Welcome back

to the

Inaugural workshop of the

UK Environmental Observation Framework

17th – 18th July 2008

Plankton Inspiration

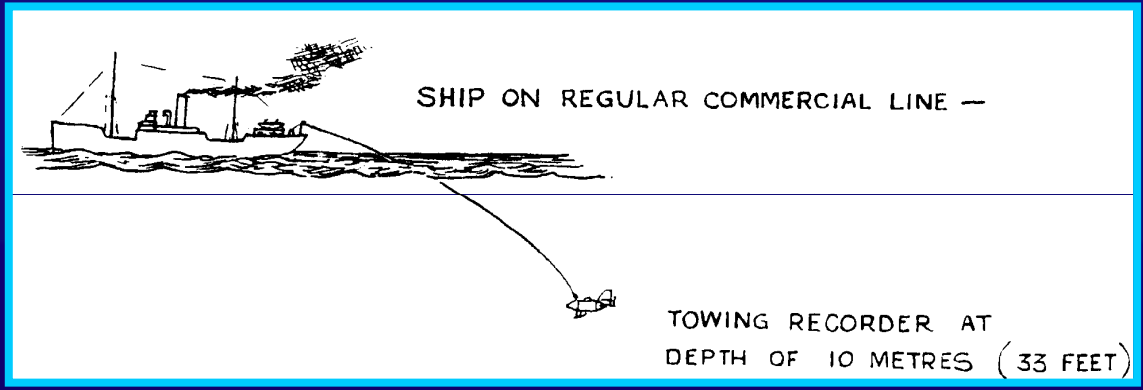
Philip C. Reid

University of Plymouth

Sir Alister Hardy Foundation
for Ocean Science

The Continuous Plankton Recorder Survey

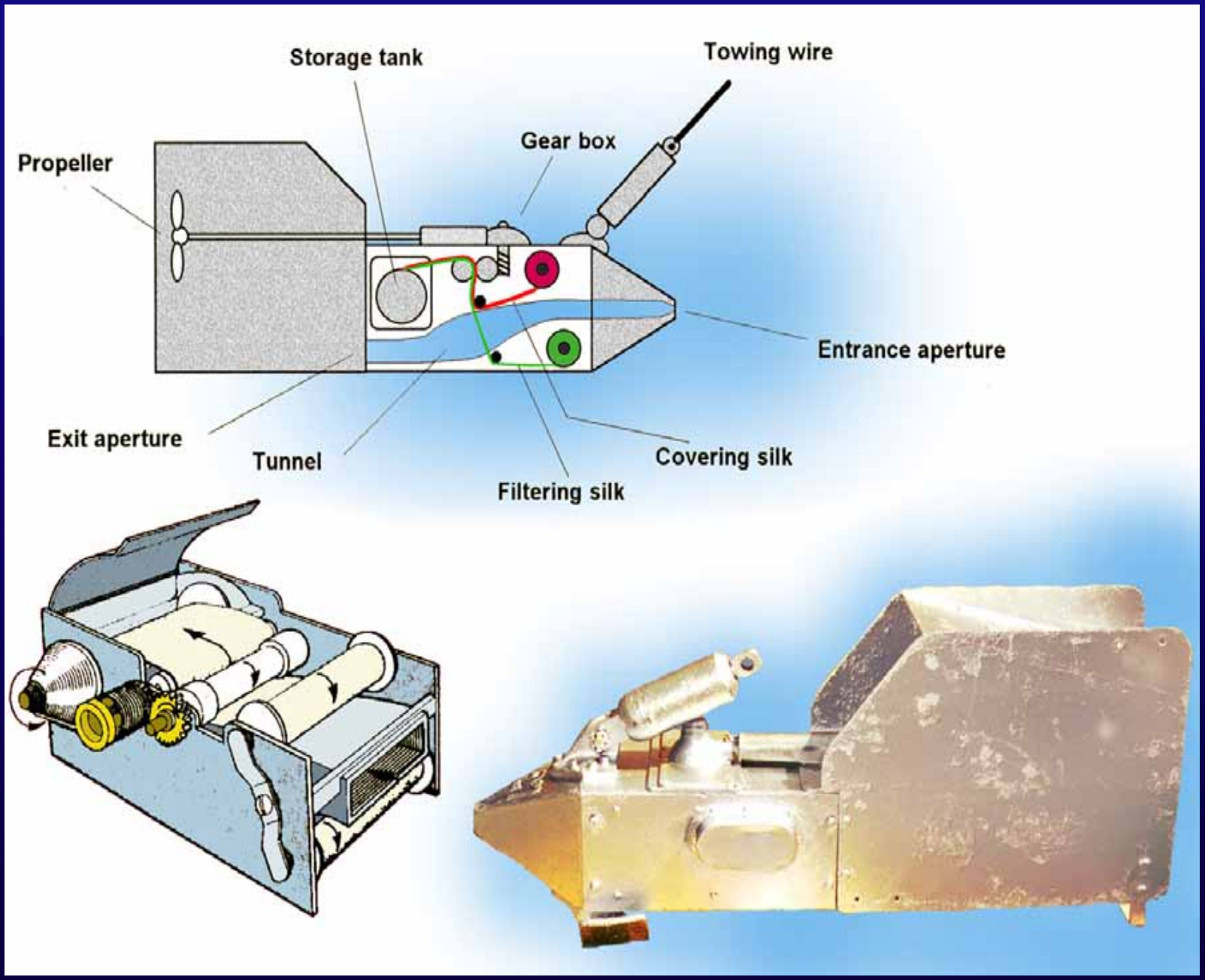
Continuous Plankton Recorder (CPR) Survey

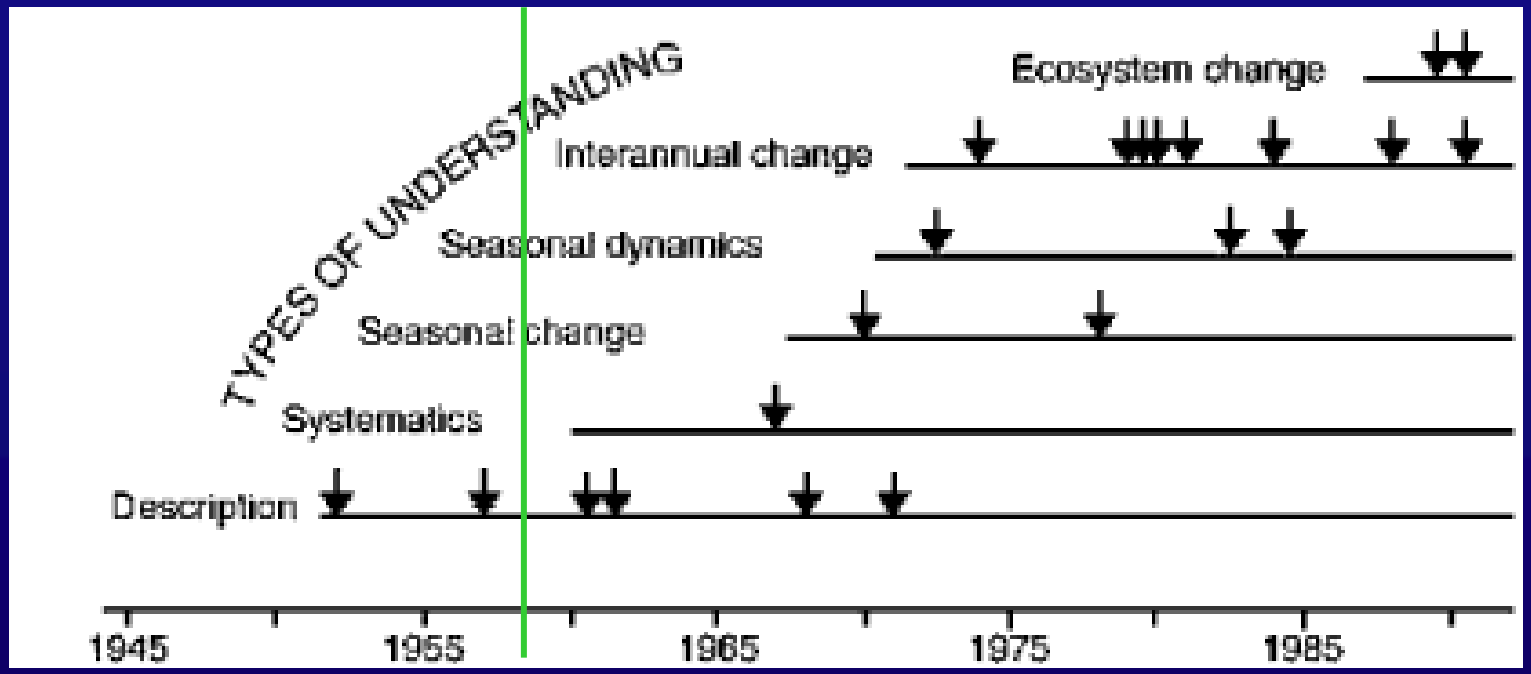


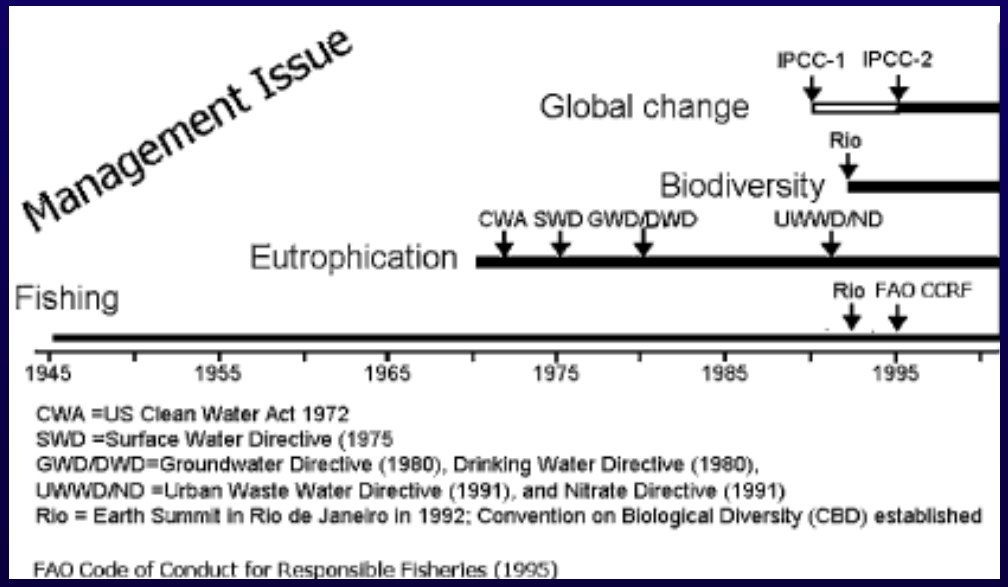
First tow
June
1931


Sir Alister Hardy

SAHFOS







Management issues become more complex

Brander et al. 2004 P in O

Hypothesis driven research

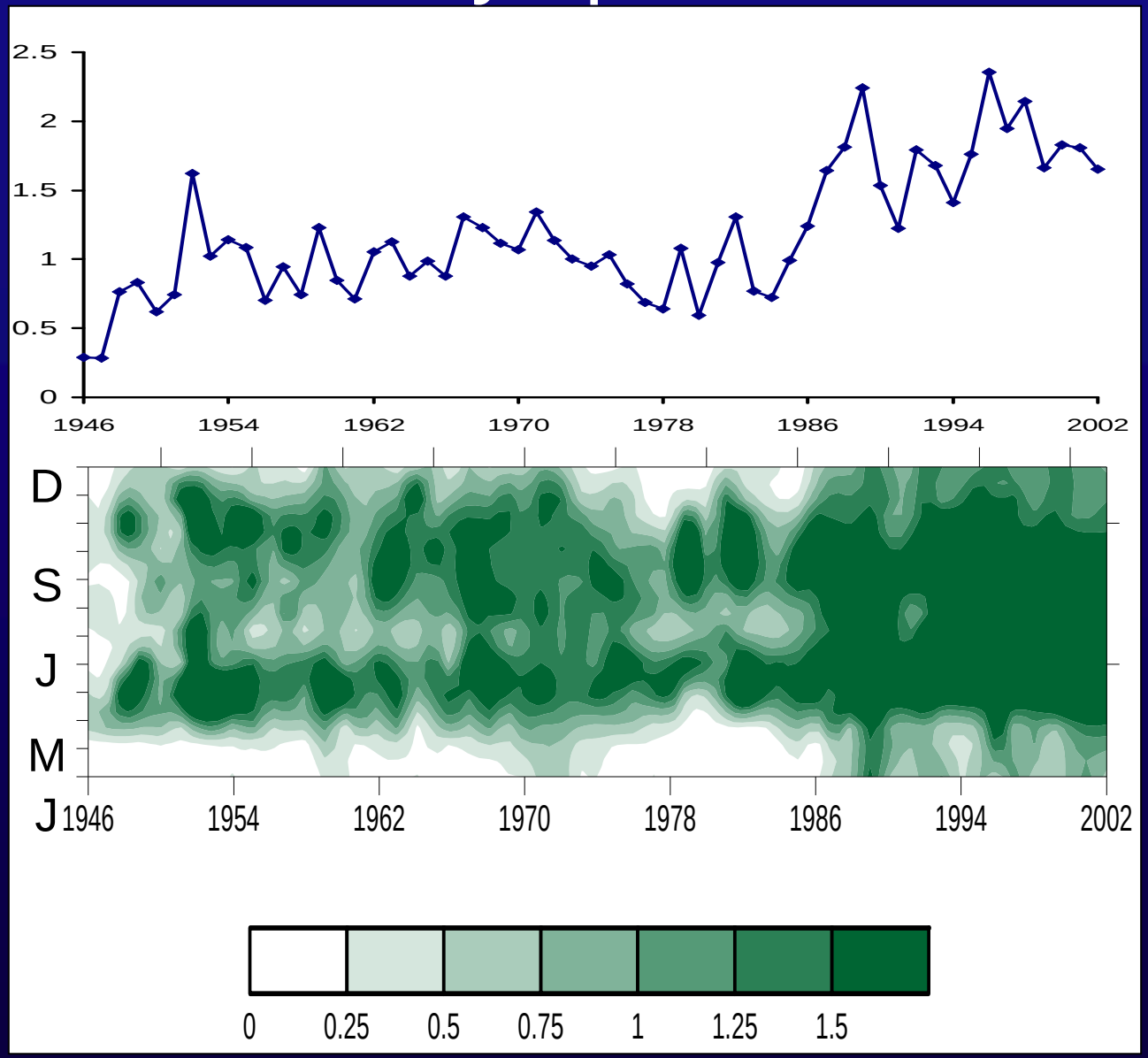
Laboratory and process oriented research

1989 Closure of the survey

North Sea Phytoplankton Colour

1946

2002



Reid *et al.* 1998, Nature 391, 546 (updated)

Step changes in regional sea systems: Regime shift

Cluster Analysis: grouping years as a function of physical and biological characters

Variables :

Sea SurfaceTemperature NE Atlantic

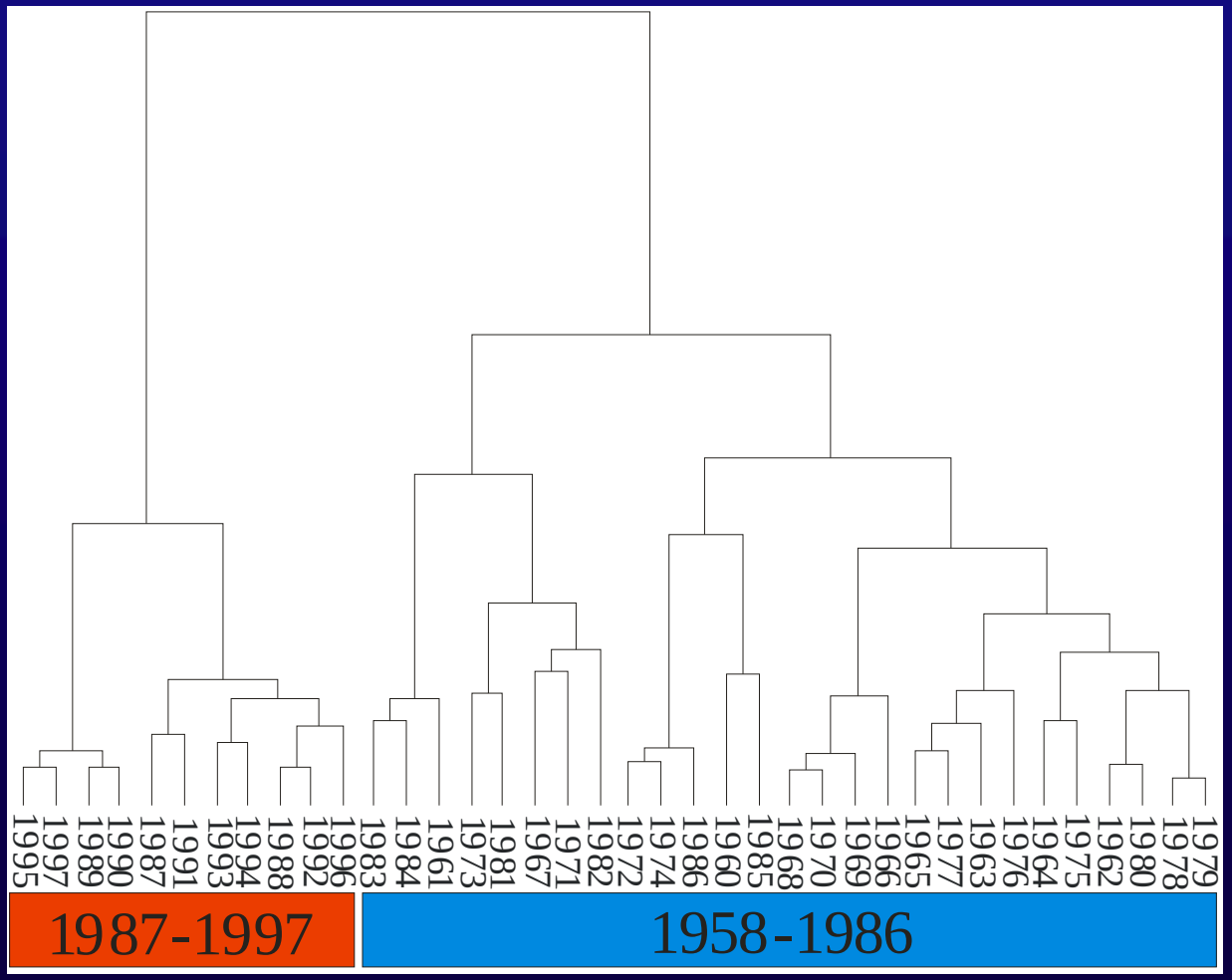
Northern Hemisphere Temperature

North Atlantic Oscillation

Phytoplankton

Zooplankton (3 taxa)

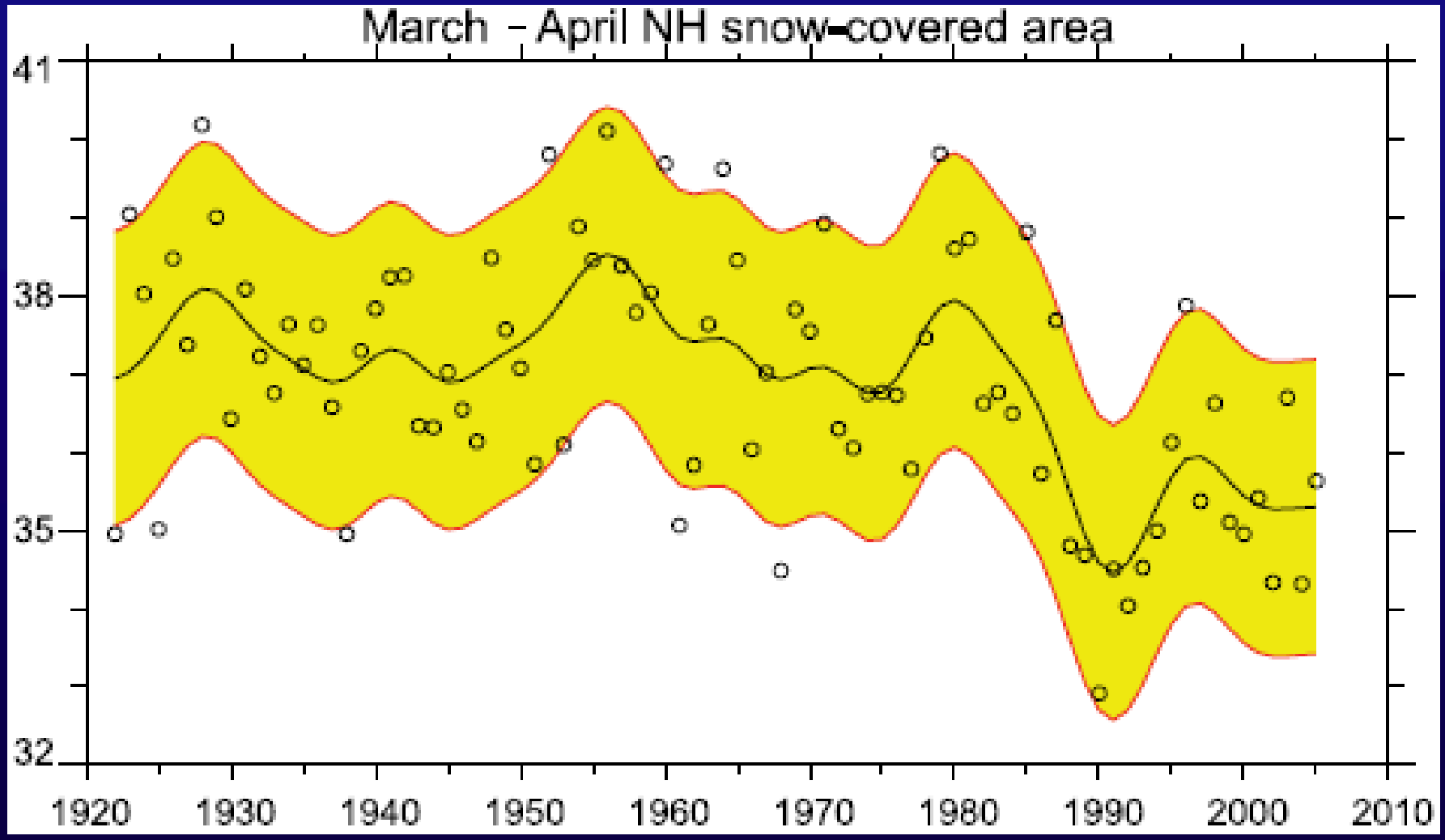
Salmon catches



Beaugrand & Reid, 2003 Global Change Biology 9, 801-807

Sir Alister Hardy Foundation for Ocean Science

Northern Hemisphere Snow Cover Mar-Apr

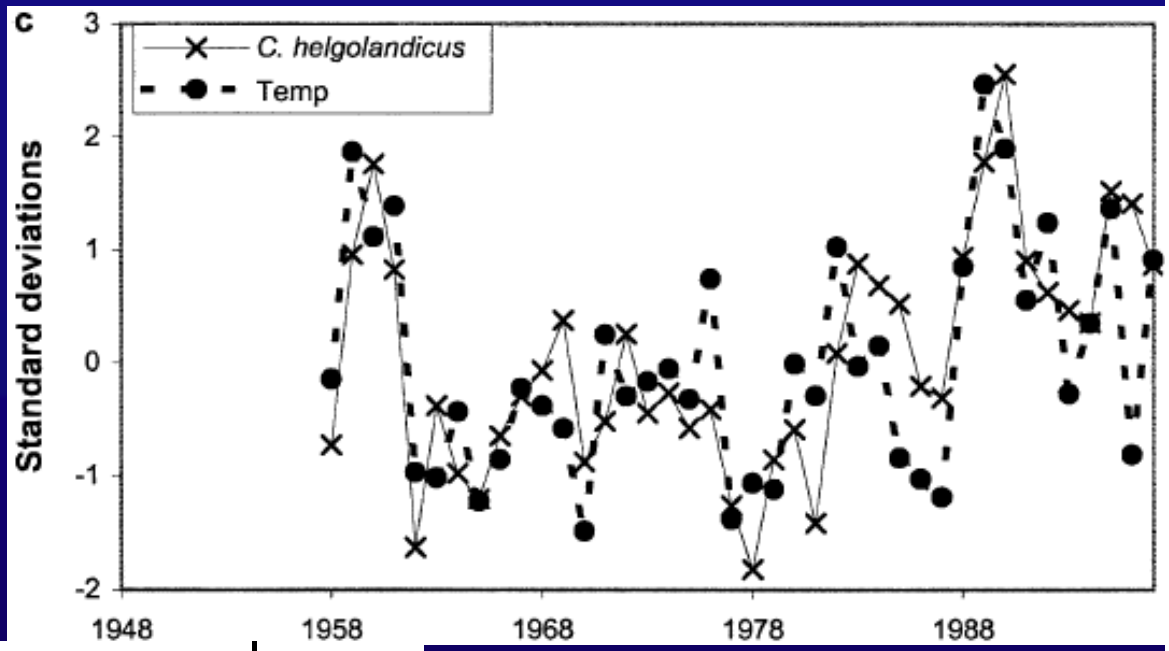


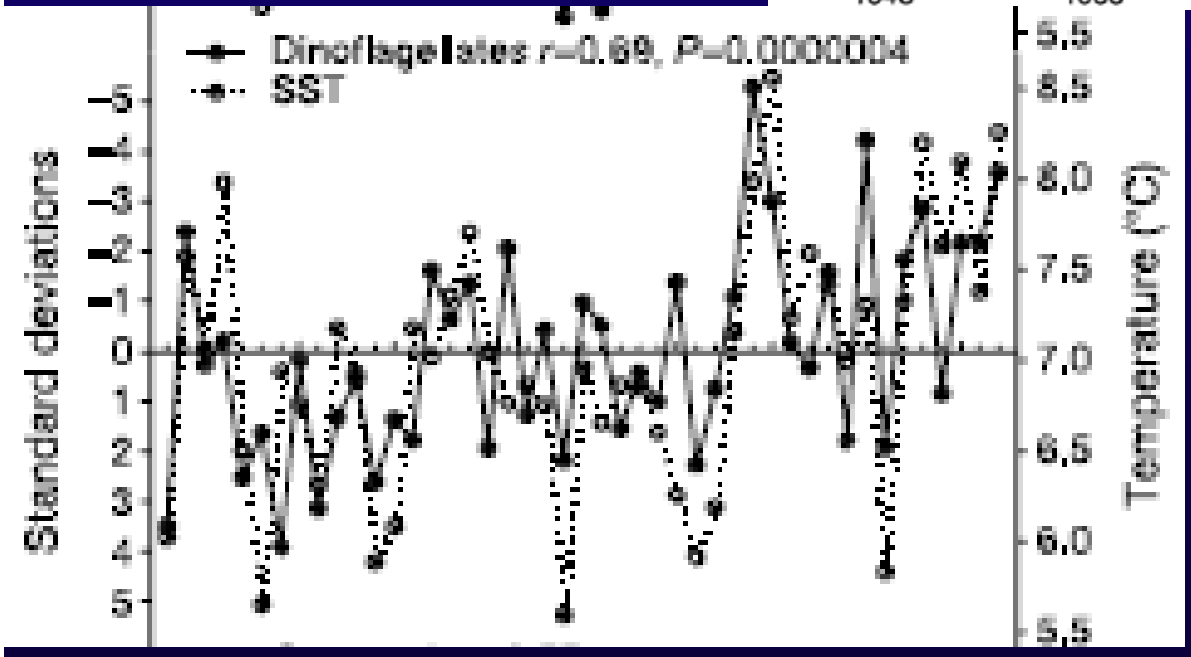
Brown 2000

IPCC 2005 *WG 1*

Plankton correlations with SST

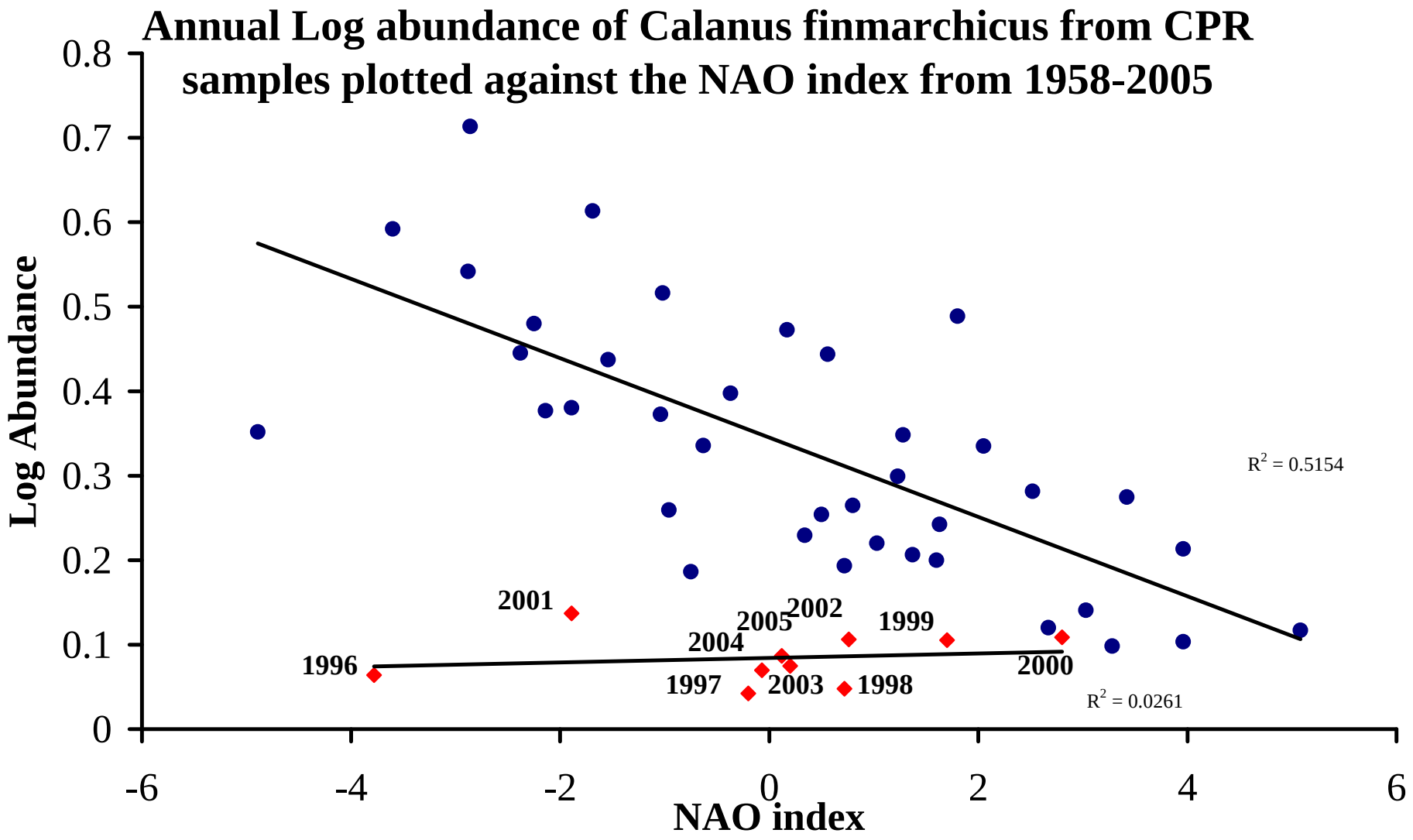
Lindley & Reid
2002. Mar. Biol. 141





Edwards & Richardson
2004. Nature 430

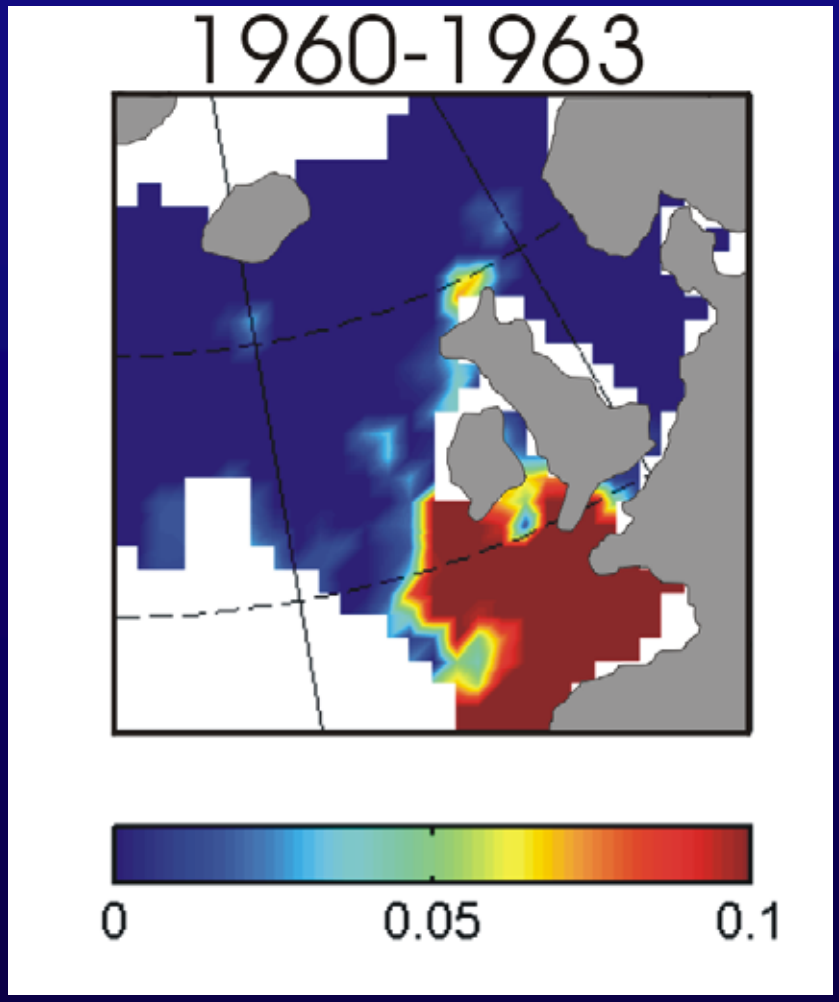
In time series, data often ask the questions

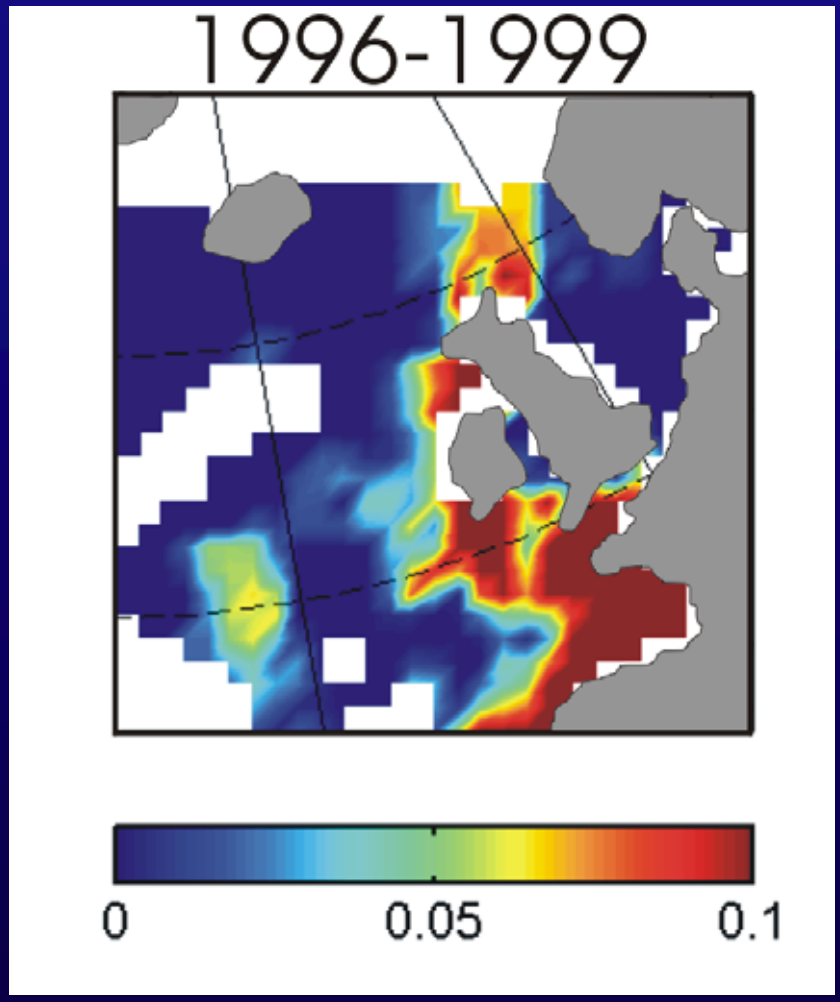


Updated from Reid and Beagrand 2002

Importance of undertaking parallel research to the monitoring

Northerly movement of plankton and fish



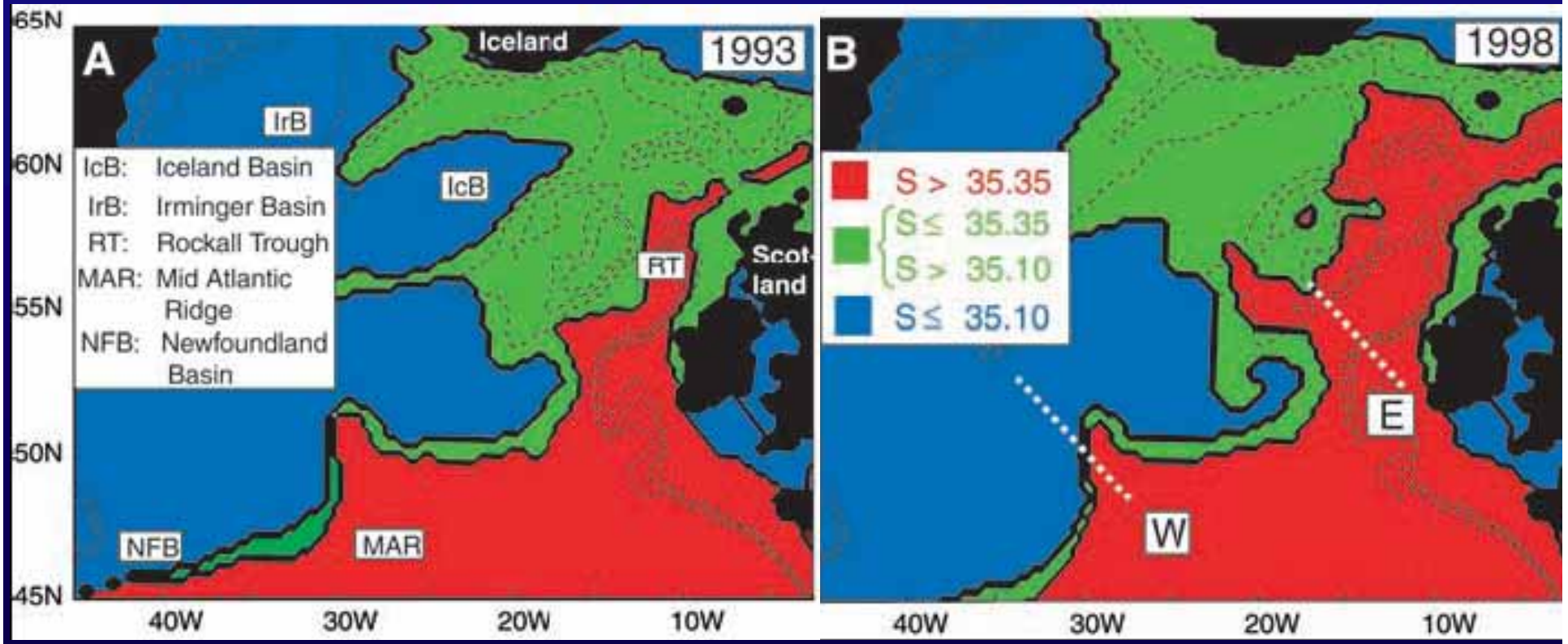


Warm temperate slope species

2005 *Euchaeta hebes, Clausocalanus, Ceratium hexacanthum*

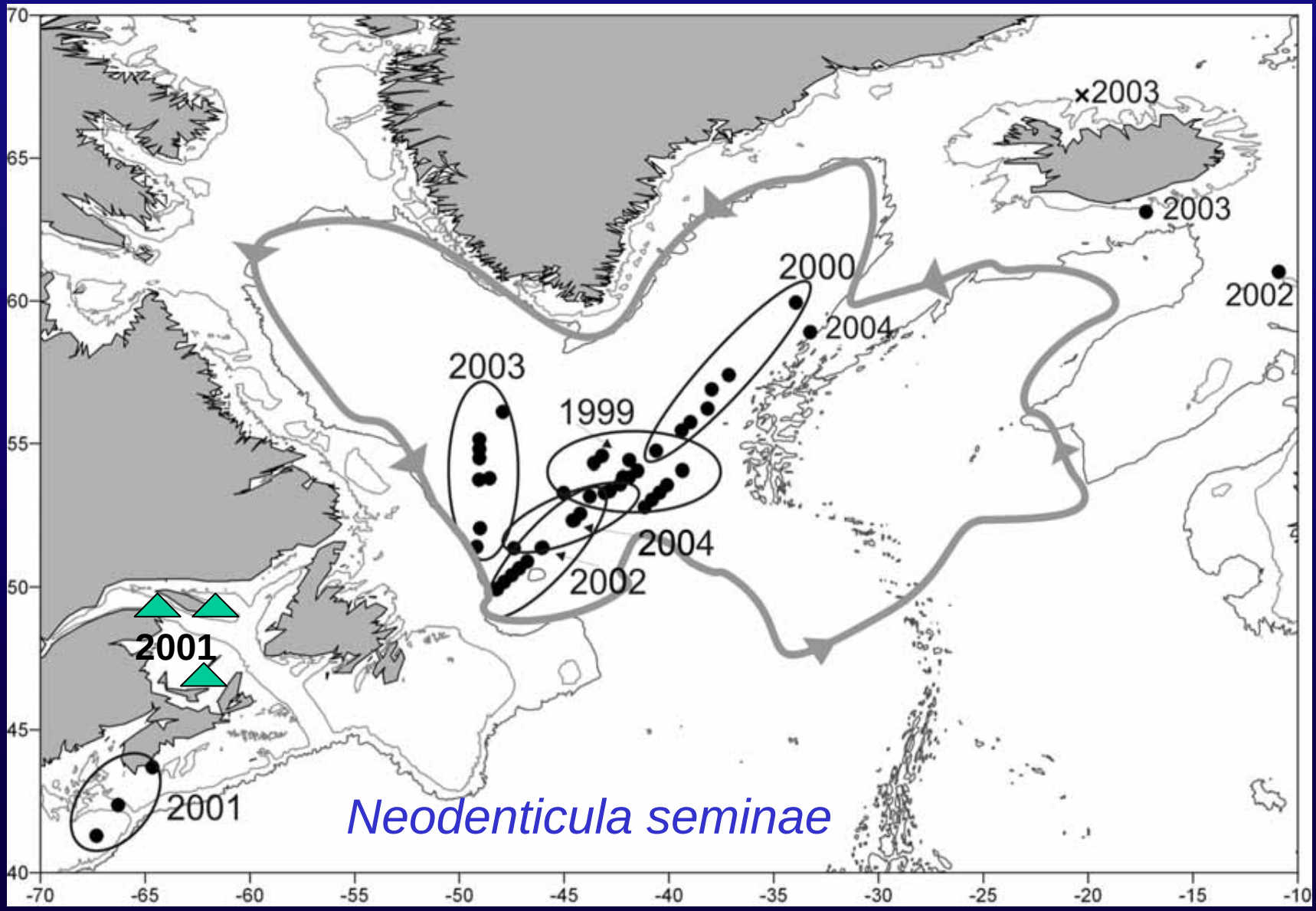
Beaugrand *et al.* 2003. Science **296,** 1692-1694

Westward retreat of the Subpolar Gyre

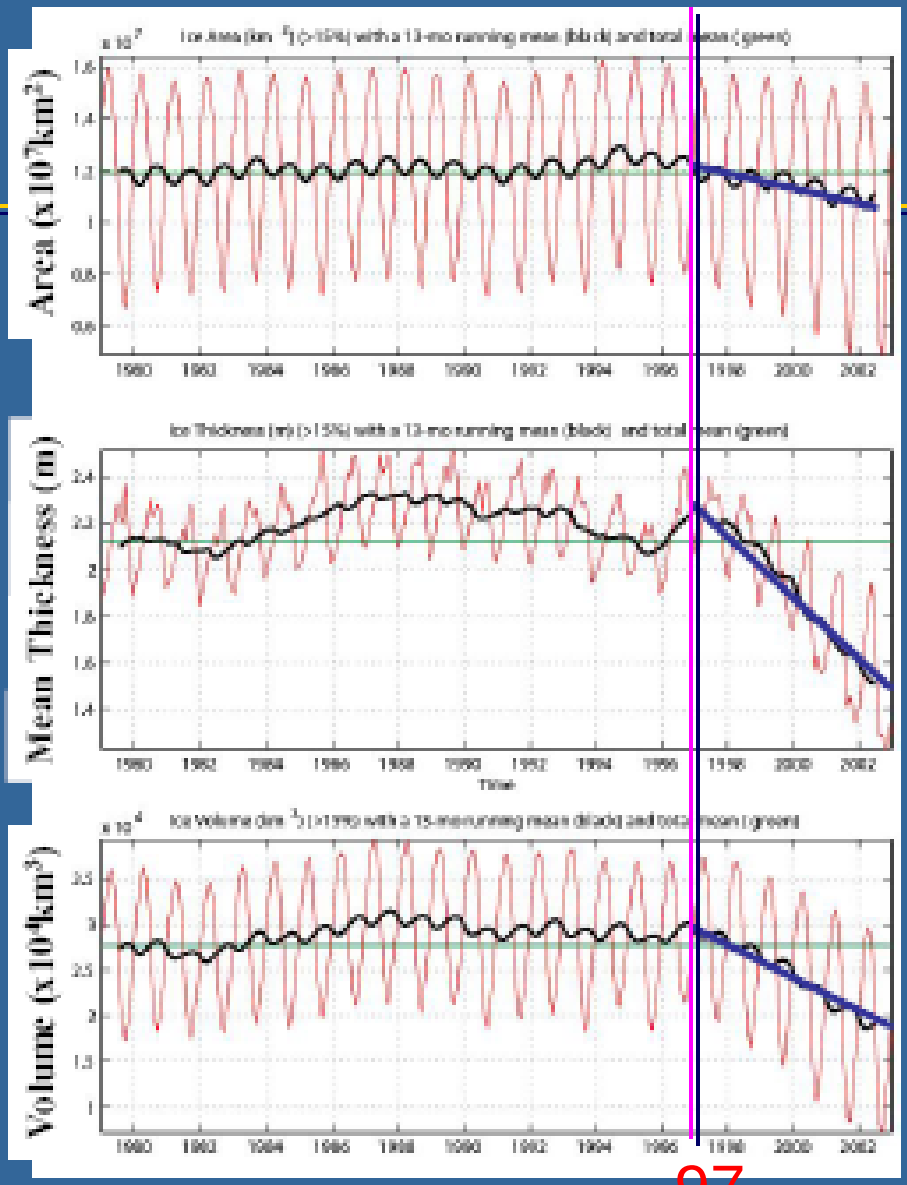


Hátún et al. 2005 Science
Hátún et al. ms

Pacific diatom in the Northwest Atlantic circa 1998



Reid *et al*. 2007. Global Change Biology 13



Modeled Sea Ice Area, Thickness, and Volume

Decrease from 1997 to 2002:

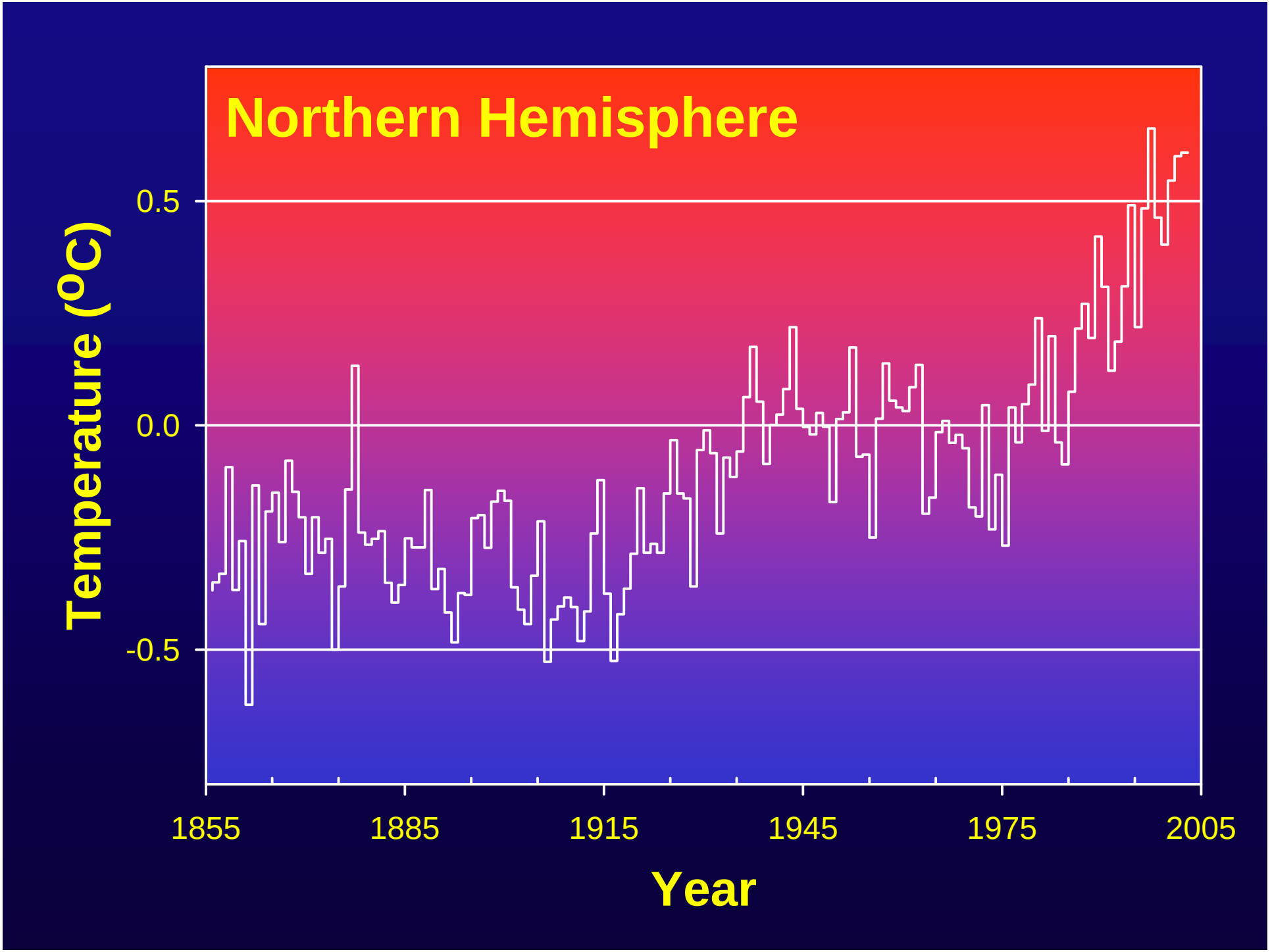
- Ice area by 15-18%, in agreement with observations

- Ice thickness by ~35% (or 80 cm from 2.3 m to 1.5 m)

- Ice volume by ~33% (from 30×10^3 km^3 to 20×10^3 km^3), which is twice the ice area

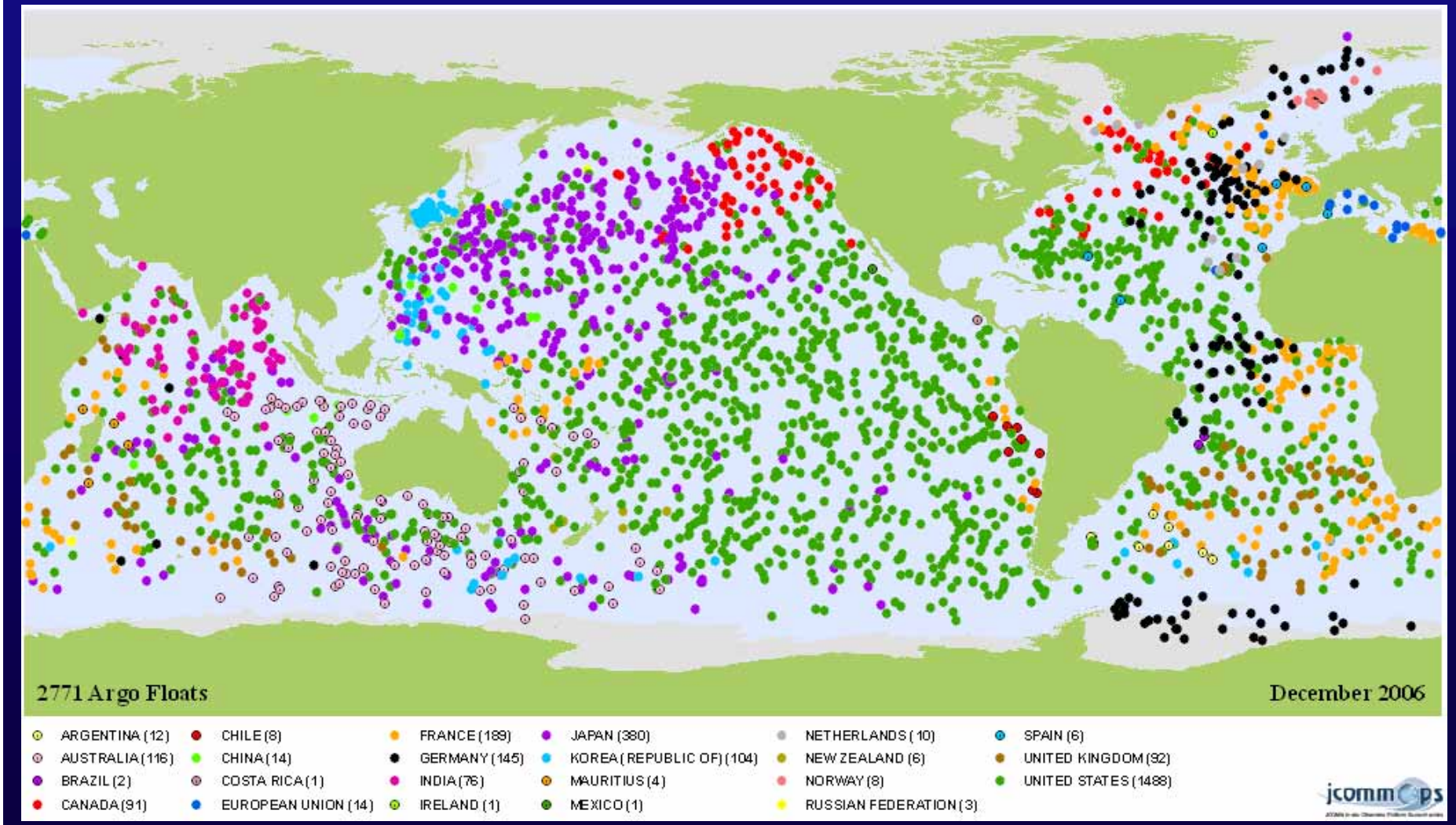
If this trend persists for another 10 years (and it has through 2005) the Arctic Ocean could be ice-free in summer!

Courtesy Wieslaw Maslowski, NPS Monterey


Northern Hemisphere
Temperature (°C)
0.5
0.0
-0.5
1855
1885
1915
1945
1975
2005
Year

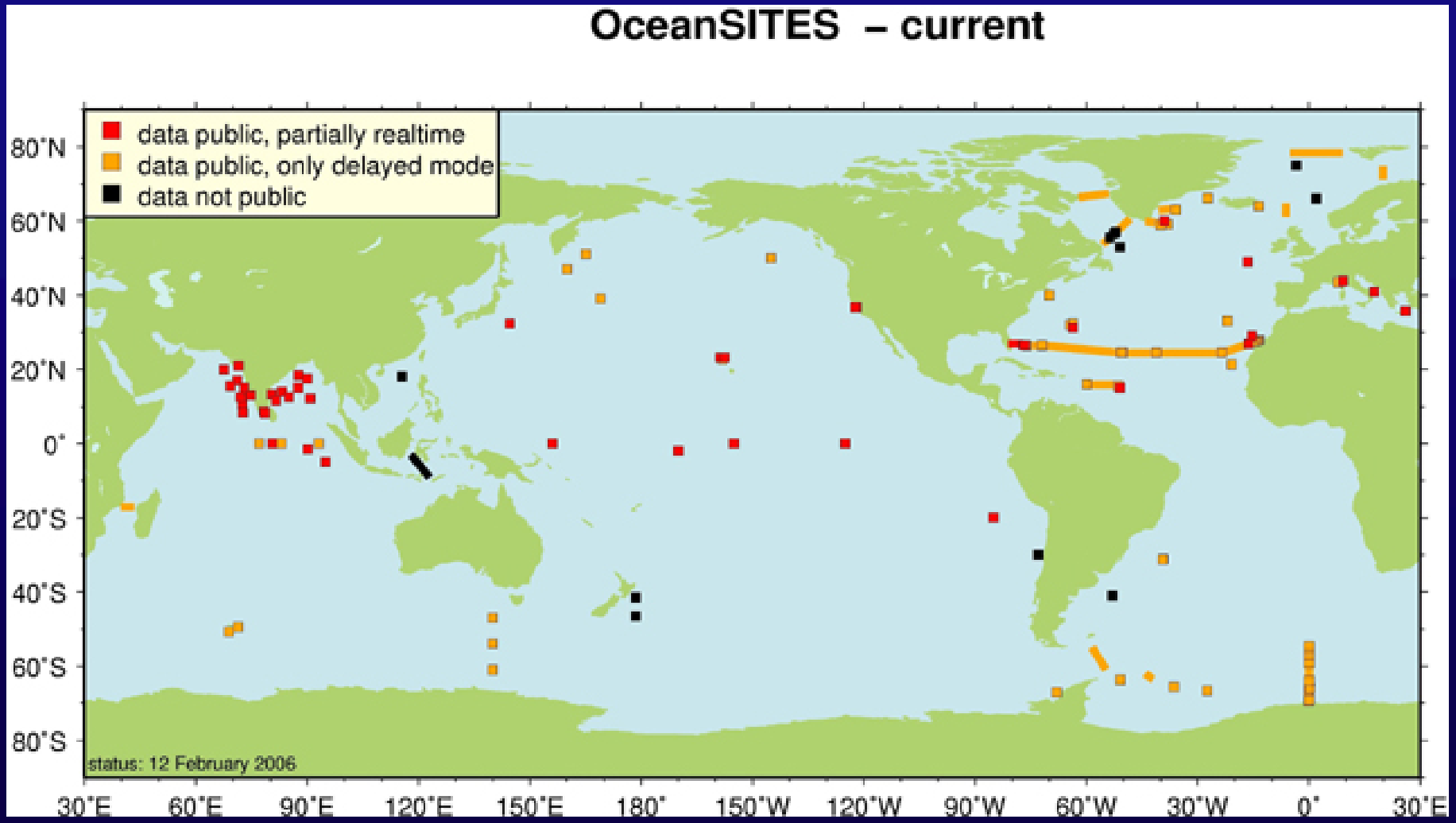
Importance of Quality Control maintain standardisation

Argo operational and funding gaps



http://www.ocean-partners.org/

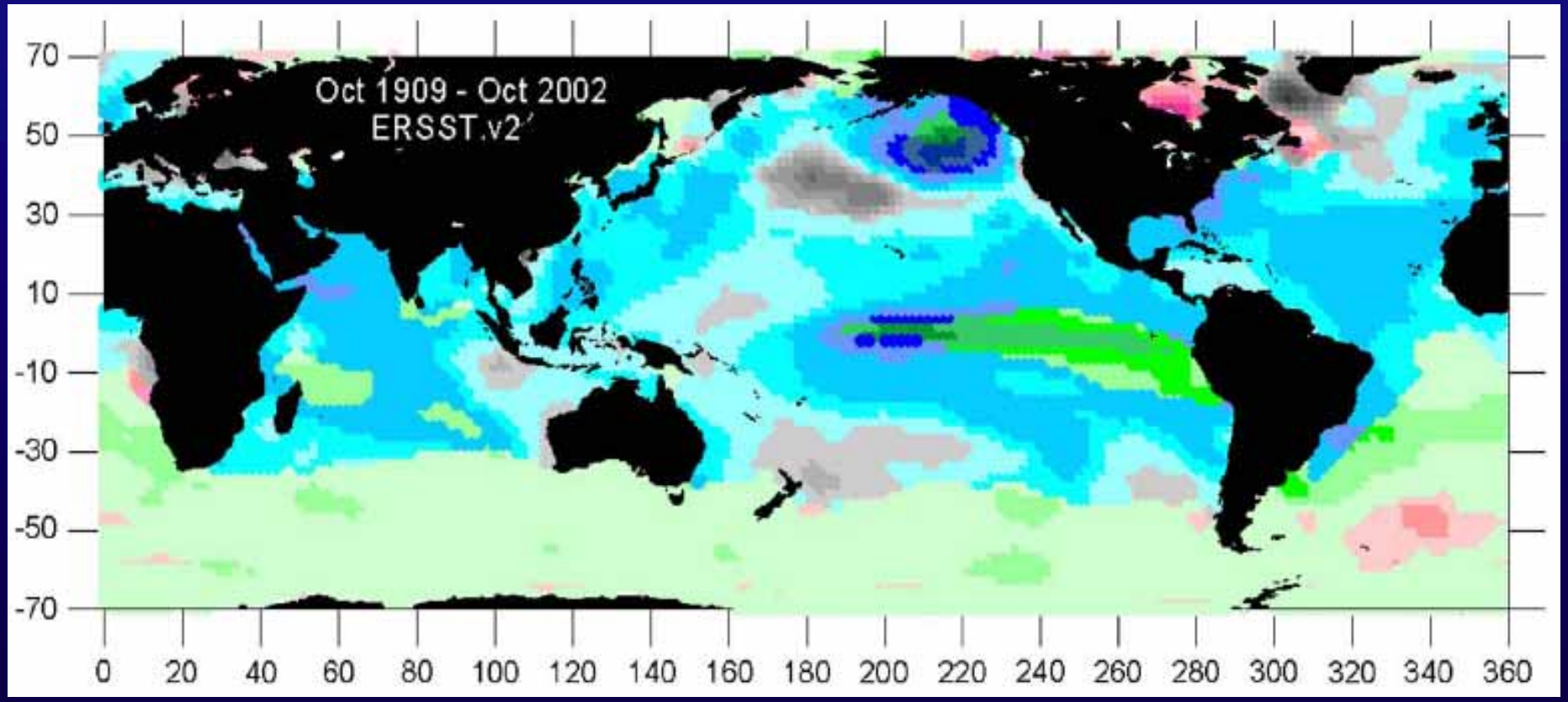
Partnership for Observation of the Global Oceans (POGO)



http://www.oceansites.org/

Importance of Global Coverage

Modelled vailability of nitrate: contrast October 1909 to 2002



Kamykowski and Zentara (2005)

Ocean telling us what is happening

Ocean responds more rapidly than land

Very poorly observed

Conclusions / Recommendations

- Planktonic ecosystems changing rapidly in N. Atlantic
- What is happening elsewhere??
- Crucial importance of the plankton in climate
- Decadal to 100 year plus prognosis worrying
- Understanding the oceans a high priority for mankind
- Historical bias to terrestrial observing systems
- Need an improved funding system for long-term monitoring

NOT TACKLING ISSUES WITH URGENCY AND RESOURCES REQUIRED

- Need an integrated global ocean biological/biogeochemical observing programme NOW

•Establish a European and global CPR survey

UK Environmental Observation Framework

17th – 18th July 2008

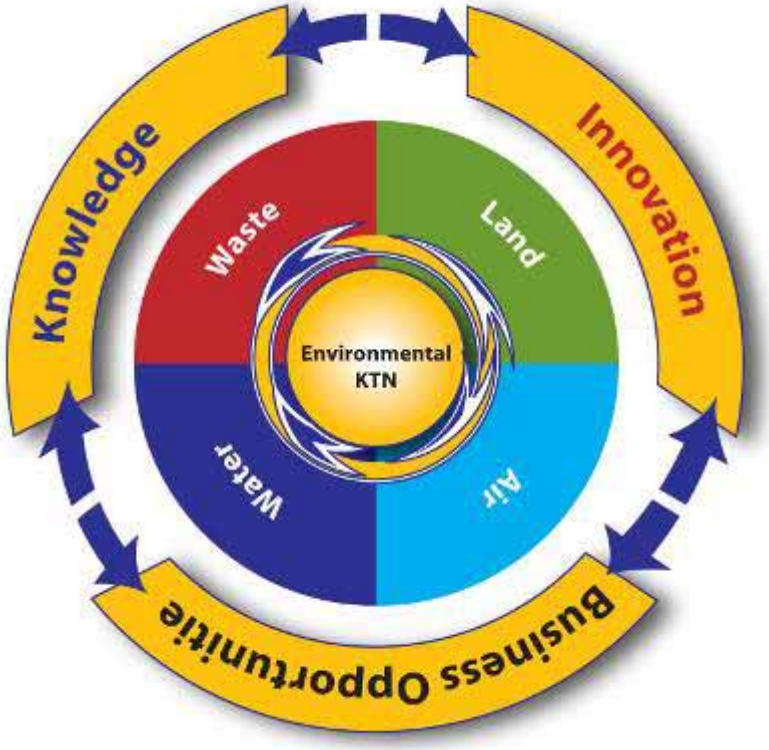
Environmental
Knowledge Transfer Network

Knowledge Transfer Networks
Accelerating business innovation;
a Technology Strategy Board programme

Environmental Observation Framework Inaugural Workshop:

18 July 2008, Institute of Electrical Engineering, Savoy Place, London

The Environmental KTN: Stimulating the Market for Innovative Measurement Technologies



Presented by:
Alec Tang, Environmental KTN

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Web: www.environmental-ktn.com

Funded by Government, Regional Development Agencies, Devolved Administrations and Research Councils

Environmental
Knowledge Transfer Network

Knowledge Transfer Networks
Accelerating business innovation;
a Technology Strategy Board programme

Overview of Presentation

1. Introduction to Knowledge Transfer Networks (KTNs)
2. The Environmental KTN and our Priority Technology Areas (PTAs)
3. The Environmental Monitoring and Forensics PTA

Funded by Government, Regional Development Agencies, Devolved Administrations and Research Councils

Knowledge Transfer Networks (KTNs)

The Objective of a KTN

> *The objective of a **Knowledge Transfer Network (KTN)** is to improve the UK's Innovation performance by increasing the breadth and depth of the knowledge transfer of technology into UK-based businesses and accelerating the rate at which this process occurs.*

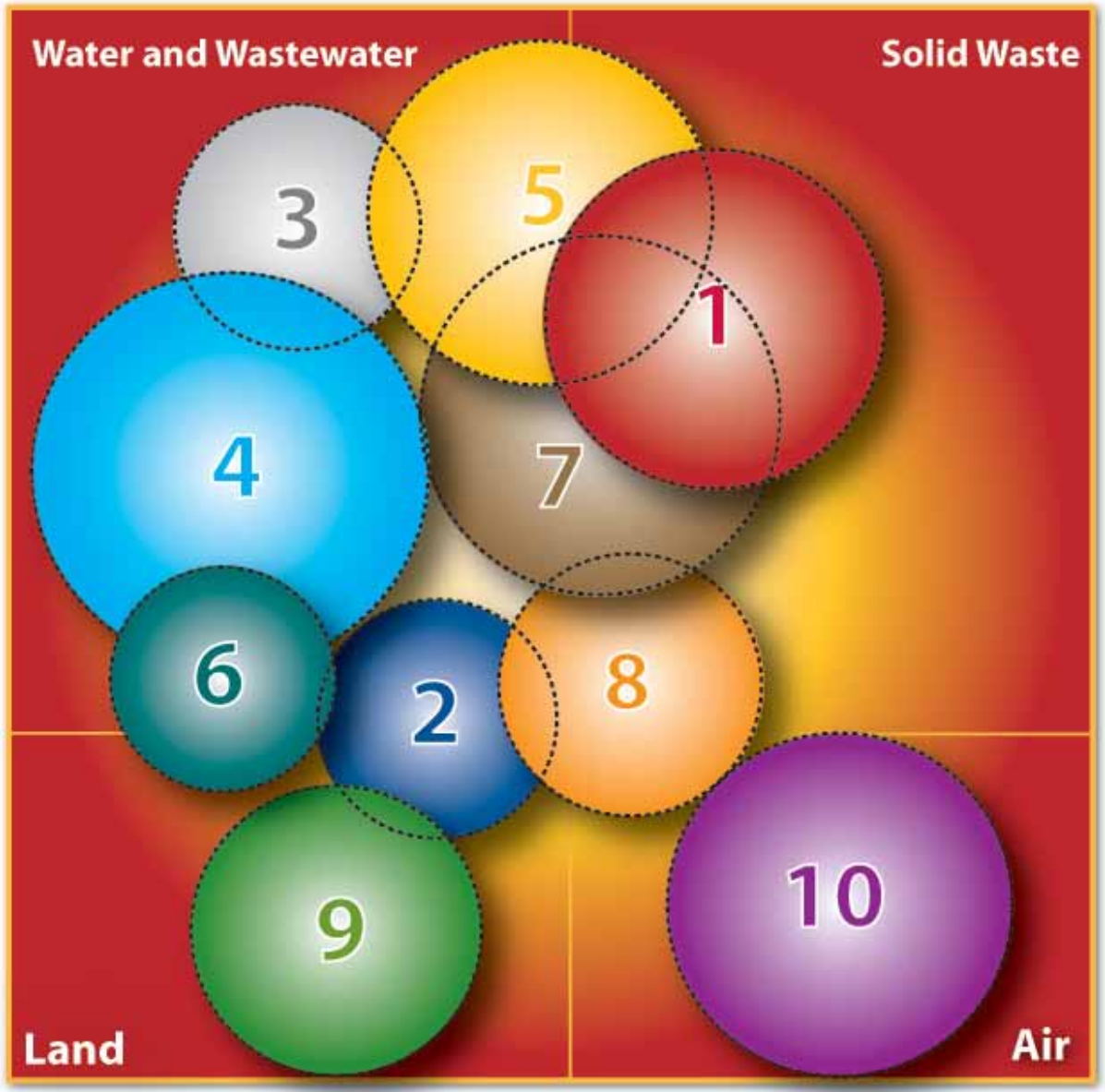
- KTNs are funded by the Technology Strategy Board (www.innovateuk.org), an executive non-departmental body sponsored by the Department for Innovation, Universities and Skills (DIUS).
- There are currently **23 KTNs** covering a wide range of technology fields.

The Environmental KTN

Our Objective

To improve the competitiveness of UK environmental industries in key priority areas by:

- Catalysing Innovation
- Enhancing the Uptake of Technology
- Improving Knowledge Transfer
- Informing Government Policy



These technology areas have been scaled in proportion (on a log scale) to the potential market opportunity associated with them.

Please note: This is an initial set of 'Priority Technology Areas', thay may evolve and new ones added later.

Priority Technology Areas Key:

1. Energy from Waste
   £15B + £2Bpa
2. Rapid Measurement Tools
   £300Mpa
3. Energy Efficient Water Treatment
   >£400Mpa
4. Chemical Free Water & Wastewater Treatment
   £10Bpa
5. On-Site Treatment Technologies for Industrial Waste & Wastewater
   £2.3Bpa
6. Treatment of Diffuse & Urban Drainage Pollution
   > £250Mpa
7. Micro & Community Scale Domestic Water & Waste Treatment Technologies
   £2-5Bpa
8. Environmental Monitoring & Forensics
   > £400Mpa
9. In-Situ Land Remediation
   Max. £800Mpa (all con land)
10. Carbon Capture & Storage
    >£5Bpa

Priority Technology Areas

Methodology

- Development of **Business Case** highlighting priorities for innovation and non-technological barriers to innovation and uptake
  - Collated through consultation with key contacts along the technology supply chain and across the environmental sector: end users, technology developers, regulators and research base
- Feed Business Case into government via the Technology Strategy Board to encourage investment and tackle regulatory barriers
- Catalyse innovation and enhance technological uptake through knowledge transfer, project brokering and "Pathfinder Projects"

Environmental Monitoring and Forensics PTA

The Market Drivers

- UK CEED estimate approx. £590M p.a. currently spent on Environmental Monitoring and Instrumentation.
- Several legislative drivers will increase the need for measurement technologies:
  - Water Framework Directive
  - Environmental Liabilities Directive
  - Waste Incineration Directive
- Socio-cultural changes may also increase demand for environmental data.

Environmental

Knowledge Transfer Network

Knowledge Transfer Networks

Accelerating business innovation;
a Technology Strategy Board programme

Environmental Monitoring and Forensics PTA

The Opportunity

Environmental Monitoring and Forensics PTA

- To significantly reduce the costs associated with generating fit-for-purpose and robust environmental data by:
  - Enhancing the market for EMF technology uptake, placing a focus on changing industry perceptions of gathering environmental data from simply a compliance activity to one that can also generate commercial benefits; and
  - Accelerating the development of novel measurement technologies/ applications that generate cost-effective, robust and fit-for-purpose environmental data to address both current needs as well as more complex emerging issues.
- To focus regulatory and industrial knowledge on the joint understanding of environmental needs so that the range of environmental measurements expected by emerging regulatory drivers delivers appropriate future regulation.

Environmental Monitoring and Forensics PTA

Technology Roadmap

- Developed during a Technology Roadmapping Workshop involving end-users, regulators, technology developers, academics and representatives of other knowledge networks.
- Highlights key market drivers, technological needs and priorities for innovation.
- The Roadmap

Environmental
Knowledge Transfer Network

Knowledge Transfer Networks
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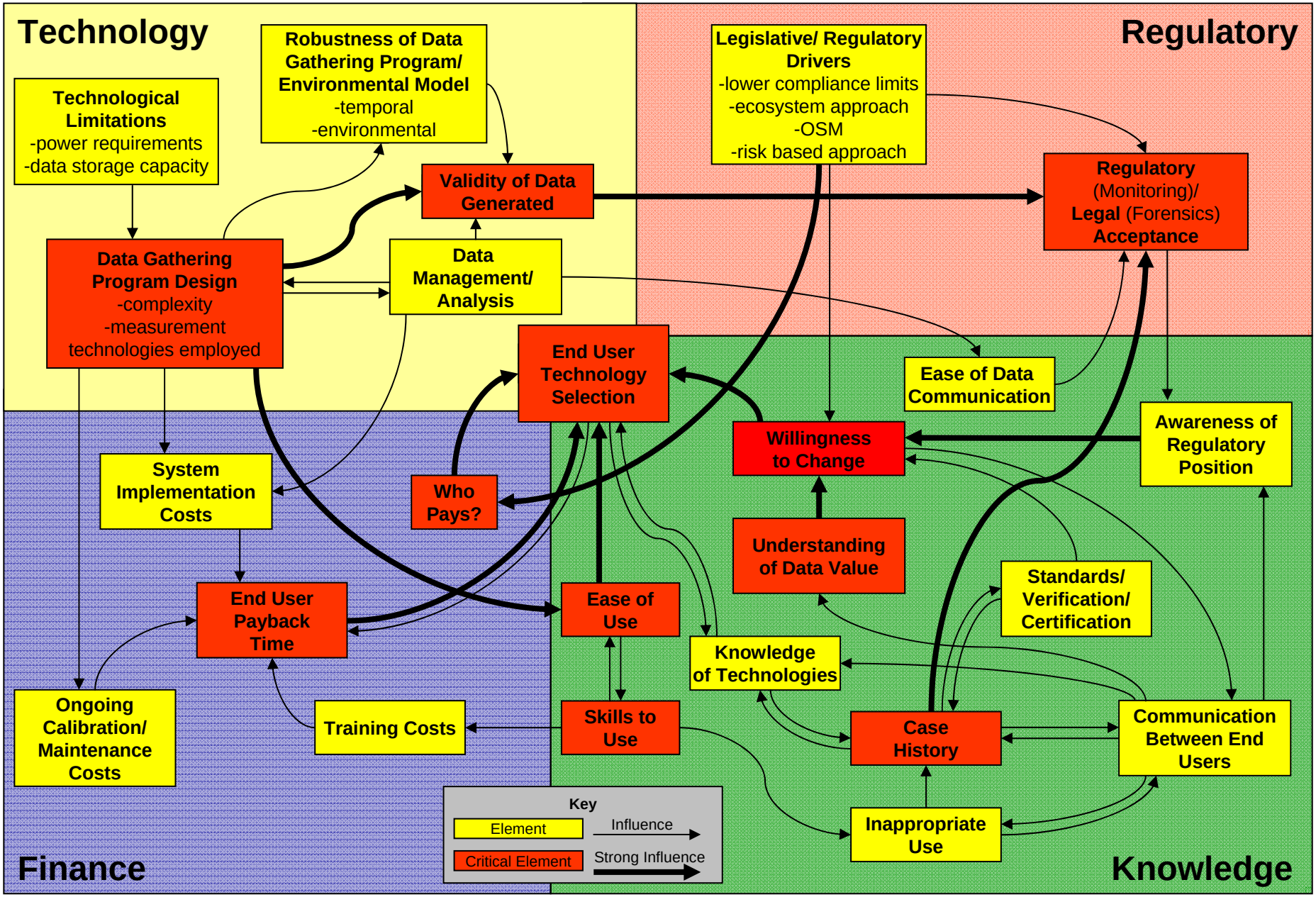
Environmental Monitoring and Forensics PTA

Systems Map

Environmental Monitoring and Forensics



Environmental
Knowledge Transfer Network

Knowledge Transfer Networks
Accelerating business innovation;
a Technology Strategy Board programme

Environmental Monitoring and Forensics PTA

Future Work

- Completion and Launch of EMF Business Case
- Integration with Sensors and Instrumentation KTN work on Environmental Instrumentation for NERC.
- Environmental Measurements Conference, 22 October 2008 The Edge, Sheffield

Please contact alec.tang@earth.ox.ac.uk for further details

Funded by Government, Regional Development Agencies, Devolved Administrations and Research Councils

UK Environmental Observation Framework

17th – 18th July 2008

JOINT NATURE CONSERVATION COMMITTEE

Co-ordinating Environmental Research
Environment Research Funders' Forum

Dad, Why count butterflies?

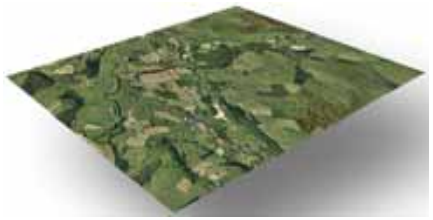
Applying and Developing a Statement of Need for Biodiversity

Lawrence Way

The ultimate statement of need

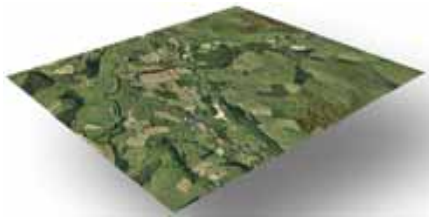
What to measure?

In which schemes?



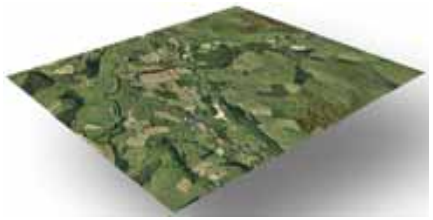
Complexity

- Loads of ‘drivers’
  - 2010 halting decline
  - Biodiversity strategy goals
  - Site condition targets
  - Agri environment outcomes
  - Understanding process, improving prediction
  - Climate change adaptation and mitigation
  - Non natives policy
- Over 70 solutions (schemes)
- Multiple connections
  - A driver can gain evidence from many schemes
  - A scheme can provide evidence to many drivers
- Drivers
  - Serviced by indicators, research, expert opinion for their information needs
  - Where does observation fit in?
  - How to link objectives to definitions of what to measure?



Simple approaches

- Turning drivers into questions
  - What are the long term objectives and shorter term targets?
  - What questions about biodiversity state, change or reasons for change need to be answered to set, measure or adjust objectives/targets
- Comparing questions between drivers
  - Many questions will be the same
  - Identifying the certainty/quality of answer needed
- Turning questions into what needs to be measured
  - There are a small number of levels at which questions can be answered
  - Landscape, habitat patch, species population, genes
- Comparing what needs to be measured against what is already
  - Identifying which schemes provide relevant measures
  - Identifying options for supplement, adjustment
- The ‘holy grail’ of a robust framework of schemes to meet current and future need
  - Becomes the schemes providing measures for many questions and drivers
  - Designed to be easy scale (increase/decrease) depending on rates of change, precision needed



Reality

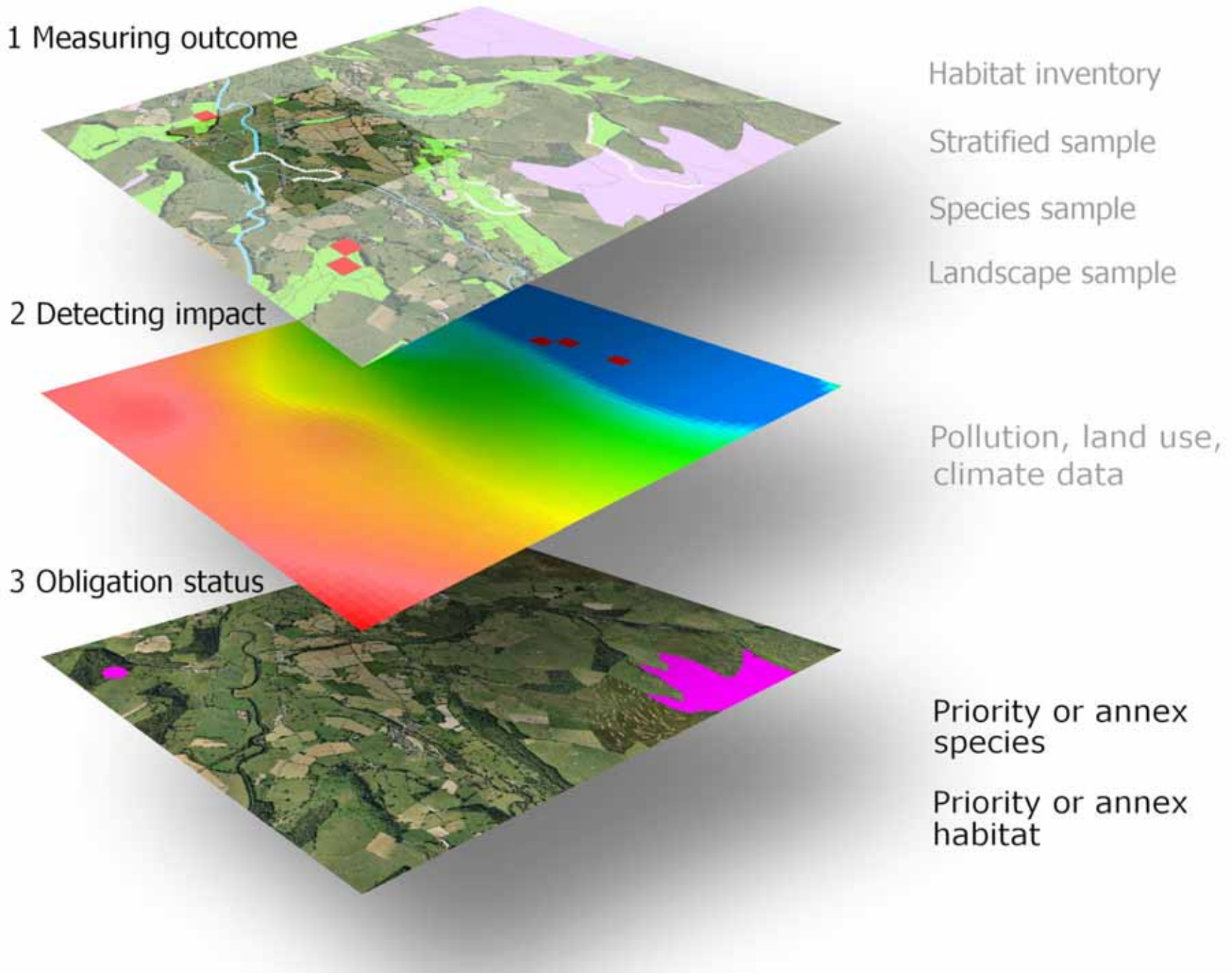
- Drivers will change
  - Don’t give up, do the analysis again, you have to join the dots up each time
- Remember bottom up is also good
  - Schemes are looking at how to improve the range of questions they can answer
- Drivers not enough,
  - Where is change likely - horizon scanning
  - You need some structure to organise drivers, we used MEA pressures
- People find it threatening
  - You are comparing need with what is in place
  - or challenging whether the evidence base is sufficient

Dad, Why count butterflies?

- Biodiversity strategy goal
  - To maintain, create, and restore functional combinations of habitats that will provide ecosystem services and reduce the vulnerability of species populations.
- For my son this is
  - We need to eat food, get enough water, mountain bike in the countryside and keep the animals and plants

Dad, why count butterflies?

- Goal translated into statement of need
- What are the population trends of species
  - Dependant on different scales of habitat eg; micro habitat to migratory
  - That have different functional roles
- Measure trends in population and range
  - For widespread species of different trophic levels
  - Include species with high public recognition
  - Select species that are cheap to observe
  - Select species where we can build up ecological knowledge quickly


1 Measuring outcome
Habitat inventory
Stratified sample
Species sample
Landscape sample
2 Detecting impact
Pollution, land use, climate data
3 Obligation status
Priority or annex species
Priority or annex habitat

UK Environmental Observation Framework

17th – 18th July 2008

Environment Research Funders' Forum

UK Environmental Observations Framework Workshop

Statement of Need Session

Martin Griffiths

18 July 2008

Statement of Need Session

Aims

- Provide an understanding of the background and the key requirements
- Provide an overview of the emerging Statement of Need document
  - Key issues and questions
  - The emerging shape of the document
- Gain a common understanding of the key questions and issues
- Explain the future process of drafting and validation
- Through the break out sessions use community knowledge to fill in the gaps, provide access to the information and test the thinking
- Enlist your help in developing collective aspirations

Statement of Need Session

A major outcome will be the :

- *Development of a holistic picture of what the **overall evidence needs** are and the role of observations in providing this information.*

- *This will enable and empower the UK, and each agency, department or observation initiative to make a clearer contribution to existing and anticipated national and international programmes, optimise its investments, recognise dependencies and work in partnership*.

Statement of Need

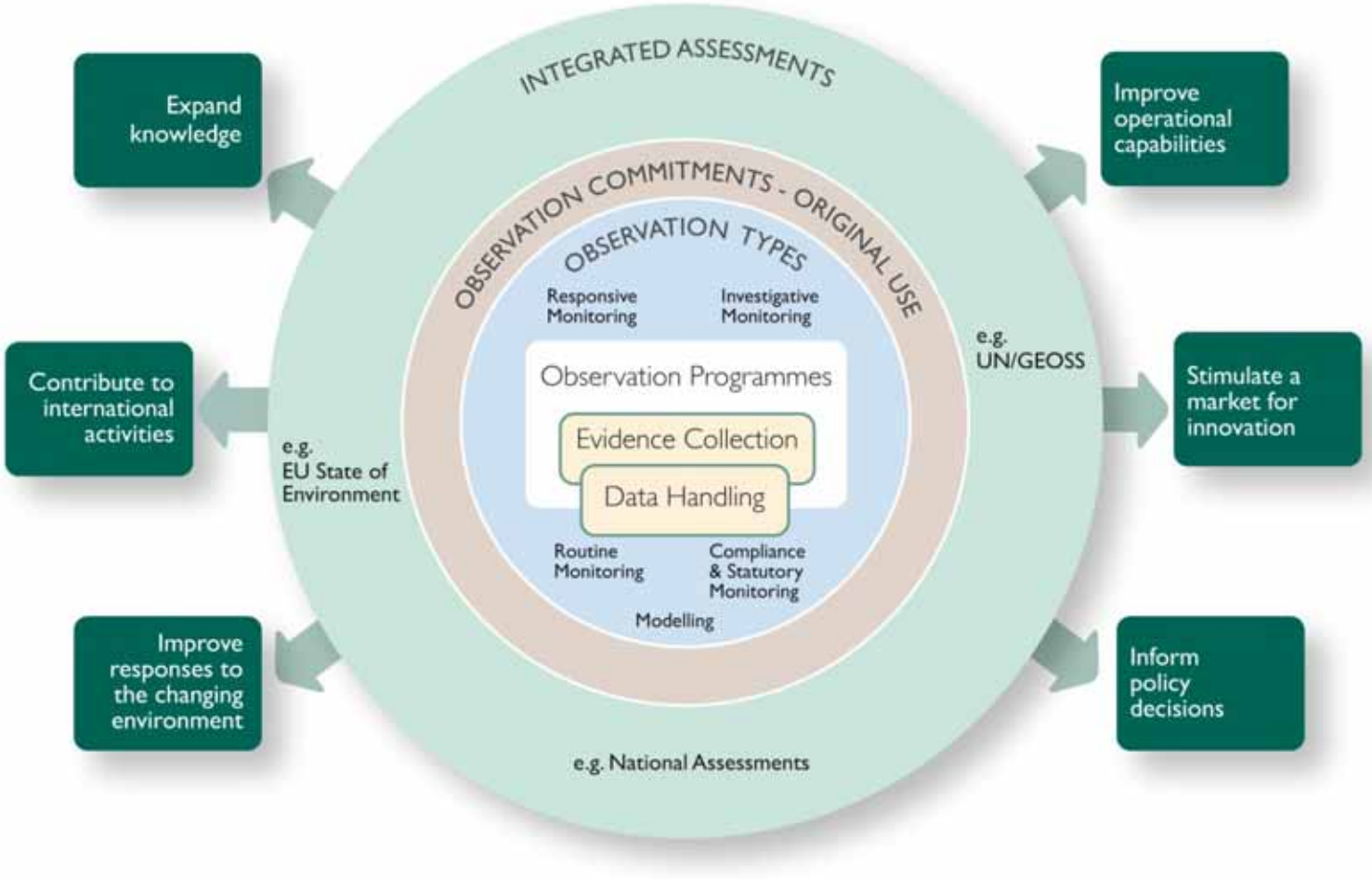
- **The approach taken to date**
  - Tested the initial assumptions
  - Undertaken some preliminary analysis
    - High level questions
    - Reviewed the obligations and commitments for a subset of the members
    - Opened dialogue with key players
  - Developed an outline structure
  - Used this to scope the workshop today

Statement of Need

Reviewed previously available material

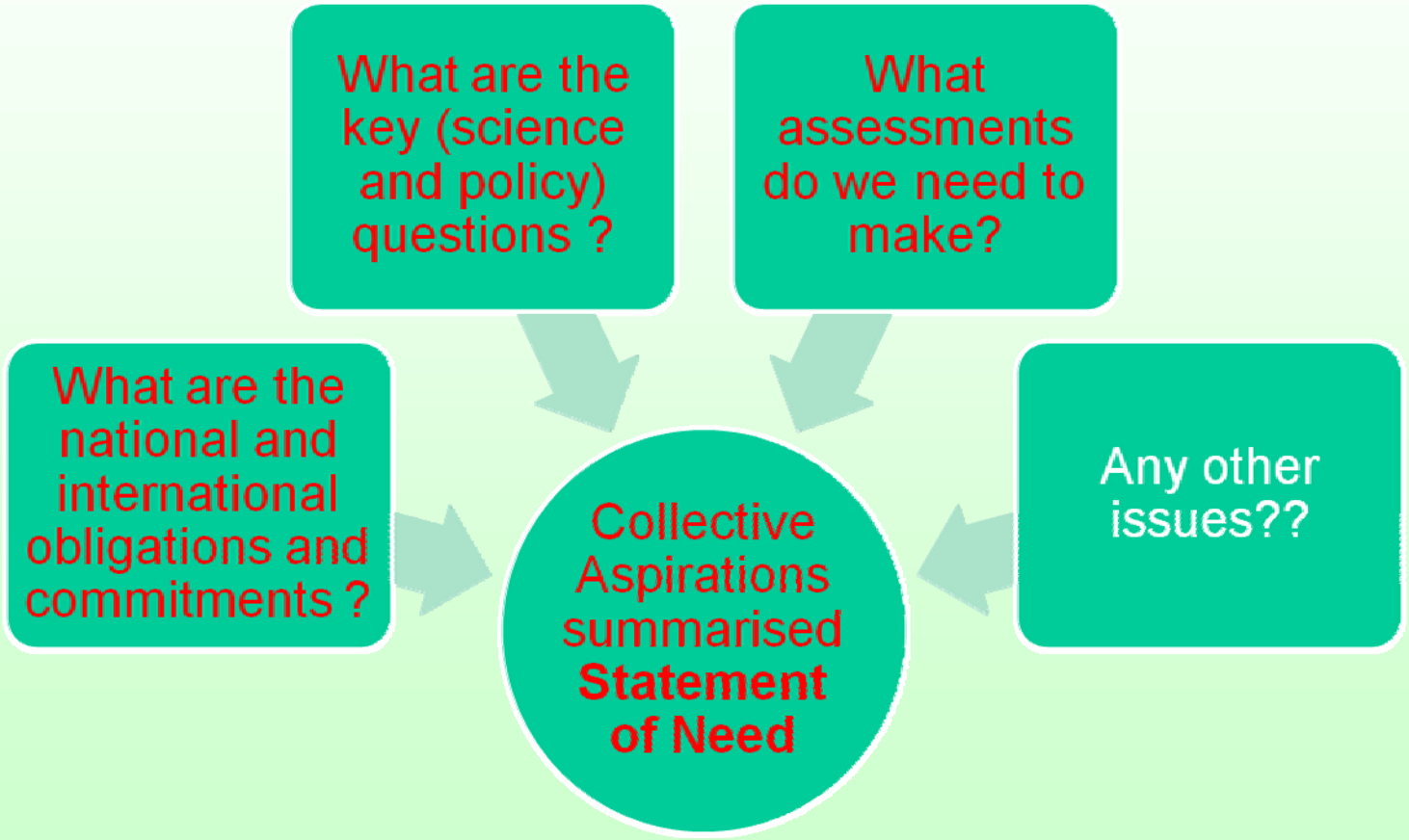
- ERFF Monitoring Database.
- Previous workshop in 2006
- ERFF Horizon Scanning
- Sustainable development strategy
- NERC Strategy
- Work done by other groups or individual organisations e.g. JNCC, EA.
- The UK EOF Framework Report
- Is there any other key Information?

Statement of Need
Concept Diagram



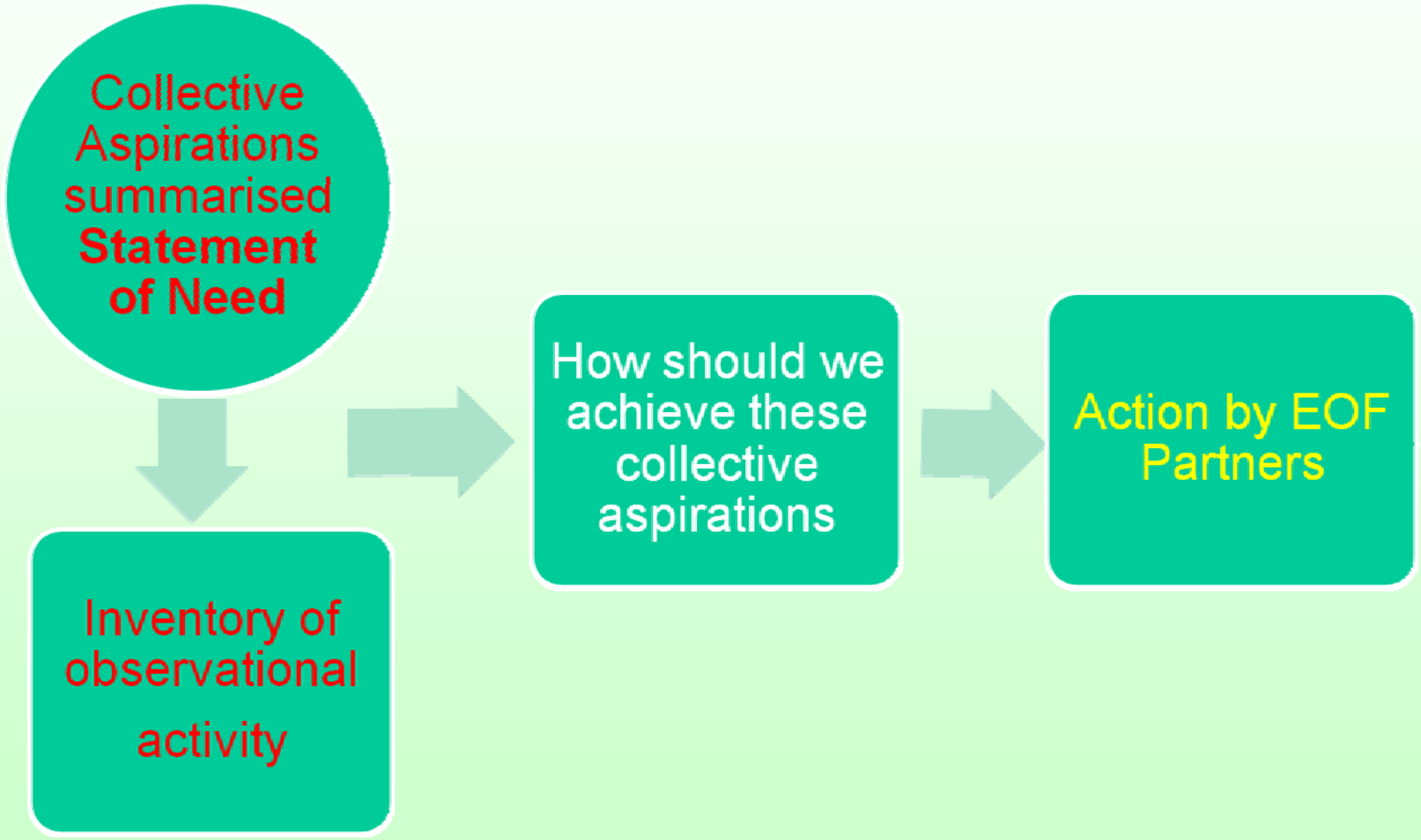
Statement of Need

Stage 1



Statement of Need

Future Stages



Outline of the proposed Statement of Need Document

It will include….

1. Overall Principles underlying the Statement of Need
2. Key factors that generate questions that influence Environmental Observations
3. The need to undertake Environmental Observations
4. Core obligations on organisations that determine Environmental Observation programmes

We need to find a middle ground between the very high level questions and the important local and specialist projects

Statement of Need

Future Timetable

Stage 1 – High level View

- Environmental Observation Framework - Launch and Workshop today
- Develop document - August 2008
  - Take on information from Workshop
  - Validate by discussing with key representatives
- Circulate first draft to Management Group- end August/Early September 2008
- Paper to Board 8/9 October 2008
- Finalise and publish Statement of Need November 2008

Stage 2

- Ongoing development

Statement of Need

Would like to broaden the debate and capture views

- The workshop today will allow input
- Follow this with more specific discussions with some of you
- We would like to hear your views – formal or informal
- Please do not hesitate to contact me or the team

Any inspiration on the format and approach will be most appreciated

ERFF Observations Workshop – Group Questions

Statement of Need Session

- **Question 1**
  - What are the key (science and policy) questions that we need to answer, now and in the future?

  Consider viewpoints and roles

  - Government and Policymakers
  - Executive Agencies and Government delivery bodies
  - Science
  - Business
  - NGOs
  - Voluntary Organisations
  - Public and Individuals

Statement of Need Session

- **Question 2**
  - What are the national and international obligations and commitments that drive environmental observations?

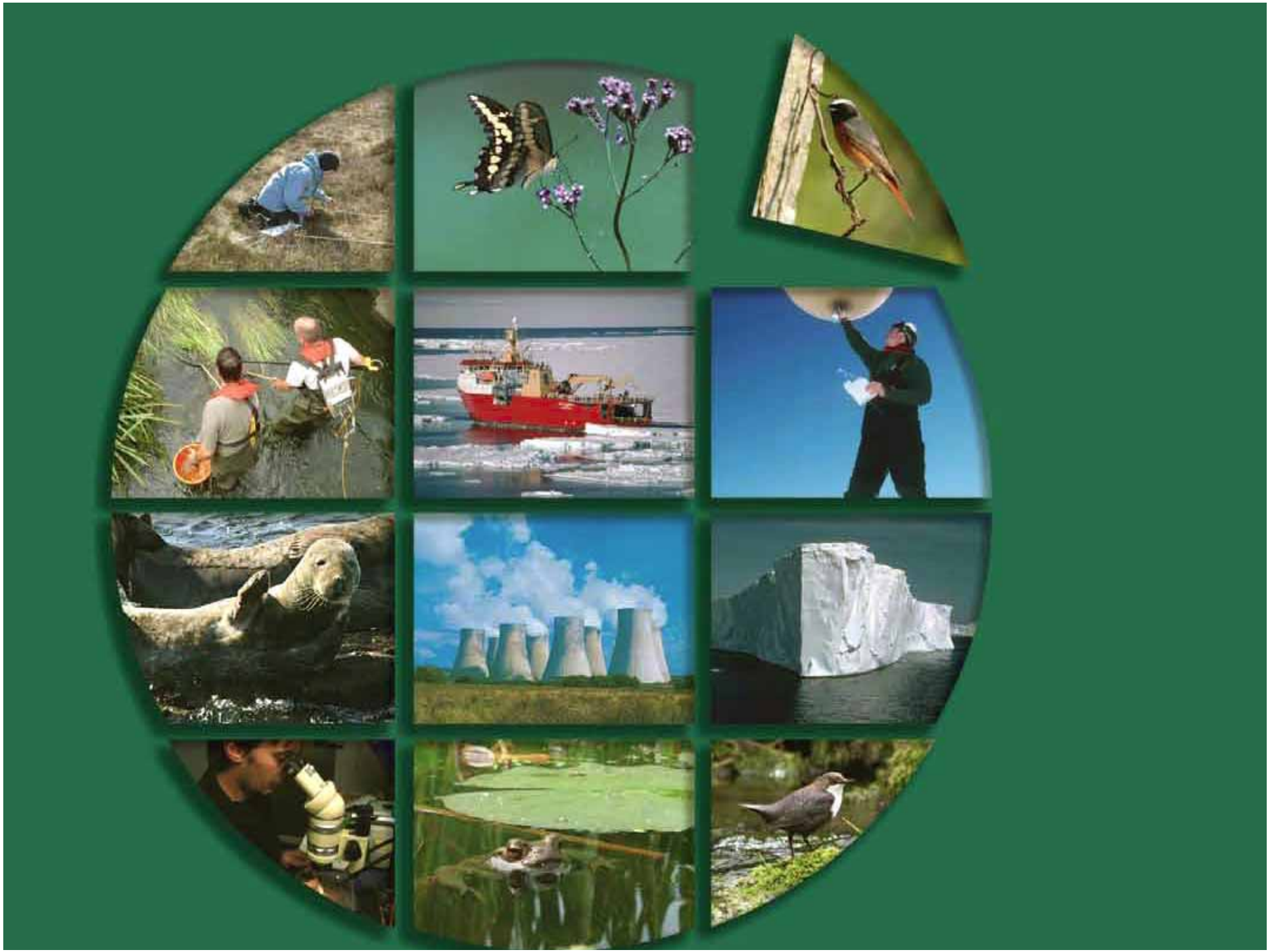
Consider for Example

- Sustainable development
- Statutory obligations
- International obligations
- Competent Authority
- Research/Science
- Assessing environmental condition
- Reporting on key environmental issues
- Informing decision making
- Investigational monitoring.

Statement of Need Session

- **Question**
  - What assessments do we need to make?

  For Example
  - Understand baselines/ Status
  - Global Indicators
  - Natural variability
  - Assess natural resources
  - Assess human impact
    - Now and in the future
  - Weather forecasts, trends, variability ….
  - Develop and test options for protection/remediation
  - Provide information to inform decision making
  - Investigational monitoring.



Close Day 2

- Chairman's summary

Next Steps

- Workshop report and presentations to website
- Clusters developed
- Statement of need
- Delivery Plan
- Database

Feedback Form – please complete now and hand to ERFF team with your Name badge

Thank you and have a safe journey back