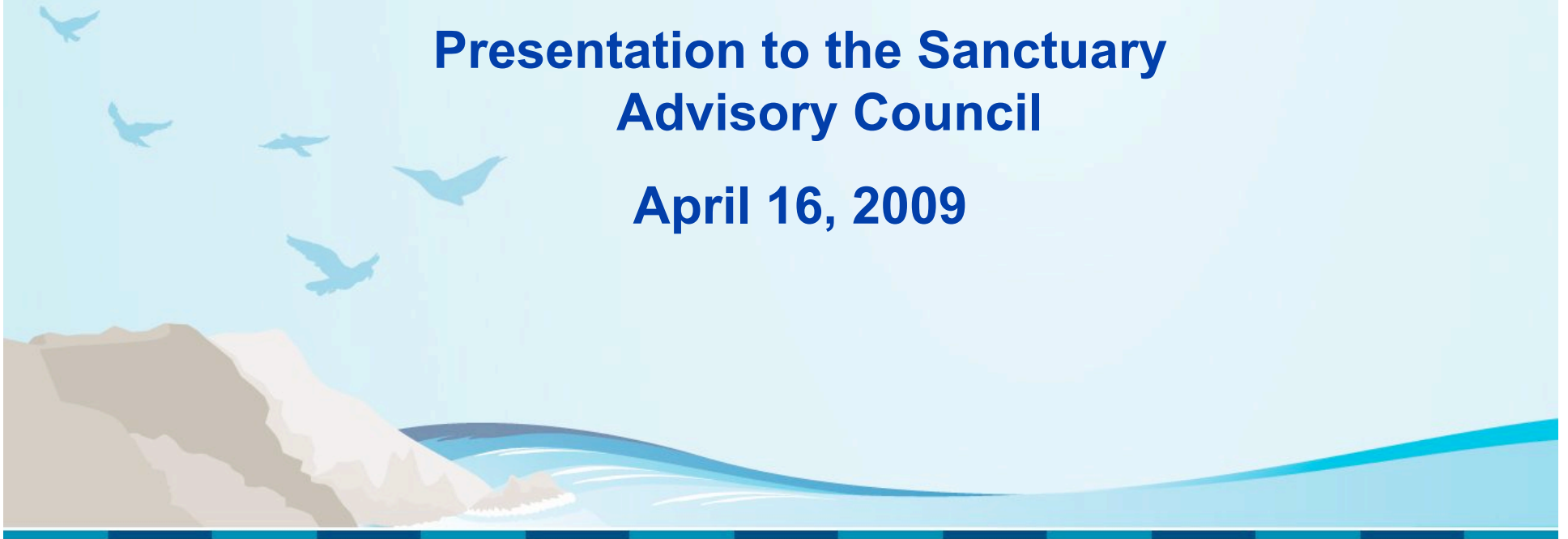


Gulf of the Farallones National Marine Sanctuary

Ocean Climate Initiative

**Presentation to the Sanctuary
Advisory Council**

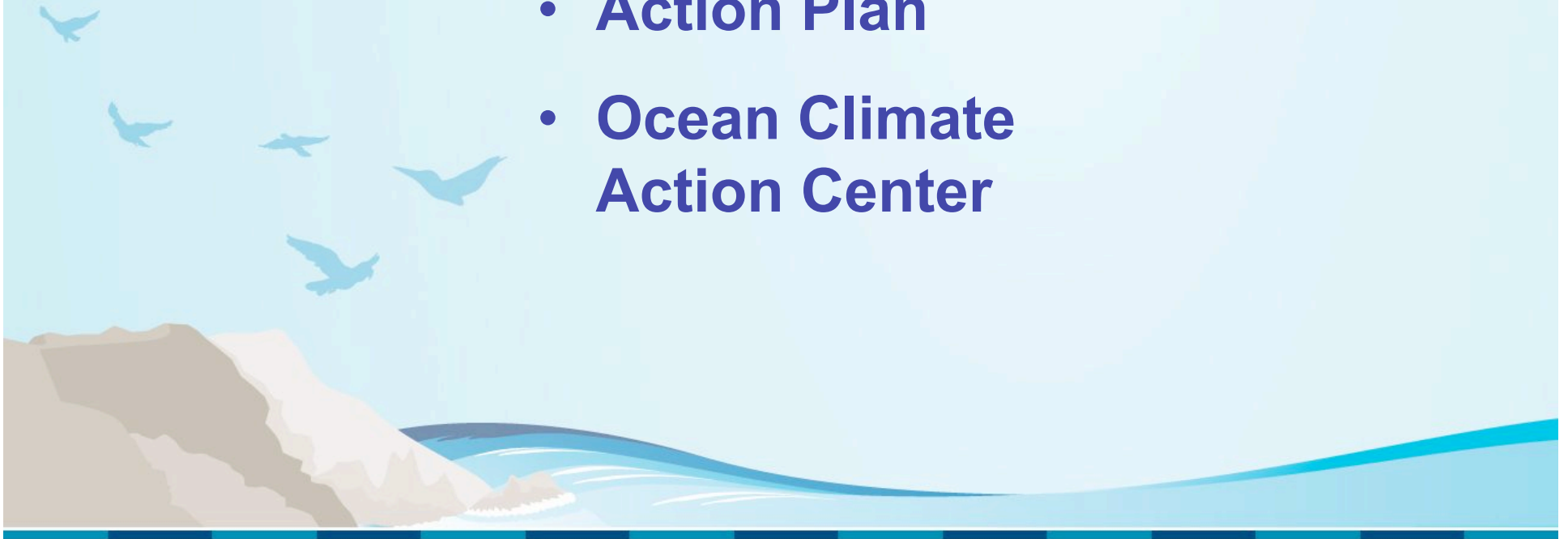
April 16, 2009



OCEAN CLIMATE INITIATIVE GOAL:

Provide solutions on a local, state, and federal level through partnerships, research collaborations, education, and policy reform.

- **Site Scenario**
- **Action Plan**
- **Ocean Climate Action Center**



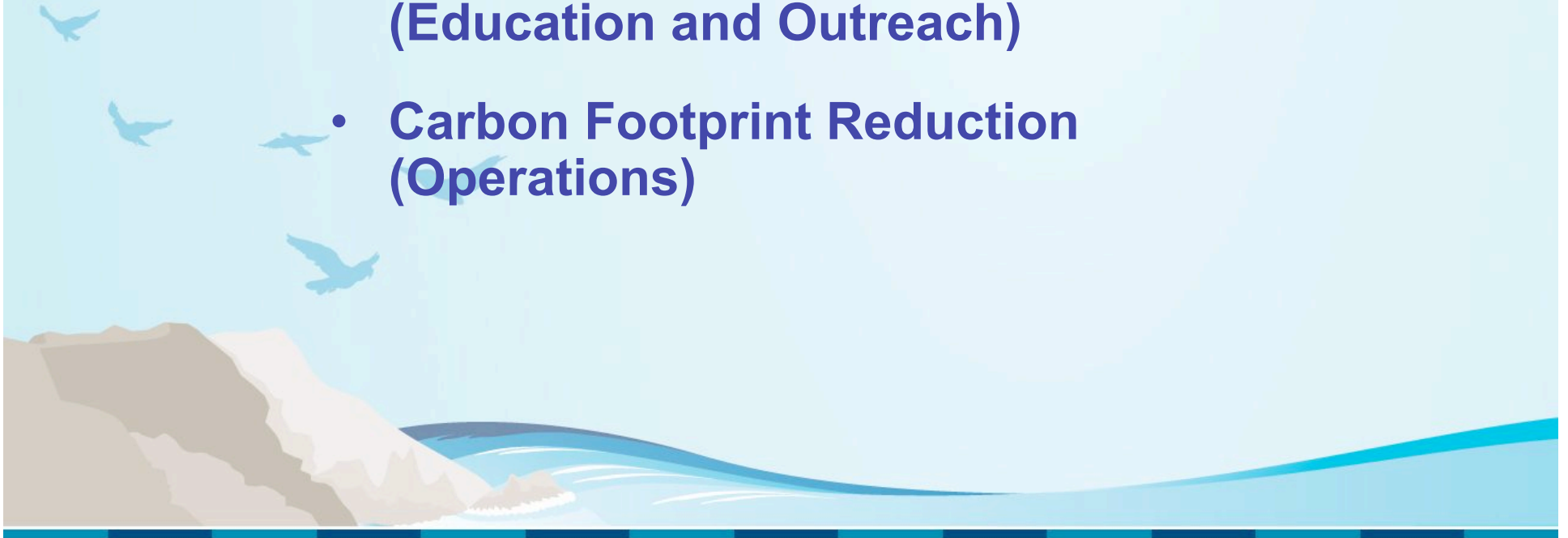
OCEAN CLIMATE INITIATIVE OBJECTIVES:

- **Identify physical drivers and address biological impacts of climate change on the region's coast and ocean;**
- **Act as a climate change communication center;**
- **Manage local marine ecosystems for resiliency;**
- **Rehabilitate GFNMS facilities and operations to become a model of sustainability; and**
- **Promote inter and intra-agency, non-profit organization, and business partnerships within the region**



INITIATIVE ACTION PLAN:

- **Conservation Science
(Research and Monitoring)**
- **Ecosystem Resilience and Protection
(Resource Protection)**
- **Community Action
(Education and Outreach)**
- **Carbon Footprint Reduction
(Operations)**



INITIATIVE WORKING GROUPS:

- **Climate Change Site Scenario - joint with CBNMS (will become Research and Monitoring)**
 - Chair: John Largier
 - Other SAC members: Bob Breen
- **Green Operations**
 - Chair: Chris Powell (Brenda Donald in Chris' absence)
 - Other SAC members: Bob Wilson, Bob Breen
- **? Ecosystem Resilience and Protection**
- **? Community Action**



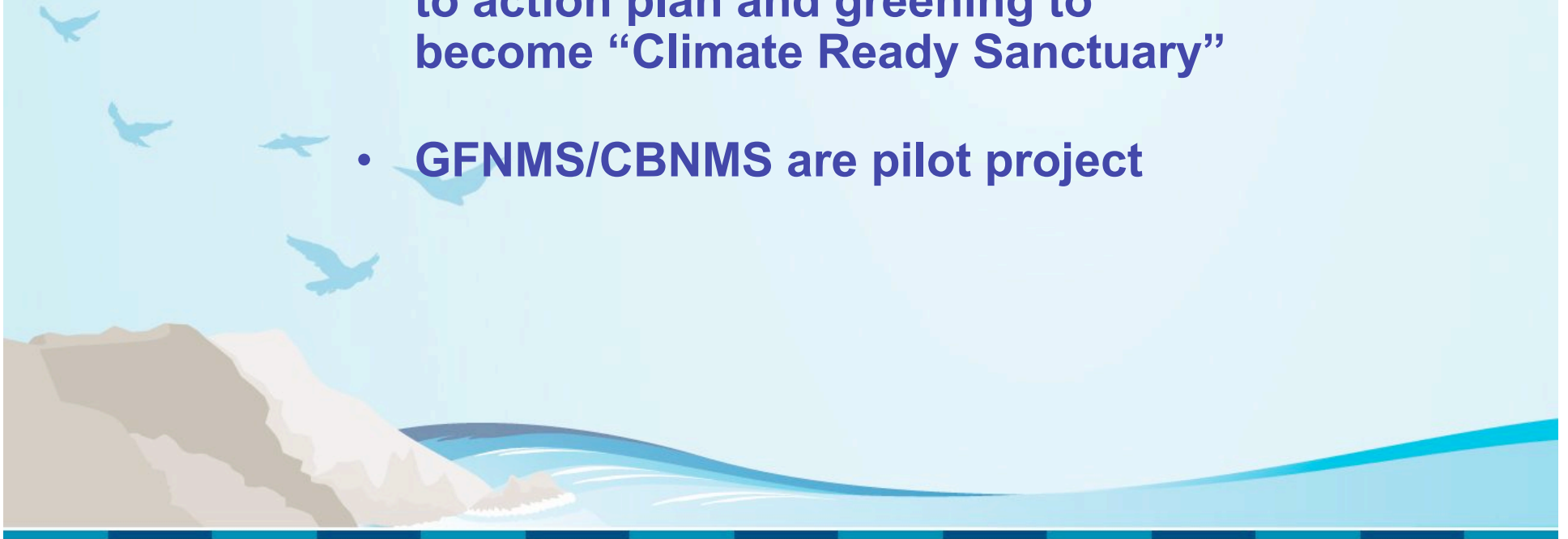
INTERNAL STAFF TEAMS:

- **Green Operations - Employee Green Team**
- **Ecosystem Resilience and Protection - Ecosystem Protection Team**
- **Community Action - Education and Outreach Team**

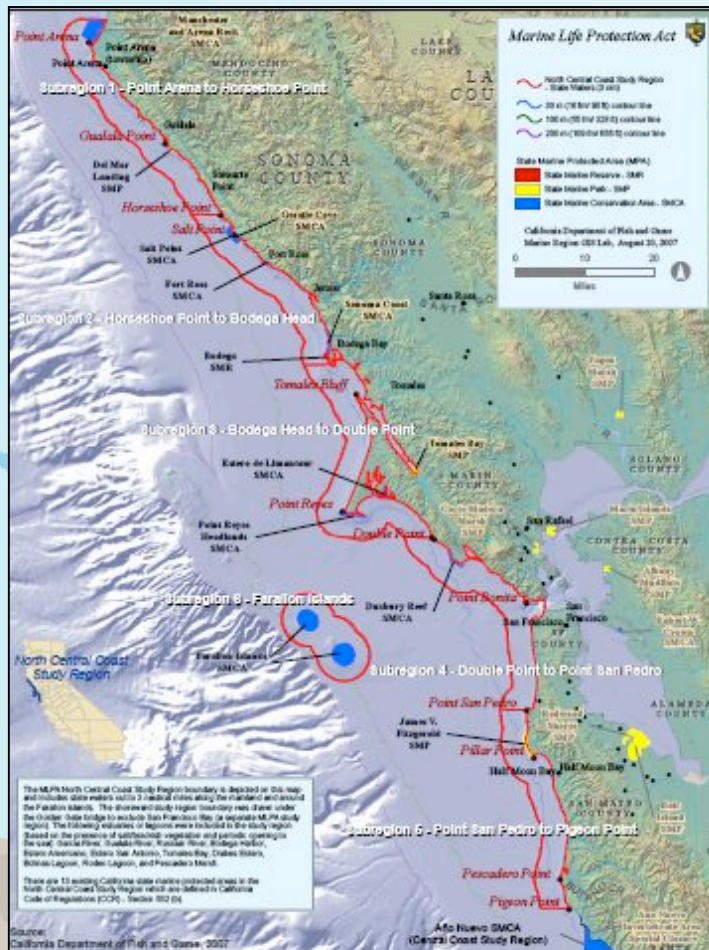


CLIMATE CHANGE SITE SCENARIO

- **Jointly developing with CBNMS**
- **Requested by ONMS - preliminary template provided**
- **All 14 sites will complete in addition to action plan and greening to become “Climate Ready Sanctuary”**
- **GFNMS/CBNMS are pilot project**



North-Central California Coast and Ocean Climate Change Site Scenario



- Team of 20+ scientists
- Downscale information - Point Arena to Año Nuevo
- Shared understanding
- Synthesize
- Informed decision-making
- Prioritize actions
- Guide policy development
- Guide management actions

CLIMATE CHANGE SITE SCENARIO

DRIVERS OF REGIONAL CHANGE

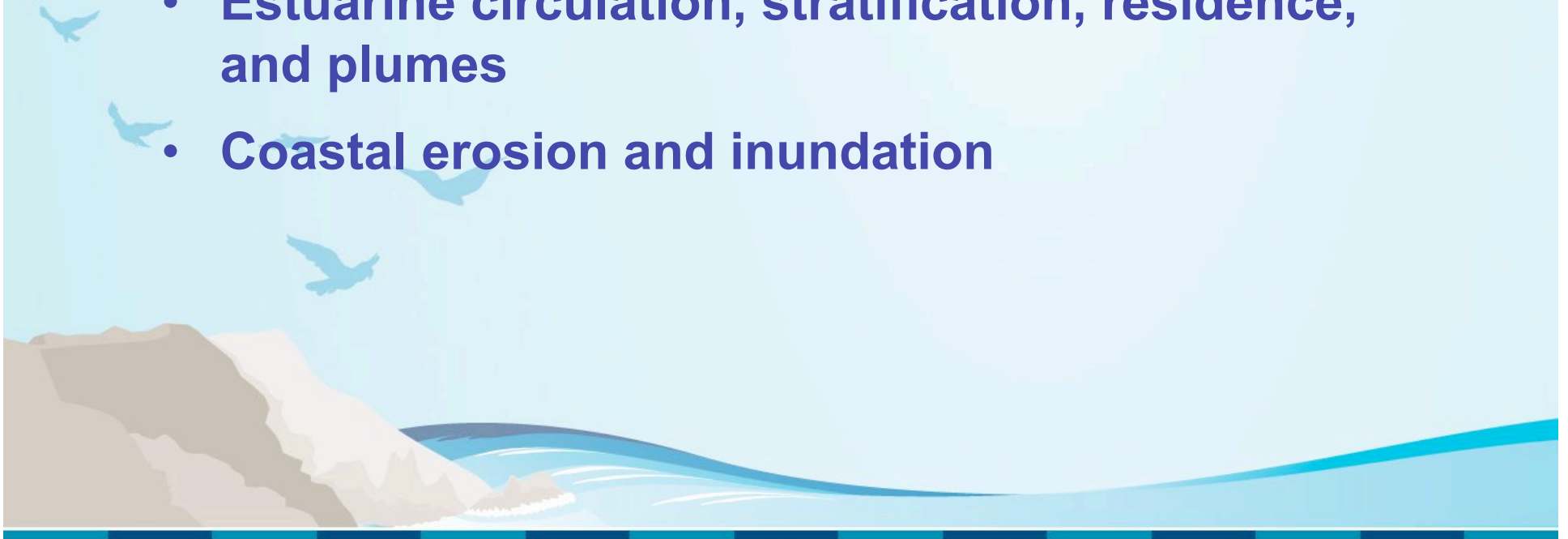
- **Sea level rise** (mean trend, storm surge, etc.)
- **Regional winds** (increases, delays, shifting patterns)
- **Changing waves** (increased amplitude, frequency, extremes)
- **Ocean circulation** (California Current System)
- **Water properties** (temperature, salinity, pH, DO, etc.)
- **Precipitation and land runoff** (amount and timing, discussion on fire, etc.)
- **Local atmospheric conditions** (fog, cloudiness, air temps, etc.)



CLIMATE CHANGE SITE SCENARIO

REGIONAL ENVIRONMENTAL RESPONSES

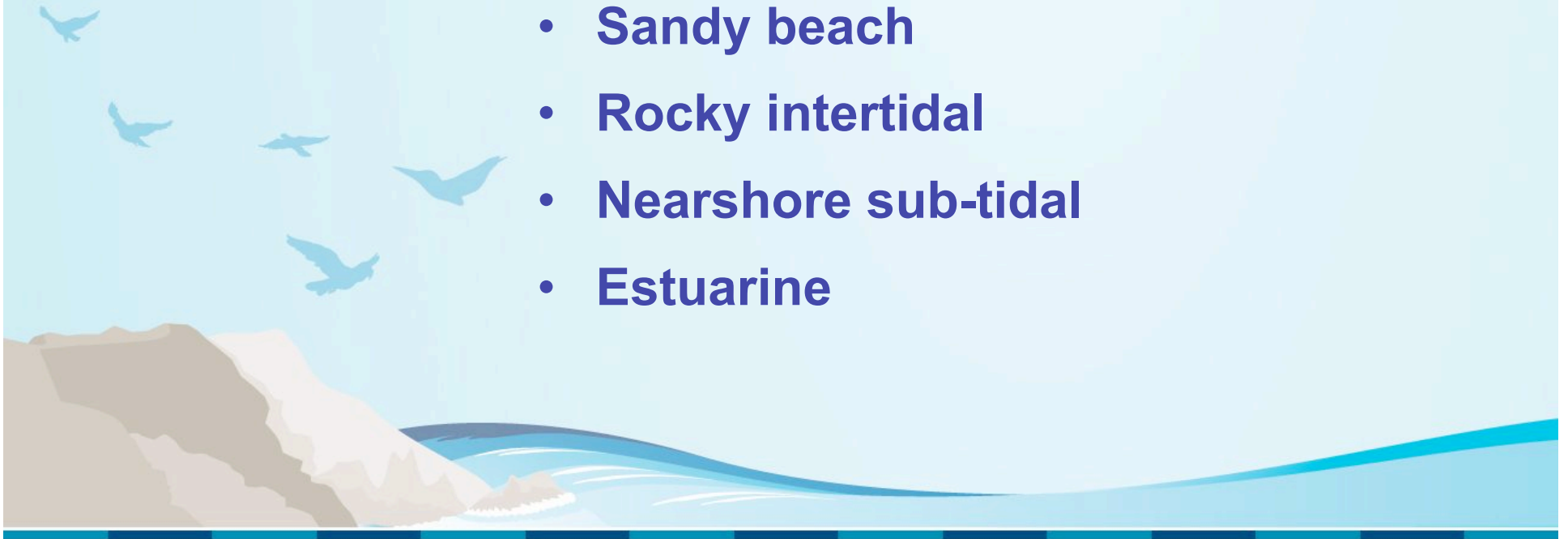
- **Coastal upwelling**
- **Regional water properties** (nutrients, DO, temp, etc.)
- **Regional ocean acidification**
- **Estuarine circulation, stratification, residence, and plumes**
- **Coastal erosion and inundation**



CLIMATE CHANGE SITE SCENARIO

CHANGING PHYSICAL HABITAT STRUCTURE

- **Offshore pelagic**
- **Offshore benthic**
- **Offshore island**
- **Sandy beach**
- **Rocky intertidal**
- **Nearshore sub-tidal**
- **Estuarine**



CLIMATE CHANGE SITE SCENARIO

BIOTIC RESPONSES

- **Plankton**
- **Invertebrates**
- **Macroalgae and plants**
- **Fish** (will be added)
- **Seabirds**
- **Marine mammals**

May change to leading section:

- **Population connectivity**
- **Phenology**
- **Physiology**
- **Range shifts**



CLIMATE CHANGE SITE SCENARIO

ECOSYSTEM AND COMMUNITY RESPONSE MECHANISMS

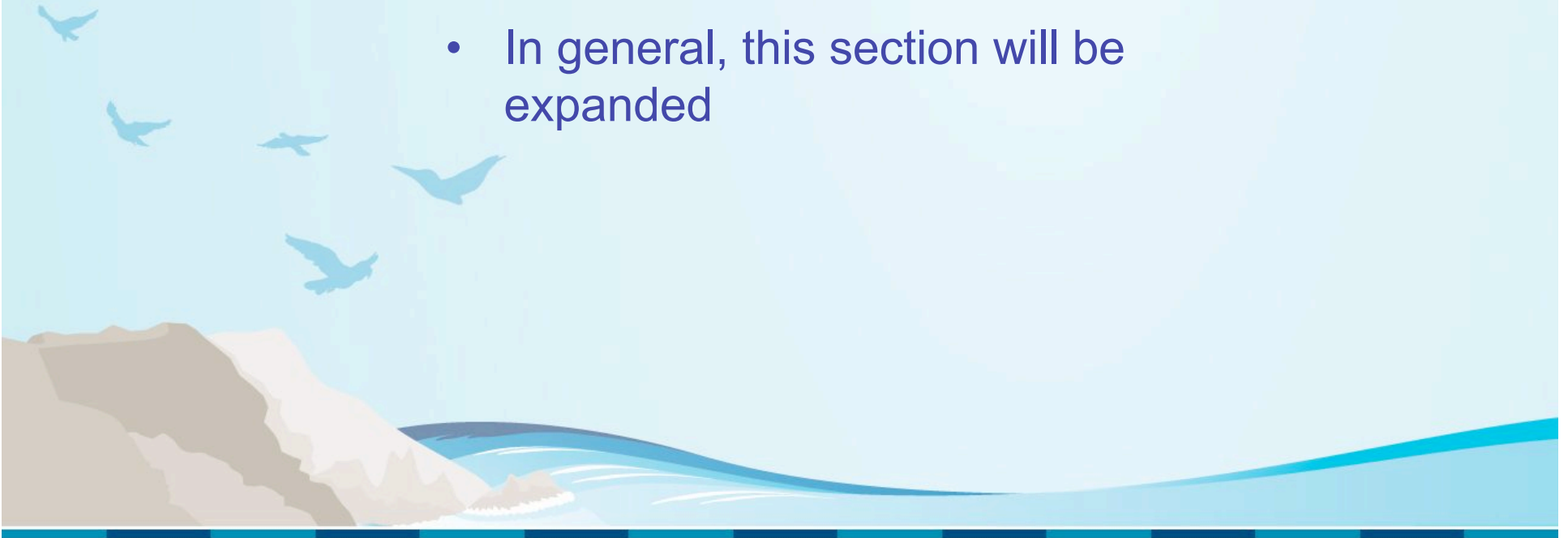
- Pelagic habitat
- Nearshore intertidal habitat
- Estuarine habitat
- **Sandy beach habitat** (may be added)



CLIMATE CHANGE SITE SCENARIO

ADDITIONAL DRIVERS OF CHANGE

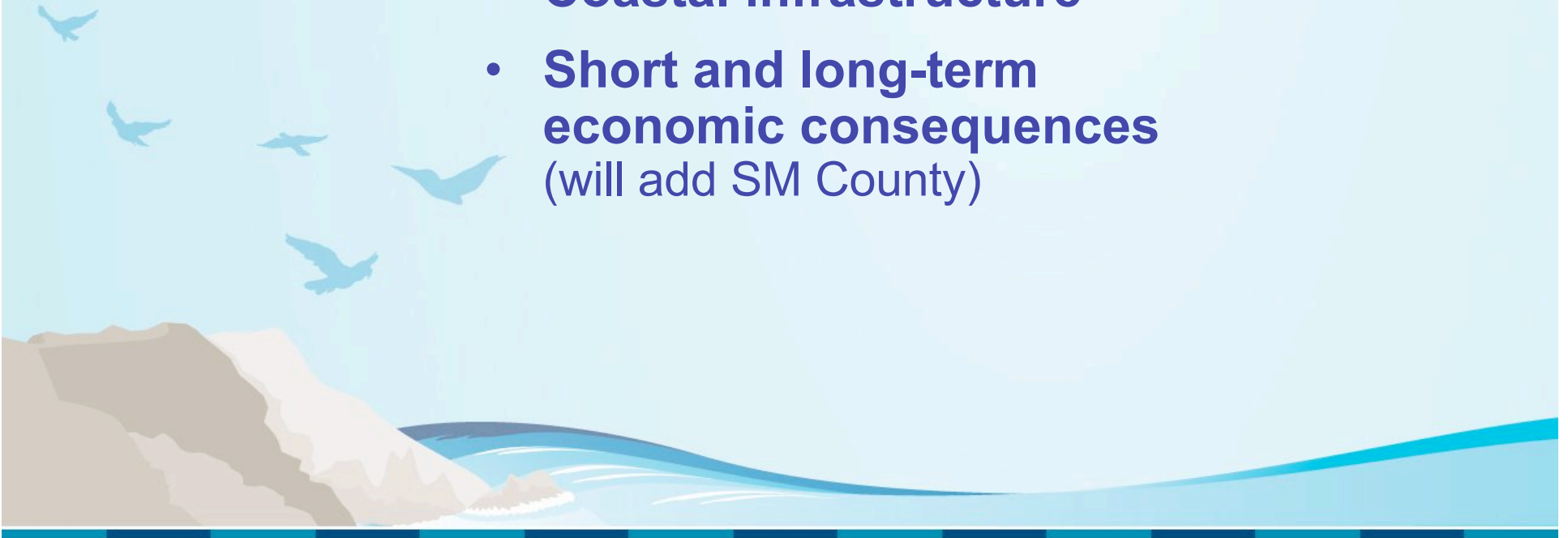
- **Fishing** (needs to be expanded)
- **Disease**
- **Contaminants**
- In general, this section will be expanded



CLIMATE CHANGE SITE SCENARIO

DIRECT IMPACTS ON HUMANS

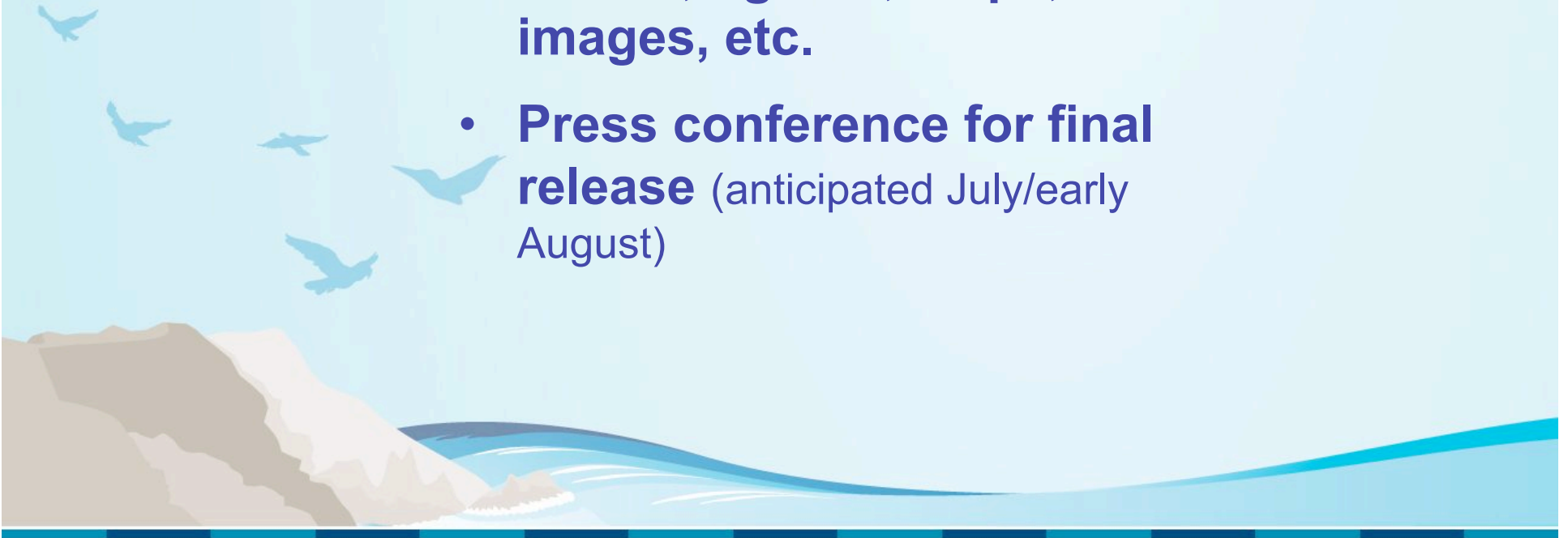
- **Public health**
- **Fisheries**
- **Ecotourism**
- **Coastal infrastructure**
- **Short and long-term economic consequences**
(will add SM County)



CLIMATE CHANGE SITE SCENARIO

TO COME...

- **Conclusion**
- **Supplementary boxes** (will be formatted, modified, etc.)
- **Tables, figures, maps, images, etc.**
- **Press conference for final release** (anticipated July/early August)



OCEAN ACIDIFICATION

- **West coast sanctuaries all adopted resolutions**
- **West coast writing team - NOAA Ocean Acidification West Coast Research Plan**
 - Partners include PMEL, NWFSC, ONMS
 - Sanctuaries as sentinel sites; education and outreach
- **Regional collaboration - GFNMS, CBNMS, Bodega Marine Lab, UCSF, PRBO**



National Involvement

- **ONMS Green Team**
- **ONMS Climate Subcommittee**
 - Coordinate climate efforts into a cohesive national program
 - Maximize ability to prepare for and protect resources from climate change impacts
 - ONMS as part of the larger climate effort within and outside of NOAA
- **Trilateral Committee for Wildlife and Ecosystem Conservation and Management** (May 11-14)
 - Lead by USFWS with NOAA as partner (U.S., Canada, Mexico)
 - Ecosystem Conservation Table
 - GFNMS as project example for U.S. marine protected areas