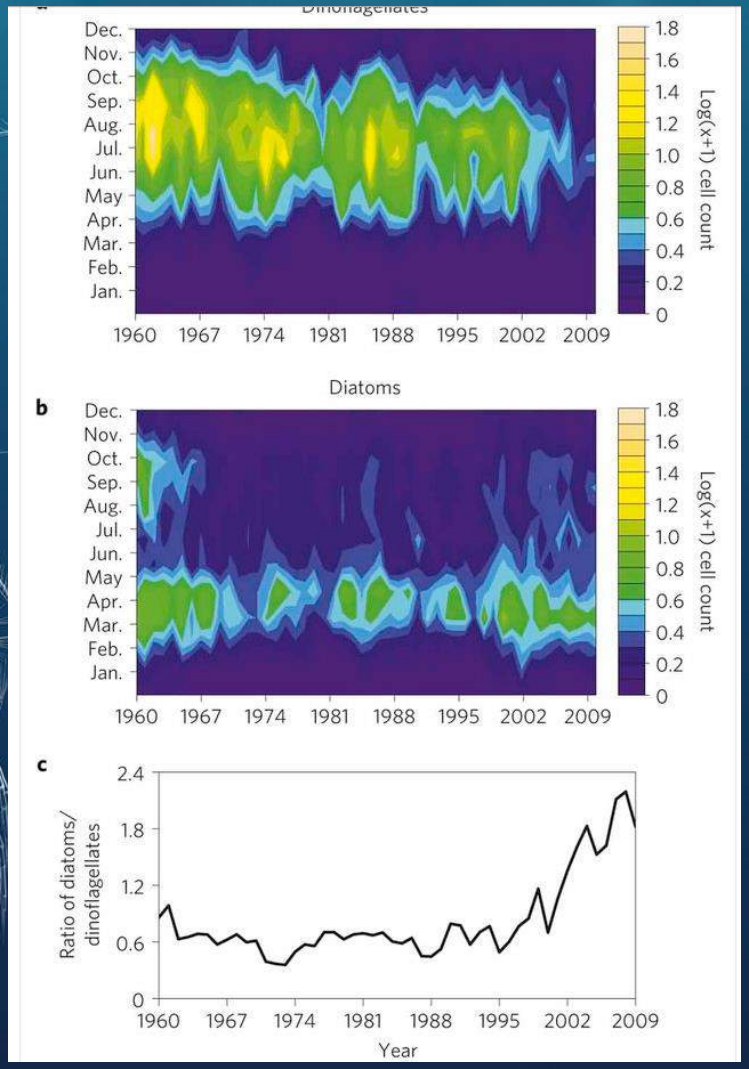
Primary production



McQuatters-Gollop et al 2011 Nature

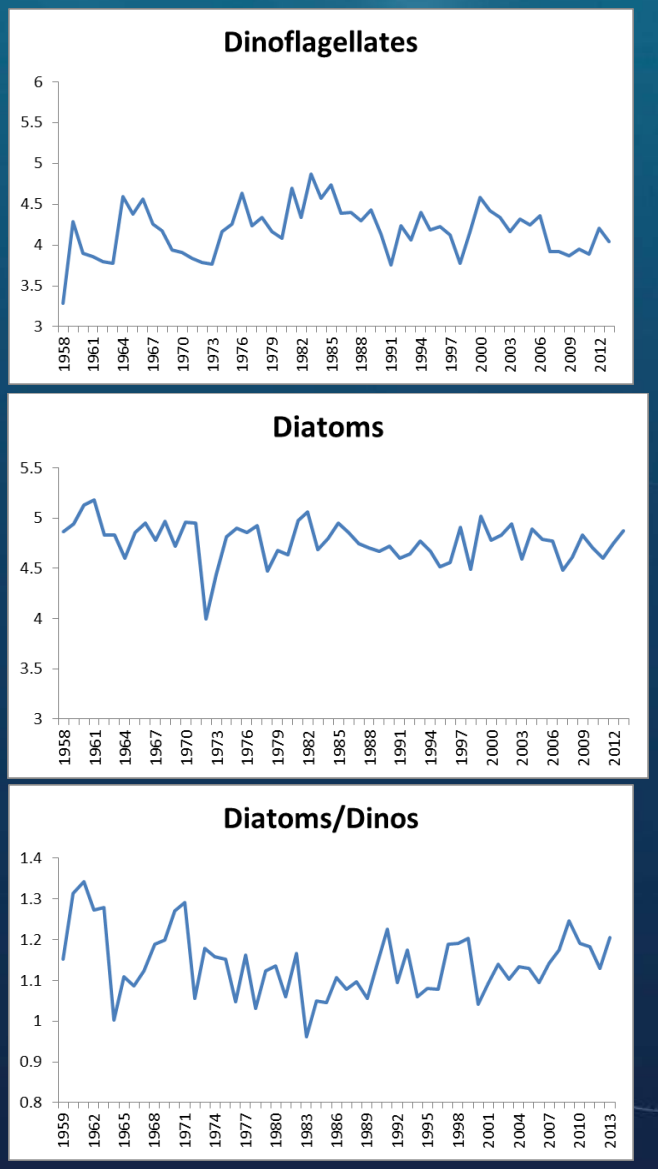
Diatoms and dinoflagellates

Northeast Atlantic

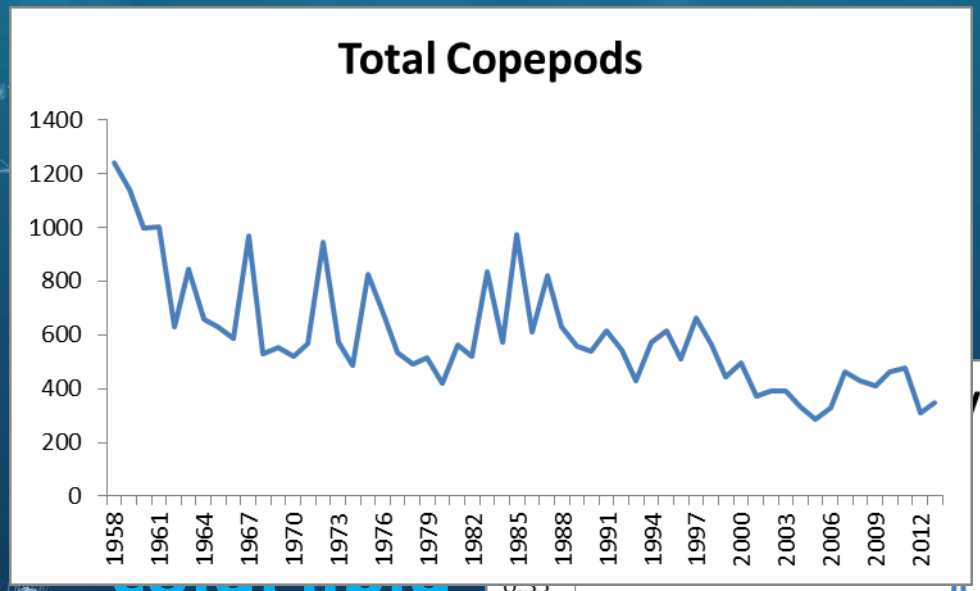


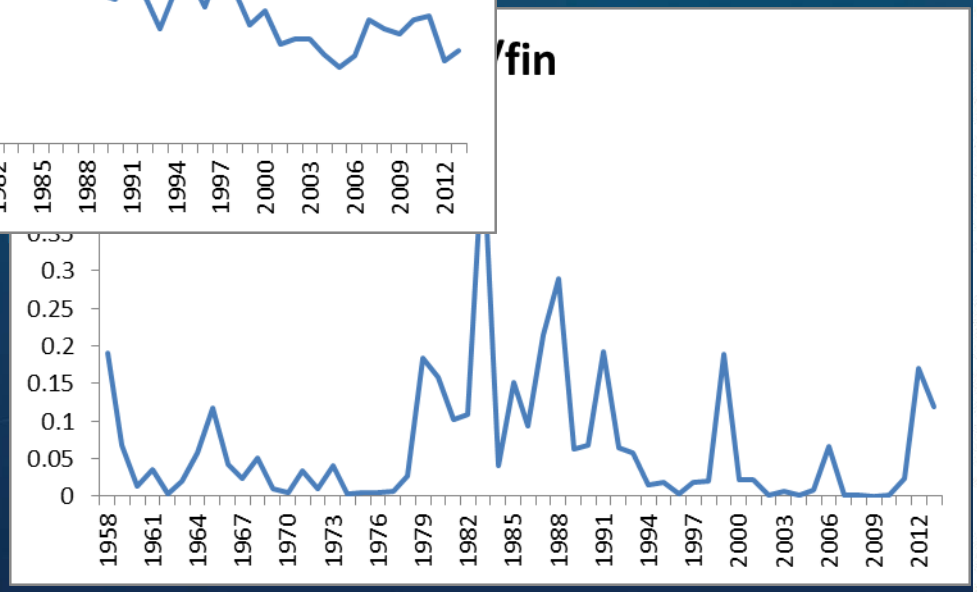
Hinder et al Nature Climate Change

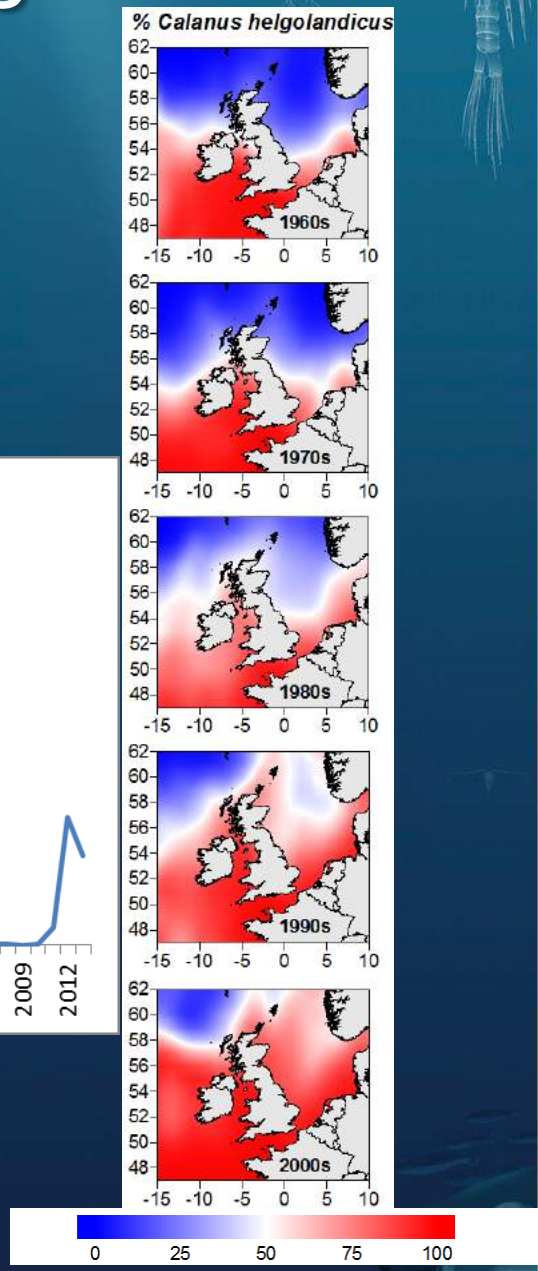
Southwest UK waters



Changes in SW copepods

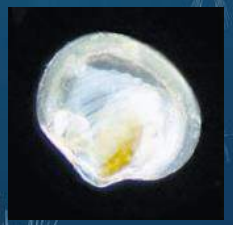


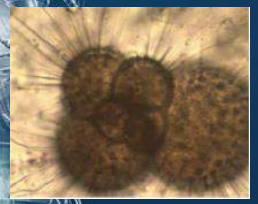


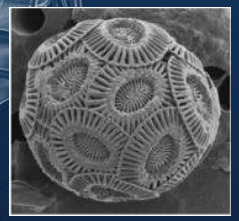


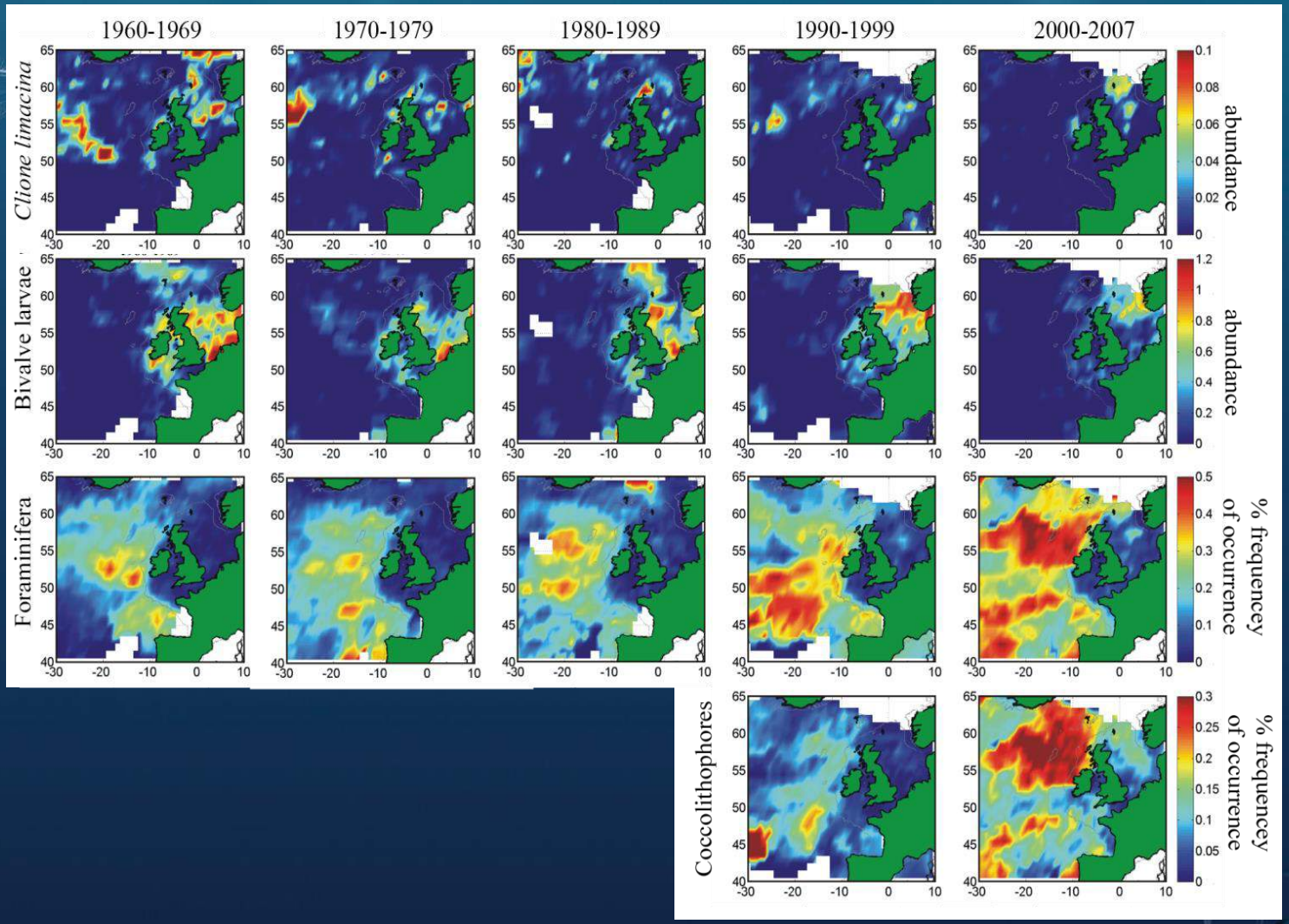
Change in quality and quantity of food for larval fish

OA – Changes in calcareous plankton





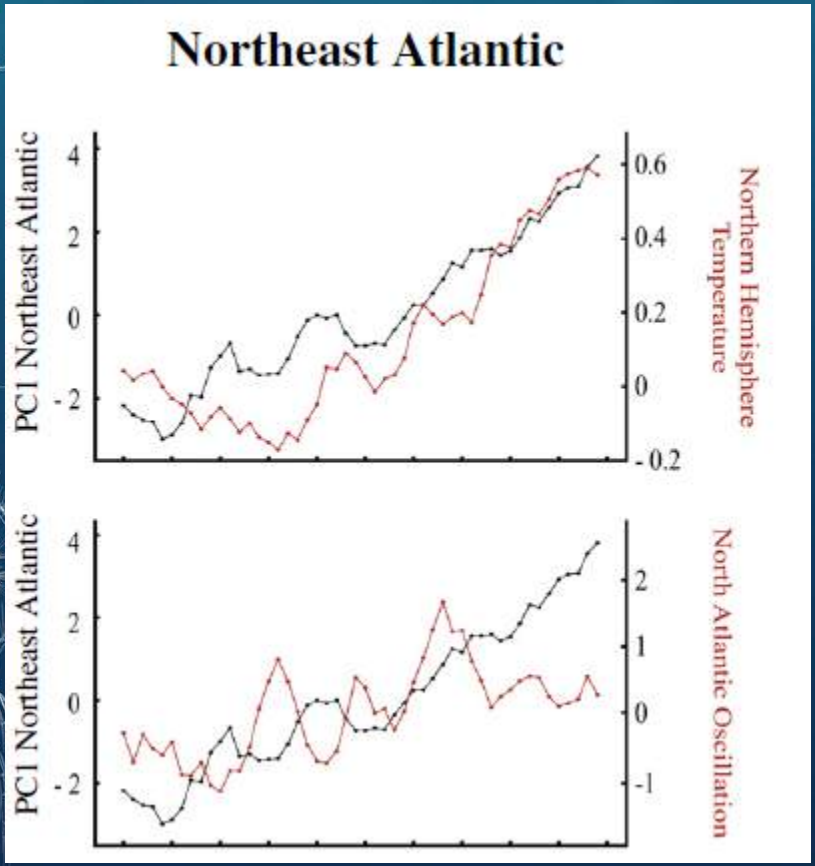


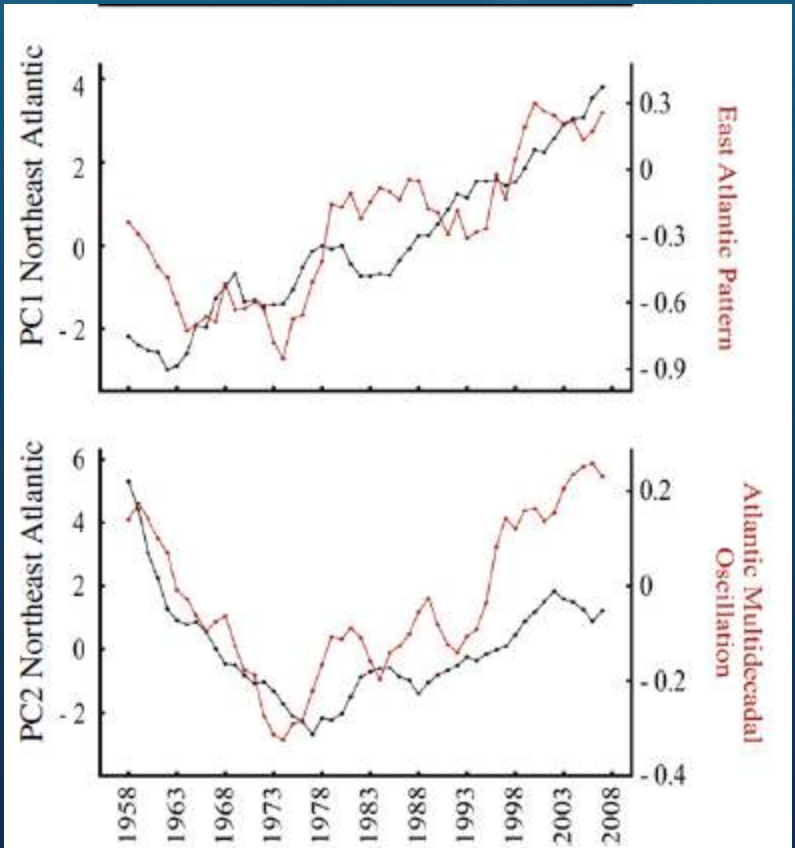


Beaugrand, **McQuatters-Gollop**, et al 2013 Nature Climate Change

Beare, **McQuatters-Gollop**, et al 2013 PLOS ONE

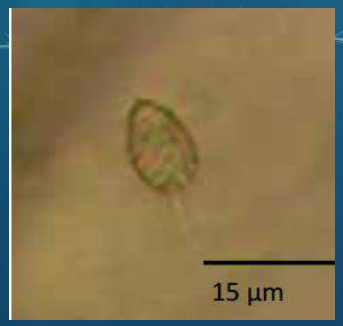
Climate key driver of plankton dynamics





Goberville et al 2015

Increased taxonomic resolution of coccolithophores



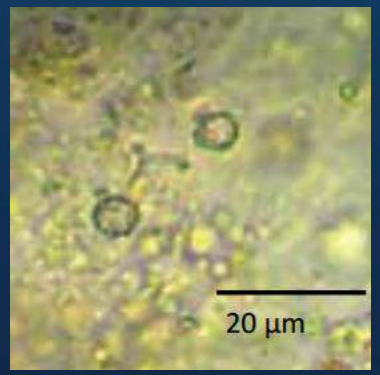
Acanthoica quattrospina

Coccolithus pelagicus

Rhabdosphaera claviger

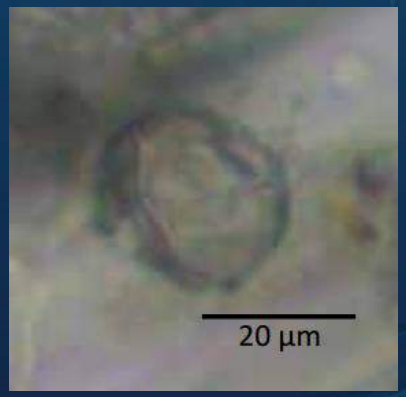
Discosphaera tubifera

Braarudosphaera bigelowii



Emiliania huxleyi

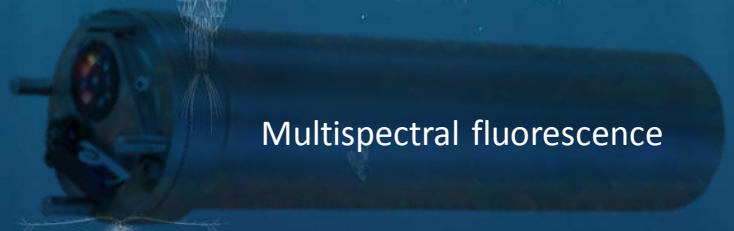
Syracosphaera pulchra



Scyphosphaera apsteinii

Developing instrumentation programme

4 Routes



Multispectral fluorescence

ARGO standard
Conductivity &
Temperature

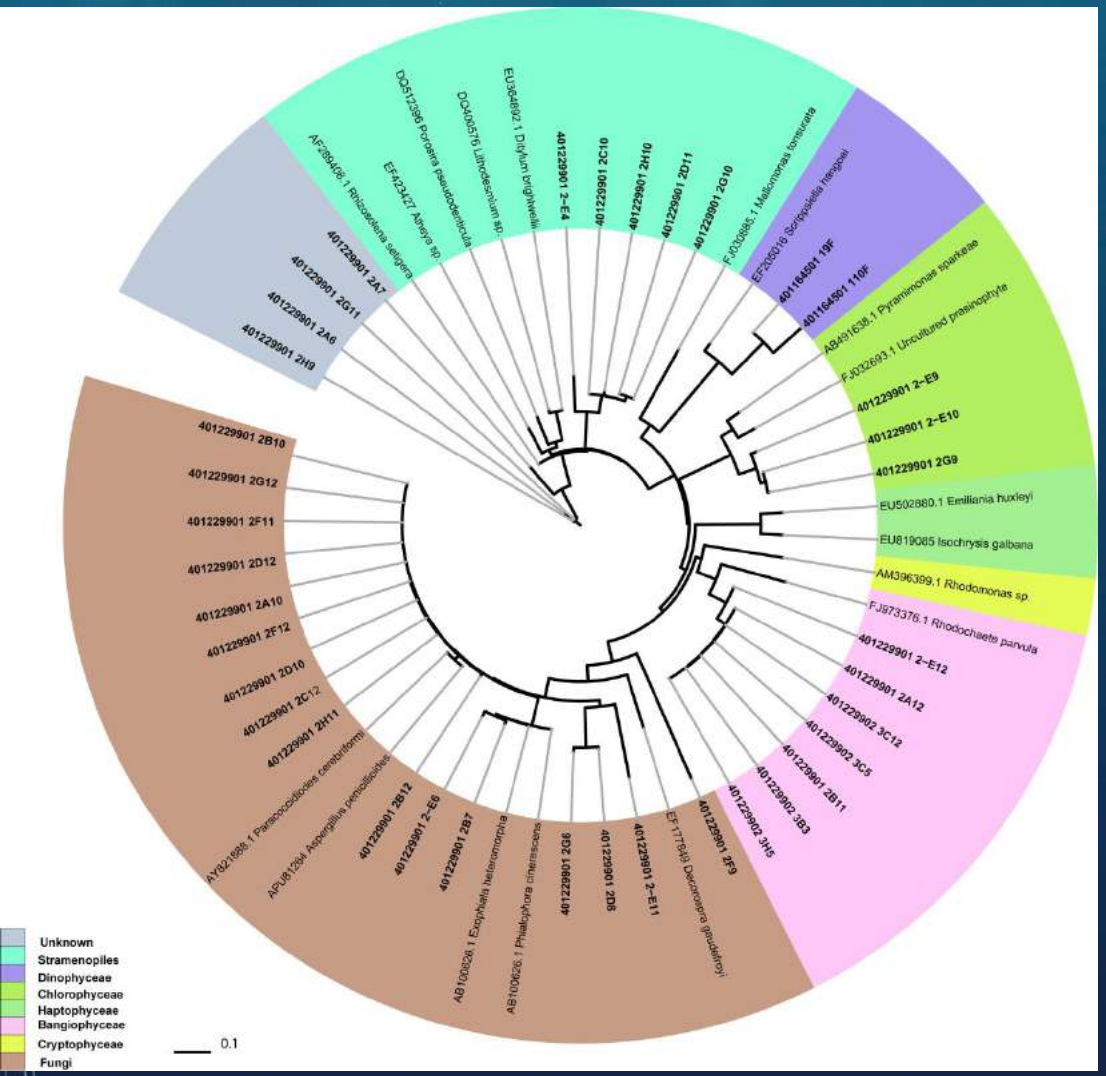
? O_2 / pCO_2

10 Routes

Conductivity,
Temperature,
Depth,
Fluorescence

Web-based Visualisations

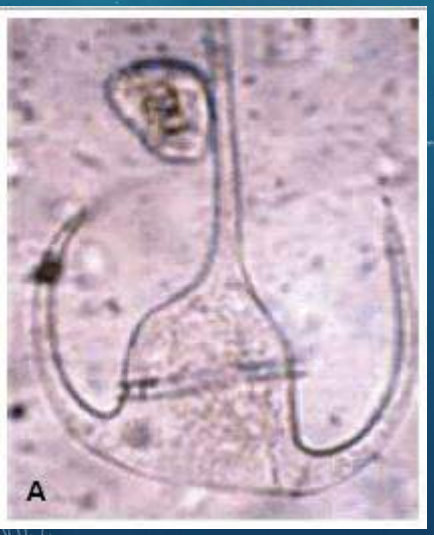
Water and Microbial Sampler (WaMS)



- Revealing new diversity in small size classes
- Complements traditional CPR sampling
- Building a more robust picture of pelagic community
- Forming a new time-series!

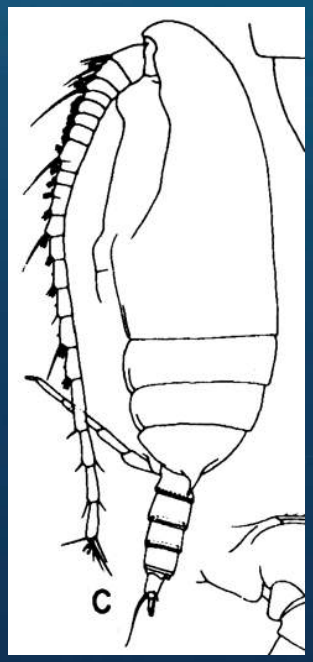
Taxa in **bold** in WaMS, rest are reference taxa

Recent unusual plankton



Neoceratium breve – warm-water, mid-Atlantic dinoflagellate, rare in CPR (Photo scilo.org)

Aetideus actutus– warm-water, new to CPR survey (Photo http://copepodes.obs-banyuls.fr/)



Cyanea lamarckii – found near Hull (Photo Sue Daly via MarLIN)

Recent unusual plankton

Heterophryxus appendiculatus – a parasitic isopod that preys on krill. Recorded near America.

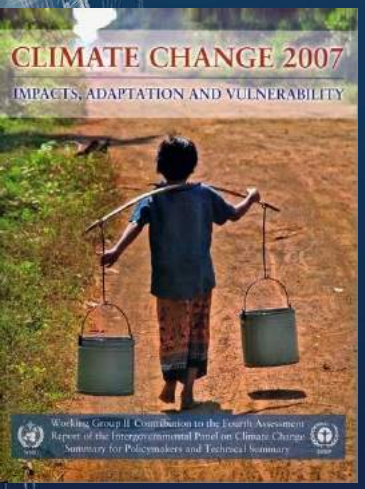
(Photo by Rob Camp)

Distoculus minor– 1 mm warm-water harpactacoid, new to the CPR survey, recorded near New England

(Photo by Astrid Fisher)

CPR data providing evidence

- CPR data underpinning target setting and indicator development for the UK's and OSPAR's implementation of the Marine Strategy Framework Directive



Key messages

- Climate change primary driver of plankton dynamics in Southwest and North Atlantic
- Multi-decadal biological t-s such as the CPR essential to detecting and understanding change
- New environmental instrumentation and microbial time-series increasing our understanding
- Data and research crucial for informing policy and decision making

Thank you!

Abigail McQuatters-Gollop
SAHFOS
abiqua@sahfos.ac.uk
@anaturalstate