



# Threats and impacts to sponge grounds

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## Objectives

Considering diverse anthropogenic stressors acting on the deep sea and the vulnerability of deep-sea sponges to human disturbance, it is urgent to understand the full scale of human impacts on these ecosystems, and how they interact with each other. Such information is essential to respond to international regulations such as the UNGA Resolution 61/105 for the protection of vulnerable marine ecosystems from destructive fishing practices and for identifying indicators of Good Environmental Status for seafloor integrity of the Marine Strategy Framework Directive.

The main aim of this Work Package is to assess the severity of the anthropogenic threats on deep-sea sponge aggregations and to quantify Significant Adverse Impacts. To achieve this the following objectives will be addressed:

- Impact identification and quantification of anthropogenic stressors (fishing, climate change, oil and mineral exploitation);
- Assessment of recovery rates of deep-sea sponge aggregations; and
- Quantification of cumulative impacts on deep-sea sponge aggregations.

## Focus

This Work Package will perform state-of-the-art scientific research for assessing the severity of the anthropogenic threats on deep-sea sponge aggregations in the North Atlantic. A traits-based approach will be used to allow transfer of knowledge from our case studies to the

broader North Atlantic and beyond. The Work Package works closely with and is supported by other work packages under the SponGES project.

## Why is this important?

Sponges are known to be long-lived and slow-growing, so they are likely to be vulnerable to physical disturbance and environmental change. Furthermore, sponge grounds are key habitats that provide ecological functions such as shelter and food, and are part of the nutrient cycles. Understanding the impacts of anthropogenic activities will help to mitigate and preserve sponge grounds, and to maintain the services



Sponge bycatch in the Barents Sea (P. University of Bergen). Inset: *Geodia* spp. ground in the North Atlantic (P. Fisheries and Oceans, Canada).



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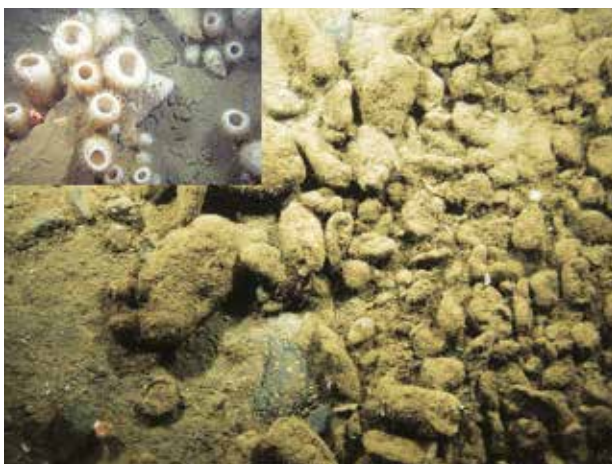
to humanity that the sponge grounds provide. Deep-sea sponge aggregations are listed under the OSPAR List of threatened and/or declining species and habitats (OSPAR agreement 2008-6).

## What are the key knowledge gaps to address?

Of the anthropogenic pressures that are known to severely impact deep-sea sponge aggregations, fishing and climate change are considered to present the highest degree of threat, both of which operate over large spatial scales. In addition, sponge grounds may be locally disturbed by activities such as oil drilling and, in the future, mining. In order to adequately inform management of these activities, we need to quantify the direct and indirect impacts (and cumulative impacts) of anthropogenic stressors and assess the recovery rates of deep-sea sponge aggregations. Moreover, it is important to integrate information on the function provided by sponge grounds to determine what levels of disturbance results in Significant Adverse Impacts.

## Expected major outputs

The project will provide information on the main human activities known to threaten deep-sea sponge grounds of the North Atlantic and advance our understanding of what constitutes Significant Adverse Impacts for these ecosystems. This will help policy makers and government bodies to improve strategies –to protect the deep sea from irreversible impacts.



Dead *Vazella pourtalesi* covered with sediment (P. University of Bergen). Inset: *Vazella* spp. ground in the North Atlantic (P. Fisheries and Oceans, Canada).



Laboratory set-up for sponges observations and experiments at Wageningen University (P. Erik Wurz, Wageningen University)

## What methods/technologies/approaches are you using

We use laboratory facilities to maintain live sponges in experimental systems for long term exposures. In these systems, we execute dose-response studies to test the (interactive) effects of temperature, ocean pH, sedimentation, and oil exposure on boreal sponges. Different physiological responses will be measured, including respiration, filtering rates and growth. Impacts of bottom fishing gear (longline and trawling) will be addressed through the analysis of bycatch data, experimental fishing surveys and video imagery collected on sponge grounds subject to different levels of fishing pressure. Dynamic models integrating results from various Work Packages will be developed to predict recovery trajectories following disturbance but also to define what constitute a Significant Adverse Impact.

**The EU-funded SponGES project** will contribute to the sustainable management of deep-sea fisheries, and the protection of sponge-dominated vulnerable marine ecosystems in the North Atlantic through the collection of data and the development of knowledge on the vulnerability and threats as well as protection measures leading to a sustainable use of the deep-sea areas.



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