From Impacts to Action:
Climate Adaptation in Greater Farallones and Cordell Bank National Marine Sanctuaries

Sara Hutto, NOAA Affiliate, Office of National Marine Sanctuaries

NOAA's Office of National Marine Sanctuaries

Farallones and Cordell Sanctuaries

- 2 sites managed together
- Nearly 6,000 square miles
- Open ocean, deep-sea banks, tidal flats, rocky intertidal, estuarine wetlands, subtidal reefs, and beaches
- Breeding/feeding grounds for:
  - 25 E&T species
  - 36 marine mammal species
  - > 1/4 million breeding seabirds
- Significant white shark population

Our marine climate is changing

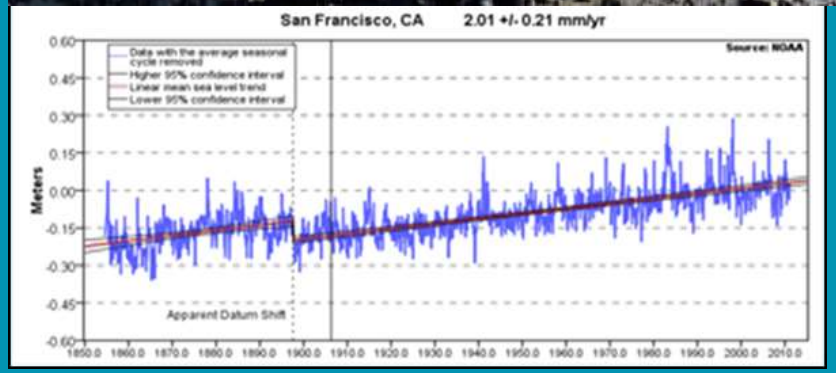
Impacts from climate change are intensifying both globally and locally, which threatens the health and resilience of our resources protected by our MPA

Marine heat waves drive kelp loss

SLR and erosion threaten coastal habitats like salt marsh

Ocean acidification impacts fish and deep-sea corals

Climate adaptation is best addressed in MPAs

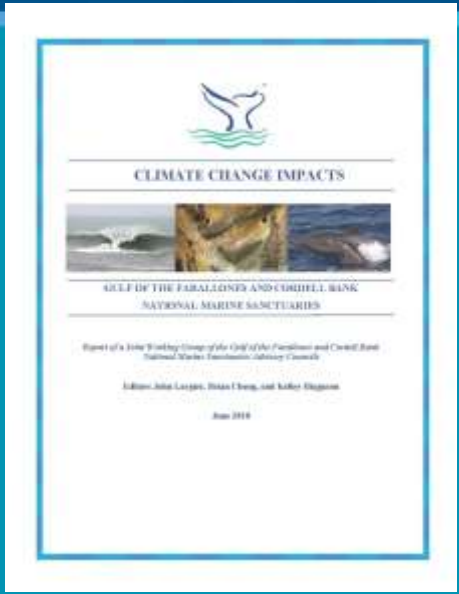


- Long-term, place-based nature of MPAs provide a focal point for science/monitoring and management
- The public is often already engaged and involved
- Protected areas offer management mechanisms to reduce stressors
- Protected areas serve as sentinel sites

The Ocean Climate Program

Founded in 2008, the Ocean Climate Program seeks to increase awareness of climate impacts and collaborate with partners to implement actions to increase resource resilience in Farallones and Cordell Sanctuaries

Understanding Climate Impacts



Sea Level
Coastal Erosion
Variability of Precipitation
Extreme Weather Events
Wave Action
Sea Surface Temperature

pH (ocean acidification)
Dissolved Oxygen

Northward shift of key species
Altered currents and mixing
Salinity
Sediment Supply

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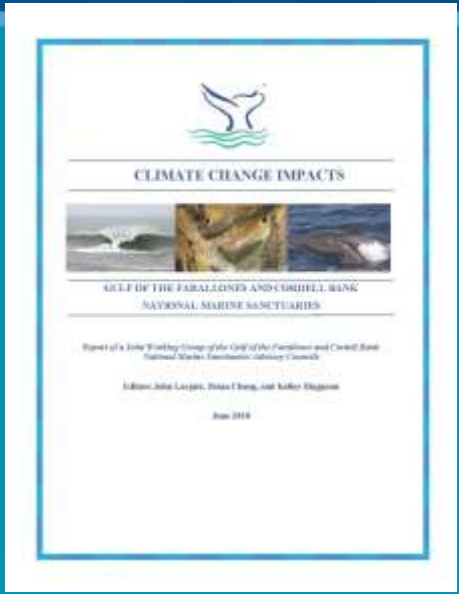
Understanding Climate Impacts



Sea Level
Coastal Erosion
Variability of Precipitation ←
Extreme Weather Events
Wave Action
Sea Surface Temperature ←

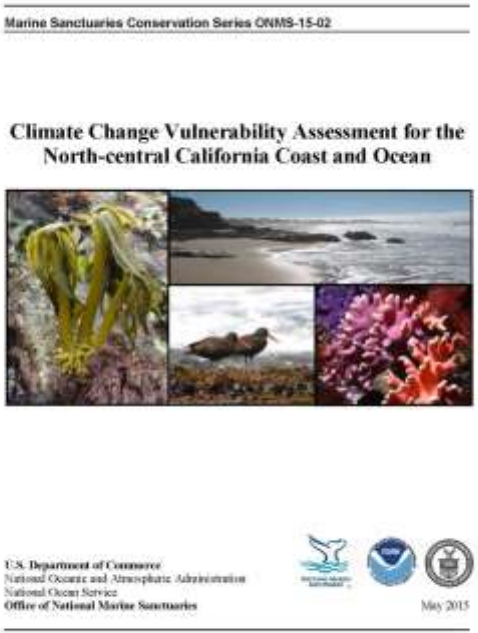
And these are intensifying!

pH (ocean acidification) ←
Dissolved Oxygen

Northward shift of key species ←
Altered currents and mixing
Salinity
Sediment Supply

?

Climate Vulnerability Assessment


Marine Sanctuaries Conservation Series ONMS-15-02

Climate Change Vulnerability Assessment for the North-central California Coast and Ocean

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Ocean Service
Office of National Marine Sanctuaries

May 2015

High

Beaches/dunes
Estuaries
Rocky Intertidal

Moderate

Nearshore
Cliffs
Pelagic

Low

Kelp Forest
Offshore rocky reefs

Development of the Climate Adaptation Plan

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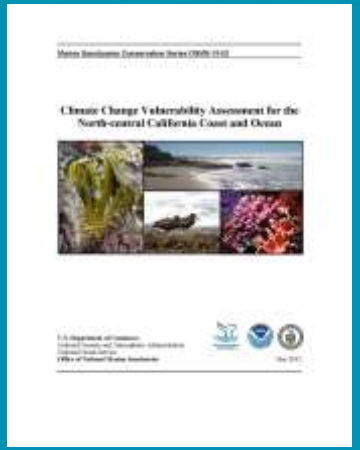
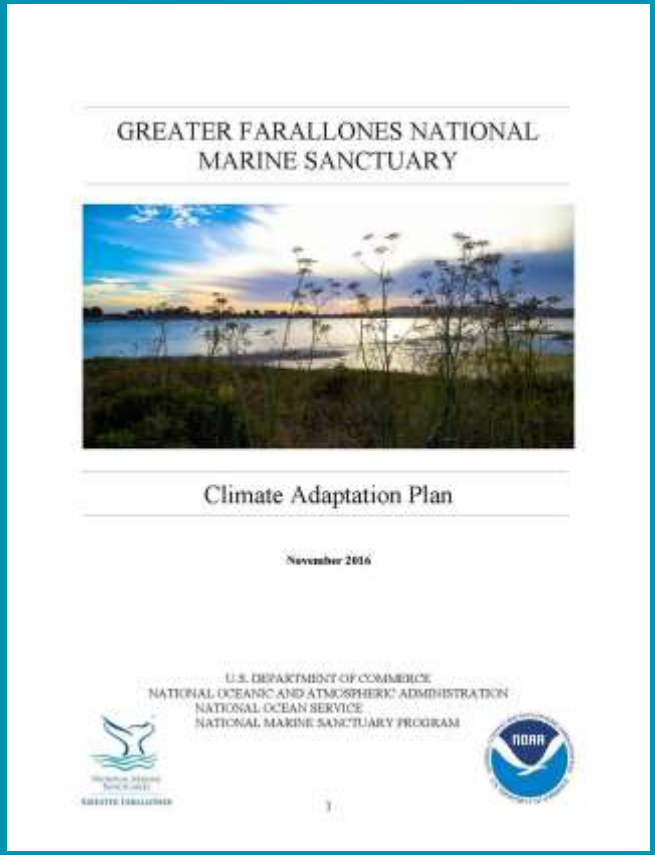
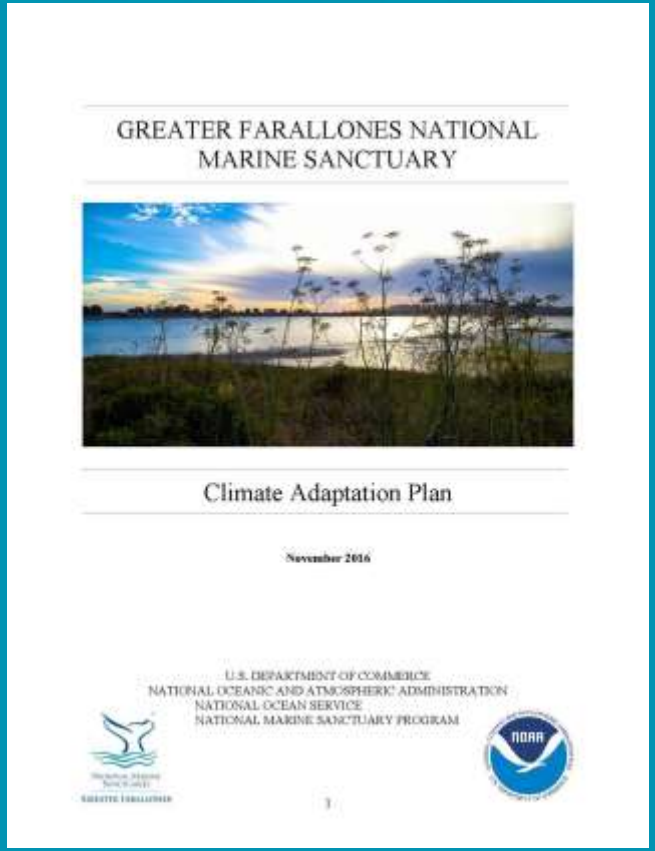


Research, assessment, and a working group informed our climate adaptation plan



Goal of the Climate Adaptation Plan

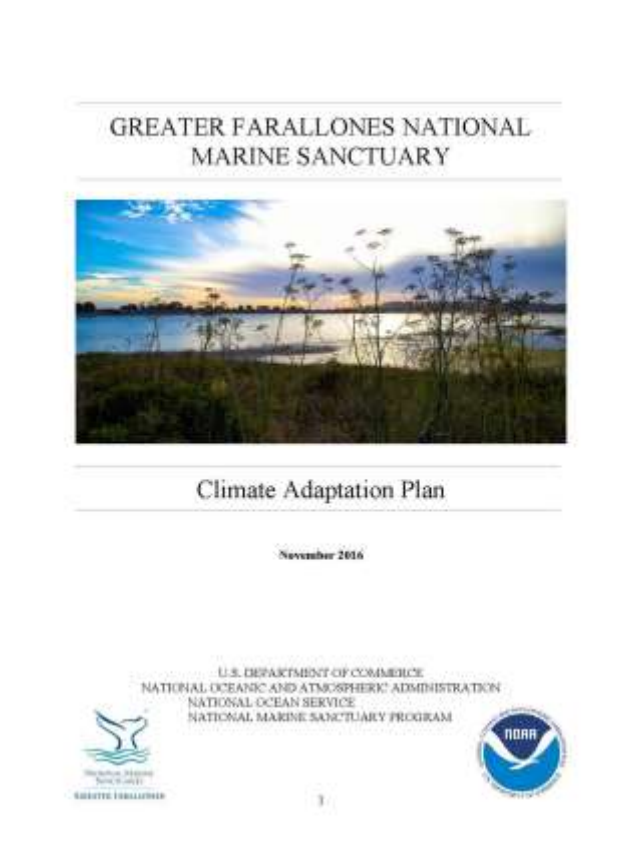


↓ Vulnerability

to

↑ Resilience

Climate adaptation strategies



- Investigate the use of vegetation to locally mitigate ocean acidification
- Remove/redesign roads to allow for coastal habitats to migrate inland in response to sea level rise
- Restore “living shorelines” (oyster reefs, saltmarsh, eelgrass)
- Determine the source of sediment for vulnerable beaches in order to improve sediment supply processes.

Climate Adaptation Implementation


GREATER FARALLONES NATIONAL MARINE SANCTUARY

Climate Adaptation Plan

November 2016

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


Living shorelines

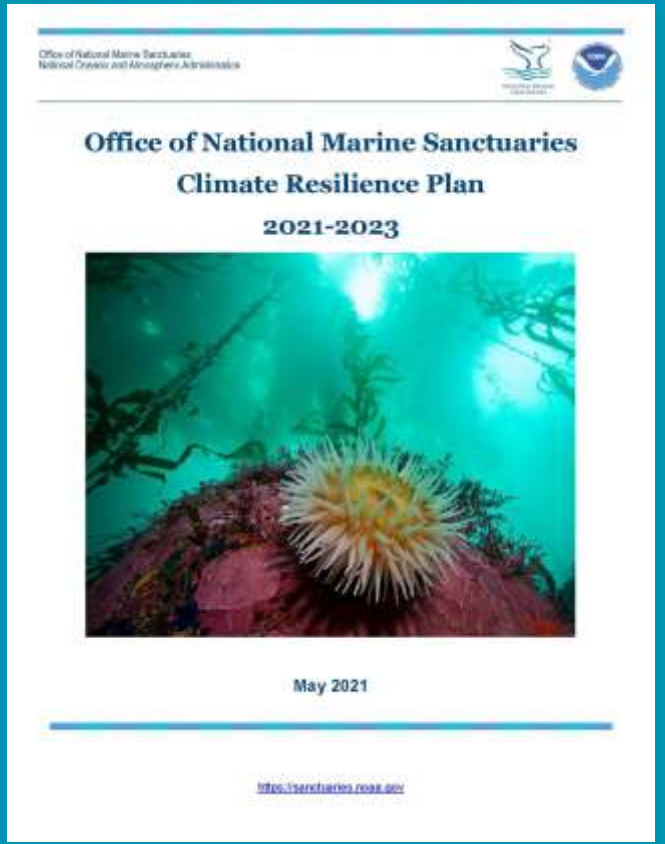

Kelp restoration


Blue carbon


Sediment management

Successful Adaptation Across ONMS

- ONMS Climate Resilience Plan: implement climate adaptation planning at all ONMS sites
- State of climate adaptation in ONMS
- Conducted interviews with all 15 sites in ONMS
- Education is most implemented adaptation strategy - can be very effective if focused on action
- Reducing non-climate stressors is a very effective strategy when climate impacts can't be managed directly



Increasing capacity at other MPAs

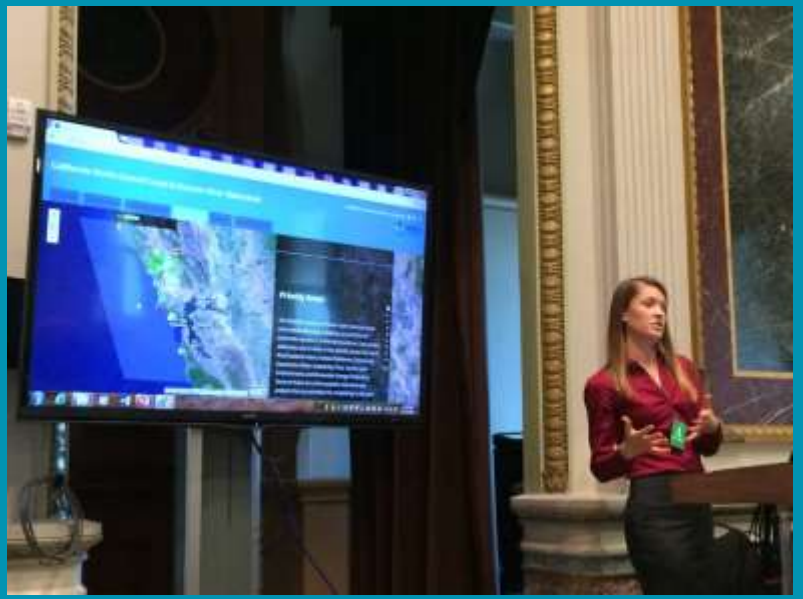
Climate planning tools for managers

Capacity-building trainings for 7 Sanctuary sites and MPAs in Mexico, Canada

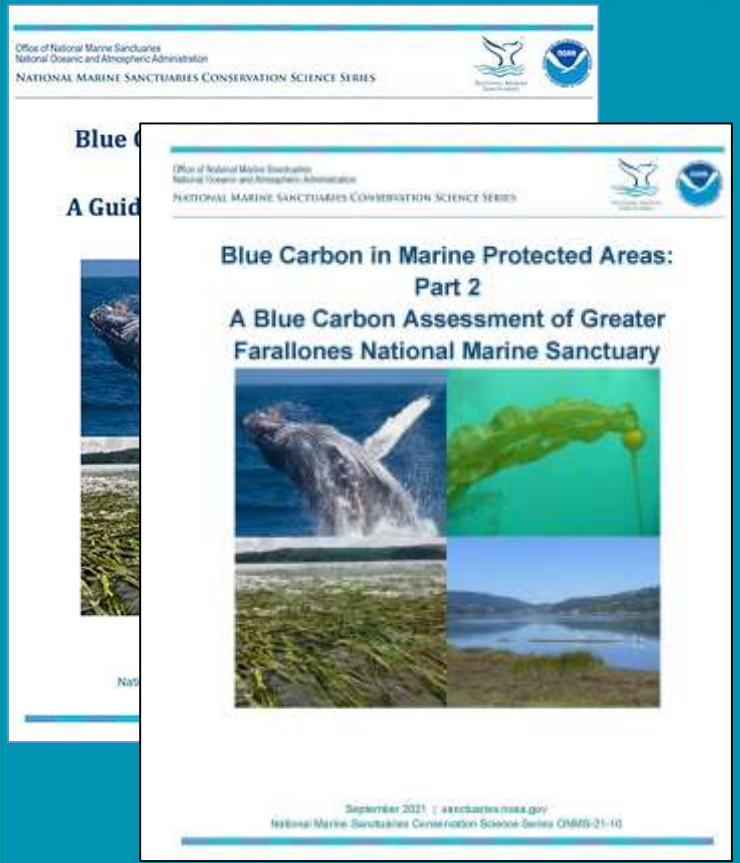
An example for other MPAs

Case study for International Partnership and UN COP26

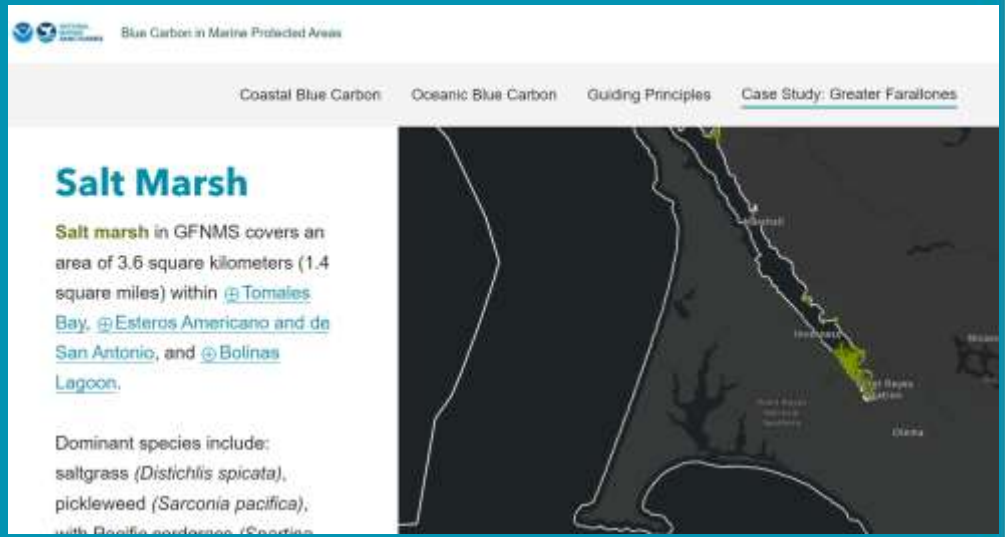
Case study for White House Council on Environmental Quality Resilient Lands and Waters Initiative



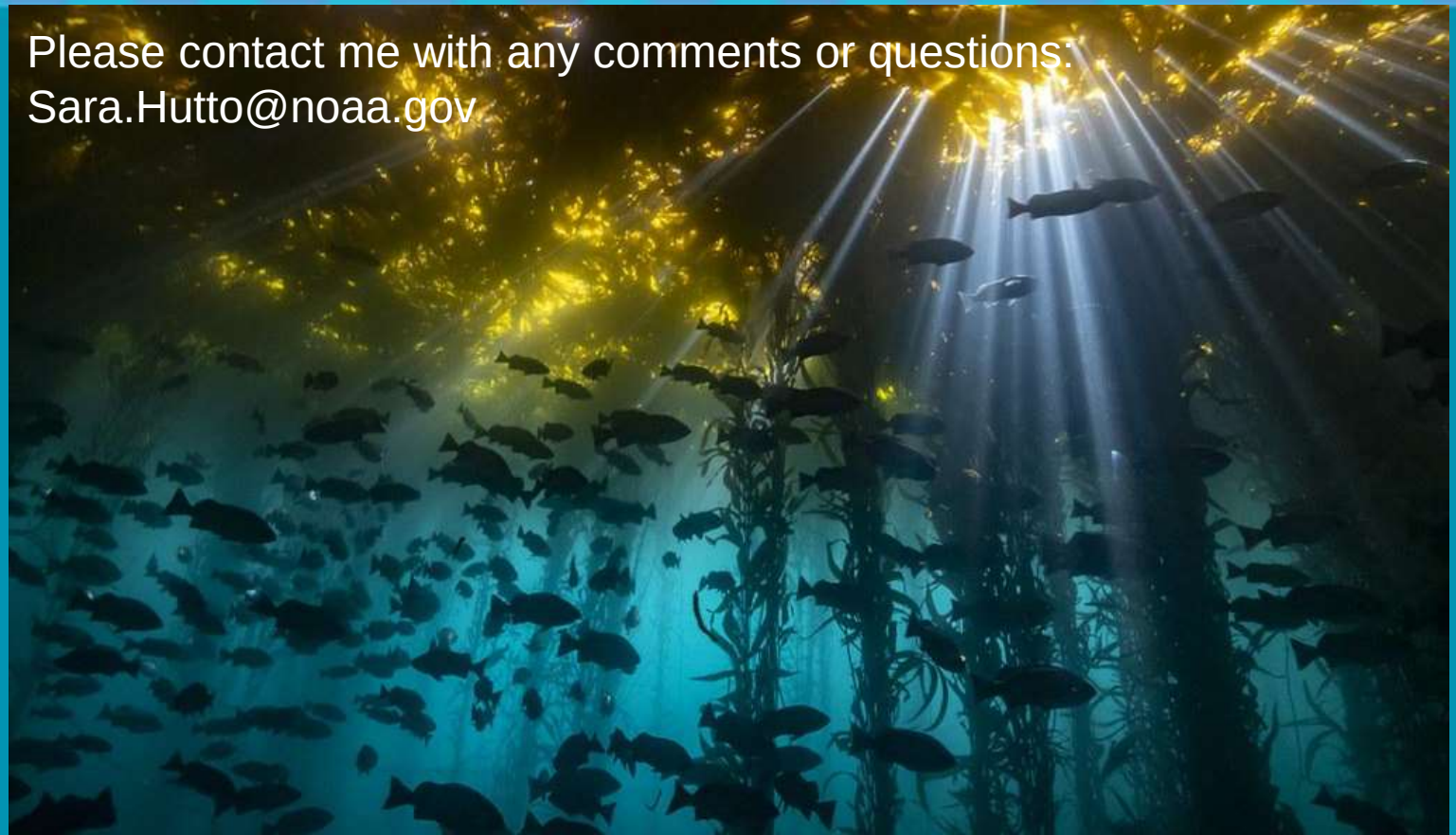
Climate Mitigation via Blue Carbon



[Blue carbon in Marine Protected Areas Storymap!]



Thank you!


Please contact me with any comments or questions:
Sara.Hutto@noaa.gov