



Climate Change Adaptation in National Marine Sanctuaries

Climate Change Adaptation, Mitigation, and Monitoring

Climate change adaptation¹ is **any policy or management action that is intended to allow resources, services, communities, or infrastructure to adjust to present and future changes in climate by reducing their vulnerability and/or increasing their resilience or adaptive capacity to the impacts of climate change.**

Climate change adaptation differs from climate change mitigation² which is **any policy or action that directly limits climate change and its effects**, such as reducing sources of greenhouse gas emissions or enhancing greenhouse gas sinks -- natural environments that draw carbon dioxide out of the atmosphere and prevent it from causing global warming. Actions can have both mitigation and adaptation

benefits. For example, the restoration of a salt marsh has a mitigation benefit of enhancing a greenhouse gas sink (i.e., blue carbon) and an adaptation benefit of enhancing coastal resilience to sea level rise.

Climate change adaptation also differs from climate change assessment, which includes **any policy or action intended to better understand or monitor past, current, and future changing environmental conditions and their effects on resources, services, communities, and/or infrastructure.** Assessment actions such as research, monitoring, and vulnerability assessments are often vital to inform adaptation and mitigation policy and action.

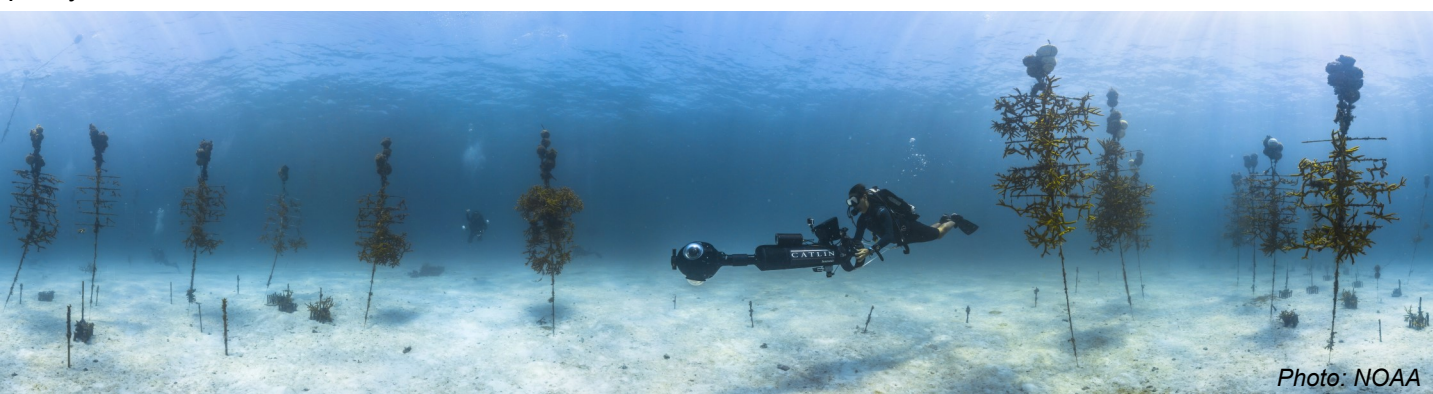
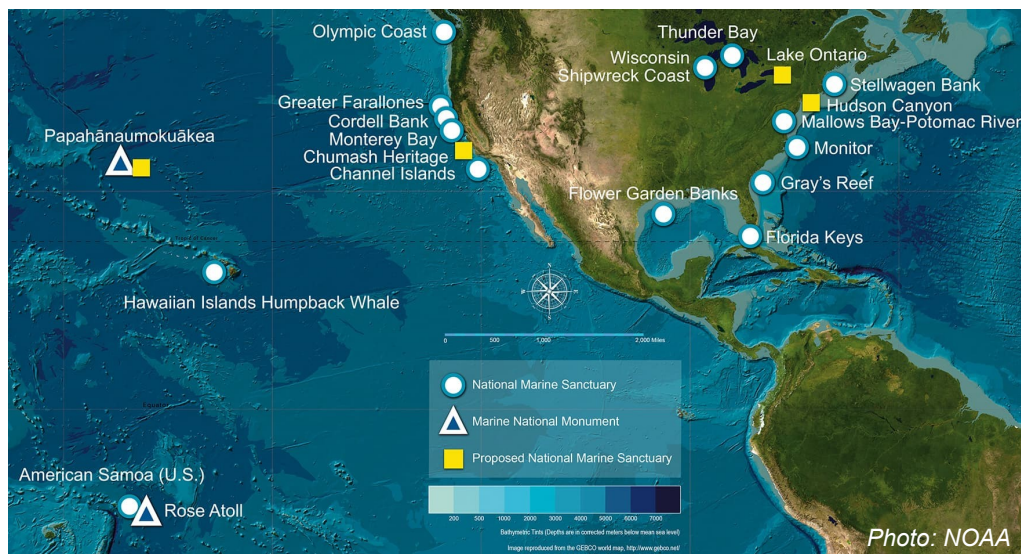


Photo: NOAA

¹Intergovernmental Panel on Climate Change (IPCC) definition of climate adaptation: *The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects.* The definition above is designed to be more specific and applicable to national marine sanctuary actions.

²Intergovernmental Panel on Climate Change (IPCC) definition of climate change mitigation: *A human intervention to reduce the sources or enhance the sinks of greenhouse gasses (GHGs).*

Applying Adaptation Actions

National marine sanctuaries and other marine protected areas are places of constant change, subject to long-term human use and changing physical and ecological processes. Climate change will likely shift the geographic area of economically valuable, culturally important, and ecologically significant species, altering ecosystem structure. Even though sanctuary habitats and ecosystems might look different than they have historically, they can still provide valuable ecosystem services -- the direct and indirect contributions of ecosystems to human well-being -- with proper management. Climate change adaptation measures can help ensure the resilience of ecosystem function and/or services.

NOAA's Office of National Marine Sanctuaries uses the best available scientific information and climate projections to inform decisions about how to best protect and manage its sites. A two-pronged approach of regulatory/policy action and ecological intervention (e.g., ecosystem restoration, translocations of sensitive species) allows for a wide range of potential adaptation actions in individual sanctuaries and across the national system. These adaptive management measures can be experimental and allow for testing and verification of management approaches.

Climate adaptation measures often look a lot like other sanctuary management measures. But true climate adaptation must be informed by climate change impacts, with targeted actions that will reduce climate vulnerability and enhance climate resilience. As such, ongoing management actions can often become climate adaptation actions through the incorporation of a climate change focus. While this may appear to be a superficial change, intentionally incorporating climate adaptation as a goal of an existing management action can result in alterations to its execution. For example, a sanctuary may restore a habitat for biodiversity benefits, but this same restoration can also have climate adaptation benefits (e.g., providing coastal protection from rising seas) depending on the species or methods chosen for restoration. By incorporating this benefit into restoration planning, different decisions may be made than if the goal of the project was for biodiversity enhancement alone.



Photo: Jessie Altstatt/NOAA

Some of the approaches and measures that the Office of National Marine Sanctuaries may take include:

- *Alleviate climate impacts*: strategies that directly reduce the impact of climate stressors.
- *Manage dynamic conditions*: strategies that are responsive and adaptive to changing conditions.
- *Promote education*: strategies that increase awareness and directly target harmful human behaviors.
- *Habitat protection and restoration*: strategies that focus on protecting and restoring habitat or key ecosystem processes.
- *Reduce human disturbance*: strategies that restrict or reduce access to sensitive habitats to limit disturbance and enhance resilience.
- *Manage for invasive species*: strategies that address the impact of invasive species on habitat resilience.
- *Water quality management*: strategies that improve, or prevent the decline of, water quality.

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<https://sanctuaries.noaa.gov/management/climate/welcome.html>