Climate change is likely to severely limit the effectiveness of deep-sea ABMTs in the North Atlantic

ATLAS General Assembly, 10 April 2018

David Johnson, Seascape Consultants Ltd.; **Maria Adelaide Ferreira**, Seascape Consultants Ltd./MARE-FCUL

Ellen Kenchington, Fisheries and Oceans Canada

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 678760 (ATLAS). This output reflects only the author's view and the European Union cannot be held responsible for any use that may be made of the information contained therein.

Effectiveness of deep-sea ABMTs under CC

atlas

Priorities for an expert assessment of N A
EBSAs, VMEs and MPAs in ABNJ

ATLAS project deliverable 7.2

2nd ATLAS General Assembly, Mallorca, 24-28 April 20

David Johnson: david.johnson@seascapeconsultants.co.uk
Ellen Kenchington: ellen.kenchington@dfo-mpo.gc.ca
Maria Adelaide Ferreira: adelaide.ferreira@fcsh.unl.pt

The different area-based management tools (MPAs, EBSAs, and VMEs) in ABNJ comprise areas of 'critical natural capital', the protection of wh prioritized in the context of actual and/or potential human impacts.

Climate change will likely affect habitat suitability and representativenes species and modify biodiversity. However, despite projected spatial and tem resulting from climate change impacts, ABMTs are still being designed o contemporary environmental and habitat conditions. Furthermore, the exis for the designation of ABMTs in ABNJ in the N Atlantic constitute indepen related ongoing processes contributing to a complex and incomplete governa

This task seeks to identify N Atlantic areas/features most and least at ris change and understand/estimate how long these areas can be expected t addition we seek to identify areas that aren't critical now but may become s and to use this analysis to help establish priorities for evaluation including lo and parameters for observation and monitoring.

Tables 1 to 6.8. (Annex A) summarize the expected effects of c discriminated by depth, pH/acidification, reduction in O_2 (hypoxia), increasi temperature, reduced flux of particulate organic carbon (POC) to the bottom, in the AMOC, as well as the expected time frame of first impacts, respective ecological components of OSPAR high seas MPAs (Table 6.5.), N Atlantic EBS NAFO VME closures (Table 6.7.) and NEAFC VME closures (Table 6.8.). This synthesised in figures 6.6. to 6.9.

atlas

UNDERSTANDING DEEP ATLANTIC ECOSYSTEMS

Report on priorities for an expert assessment of North Atlantic MPAs, EBSAs, and VMEs in ABNJ

Project acronym:	ATLAS
Grant Agreement:	678760
Deliverable number:	7.2
Deliverable title:	Thought-leadership papers on priorities from expert assessment of Atlantic VMEs and EBSAs
Work Package:	7. Policy Integration to Inform Key Agreements
Date of completion:	5 May 2017
Author:	David Johnson, Maria Adelaide Ferreira, Ellen Kenchington

seascape consultants ltd

Fisheries and Oceans Canada / Pêches et Océans Canada

Marine Policy 87 (2018) 111–122

Contents lists available at ScienceDirect

Marine Policy

journal homepage: www.elsevier.com/locate/marpol

ELSEVIER

Climate change is likely to severely limit the effectiveness of deep-sea ABMTs in the North Atlantic

David Johnson[a], Maria Adelaide Ferreira[a,*], Ellen Kenchington[b]

[a] Seascape Consultants Ltd., Jermyn's House, Romsey SO52 0QA, UK
[b] Fisheries and Oceans Canada - Bedford Institute of Oceanography, P.O. Box 1006, 1 Challenger Dr., Dartmouth, N.S. Canada B2Y 4A2

ARTICLE INFO

Keywords:
ABNJ
ABMT
Resilience
Climate change

ABSTRACT

In the North Atlantic, Area-Based Management Tools (ABMTs), including Marine Protected Areas (MPAs) and areas describing the inherent value of marine biodiversity, have been created in Areas Beyond National Jurisdiction (ABNJ). This deep-sea area (> 200 m) supports vitally important ecosystem services. Dealing with the multiple and increasing pressures placed on the deep sea requires adequate governance and management systems, and a thorough evaluation of cumulative impacts grounded on sound science. Notwithstanding the different objectives of various types of ABMTs, at an ocean scale it makes good sense to consider MPAs, Ecologically or Biologically Significant Areas (EBSAs) and other effective conservation measures, such as areas closed to protect Vulnerable Marine Ecosystems (VMEs), collectively to inform future systematic conservation planning. This paper focuses on climate change pressures likely to affect these areas and the need to evaluate implications for the state of biodiversity features for which they have been established. In a 20–50 year time-frame, virtually all North Atlantic deep-water and open ocean ABMTs will likely be affected. More precise and detailed oceanographic data are needed to determine possible refugia, and more research on adaptation and resilience in the deep sea is needed to predict ecosystem response times. Until such analyses can be made, a more precautionary approach is advocated, potentially setting aside more extensive areas and strictly limiting human uses and/or adopting high protection thresholds before any additional human use impacts are allowed.

1. Introduction

The deep sea (area where the water column extends > 200 m below sea level; covering c. 65% of the Earth's surface) harbours ecosystems that support a rich variety of life, and which are crucial to the transfer of primary production, carbon and nutrients from the ocean surface to the seafloor. Many of the ecosystems also provide important habitat for resident and migratory species of fish, sea birds and marine mammals. The oceans are also a major sink for CO_2 and for the heat resulting from the associated greenhouse effect [1]. In addition to such supporting, regulatory and provisioning services, deep-sea ecosystems can also provide cultural services that are important to (coastal) nations and their citizens [2-4].

Some direct and indirect consequences of human activities (including anthropogenic climate change and related atmospheric changes) adversely impact the ocean [5]. In the deep sea, such impacts may span extensive areas with their effects likely to persist over long time-frames. Such impacts can act synergistically, eventually leading to changes in ecosystems including regime shifts, impacting the distribution and sustainability of living marine resources, and affecting deep-sea ecosystem functioning [6,7].

Addressing the multiple and increasing pressures placed on the ocean, including on the deep sea, is an urgent task requiring adequate governance and management systems and thorough evaluation of cumulative impacts, grounded on sound science. However, there are significant knowledge and governance gaps that challenge our capacity to adequately manage such pressures and ensure the long-term health and resilience of these ecosystems. This is in part because historically governments have not given their environmental agencies broad authority to regulate all activities that affect the environment. Such compartmentalization is a major cause of the poor state of ecosystems globally [5,8] and applies equally to the deep sea. Further, only "endogenic" area-specific pressures caused by on-site human activities (e.g., fisheries or mining), are amenable to management. Exogenic pressures, caused by natural drivers and/or some created anthropogenically outside of the system (e.g., the effects of climate change), create situations where management can only respond to the consequences [9,10].

Particularly challenging, in terms of governance, is the 64% of the

* Corresponding author.
E-mail address: m.adelaide.o.ferreira@gmail.com (M. Adelaide Ferreira).

http://dx.doi.org/10.1016/j.marpol.2017.09.034
Received 29 June 2017; Received in revised form 26 September 2017; Accepted 27 September 2017
Available online 21 October 2017

www.eu-atlas.org

Presentation outline

- Background on deliverable 7.2
  - Objectives/ Key questions
- Methods
- Findings
- Recommendations/Key policy brief messages

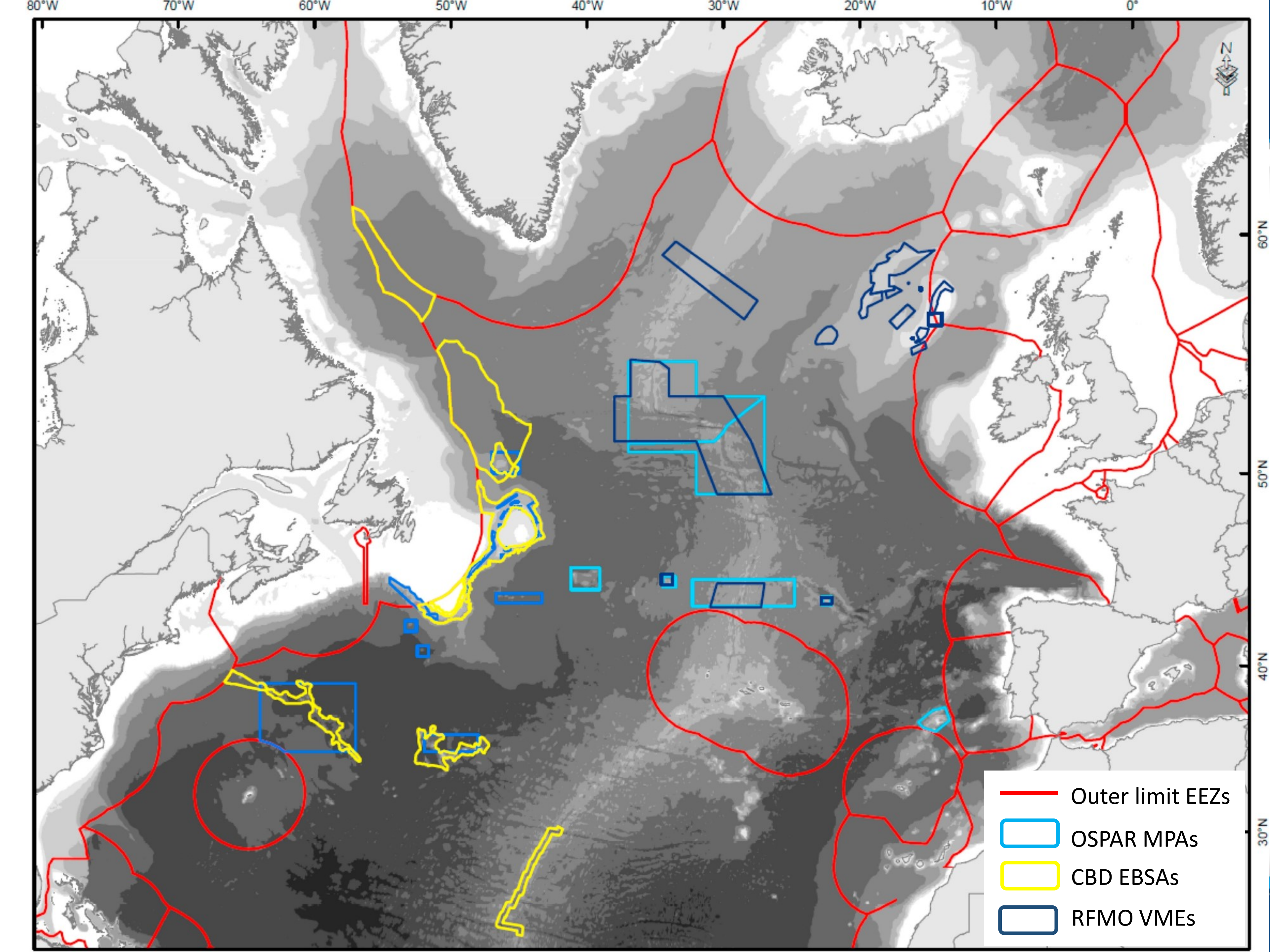
Objective of deliverable 7.2

- To contribute to an evaluation of **priorities** for an expert assessment of N Atlantic EBSAs, VMEs, MPAs in ABNJ to inform an expert workshop in 2018.
- Recognise a set of on-going 'expert evaluation' considerations and *fora* (CBD – Berlin EBSA workshop, SBSTTA, COP; UN Deep-sea fisheries reviews, NAFO, NEAFC; World Ocean Assessment; BBNJ process towards a legally binding agreement to UNCLOS; AORA; ICES)

Area-based management tools (ABMTs)

Provide higher protection (than surrounding area) due to more stringent regulation of one or more of all human activities, for one or more purposes.

- ABMTs specifically tailored to ABNJ
- ABMTs encompass a broader set of tools than MPAs:
  - Single sectoral or sector specific: PSSAs (shipping); VME closures (fishing); ISA Areas of Particular Environmental Interest (mining), …
  - Multi-sectoral: OSPAR's network of high seas MPAs


80°W
70°W
60°W
50°W
40°W
30°W
20°W
10°W
0°
60°N
50°N
40°N
30°N
N
Outer limit EEZs
OSPAR MPAs
CBD EBSAs
RFMO VMEs

Key questions

What is the future of current ABMTs in the N Atlantic in the framework of future scenarios and Blue Growth?

- How are these areas going to be affected?
- When are impacts going to be felt?
- Will current protections remain useful/relevant in the face of a changing environment?
- How can we secure a network of resilient ABMTs in the N Atlantic?

PRESSURE

A result of a driver-initiated mechanism (anthropogenic/natural process) causing an effect on any part of an ecosystem that may alter the environmental state

STATE

The actual condition of the ecosystem and its components in a specific area at a given time, that can be quantitatively-qualitatively described based on physical, chemical and biological characteristics

RESPONSE

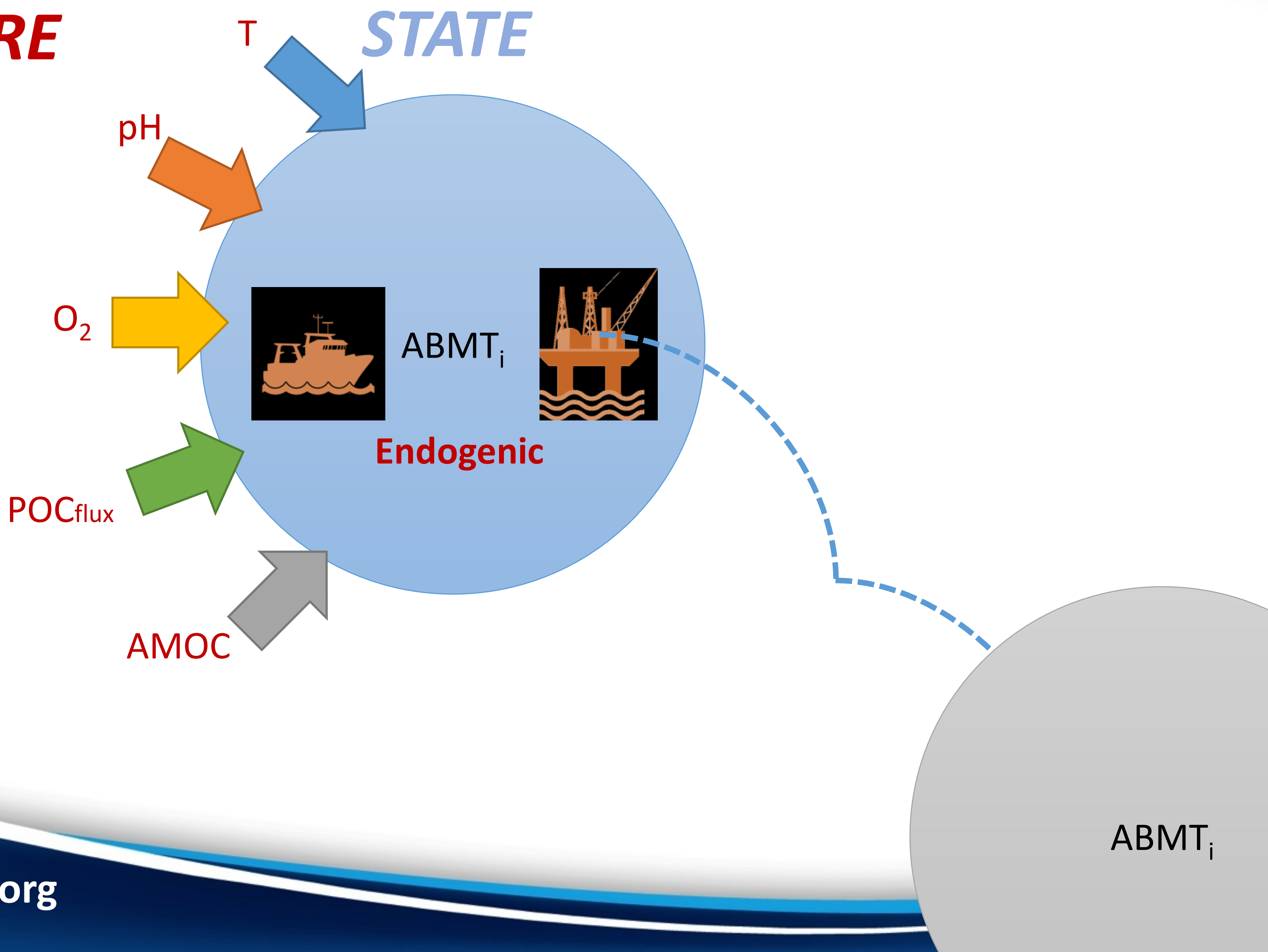
All management actions seeking to reduce or prevent an unwanted change or to develop a positive (desirable) change in the ecosystem

STATE

ABMT$_i$

PRESSURE

Exogenic CC variables

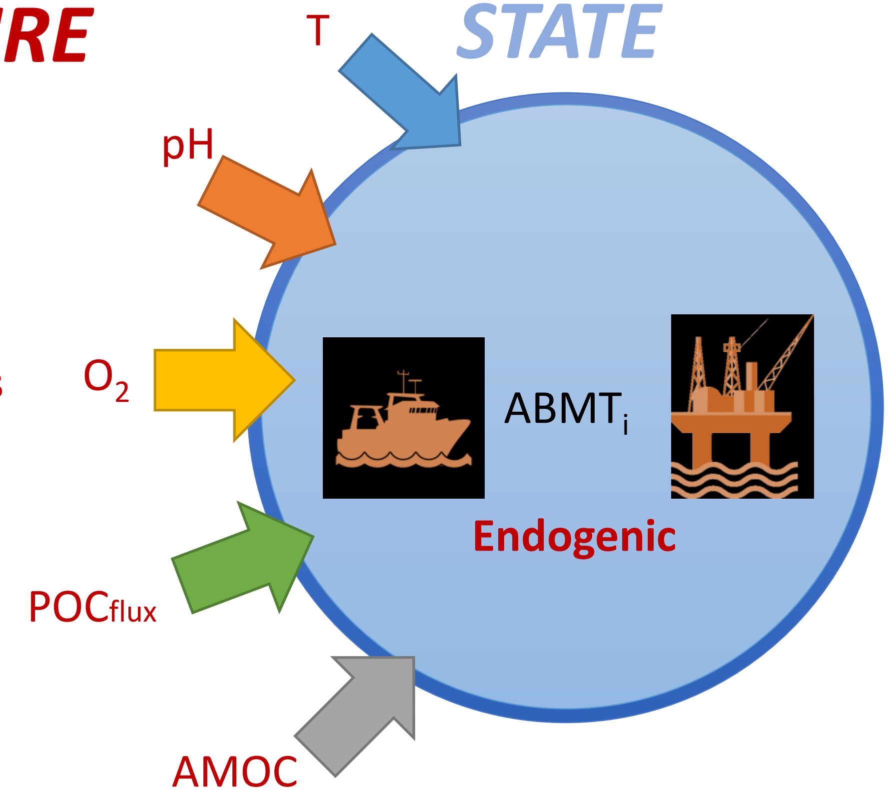


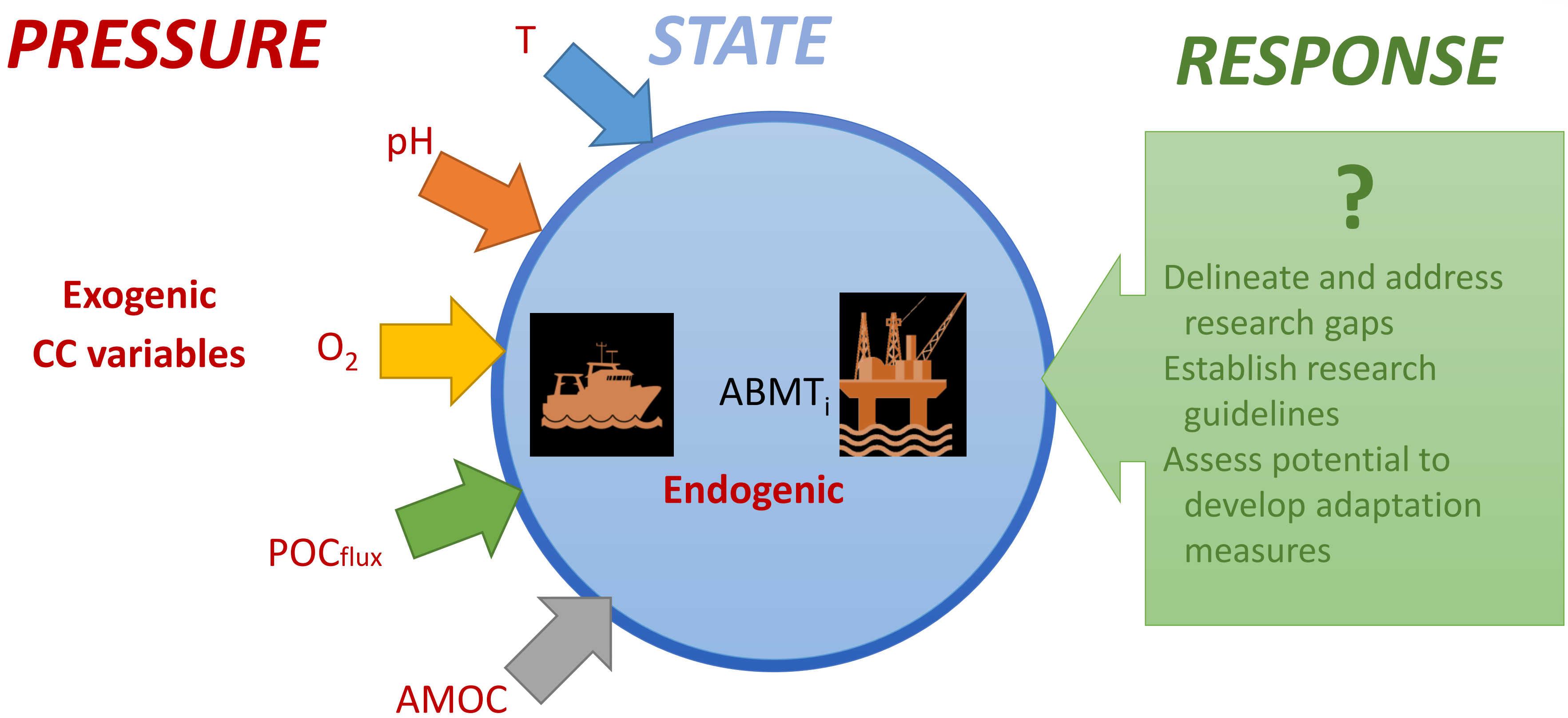
PRESSURE

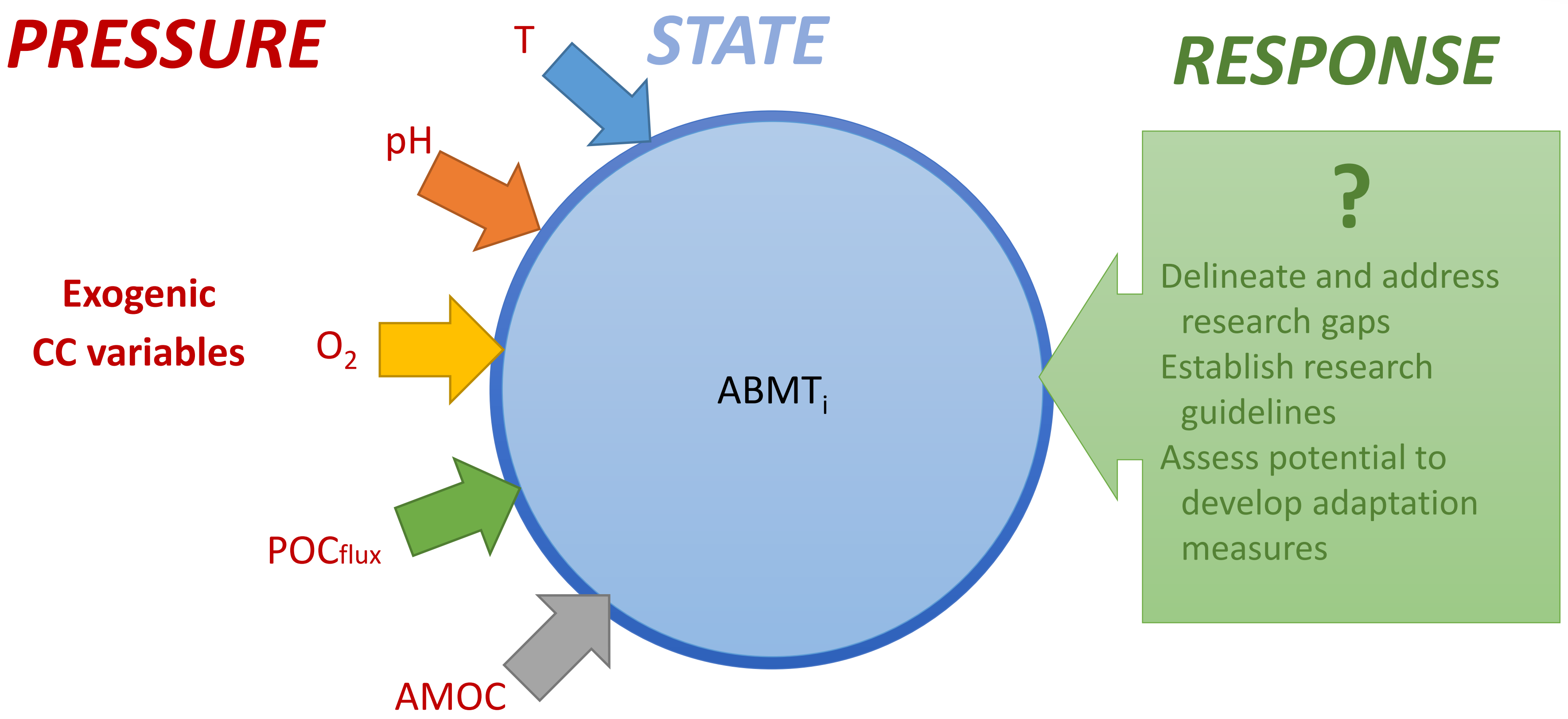
STATE

Exogenic

CC variables



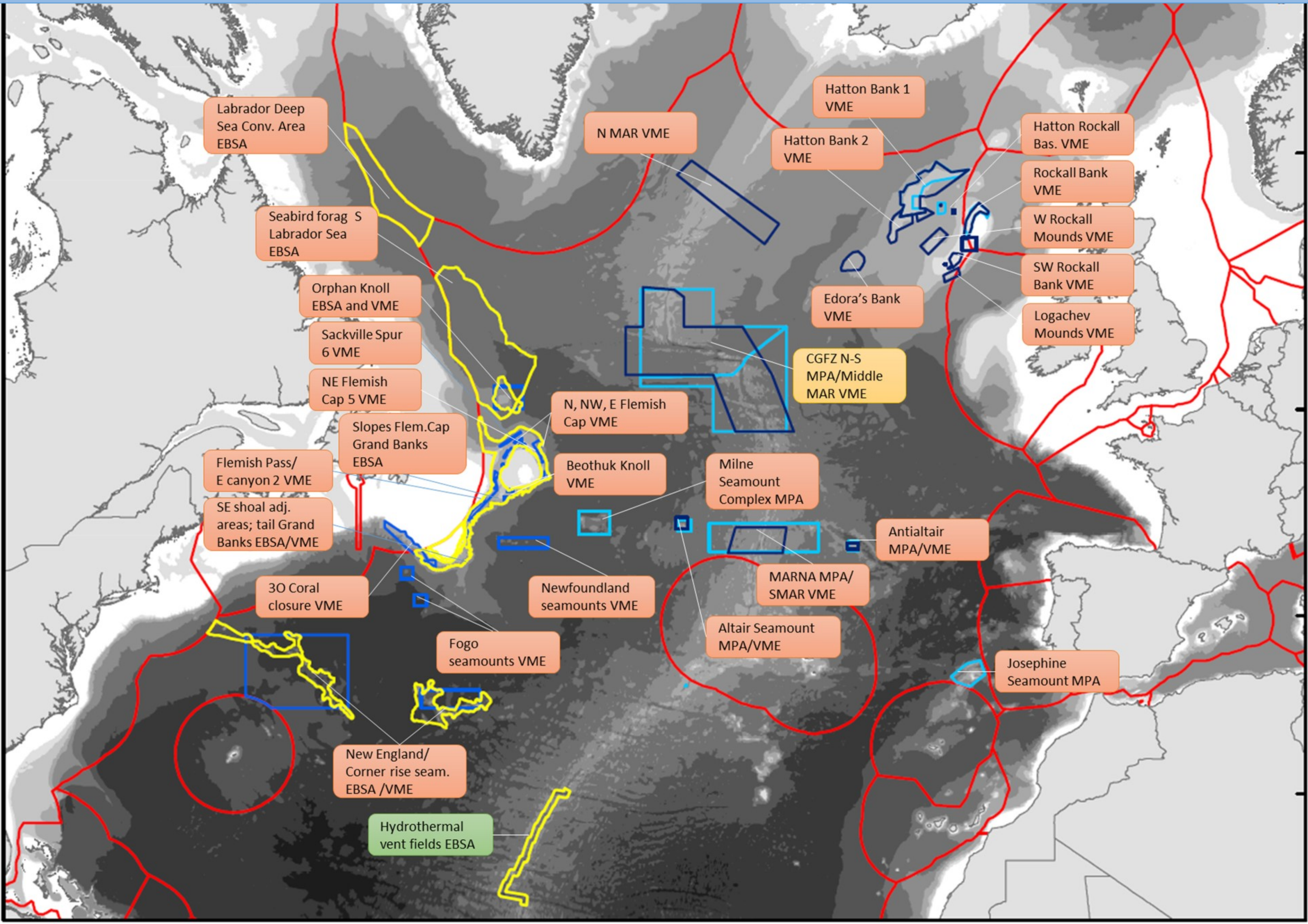

PRESSURE
STATE
RESPONSE
T
pH
Exogenic
CC variables
O_2
POCflux
AMOC
$ABMT_i$
Endogenic
?
Delineate and address research gaps
Establish research guidelines
Assess potential to develop adaptation measures


PRESSURE
STATE
RESPONSE
Exogenic
CC variables
T
pH
O2
POCflux
AMOC
ABMTi
?
Delineate and address research gaps
Establish research guidelines
Assess potential to develop adaptation measures

Methods

- Review of existing ABMTs in the N Atlantic (MPAs, EBSAs, VMEs) and the reasons justifying their designation
- Review predicted impacts on *taxa* present in these ABMTs caused by changing oceanic variables (T, pH, DO, POC flux, red. AMOC)
- Review and factor in resilience to CC effects
- Construct a synthesis map of ABMTs most/least at risk
- Expert focus group with ATLAS colleagues

Results


Labrador Deep Sea Conv. Area EBSA
Seabird forag S Labrador Sea EBSA
Orphan Knoll EBSA and VME
Sackville Spur 6 VME
NE Flemish Cap 5 VME
Slopes Flem.Cap Grand Banks EBSA
Flemish Pass/ E canyon 2 VME
SE shoal adj. areas; tail Grand Banks EBSA/VME
3O Coral closure VME
New England/ Corner rise seam. EBSA /VME
Hydrothermal vent fields EBSA
Fogo seamounts VME
Newfoundland seamounts VME
N, NW, E Flemish Cap VME
Beothuk Knoll VME
N MAR VME
CGFZ N-S MPA/Middle MAR VME
Milne Seamount Complex MPA
MARNA MPA/ SMAR VME
Altair Seamount MPA/VME
Antialtair MPA/VME
Josephine Seamount MPA
Hatton Bank 1 VME
Hatton Bank 2 VME
Edora's Bank VME
Hatton Rockall Bas. VME
Rockall Bank VME
W Rockall Mounds VME
SW Rockall Bank VME
Logachev Mounds VME
60°N
50°N
40°N
30°N

Can current ABMTs meet their conservation objectives over time?

- Unlikely
- Spp. distribution regime shifts will likely be worsened by other changes
  - nutrient flux/cycling changes, pollutant toxicity increases, reduction in plankton productivity, invasive species distribution/dominance
- Availability of refugia is very limited.

Will current protections remain useful/relevant in the face of a changing environment?

- Most ABMTs likely to be less fit for purpose/redundant in 20-50 y.
  - For mobile pelagic features (*e.g.*, associated with oceanographic fronts):
    - may need to consider repositioning with a need for more pelagic EBSAs in N latitudes (meeting conservation targets in the short term)
  - For sessile benthic fauna (associated with fixed geomorphic features):
    - There may be few mitigation options
    - applying ABMT to similar features may only be possible in some cases
    - potential problems for cold-water species whose habitat is diminishing

In synthesis:

- ABMTs in the N Atlantic ABNJ include areas of ‘critical natural capital’
- Their protection should be prioritized in the context of actual and/or potential human impacts

How can a network of resilient ABMTs be built?

- Need for adaptive management
- Significantly reduce endogenous stressors: appropriate management actions
- Consider ABMTs for a ‘second order’ of biodiversity: protection of ecological function (ecosystem services) rather than key species

Recommendations/Key policy brief messages

- **Spatial heterogeneity in N Atlantic results in need to 'future proof' ABMTs:** emphasize resilience and refugia
- **By 2050 all ABMTs will be impacted:** case-by-case analysis needed
- **Consider these ABMTs collectively as a "network":** commonality of purpose
  - Evaluate connectivity/gaps: see where new/alternative areas are best located
  - Draw up assessment and monitoring programme: monitor the state of ABMTs
  - Use expert assessments to advance Aichi 11 and SDG 14.5 targets: broad interpretation of OECMs as a contribution to 10% MPA coverage
  - Draw the attention of results to those responsible for the BBNJ Implementing Agreement: acknowledging implications beyond ABMTs to other elements of the BBNJ 'package'
- **Contribute to MSP decisions recognising that CC impacts may dominate some situations:** protecting 'lucky spots' and areas of high resilience
- **Adopt a more precautionary approach:** Setting aside more extensive areas, strictly limiting human uses, adopting high protection thresholds before further human uses are allowed.

atlas

New information from ATLAS project

- Need to input information on VMEs to ICES
- Viking 20 modelling can produce different/finer grained predictions than IPCC scenarios
- New information on corals sensitivity and resilience
- New species distribution models under future scenarios

Thank You!

Contact Details:

David Johnson
david.johnson@seascapeconsultants.co.uk
Maria Adelaide Ferreira
maferreira@fc.ul.pt
Ellen Kenchington
ellen.kenchington@dfo-mpo.gc.ca

Follow us: @eu_atlas
@EuATLAS
www.eu-atlas.org

atlas

Template developed by AquaTT

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 678760 (ATLAS). This output reflects only the author's view and the European Union cannot be held responsible for any use that may be made of the information contained therein.

Image credit: D van Oevelen