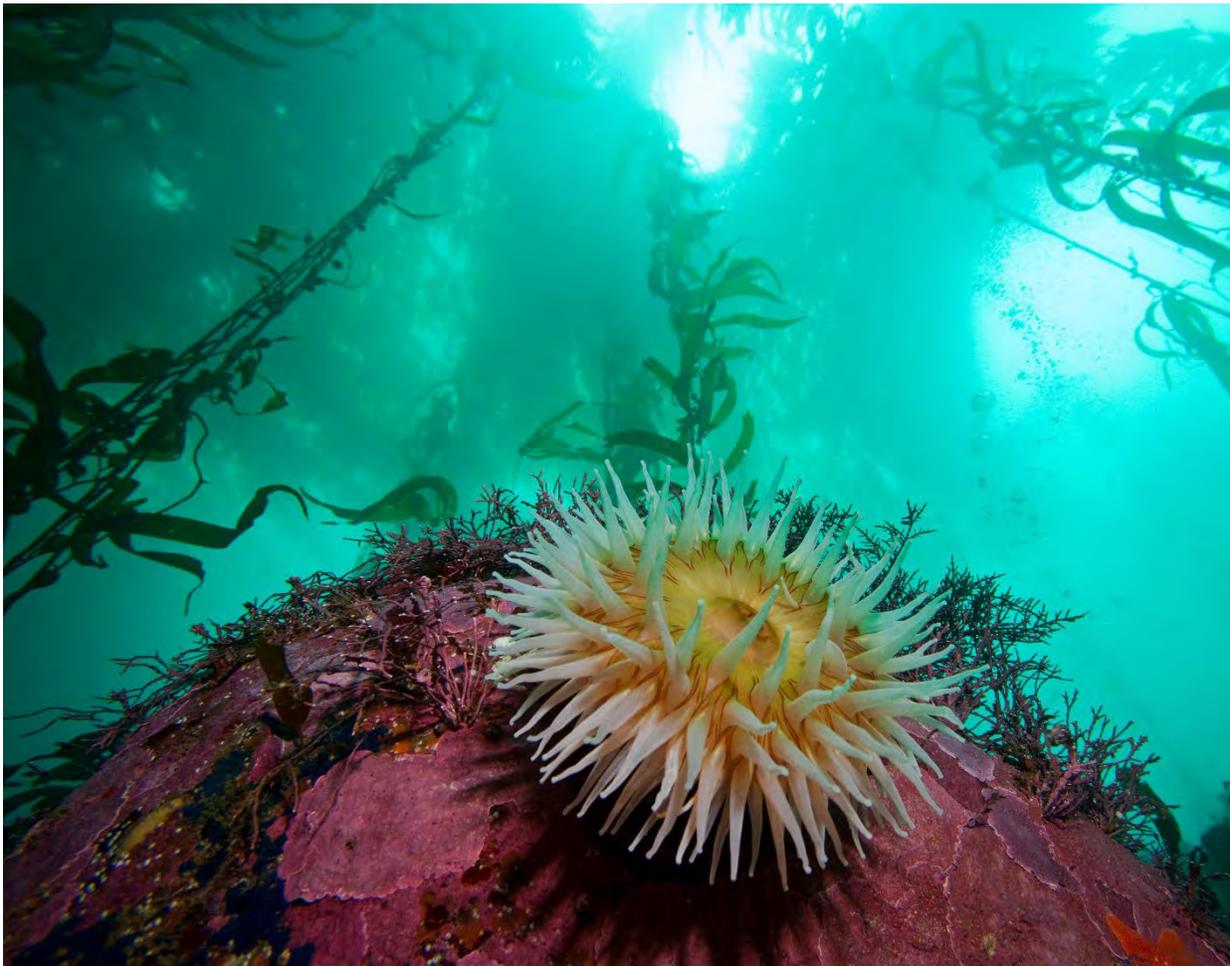


Office of National Marine Sanctuaries

Climate Resilience Plan

2021-2023



May 2021

U.S. Department of Commerce
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Cover photo: An anemone sits below a canopy of giant kelp in Monterey Bay National Marine Sanctuary. Kelp forests in some sanctuaries on the West Coast are being negatively affected by climate change.
Photo: Chad King/NOAA



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I am pleased to share with you the Office of National Marine Sanctuaries' Climate Resilience Plan. The impacts of climate change are intensifying both globally and locally, threatening America's physical, social, economic, and environmental well-being. Managers of national marine sanctuaries, marine national monuments, and other types of MPAs around the world must increasingly contend with rising water temperatures and sea levels; water that is more acidic and contains less oxygen; shifting species; and altered weather patterns and storms.

Yet marine protected areas like national marine sanctuaries and marine national monuments are also a key part of the solution to ocean climate impacts. They protect coastal and marine ecosystems that remove atmospheric carbon and store it in marine sediments, safeguard coastal communities from flooding and storms, reduce non-climate stressors to support ecosystem resilience, and act as living laboratories for stewardship, education, restoration, and science to address climate impacts. Scientists across NOAA are increasing our understanding of the climate drivers, conditions, trends and predictions affecting the places we manage. In particular, we are very grateful for scientists in the National Centers for Coastal and Ocean Science, Integrated Ocean Observing System, Integrated Ecosystem Assessment Program, Climate Program Office, Ocean Acidification Program, and CoastWatch who are working side-by-side with MPA managers to answer many of the real-world questions we face.

This plan represents our commitment to integrating a climate-informed approach to management across the entire National Marine Sanctuary System. Working closely with our partners, we will apply the latest climate science to assess impacts to the sanctuary system, identify and implement adaptation solutions, use our outreach capacity to educate visitors and local communities about climate impacts and solutions, and take steps to reduce the greenhouse gas footprint of our operations.

This plan is only the beginning. It describes actions over the coming three years we will take to address climate impacts to the sanctuary system and acts as the foundation of sustained efforts to confront climate change in these unique and valuable places. We look forward to continuing to work across NOAA and with our partners to expand our efforts, and demonstrating the value of these important places to a resilient, healthy ocean and Great Lakes.

Sincerely,

John Armor
Director



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The Office of National Marine Sanctuaries (ONMS) would like to thank the ONMS Climate Tiger Team for drafting this Climate Resilience Plan; the Leadership Team for generating and committing to the approaches and actions included here; and the Senior Management Team for their comments throughout. Our sincere thanks are extended to the Climate Tiger Team including: Lauren Wenzel, National Marine Protected Areas Center Director/ONMS Headquarters; Atuatasi-Lelei Peau, Superintendent of National Marine Sanctuary of American Samoa; Carol Bernthal, Superintendent of Olympic Coast National Marine Sanctuary; Maria Brown, Superintendent of Greater Farallones National Marine Sanctuary; and Stan Rogers, Superintendent of Gray's Reef National Marine Sanctuary, as well as contributors Sara Hutto, Conservation and Climate Program Coordinator at the Greater Farallones Association/Greater Farallones National Marine Sanctuary; and Zachary Cannizzo, Climate Coordinator/Visiting Climate Scientist at the National Marine Sanctuary Foundation/the National Marine Protected Areas Center and NOAA's Climate Program Office.

CHAPTER 1: Introduction and Guiding Principles



A scientific diver collects data on a reef in Papahānaumokuākea Marine National Monument. Research conducted in sanctuaries is critical to understanding climate change and its impacts. Photo: Greg McFall/NOAA

Introduction

The impacts of climate change are intensifying both globally and locally, threatening America's physical, social, economic, and environmental well-being. National marine sanctuaries (NMS) and monuments are facing rising water temperatures and sea levels, water that is more acidic and contains less oxygen, shifting species, and altered weather patterns and storms. Although all of our sanctuaries and monuments must face these global effects of climate change, each is affected differently. While climate impacts are felt at global, regional and local scales, and include many impacts beyond our management authorities, sanctuaries can play a key role, with our partners, in reducing climate impacts both within and beyond our boundaries.

This climate resilience plan outlines near-term steps that NOAA's Office of National Marine Sanctuaries (ONMS) will take to address climate impacts in order to achieve our mission. It is intended to be aligned with the existing (2018-2022) and new ONMS Strategic Plans (2023-2027), and is based on discussions with the Sanctuaries Leadership Team as well as staff input for the new Strategic Plan. This plan is intended to be updated in FY23 to reflect progress towards the goals identified below. It will be accompanied by implementation guidance in support of the four goals: science and assessment; adaptation and mitigation; education and outreach; and green operations.



Coral bleaching, as seen in this coral found in Hawaiian Islands Humpback Whale National Marine Sanctuary, is often caused by waters that are too warm and is one of the many impacts of climate change being experienced by sanctuary resources. Photo: NOAA

Guiding Principles

Addressing climate change in ONMS:

- is essential for achieving our mission today and in the future;
- requires integrating actions throughout our work and accelerating our efforts;
- necessitates developing strong partnerships with other NOAA offices and external partners to build our climate science, education and outreach, and management capabilities;
- demands more effective and visible communication and outreach to build understanding and support;.
- creates opportunities to engage new constituencies and address environmental justice, equity, diversity and inclusion issues;.
- calls for closely working with our Sanctuary Advisory Councils and partners to facilitate climate solutions beyond our boundaries;
- involves engaging with international partners to share solutions and bridge the dialogue among climate, biodiversity and sustainable development goals;
- promotes a creative, flexible and adaptive culture that will help us apply practical, science-based solutions to climate impacts; and
- builds on the foundation of past climate work within ONMS and will help guide and expand our efforts to address the rate and scale of change.

CHAPTER 2: Goals, Strategies, and Actions



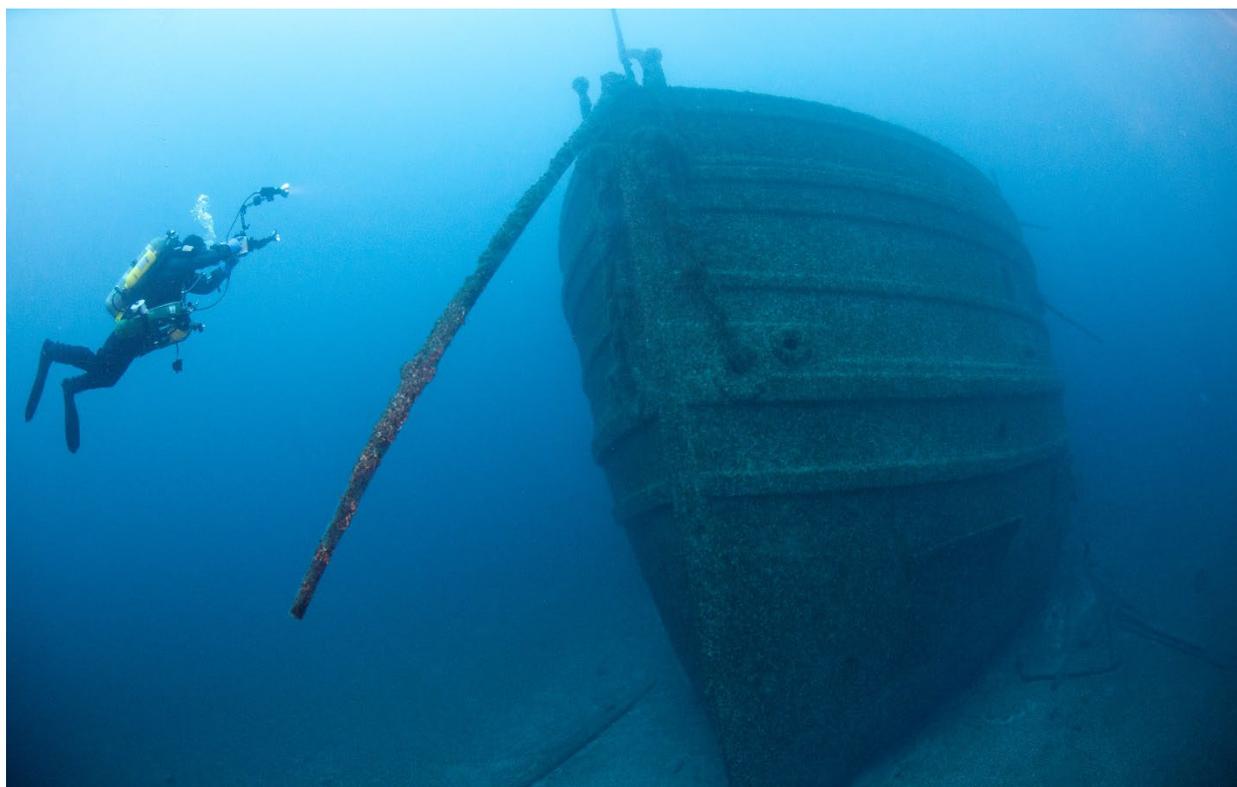
Planning, observing, and monitoring at sanctuaries, like Stellwagen Bank National Marine Sanctuary, is key to successful climate adaptation, management, and resilience. Photo: Evelyn Ganson/NOAA

Goal 1: Assess current and predicted climate impacts to sanctuary resources

Outcome: Sanctuary staff and partners have a common understanding of current and predicted impacts to inform management.

Strategies

- 1.1 Increase collaboration with other NOAA offices to address climate priorities.
- 1.2 Identify climate science needs as part of existing efforts to assess overall ONMS science needs to engage other organizations to help fill gaps.
- 1.3 Work with other agencies to direct federal funding opportunities (FFOs) to address climate science needs within sanctuaries.
- 1.4 Look for opportunities to integrate climate components into existing natural and social science activities, where appropriate.
- 1.5 Further integrate climate perspectives into Condition Reports.
- 1.6 Promote, establish, and fund NMS sites as “climate sentinels” where critical research, observation, outreach, and management can be conducted with partners and tracked over time.
- 1.7 Complete vulnerability assessments for all sites as a foundation for adaptation strategies.



Assessing and tracking possible changes to resources like the wreck of the steamer *Florida* in Thunder Bay National Marine Sanctuary is an important part of understanding the impacts of climate change in national marine sanctuaries. Photo: Doug Kesling/NOAA

Actions for FY21-23

- 1.1 Complete remaining climate impact profiles for every site in the National Marine Sanctuary System. (FY21) [HQ/Sites]
- 1.2 Complete a literature review and research needs synthesis on climate impacts to maritime heritage resources. (FY21) [HQ]
- 1.3 Complete regional climate impact profiles to communicate the regional climate picture and linkages between MPA sites in a given region. (FY23) [HQ/Region]
- 1.4 Integrate a flexible climate vulnerability assessment process into the Condition Report/Management Plan schedule. (FY21) [HQ/Sites]
- 1.5 Complete vulnerability assessment for OCNMS (FY22), MBNMS (FY23), and CINMS (FY23). [Sites/ HQ]
- 1.6 Review and update vulnerability assessments for CBNMS, GFNMS, and NMSAS. (FY22) [Sites/HQ]
- 1.7 Summarize lessons learned from completed vulnerability assessments to inform vulnerability assessment toolkit. (FY22) [Sites/HQ]
- 1.8 Develop vulnerability assessment toolkit modeled after the Condition Report toolkit for ONMS. (FY22) [GFNMS/HQ]
- 1.9 Seek detailees to support site-based vulnerability assessments and provide additional capacity. (FY21-23) [HQ/Sites]
- 1.10 In collaboration with NOAA's Climate Program Office (CPO), identify priority climate-related science needs for national marine sanctuaries and potential partners to address them. (FY21) [HQ]
- 1.11 Ensure the sanctuary nomination evaluation criteria and process considers climate resilience factors, and NOAA reviews existing nominations to consider climate impacts, resilience, and potential benefits in designation. (FY22-23) [HQ/Regions]
- 1.12 Develop and share climate information with communities to inform sanctuary nominations. (FY22-23) [HQ/Regions]

Goal 2: Identify and implement climate adaptation and mitigation strategies for sanctuaries

Outcome: Sanctuary staff and their partners actively pursue climate adaptation and mitigation strategies in sanctuaries and monuments.

Strategies

- 2.1 Develop adaptation strategies with sanctuary stakeholders and regional partners to engage diverse perspectives, pool knowledge, and leverage resources.
- 2.2 Identify opportunities for conservation and enhancement of in-situ carbon sequestration through protection and restoration of “blue carbon” habitats and healthy marine ecosystems.
- 2.3 Identify climate refugia in existing or potential sanctuaries or under partner jurisdictions and their potential connectivity to other current and potential sanctuaries.
- 2.4 Identify priorities for habitat restoration for climate resilience.
- 2.5 Build partnerships to implement priority climate resilience and blue carbon restoration in sanctuaries (based on the model of Mission: Iconic Reefs).
- 2.6 Assess climate change impacts to sanctuary facilities and infrastructure.



Many species, such as black sea bass in Gray's Reef National Marine Sanctuary, are changing their geographical ranges in response to warming waters and other climate change impacts, presenting challenges to sanctuary managers. Photo: Greg McFall/NOAA

Actions for FY2021-2023

- 2.1 Present the climate impact profiles to each site's Advisory Council and discuss potential approaches for climate adaptation and mitigation, as well as the role of sanctuaries in addressing climate change. (FY21) [Sites]
- 2.2 For sites with vulnerability assessments, begin discussing actions to reduce vulnerabilities and increase resilience and/or address climate impacts in management plans. [Sites] (FY22)
- 2.3 Develop an interactive national blue carbon map with a focus on coastal and marine protected areas, highlighting existing and future opportunities for conservation, research, management, and community engagement. (FY21) [HQ]
- 2.4 Develop and publish in the ONMS Conservation Science Series a blue carbon assessment and methodology based on a literature review to assess blue carbon capacity of existing and potential sanctuaries. (FY21) [GFNMS]
- 2.5 Develop tools to facilitate the inclusion of climate information in management plans, environmental compliance documents, permits, and consultations. (FY21-22) [HQ]
- 2.6 Provide examples/best practices of how to engage Sanctuary Advisory Councils, partners, and stakeholders in sanctuary climate change issues. (FY22) [WCR/HQ]
- 2.7 Train ONMS staff on climate adaptation tools and resources. (FY22) [GFNMS/HQ]

Goal 3: Advance ocean and climate literacy through sanctuaries

Outcome: NOAA staff, partners, and volunteers are effectively communicating about climate impacts and resilience within and beyond sanctuary boundaries.

Strategies

- 3.1 Develop and deliver messages on how climate change is impacting sanctuaries and how sanctuaries can be part of the solution to lessen or mitigate climate change impacts.
- 3.2 Develop and deliver messages about how communities, partners, and stakeholders can reduce climate change impacts and increase resilience in sanctuaries.
- 3.3 Train our staff, partners, and volunteers to ensure they understand the latest climate science and effective communication strategies.
- 3.4 Assess and leverage existing education programs to emphasize climate literacy.
- 3.5 Integrate climate messages, science, and actions into all appropriate outreach, education, and management materials



Communicating about climate impacts, resiliency, and other conservation topics through sanctuaries like Mallow's Bay-Potomac River National Marine Sanctuary is a critical component of building climate-resilient sanctuaries. Photo: Matt McIntosh/NOAA

Actions for FY2021-2023

- 3.1 Annually host climate learning exchanges for ONMS staff on climate change issues. (FY21-23) [HQ/Sites]
- 3.2 Develop internal and external climate change communications plans, including strategies for engaging NOAA and interagency leadership about climate change in marine protected areas. (FY21-22) [HQ]
- 3.3 Collaborate with the Education Team to identify and prioritize opportunities to integrate the latest climate science into ONMS education programs. (FY21-22) [HQ/Sites]
- 3.4 Develop and widely disseminate new public outreach materials (e.g., infographics, video and web materials) based on site climate change impact profiles and other climate change information. (FY21-23) [HQ/Sites]
- 3.5 Include available information on socio-economic impacts of climate change in communication materials. (FY22-23) [HQ/Sites]
- 3.6 Assess opportunities associated with ONMS' 50th to launch a high visibility public education campaign including the role of sanctuaries in climate resilience. (FY22) [HQ]

Goal 4: Implement actions to reduce greenhouse gas emissions from sanctuary facilities and operations

Outcome: Decreased ONMS greenhouse gas (GHG) emissions with the long-term goal of reaching carbon neutrality.

Strategies

- 4.1 Establish a baseline for ONMS carbon emissions.
- 4.2 Monitor and evaluate ONMS GHG emissions and mitigation efforts.
- 4.3 Consider ONMS operations' carbon footprint (e.g., facilities planning and management, staff travel, vehicles and vessels, and telework plans and policies).
- 4.4 Develop strategies and dedicate resources to reduce GHG emissions.



The Ocean Climate Center and Greater Farallones National Marine Sanctuary, and other facilities across the National Marine Sanctuary System, are working to assess and reduce their greenhouse gas emissions. Photo: MJ Schramm/NOAA

Actions for FY2021-2023

- 4.1 Complete a baseline GHG emissions inventory for each site, region, and headquarters in the NMSS. (FY21-22) [HQ/Region/Sites]
- 4.2 Identify and quantify sources of GHG emissions across the program. (FY21) [HQ/Region/Sites]
- 4.3 Identify strategies to reduce GHG emissions focusing on the largest contributors. (FY22) [HQ/Region/Site]
- 4.4 Establish a dedicated fund to implement GHG reduction strategies. (FY22) [HQ]
- 4.5 Begin tracking changes in GHG emissions across the program, report results to the Leadership Team, and maintain a list of the most effective strategies to reduce GHG emissions. (FY22) [HQ]
- 4.6 Integrate climate change considerations into ongoing facilities assessment and space utilization planning (including potential for reduced carbon footprint through increased telework). (FY21-22) [Sites/Regions/HQ]
- 4.7 Document costs and savings from implementing emission reduction measures. (FY23) [HQ]

CHAPTER 3: Resources, Staffing, and Partnerships



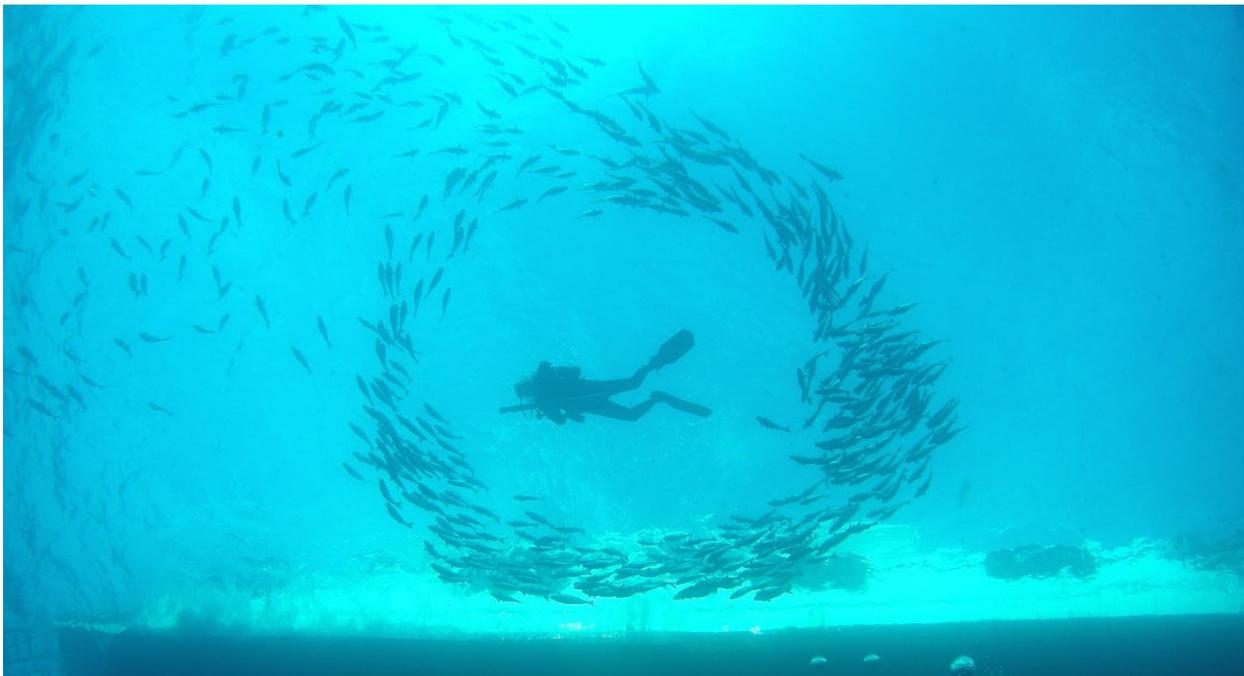
Sanctuary managers are taking actions, such as removing crown-of-thorns sea stars in the National Marine Sanctuary of American Samoa, to enhance the resilience of sanctuary resources to the impacts of climate change. Photo: Greg McFall/NOAA

ONMS' climate strategy requires integrating climate change considerations throughout its planning and operations. Building this capacity will require investment at the site, regional, and headquarters levels, as part of ongoing and new funding for science, management, education, facilities, and vessels.

Specific recommended near term actions (FY21-23) related include:

Resources and Staffing

- **Support for system-wide climate coordination:** Support a headquarters position to advance integration of climate resilience across ONMS sites and regions, including the development of partnerships to strengthen our capacity. Given the critical, long-term nature of this issue, and need to coordinate across NOAA, we recommend this be an FTE.
- **Recognize and support climate integration in existing duties and projects** through inclusion in staff performance plans, and scope of work documents for NOAA affiliates, as appropriate.
- **Build staff capacity** through training and the development of an internal google site to host information and tools.
- **Include climate actions in budget planning** by providing direction on climate-related work through the annual guidance memorandum and other budget and planning guidance.
- **Funds for green operations:** As noted under Goal 4 above, starting in FY22, advocate for additional PAC funds based on assessments and set aside a portion for reducing GHG emissions.



Partnerships are key to addressing the challenge of climate change at Flower Garden Banks National Marine Sanctuary, and every sanctuary in the National Marine Sanctuary System. Photo: Emma Hickerson/NOAA.

Leadership and Organizational Support

- **ONMS Strategic Plan:** Integrate climate objectives into the new ONMS Strategic Plan (2023-2027) to clearly communicate our commitment to climate resilience, recognizing the resources needed to support this commitment.
- **Continue collaboration with NOAA Climate Program Office (CPO) and other agency partners:** The CPO's "Science for Sanctuaries" initiative has already resulted in identifying ONMS climate science needs and potential ways to address them through NOAA and external partnerships. ONMS should continue to grow partnerships with CPO, NCCOS, NOAA Fisheries and others to meet climate science, management and communication needs.
- **Communicate with NOAA leadership** about ONMS' role in addressing climate change adaptation and mitigation, and the broader role of MPAs in climate resilience and linkages to the 30x30 initiative.
- **Demonstrate national leadership on MPAs and climate change** through the development of a national report on how to integrate climate change into MPA management.
- **Demonstrate international leadership** on climate and MPAs through the International Partnership on MPAs, Biodiversity and Climate Change; the Commission for Environmental Cooperation; the North American MPA Network; the MPA Agency Partnership; sister sanctuaries; and other mechanisms.



AMERICA'S UNDERWATER TREASURES