From Impacts to Action: Climate Change Response on the North-central California Coast

Sara Hutto
Ocean Climate Program Coordinator
Greater Farallones Association

April 19, 2018
Greater Farallones National Marine Sanctuary

- 1 of 14 sites nationwide
- 3,295 square miles
- Open ocean, tidal flats, rocky intertidal, estuarine wetlands, subtidal reefs, and beaches
- Critical habitat for:
  - 25 E&T species
  - 36 marine mammal species
  - > 1/4 million breeding seabirds
  - Significant white shark population
Sanctuary Ocean Climate Program

Increase awareness

Take action

Collaborate

Lead
Climate Impacts

- Sea Level
- Coastal Erosion
- Variability of Precipitation (drier dry years, wetter wet years)
- Extreme Weather Events
- Wave Action
- pH
- Dissolved Oxygen
- Northward shift of key species
- Altered currents and mixing
- Sea Surface Temperature
- Salinity
- Sediment Supply
Climate Vulnerability

- **Mod-High**: Beaches/dunes, Estuaries, Rocky Intertidal
- **Mod**: Nearshore, Cliffs, Pelagic
- **Low-Mod**: Kelp Forest, Offshore rocky reefs
Climate Vulnerability

- **Mod-High**:
  - Beaches/dunes
  - Estuaries
  - Rocky Intertidal

- **Mod**:
  - Nearshore
  - Cliffs
  - Pelagic

- **Low-Mod**:
  - Kelp Forest
  - Offshore rocky reefs
Key stressors driving vulnerability

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

Non-climate stressors:
1. Roads/coastal armoring
2. Invasive/problematic species
3. Land use change
Climate Action Plan

Vulnerability to Resilience
Climate Action Plan

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 (kelp beds, seagrass beds, beaches/dunes)
• Determine the source of sediment for vulnerable beaches in order to improve sediment supply processes.
Progress – Sediment Management

Improved understanding of sediment dynamics and sediment management to address changing sediment supply, erosion and sea level rise.
Progress – Habitat Protection

Remove/redesign roads to allow for coastal habitats to migrate inland in response to sea level rise
Restore living shorelines (kelp beds, seagrass beds, beaches/dunes) for multiple benefits (wave attenuation, mitigate OA, reduce erosion)
Emerging – OA Mitigation

Investigate the use of vegetation (kelp, seagrass) to locally mitigate ocean acidification
Emerging – Kelp Recovery Project

Kelp forms essential habitat for nearshore ecosystems

Giant kelp – Southern and Central California

Bull kelp – Central and Northern California

Riverview Science
Emerging – Kelp Recovery Project

86-97% of Kelp Biomass Lost along North Coast

2012

>60 km » Harmful Algal Bloom (2011)
>4,000 km » Sea Star Wasting Disease (2013)
>600 km » Purple Urchin Explosion (2014 - )
>4,000 km » Persistent Warm Water (2014 - 2015)

2016
Emerging – Kelp Recovery Project

Goals include identifying the management, education and research needed to facilitate recovery and increase resilience of bull kelp forests to regional and large-scale stressors.
Thank you!

Contact:
Sara.Hutto@noaa.gov
415-970-5253

http://farallones.noaa.gov/manage/climate