Building Capacity for Climate Change Adaptation in Marine Protected Areas

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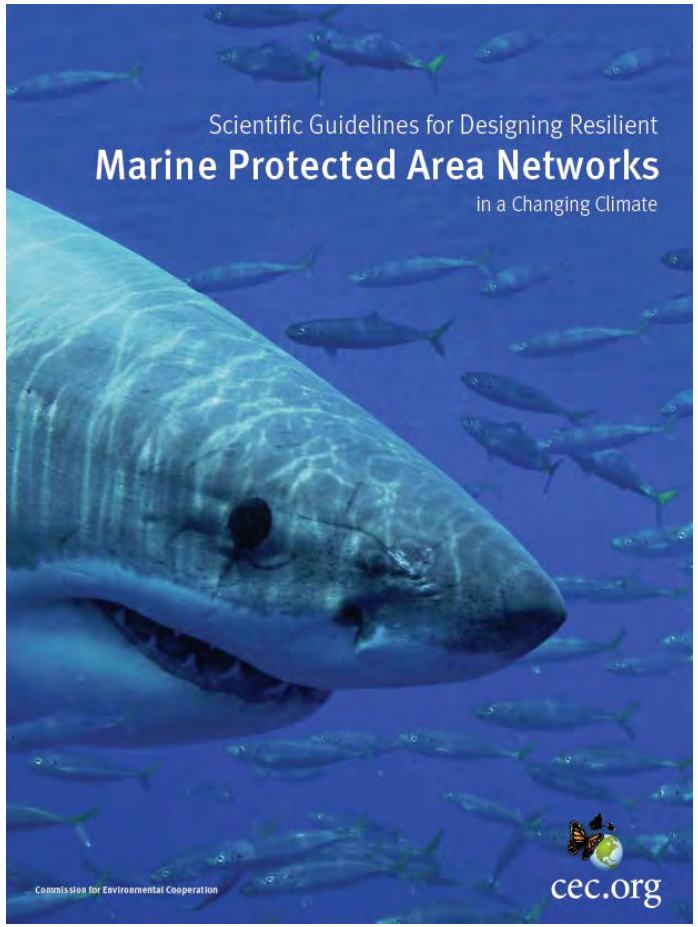
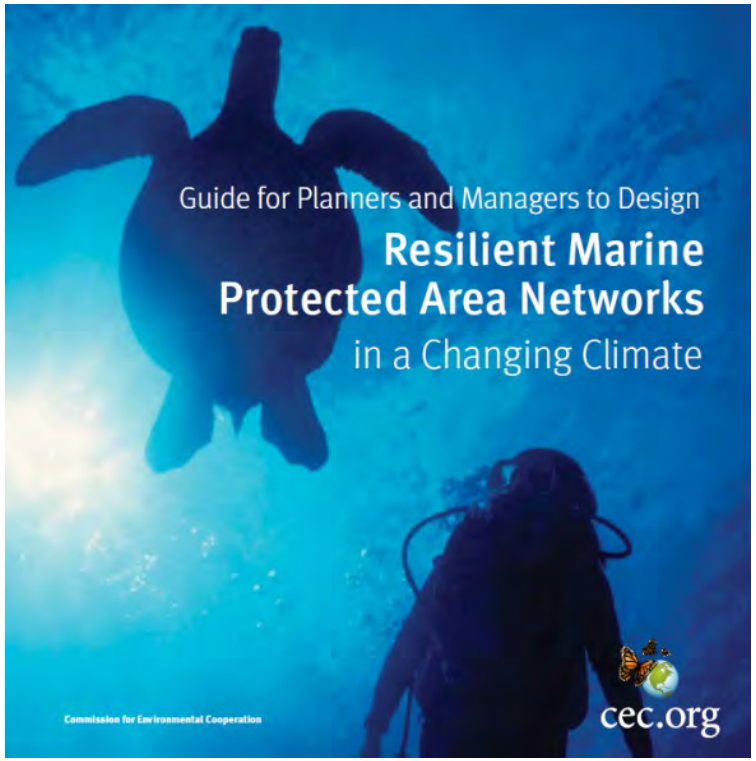
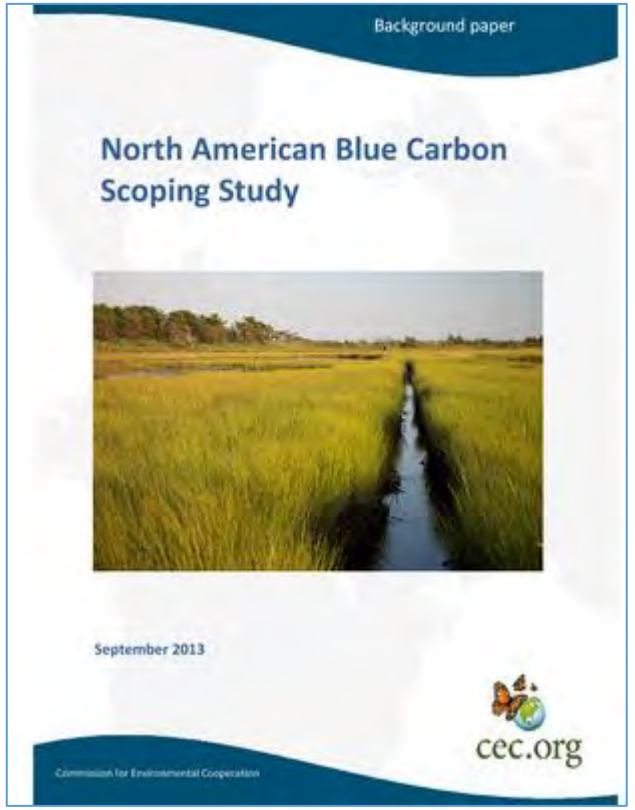
Collaborating with the Commission for Environmental Cooperation







Climate Change Information for MPAs

Guideline 1:	Protect Species and Habitats with Crucial Ecosystem Roles or Those of Special Conservation Concern
Guideline 2:	Protect Potential Carbon Sinks
Guideline 3:	Protect Ecological Linkages and Connectivity Pathways for a Wide Range of Species
Guideline 4:	Protect the Full Range of Biodiversity Present in the Target Biogeographic Area

Each step under the guidelines has the following subsections:

Overview: the rationale for the step.

Method: suggested initiatives to achieve the guideline. These are presented as a suite of actions, although they are not necessarily sequential. A number of suggested initiatives in this method section are common to all the guidelines, including a workshop with relevant experts, a literature review of the science relevant to each step, the selection of appropriate models, and engaging stakeholders.

Practical considerations: resource needs and challenges.

Products: the expected documentation (e.g., reports, maps, data) produced or compiled by the end of each step.

Resources: literature, data, organizations, web pages, and other sources likely to be of help in undertaking the steps.

Project Report

Greenhouse Gas Offset Methodology Criteria for Tidal Wetland Conservation

December 2014

Commission for Environmental Cooperation

Blue Carbon | Carbono azul | Carbone bleu

Estimation of Carbon Stocks from Mexico's Pantanos de Centla Mangroves

The blue carbon ecosystems of Southeastern Mexico are among the largest of any measured globally.

Principal investigators

Dr. Boone Kauffman (President and Lead Scientist, Illahee Sciences International, Inc.), **Dr. Humberto Hernández Trejo** (*Universidad Juárez Autónoma de Tabasco*), **María del Carmen Jesús García** (*Universidad Juárez Autónoma de Tabasco*), **Chris Heider** (Watershed Professionals Network LLC), and **Dr. Wilfrido M. Contreras Sánchez** (*Universidad Juárez Autónoma de Tabasco*).

This research project was carried out with support from the Commission for Environmental Cooperation's (CEC's) 2013–2014 project North America's Blue Carbon: Assessing the Role of Coastal Habitats in the Continent's Carbon Budget. For additional background on the CEC's blue carbon work, go to LINK TO BACKGROUNDER.

Sabalo estuarine mangrove forest, Pantanos de Centla

Important Mexican Mangrove Carbon Stocks

The mangroves of southeastern Mexico's Pantanos de Centla—the largest wetland in Mesoamerica—contain exceptionally large carbon stocks, which are among the largest of any mangrove ecosystem on Earth and among the largest of any tropical ecosystem. Clearing mangroves so that the land or shoreline can serve other uses thus comes at a high cost, because the replacement use may not store nearly as much carbon or in fact may allow stored carbon to be lost through greenhouse gas emissions, and it may also fail to provide other important ecosystem services that are characteristic of mangrove forests.

Research has been conducted to assess carbon stocks in these ecosystems and, in particular, the differences in carbon storage between mangroves along the coastal fringe and estuarine mangroves. The project also examined the carbon stocks of cattle pastures that were established on sites previously occupied by mangrove forests, including the potential emissions that could arise from conversion of mangroves to cattle pastures. Results indicate that mangrove carbon stocks in the Pantanos de Centla are exceedingly high compared to those of the upland forests of Mexico and, moreover, that significant emissions result from the conversion of mangrove forests to cattle pastures.

This research represents the first quantification of carbon stocks in the largest wetland in Mesoamerica. It is also the first time that measurements of carbon stocks and estimates of emissions arising from converting these mangroves to other land uses have been published.

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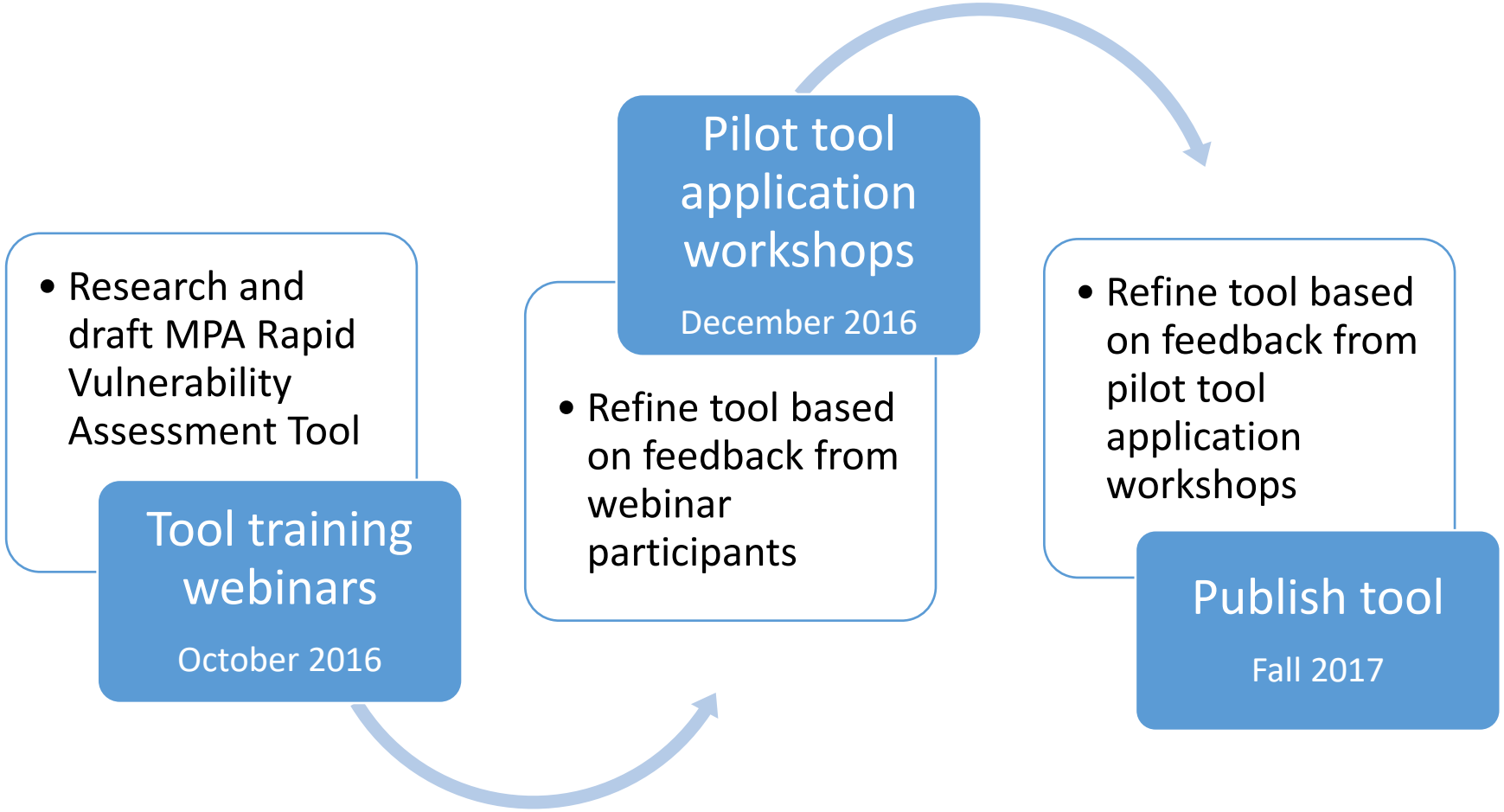
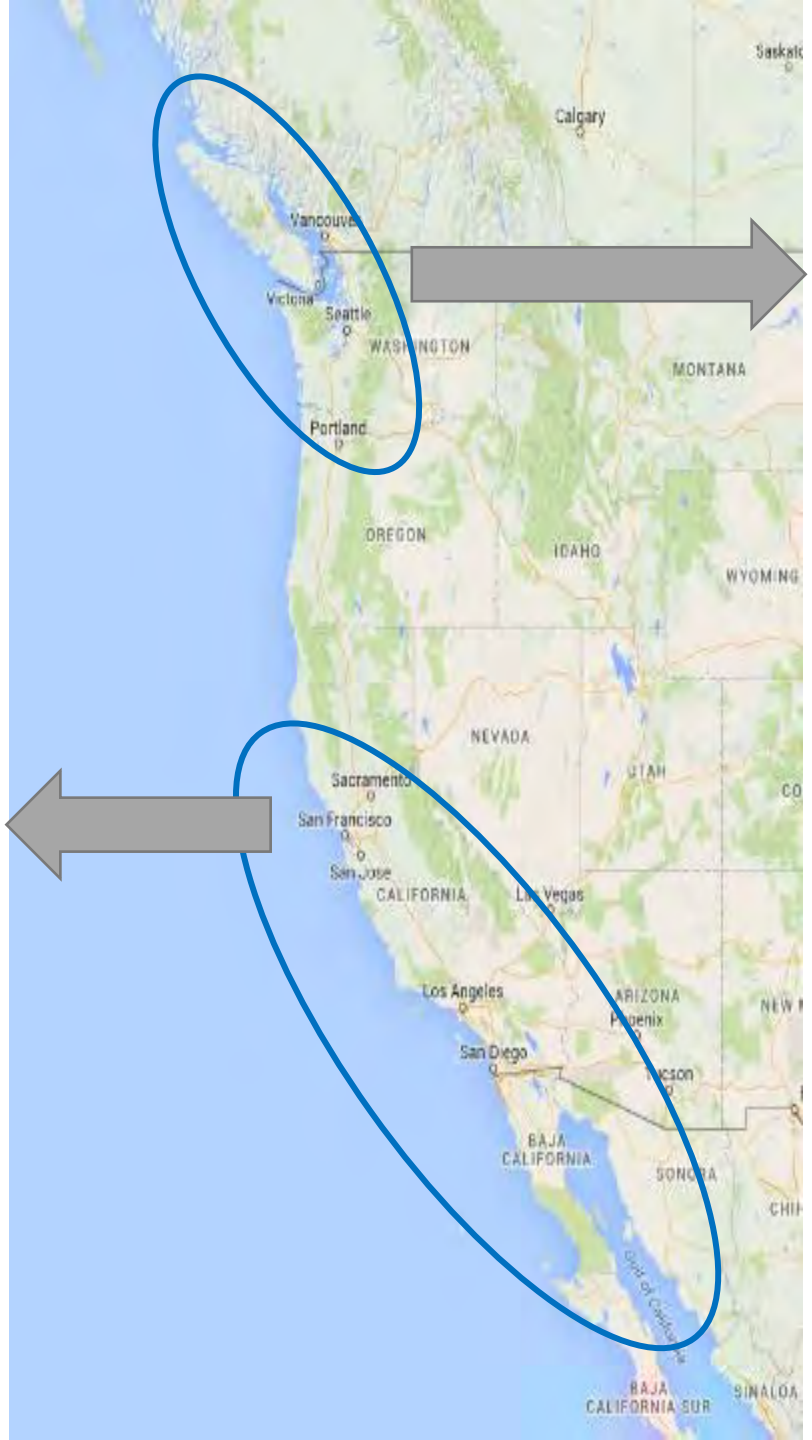
Development Process



Regional Vulnerability Assessment Workshops



Pacific Northwest Workshop
(late Fall 2016)

Olympic Coast National Marine Sanctuary, Olympic National Park, Pacific Rim National Park and Partners

North Central Coast Workshop
(late fall 2016)

Isla de Guadalupe Biosphere Reserve, Channel Islands National Park, El Vizcaino Biosphere Reserve and Partners

Assessment Steps

Step 1
Define the scope of the vulnerability assessment

Step 2
Construct your assessment matrices

Step 3
Undertake your assessment

Step 4
Adaptation strategy development

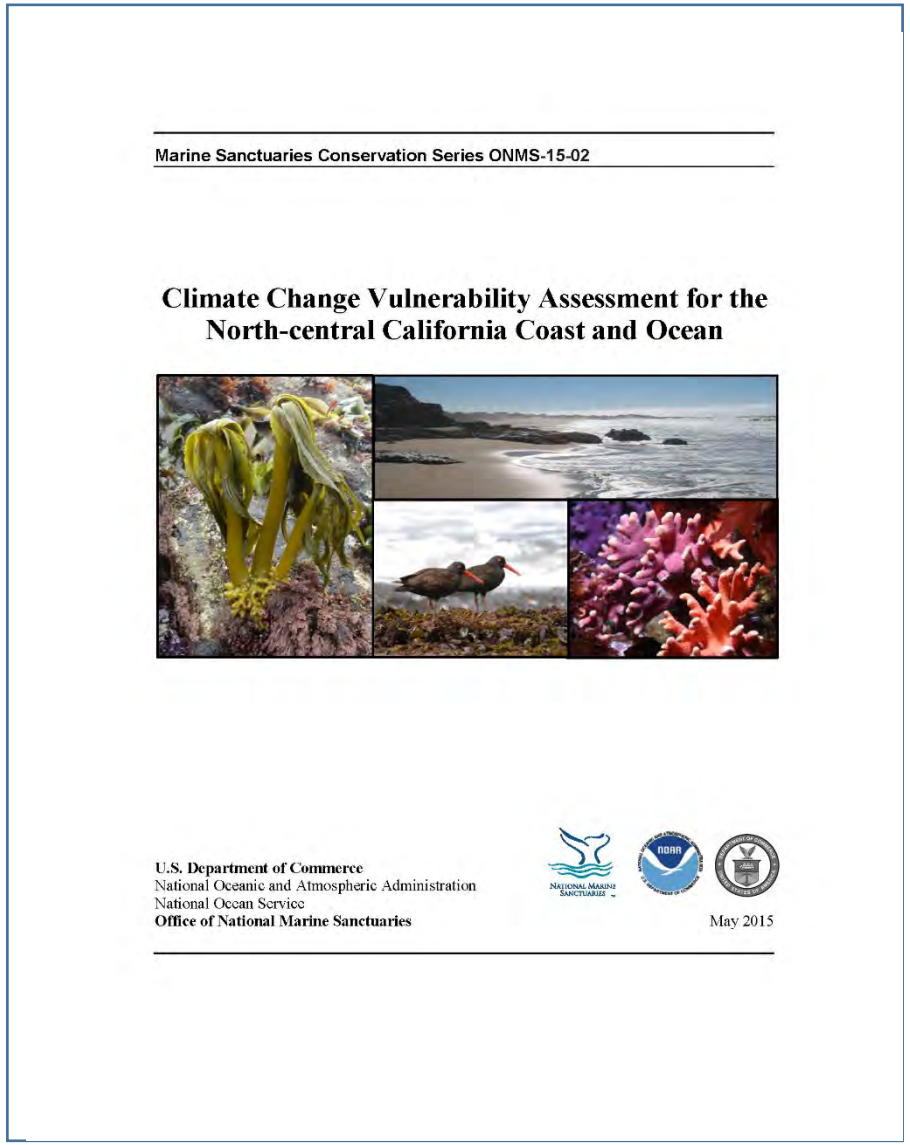
Step 5
Create your own narrative vulnerability assessment report

Sample Worksheet

Table 1. Vulnerability Assessment

Location: Greater Farallones NMS		Habitat Type: Rocky Intertidal				Timescale: Medium term (next 50 years)	
A Climate Stress	**B** Indicate the observed or projected direction and magnitude of this stress, as well as any specific relevant details	**C** Anticipated effects on this habitat type (Highlight any important features that might be affected)	**D** Likelihood	**E** Consequence (Table 2)	**F** Risk (Figure A)	**G** Adaptive Capacity (Table 3)	**H** Vulnerability Level (Figure B) and Key Drivers
Sea-Level Rise (SLR)	Sea-level rise projections for northcentral California: 12-61 cm of sea-level rise is expected by 2050 and 42-167 cm is expected by 2100.	Flooding and inundation of habitat – long-term impact is that zonation will shift upland and high intertidal may have nowhere to go.	Likely	Catastrophic	Extreme	High	Moderate Key drivers: Likelihood and Consequence

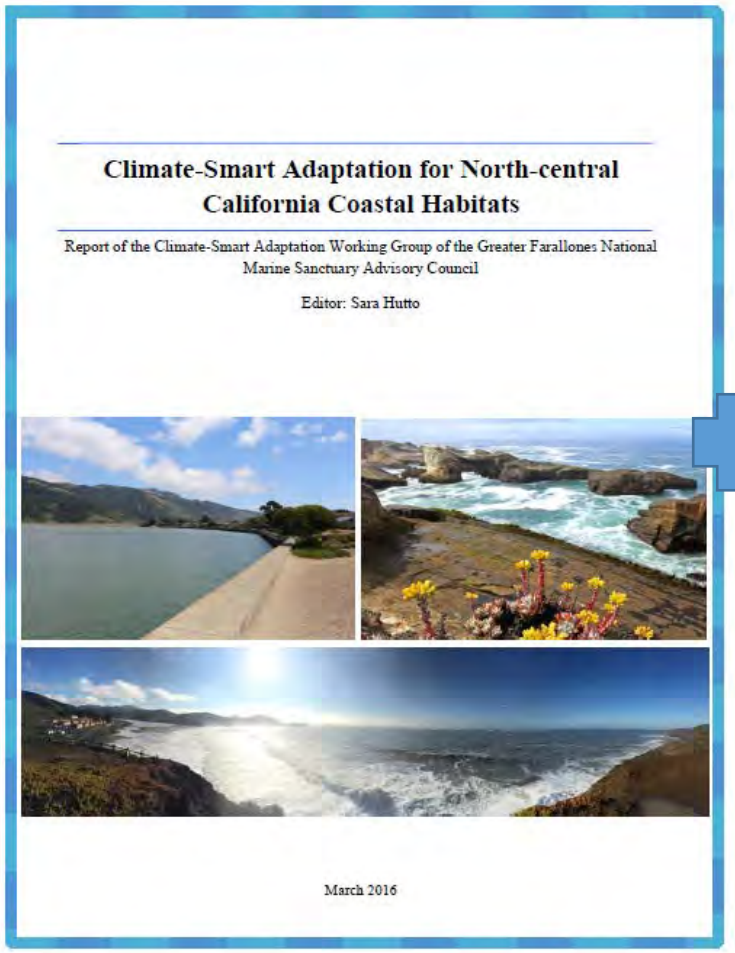
Case Study: Greater Farallones National Marine Sanctuary

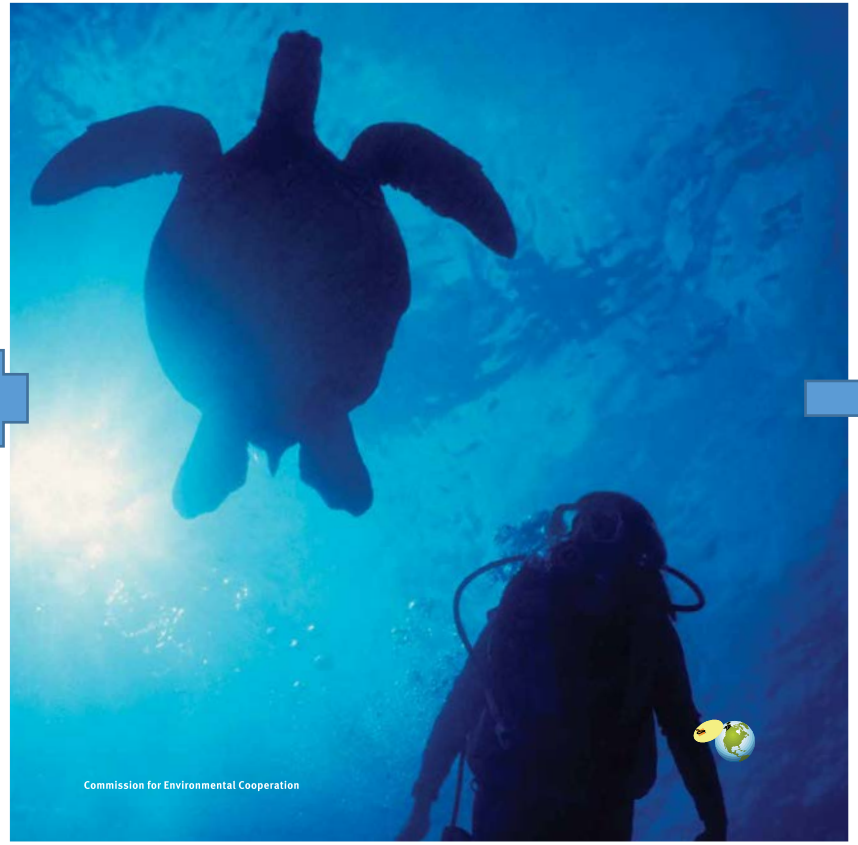


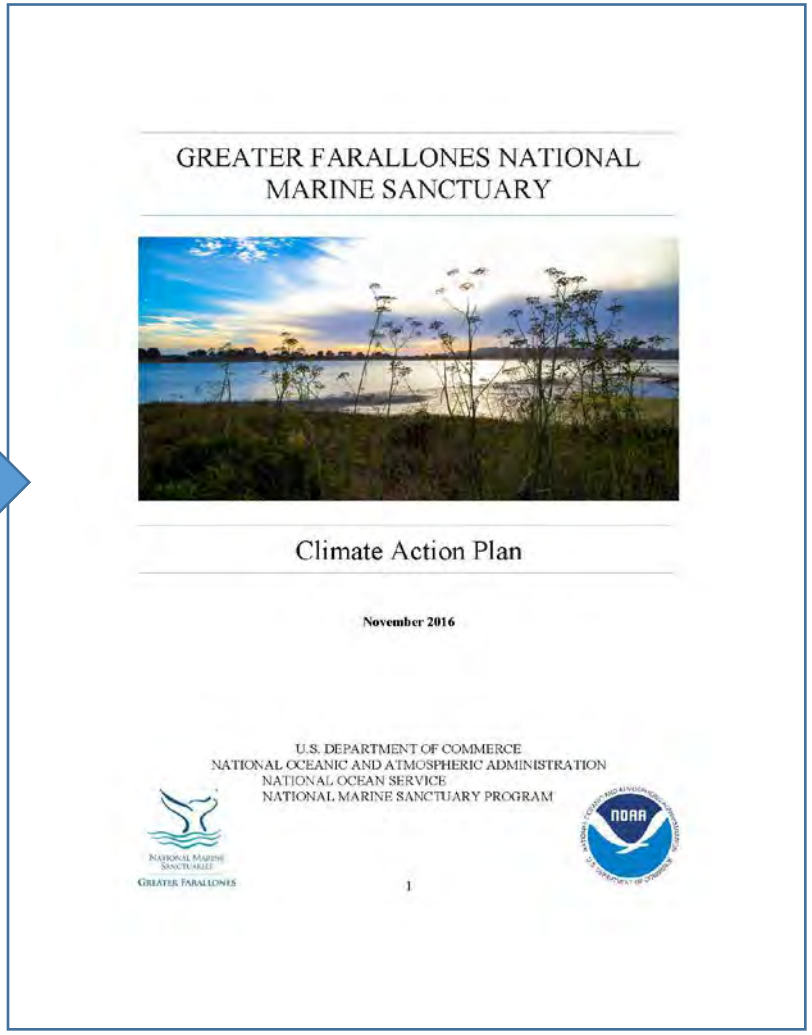
Most vulnerable habitats:

- Beaches
- Estuaries
- Intertidal

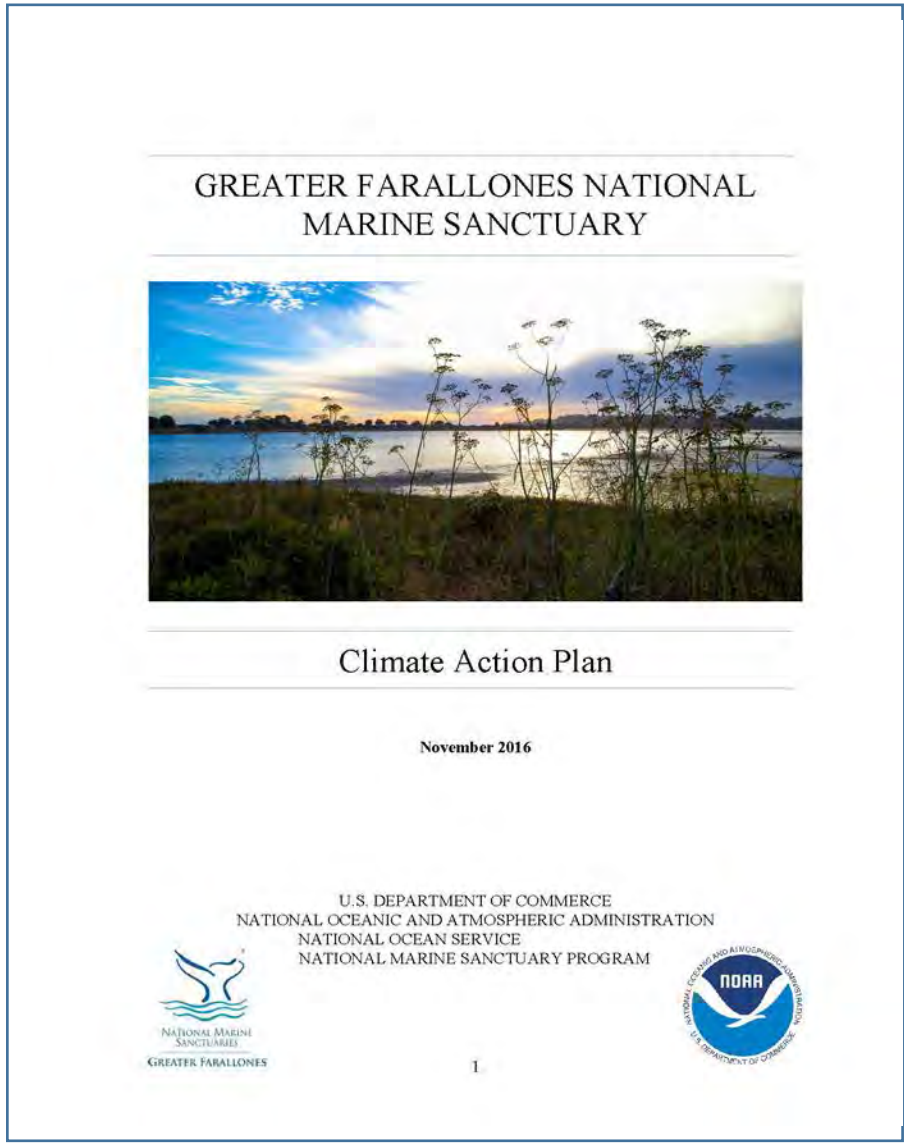
Case Study: Greater Farallones National Marine Sanctuary







Case Study: Greater Farallones National Marine Sanctuary


GREATER FARALLONES NATIONAL MARINE SANCTUARY

Climate Action Plan

November 2016

U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SERVICE
NATIONAL MARINE SANCTUARY PROGRAM

NATIONAL MARINE SANCTUARIES
GREATER FARALLONES

1

Adaptation Strategies:

- Implement Living Shorelines
- Promote Education
- Protect and Restore Habitat
- Limit Human Disturbance
- Address Invasive Species
- Invest in Science Needs

Case Study: Greater Farallones National Marine Sanctuary

Implement Living Shorelines:

- Identify demonstration projects
- Reduce/modify armoring
- Remove/redesign coastal roads
- Restore lower intertidal mussel beds and algae

Case Study: Greater Farallones National Marine Sanctuary

Promote Education:

- Develop a Climate Education Action Plan
- Enhance tidepool education and interpretation programs

Case Study: Greater Farallones National Marine Sanctuary

Protect and Restore Habitat:

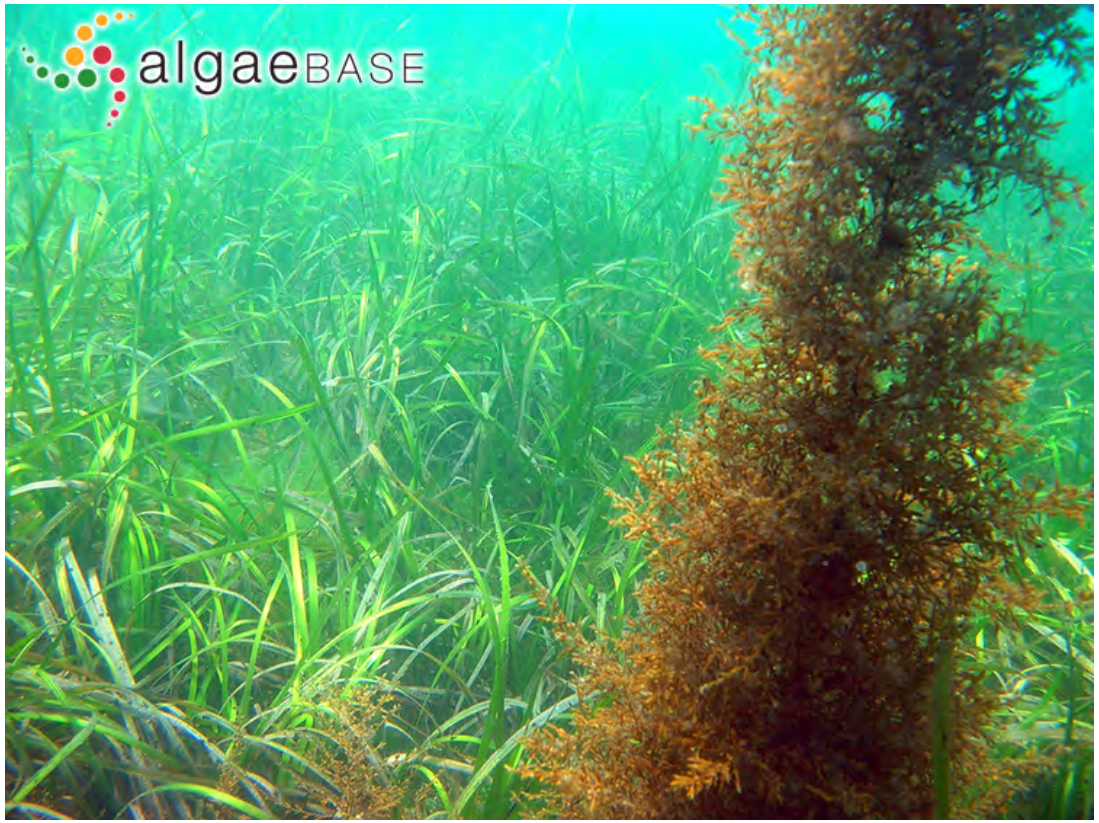
- Remove or modify structures that disrupt sediment delivery
- Allow erosion to create more intertidal habitat
- Protect and Restore eelgrass
- Restore lower intertidal mussel beds and algae
- Restore kelp forests
- Do not intervene to save pocket beaches that can not retreat

Case Study: Greater Farallones National Marine Sanctuary

Limit Human Disturbance:

- Designate “refugia” habitat for intertidal and subtidal organisms, marine mammals, and seabirds
- Reduce acoustic impacts and ship strikes to large whales

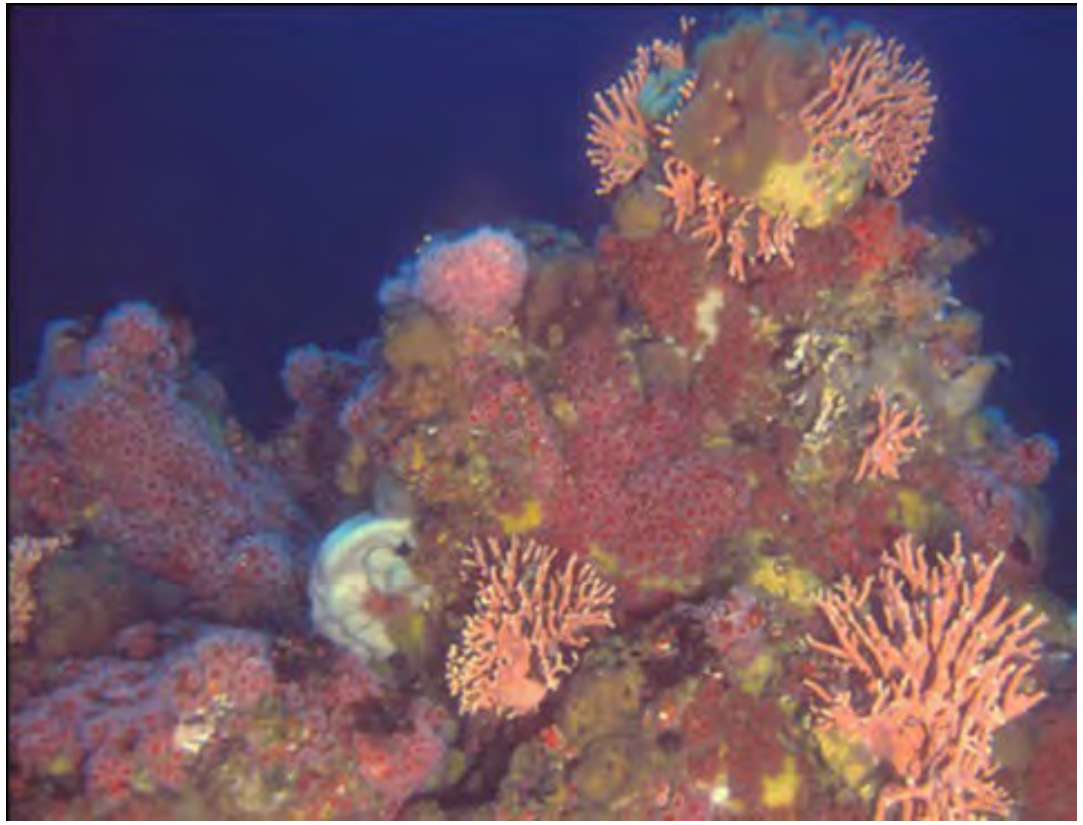
Case Study: Greater Farallones National Marine Sanctuary



Address Invasive Species:

- Prevent non-native, invasive species
- Clarify definition of introduced/invasive/non-native species
- Enhance/establish detection and monitoring of species changes
- Conduct rapid removal

Case Study: Greater Farallones National Marine Sanctuary



Invest in Science Needs:

- Monitor before and following extreme events
- Determine source of sediment for vulnerable beaches
- Promote eelgrass research
- Pursue and encourage OA research and mitigation
- Map extent of “Blue Carbon” habitat
- Track impact of OA

National marine sanctuary system

Building capacity for climate adaptation internationally

MPA Capacity Building – Cross cutting themes

Holistic Approach

Ecosystem Function

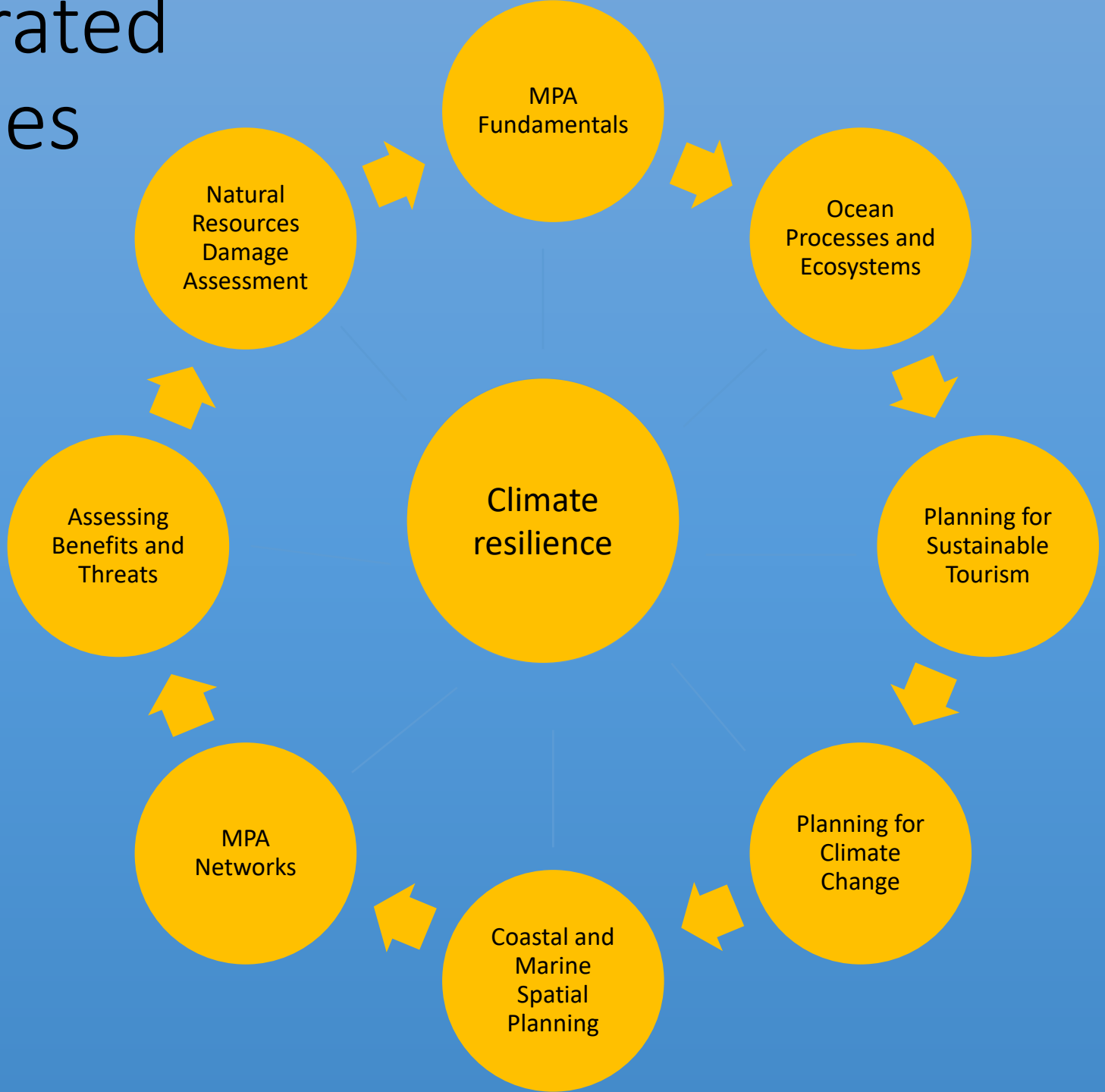
Supporting Resiliency

Addressing Cumulative Impacts

Integrating climate change - Philippines

- Connecting MPAs, climate resilience, marine spatial planning, tourism and coastal development in MPA capacity building

Integrated Themes



Focus on climate change: Western Indian Ocean

- Build climate change adaptation planning into MPA management planning, and empower site staff with monitoring and adaptation tools
- Climate change needs assessment 2012
- 3 trainings 2013-2015

ASCLME
Agulhas and Somali Current Large Marine Ecosystems Project

NOAA
National Oceanic and Atmospheric Administration
U.S. Department of Commerce

USAID

The Nature Conservancy

WIOMSA
Western Indian Ocean Marine Science Association
Coasts Ocean and People

Focus on climate change: Western Indian Ocean

- **Concepts:**
- Climate Change Impacts
- Information from communities
- Vulnerability assessment
- Scenario planning
- Adaptation strategies

- **Outcomes:**
- Network
- Cadre of trainers (mentor program)
- MPA Practitioners knowledge and tools
- Implementation Roadmaps

Acknowledgements

Gabrielle Johnson, NOAA Marine Protected Areas Center
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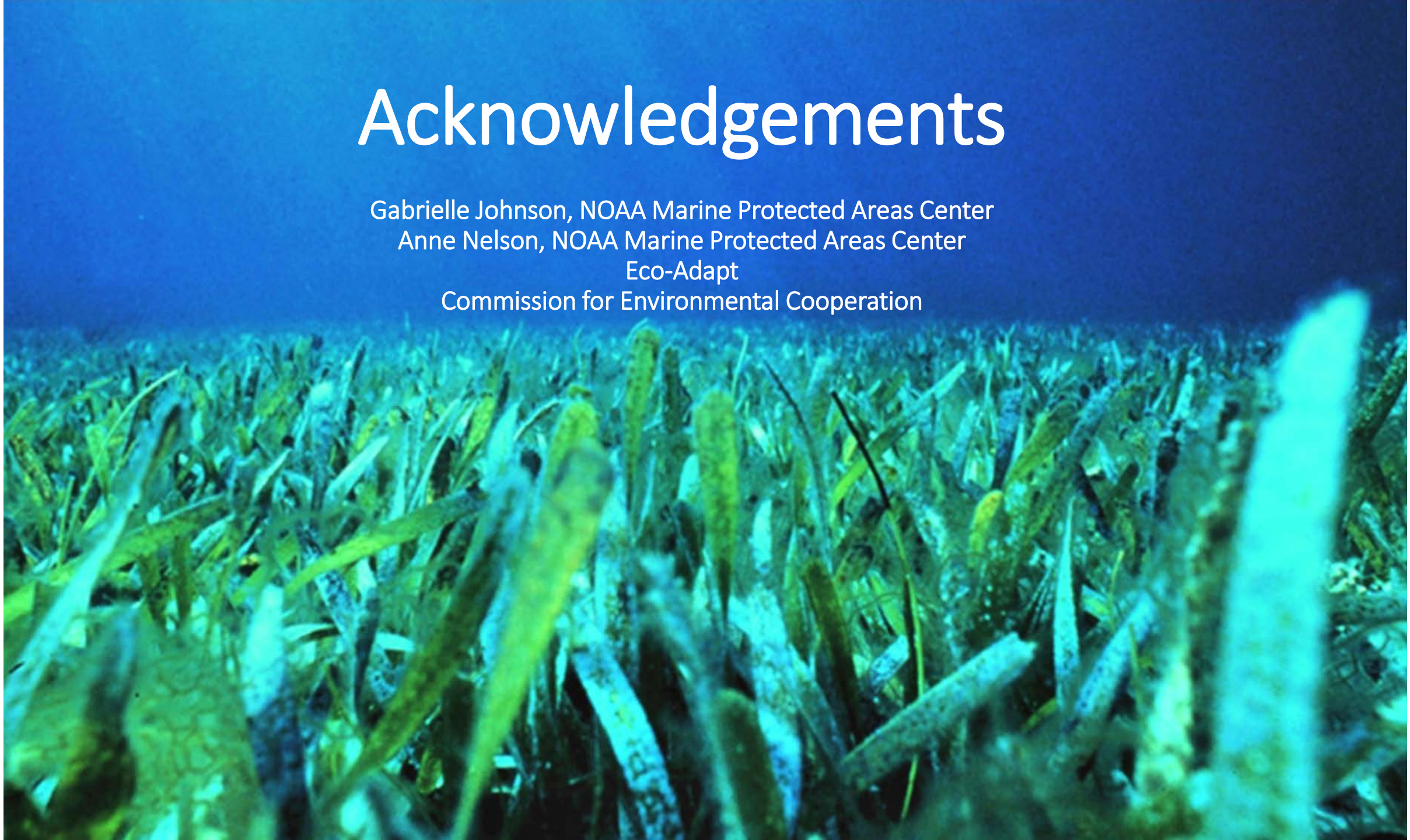
Commission for Environmental Cooperation



Office of National Marine Sanctuaries
National Oceanic and Atmospheric Administration

NATIONAL MARINE SANCTUARIES

http://sanctuaries.noaa.gov