

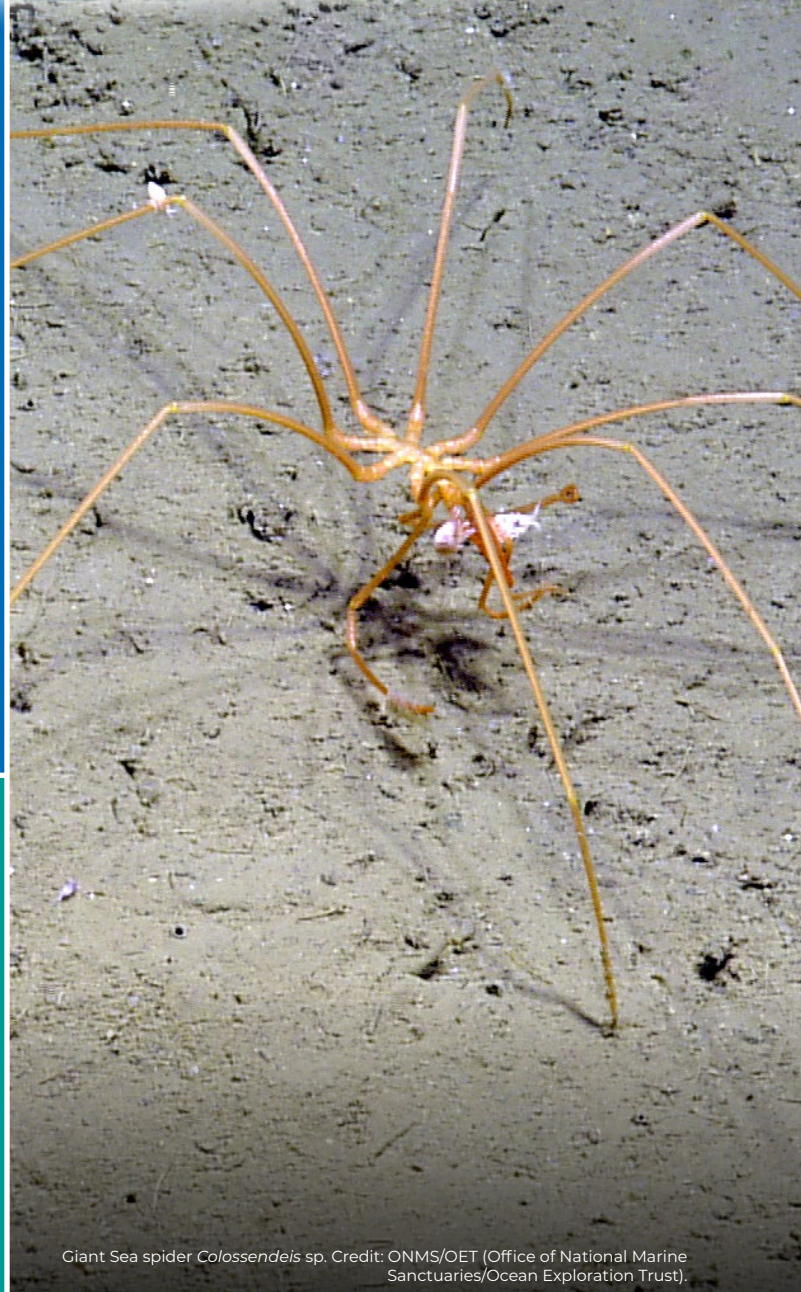


International Partnership
on **MPAs, Biodiversity**
and **Climate Change**

Blue Carbon in Marine Protected Areas

CASE STUDY

Investigating and Protecting Seabed Carbon in Greater Farallones and Cordell Bank National Marine Sanctuaries



Giant Sea spider *Colossendeis* sp. Credit: ONMS/OET (Office of National Marine Sanctuaries/Ocean Exploration Trust).

The International Partnership on MPAs, Biodiversity and Climate Change is an alliance of government agencies and organisations from across the world, working together to progress the evidence base around the role of Marine Protected Areas (MPAs) and biodiversity in tackling climate change.

Our vision is for global decision-makers to implement MPA networks as nature-based solutions for biodiversity conservation and climate change mitigation, adaptation, and resilience.

For further information about the Partnership please visit www.mpabioclimate.org

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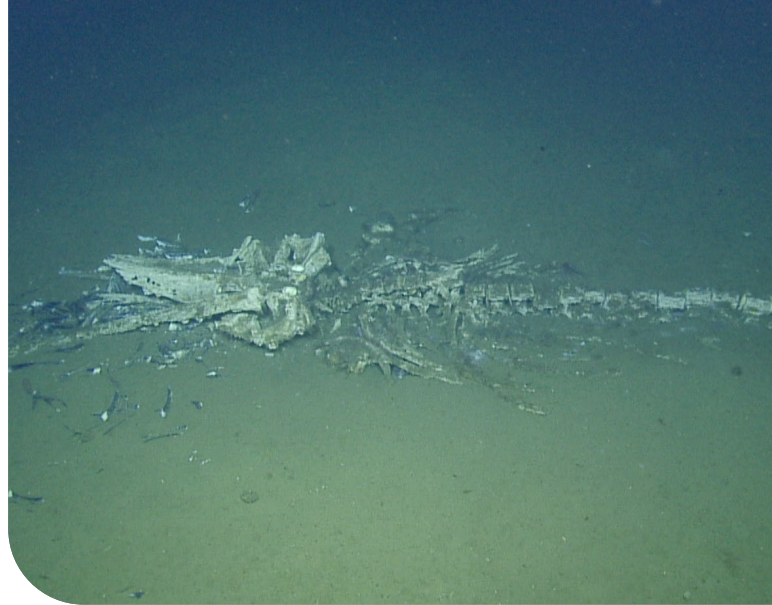
Long-term storage of carbon sequestered in the marine environment occurs in the ocean's sediments, which represent the largest non-fossil pool of organic carbon on the planet. The Greater Farallones Association in partnership with NOAA's Office for Coastal Management (OCM) conducted the first systematic evaluation of marine sedimentary carbon stocks in NOAA's Greater Farallones and Cordell Bank National Marine Sanctuaries (sanctuaries), and developed a spatial model of carbon density based on a novel relationship between sediment grain size and percent organic carbon (Hutto et al., 2023).

Results show surficial sediments (the top 10 cm of the seabed) in the two sanctuaries hold approximately 9 million metric tons of organic carbon, which is equivalent to 32 million metric tons of CO₂. Areas of high carbon content were identified in the sanctuaries; this information can be applied to spatial planning and management of the seabed to ensure adequate protection of carbon sinks.

Outcomes from Case Study

The sanctuaries will use this information to evaluate the need for additional protections of areas and habitats with high carbon content sediment when revising the sites' Management Plan. The data will also be used in decision-making and issuance of permits for future activities that could disturb the seafloor. This could occur during a permit application review, or in a marine spatial planning process, and used as a basis for understanding the impacts proposed activities may have on carbon stores and sequestration.

Skeleton of a whale on the soft sediments of the seafloor. Credit: ONMS/OET.



Future Desired Outcomes

The overall goal of this project is to advance the understanding of coastal and oceanic blue carbon and the role MPAs can play in reducing atmospheric carbon. The sanctuaries plan to use the data from this project to inform seabed protections, project permitting, and marine spatial planning, to ensure carbon stores are not disturbed and seabed carbon accumulation is maintained in the sanctuaries.

How do these outcomes address climate change adaptation strategies, climate change mitigation, and conserving biodiversity?

The outcomes from this project primarily address climate change mitigation in MPAs, by identifying areas of the seabed that contain the highest concentration of organic carbon that should be considered for increased protection. By protecting the seabed from disturbance and maintaining the processes that deposit organic carbon in the deep-sea environment, MPAs can safeguard the carbon stores present within their boundaries, ensuring the sustainability of carbon sequestration and preventing emissions from those stores.



Sea pig: *Scotoplanes globosa*. Credit: ONMS/OET.

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How are nations collaborating on the case study or does it promote international collaboration?

This project came to fruition as a direct result of international collaboration and learning from sediment carbon studies conducted in the United Kingdom; members of the International Partnership on MPAs, Biodiversity and Climate Change and other international colleagues have served as advisors to the project and reviewers of project results and publications.

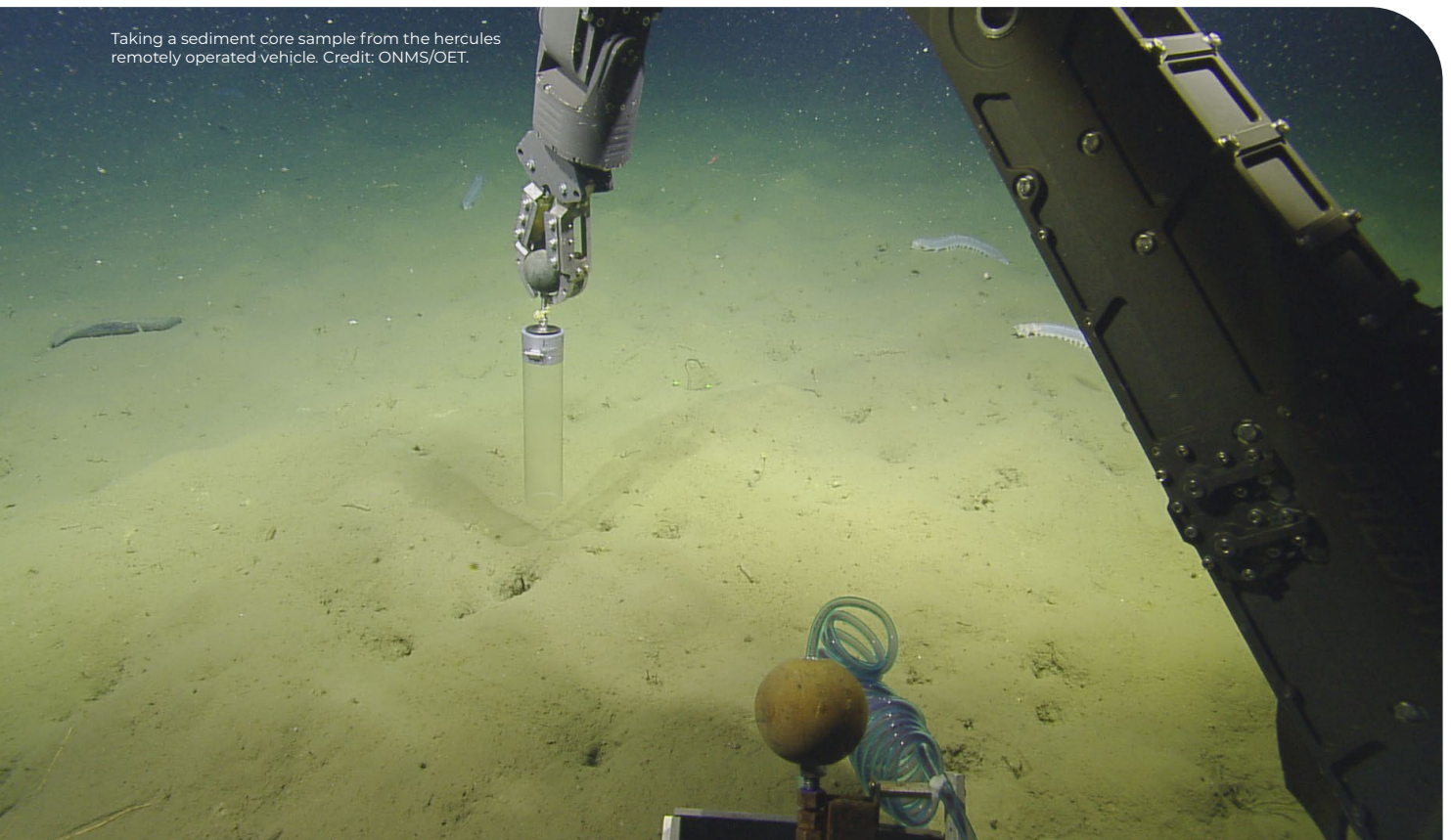
How is this case study and lessons learned transferable to other MPAs globally?

The International Partnership on MPAs collaborates and shares the latest evidence from partnership countries to demonstrate how MPAs globally can identify areas of high carbon concentration that could inform seabed protections. The methods in this case study are intentionally replicable and based on methods previously published by Smeaton et al. (2020, 2021).

Next Steps/Future Actions Related to the Case Study

The MPA plans to conduct a more thorough assessment of the overlap of seabed disturbances with the carbon hot-spots identified in this study and further build the dataset of sediment samples to refine the sediment carbon model.

Taking a sediment core sample from the hercules remotely operated vehicle. Credit: ONMS/OET.



References:

Hutto, S. H., George, D. & Tezak, S. 2023. Blue carbon in marine protected areas: Part 3; An evaluation of sedimentary carbon stocks in Greater Farallones and Cordell Bank National Marine Sanctuaries. National Marine Sanctuaries Conservation Series ONMS-23-09. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of National Marine Sanctuaries.

Smeaton, C., Austin, W., Turrell, W.R. 2020. Re-evaluating Scotland's Sedimentary Carbon Stocks. Scottish Marine and Freshwater Science, 2 edn, Edinburgh, United Kingdom: Marine Scotland. Vol. 11, doi:10.7489/12267-1.

Smeaton, C., Hunt, C.A., Austin, W., Turrell, W.R. 2021. Marine Sedimentary Carbon Stocks of the United Kingdom's Exclusive Economic Zone. *Frontiers in Earth Science*. 9:593324. doi: 10.3389/feart.2021.593324.