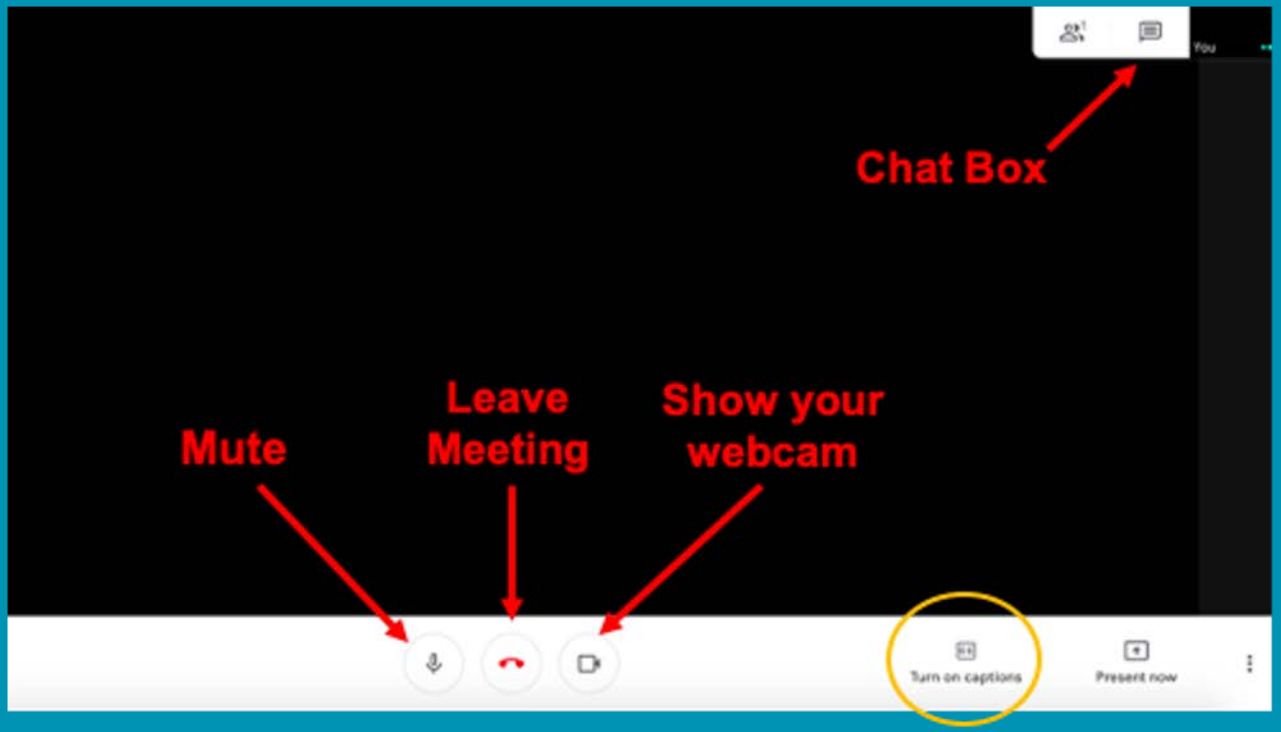
Welcome to the 2020 Virtual SAC Retreat – Day 1

Please mute yourself to reduce background noise.

<u>To join by phone</u>:
+1 720-500-4379
PIN: 642 683 106#

<u>If you are using a phone for audio</u>:
Use *6 to mute and unmute.



Note the option to turn on captions

Roll Call

1. Dominique Richard (Chair), CAL Marin Primary
2. Abby Mohan (Vice Chair), Recreational Activities Primary
3. Barbara Emley (Secretary), Commercial Fishing Primary
4. Sarah Bates, Commercial Fishing Alternate
5. Joe Fitting, CAL SF/SM Primary
6. Kris Lannin Liang, CAL SF/SM Alternate
7. George Clyde, CAL Marin Alternate
8. Cea Higgins, CAL Sonoma/Mendo Primary
9. Nancy Trissel, CAL Sonoma/Mendo Alternate
10. Richard Charter, Conservation Primary
11. Bruce Bowser, Conservation Primary
12. Francesca Koe, Conservation Alternate
13. Kathi George, Conservation Alternate
14. Bibit Traut, Education Alternate
15. John Berge, Maritime Activities Primary
16. Julian Rose, Maritime Activities Alternate
17. Joshua Russo, Recreational Activities Alternate
18. John Largier, Research Primary
19. Jaime Jahncke, Research Alternate
20. Ezra Bergson-Michelson, Youth Primary
21. Owen Youngquist, Youth Alternate

<u>Government Members</u>

23. Mark Gold, CA Natural Resources Primary
24. Michael Esgro, CA Natural Res. Alternate
25. Cicely Muldoon, NPS Primary
26. Ben Becker, NPS Alternate
28. LT Jacob Joseph, USCG Alternate
29. Chris Barr, USFWS Primary
30. Gerry McChesney, USFWS Alternate
31. Jennifer Boyce, NFMS Primary

31. Paul Michel, MBNMS Primary
32. Dawn Hayes, MBNMS Alternate
33. Dan Howard, CBNMS Primary
34. Michael Carver, CBNMS Alternate
35. Chris Mobley, CINMS Primary
36. Michael Murray, CINMS Alternate

Review Agenda

Thursday, October 1		
Time	**Topic**	**Lead**
9:00-9:15	Welcome, Roll Call, Review Agenda	Alayne Chappell, SAC Coordinator
9:15-9:40	Introduction to the 2020 SAC Retreat theme: Climate Change & the Sanctuary	Maria Brown, GFNMS Superintendent Sara Hutto, GFNMS Affiliate
9:40-11:00	Climate Indicators and the Sanctuary • Ocean Acidification and the Sanctuary: Impacts & Responses	Meredith Elliot, Point Blue Conservation Science Kate Hewett, UC Davis, Bodega Marine Laboratory
11:00-11:10	**BREAK**	
11:10-12:10	NNOCCI Ocean and Climate Change Interpretation Training	Aya Yamamoto, California Academy of Sciences
12:10-1:00	Blue Carbon in the Sanctuary	Abby Mohan, GFNMS SAC, Silvestrum Climate Associates Elizabeth Francis, Middlebury Institute of International Studies at Monterey
1:00	**ADJOURN**	

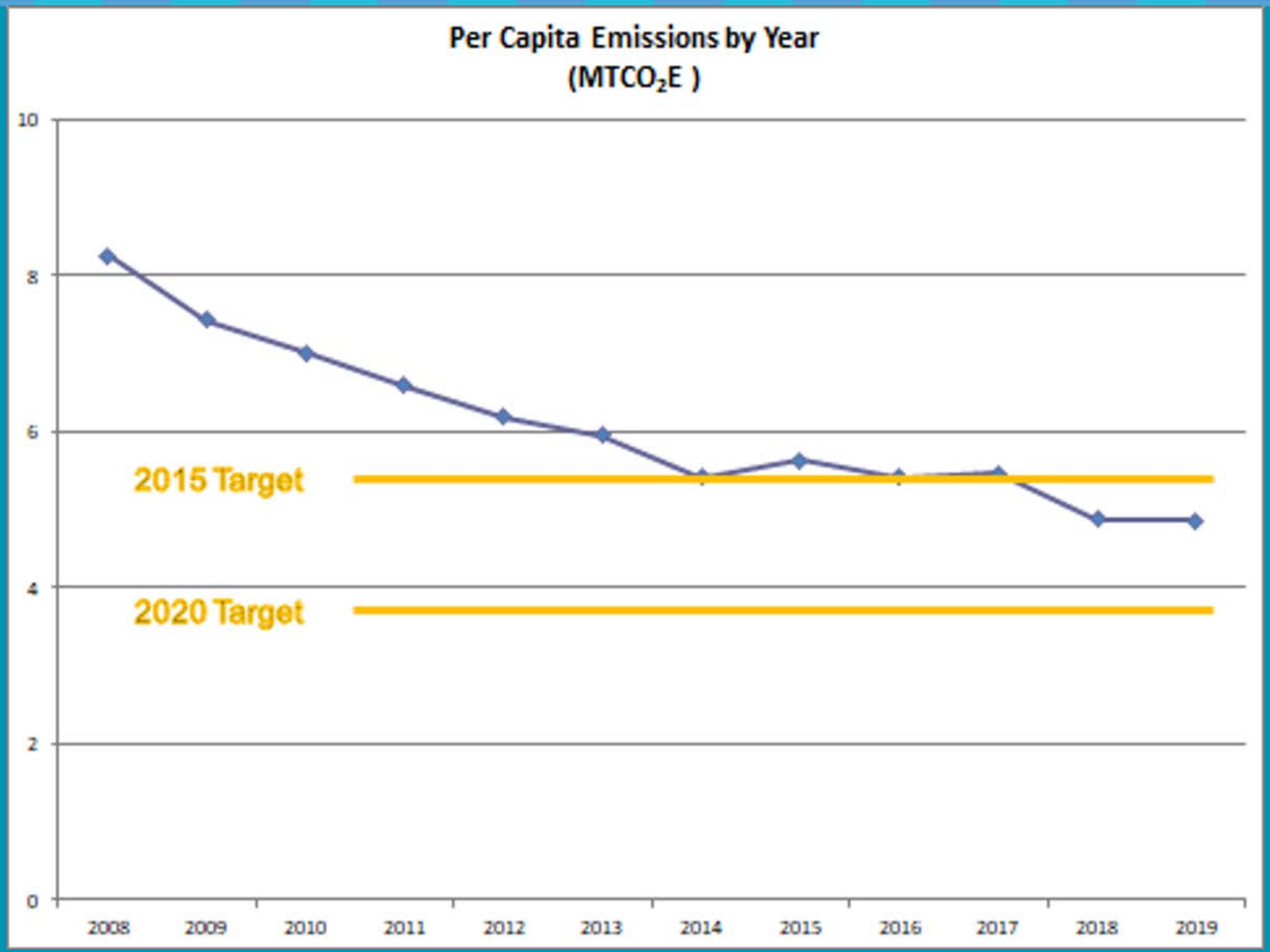
2007 Launch of GFNMS Ocean Climate Initiative

2008 Inaugural Ocean Climate Summit

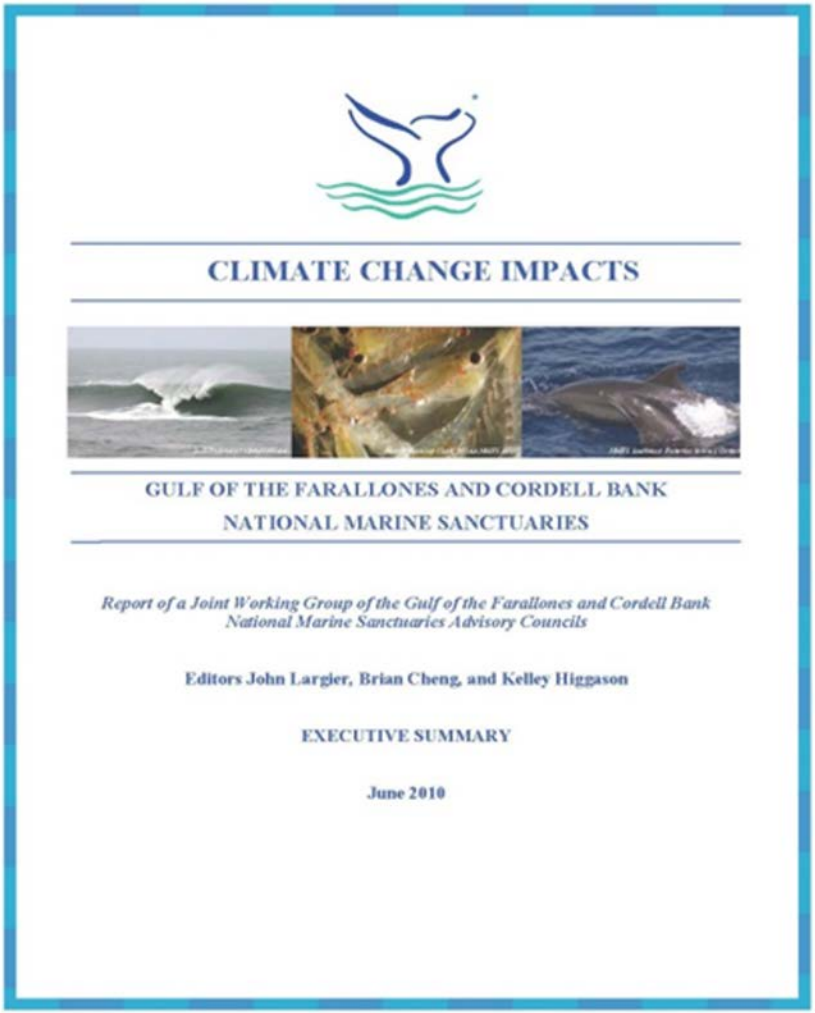
National Marine Sanctuaries

NOAA

2009 Green Operations Plan



2010 Climate Impacts Report



CLIMATE CHANGE IMPACTS

GULF OF THE FARALLONES AND CORDELL BANK
NATIONAL MARINE SANCTUARIES

Report of a Joint Working Group of the Gulf of the Farallones and Cordell Bank National Marine Sanctuaries Advisory Councils

Editors John Largier, Brian Cheng, and Kelley Higgason

EXECUTIVE SUMMARY

June 2010

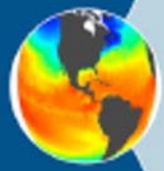
Characterized observed and predicted climate change impacts

2011 Ocean Climate Indicators

National Marine Sanctuaries

NOAA

Physical Ocean Climate Indicators



Ocean Water Properties

Sea Surface Temperature

Indicates Changes In:

- Upwelling
- Water transport
- Habitat suitability
- Water quality

Sea Surface Salinity

Indicates Changes In:

- Runoff
- Downwelling events
- Water quality
- Nutrients

Dissolved Oxygen

Indicates Changes In:

- Habitat suitability
- Water quality
- Primary productivity

Ocean Chemistry (pH; pCO_2)

Indicates Changes In:

- Ocean Acidification
- Habitat suitability
- Water quality

Sea Level

Indicates Changes In:

- Habitat extent
- Inundation time
- Storminess
- Upwelling
- Interannual ocean state (ex: El Niño conditions)

Wave Height & Direction

Indicates Changes In:

- Habitat suitability
- Inundation time
- Storminess
- Shoreline erosion
- Beach condition
- Estuary mouth state
- Agitation of coastal bottom and shoreline biota

Atmospheric Properties

Air Temperature

Indicates Changes In:

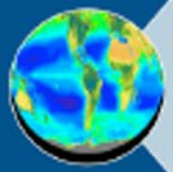
- Weather and climate patterns
- Incoming radiation
- Presence of marine layer clouds
- Intertidal habitat suitability
- El Niño Southern Oscillation

Alongshore Wind Speed

Indicates Changes In:

- Storminess
- Upwelling
- Habitat suitability

Biological Ocean Climate Indicators



Primary Productivity (Rate and Biomass of Primary Producers)

Indicates:

- Health of lowest trophic levels of food web
- Potential for harmful algal blooms

Examples:

- Chlorophyll Biomass
- Phytoplankton Assemblages

Abundance, Biomass, and/or Phenology of Mid-Trophic Level Species

Indicates:

- Health of middle trophic levels of food web

Examples:

- Mole Crabs
- California Mussels
- Gooseneck Barnacles
- Ochre Sea Stars
- Blue & Gopher Rockfish
- Copepods

Spatial Extent of Habitat-Forming Organisms

Indicates:

- Changes in habitat availability

Examples:

- Surfgrass
- Mussel Beds
- Bull Kelp
- Eelgrass
- Corals

Seabird Phenology, Productivity, and/or Diet:

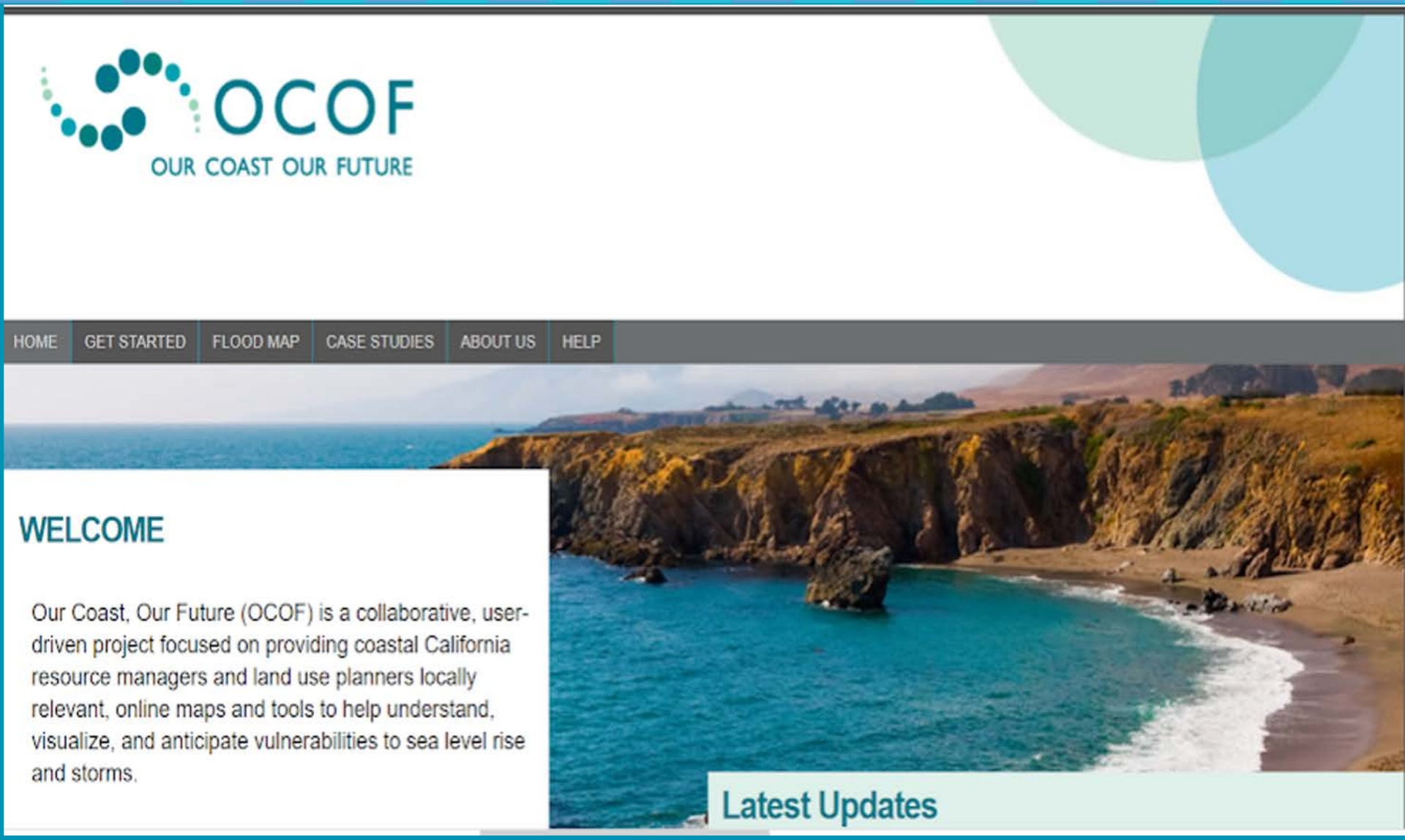
Indicates:

- Year-round picture of health of high trophic levels of food web
- Impacts of changes in primary productivity
- Potential for mismatches in species phenology

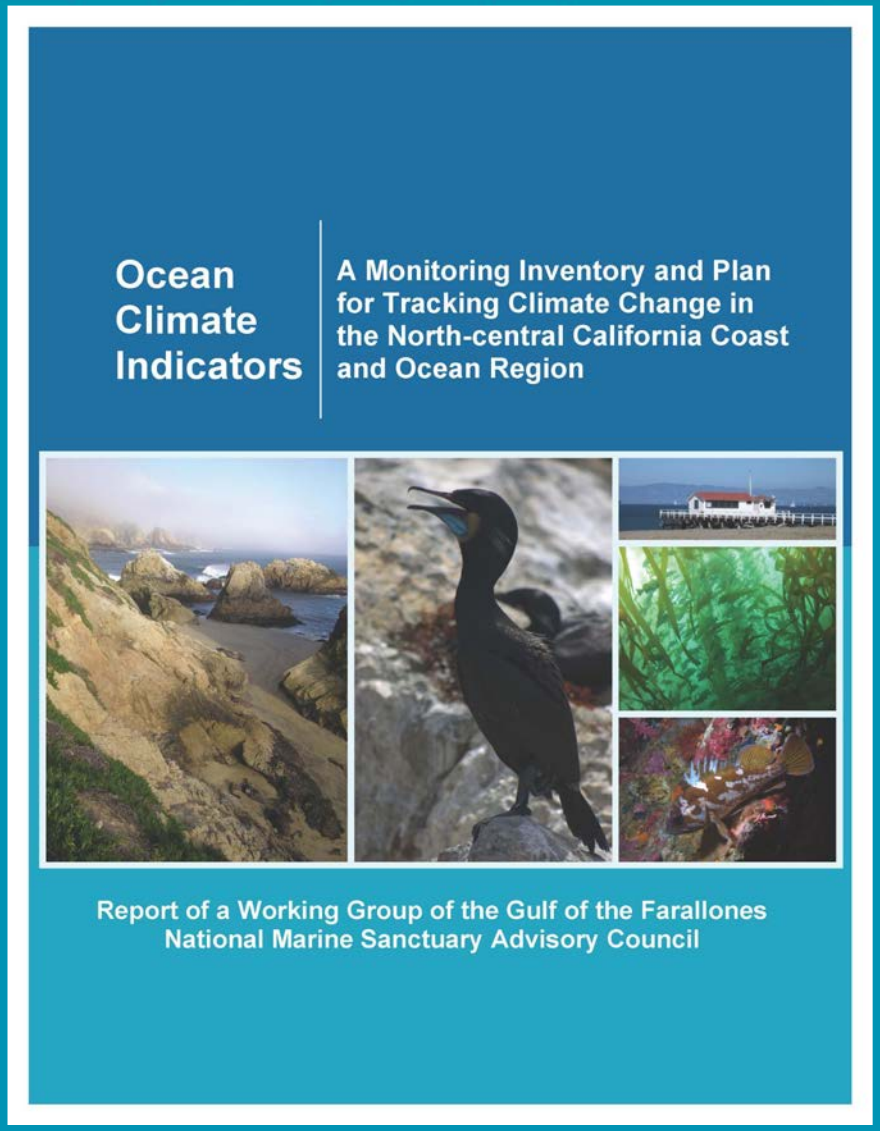
Examples:

- Brandt's Cormorant
- Cassin's Auklet
- Common Murre

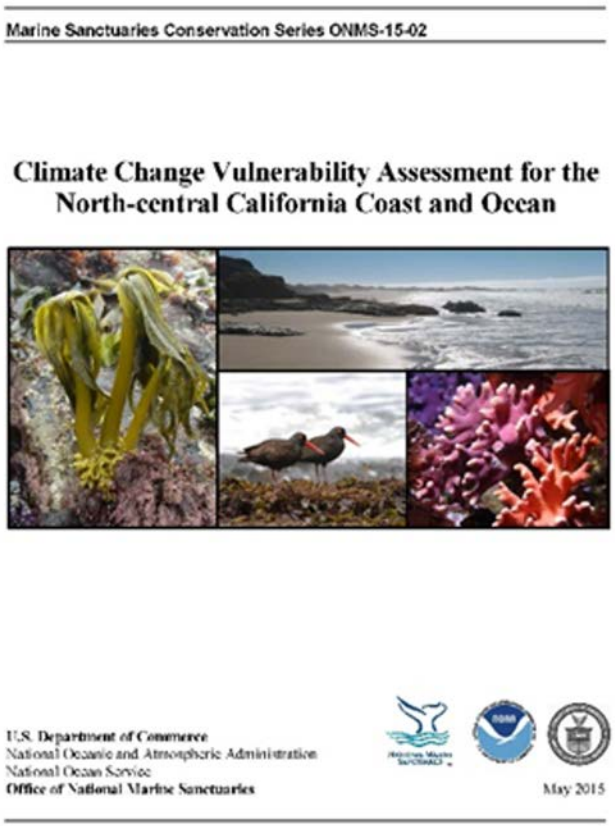
2012 Our Coast Our Future Decision Support Tool



2013 Ocean Climate Indicators: Monitoring Inventory and Plan



2014 Climate Vulnerability Assessment


Marine Sanctuaries Conservation Series ONMS-15-02

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

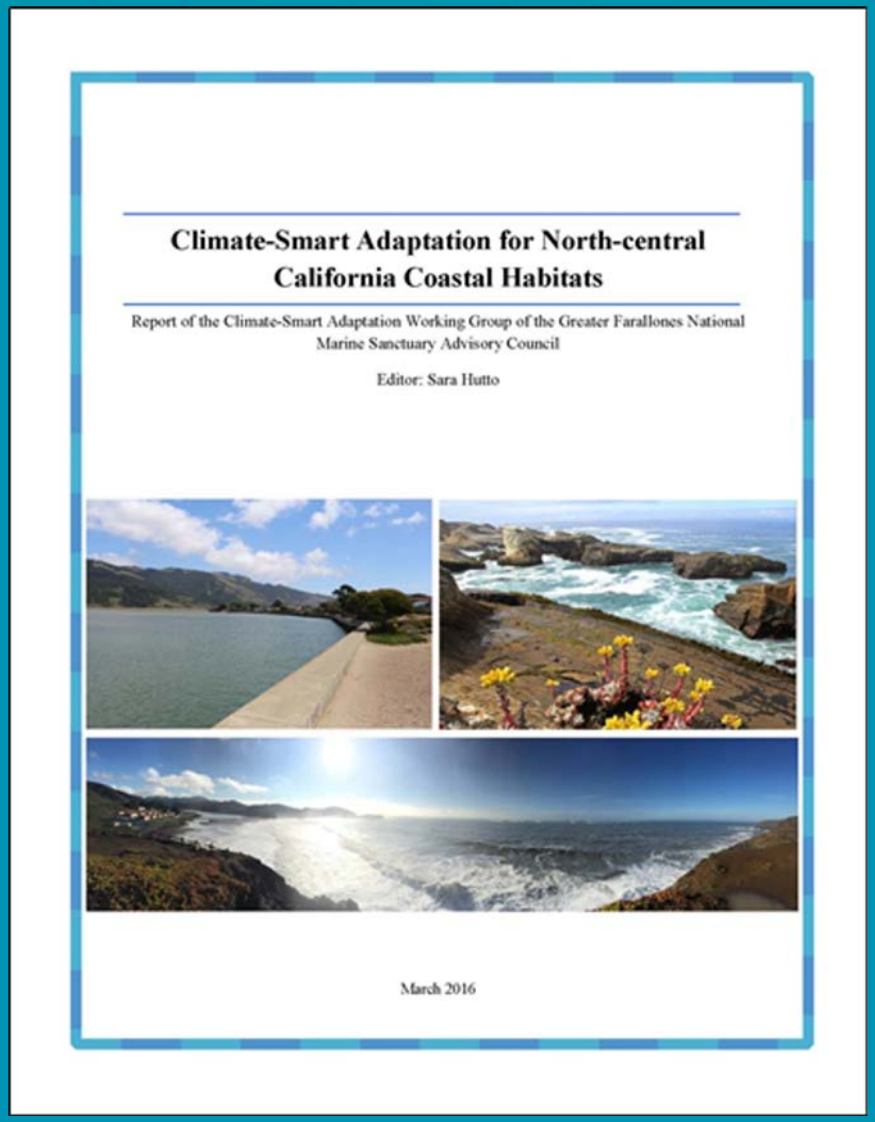
U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Ocean Service
Office of National Marine Sanctuaries

May 2015

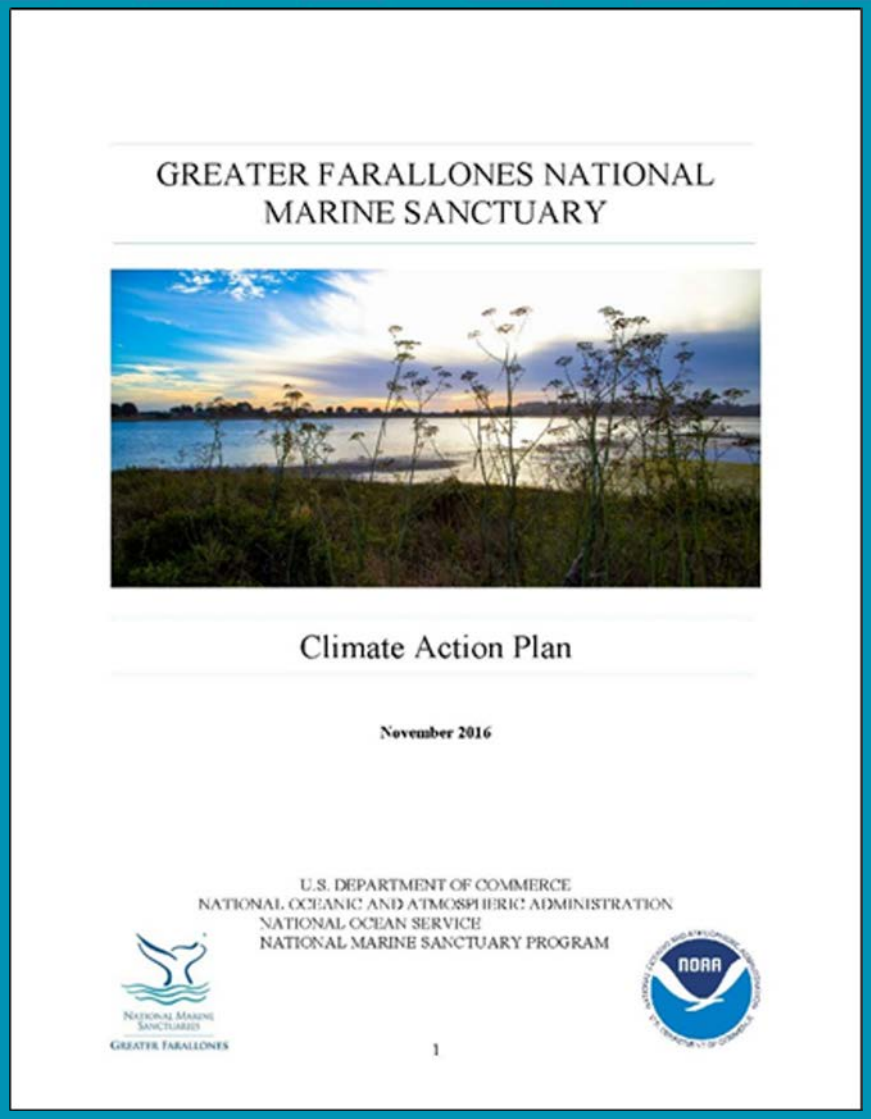
Predicted the most vulnerable species, habitats, and ecosystem services

High	Beaches/dunes Estuaries Rocky Intertidal
Mod	Nearshore Cliffs
Mod-Low	Pelagic Kelp Forest Offshore rocky reefs

2015 Climate Adaptation Strategies



2016 Climate Adaptation Plan



GREATER FARALLONES NATIONAL MARINE SANCTUARY

Climate Action Plan

November 2016

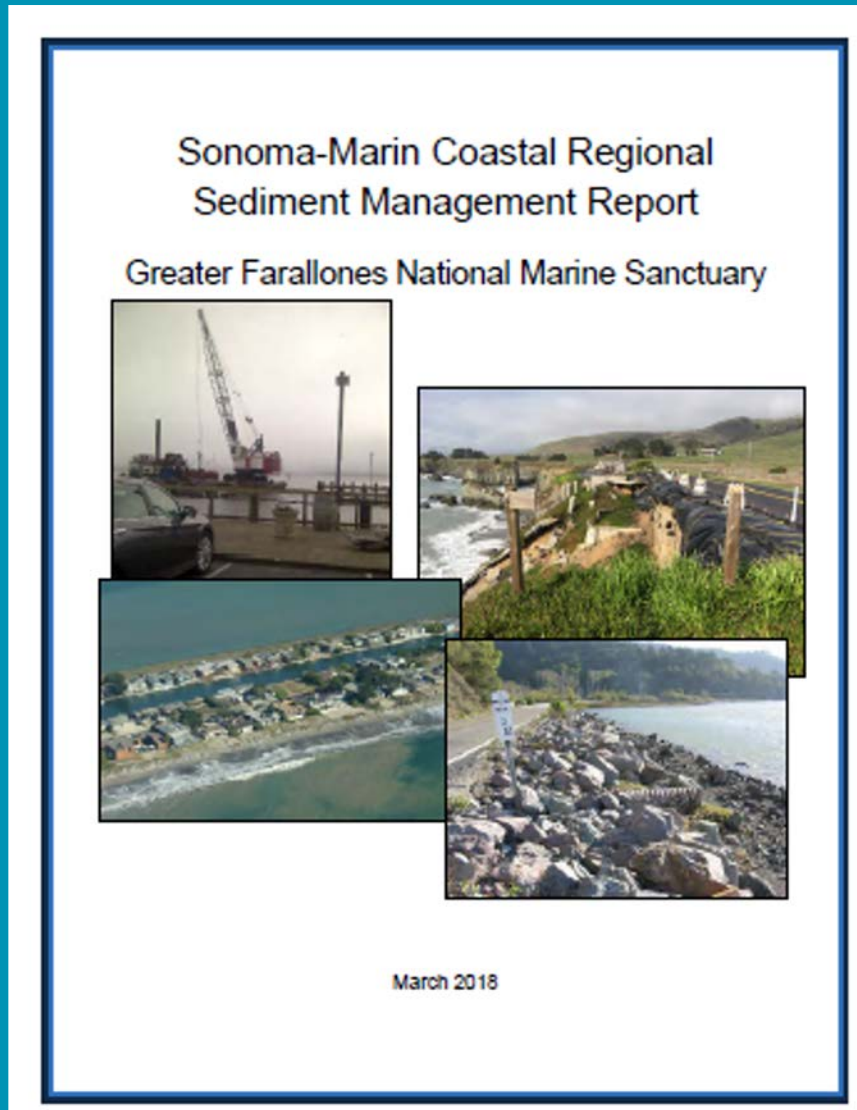
U.S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL OCEAN SERVICE
NATIONAL MARINE SANCTUARY PROGRAM

1

6 strategy categories

26 management actions to reduce vulnerability and increase resilience

2017 Sediment Management Recommendations



Key Climate-driven Stressors

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

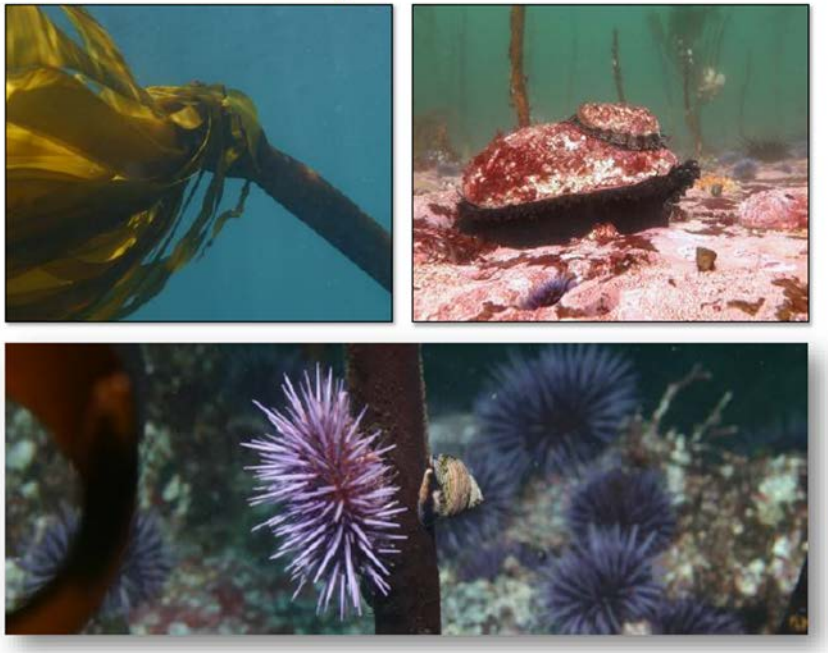
2018 Kelp Recovery Recommendations

National Marine Sanctuaries

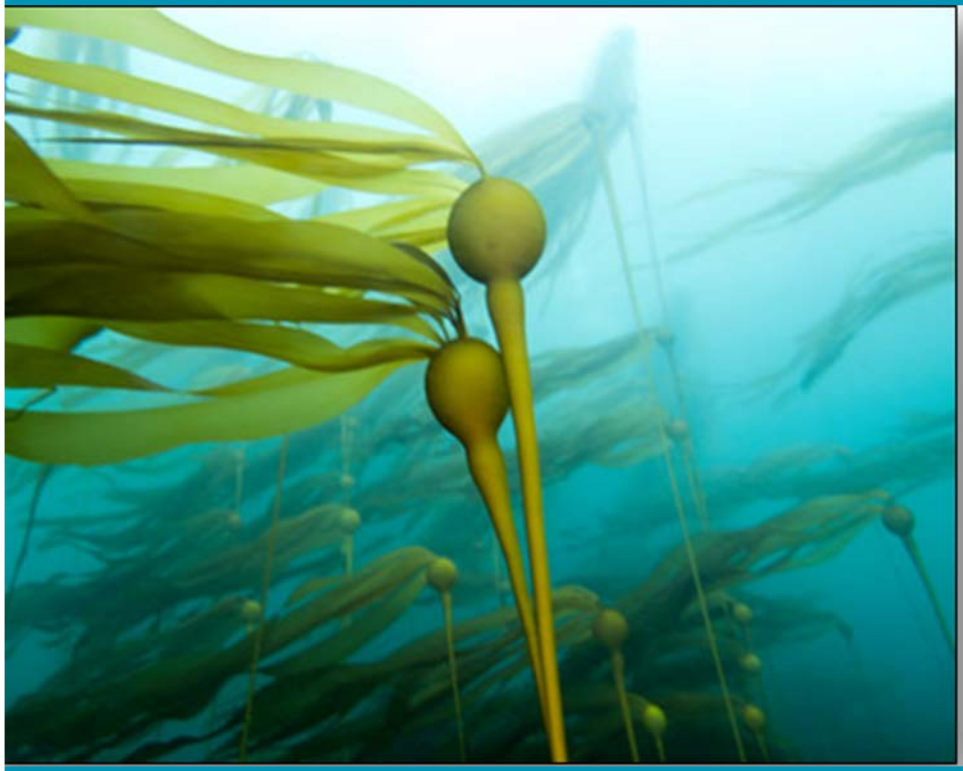
NOAA

Sonoma-Mendocino Bull Kelp Recovery Plan

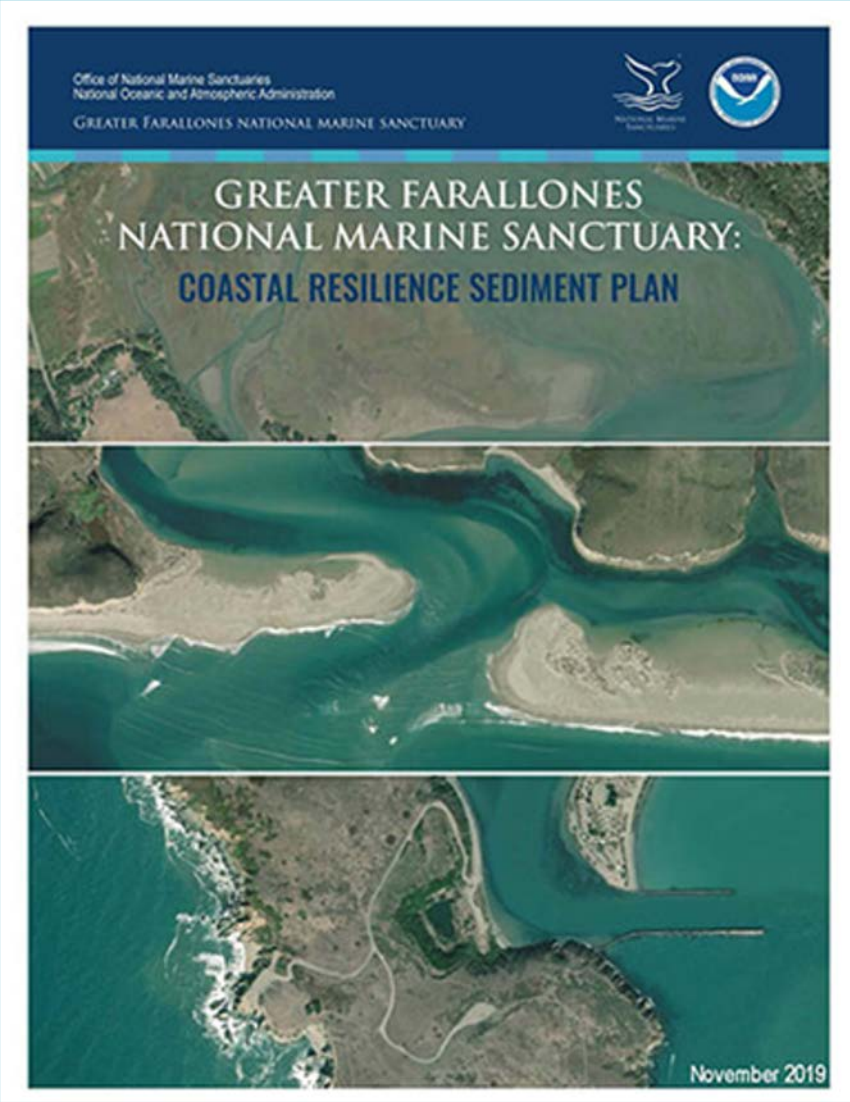
For Greater Farallones National Marine Sanctuary
and California Department of Fish & Wildlife



April 2019



2019 Coastal Resilience Sediment Plan

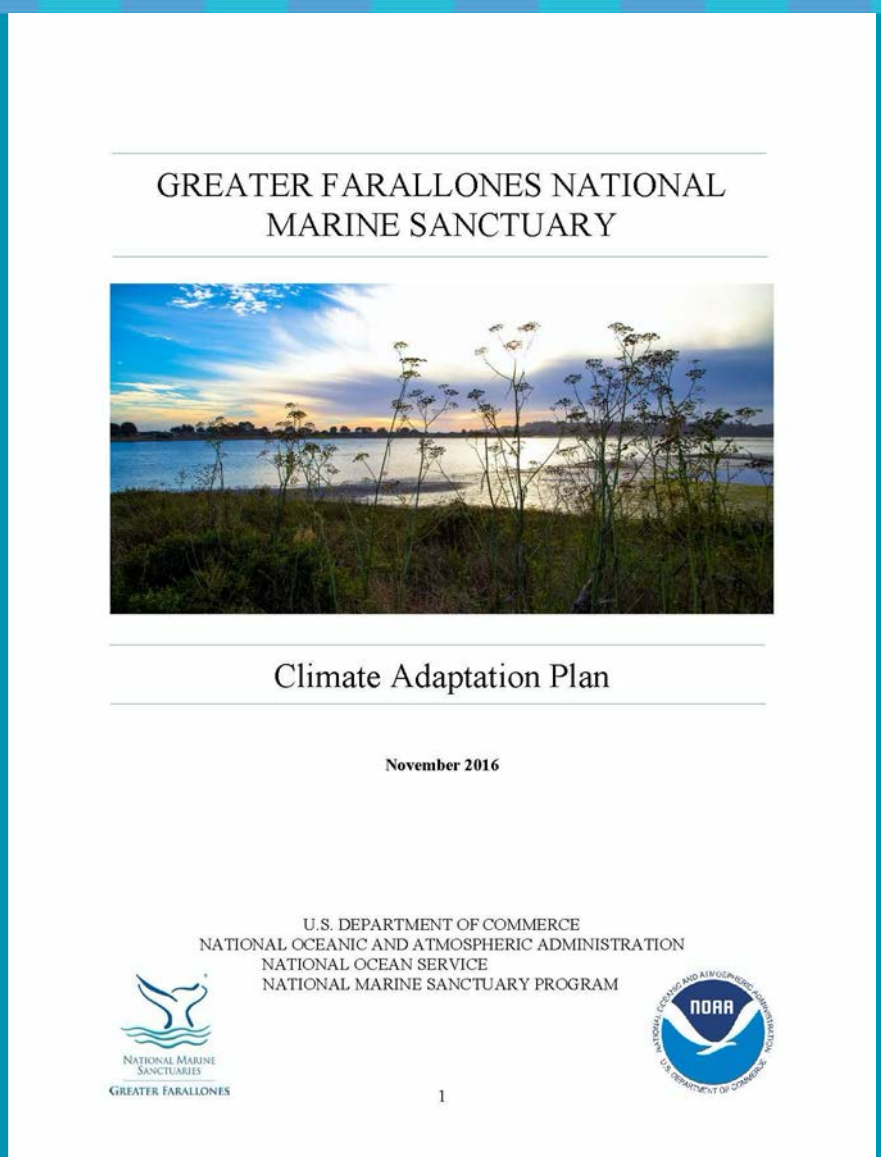


2019 Native Oyster Restoration Recommendations

National Marine Sanctuaries

NOAA

Implementing the 2016 Climate Adaptation Plan


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

NATIONAL MARINE SANCTUARIES
GREATER FARALLONES

1

6 broad approaches, based on SAC recommendations:

1) Implement Living Shorelines
2) Promote Education
3) Protect and Restore Habitat
4) Limit Human Disturbance
5) Address Invasive Species
6) Invest in Science Needs

Implement Living Shorelines

- Living Shorelines workshop
- Coastal Resilience Sediment Plan
- Bolinas Living Shoreline Conceptual Design
- Tomales Bay Living Shoreline Feasibility Study
- Stinson Beach Dune Restoration Feasibility Study

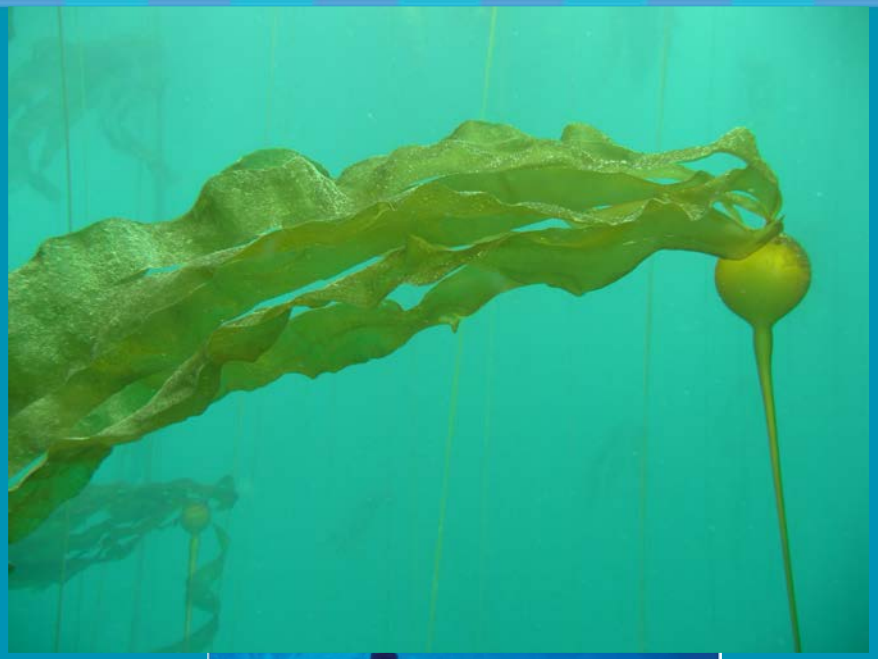
Promote Education

- LiMPETS climate literacy: middle and high school students
- Climate Adaptation Toolkit and trainings: MPA Managers
- ONMS Capacity-building webinars: Sanctuary staff
- Climate Program Storymap: general public, resource managers

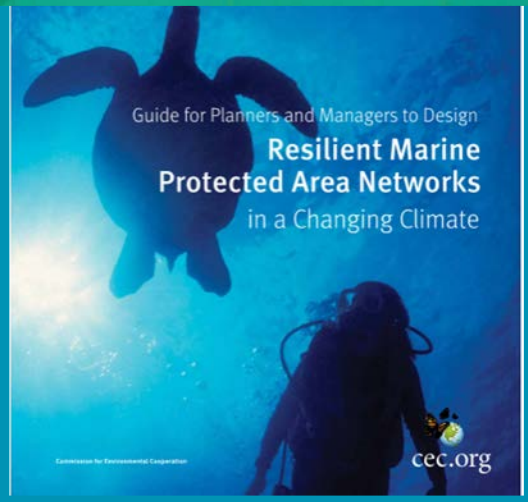
TODAY:
NNOCCI climate interpretation training

Protect and Restore Habitat

- Kelp Recovery Project
- Coastal Resilience Sediment Plan
- Bolinas and Tomales projects



TODAY:
NEW Advancing Blue Carbon Understanding and Management project



Limit Human Disturbance

- Seabird Protection Network: reducing disturbance from aircraft and boats
- Whale conservation program: reducing ship strikes, entanglements and acoustic impacts

Address Invasive Species

- Invasive European Green Crab removal in Bolinas Lagoon
- Kent Island invasive species removal

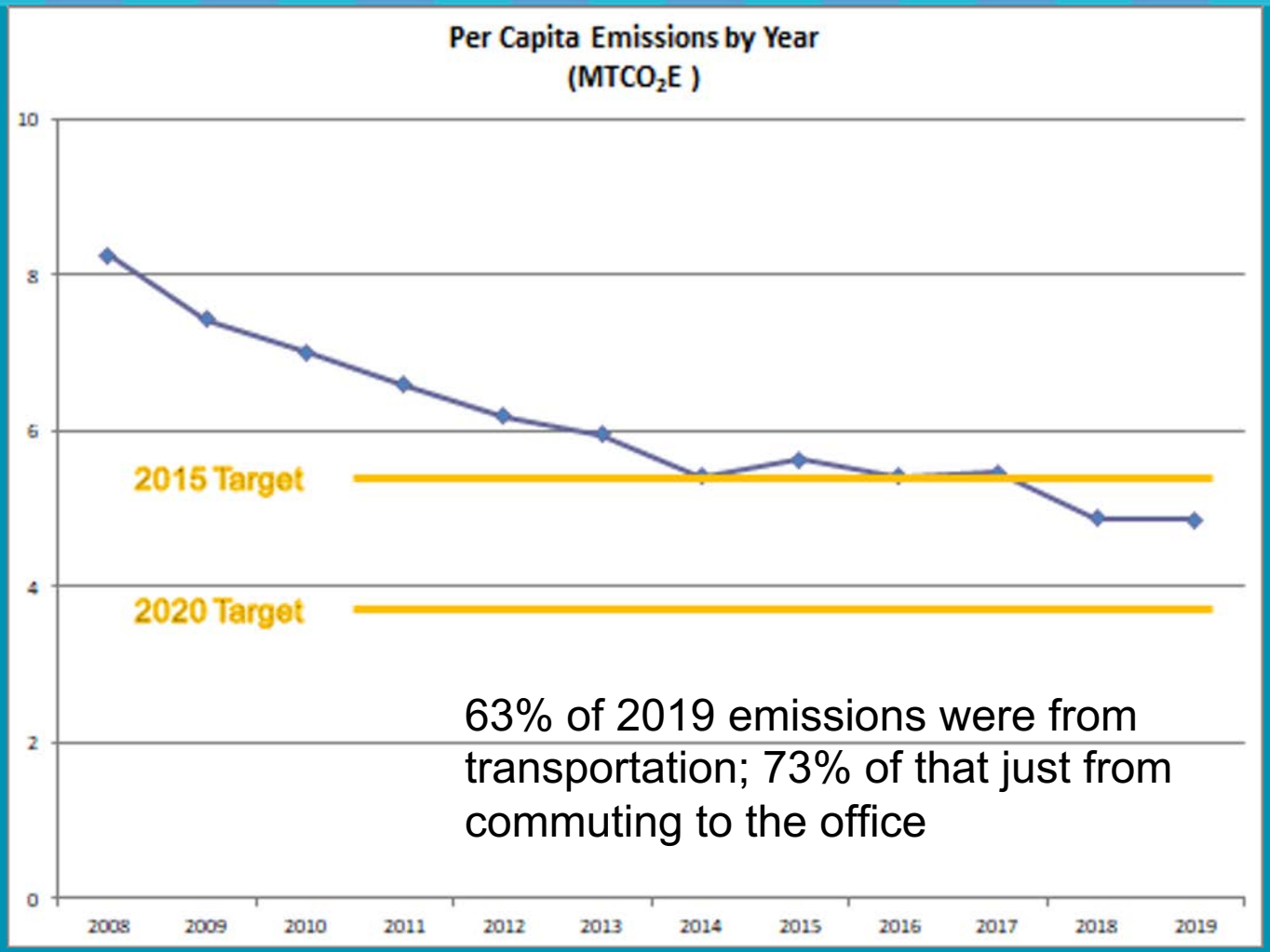
Invest in Science Needs

- ACCESS cruises: climate indicator monitoring
- Climate science needs for NOAA Climate Program Office partnership
- Sediment characterization in Bolinas Lagoon
- Kelp canopy mapping: methods comparison

TODAY:

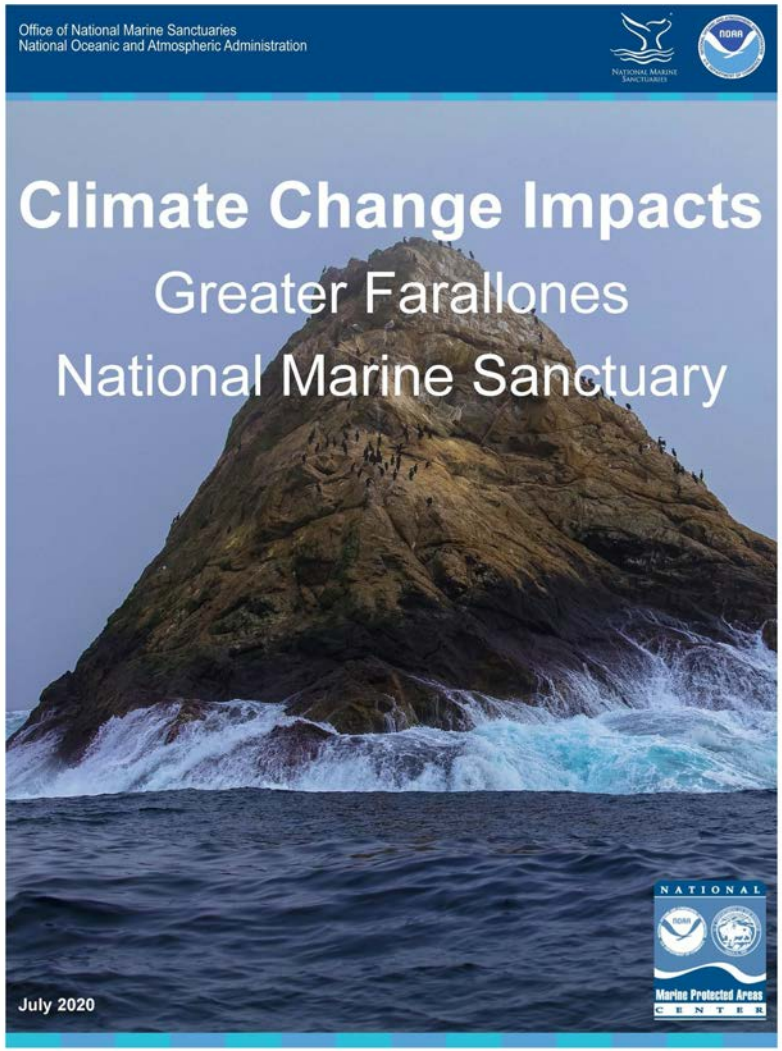
- Advancing Blue Carbon Understanding and Management
- Climate Indicators update
- Ocean Acidification update

Mitigation: Adaptation's (not evil) twin!



What do we envision for sanctuary operations post-COVID?

Climate Impacts Profile - a critical science update!



- Initiative of ONMS for each Sanctuary
- 73 sources cited, 90% from last 10 years
- 4 climate drivers reviewed: OA, Temp, weather changes, SLR
- 2 focus boxes: blue carbon and update to 2010 Climate Impacts Report

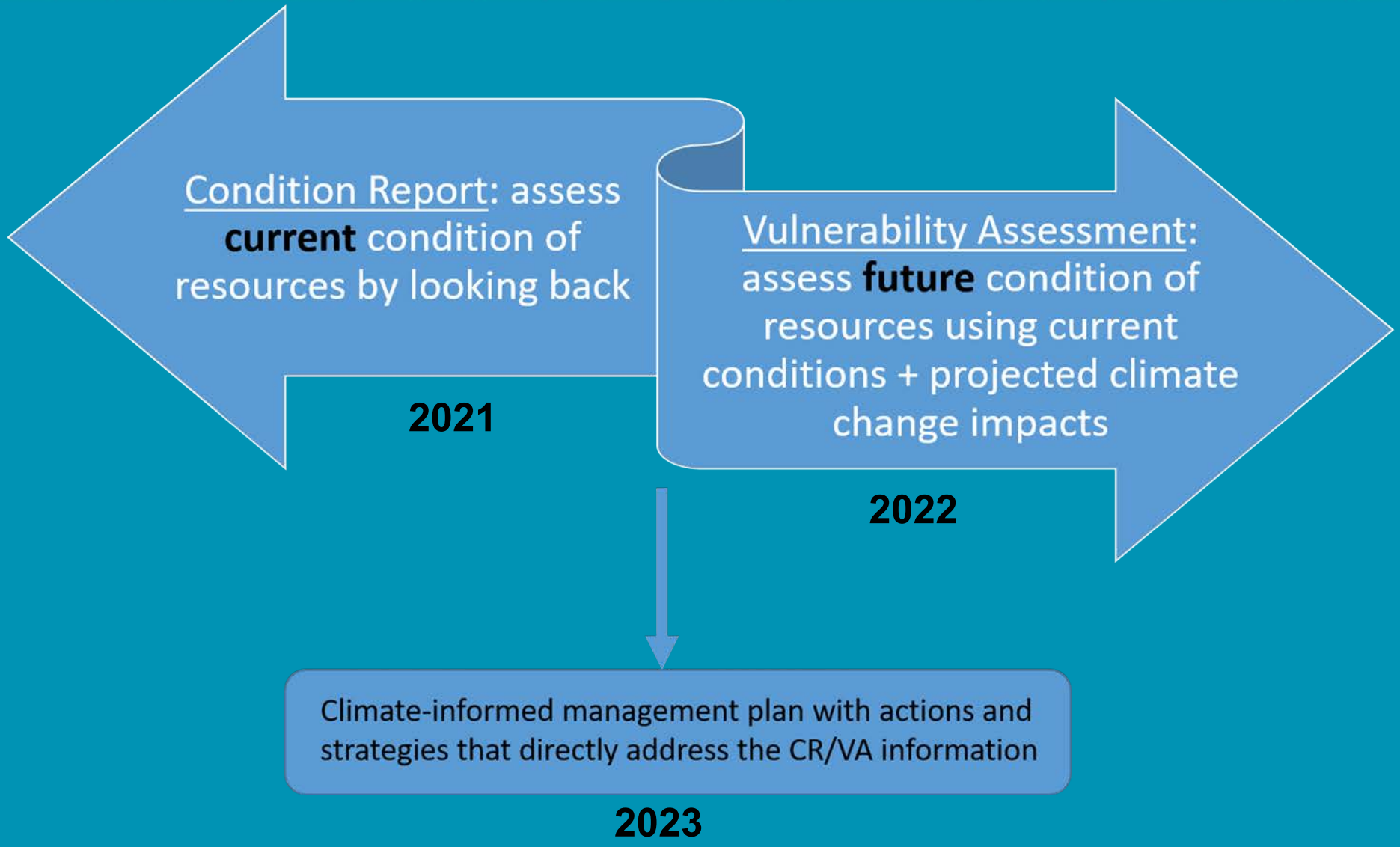
Climate Impacts Profile - a critical science update!

Climate Trend from 2010 report	Change since 2010 report	Source
Up to 75 inches sea level rise by 2100	↔	4
Increase in coastal erosion due to changes in sea level and storm waves	↔	7
Decrease in Spring runoff due to decreases in Sierra snowpack	↑	57
Increased precipitation variability with dryer dry years and wetter wet years	↑	14,15, 60
Increase in sea surface temperature offshore and on the continental shelf	↑	34
Increase in winds driving upwelling and associated decrease in surface temperature over continental shelf	↔	35,36
Increase in extreme weather events	↔	7,14, 15,60
Decrease in seawater pH	↑	65,72
Northward shift in key species	↑	40,48
Shift in dominant phytoplankton (from larger to smaller)	↑	40
Climate impacts compounded by other human impacts	↔	

How have 2010 projections changed?

- 5 impact projections remain the same
- 6 impact projections accelerating faster than initially expected
- None adjusted downward.

Working towards climate-informed management



Next: Ocean Climate Indicators

15-min BREAK - Back at 11:10

Next: NNOCCI Climate Interpretation Training for SAC Members