

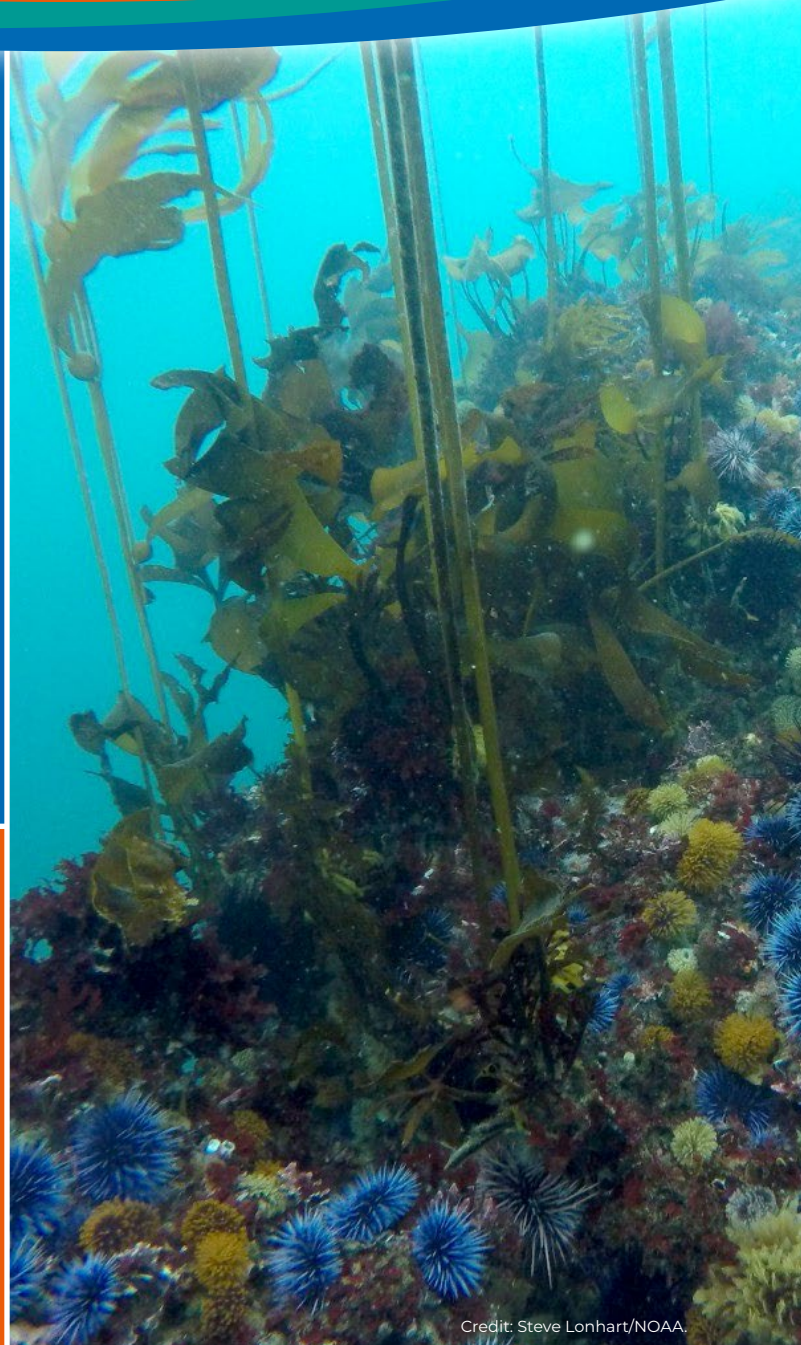


International Partnership
on **MPAs, Biodiversity**
and **Climate Change**

Blue Carbon in Marine Protected Areas

CASE STUDY

Kelp Restoration in Greater Farallones National Marine Sanctuary



Credit: Steve Lonhart/NOAA.

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

CASE STUDY

Kelp Restoration in Greater Farallones National Marine Sanctuary



The kelp forests of the North American west coast support a highly diverse community of organisms, many of which are significant for local tribes and fishing communities, and act as a blue carbon ecosystem by absorbing carbon dioxide from the water during photosynthesis and incorporating it into tissues. As kelp is detached from the rock or broken apart through herbivory, it can float offshore and sink to the deep ocean where the carbon can be stored indefinitely.

In Greater Farallones National Marine Sanctuary (sanctuary), a federal Marine Protected Area (MPA) situated along the coastline of north-central California, kelp once facilitated the export and long-term storage of up to an estimated 613 metric tons annually. However, in 2014, a series of ecological events triggered by a marine heatwave led to dramatic declines in the region's kelp. Persistently high numbers of sea urchins, facilitated by climate change-driven ecological effects, have prevented kelp recovery. The 90% reduction in kelp cover has significant consequences for both the region's ecology and the ability of this ecosystem to remove carbon from the atmosphere. The Greater Farallones Kelp Restoration Project, a joint project of the sanctuary and its non-profit partner, Greater Farallones Association (Association), is working to protect and restore the region's kelp forest ecosystem and its carbon removal capabilities in federal and state MPAs by investigating and implementing active restoration, monitoring, research, and community engagement.



Bull kelp. Credit: Nick Zachar/NOAA.

Outcomes from Case Study

Outcomes to date include enhanced partnerships with communities and academic partners to monitor kelp forest ecosystem health and to pilot novel restoration techniques at select sites in the sanctuary. In addition, the MPA has demonstrated that kelp loss has resulted in a significant reduction of carbon sequestration potential by the sanctuary's kelp forest (Hutto et al. 2021). Prior to the significant kelp loss that first occurred in 2014, bull kelp covered an area of nearly 2.5 million square meters in the sanctuary and sequestered over 5,500 megagrams of carbon per year, exporting approximately 613 megagrams of carbon to the deep sea, which is equivalent to removing 489 passenger vehicles from the road each year. Currently, however, depleted forests only sequester and export around 0.3% of this amount, approximately 1.8 megagrams of carbon, each year.

Future Desired Outcomes

The International Partnership on MPAs, Biodiversity and Climate Change collaborates and shares the latest methodologies and evidence on the roles MPAs play in mitigating and addressing climate change impacts and conserving biodiversity. The Kelp Restoration Project provides a novel methodology for estimating the role of MPAs in sequestering carbon from kelp and will share lessons learned and biodiversity gains from restoring bull kelp to inform MPA management globally.



Urchin harvesting. Credit: Grant Downey/NOAA.

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

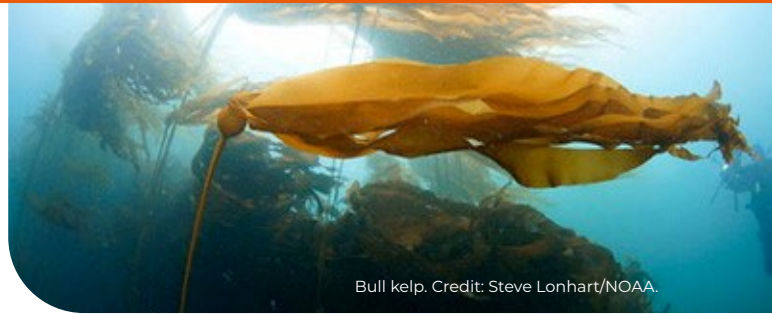
If successful, this effort will result in improved ecosystem health and biodiversity, recovery of impacted fisheries and local economies, and restored carbon sequestration and export as a nature-based solution for addressing climate change. Ideally, restoration will also result in a more climate-resilient kelp forest ecosystem.

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

The United Kingdom's JNCC and NOAA's Greater Farallones National Marine Sanctuary shared methodologies and lessons learned for assessing the spatial extent and persistence of kelp forests.

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

As kelp loss is a global and persistent issue, the approach and lessons learned from this case study are highly relevant and transferable to MPAs globally. Specifically, bull kelp restoration is a novel process and



Bull kelp. Credit: Steve Lonhart/NOAA.

the techniques employed in this project will be shared with MPA managers internationally as a potential strategy to use in similar areas experiencing kelp loss. This information will be made available on the website of the International Partnership for MPAs, Biodiversity and Climate Change, and via other international fora.

Next Steps/Future Actions Related to the Case Study

Next steps for this project include consistent and thorough ecosystem health surveys to assess the success of restoration techniques and recovery of kelp habitat. To support improved estimates of kelp-driven carbon sequestration and export to the deep sea, the MPA will continue to seek additional funding opportunities and academic partnerships.



Bull kelp. Credit: Paul Chetirkin/NOAA.

References

Hutto, S. H., Hohman, R., & Tezak, S. (2021). Blue carbon in marine protected areas: Part 2; A blue carbon assessment of Greater Farallones National Marine Sanctuary. National Marine Sanctuaries Conservation Series ONMS-21-10. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of National Marine Sanctuaries.