



A Monitoring Program of the
Gulf of the Farallones National Marine Sanctuary



Research • Education • Conservation • Stewardship

SEAS-Pelagic Habitat Overview

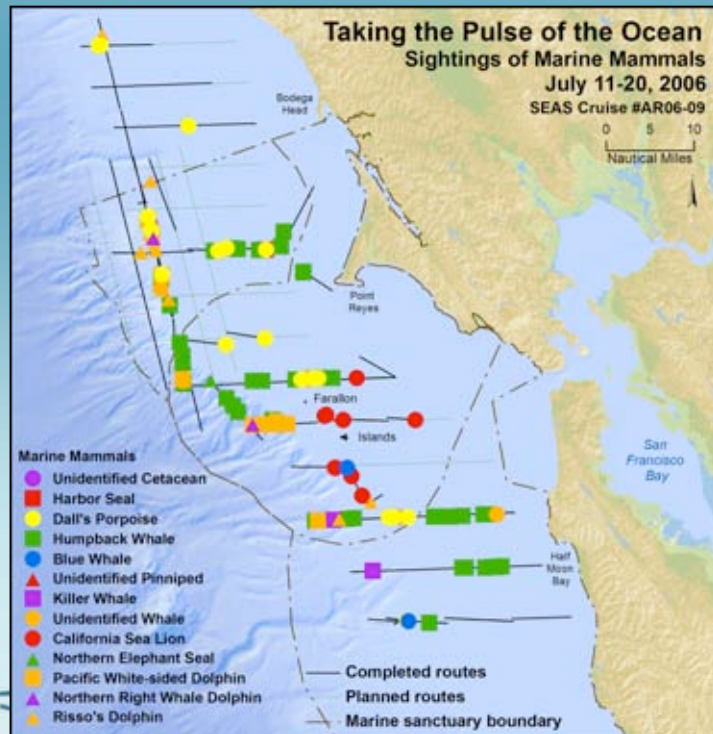
- Purpose of SEAS-PH
- Methods
 - How our Partnerships Shape Data Collection
- Strategies & Management Issues
 - Examples of how we use these data



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SEAS-Pelagic Habitat Overview

Sanctuary Ecosystem Assessment Surveys (SEAS)-Pelagic Habitat is a vessel-based, monitoring program of the GFNMS. Surveys are designed for long-term monitoring and baseline assessment of coastal and offshore areas of the Gulf of the Farallones, Cordell Bank and Bodega Bay regions.



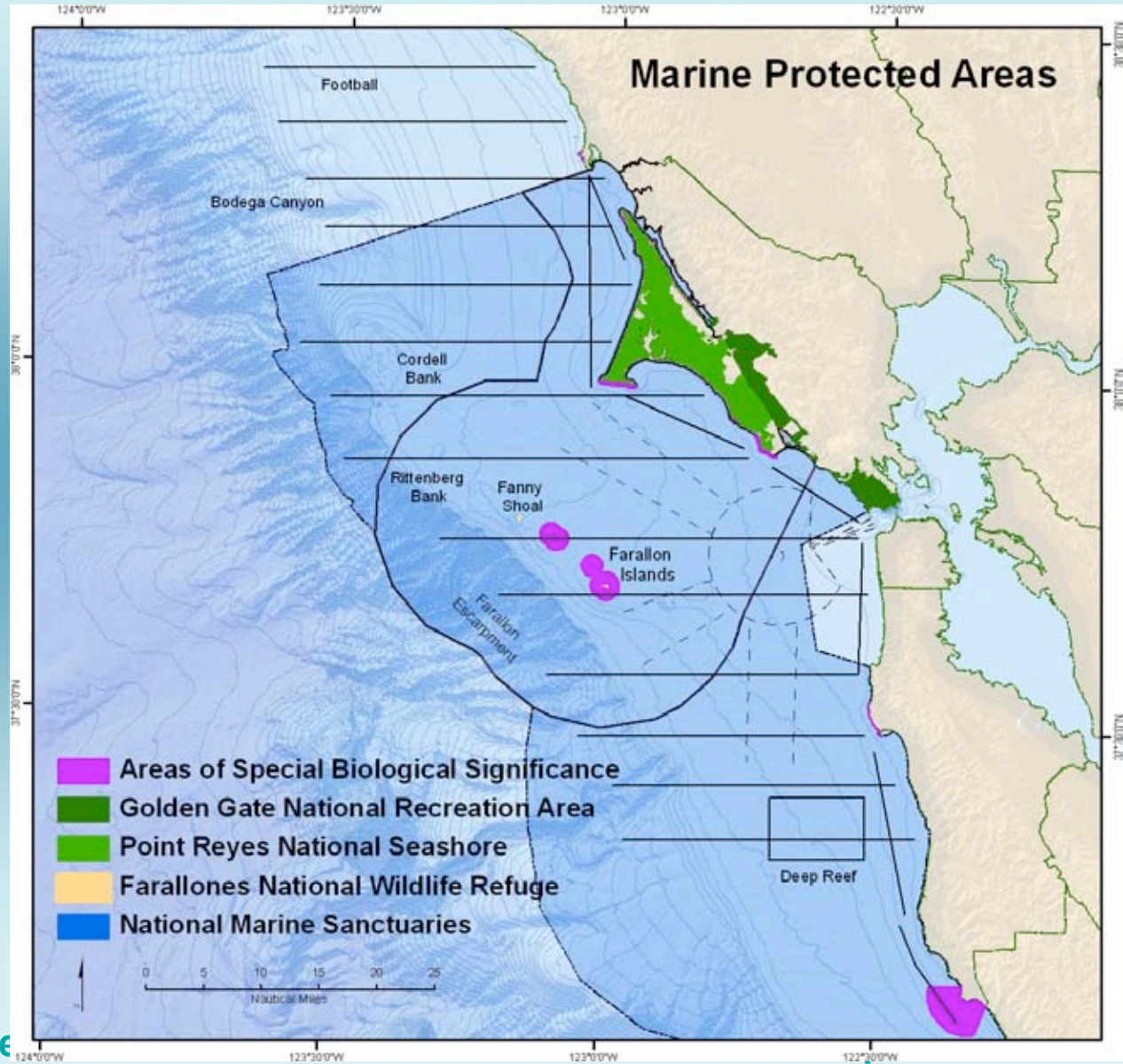
SEAS Addresses NOAA-Performance Measures

- Collect long-term monitoring data, to determine if water quality is being maintained or improved.
- Collect long-term monitoring data, to determine if select living marine resources are being maintained or improved.
- Adequately characterize the sanctuary.
- Develop and implement methodologies to assess the effectiveness of marine zones.

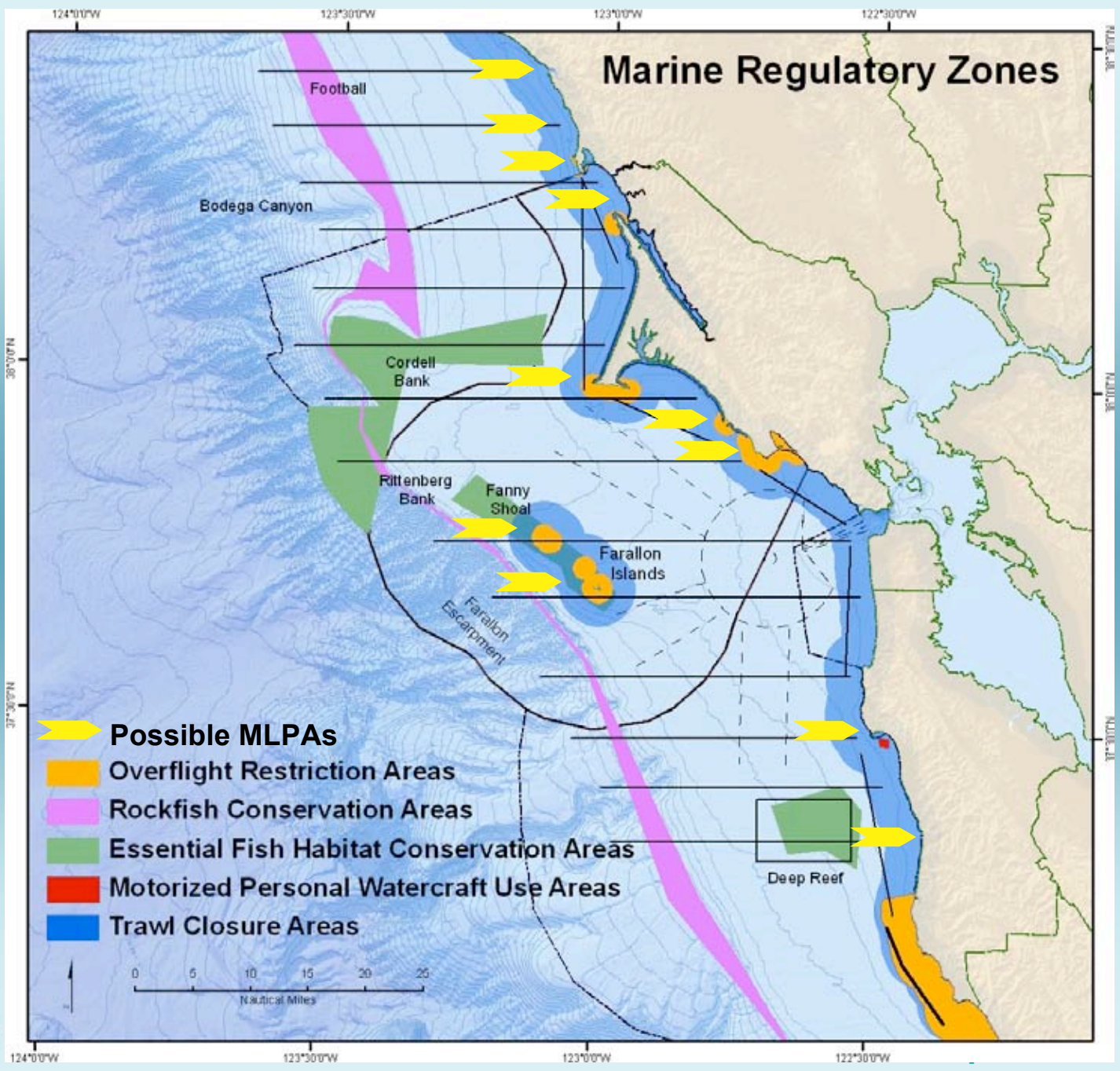


SEAS-Pelagic Habitat Overview

- Highly productive
- Localized influences
- Unique pressures
- Multi-agency marine protected areas



Marine Regulatory Zones



SEAS-Pelagic Habitat Overview

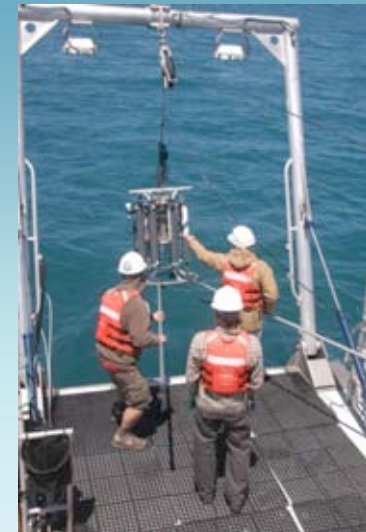
SEAS methods were developed in consultation with partners and researchers to provide data on various nearshore and offshore issues.

- Key species distribution in relation to marine zoning and climate change
- Marine debris
- Vessel activities
- Early detection of mortality events from harmful algal blooms, e.g. biotoxins
- Developing rapid damage assessment techniques



SEAS-Pelagic Habitat Partners

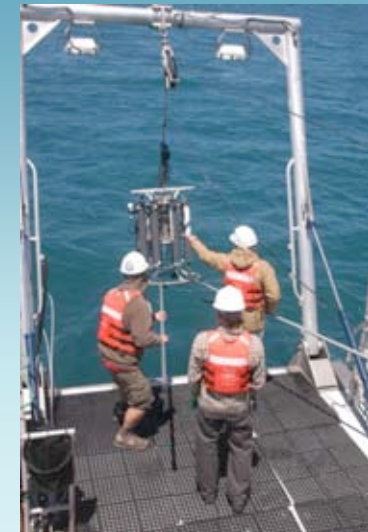
- OCNMS, CBNMS, MBNMS, CINMS
- California Dept. of Public Health
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- SFSU Romberg Tiburon Center for Environmental Studies
- CDFG Office of Spill Prevention & Response
- NOAA Fisheries Office of Restoration and Response
- NOAA Oceanographic Data Center and the Climate Database Modernization Program
- NMFS - SWFSC
- USFWS
- PRBO Conservation Science
- More to follow...



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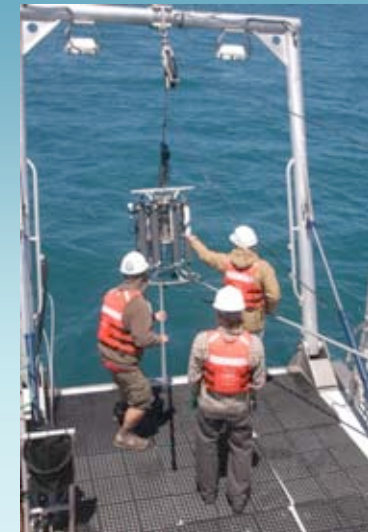
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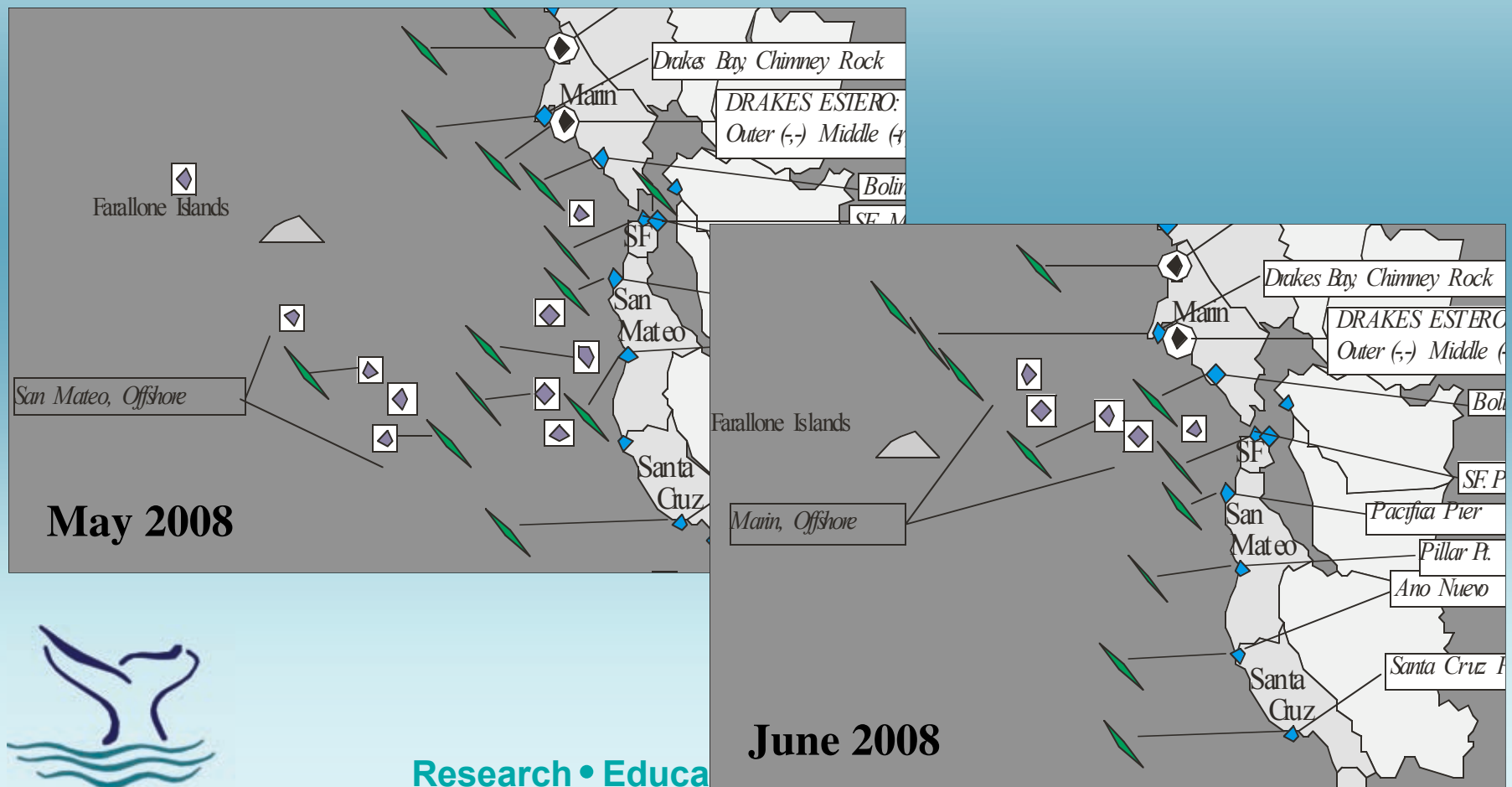
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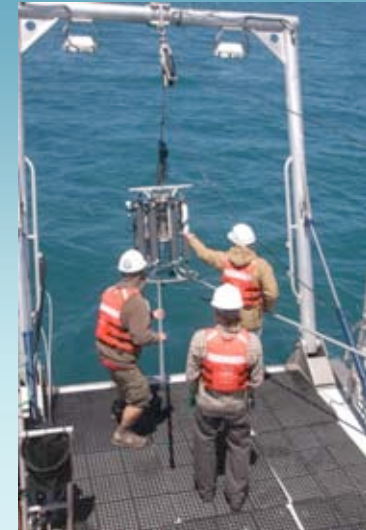
SEAS-Pelagic Habitat Examples of Collaborations

Collecting “piggyback samples” for HAB and oceanographic research



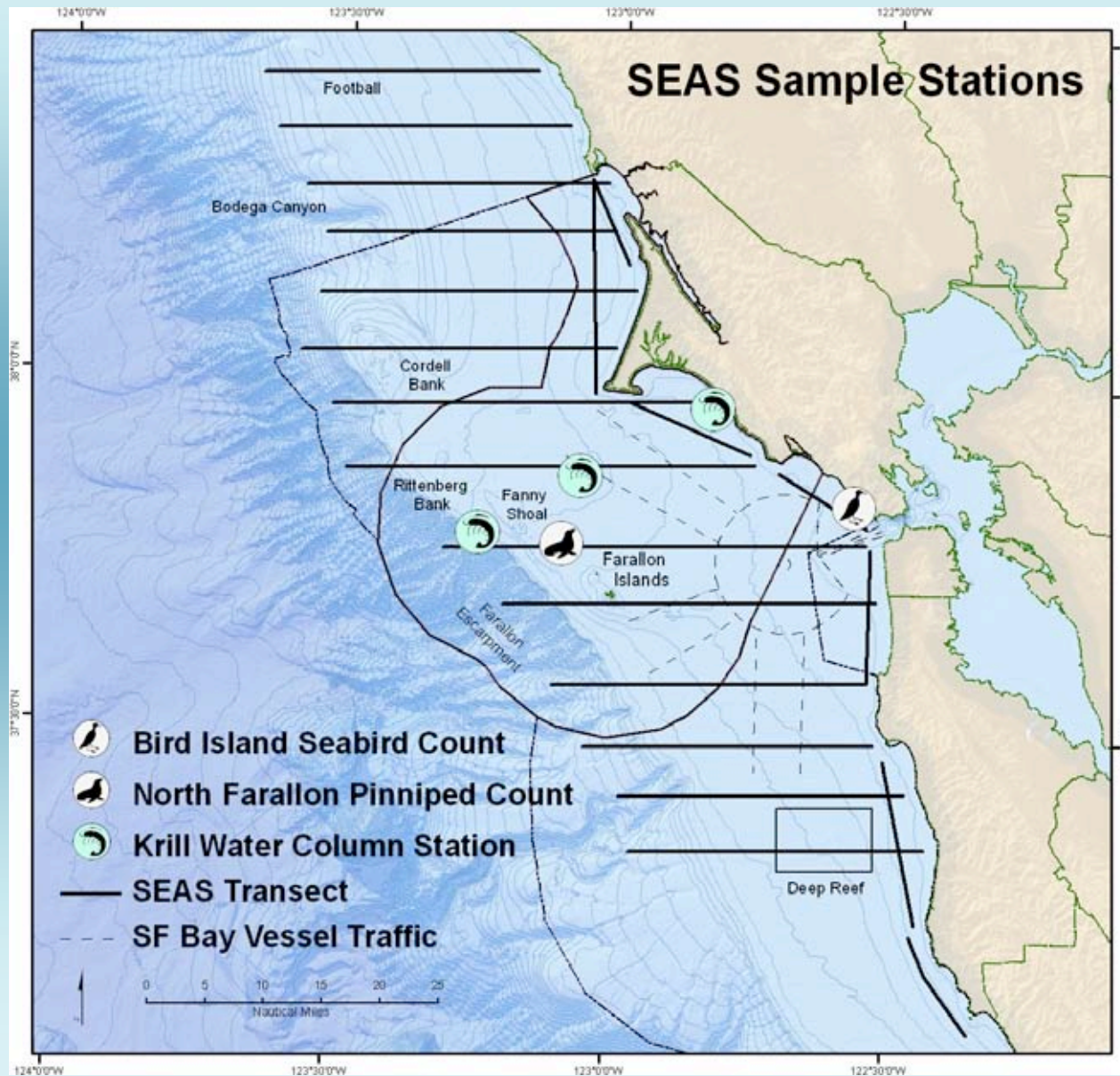
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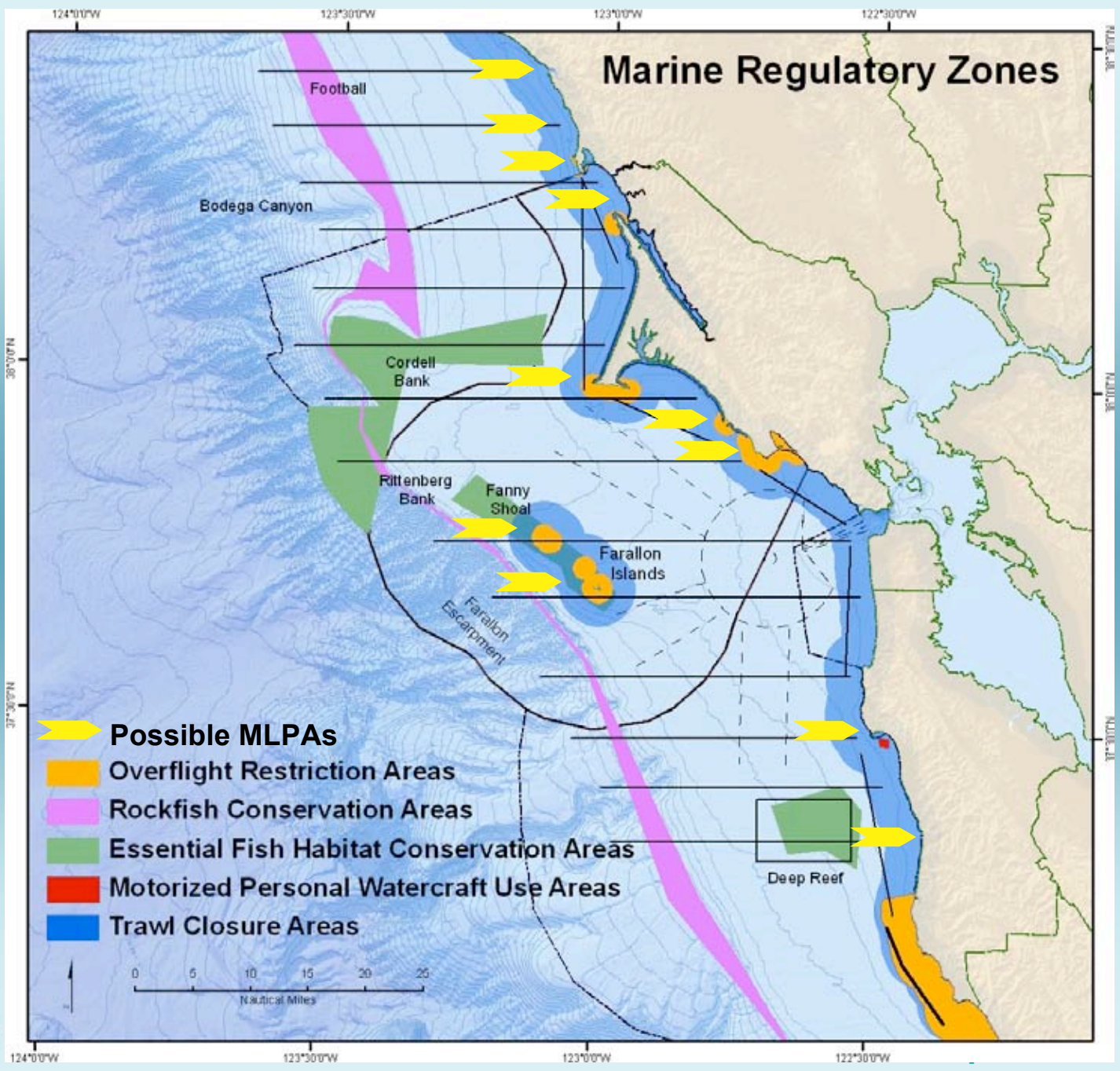


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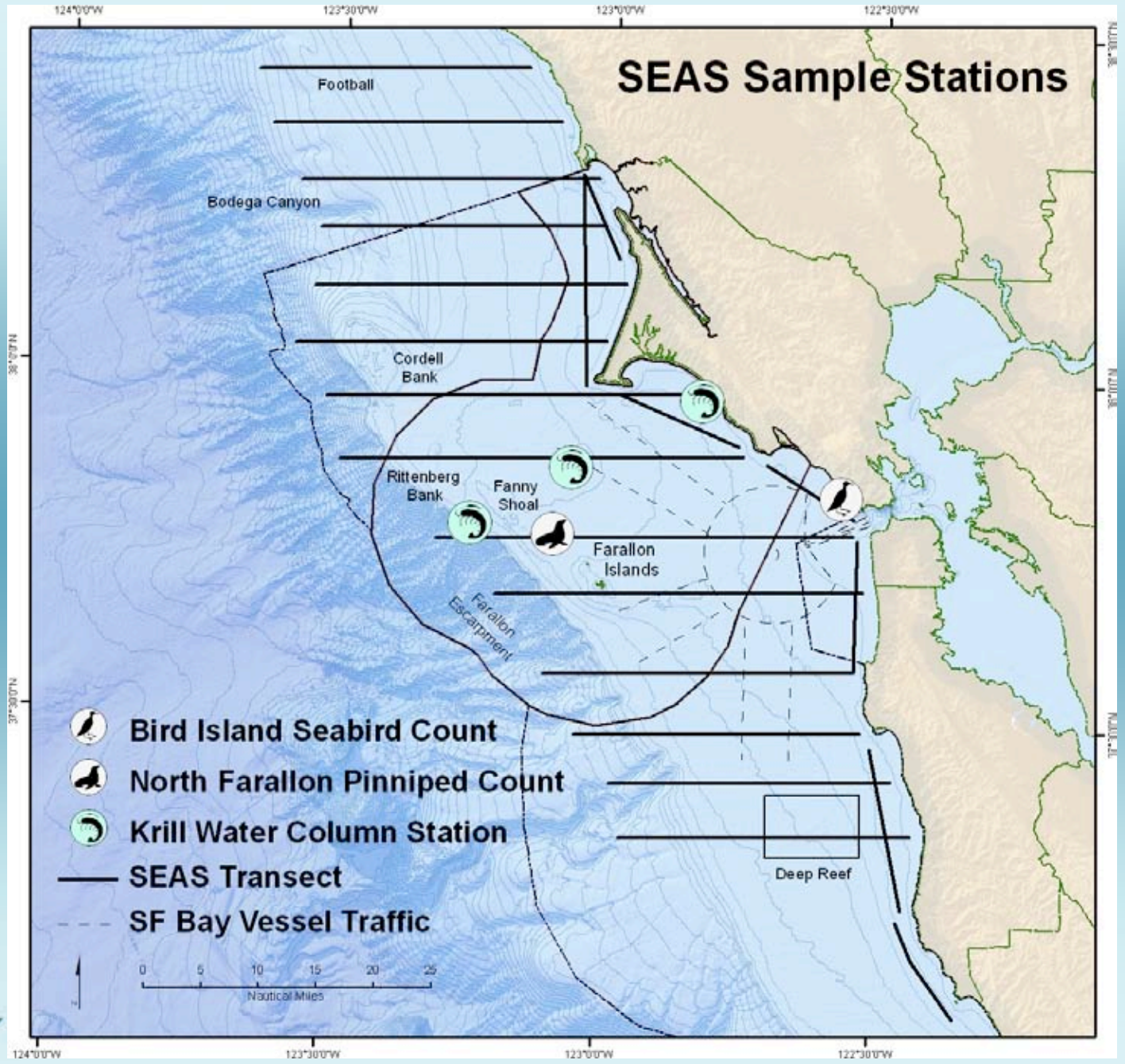
SEAS - Current Sample Design



Marine Regulatory Zones



SEAS Sample Stations



-  Bird Island Seabird Count
-  North Farallon Pinniped Count
-  Krill Water Column Station
- SEAS Transect
- SF Bay Vessel Traffic



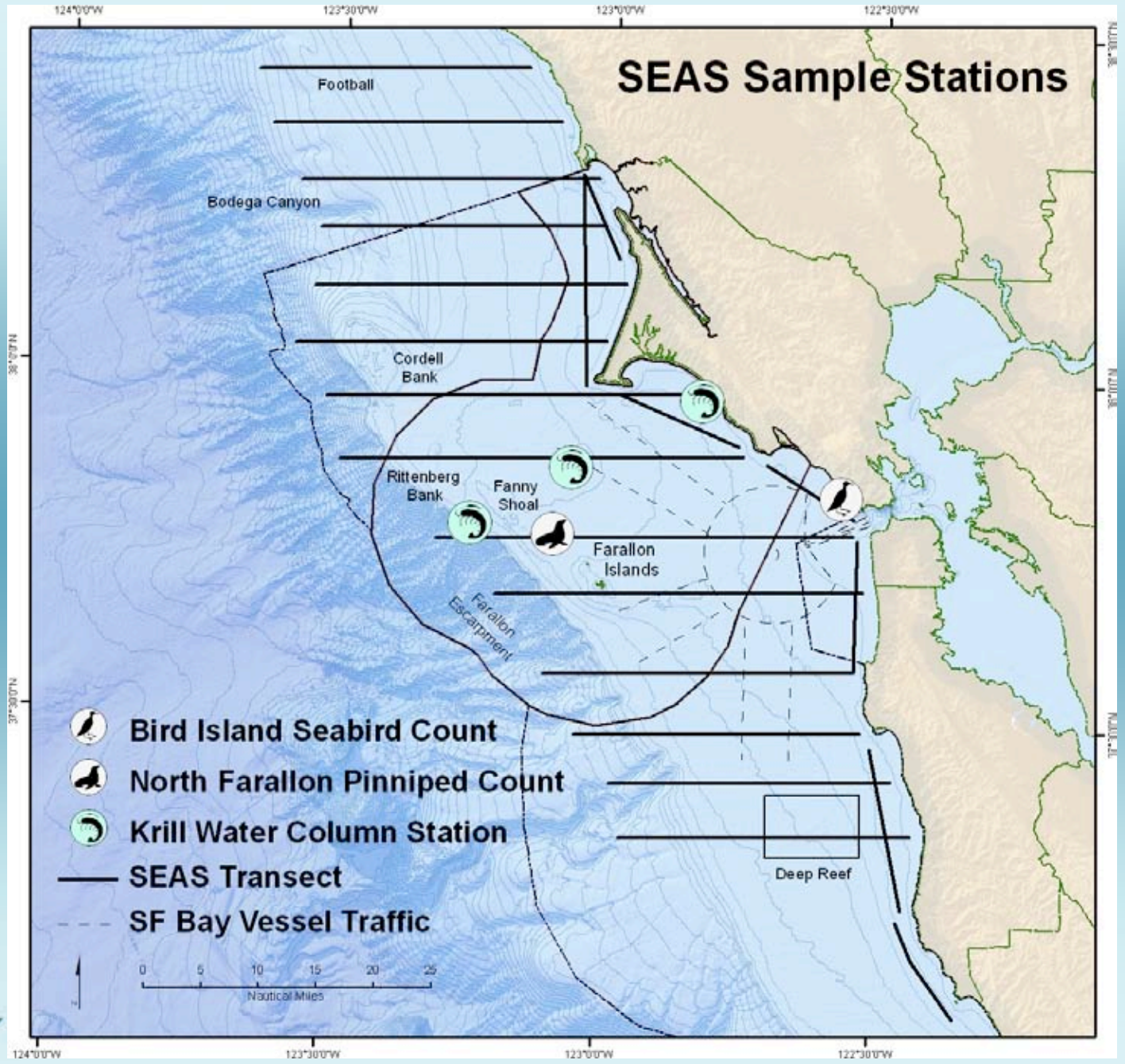
124°00'W 123°30'W 123°00'W 122°30'W

SEAS-Pelagic Habitat Examples of Collaborations

- Point station samples
 - Krill, copepods, water column characteristics, special counts - Bird Island and North Farallon Island



SEAS Sample Stations

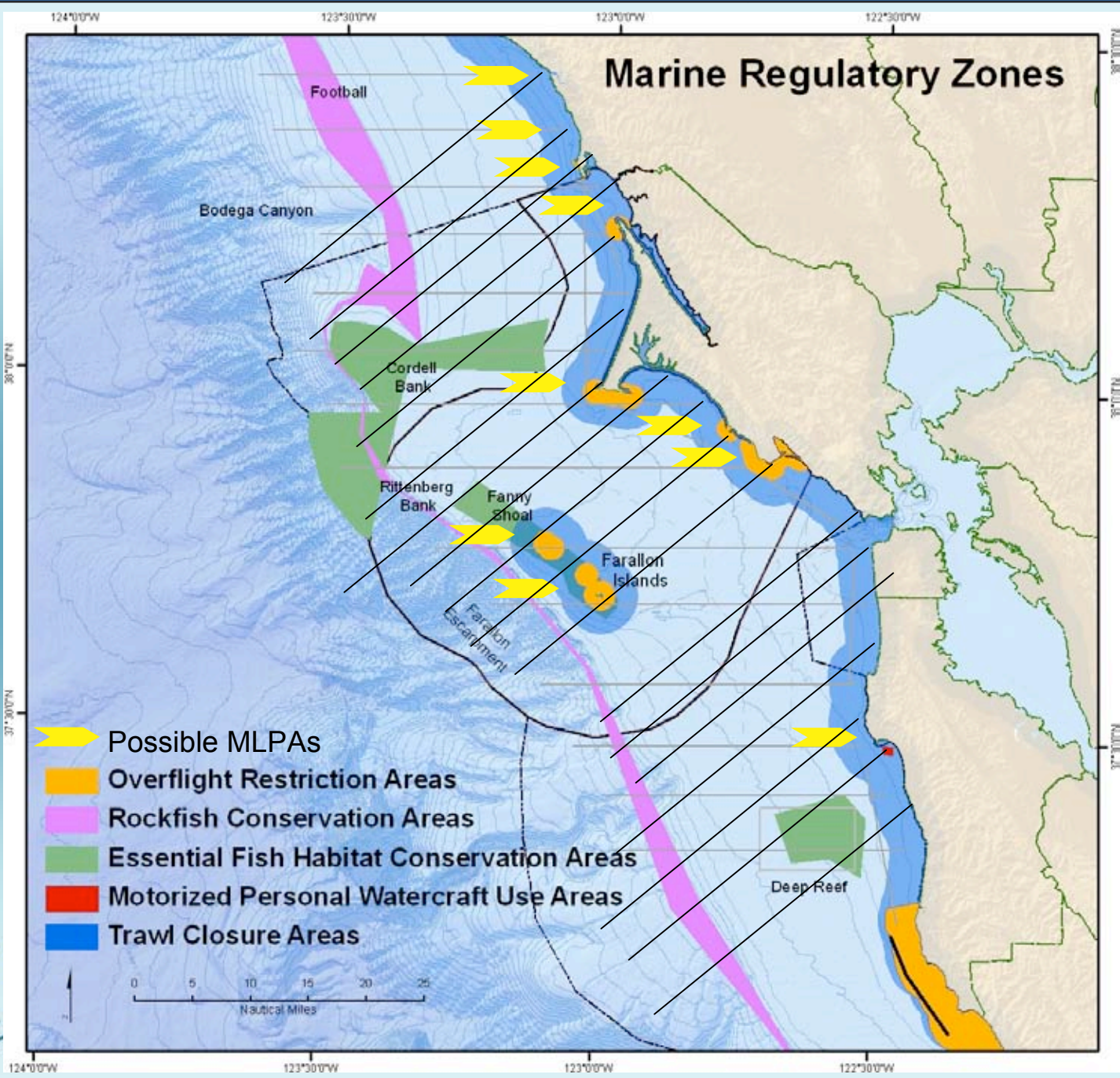


-  Bird Island Seabird Count
-  North Farallon Pinniped Count
-  Krill Water Column Station
- SEAS Transect
- SF Bay Vessel Traffic



0 5 10 15 20 25
Nautical Miles

Marine Regulatory Zones



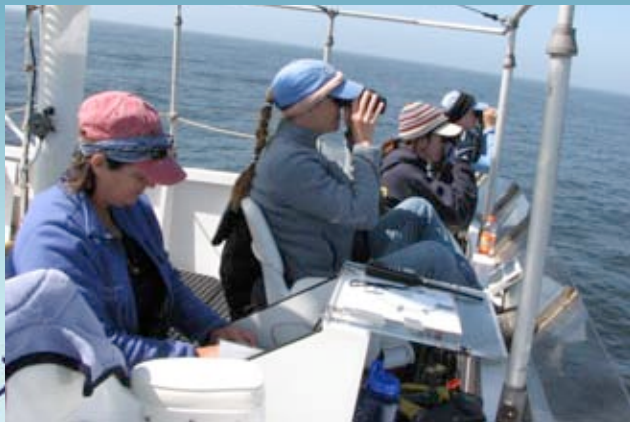
SEAS - Methods

- Vessel-based surveys from R/V *FULMAR*
- Currently seasonal; future plans for year-round surveys
- Strip Transect
 - Birds, turtles, marine debris, fronts/convergent zones, jellyfish, drift algae, sharks and sunfish
- Line transect
 - Mammals and vessel activities
- Demographics & Behavior
 - Age, Sex, Feeding, Mating, Traveling, Milling, etc.

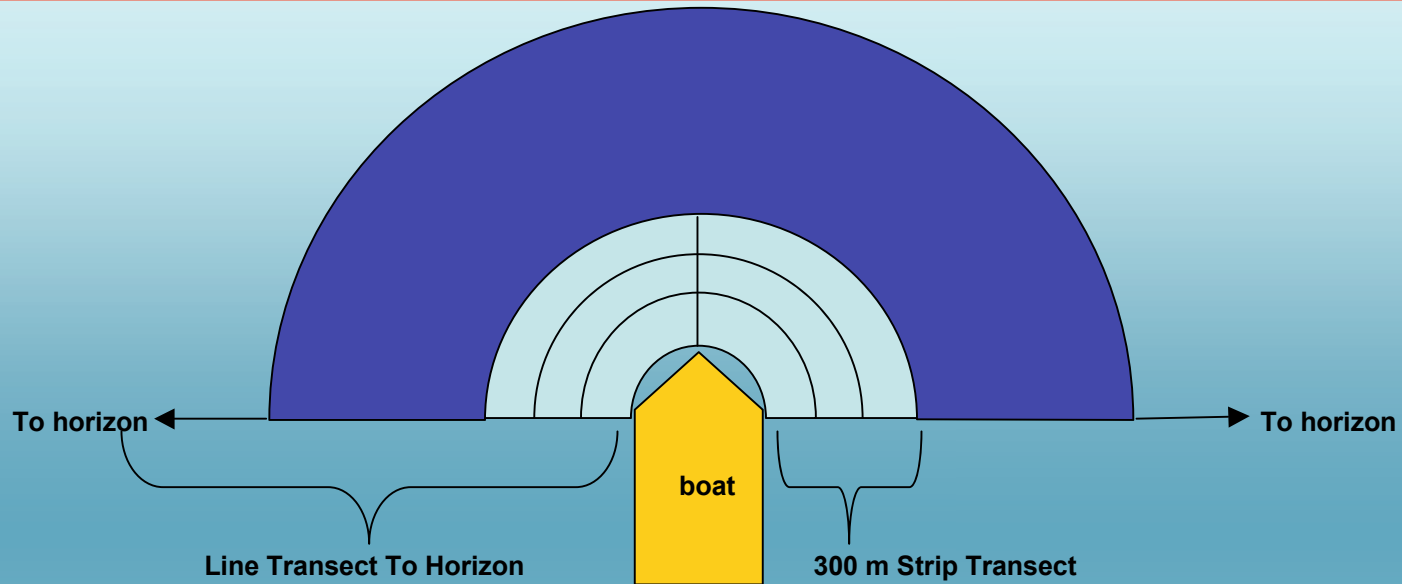


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SEAS - Methods



Line Transect

- 2 Observers
- 180° Observation Zone to Horizon
 - Mammals
 - Vessel & Activities

Strip Transect

- 2 Observers
- 180° Three-100 m Zones
 - Sea Turtles
 - Marine Debris
 - Drift Algae
 - Jellyfish
 - Sharks/Sunfish
 - Fronts

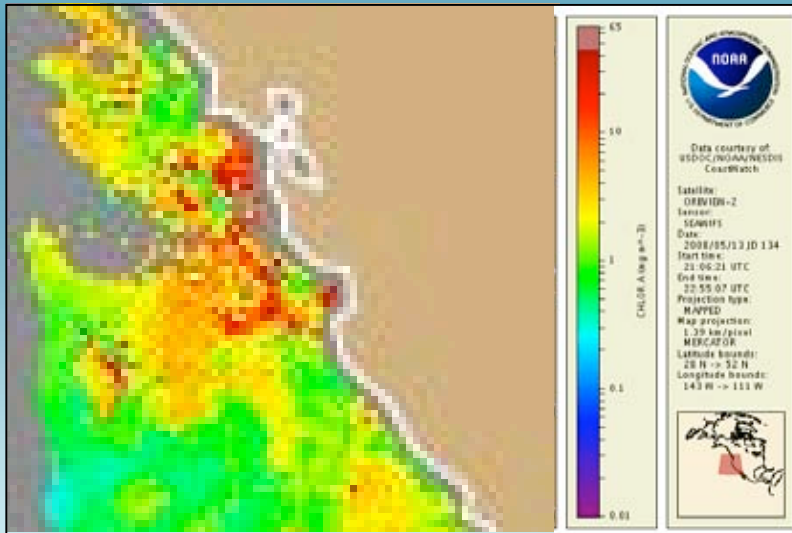
Strip Transect

- 1 Observer
- 90° Three-100 m Zones
 - Birds

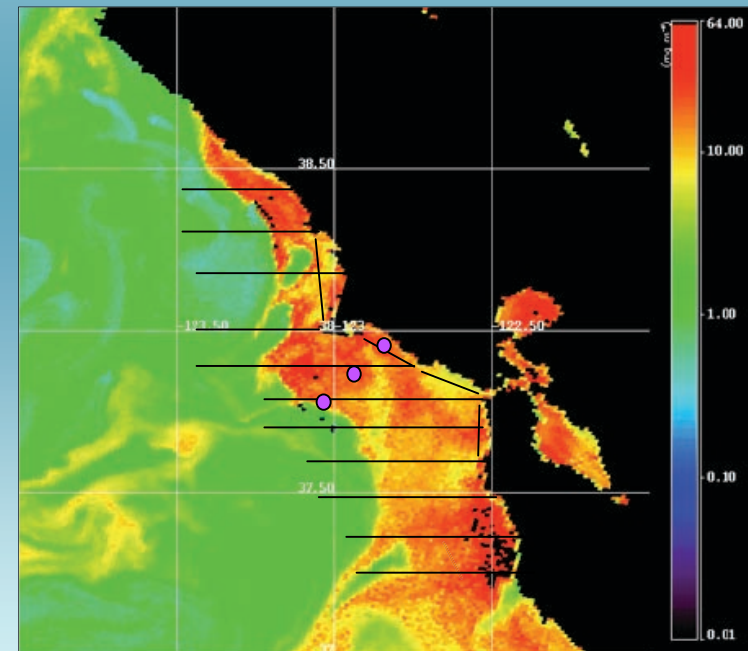


SEAS - Methods

- Continuous, underway sampling for sea surface temperature and starting in 2009/10 acoustic sampling for biomass
 - Future funding needed for fluorescence sampling on R/V *FULMAR*
- Remote sensing for chlorophyll and sea surface temperature



Chlorophyll-a Satellite Image

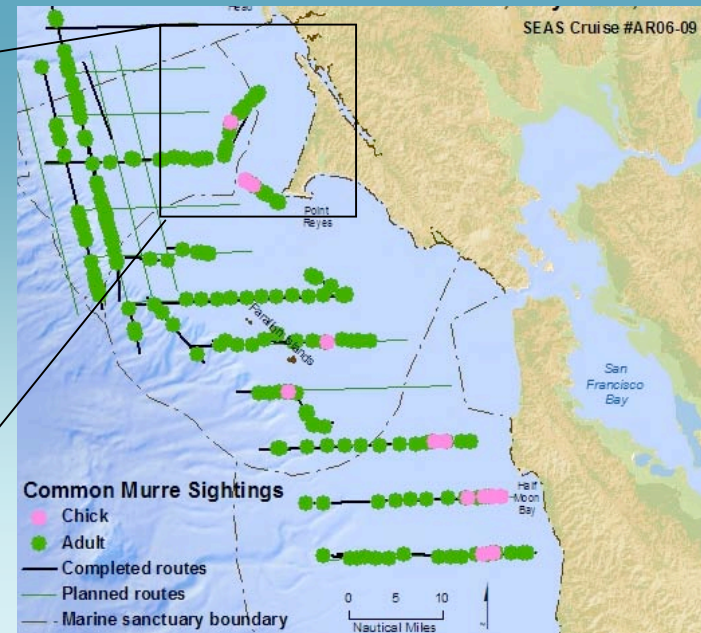
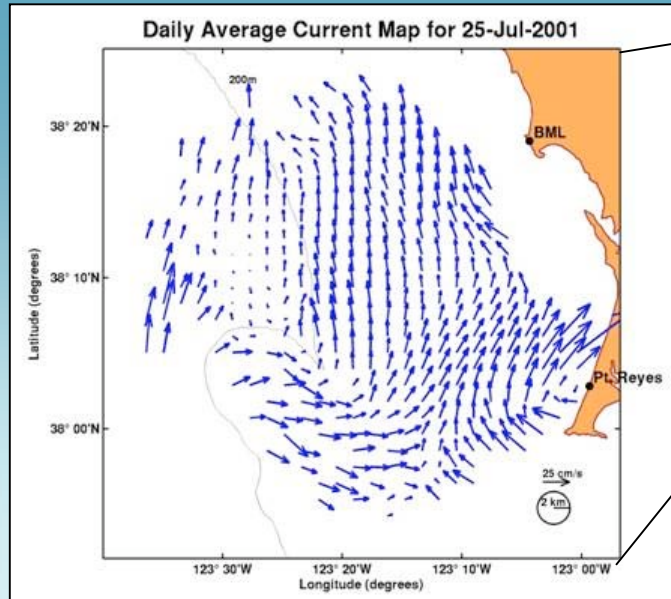


SST Satellite Image



SEAS Addresses GFNMS Management Issues

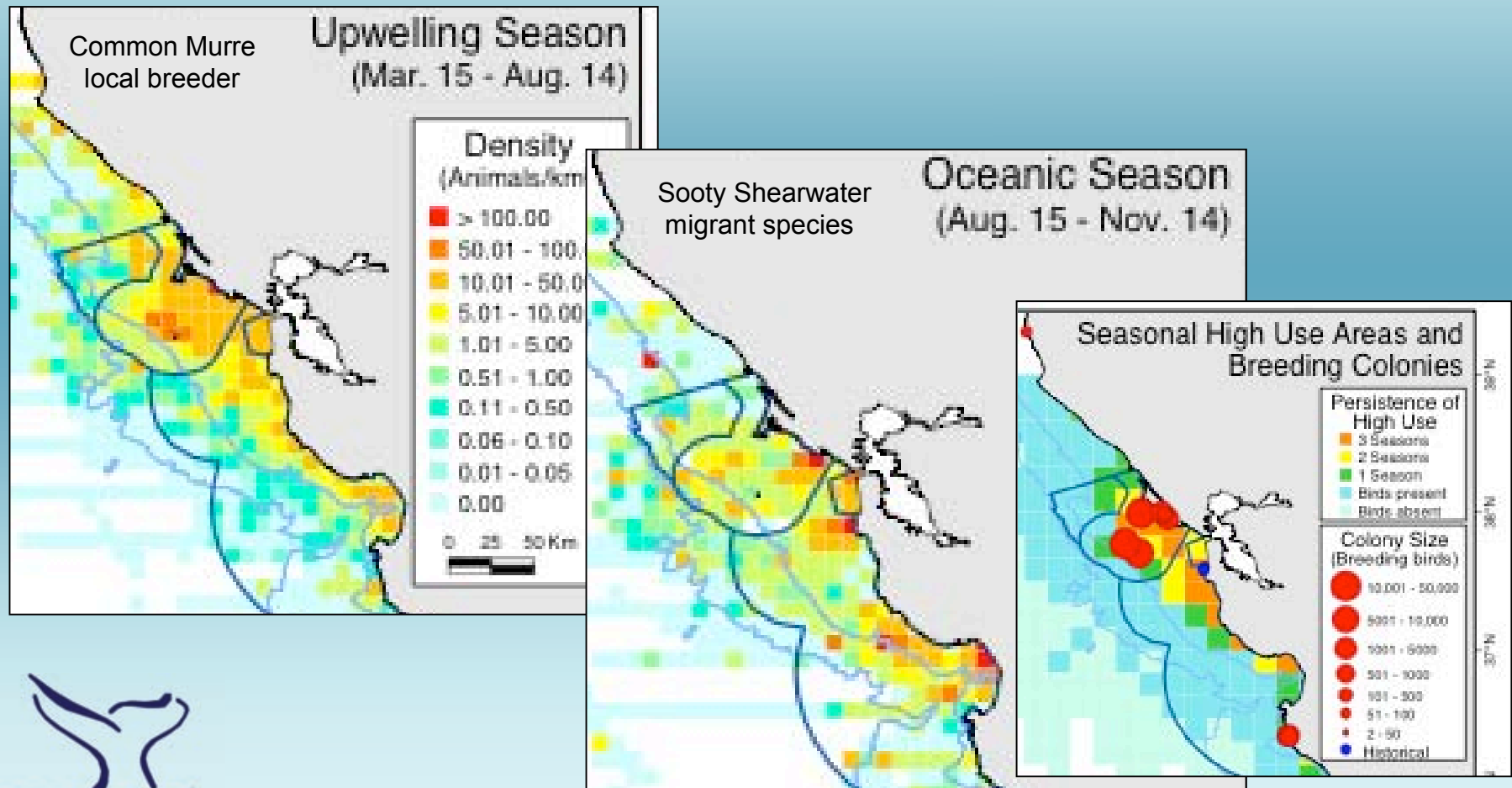
- Map spatial and temporal changes in areas of convergent water mass and frontal zones concentrating floating/feeding birds, algae, oil and anthropogenic flotsam, to better characterize ephemeral and persistent areas of higher ecological richness for resources at risk from oil pollution, marine debris and disturbance.



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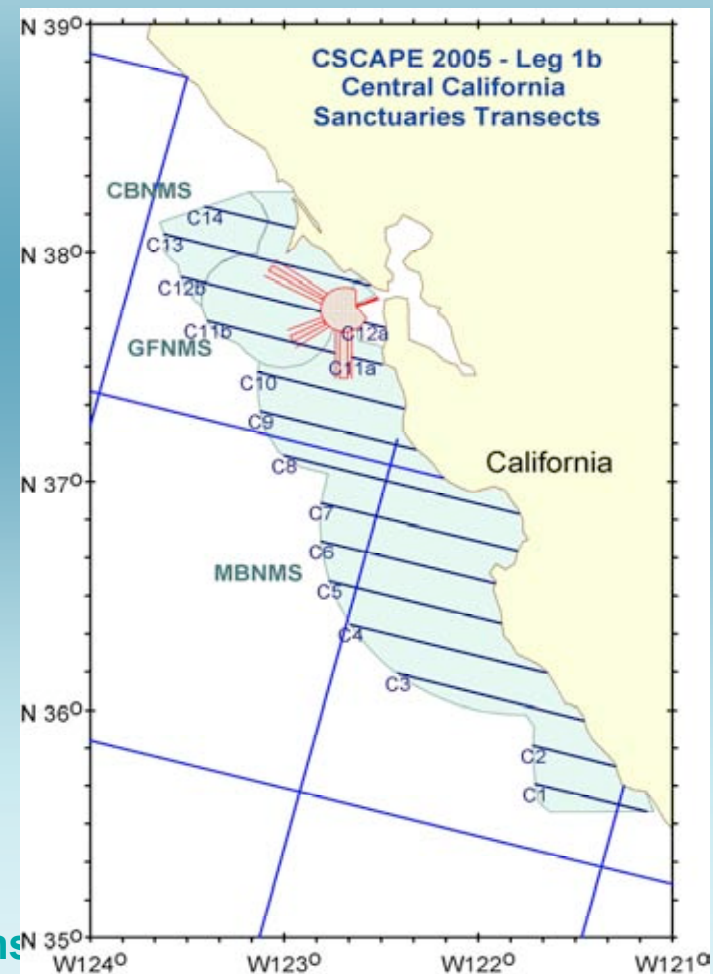
SEAS Addresses GFNMS Management Issues

- Identify and map ecological hotspots that are consistently of higher productivity for birds and mammals.



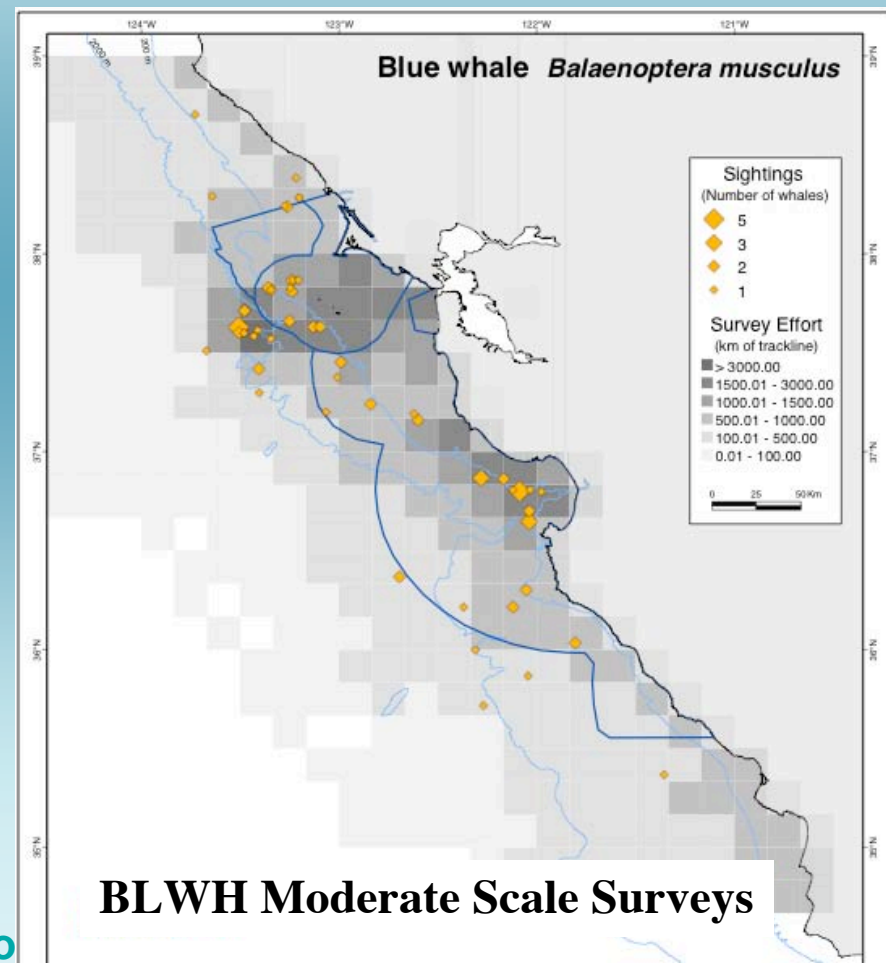
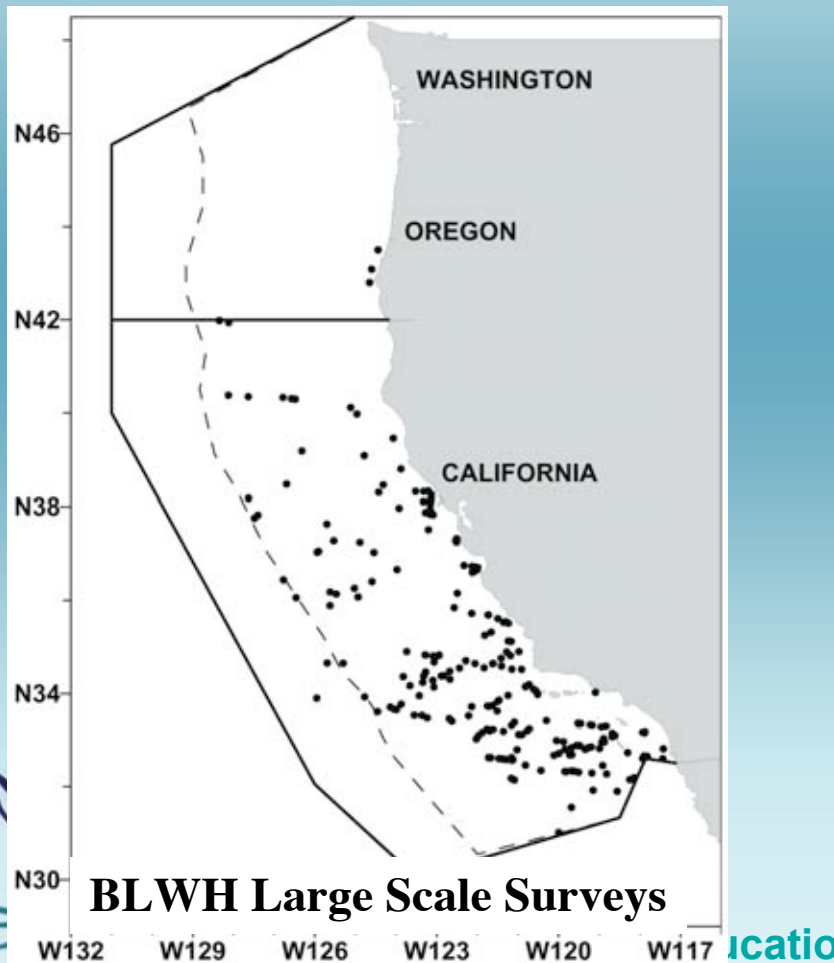
SEAS Addresses GFNMS Management Issues

- Identify shifts in range of vertebrates such as seabirds, marine mammals and sea turtles, as potential indicators of global climate changes



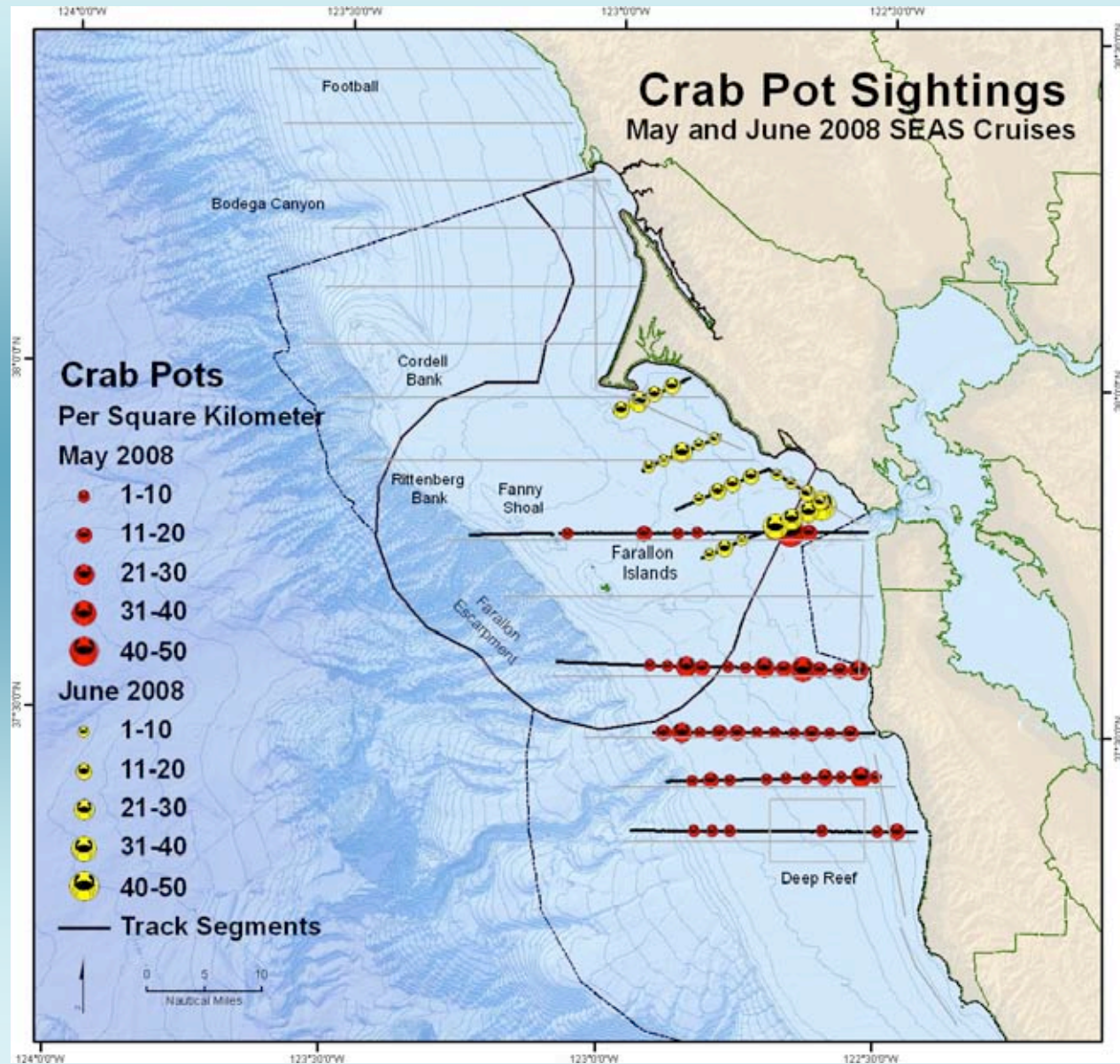
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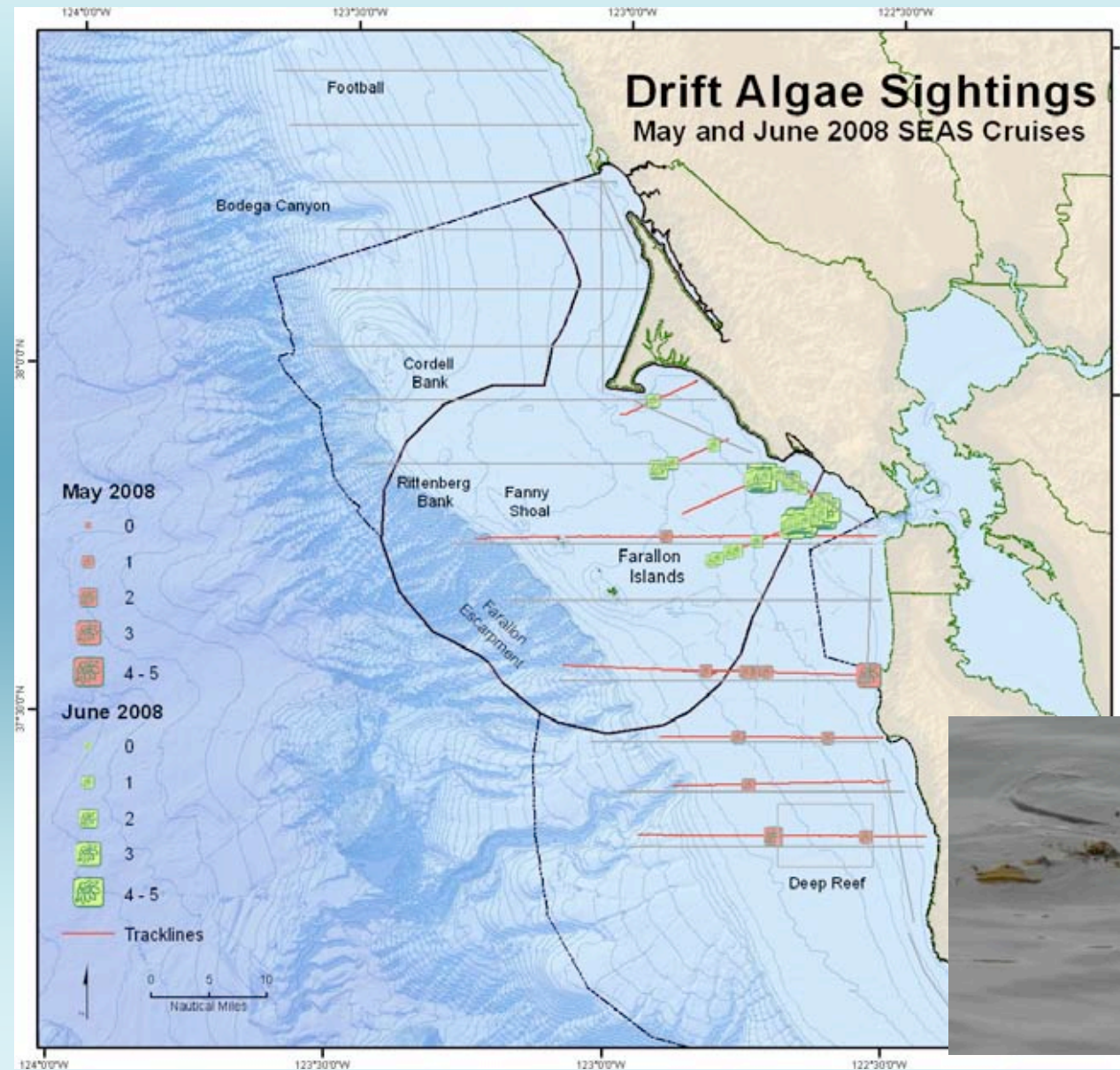


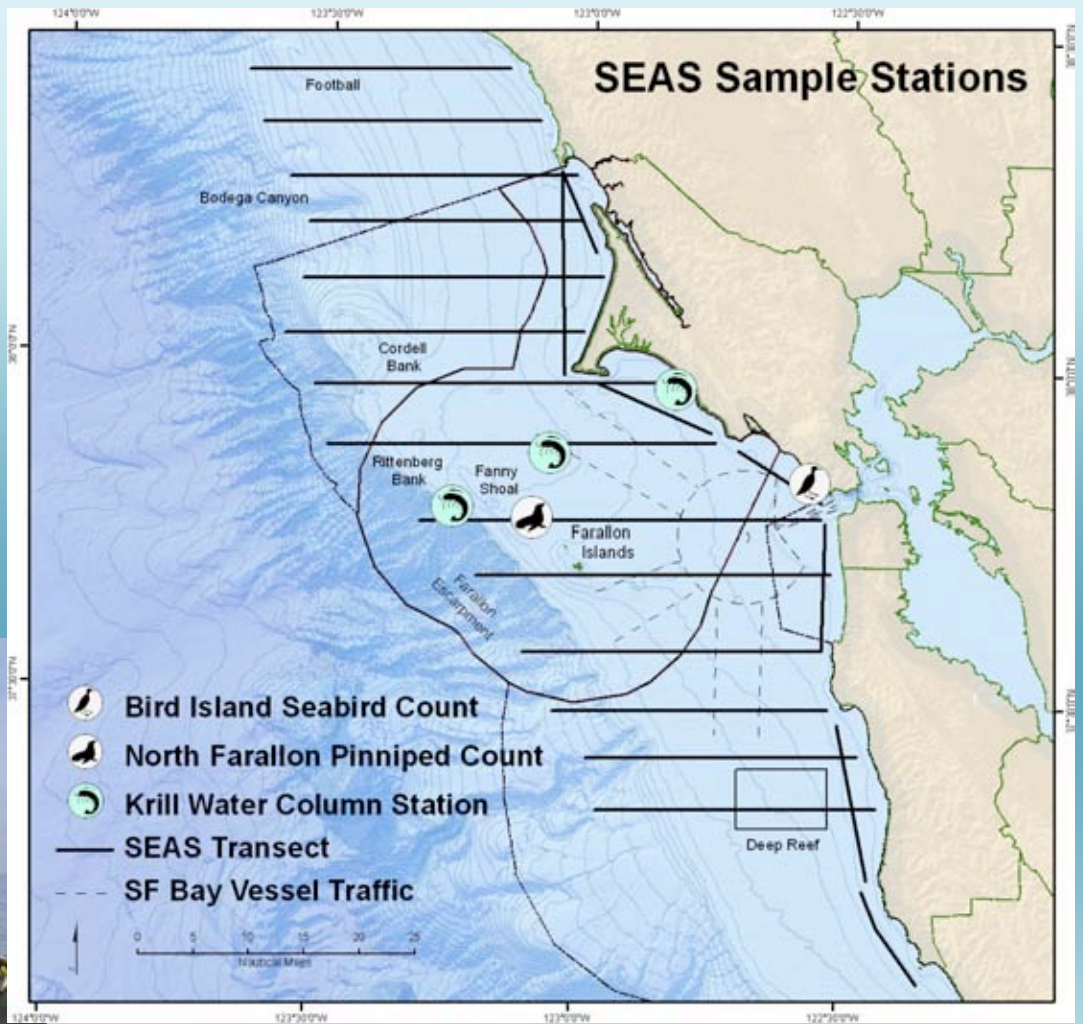
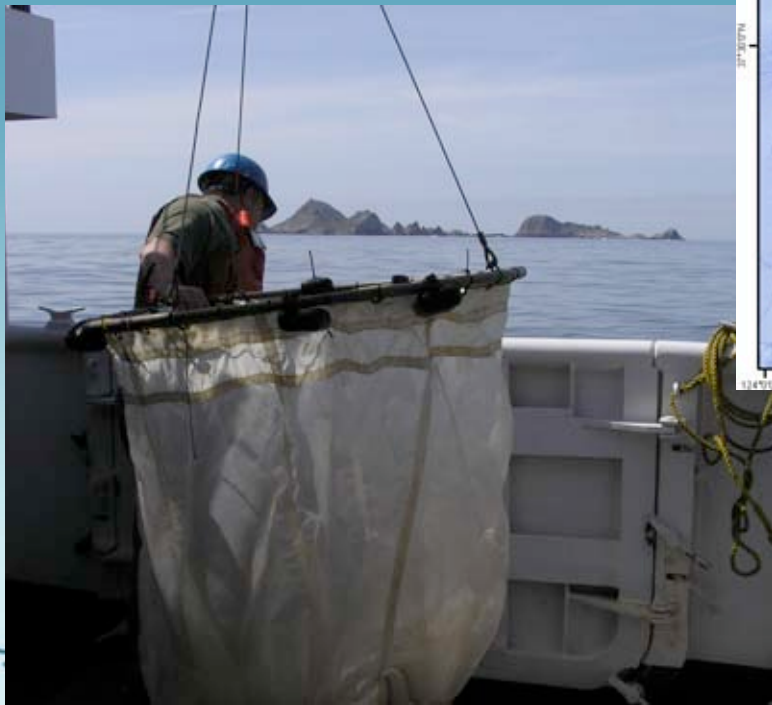
SEAS - Example of Current Use of Data

- Identify areas of concentrated marine debris and derelict fishing gear such as crab pots out of season.



SEAS - Example of Current Use of Data

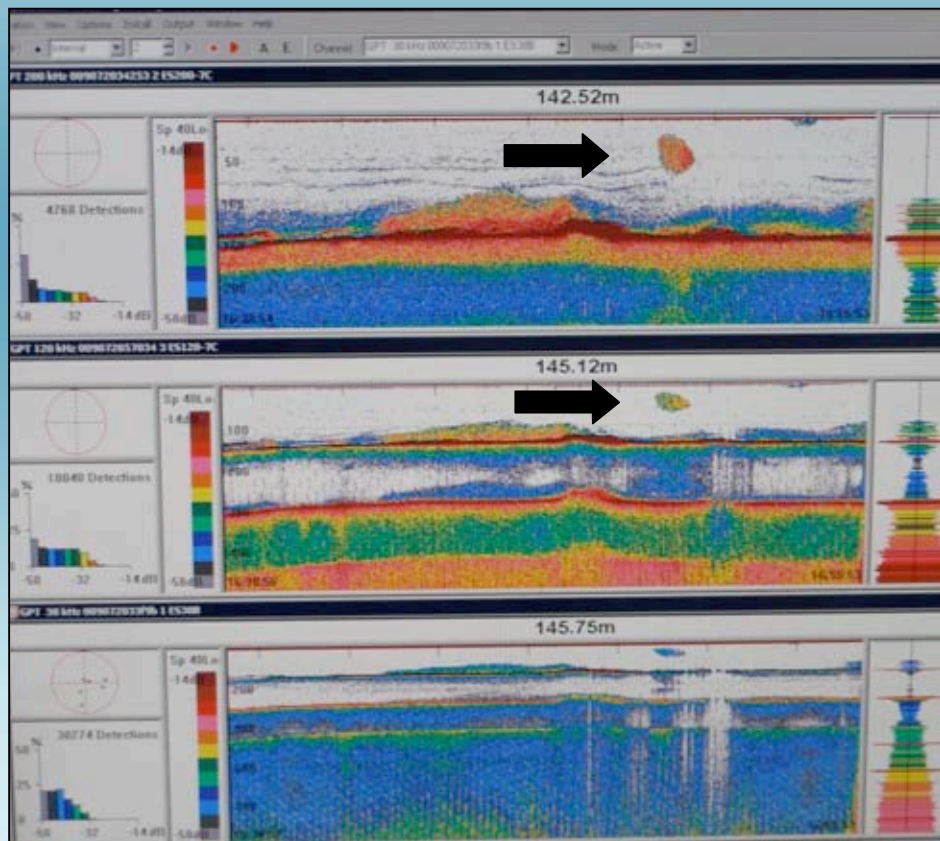




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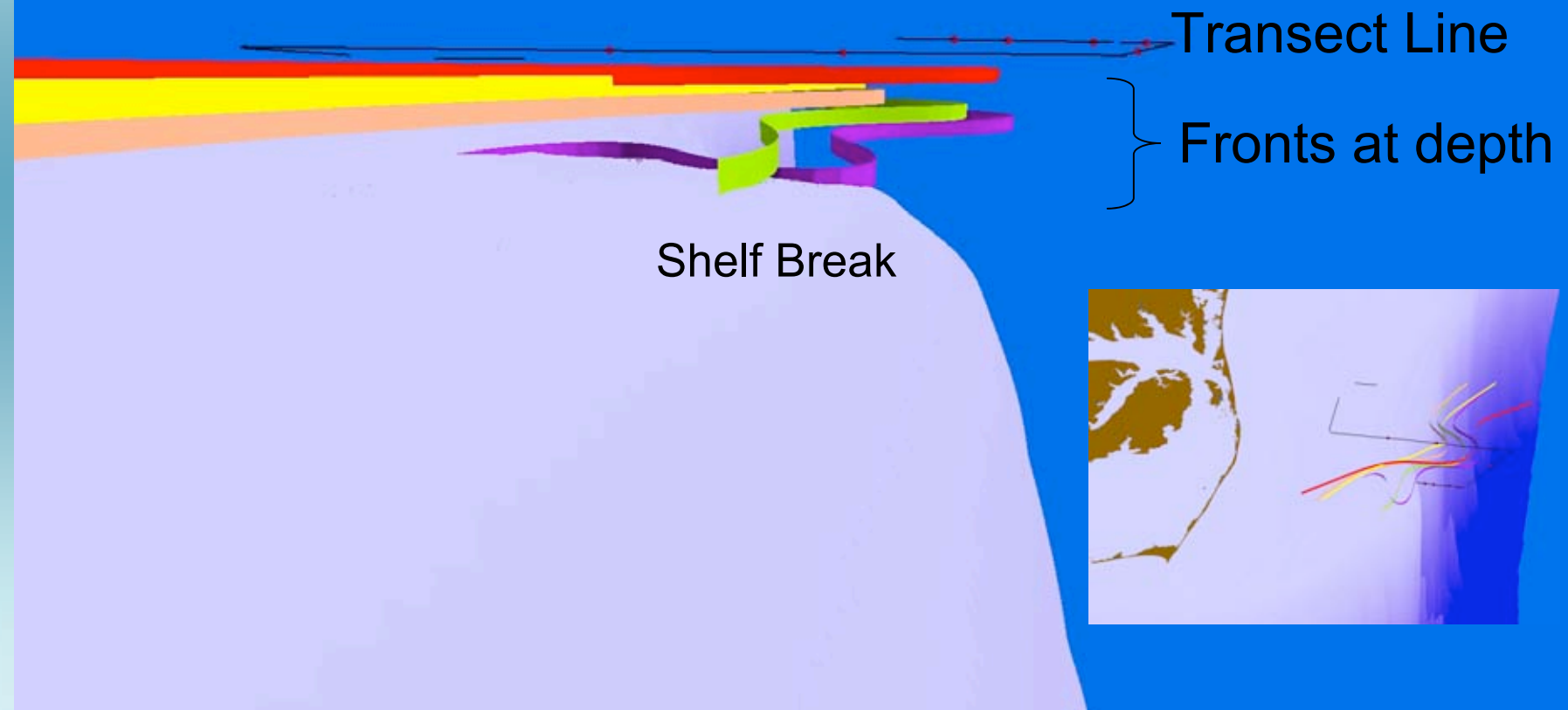
SEAS- Expansion of Parameters

- Identify water column features to help track impacts from oil spills and effects of response measures such as dispersants, fate of dispersed oil, and trophic level impacts.



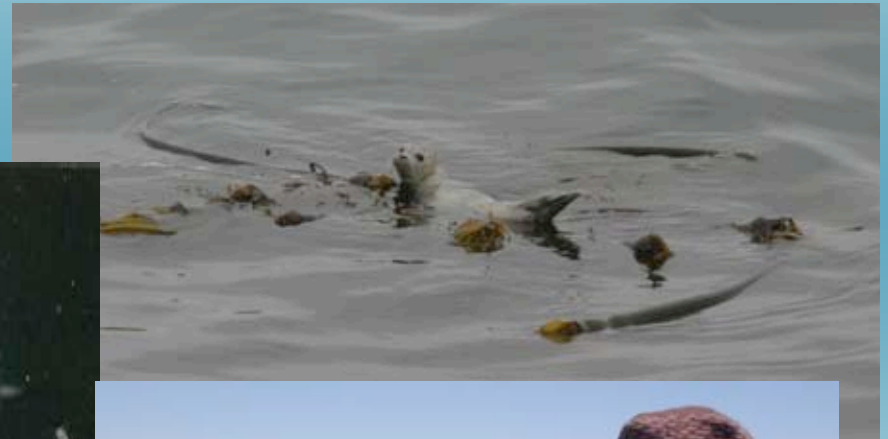
SEAS- Expansion of Parameters to be Sampled

Example of vertical progression of fronts throughout the water column.



SEAS Addresses GFNMS Management Issues

- Develop a damage assessment “Strike Team” to be deployed to assess the offshore and water column natural resources during an oil spill and to aid management in determining the use of dispersants and in-situ burning.



SEAS - Products

- Near-real-time maps and tables of the location and density of key species, fronts and biological habitats
- “What’s New” findings for ONMS Exploration pages, GFNMS and GF-SIMoN web sites
- Link with other ecosystem monitoring observations programs
- Link with sanctuary SHIELDS program for rapid access to environmental information, sensitive species, and resources at risk information during emergency response
- Develop techniques to rapidly assess water column features, such as layered fronts
- Annual reports



Photo Credits - Thank you!

Jamie Hall

Emma Moore

Cornelia Okedovan

PRBO Conservation Science Library

Peter Pyle

Jan Roletto

Ben Saenz

Jason Thompson

Sophie Webb