Conserving the Ocean for Our Future

The science behind marine protected areas and the need to protect at least 30% of U.S. ocean and coastal waters by 2030
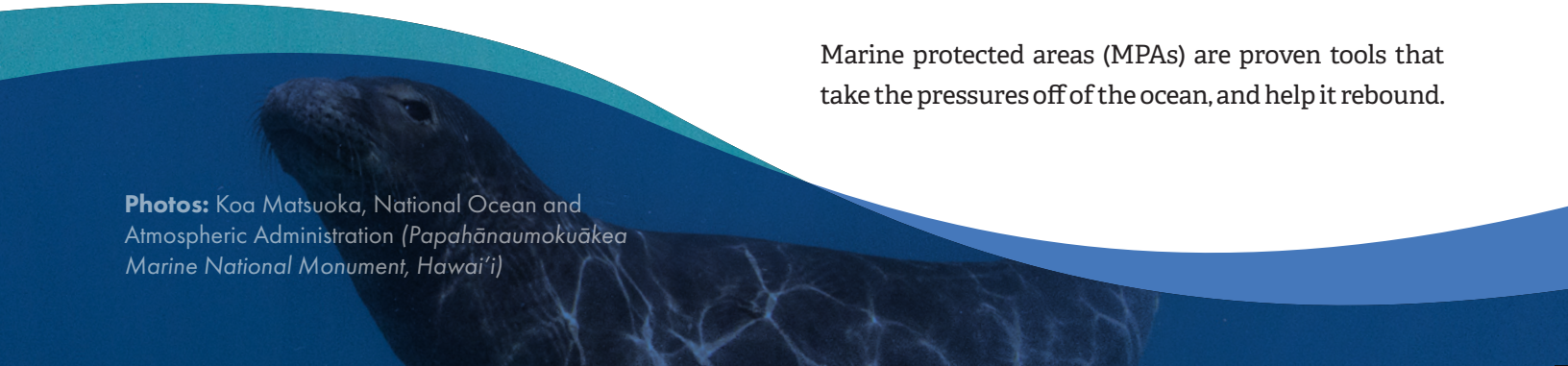
We all need the ocean for survival.

The ocean is essential to Americans everywhere. It stabilizes the climate, stores carbon, and generates the oxygen we breathe. It is a source of joy, wonder, and countless other spiritual and mental benefits for humanity. And it supplies food, jobs, and recreation for our communities. Ocean-based tourism and recreation contribute about $124 billion to the U.S. economy each year and employ almost 2.4 million Americans. Commercial and recreational saltwater fishing in 2016 generated more than $212 billion in sales, contributed $100 billion to the nation's gross domestic product, and supported 1.7 million jobs across the country. These industries depend on a healthy ocean, clean beaches, and abundant fish and wildlife. A decline in ocean health would diminish their value to the U.S. economy.[1]

The ocean was once thought to be limitless. But we now know that it's not.

We are in the midst of a global crisis. For decades, the world's ocean has literally been "taking the heat" for climate change, absorbing over 90% of the heat and nearly a third of the carbon dioxide from greenhouse gas emissions. The result is an ocean that is warmer, more acidic, and increasingly starved of oxygen—overall, an ocean that is becoming less habitable for fish and wildlife. At the same time, nearly every corner of the ocean has been touched by human impact or extraction, with over ⅔ of the ocean significantly altered by human activity. And the ocean's biodiversity is at risk, with almost 33% of reef forming corals and more than a third of all marine mammals threatened with extinction.

But we can solve this problem.

Marine protected areas (MPAs) are proven tools that take the pressures off of the ocean, and help it rebound.

MARINE PROTECTED AREAS

MPAs are areas of the ocean set aside primarily for the conservation of habitat and species.[6] In a **fully protected MPA** no extractive or destructive activities are allowed, and all abatable impacts are minimized. In a **highly protected MPA** only very light extractive activities are allowed, such as subsistence or very small amounts of recreational fishing.[7] Research has shown that these types of protected areas are more effective than other actions (like fisheries management or lightly protected MPAs) at restoring and preserving biodiversity, increasing yields in adjacent fisheries, and enhancing ecosystem resilience.[8]

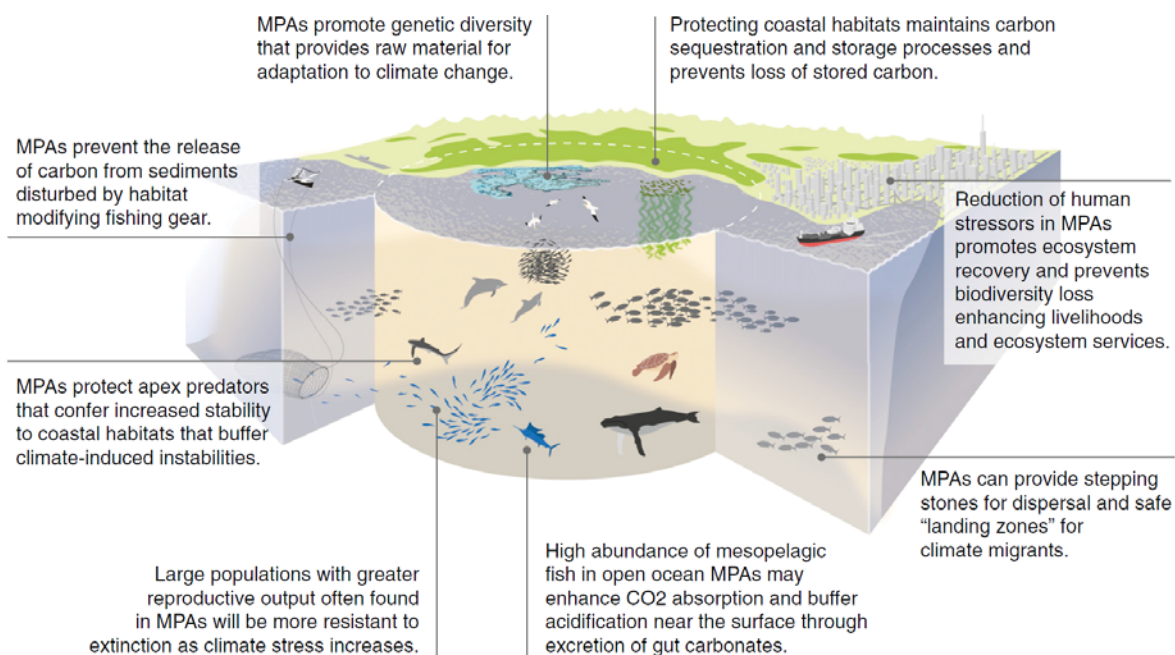## When well-sited fully or highly protected MPAs are put in place...

FISH AND THEIR HABITATS BOUNCE BACK.

Fully and highly protected MPAs provide a refuge for exploited species and biological habitats such as kelp and coral to rebound. By halting all abatable extractive and destructive activities, these MPAs prevent the further degradation of ocean habitats and help them return to a healthy state.[9] Fish populations recover as well—research has found the size and number of fish,[10] as well as number of species[11] to be greater within these MPAs relative to unprotected areas. Scientists have also found a significant increase in biomass outside of the boundaries in many places for many species, due to adult migration and larval export.[12] This "spillover" effect can help rebuild populations and lead to larger populations outside of the protected area—a result that benefits fishermen, coastal communities, and ocean animals alike.

THE OCEAN IS MORE RESILIENT IN THE FACE OF FUTURE CHANGES.

Fully and highly protected MPAs help take the pressure off an ocean area. They allow disturbed and degraded areas to recover, and also promote and retain complex, intact ecosystems that are better at resisting future

MPAs promote genetic diversity that provides raw material for adaptation to climate change.

Protecting coastal habitats maintains carbon sequestration and storage processes and prevents loss of stored carbon.

MPAs prevent the release of carbon from sediments disturbed by habitat modifying fishing gear.

Reduction of human stressors in MPAs promotes ecosystem recovery and prevents biodiversity loss enhancing livelihoods and ecosystem services.

MPAs protect apex predators that confer increased stability to coastal habitats that buffer climate-induced instabilities.

MPAs can provide stepping stones for dispersal and safe "landing zones" for climate migrants.

Large populations with greater reproductive output often found in MPAs will be more resistant to extinction as climate stress increases.

High abundance of mesopelagic fish in open ocean MPAs may enhance CO_2 absorption and buffer acidification near the surface through excretion of gut carbonates.

Figure 1: Eight illustrative pathways by which MPAs can mitigate and promote adaptation to the effects of climate change in the oceans. **Citation:** Roberts et al. 2017, Marine reserves can mitigate and promote adaptation to climate change. PNAS 114 (24) 6167-6175. https://doi.org/10.1073/pnas.1701262114

stresses.[13] These MPAs protect a number of natural processes that help maintain the structure and functioning of ocean ecosystems in the face of climate change (see Figure 1), including:

- Protecting genetic diversity that provides raw materials for adaptation to climate change;

- Protecting the top predators that are needed for sustaining ecosystem structure and community composition;

- Protecting the coastal habitats that help buffer against climate change impacts;

- Providing stepping stones and safe "landing zones" for animal populations migrating, and for those shifting their ranges in response to warming waters;

- Protecting against extinctions by promoting larger populations of marine organisms with larger reproductive output; and

- Preventing carbon from being released from the sediments on the ocean floor by restricting habitat-modifying fishing gear.[14]

Fully and highly protected MPAs can also serve as climate refuges for climate-vulnerable species or ecosystems that are spatially isolated. And finally, when protecting "blue carbon" habitats like seagrass meadows, salt marshes and mangroves that can sequester more atmospheric carbon by area than tropical forests, these MPAs can help realize climate mitigation goals.[15]

PEOPLE BENEFIT.

Fully and highly protected MPAs also benefit Americans. They provide direct economic benefits by enhancing our fisheries,[16] increasing tourism revenue, and generating jobs,[17] and provide indirect economic benefits where nearshore habitats buffer communities from bacterial pathogens, storm damage, and provide long-term carbon storage.[18, 19] Other gains include scientific discoveries, such as new medicines, technologies, and genetic material that is used in products supporting health and well-being.[20, 21]

MPAs need not impact the bottom line for commercial fisheries. For example, research has shown no negative impacts of two large, highly protected MPAs on the lucrative Hawaiian longline fishery.[22] The economic value of fully and highly protected MPAs can often exceed the area's pre-protection value,[23] and the economic benefits have been shown to outweigh the costs by a ratio of at least five to one.[24] Further, human health and well-being tends to be higher in proximity to healthy natural ecosystems like those found in these MPAs.[25]

Scientists have found that placing at least 30% of the world's ocean in fully or highly protected MPAs is necessary to stem the extinction of ocean wildlife, stabilize our climate, and safeguard our future.[26,27]

While the benefits of these MPAs are clear, today 23 percent of U.S. oceans are fully or highly protected —and nearly all of this area is located in two large protected areas in the remote Pacific Ocean.[28]

The U.S. must adopt a goal to fully or highly protect at least 30% of our coastal and ocean waters by 2030. This should include:

- Areas that help address the impacts of climate change, including carbon storage areas and areas that provide adaptation and resilience benefits;

- Areas that protect a diversity of habitats, communities, and ecosystems with regional representation;

- Connected networks of areas important for preserving biodiversity and wildlife migration corridors;

- Areas with habitats important for fish and wildlife to thrive, including critical spawning, breeding, feeding, and growth to maturity;

- Areas that are relatively pristine, still intact, and least impacted by human activity,

- Areas that support coastal livelihoods and cultures, and provide access and enjoyment/recreational opportunities for Americans;

- Areas that help mitigate threats to America's most vulnerable coastal communities; and

- The natural resources that support the economy and health of communities that rely on clean oceans and water, in particular Indigenous and low-income communities at the front lines of climate change disaster.

It is in all of our interests to fully or highly protect at least 30% of our U.S. ocean by 2030.

In light of the ecological crisis our species and planet are facing, we are more in need of these effective conservation tools than ever.

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Photos: Kydd Pollock, United States Fish and Wildlife Association
(Pacific Remote Islands Marine National Monument)