



Greater Farallones National Marine Sanctuary Climate-Smart Adaptation

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GFNMS Ocean Climate Program

**Increase
awareness**

**Take
action**

Collaborate

Lead



Climate-Smart Adaptation

Protect, maintain healthy ecosystems by enhancing resilience

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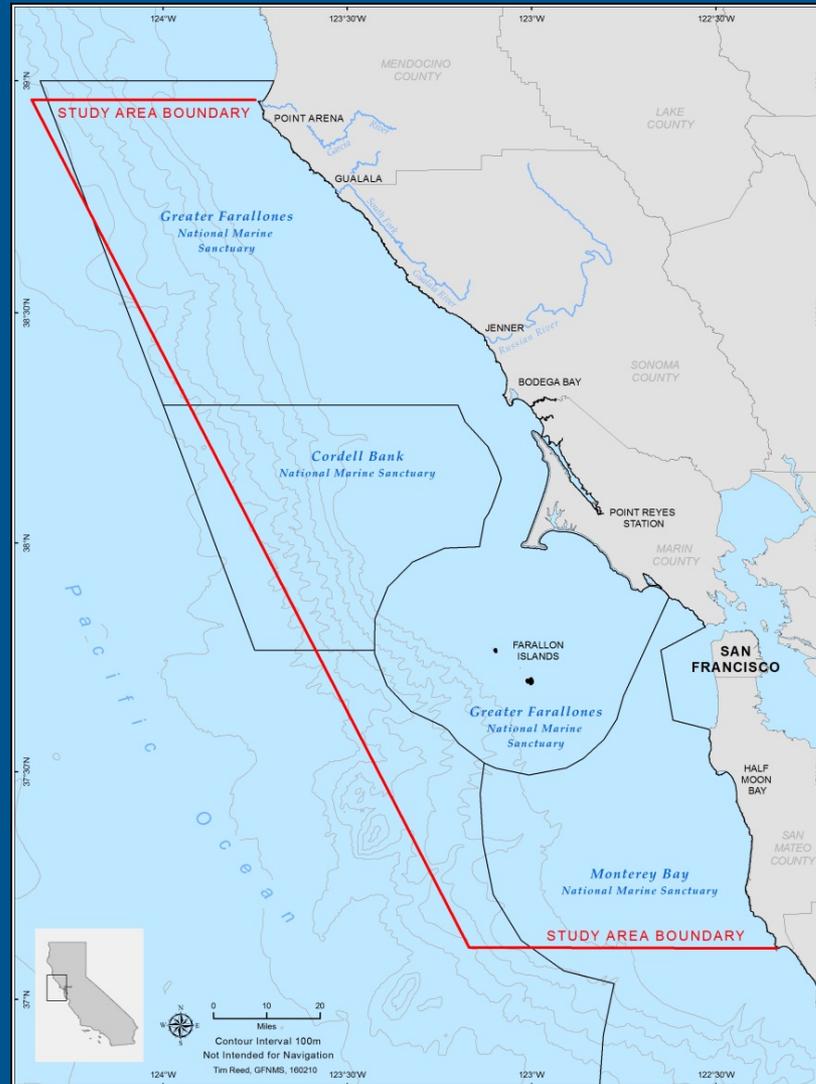
Climate-Smart Adaptation

Protect, maintain healthy ecosystems by enhancing resilience



to the impacts of climate change through collaboratively developed adaptation actions that are feasible, effective and nature-based.

Climate-Smart Adaptation



Project Partners



seedfund



Answering two big questions



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- 1) How vulnerable to climate change are the resources that we manage?
- 2) What can we do to limit or reduce vulnerability?



Answering two big questions

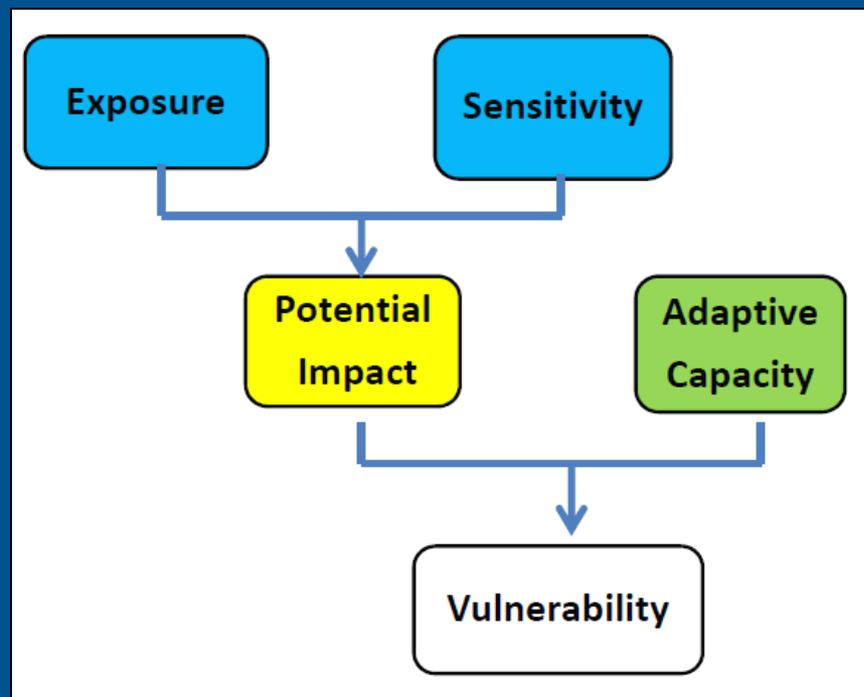
1) How vulnerable to climate change are the resources that we manage?

2) What can we do to limit or reduce vulnerability?



Defining Vulnerability

*A function of the **sensitivity** of a particular resource to climate changes, its **exposure** to those changes, and its **capacity to adapt** to those changes (IPCC 2007)*



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

SENSITIVITY & EXPOSURE



Low (1)

Low-Mod (2)

Mod (3)

Mod-High (4)

High (5)

ADAPTIVE CAPACITY



Low (1) Low-Mod (2) Mod (3) Mod-High (4) High (5)

Low
Vulnerability

Habitats

High
Vulnerability

SENSITIVITY & EXPOSURE



Low (1)

Low-Mod (2)

Mod (3)

Mod-High (4)

High (5)

ADAPTIVE CAPACITY



Low (1) Low-Mod (2) Mod (3) Mod-High (4) High (5)

Low Vulnerability

Kelp Forest
Pelagic Water Column

Rocky Intertidal
Estuaries

3
2

Offshore Rocky Reefs

Cliffs
Nearshore

Beaches & Dunes

1

Habitats

High Vulnerability

Key climate-driven stressors

1. Wave action
2. Coastal erosion
3. Sea level rise



Key non-climate stressors

1. Roads/coastal armoring
2. Invasive/problematic species
3. Land use change



Answering two big questions

1) How vulnerable to climate change are the resources that we manage?

2) What can we do to limit or reduce vulnerability?



Working Group Membership

Federal: USFWS, CA LCC, National Park Service, GGNRA, NMFS, BLM, USGS

State: Coastal Commission, State Parks, State Coastal Conservancy, CDFW

Local: San Mateo and Marin Counties

NGOs: Point Blue, BAECCEC, Greater Farallones Association

Academia: Bodega Marine Lab, Stanford University



Working Group Outcomes

Working Group Outcomes



Working Group Outcomes



Working Group Outcomes



Climate-Smart Adaptation Report

Climate-Smart Adaptation for North-central California Coastal Habitats

Report of the Climate-Smart Adaptation Working Group of the Greater Farallones National
Marine Sanctuary Advisory Council

Editor: Sara Hutto



March 2016

Strategy Approaches

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Alleviate Climate Impacts

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Manage Dynamic Conditions

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Manage Dynamic Conditions

Promote Education

Strategy Approaches

Alleviate Climate Impacts

Manage Dynamic Conditions

Promote Education

Protect and Restore Habitat

Strategy Approaches

Alleviate Climate Impacts

Manage Dynamic Conditions

Promote Education

Protect and Restore Habitat

Limit Human Disturbance

Strategy Approaches

Address Invasive Species

Strategy Approaches

Address Invasive Species

Promote Landward Migration

Strategy Approaches

Address Invasive Species

Promote Landward Migration

Invest in Science Needs

Strategy Approaches

Address Invasive Species

Promote Landward Migration

Invest in Science Needs

Protect Species

Strategy Approaches

Address Invasive Species

Promote Landward Migration

Invest in Science Needs

Protect Species

Manage Water Quality

What is next?



What is next?

GFNMS Climate Action Plan

- Selection of modified adaptation strategies
- Conceptual implementation



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Ocean Climate Summit today!

- Gather input from YOU on select adaptation strategies via two Adaptation Strategy Cafés

