NovasArc : Nordic Vulnerable Marine Ecosystems and anthropogenic activities in sub-Arctic and Arctic waters

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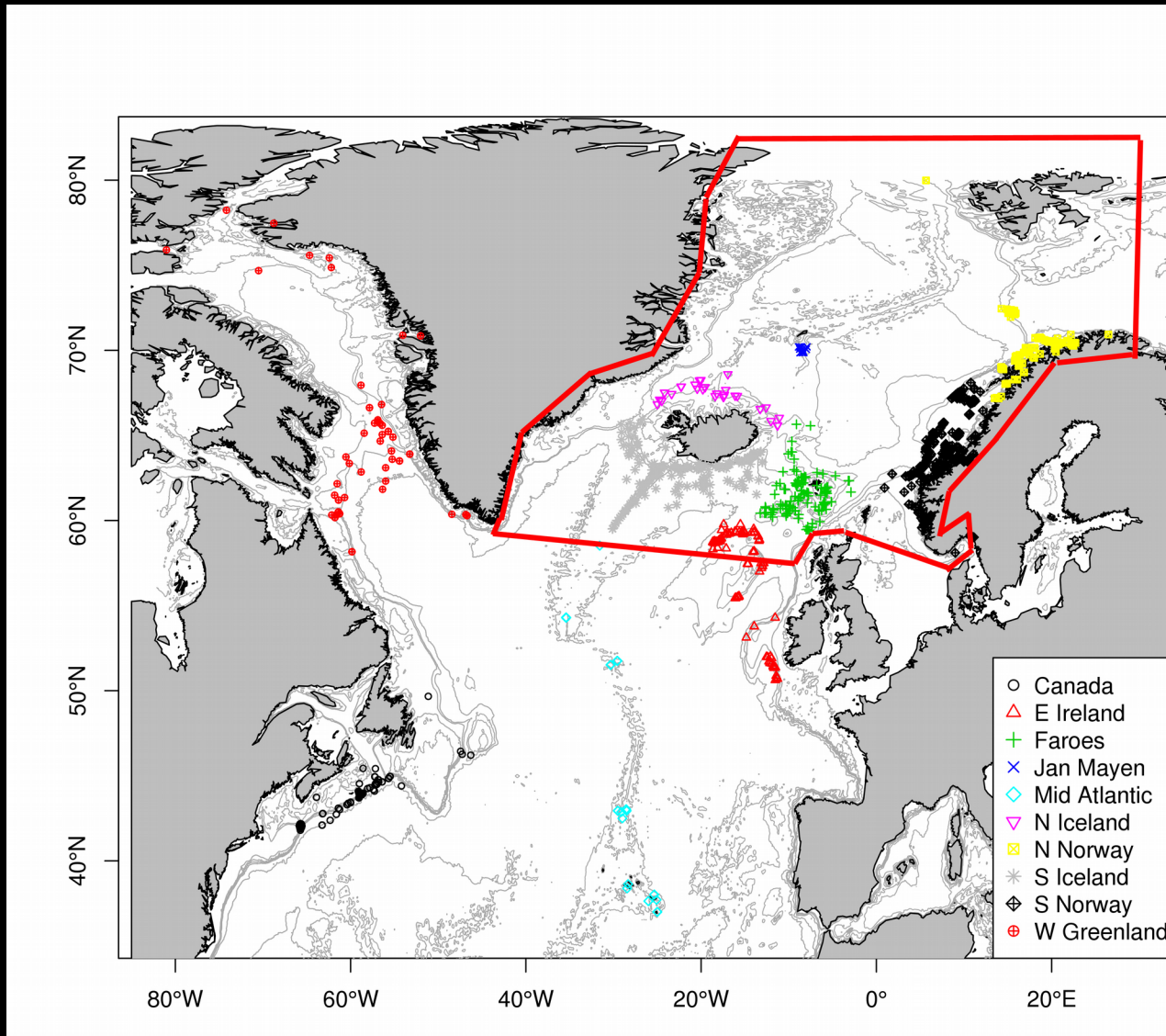
Nordic Counsel of Ministers
The marine group **HAV** and Working group for fisheries **AG Fisk** and is planned for the period **2016-18**

Led by: Norway (Institute of Marine Research) in collaboration with Iceland (Marine Research Institute) and the Faroes (Faroe Marine Research Institute).

Study area: the EEZ of these countries but also includes the waters between the Greenland Sea and the Norwegian Sea, and between 62°N and the Svalbard archipelago.



Iceland, Faroes and Norway have EEZs including cold and deep waters with several categories of vulnerable marine ecosystems (VMEs).

Fisheries are very important for these nations and a good management in relation to VMEs is much needed to secure a sustainable management of the resources and the biodiversity.

Sensitive habitats (modified from OSPAR' list of Threatened and/or declining habitats).

The goal of the project

The huge spatial extent, great bio-diversity and special oceanographic settings of these countries makes it important to:

exchange experience and knowledge about:

- VMEs, their distribution, and suitable data analyses

- Pressure of fisheries.

In addition to strengthen the relationship and collaboration between their scientists

The project consists of four work packages

The first three work packages provide the basic empirical information from available data including own mapping and databases and literature.

Work packages

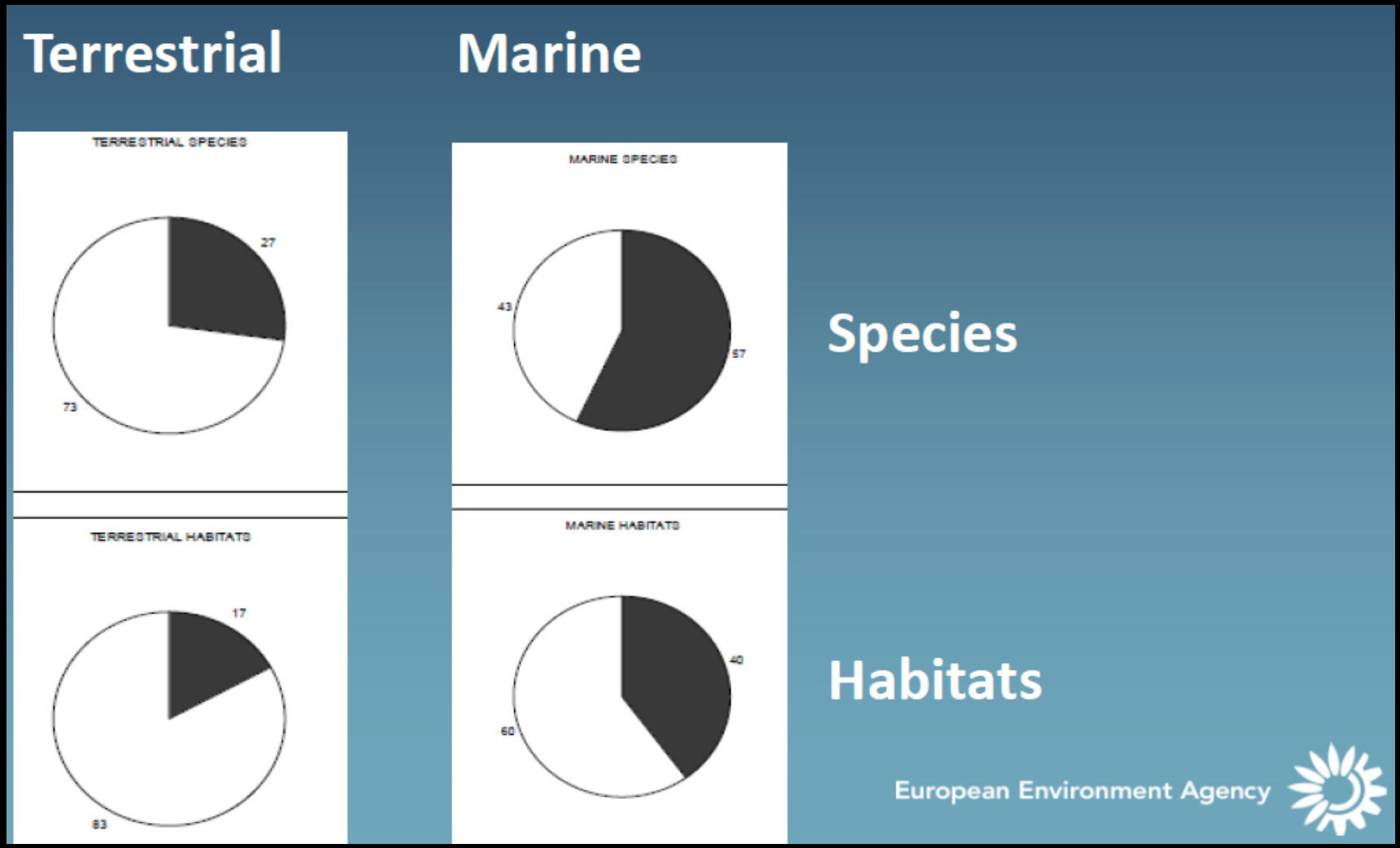
1.Distribution of VME species
2.Distribution human pressures
3.Geomorphologic and oceanographic settings
4.Interactions between human activities and VMEs will be analysed compared and conflicts will be addressed.

Target groups for results i.e.

1)the scientific/academic community,
2)managers,
3)background info to mitigate negative effects from fisheries and avoid conflicts between user groups, both at National level and internationally (management of high seas areas).

Gaps in knowledge

Our knowledge of the extent, geographical range and ecological functioning of benthic habitats is still extremely poor .
It is estimated that only 5-10% of the seafloor is mapped with a resolution of similar studies on land (Wright and Heyman, 2008).



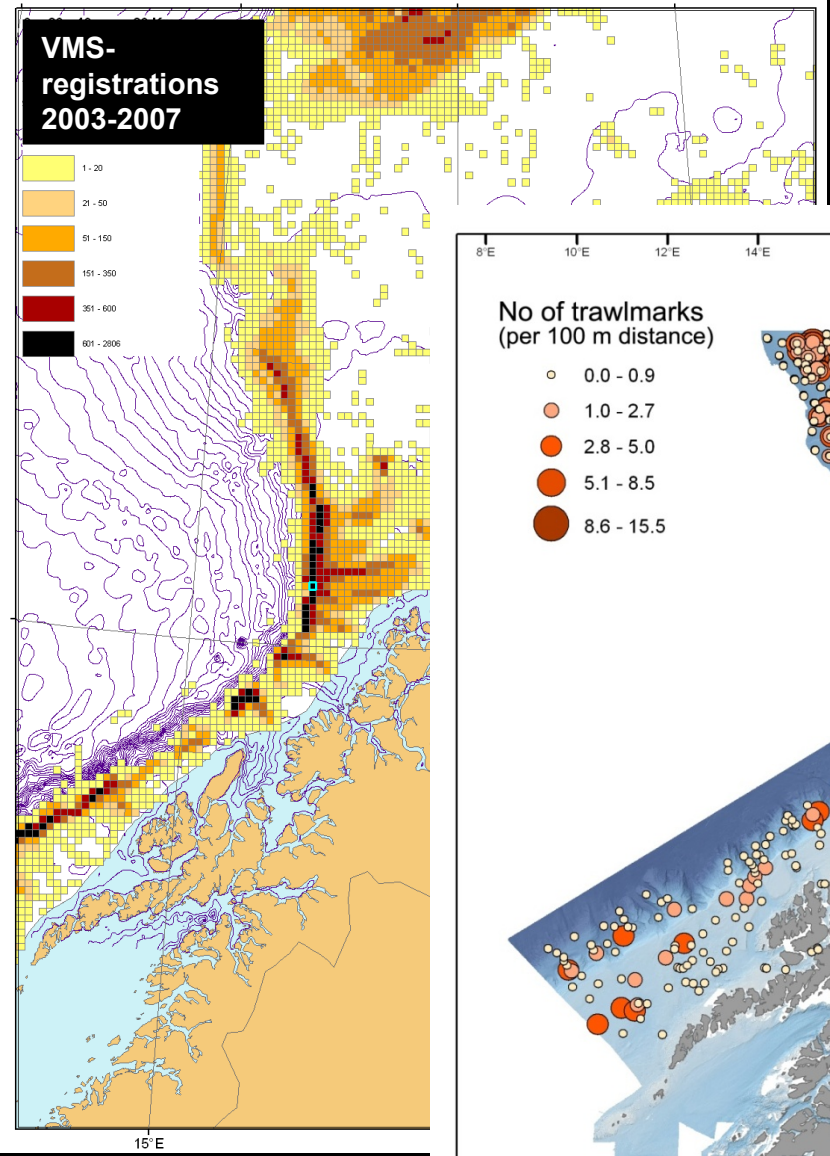
Recommendations of the meeting of the
European Platform for Biodiversity Research Strategy
held under the Irish Presidency of the EU
Dublin, Ireland, 15-17th of May, 2013

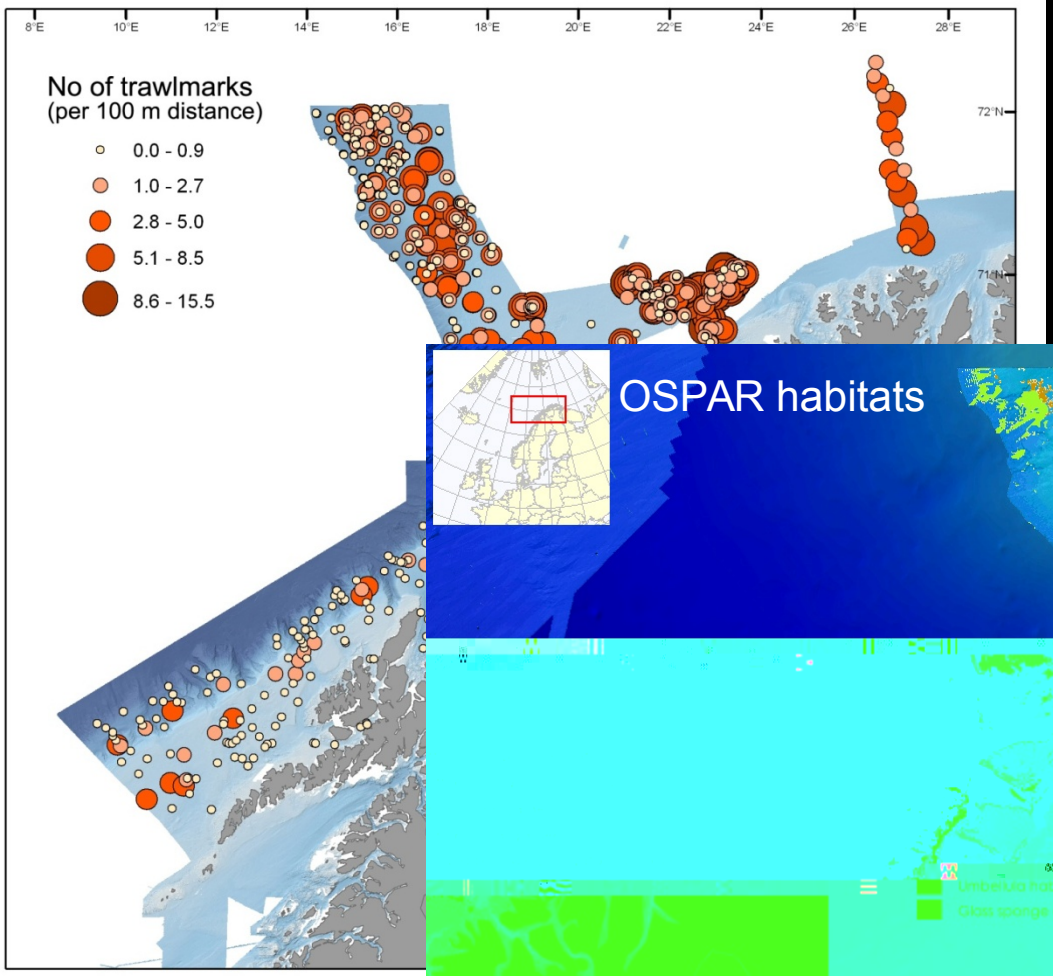
The European Platform for Biodiversity Research Strategy: promoting knowledge for sustainability.

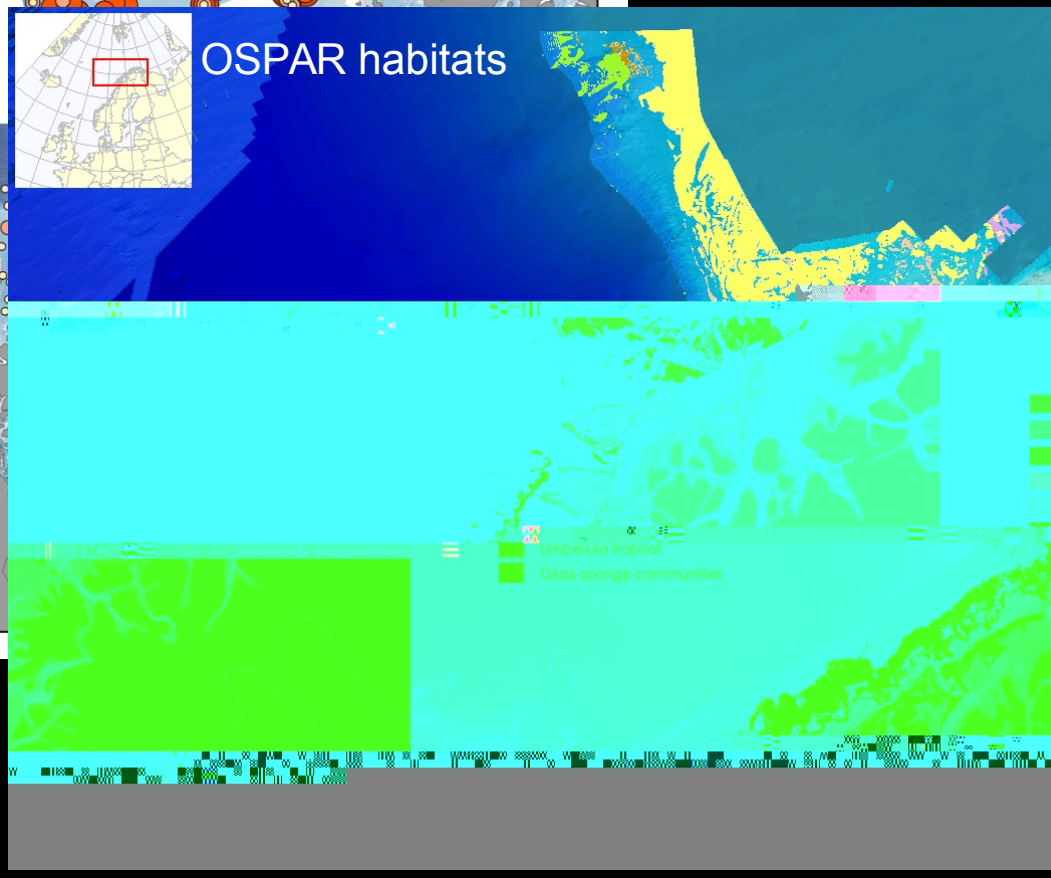
5. Substantially advance our knowledge of marine habitats and species in support of evidence-based policy and its implementation.

   Specific research needs include:
   - Develop and validate operational habitat definitions.
   - Define favourable conservation status, taking account of natural variability in habitat area, structure and function, and species abundance and distribution.
   - Develop and validate ecologically relevant thresholds of change between levels of conservation status.
   - Develop and validate cost-effective monitoring tools and indicators to assess changes in conservation status.
   - Maximise access to and assess applicability of data from all sectors (e.g., fisheries data).

Maps for conservation and management of human activities

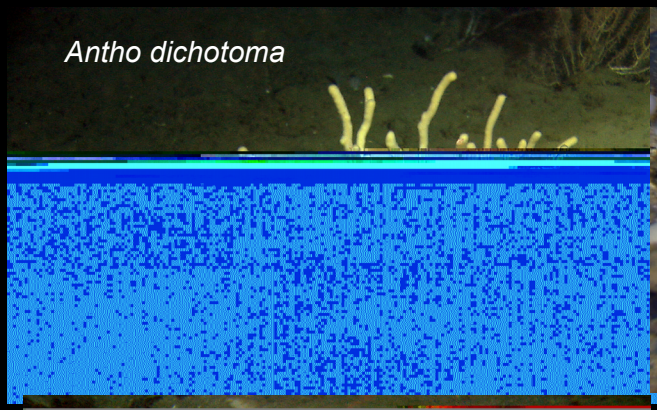






Fishery sensitive taxa

Morphological traits



Correlation between VMS reg./år and dentity of mega fauna taxa

Pearson's r **p < 0.05 * p < 0.1 (df 7)

	Snitt VMS	
Antho dichotoma	-0,74	**
Craniella zetlandica	-0,71	**
Porifera small	-0,65	**
Hyas coactatus	-0,64	**
Bivalvia	-0,63	**
Phakellia /Axinella	-0,59	**
Porifera encrusting	-0,59	**
Ascidia	-0,59	**
Ophiuroidea	-0,58	**
Asbestopluma	-0,56	*
Bryozoa	-0,56	*
Crinoidae	-0,54	*
Porifera round	-0,54	*
Holothuroidea	-0,54	*
Galatheidae	-0,53	*
Porifera	-0,51	*
Porifera bat	-0,51	*
Hydrozoa	-0,50	*
Paguridae	-0,50	*
Serpulidae	-0,49	*
Parastichopus tremulus	-0,49	*
Porifera orange	-0,48	*
Solaster endeca	-0,47	*
Gastropoda	0,72	**
Asteroidea White	0,76	**
Poranidae	0,79	**

Results from megafauna study with video

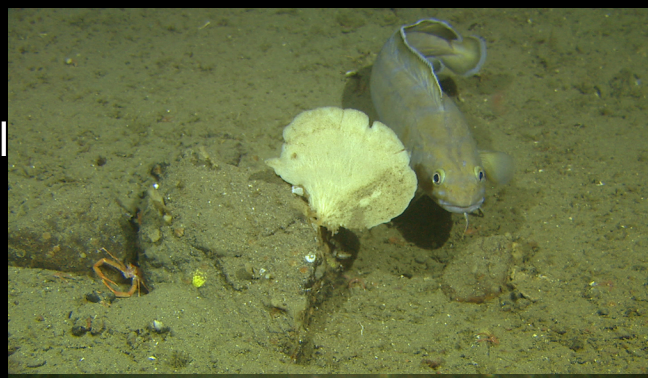
TRAWL MARKS
Abundance of trawl marks was not directly related to FI but reflected substratum softness.

MEGAFAUNA
Density and diversity decreased significantly with increased FI and effects was indicated even for low FIs 2-3 recorded trawling vessels per year.

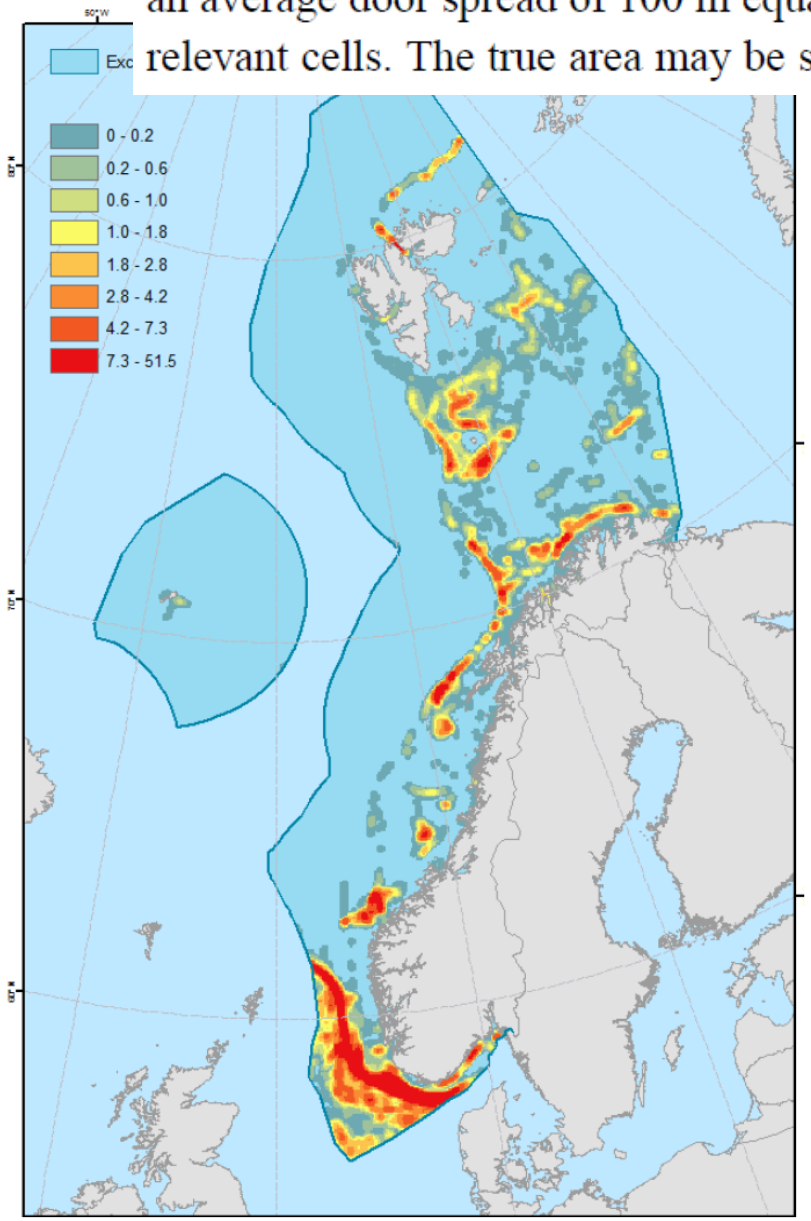
On hard bottom and sand megafauna density was < 40 individuals per 100 m^2 and diversity < 30 taxa per video where more than 15 trawling vessels were recorded yearl

Particularly vulnerable were the sponges: *Antho dichotoma*, *Craniella zetlandica*, and *Phakellia/Axinella* while scavenging large gastropods and some asteroids increased with FI.

Redfish showed a negative relationship to FI, while cod showed a positive relation.

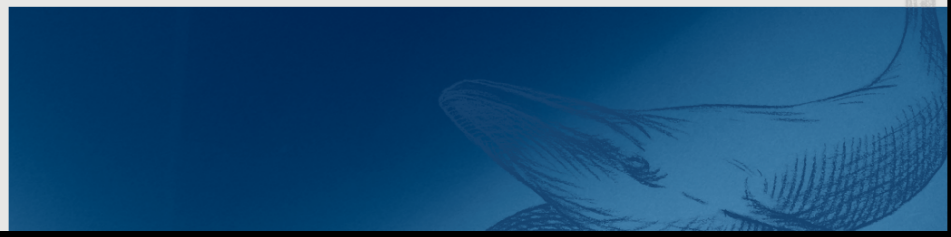


Based on the data shown in Figure 4.8, the total seabed area exposed to bottom trawling is estimated to be 607,683 km^2, or 25.1% of the Norwegian exclusive economic zone (2,419,182 km^2 in total). The average trawling intensity within this area was 1.7 km/km^2, which assuming an average door spread of 100 m equates to an average affected area of 0.17 km^2/km^2 within the relevant cells. The true area may be somewhat higher, however, due to changes of course while

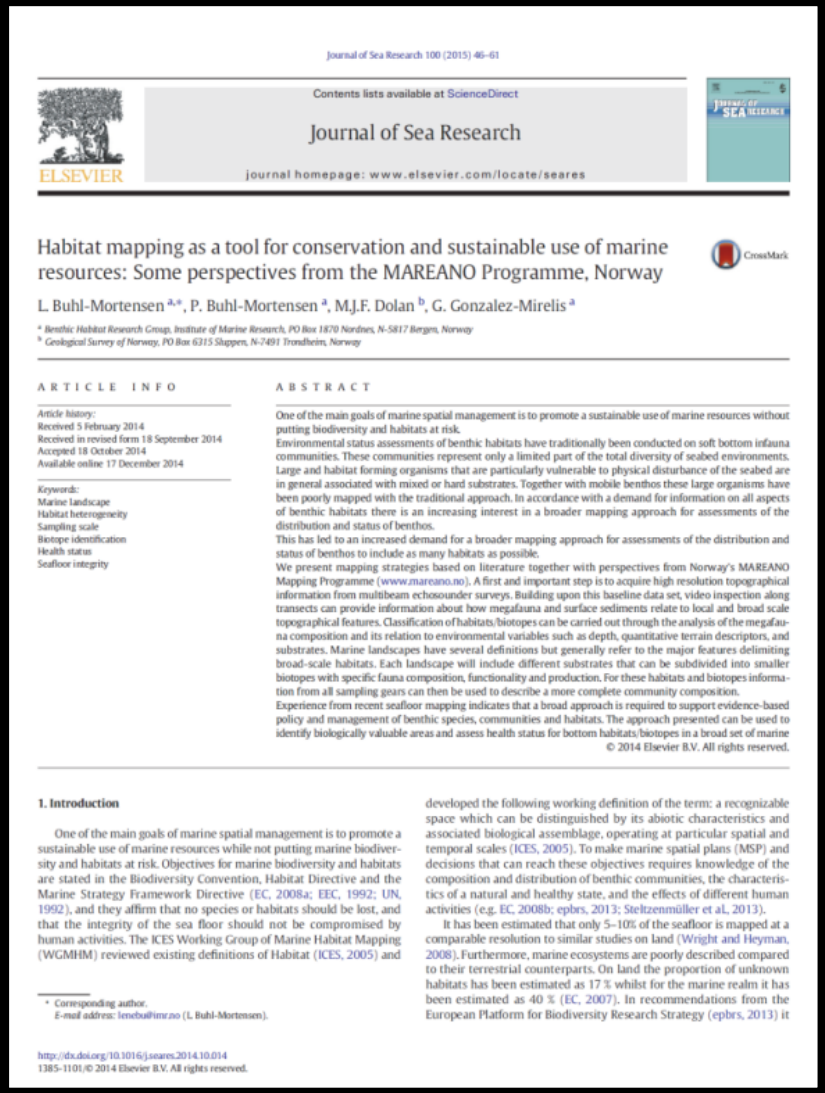


Impacts of fisheries and aquaculture on sediments and benthic fauna: suggestions for new management approaches

By Lene Buhl-Mortensen, Asgeir Aglen, Michael Breen, Pål Buhl-Mortensen, Arne Ervik, Vivian Husa, Svein Løkkeborg, Ingolf Røttingen and Hans Hagen Stockhausen



Publication on mapping for management and a spesial issue ICESJMS on effects of fishing on the seafloor



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Habitat mapping as a tool for conservation and sustainable use of marine resources: Some perspectives from the MAREANO Programme, Norway

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ABSTRACT

One of the main goals of marine spatial management is to promote a sustainable use of marine resources without putting biodiversity and habitats at risk.
Environmental status assessments of benthic habitats have traditionally been conducted on soft bottom infauna communities. These communities represent only a limited part of the total diversity of seabed environments. Large and habitat forming organisms that are particularly vulnerable to physical disturbance of the seabed are in general associated with mixed or hard substrates. Together with mobile benthos these large organisms have been poorly mapped with the traditional approach. In accordance with a demand for information on all aspects of benthic habitats there is an increasing interest in a broader mapping approach for assessments of the distribution and status of benthos.
This has led to an increased demand for a broader mapping approach for assessments of the distribution and status of benthos to include as many habitats as possible.
We present mapping strategies based on literature together with perspectives from Norway's MAREANO Mapping Programme (www.mareano.no). A first and important step is to acquire high resolution topographical information from multibeam echosounder surveys. Building upon this baseline data set, video inspection along transects can provide information about how megafauna and surface sediments relate to local and broad scale topographical features. Classification of habitats/biotopes can be carried out through the analysis of the megafauna composition and its relation to environmental variables such as depth, quantitative terrain descriptors, and substrates. Marine landscapes have several definitions but generally refer to the major features delimiting broad-scale habitats. Each landscape will include different substrates that can be subdivided into smaller biotopes with specific fauna composition, functionality and production. For these habitats and biotopes information from all sampling gears can then be used to describe a more complete community composition.
Experience from recent seafloor mapping indicates that a broad approach is required to support evidence-based policy and management of benthic species, communities and habitats. The approach presented can be used to identify biologically valuable areas and assess health status for bottom habitats/biotopes in a broad set of marine

1. Introduction

One of the main goals of marine spatial management is to promote a sustainable use of marine resources while not putting marine biodiversity and habitats at risk. Objectives for marine biodiversity and habitats are stated in the Biodiversity Convention, Habitat Directive and the Marine Strategy Framework Directive (EC, 2008a; EEC, 1992; UN, 1992), and they affirm that no species or habitats should be lost, and that the integrity of the sea floor should not be compromised by human activities. The ICES Working Group of Marine Habitat Mapping (WGMHM) reviewed existing definitions of Habitat (ICES, 2005) and developed the following working definition of the term: a recognizable space which can be distinguished by its abiotic characteristics and associated biological assemblage, operating at particular spatial and temporal scales (ICES, 2005). To make marine spatial plans (MSP) and decisions that can reach these objectives requires knowledge of the composition and distribution of benthic communities, the characteristics of a natural and healthy state, and the effects of different human activities (e.g. EC, 2008b; epbrs, 2013; Steltzenmüller et al., 2013).

It has been estimated that only 5–10% of the seafloor is mapped at a comparable resolution to similar studies on land (Wright and Heyman, 2008). Furthermore, marine ecosystems are poorly described compared to their terrestrial counterparts. On land the proportion of unknown habitats has been estimated as 17 % whilst for the marine realm it has been estimated as 40 % (EC, 2007). In recommendations from the European Platform for Biodiversity Research Strategy (epbrs, 2013) it

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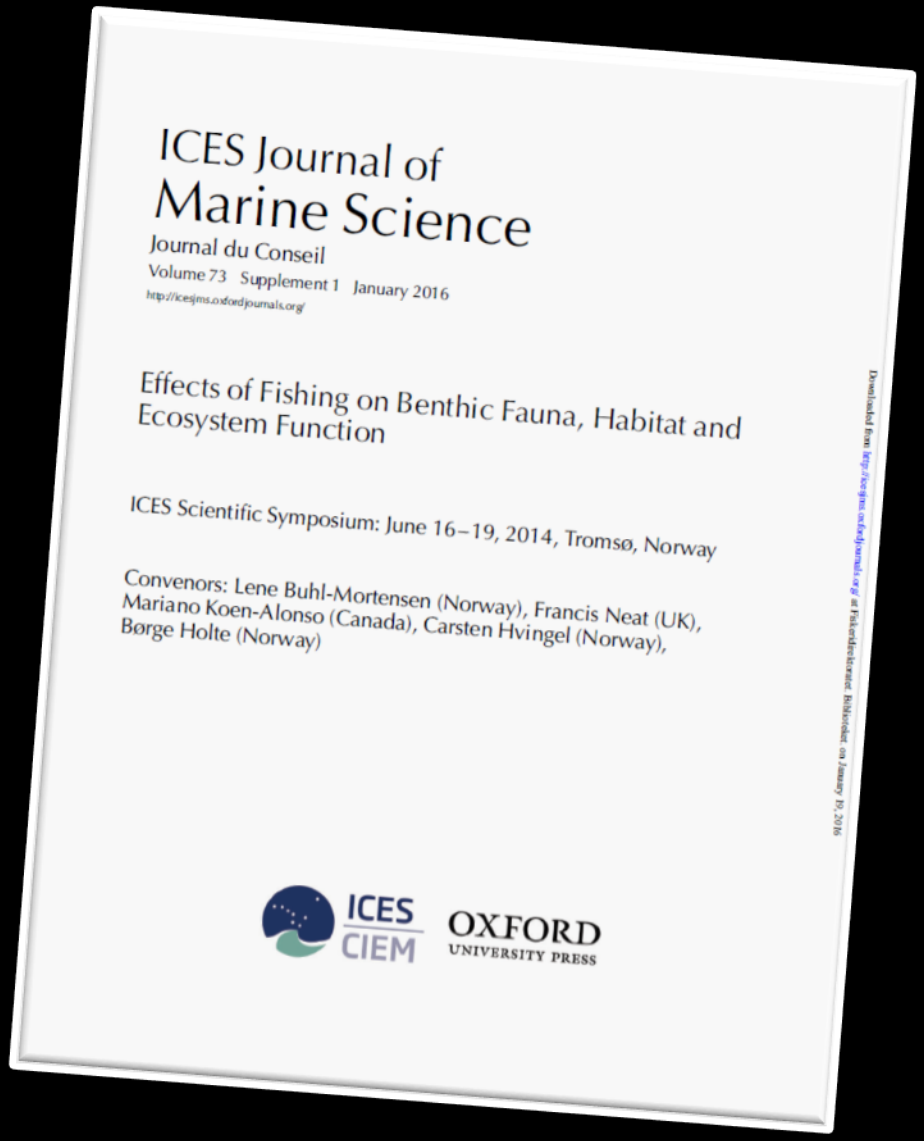

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Effects of Fishing on Benthic Fauna, Habitat and Ecosystem Function

ICES Scientific Symposium: June 16–19, 2014, Tromsø, Norway

Convenors: Lene Buhl-Mortensen (Norway), Francis Neat (UK), Mariano Koen-Alonso (Canada), Carsten Hvingel (Norway), Børge Holte (Norway)

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