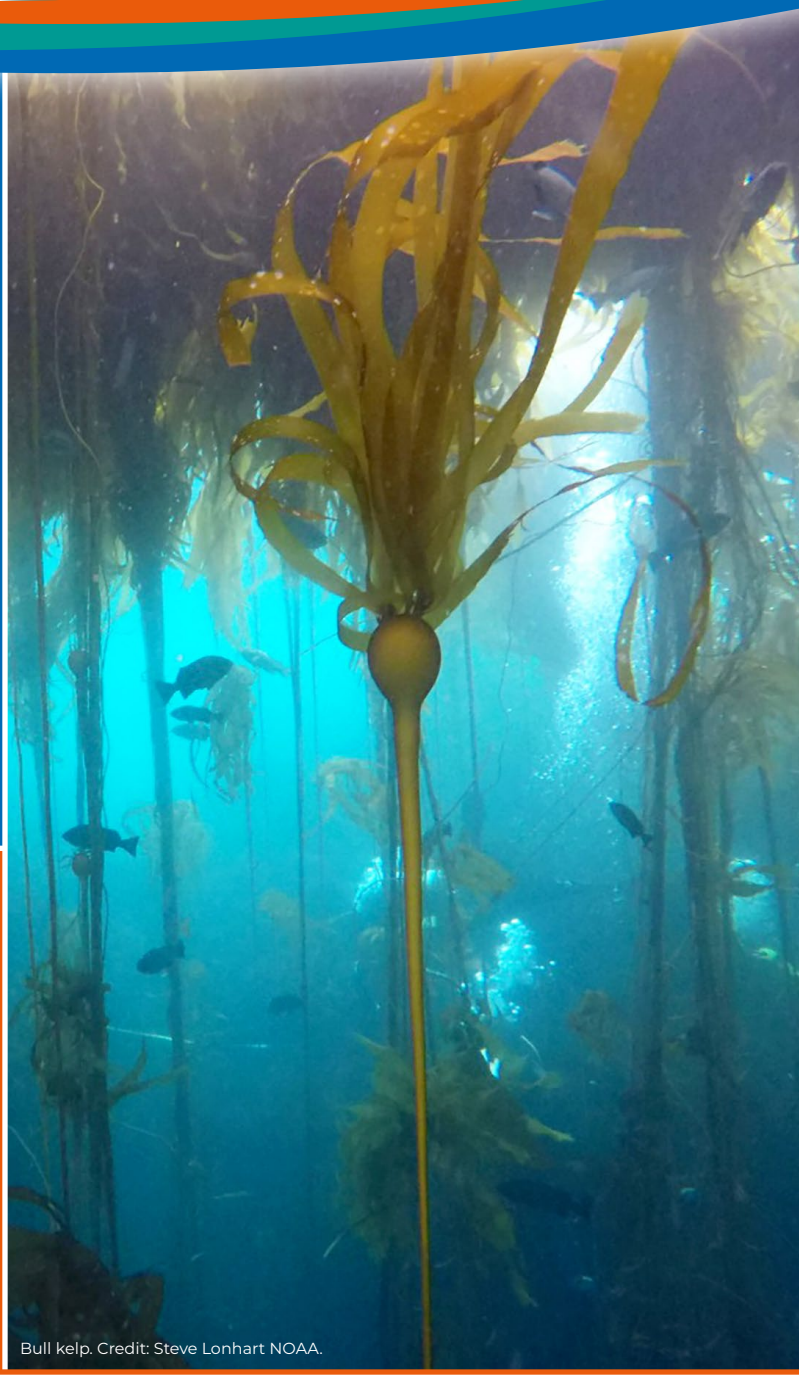
International Partnership on MPAs, Biodiversity and Climate Change

Blue Carbon in Marine Protected Areas

CASE STUDY

Greater Farallones National Marine Sanctuary Kelp Recovery Program



Bull kelp. 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**

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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, 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 Recovery Program is working to protect and restore the region's kelp forests and their carbon removal capabilities in federal and state MPAs. The sanctuary co-manages the project with the California Department of Fish and Wildlife, which manages a statewide MPA network, and thus provides the critical leadership, management framework, and place-based focus necessary for such large-scale research and restoration. For a large-scale ecosystem restoration project like this it is critical for a trusted management entity to provide the authority and coordination role, leverage resources, and engage early and often in multi-jurisdictional and stakeholder partnerships. The sanctuary plays a key role as a trusted, authoritative leader in building partner, funder, and community support for this largely untested management strategy.

Preparing Uncrewed Aerial System for kelp canopy survey. Credit: Abby Nickel.

Sea urchin removal to assist kelp recovery. Credit: Francesca Koe.

The project employs a three-pronged approach to protect and restore bull kelp forests. Strong research and monitoring partnerships with academic institutions, state and federal agencies, and NGOs are supporting ecosystem health and kelp canopy surveys to provide managers with spatially dynamic information on kelp cover and resilience, and inform restoration and conservation efforts. Community engagement is being achieved through the Kelp Recovery Network, a consortium of over 45 partners, including researchers, fishermen, tribes, not for profit organizations, industry, and natural resource managers all working to address issues related to the ongoing decline of the region's kelp. Finally, active kelp recovery is and will be pursued with partners by culling urchin populations in key kelp recovery sites, and seeding kelp directly or culturing kelp in the laboratory and outplanting individuals to areas cleared of urchins.

Outcomes to date include partnerships with communities and academic partners to monitor kelp forests and develop recommendations for restoration. Expected outcomes include demonstrated success of new kelp monitoring and restoration methodologies, and the recovery of kelp forests and their services in the MPAs. If successful, this effort will result in improved ecosystem health and biodiversity, recovery of impacted fisheries and local economies, and restored carbon removal services as a nature-based solution for addressing climate change.