

Climate-Smart Adaptation Working Group Report

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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



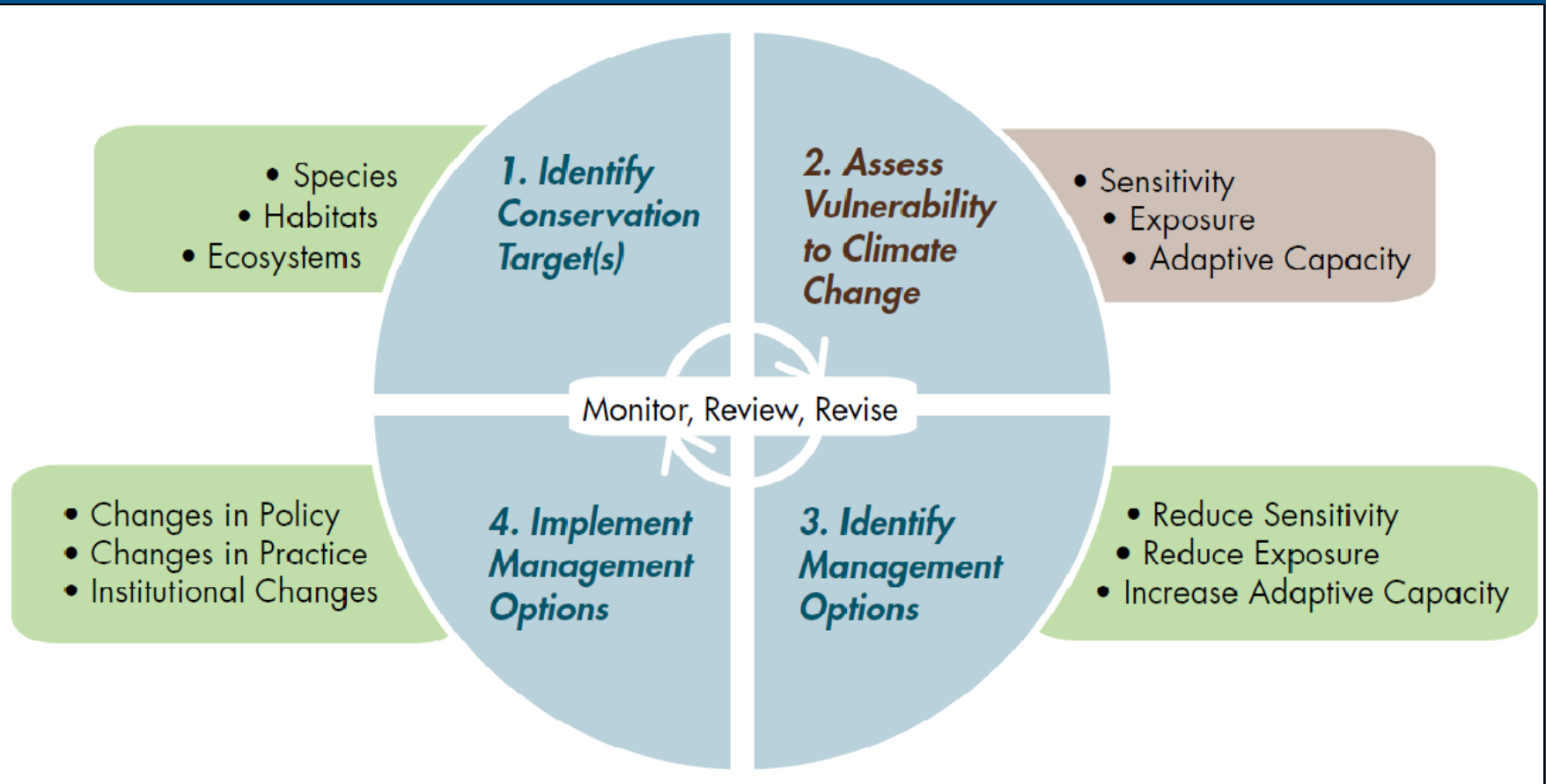
March 2016

Climate-Smart Adaptation Project

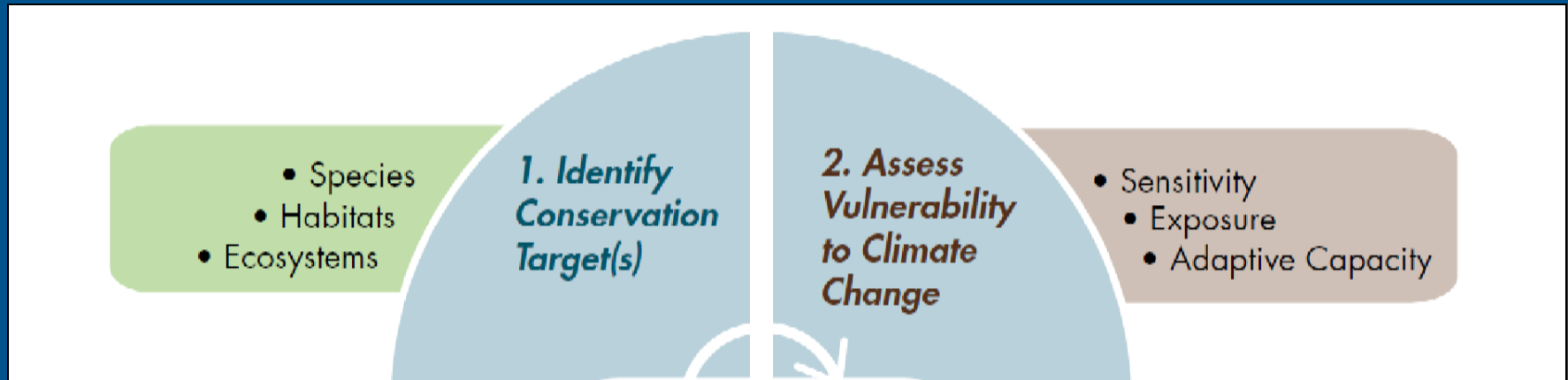
How vulnerable to climate change are the species, habitats, and ecosystem services that we manage? [Vulnerability Assessment]

What can we do to limit or reduce vulnerability? [Adaptation Planning]

Climate-Smart Adaptation Project



Climate-Smart Adaptation Project

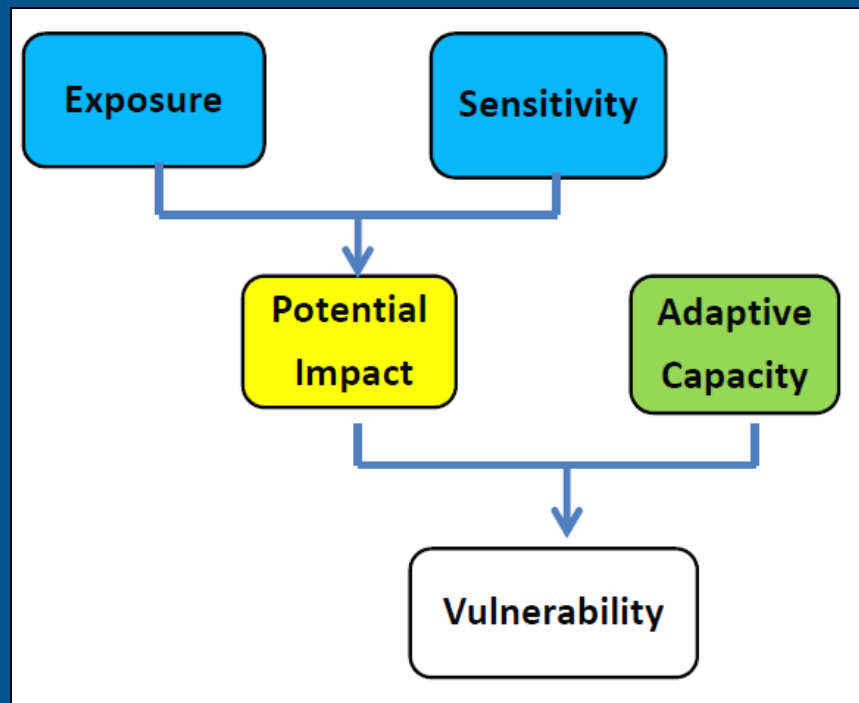


Focal Resources Workshop
February 2014
72 resources identified

Vulnerability Assessment Workshop
June 2014
44 resources assessed

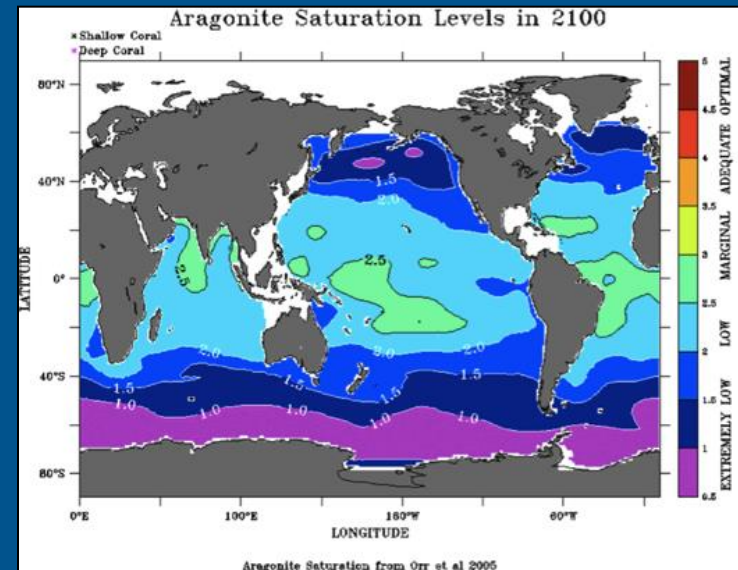
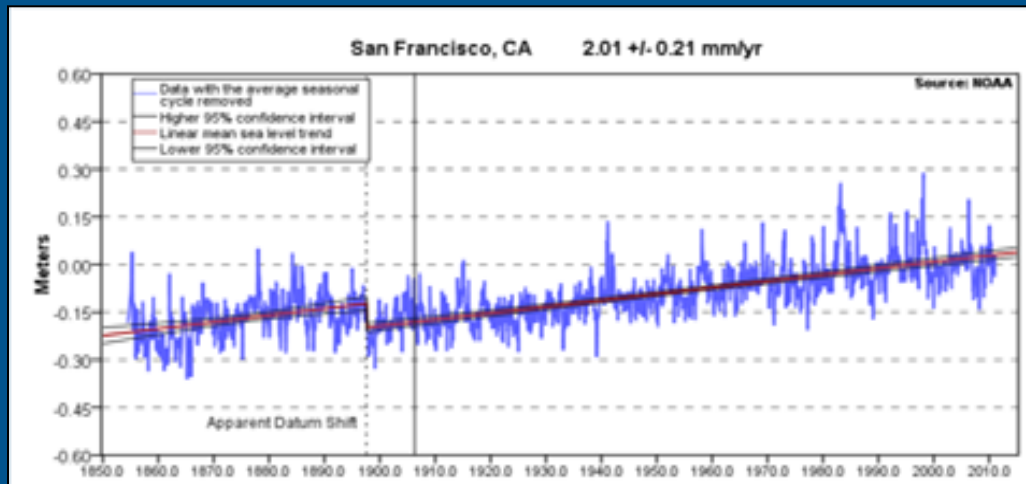
Defining Vulnerability

*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)*



Defining Vulnerability

Exposure: Measure of how much of a change in climate or other environmental factor a resource is likely to experience.



Workshop participants provided degree of exposure (1 low -5 high) for a list of climate factors for each focal resource.

Defining Vulnerability

Sensitivity: Measure of whether and how a resource is likely to be affected by a given change in climate.



Workshop participants considered:

- *Sensitivity to climate factors (1 low – 5 high)*
- *Sensitivity to non-climate stressors (1 low – 5 high)*
- *Dependencies (specific habitat or prey, generalist or specialist?)*

Defining Vulnerability

Adaptive Capacity: Ability to accommodate or cope with climate change impacts with minimal disruption.



Workshop participants considered:

- *Extent, status, dispersal ability*
- *Population connectivity*
- *Diversity (genetic, life history strategies)*
- *Plasticity (behavioral, morphological)*
- *Value of resource*
- *Management potential*

Climate-driven stressors

Most impactful (average sensitivity score):

1. Wave action
2. Coastal erosion
3. Salinity
4. pH
5. Dynamic ocean conditions
(currents/mixing/stratification)

Most cited (# resources):

1. pH
2. Dynamic ocean conditions
3. Sea surface temperature

Non-climate stressors

Most impactful (average sensitivity score):

1. Roads/coastal armoring
2. Invasive/problematic species
3. Recreation
4. Pollution and poisons
5. Land use change

Most cited (# resources):

1. Pollution and poisons
2. Harvest
3. Invasive/problematic species

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

Rocky Intertidal

3

Pelagic Water Column

Estuaries

2

Offshore Rocky Reefs

Cliffs

Nearshore

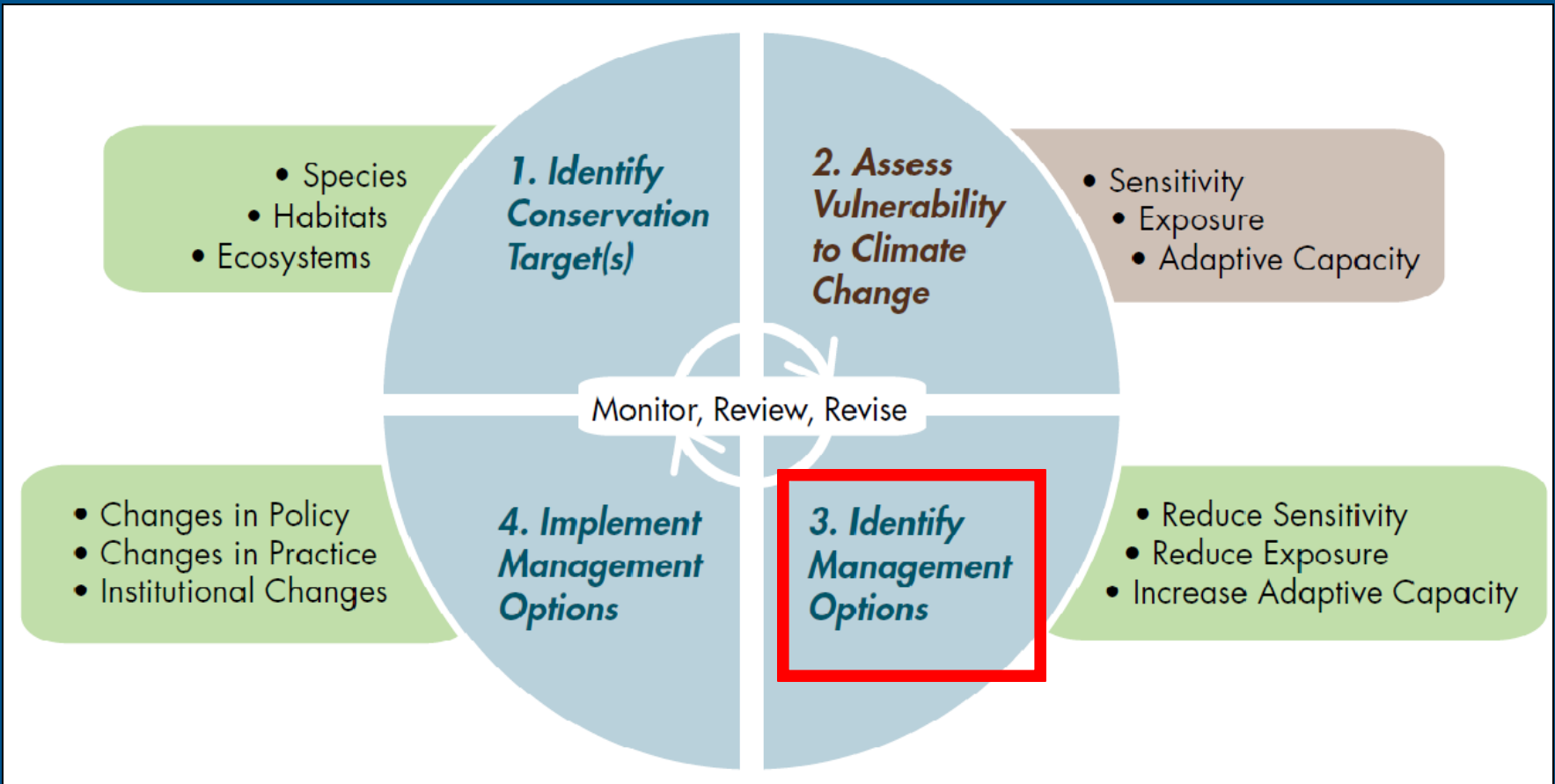
Beaches & Dunes

1

Habitats

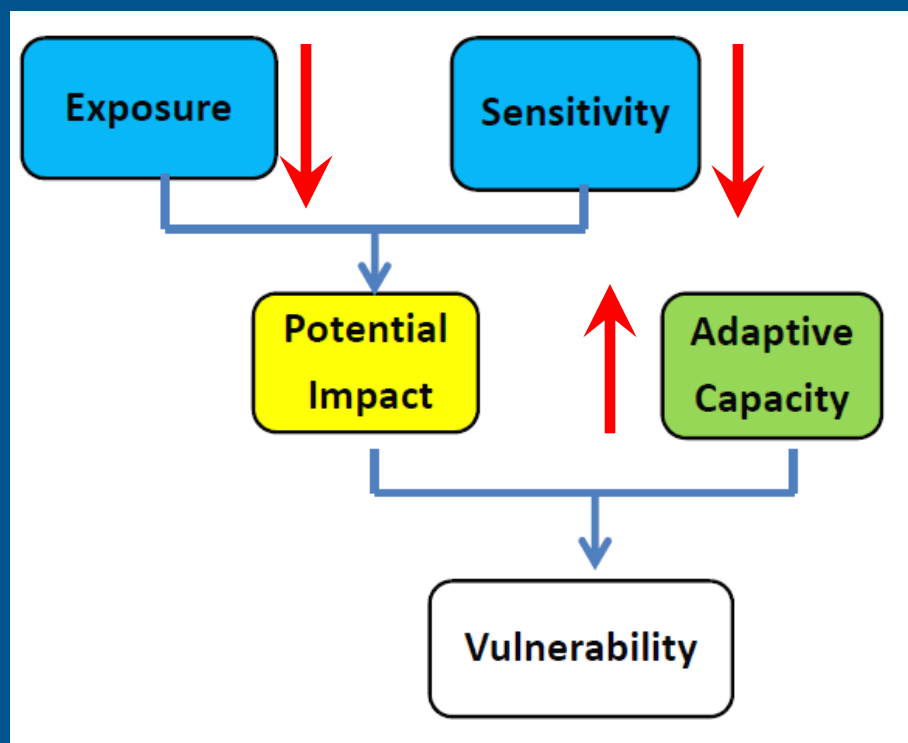
High Vulnerability

Climate-Smart Adaptation Project



Working Group Goal

Use assessment results to develop management strategies that will...



...in a variety of plausible future climate scenarios

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

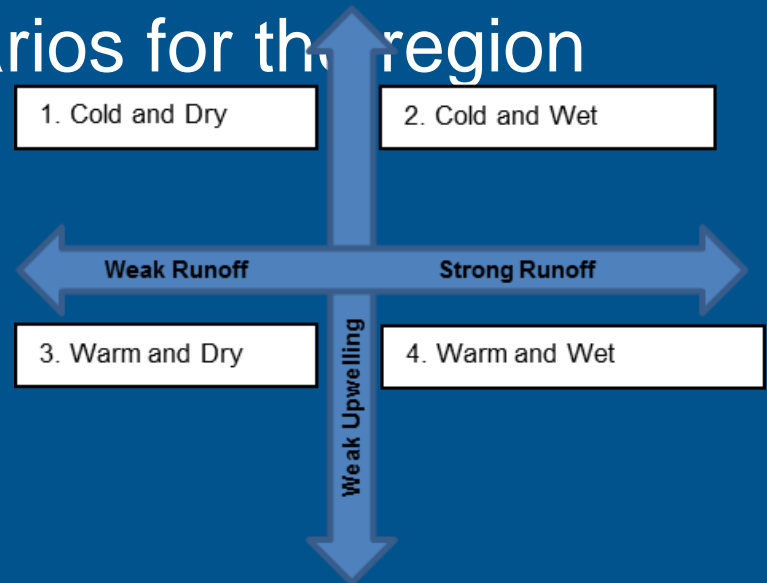
NGOs: Point Blue, BAECCE, Greater Farallones Association

Academia: Bodega Marine Lab, Stanford University

Working Group Process

April - May

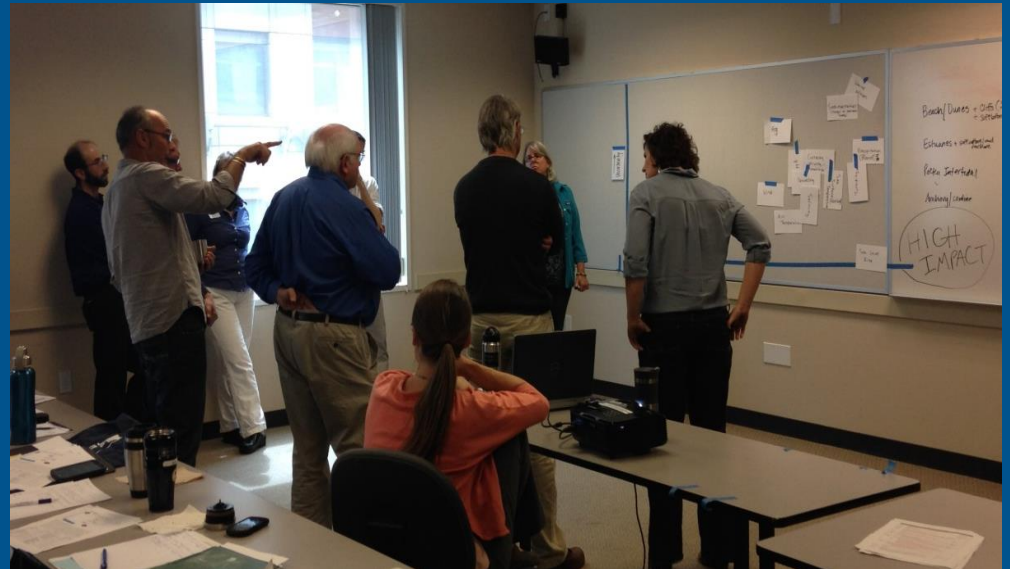
- Based on vulnerability assessment, selected resources for focus of adaptation planning: beaches/dunes, rocky intertidal, outer coast estuaries
- Developed climate scenarios for the region
- Developed management goals for habitats



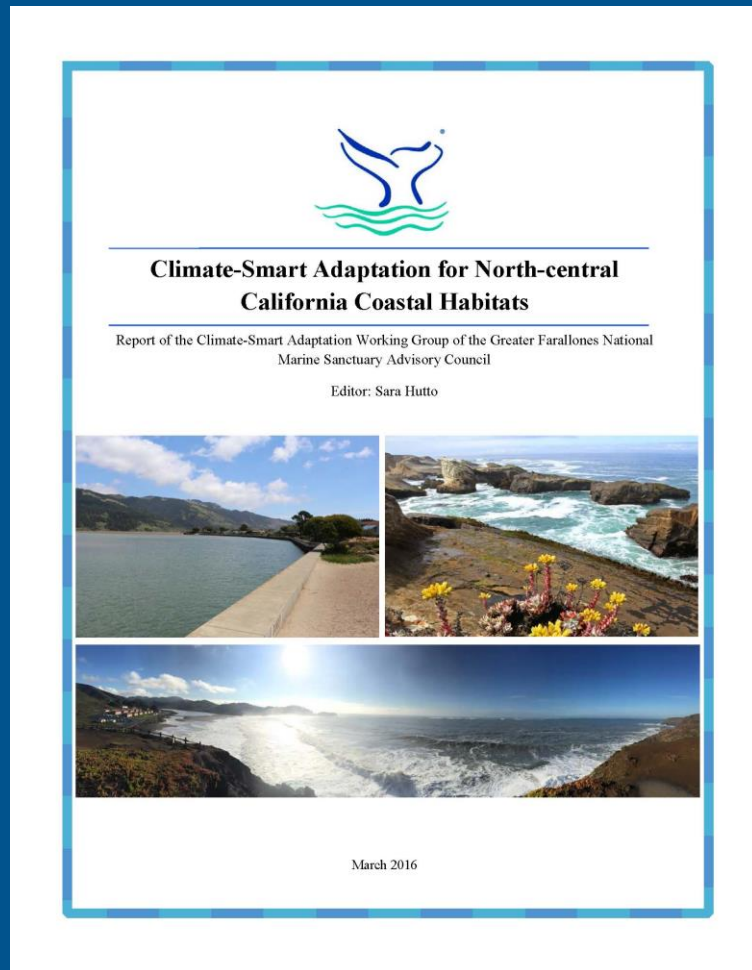
Working Group Process

September - December:

- Developed initial management recommendations for each habitat under each scenario to reduce vulnerabilities and accomplish habitat goal
- Refined, finalized, prioritized management recommendations



Working Group Report



84 strategies

- 31 for the Sanctuary to either lead implementation or directly partner to implement
- 53 identified as priority
- Conceptual, not prescriptive

What is next?

Advisory Council vote to:

- Recommend strategies to Sanctuary Superintendent
- Request strategies be sent to management agencies indicated

Ocean Climate Summit to present adaptation strategies

Climate Change Adaptation Action Plan

- Approved and/or modified adaptation strategies
- Implementation details: timeline, cost, resources
- Participating partners



Today's Work

- 1) Review strategies by main approach - In detail those that are identified for sanctuary implementation
- 2) Discussion and edits to strategies
- 3) **Vote:** The GFNMS Advisory Council votes to recommend the implementation of the “Alleviate Climate Impacts” strategies identified for the sanctuary, and for the strategies identified for other agencies, the council recommends that the sanctuary superintendent forward them to the appropriate agency.

Alleviate Climate Impacts

strategies that directly reduce the impact of climate stressors

4 strategies – 3 for sanctuary, 0 priority

Manage Dynamic Conditions

strategies that are responsive and adaptive to changing conditions

9 strategies – 5 for sanctuary, 7 priority

Promote Education

strategies that address the need to educate the community

1 strategy – 1 for sanctuary, 1 priority

Protect and Restore Habitat

strategies that focus on protecting and restoring habitat or key ecosystem processes

21 strategies – 6 for sanctuary, 11 priority

Limit Human Disturbance

strategies that restrict or reduce access to sensitive habitats to limit disturbance and enhance resilience

6 strategies – 2 for sanctuary, 3 priority

Address Invasive Species

strategies that address the impact of invasive species on habitat resilience

5 strategies – 4 for sanctuary, 5 priority

Promote Landward Migration

strategies that consider the need and plan for the ability for habitat to migrate landward in response to sea level rise and storms

18 strategies – 3 for sanctuary, 13 priority

Remove Legal Impediments

strategies that seek to redefine legal terminology to account for changing conditions

2 strategies – 0 for sanctuary, 2 priority

Invest in Science Needs

strategies that call for increased research to inform management

7 strategies – 5 for sanctuary, 4 priority

Protect Species

strategies that directly protect species rather than habitats

4 strategies – 2 for sanctuary, 1 priority

Manage Water Quality

strategies that improve water quality to enhance habitat resilience

7 strategies – 0 for sanctuary, 6 priority

Motion for vote

The GFNMS Advisory Council votes to recommend the implementation of the “Alleviate Climate Impacts” strategies identified for the sanctuary, and for the strategies identified for other agencies, the council recommends that the sanctuary superintendent forward them to the appropriate agency.

Thank you!

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