



atlas

UNDERSTANDING DEEP ATLANTIC ECOSYSTEMS

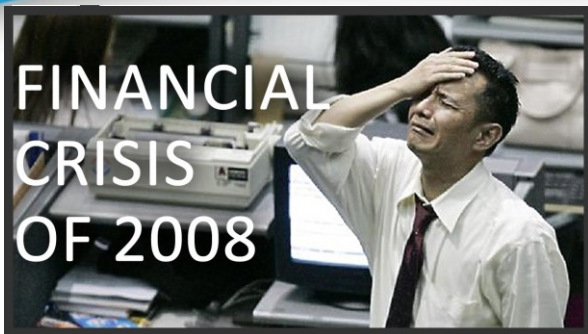


A trans-Atlantic assessment and deep-water ecosystem-based spatial management plan for Europe

ATLAS General Assembly Open Session
Mallorca, Spain, 26 April 2017



FINANCIAL CRISIS OF 2008



Dow Jones Industrial Average
Jan 2006 - Nov 2008



World-Crisis.net

Weekend Journal: Dancing on Geby's Rooftops

THE WALL STREET JOURNAL.

FRIDAY, SEPTEMBER 19, 2008 • VOL. CCLXII NO. 48

U.S. Drafts Sweeping Plan to Fight Crisis As Turmoil Worsens in Credit Markets

Philon Briefs Congress on Idea to Buy Bad Assets From Banks, Issue Money-Market Funds; Stocks Rebound Sharply

SEC Is Set To Issue Temporary Ban Against Short Selling

Street Scenes: The Players Remaking Financial World

What's News—

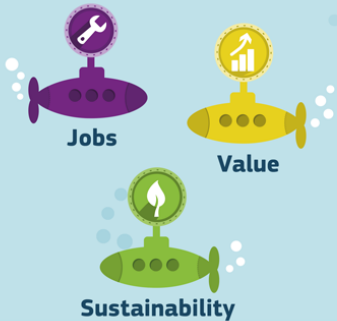


BLUE GROWTH

71%
of the Earth surface
is WATER

Why?

Blue Growth is the European Commission's initiative to further harness the potential of Europe's oceans, seas and coasts for:



Focus Area

Five sectors with high potential for sustainable Blue Growth are to be further developed.



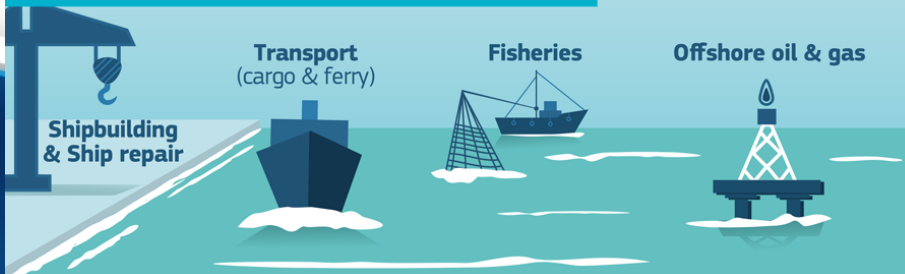
other **sectors of the blue economy** crucial for value & jobs

Shipbuilding & Ship repair

Transport
(cargo & ferry)

Fisheries

Offshore oil & gas



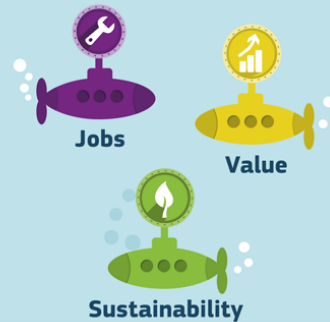


BLUE GROWTH

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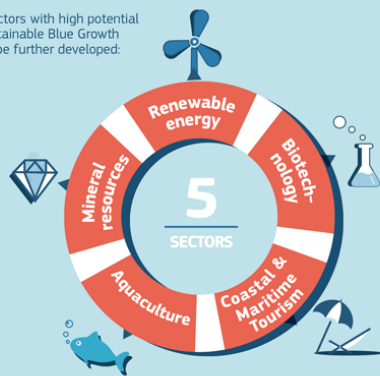
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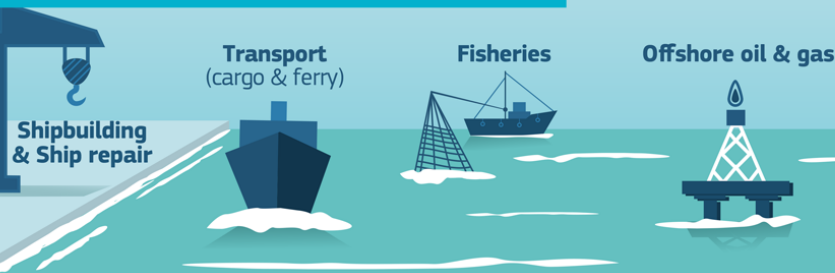


Focus Area

Five sectors with high potential for sustainable Blue Growth are to be further developed.



other sectors of the blue economy crucial for value & jobs

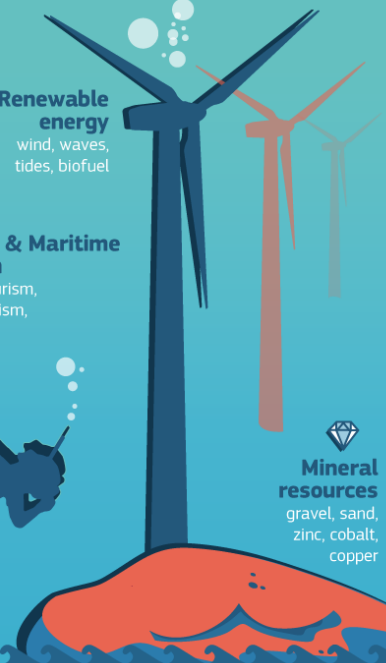


The 5 Blue Growth sectors

Biotechnology
medicines,
industrial enzymes



Renewable energy
wind, waves,
tides, biofuel

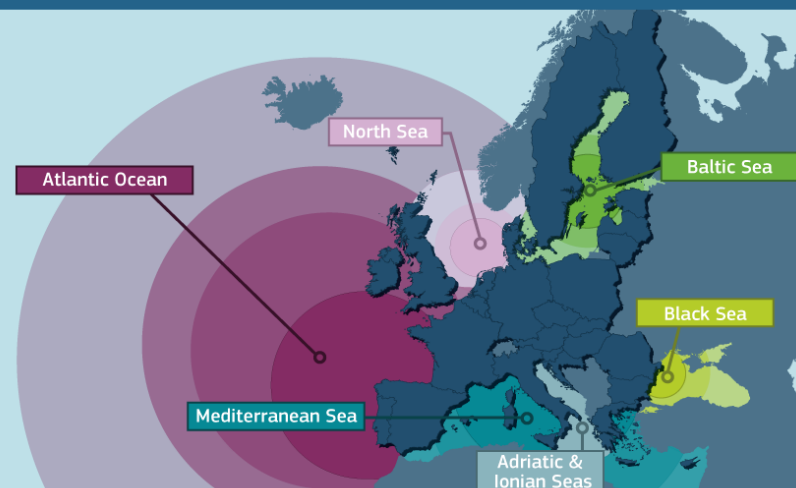


Coastal & Maritime Tourism
coastal tourism,
cruise tourism,
yachting

Mineral resources
gravel, sand,
zinc, cobalt,
copper

Aquaculture
farming of fish,
shellfish, marine plants

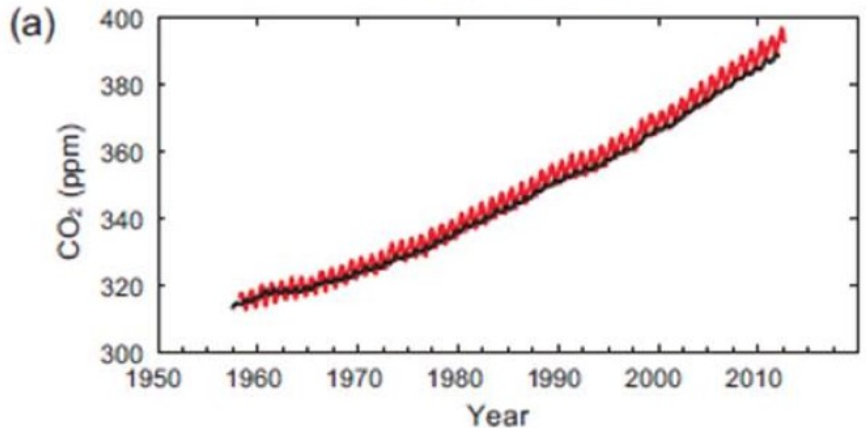
Map of Sea Basins



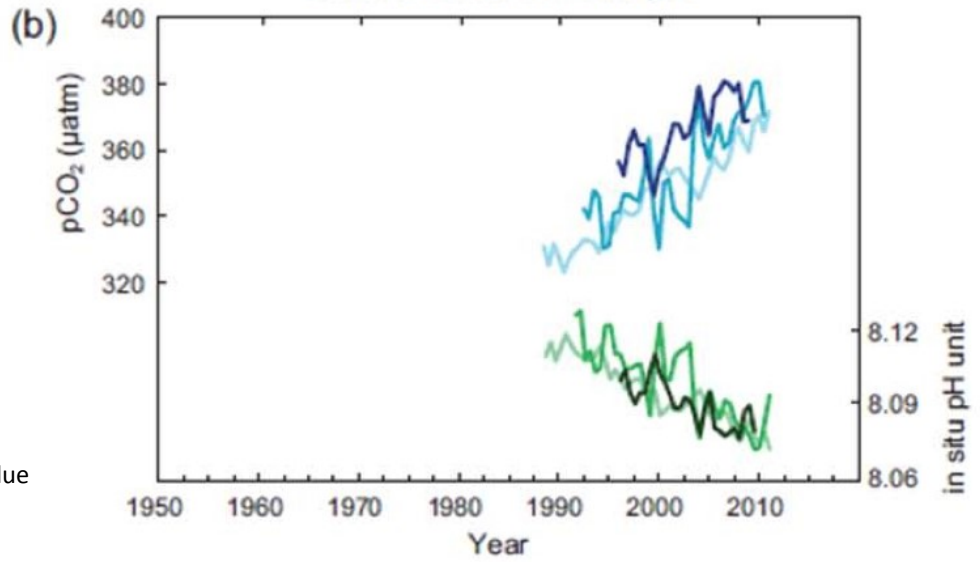
The Blue Economy by sea basin and by country shown in jobs and value



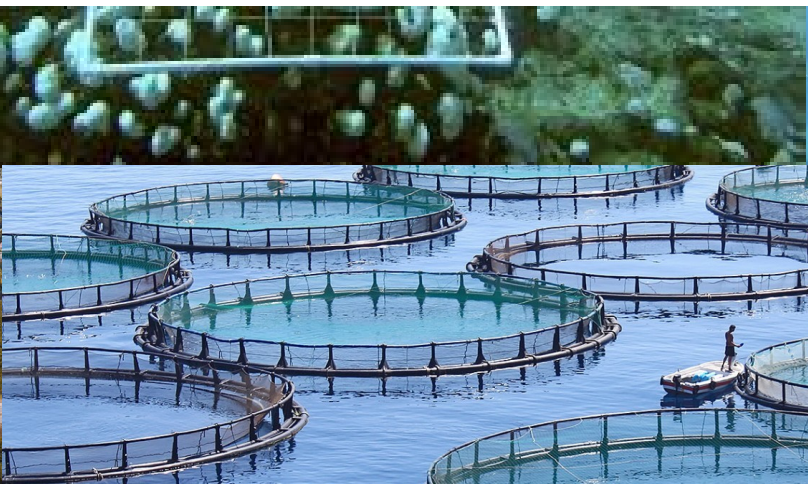
Atmospheric CO₂



Surface ocean CO₂ and pH



(a) atmospheric concentrations of CO₂ from Mauna Loa (red) and South Pole (black) since 1958; (b) partial pressure of dissolved CO₂ at the ocean surface (blue curves) and in situ pH (green curves). IPCC (2013)





At a Glance

A trans-Atlantic assessment and deep-water ecosystem-based spatial management plan for Europe

Call: EU Horizon 2020: BG-2015-2
(Unlocking the potential of seas and oceans)

Duration: May 2016 – April 2020 (48m)

Consortium: 24 partners +1 linked 3rd party, from 12 countries

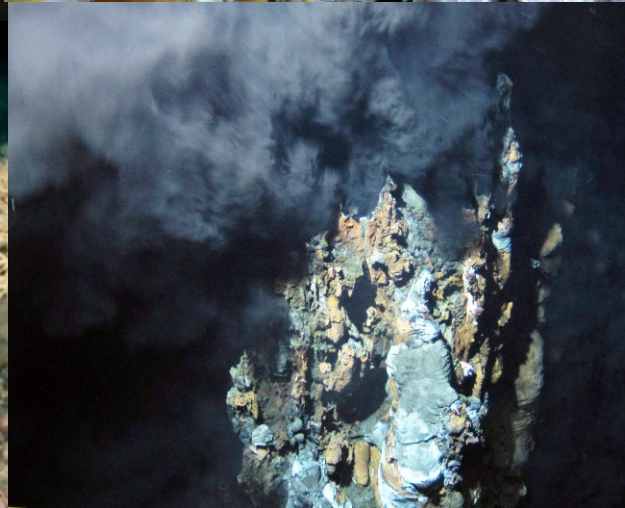
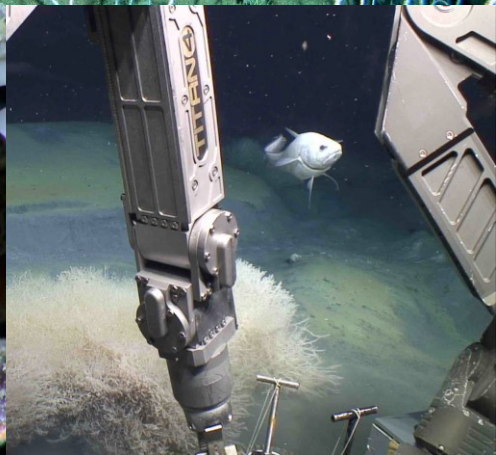
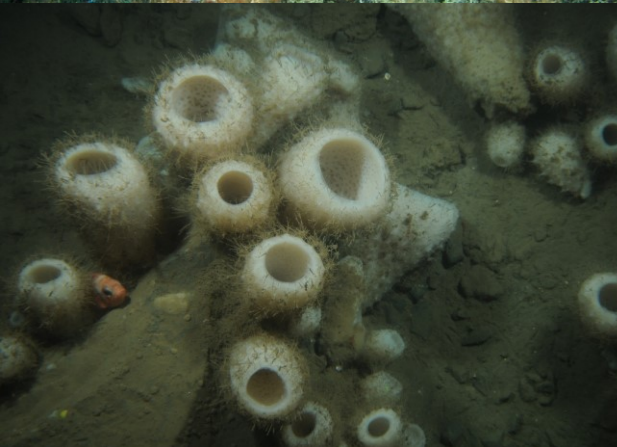
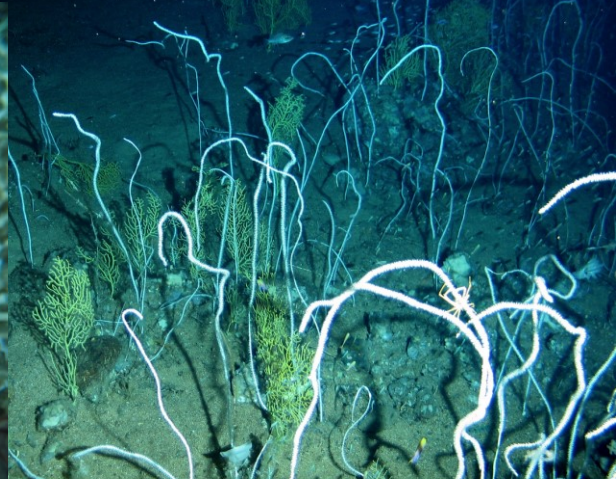
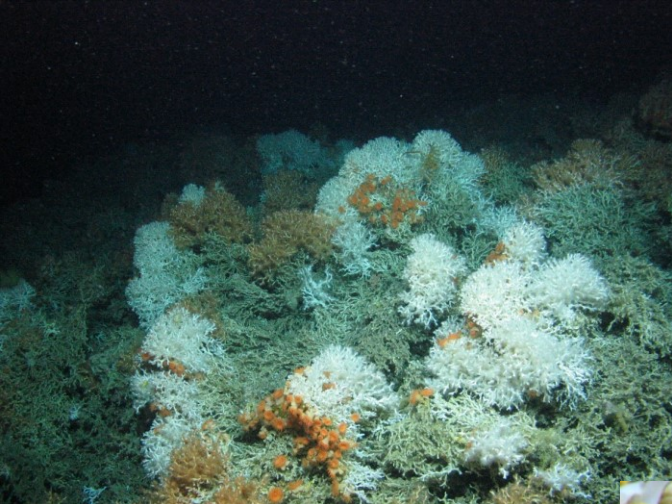
Budget: €9.3M

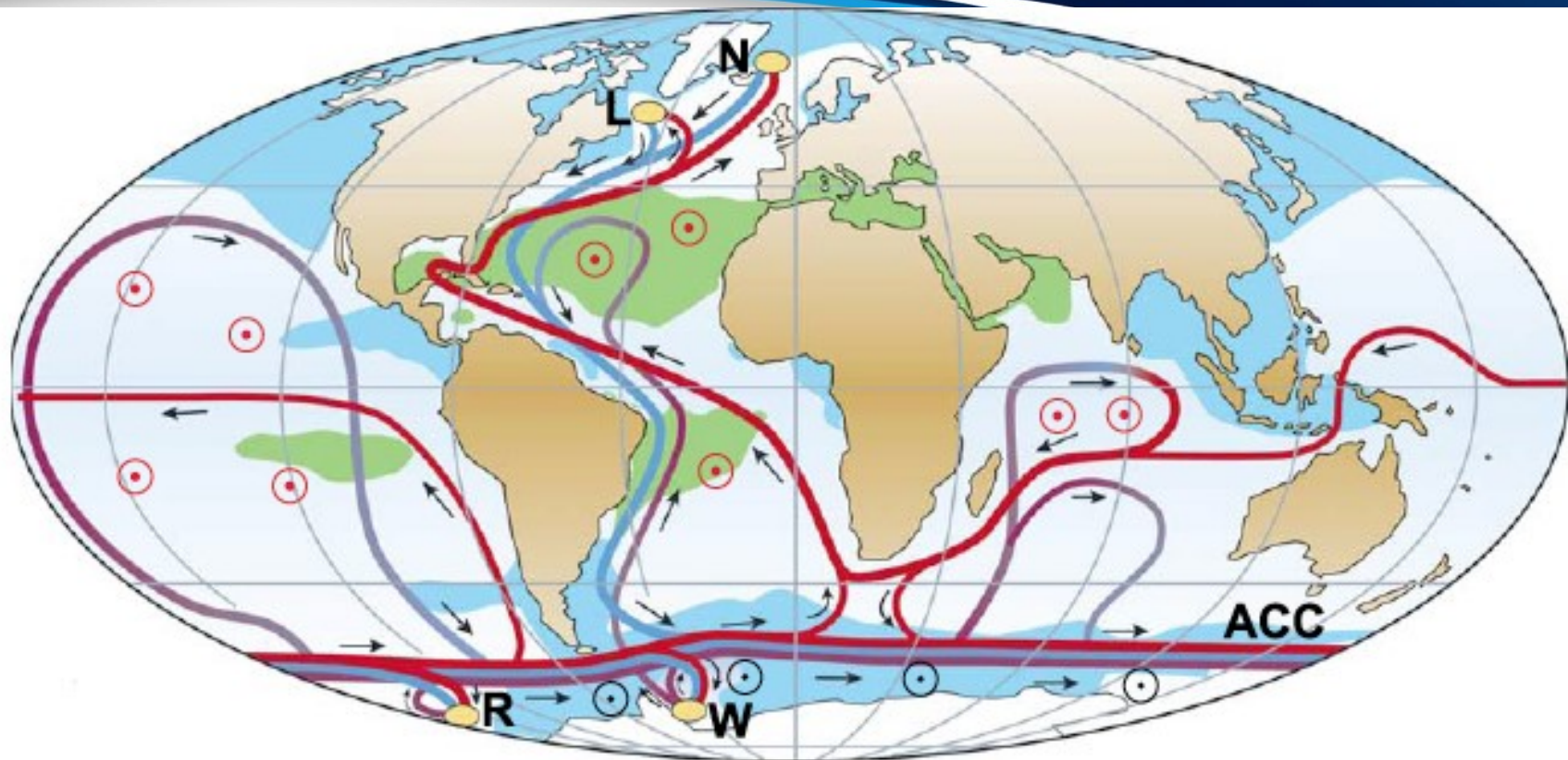
Coordinator: University of Edinburgh (UK)

Focus: Providing essential new knowledge of North Atlantic ecosystems through data gathering and synthesis

Impact: Discoveries and outputs will inform and facilitate stakeholder agreement on marine policy and regulation and spur Blue Growth

Core activities: 25+ research cruises investigating 12 case studies across the Atlantic





- Surface flow
- Deep flow
- Bottom flow
- Deep Water Formation

- ⊙ Wind-driven upwelling
- ⊙ Mixing-driven upwelling
- Salinity > 36 ‰
- Salinity < 34 ‰

- L** Labrador Sea
- N** Nordic Seas
- W** Weddell Sea
- R** Ross Sea



Trans-Atlantic Collaboration



ATLAS kick-off meeting Edinburgh (June 2016)



★ Case studies ● Project Partners

- | | | | |
|---|--|---|--|
| 1 University of Edinburgh (UEDIN) | 5 British Geological Survey (BGS/NERC) | 11 NIOZ Koninklijk Nederlands Instituut voor Onderzoek der Zee (NIOZ) | 19 UiT The Arctic University of Norway (UiT) |
| 2 Aarhus Universitet (AU) | 6 Gianni Consultancy (GC) | 12 Dynamic Earth (DE) | 20 Scottish Association for Marine Science (SAMS) |
| 3 IMAR - Instituto do Mar (IMAR -Uaz) | 7 Institut Francais de Recherche pour L'Exploitation de la Mer (Ifremer) | 13 University of Oxford (UOX) | 21 Seascope Consultants (SC) |
| 4 Secretária Regional do Mar, Ciência e Tecnologia (DRAM) | 8 Marine Scotland (MSS) | 14 University College Dublin (UCD) | 22 Instituto Español de Oceanografía (IEO) |
| | 9 Universitaet Bremen (UniHB) | 15 University College London (UCL) | 23 University of North Carolina at Wilmington (UNCW) |
| | 10 Iodine (Iodine) | 16 National University of Ireland, Galway (NUIG) | 24 AquaTT UETP Ltd (AquaTT) |
| | | 17 University of Liverpool (ULIV) | 25 Fisheries and Oceans Canada (DFO) |
| | | 18 Syddansk Universitet (USD) | |



Objectives

- **Advance** our understanding of deep Atlantic marine ecosystems and populations
- **Improve** our capacity to monitor, model and predict shifts in deep-water ecosystems and populations
- **Transform** new data, tools and understanding into effective ocean governance
- **Scenario-test** and develop science-led, cost-effective adaptive management strategies that stimulate Blue Growth

Anatomy of a new international instrument for marine biodiversity beyond national jurisdiction First impressions of the preparatory process

Ronán Long

*Professor and Senior Visiting Scholar-in-Residence, Law of the Sea Institute, Institute for Legal Research,
University of California Berkeley School of Law**

Mariamalia Rodríguez Chaves

School of Law, National University of Ireland Galway

Sensitivity of marine protected area network connectivity to atmospheric variability

Alan D. Fox^{1,2,†}, Lea-Anne Henry^{1,†}, David W. Corne²
and J. Murray Roberts^{1,3,†}



Moving from ecosystem-based policy objectives to operational implementation of ecosystem-based management measures

Roland Cormier,^{1,*} Christopher R. Kelble,² M. Robin Anderson,³ J. Icarus Allen,⁴ Anthony Grehan,⁵
and Ólavur Gregersen⁶

Coral Reefs (2017) 36:255–268
DOI 10.1007/s00338-016-1519-8

REPORT

Using novel acoustic and visual mapping tools to predict the small-scale spatial distribution of live biogenic reef framework in cold-water coral habitats

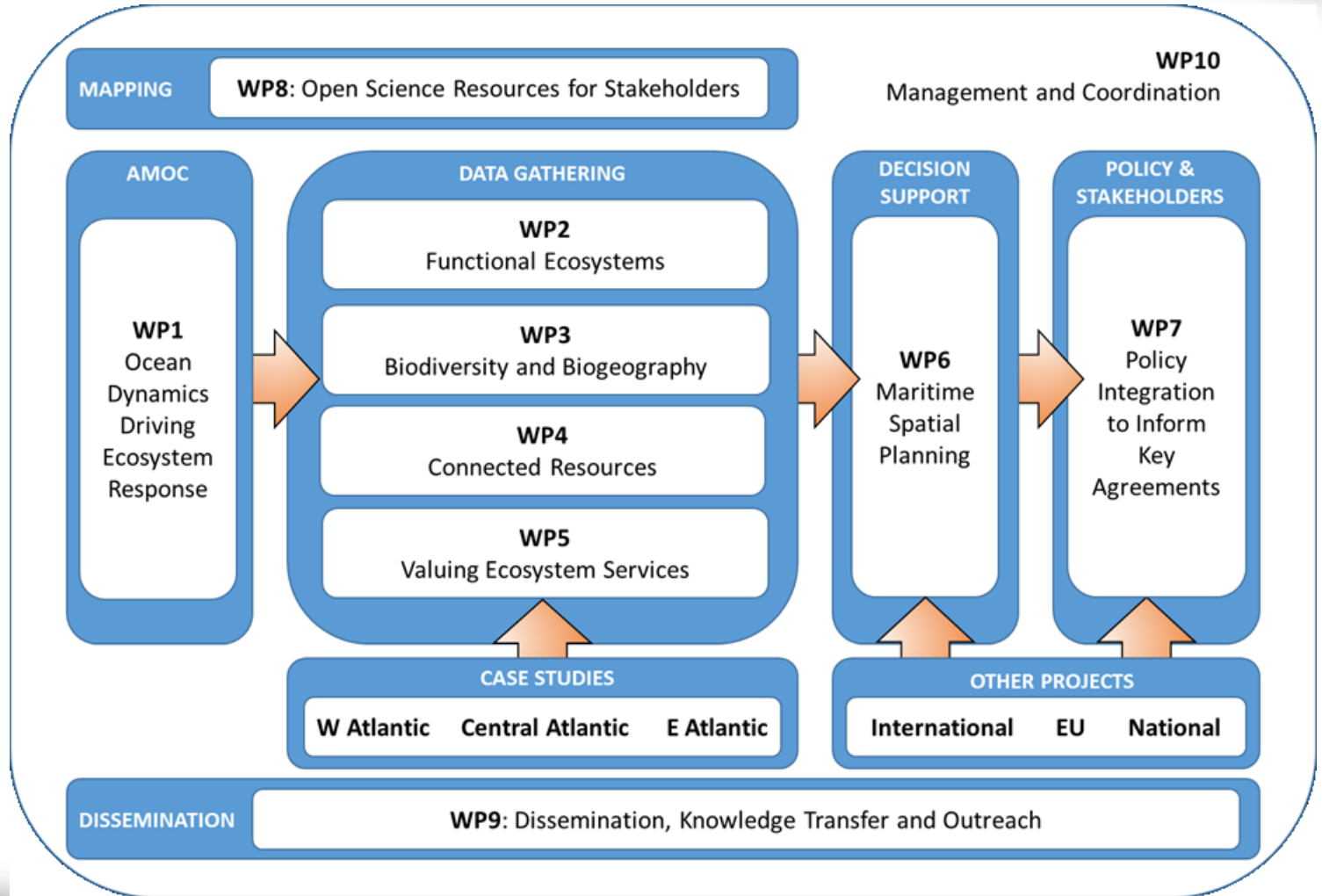
L. H. De Clippele¹ · J. Gafeira² · K. Robert³ · S. Hennige⁵ · M. S. Lavaley⁴ ·
G. C. A. Duineveld⁴ · V. A. I. Huvenne³  · J. M. Roberts⁵ 

Ecosystem engineering creates a direct nutritional link between 600-m deep cold-water coral mounds and surface productivity

Karline Soetaert¹, Christian Mohn², Anna Rengstorf³, Anthony Grehan³ & Dick van Oevelen¹



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Steering Committee



Stuart Cunningham
WP1, SAMS



Dick van Oevelen
WP2, NIOZ



Telmo Morato
WP3, IMAR-UAz



Sophie Arnaud-Haond
WP4, Ifremer



Claire Armstrong
WP5, UiT



Anthony Grehan
WP6, NUIG



David Johnson
WP7, SC



Stéphane Pesant
WP8, UniHB



David Murphy
WP9, AquaTT



J Murray Roberts
WP10, UEDIN



Workpackages

WP Leaders:

WP1: Scottish Association for Marine Science

WP2: Royal Netherlands Institute for Sea Research

WP3: IMAR-University of the Azores

WP4: French Research Institute for Exploration of the Sea

WP5: UIT The Arctic University of Norway

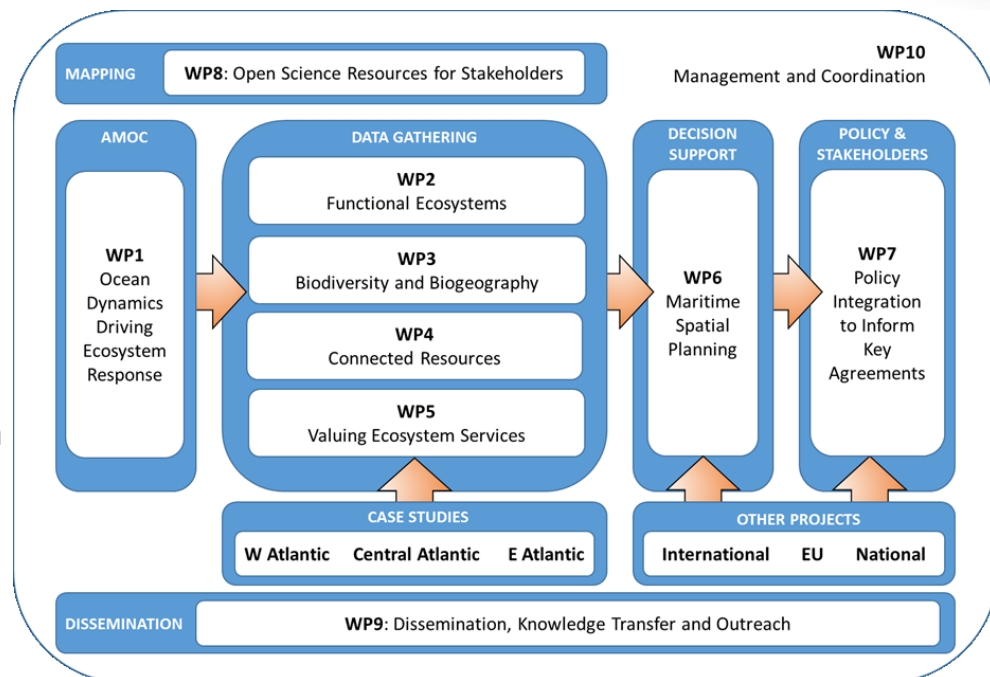
WP6: National University of Ireland, Galway

WP7: Seascope Consultants

WP8: University of Bremen

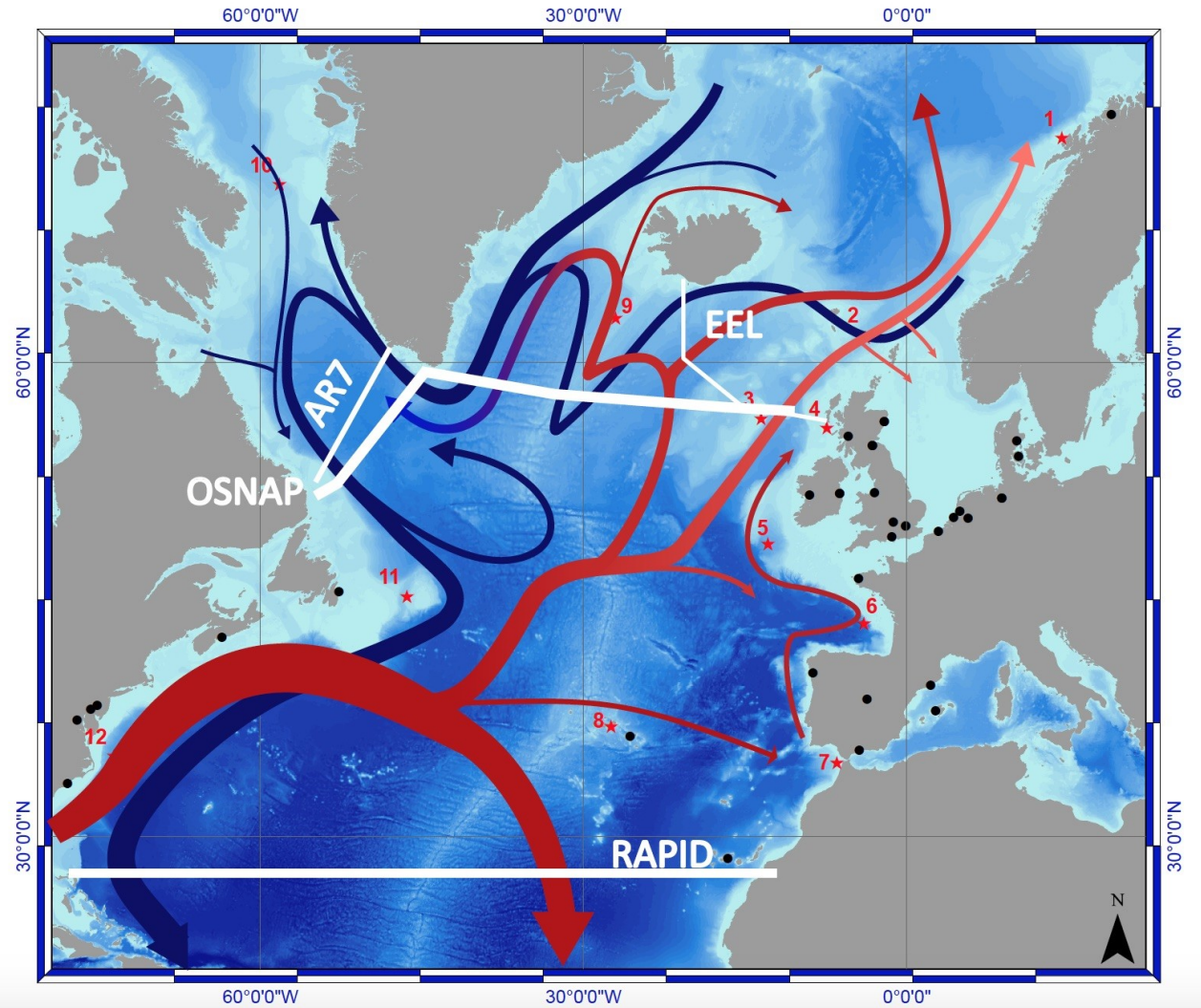
WP9: AquaTT

WP10: University of Edinburgh



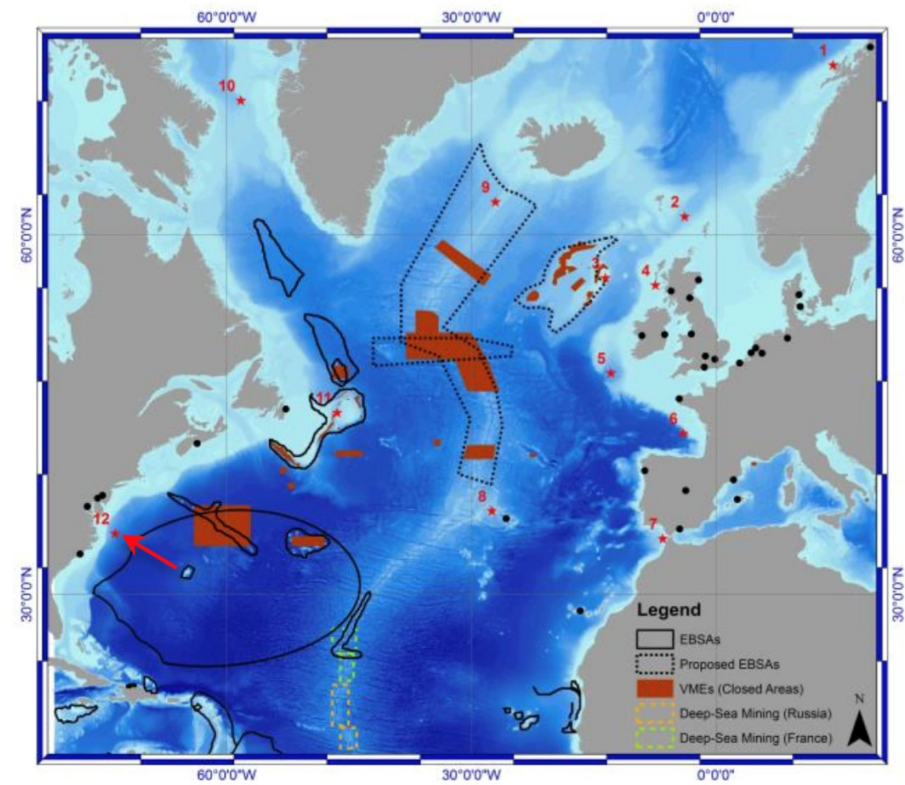
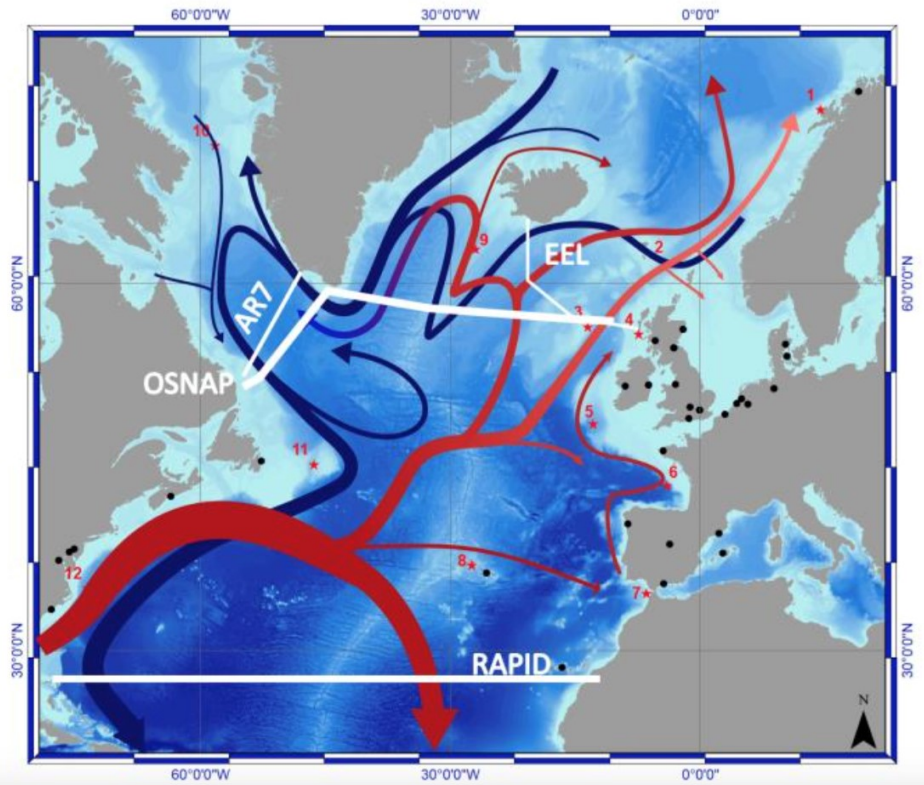


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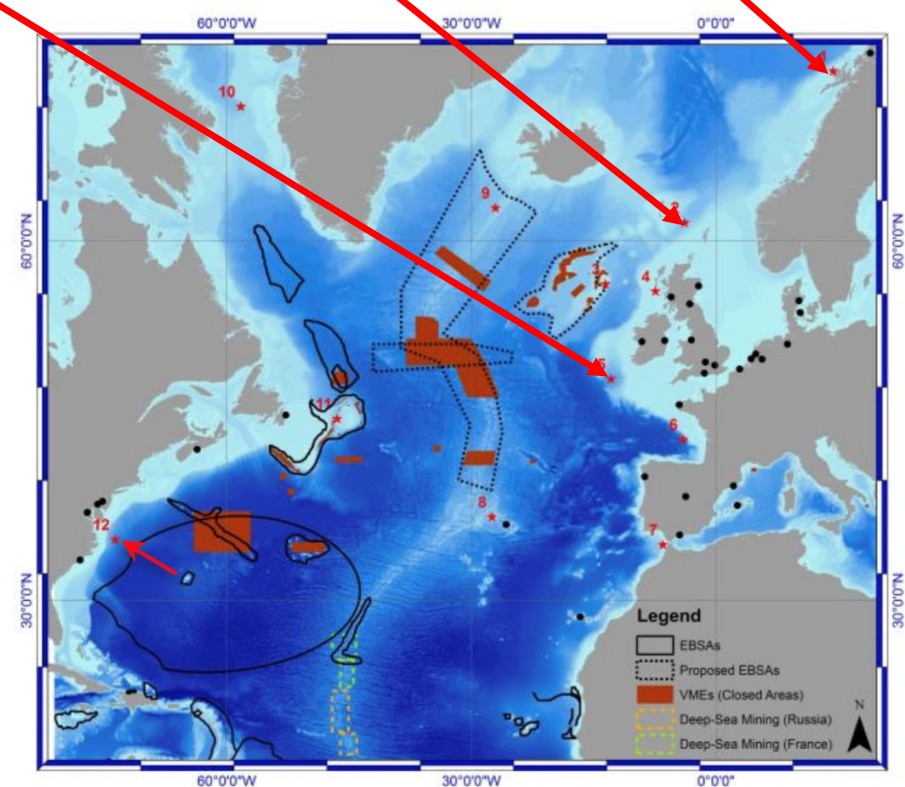
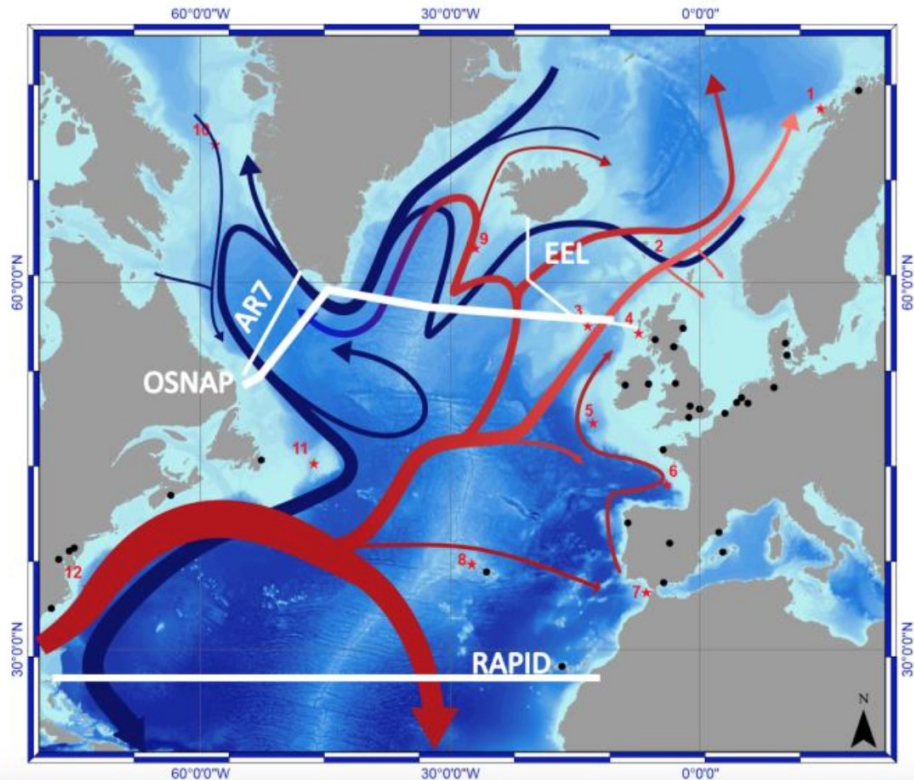


Lea-Anne Henry
 Case Study co-ordinator
 Chancellor's Fellow, University of Edinburgh



Case Study	Focus Ecosystems (CWC, cold-water coral)	Current and BG Sectors*	Lead & collaborators
1. LoVe Observatory (Norway)	CWC reefs, sponges	F, OG, T	<u>Statoil</u> , NIOZ, UEDIN
2. West of Shetland and W Scotland slope (UK)	Sponge grounds	B, F, OG	<u>UEDIN</u> , BP, OGUK, MSS
3. Rockall Bank (UK & Ireland)**	CWC reefs, coral gardens, carbonate mounds, sponge grounds, cold seeps	B, F, OG	<u>MSS</u> , IEO, OXU
4. Mingulay Reef Complex (UK)	CWC reefs	F, T	<u>UEDIN</u> , MSS
5. Porcupine Seabight (Ireland)	CWC reefs, coral gardens, carbonate mounds, sponge grounds	B, F, OG	<u>NUIG</u> , Woodside
6. Bay of Biscay (France)	CWC on slope and in canyon settings	B, F	<u>IFREMER</u>
7. Gulf of Cádiz/Strait of Gibraltar/Alborán Sea (Spain & Portugal)	CWC reefs, coral gardens, sponge grounds	B, F, OG	<u>IEO</u> , IFREMER, IMAR-UAz
8. Azores (Portugal)**	Hydrothermal vents, seamounts, coral gardens, sponge grounds	B, F, M	<u>IMAR-UAz</u> , IEO
9. Reykjanes Ridge (Iceland)**	Hydrothermal vents, CWC reefs, coral gardens, sponge grounds	B, F, M	<u>UCD</u>
10. S Davis Strait/Western Greenland/Labrador Sea (Canada)	CWC reefs, coral gardens, sponge grounds	B, F	<u>DFO</u>
11. Flemish Cap (Canada)**	Coral gardens, sponge grounds	B, F, OG	<u>IEO</u> , <u>DFO</u> , OXU, NAFO
12. SE USA (Bermuda transect)**	CWC reefs on slope and in canyon settings	B, F, M, OG	<u>UNCW</u> , AP-TU, NOAA

* Blue Growth sectors: **B**iototechnology; **F**isheries; **M**ining; **O**il & **G**as; **T**ourism; ** indicates data include ABNJ





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21th September 2016 – 26th October 2016 (36 days; one scale in Azores)
Research Vessel “Sarmiento de Gamboa” (CSIC)

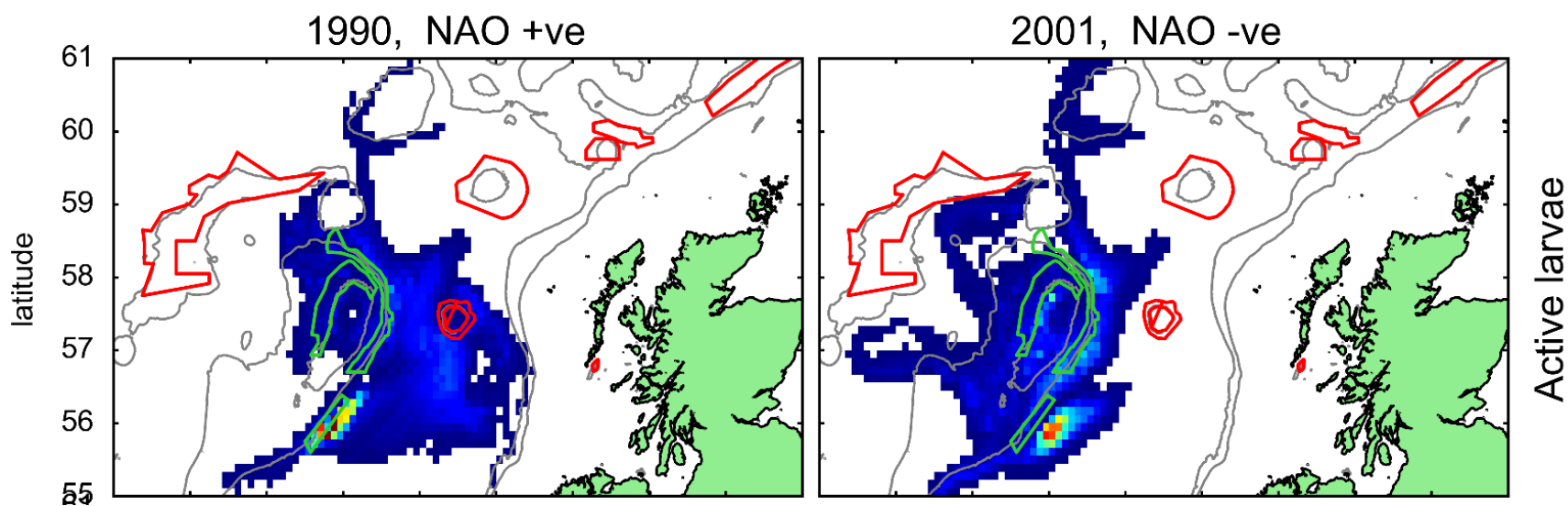


RV Sarmiento de Gamboa (image: Joan Costa, CSIC)



- ROV “Liropus” Super Mohawk
- 2 CDT rosettes
- ADCP and EK-60
- Multibeam echosounder
- Sidescan sonar
- Box corer, Multicorer, van Veen grab





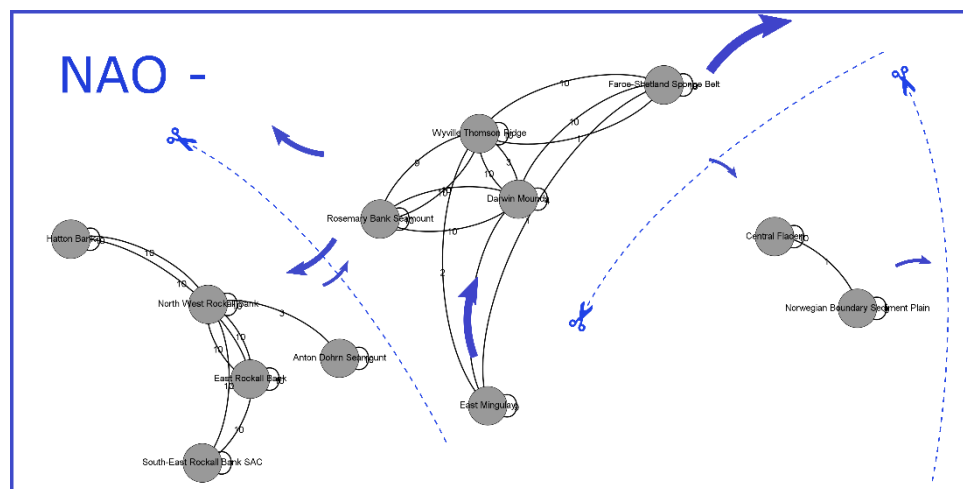
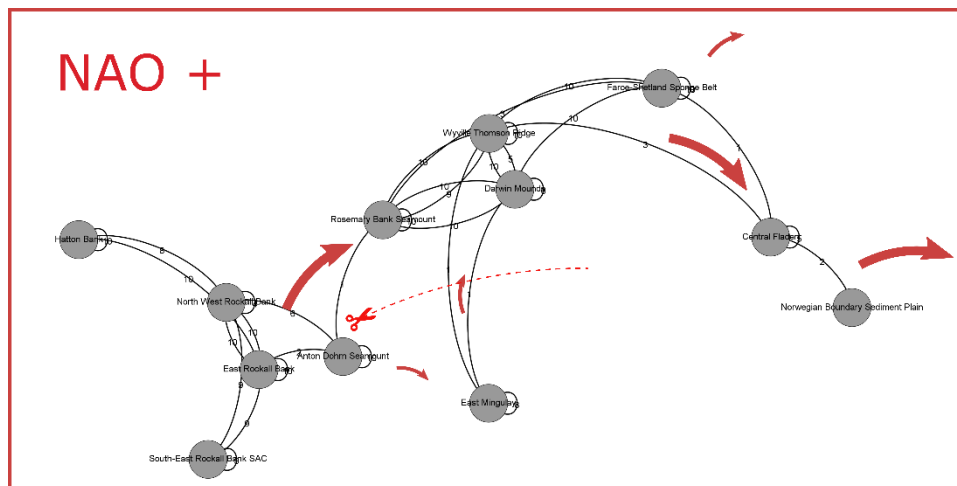
Distribution of modelled *Lophelia pertusa* larvae released from Rockall Bank MPAs
NAO + conditions show increased eastward larval dispersal



Network Analysis

A shift in NAO state will have profound effects on connectivity and ecosystem function of deep N Atlantic ecosystems

Essential understanding to design ecologically coherent MPA networks





Bermuda to Atlantic Canada 28 July – 8 August 2016

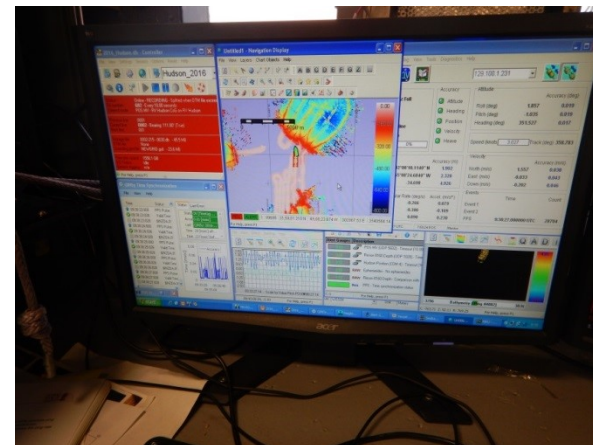
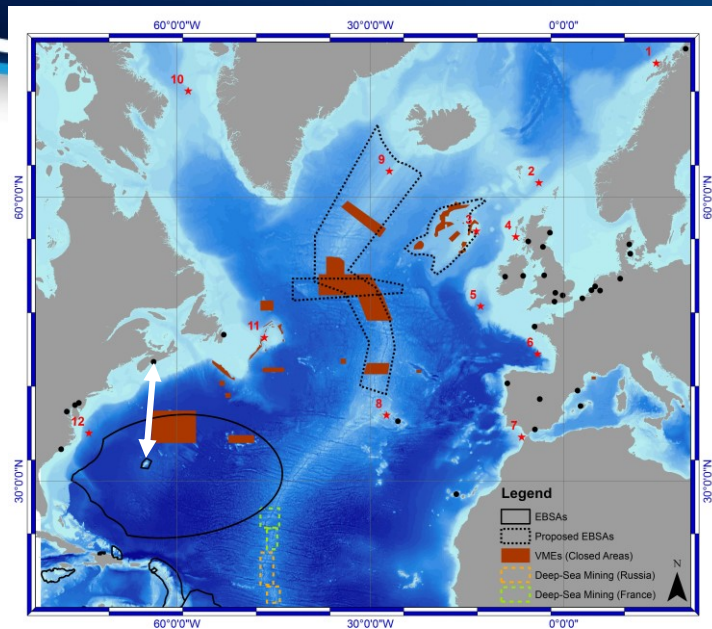
Deep-sea habitat mapping; Oceanographic profiling;
Seamounts; Biodiversity; Geology and fossil history



CGS *Hudson* in St. Georges' Harbour



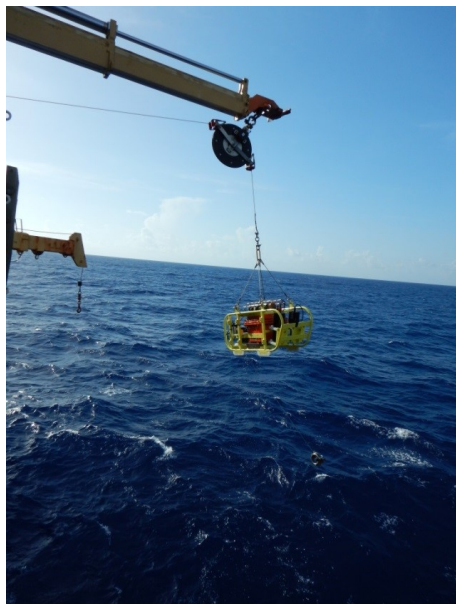
CTD casts on 3 seamounts
(Argus, Challenger and Bowditch)



Oceanographic seamount profiling



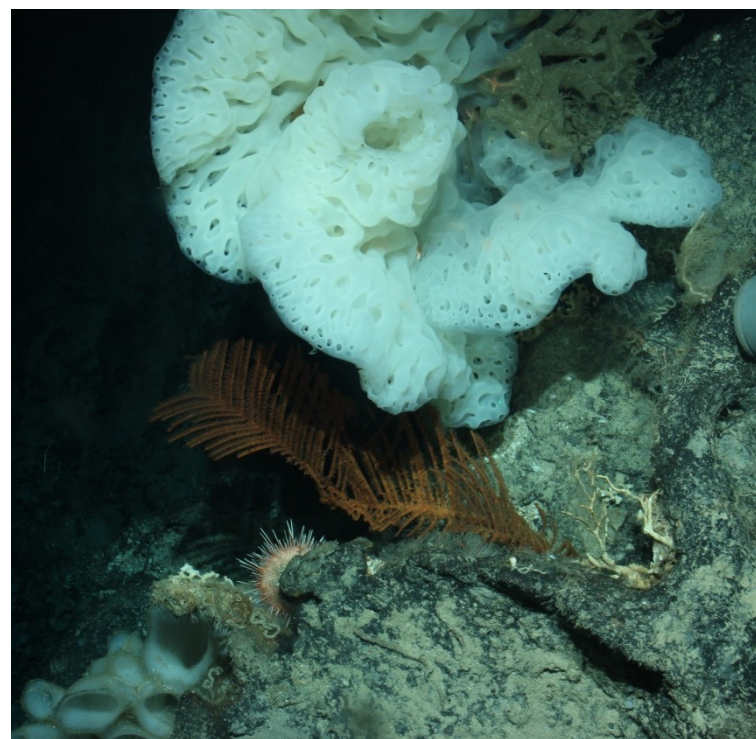
Fisheries and Oceans
Canada



NRCan's 4K dropcamera

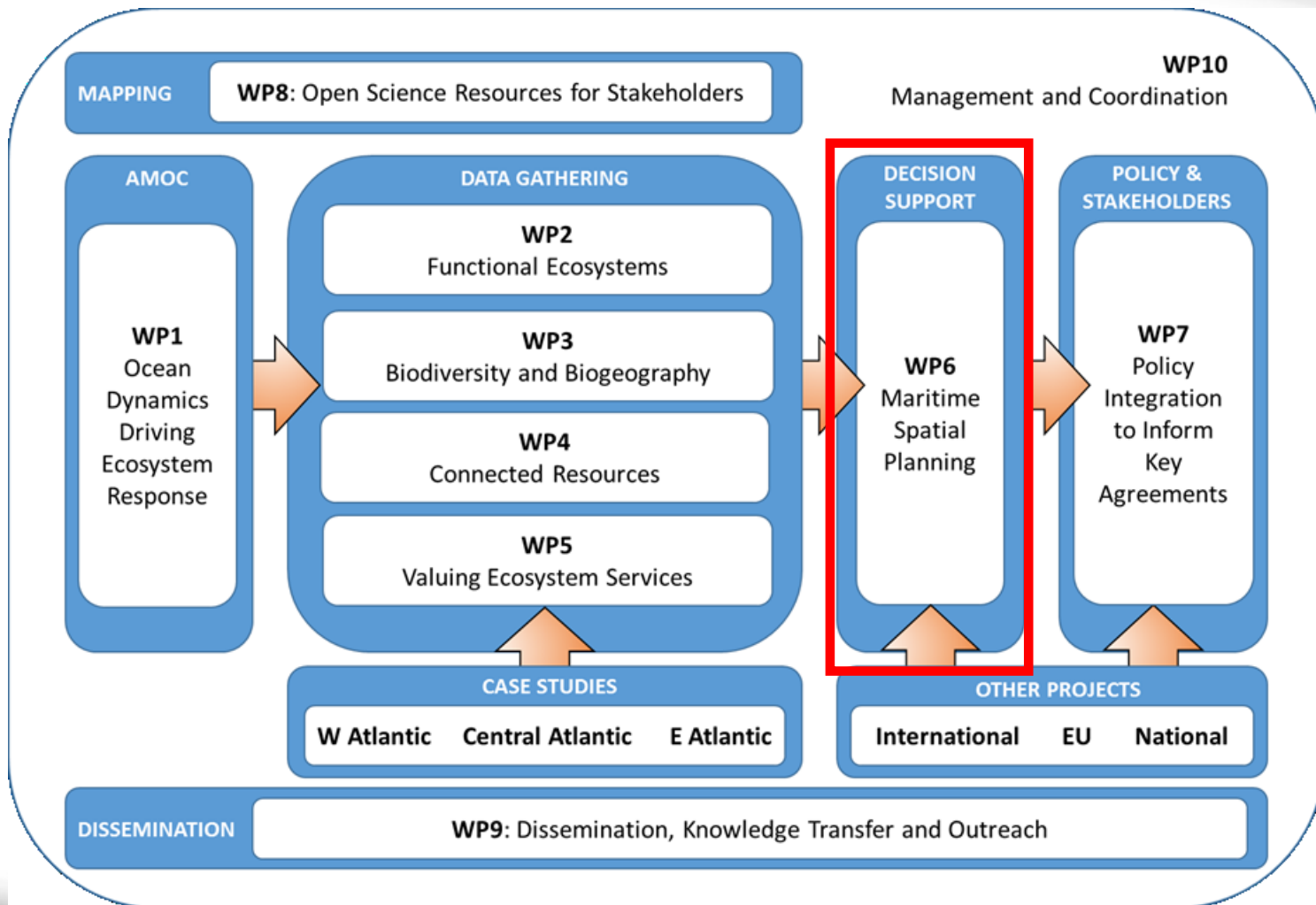


Van Veen grabs on seamounts



Seamount biodiversity captured by 4k camera







Multidisciplinary Approach

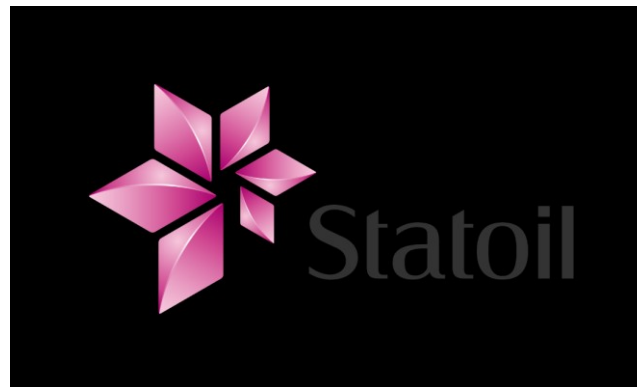




Advisory Board



Jake Rice, DFO
Scientist Emeritus



Icelandic Marine Research Institute



Societal engagement, capacity building and wider outreach





Expected Impacts

Blue Growth: Opportunities for marine and maritime sustainable growth

- Improve **resource management** (ecosystem approach) and governance
- Improve **cooperation** within EU and trans-Atlantic
- Contribute to the **EU Integrated Maritime Policy**
- Strengthen international **agreements to conserve** Vulnerable Marine Ecosystems and Ecologically & Biologically Significant Areas
- Engage with UN process developing an international legally binding instrument under UNCLOS on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction



Many thanks!

Project Contact Details:

Coordination: J Murray Roberts
murray.roberts@ed.ac.uk

Project Management: Katherine Simpson
katherine.simpson@ed.ac.uk

Communication & Press: Claudia Junge
claudia@aquatt.ie

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