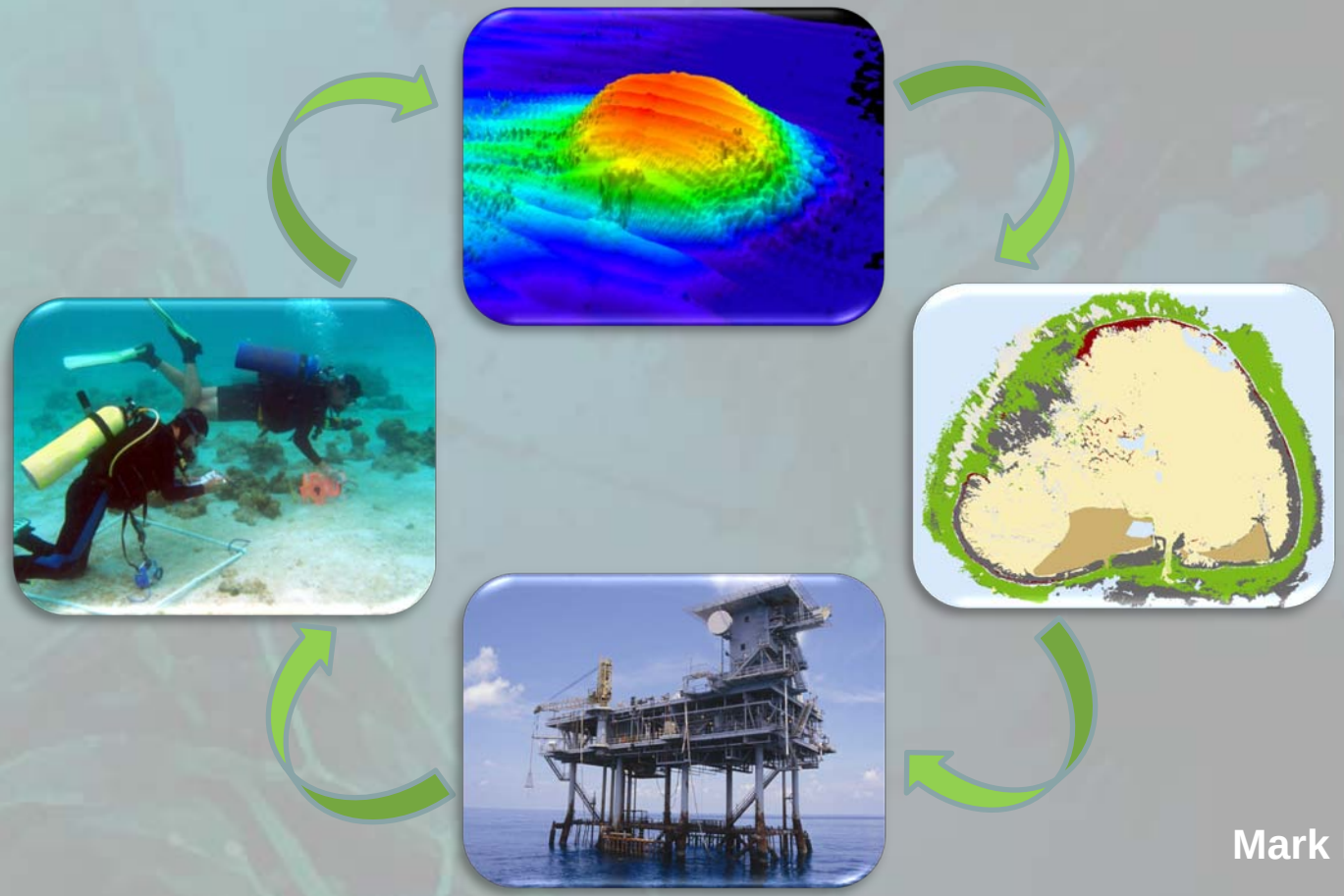
Biogeographic Approach to Coastal Assessments & Spatial Planning



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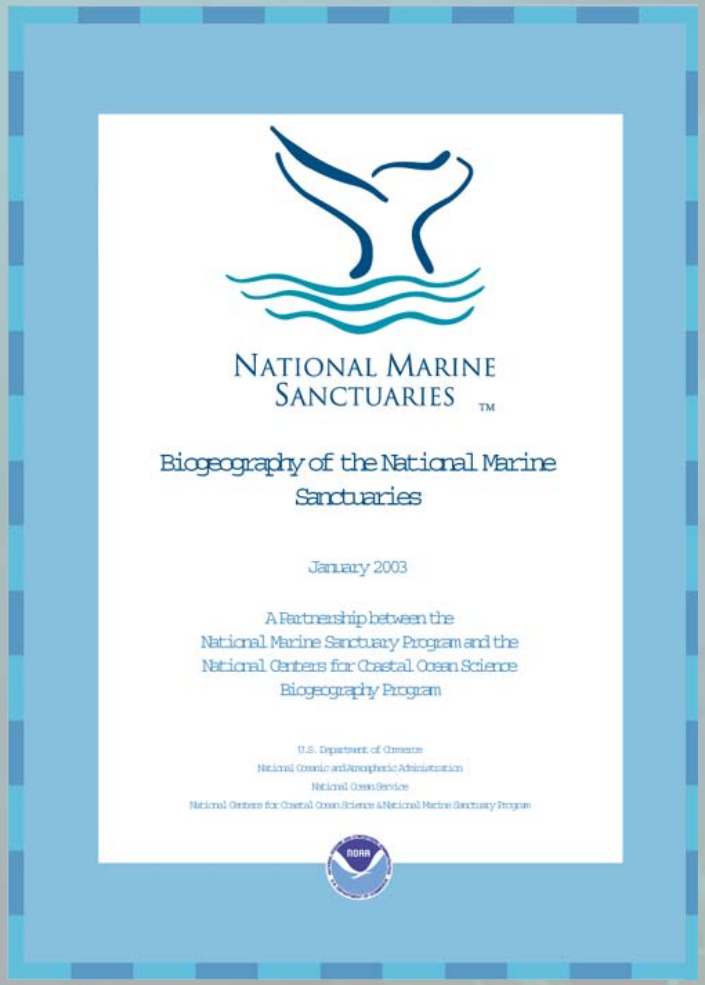
Biogeography to Support Marine Spatial Planning in NOAA's National Marine Sanctuaries



Developed plan to address:

- Management Plan Revisions
- Environmental Characterizations
- Boundary Evaluations
- Zoning
- Threat Assessment
- Issues of Concern

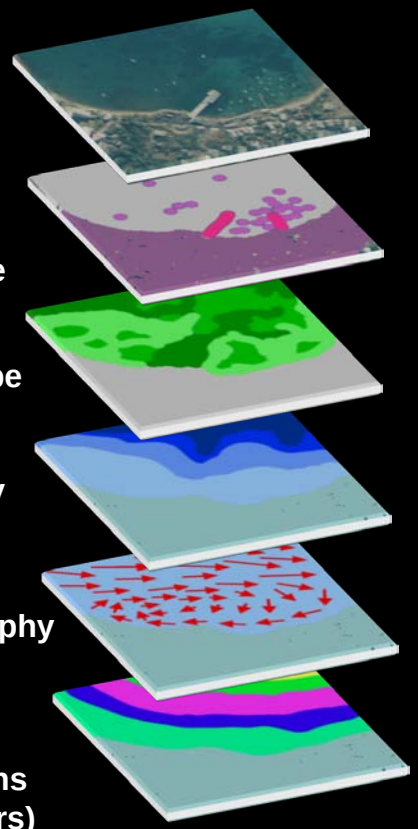
Key steps:

- Identify Site Needs Across Multiple Spatial Scales
- Develop a Biogeographic Characterization Plan
- Conduct Joint Biogeographic Characterizations
- Address Future Management Needs and Challenges

Biogeography in National Marine Sanctuaries

Biogeographic Assessment Approach to Support Marine Spatial Planning

Biogeographic Data Layers

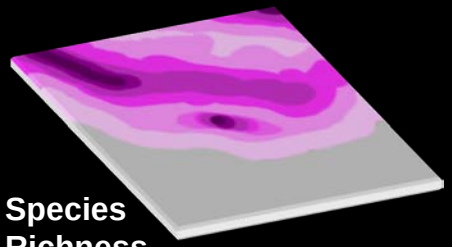


- Imagery
- Patterns of Human Use
- Bottom Type
- Bathymetry
- Oceanography
- Species Distributions (many layers)

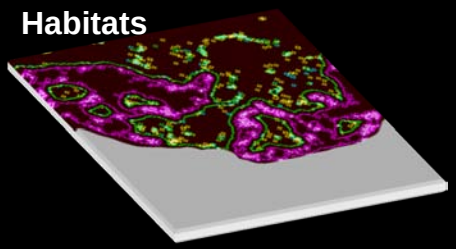
Combine Biogeographic Layers for Analysis

Example Integrated Biogeographic Analyses*

* Specific analyses targeted to management needs



Species Richness

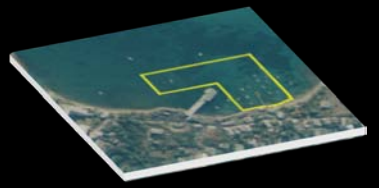


Threatened Habitats

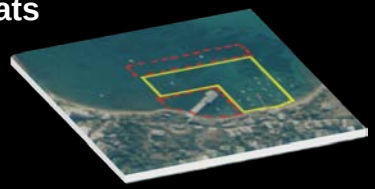
Analytical Products to Meet Management Objectives

Products to Aid Management

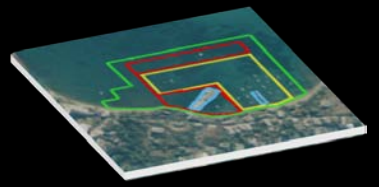
Evaluate internal zone boundaries relative to biological resources



Explore options for reducing ecosystem threats



Evaluate alternative management strategies



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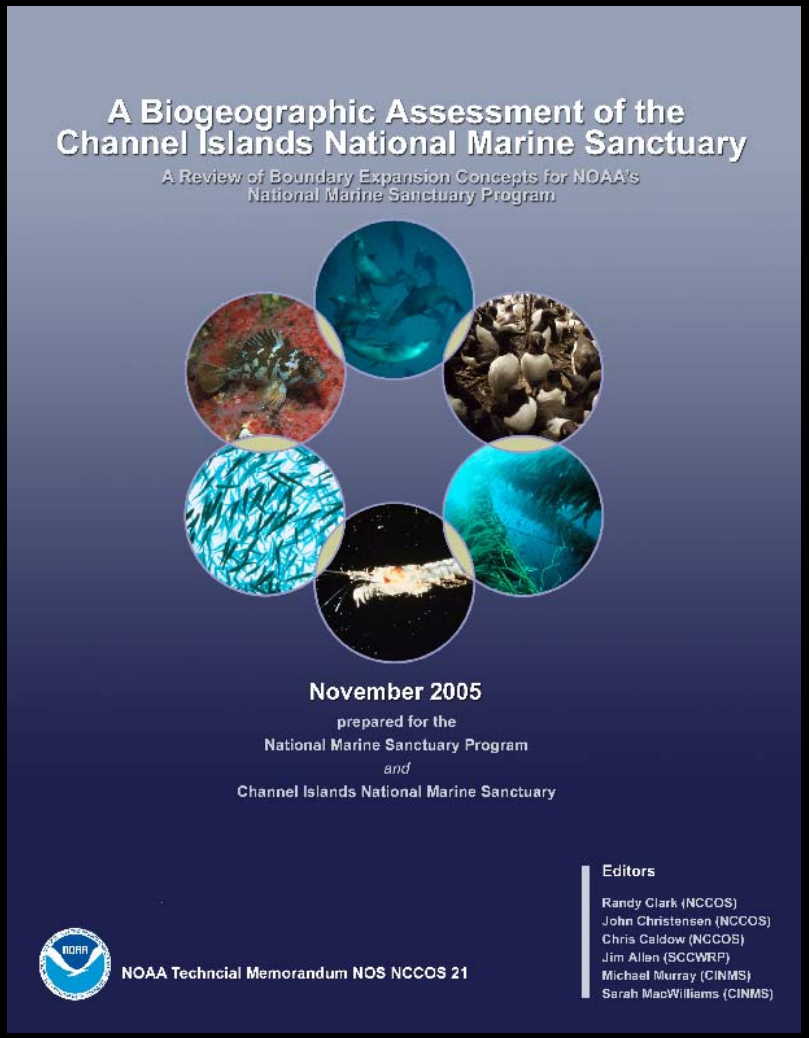
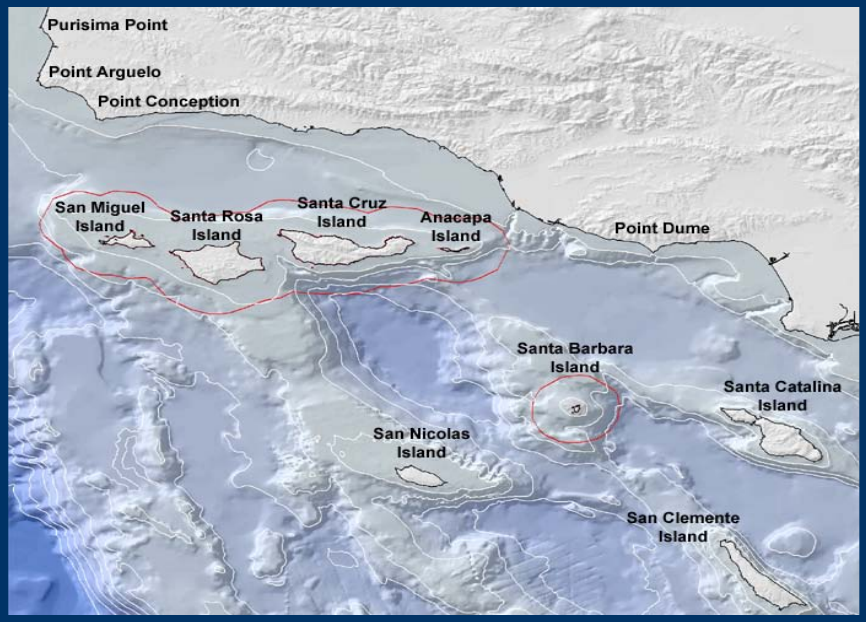
Case Study: Southern California Bight



- To produce a quantitative characterization of the distribution of organisms and habitats throughout southern California.
- To evaluate six proposed boundary expansion alternatives under consideration by the Channel Islands National Marine Sanctuary

Questions Identified

- What data exists to identify ecologically important areas?
- Can we model the distribution of selected species?
- What can these patterns and trends tell us about the biogeography of the region?
- How do these patterns and trends relate to Sanctuary boundary concepts?

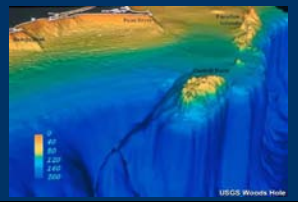


Mammals

Fishes

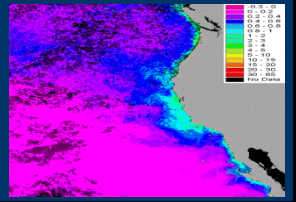
Birds

Habitats



Inverts

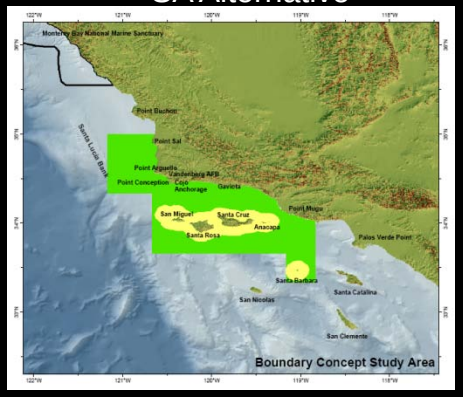
Oceanography



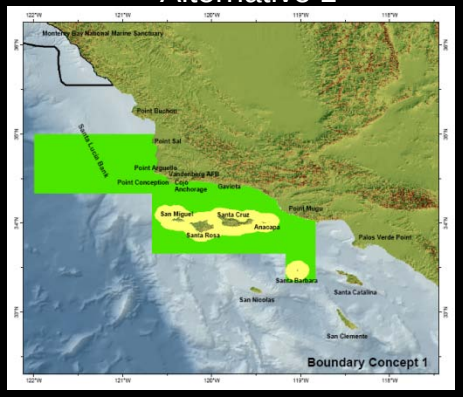
Boundary Alternatives

- High public interest in the concept of boundary expansion was expressed during 1999 public scoping meetings.
- The management plan review process identified six alternatives, plus a 'no action' alternative for consideration.
- The proposed boundaries would encompass areas ranging from 3,745 km^2 to 22,613 km^2.

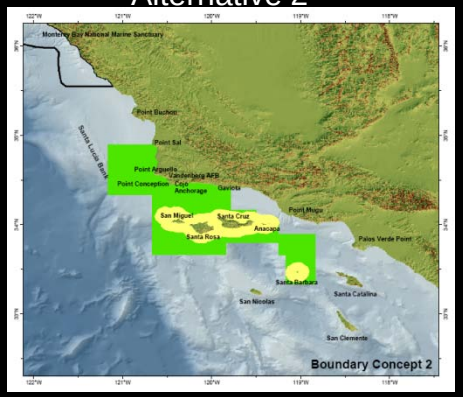
SA Alternative



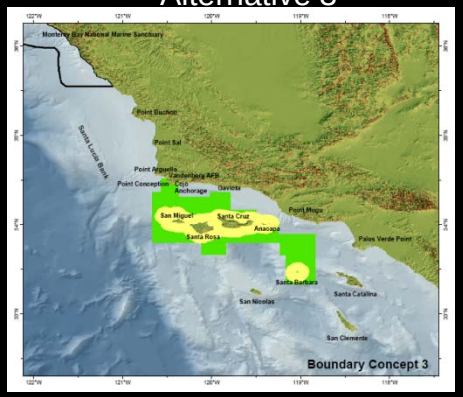
Alternative 1



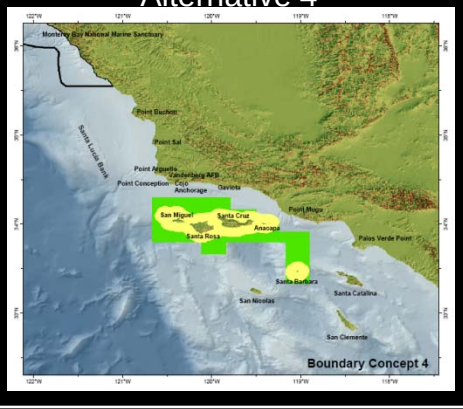
Alternative 2



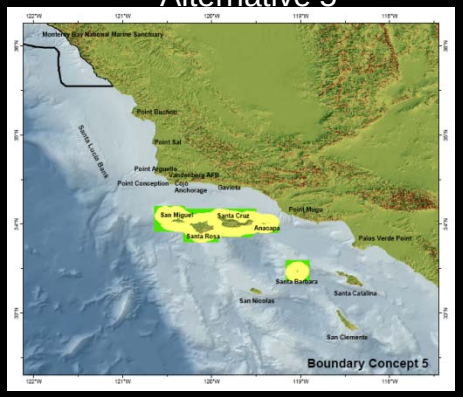
Alternative 3



Alternative 4

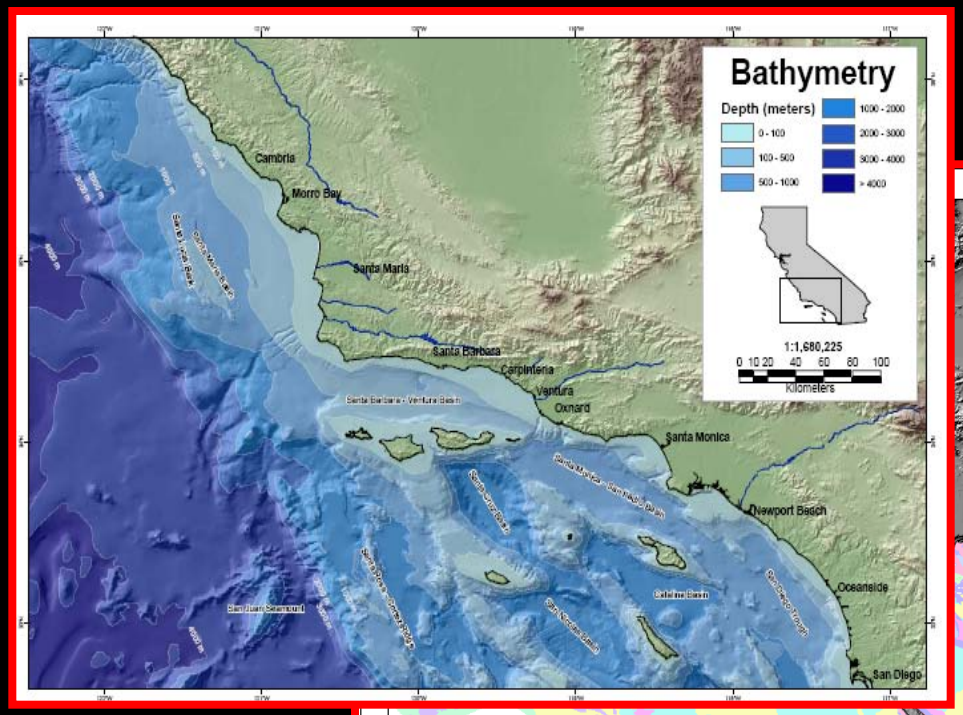


Alternative 5



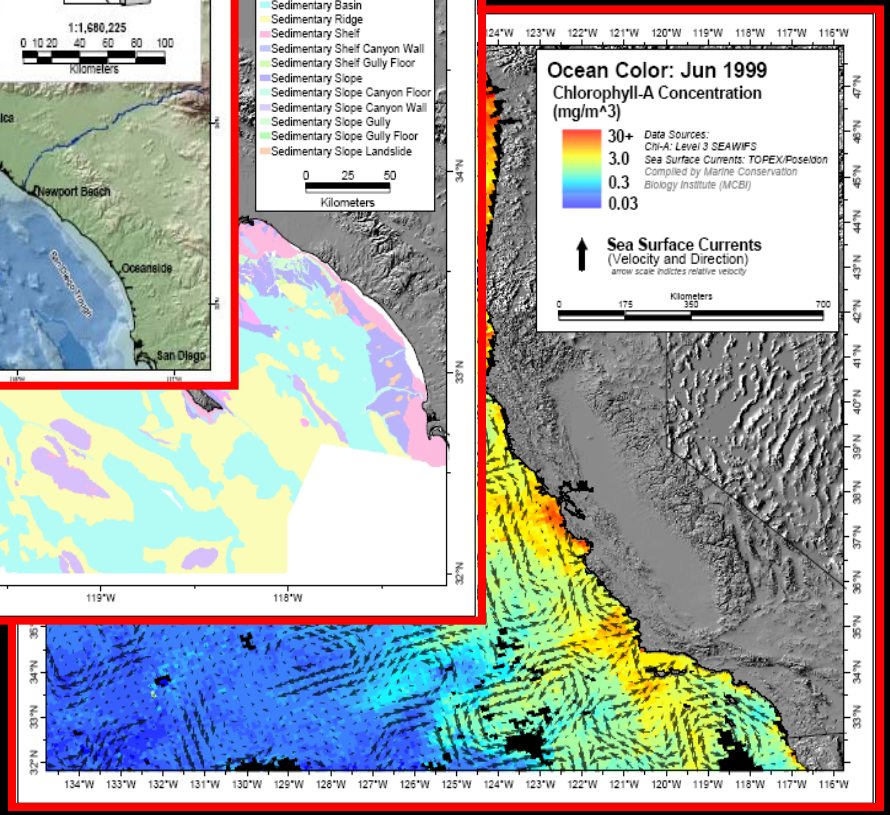
Habitat Data

Bathymetry

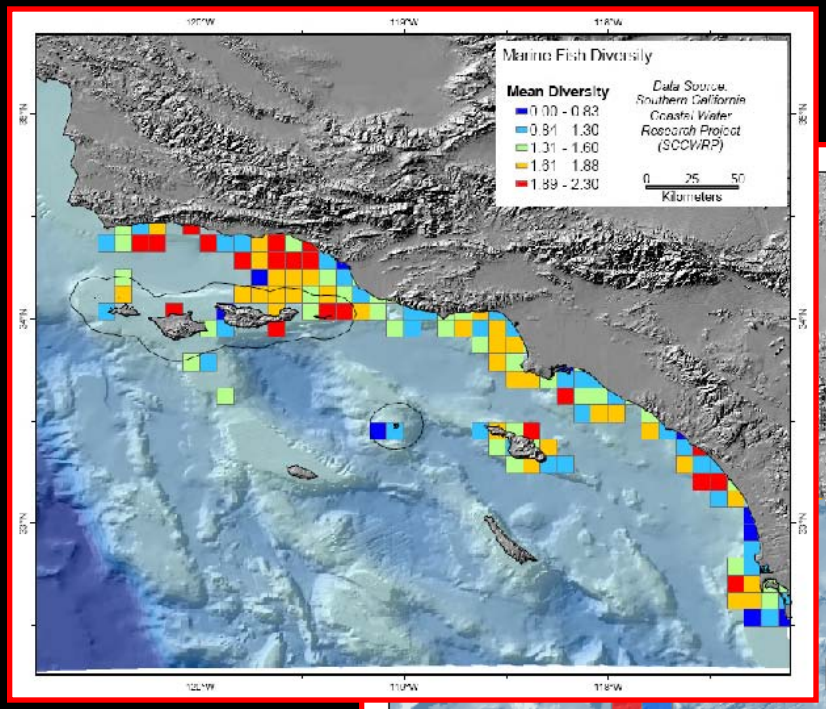


Bottom Type

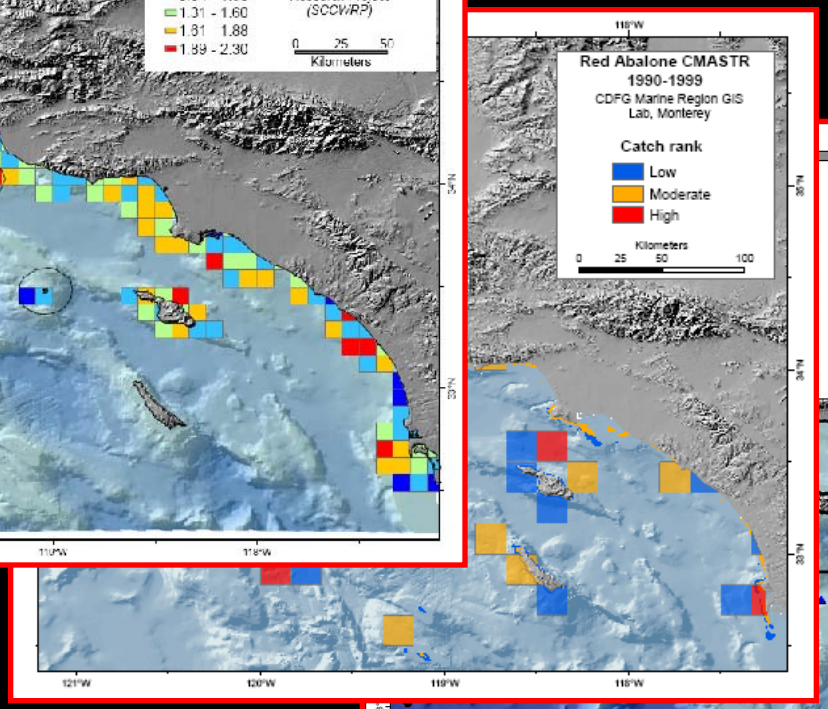
Oceanography



Biological Data



Fishes



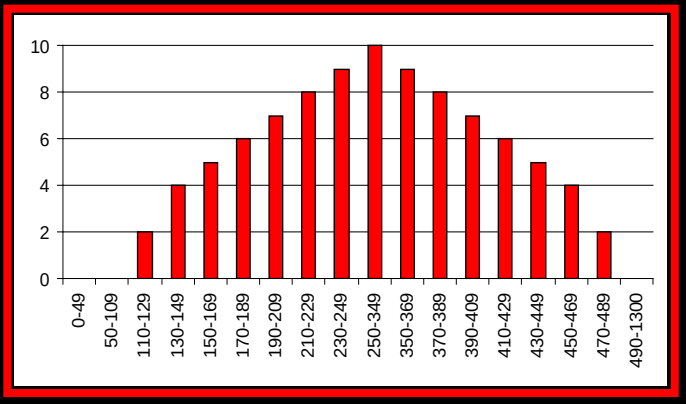
Invertebrates

Marine Mammals

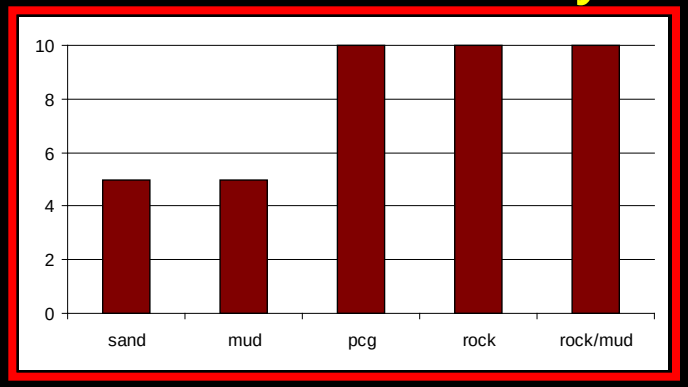
Seabirds/
Shorebirds

Modeling to Fill Gaps

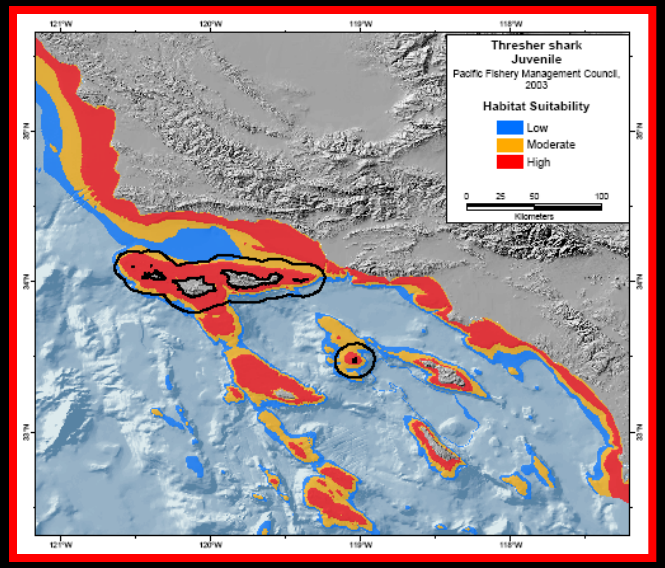
Bathymetry Suitability



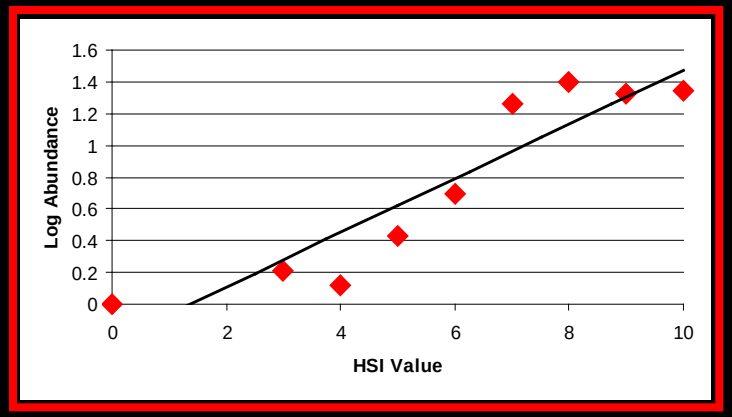
Substrate Suitability



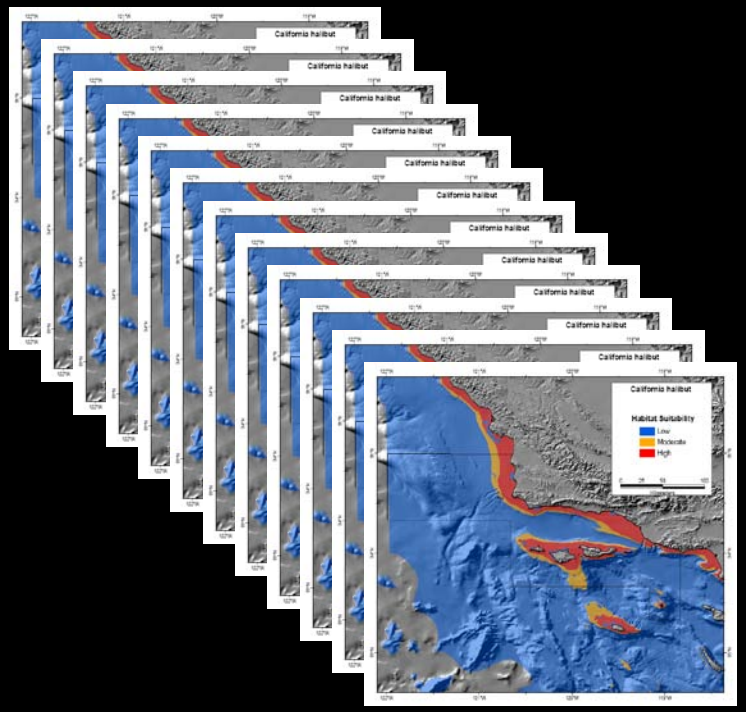
HSI Results - Validation

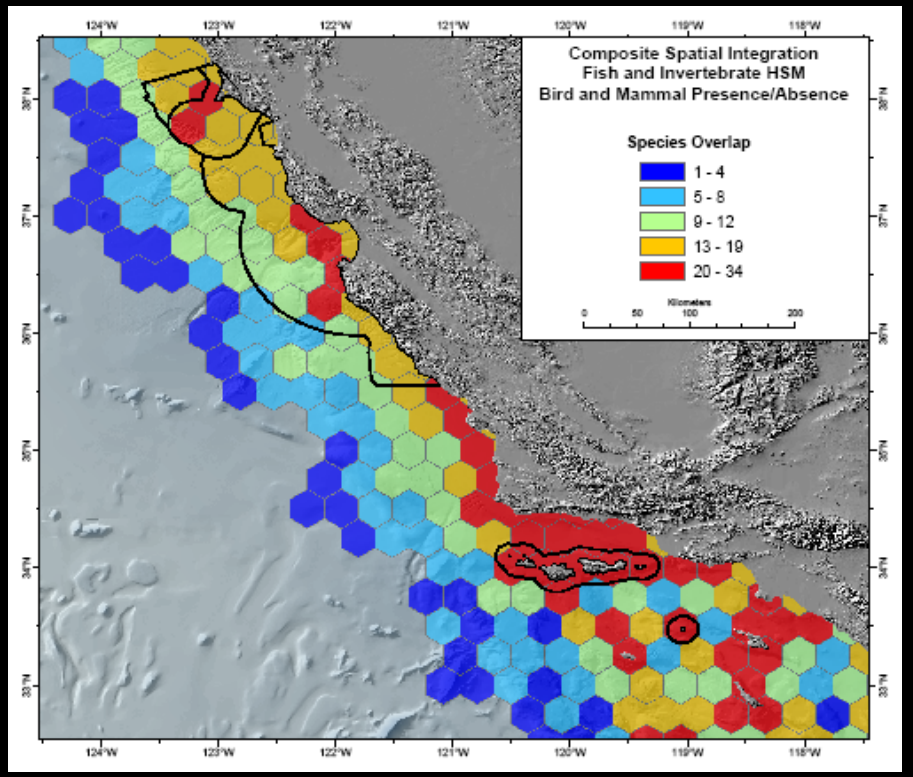


HSI Results - Validation



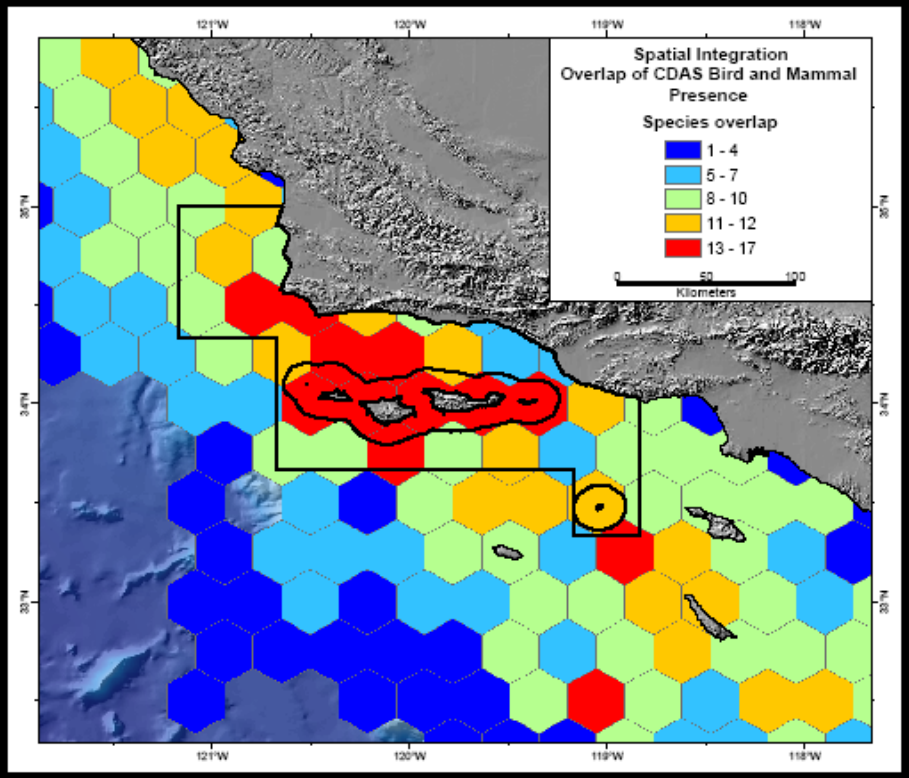
Regional Patterns



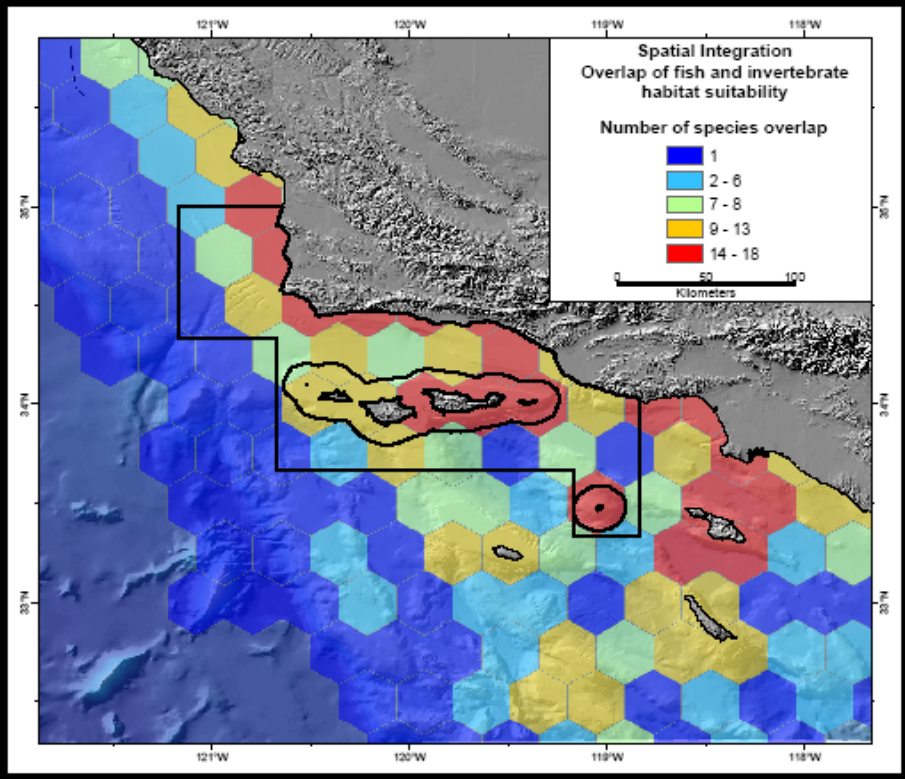


Overlay of spatially concurrent and related data

Boundary Options



Study Area Overlain on Bird & Mammal Data



Study Area Overlain on Fish & Invertebrate Data

Assessment demonstrated existing CINMS boundary protects key regional marine resources and contributed to planning efforts to establish network of MPAs in CINMS

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A Biogeographic Analysis of Marine Biological Resources off North/Central California:

in Support of Revisions to Management Plans for Three National Marine Sanctuaries: Cordell Bank, Gulf of the Farallones and Monterey Bay

1. Does analysis reveal significant spatial and/or temporal patterns in the distribution of marine fauna?

2. Can we model the distribution of selected species to fill information gaps?

3. Are there important ecological areas adjacent to existing sanctuaries?

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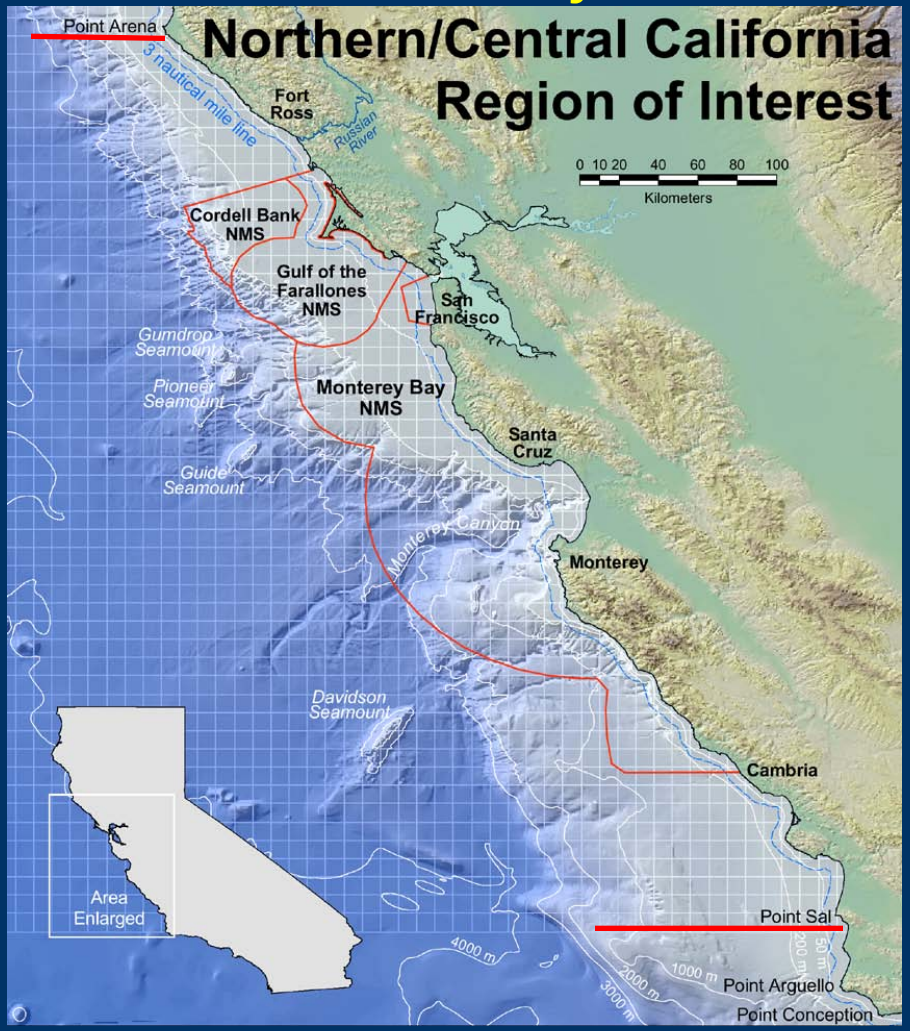
Central CA Study Area



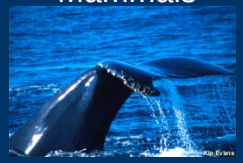
Resource Data Layers

- Marine Mammals
- Marine Birds
- Demersal Fishes
- Macro-Invertebrates
- Physical Oceanography
- Habitat (Kelp, Substrate, etc.)
- Physiography

Integrated Assessments

- Characterizing meso-scale <u>patterns</u>
- Analyzing to identify <u>coincidence</u> in spatial patterns

Mammals

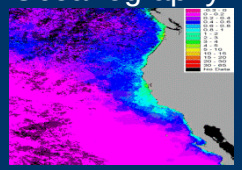


Birds

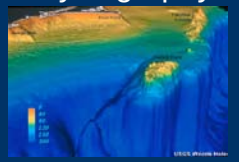
Fishes

Inverts

Oceanography



Physiography



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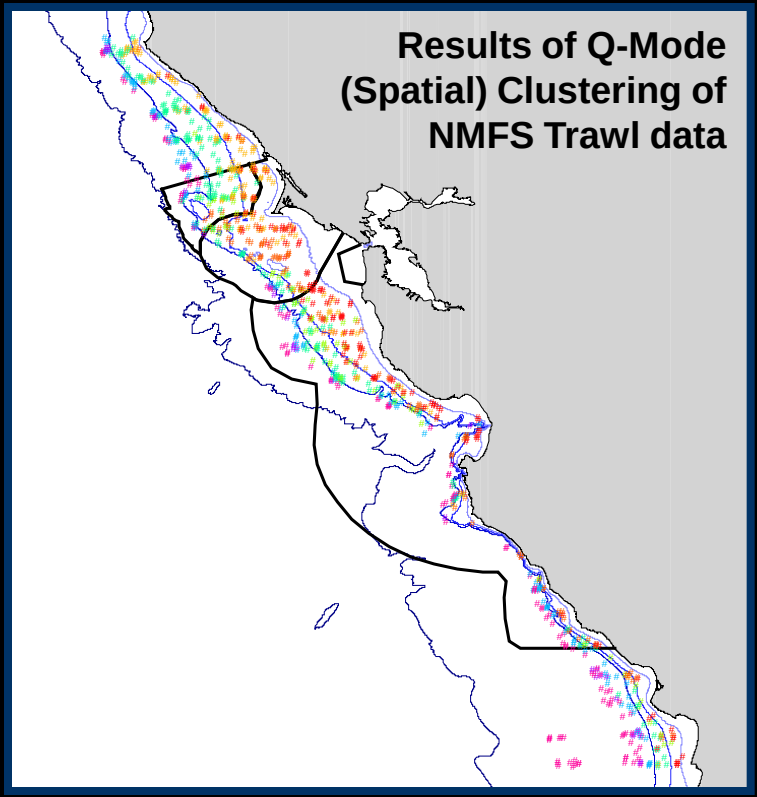
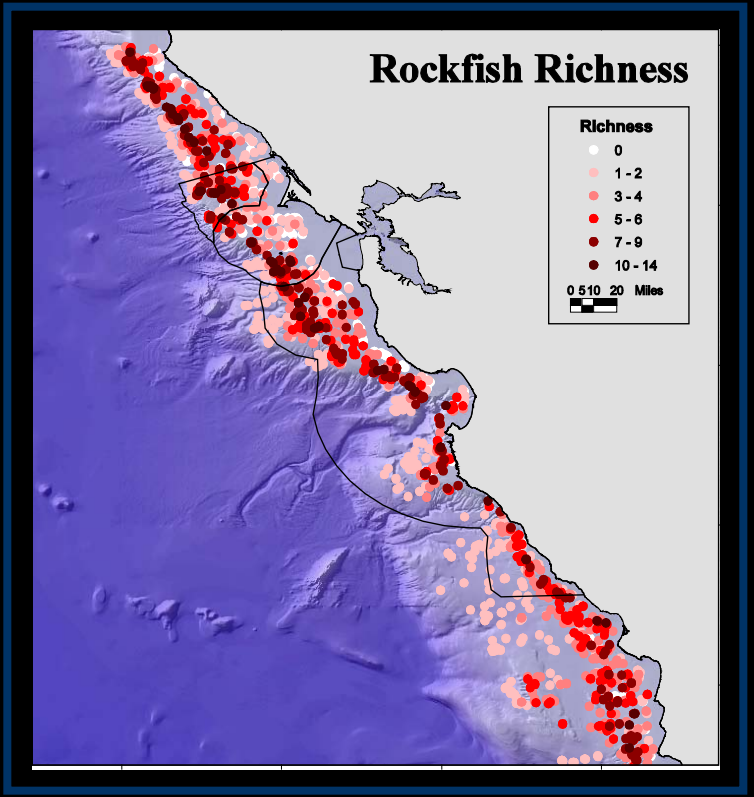
Evaluation of Fish Assemblages Within and Outside National Marine Sanctuary Borders





- How many fish assemblages exist within a boundary?
- Can boundareis be optimized to contain most or all assemblages in the region?

- What is the estimated total number of Rockfish species within each boundary?
- Can the boundary be optimized to better manage species in the region?

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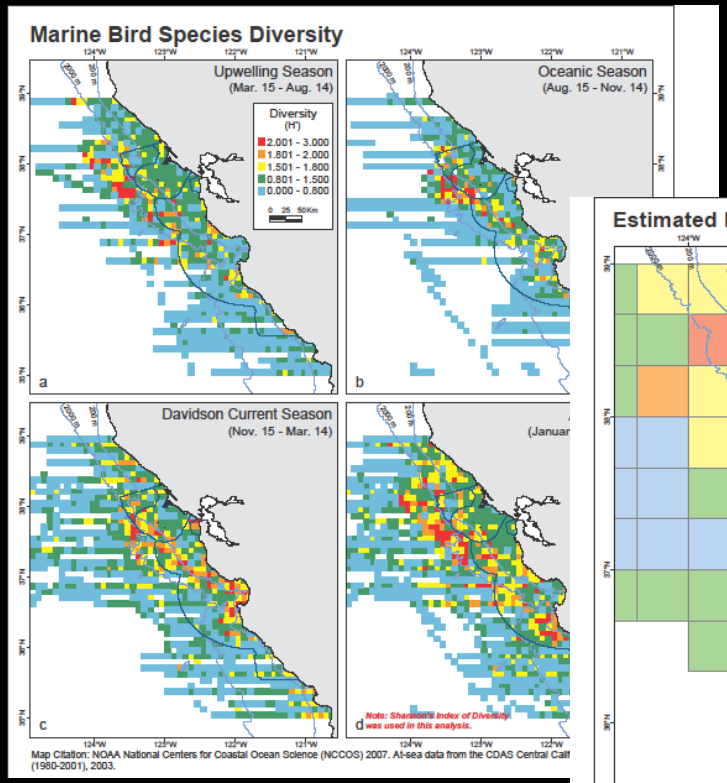
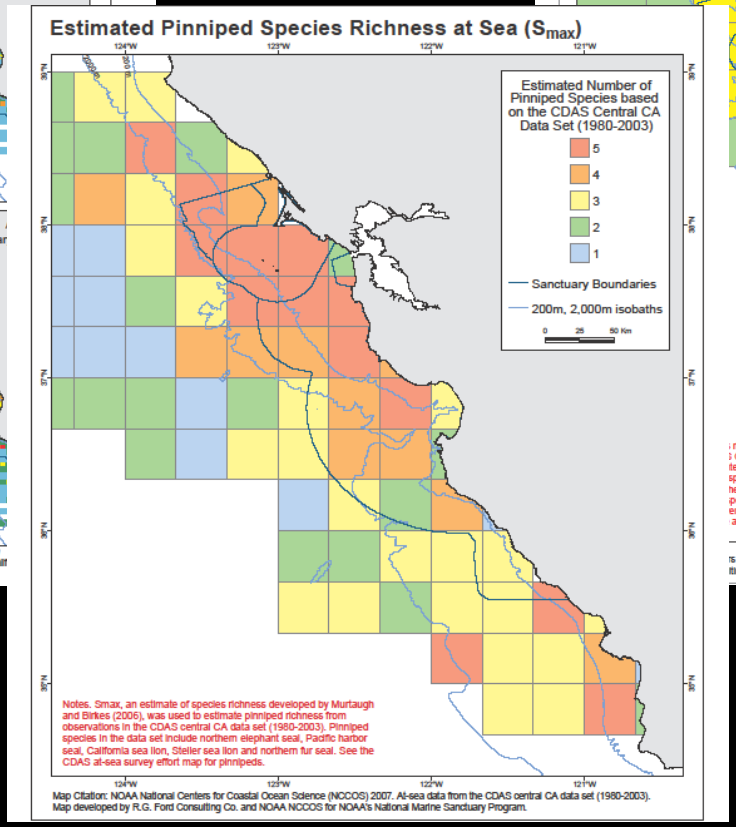
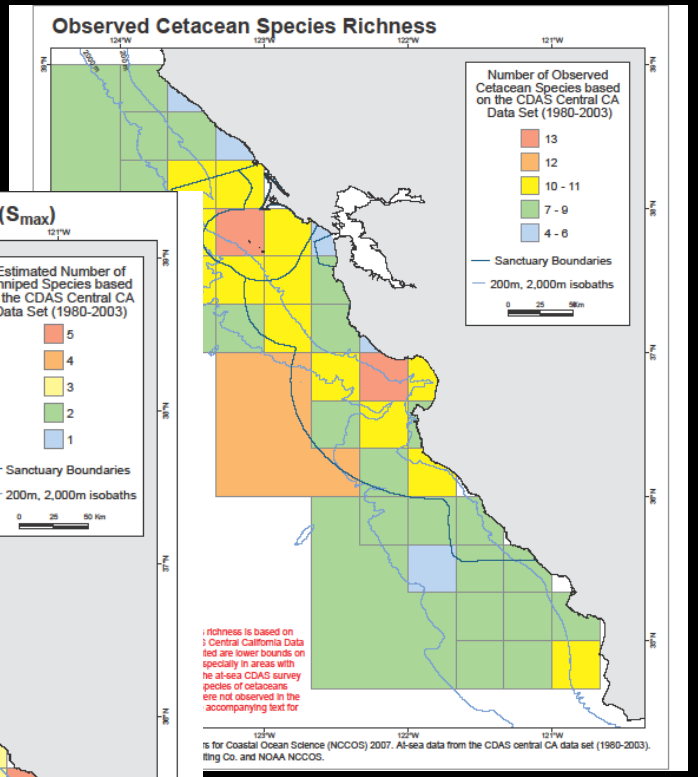
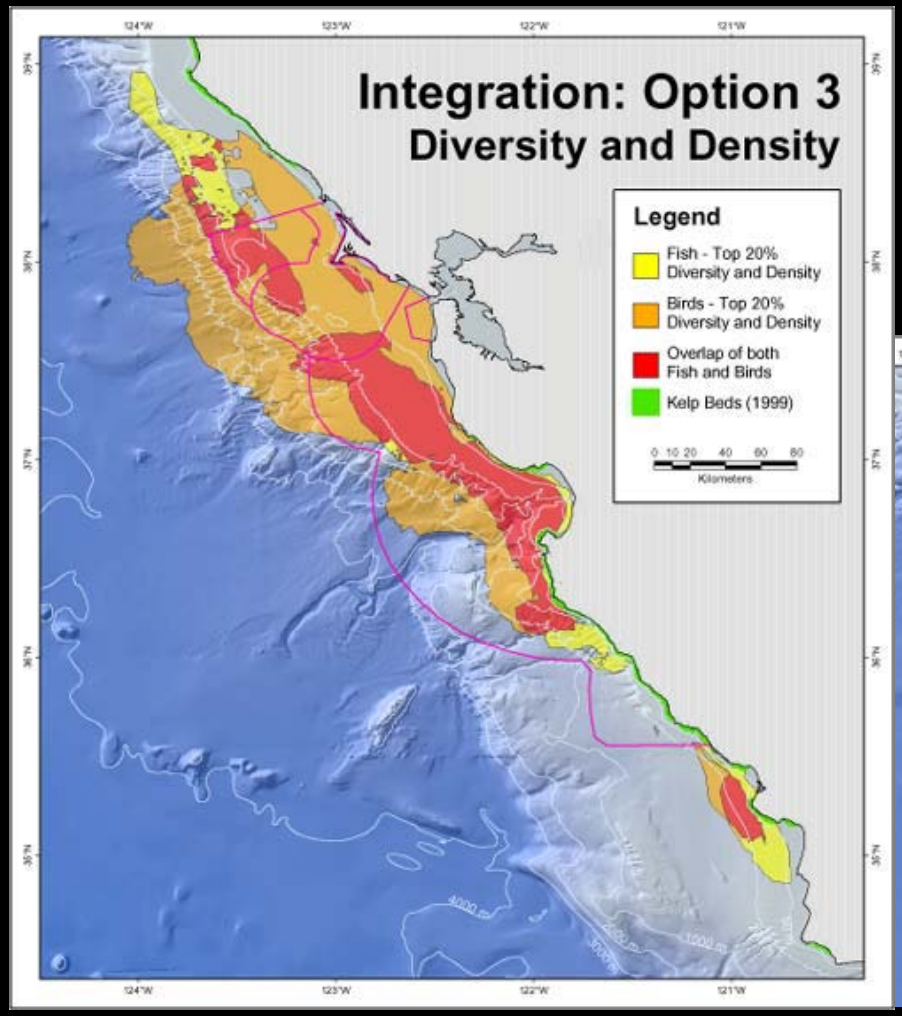
Diversity of Seabirds and Richness of Marine Mammals off Central CA

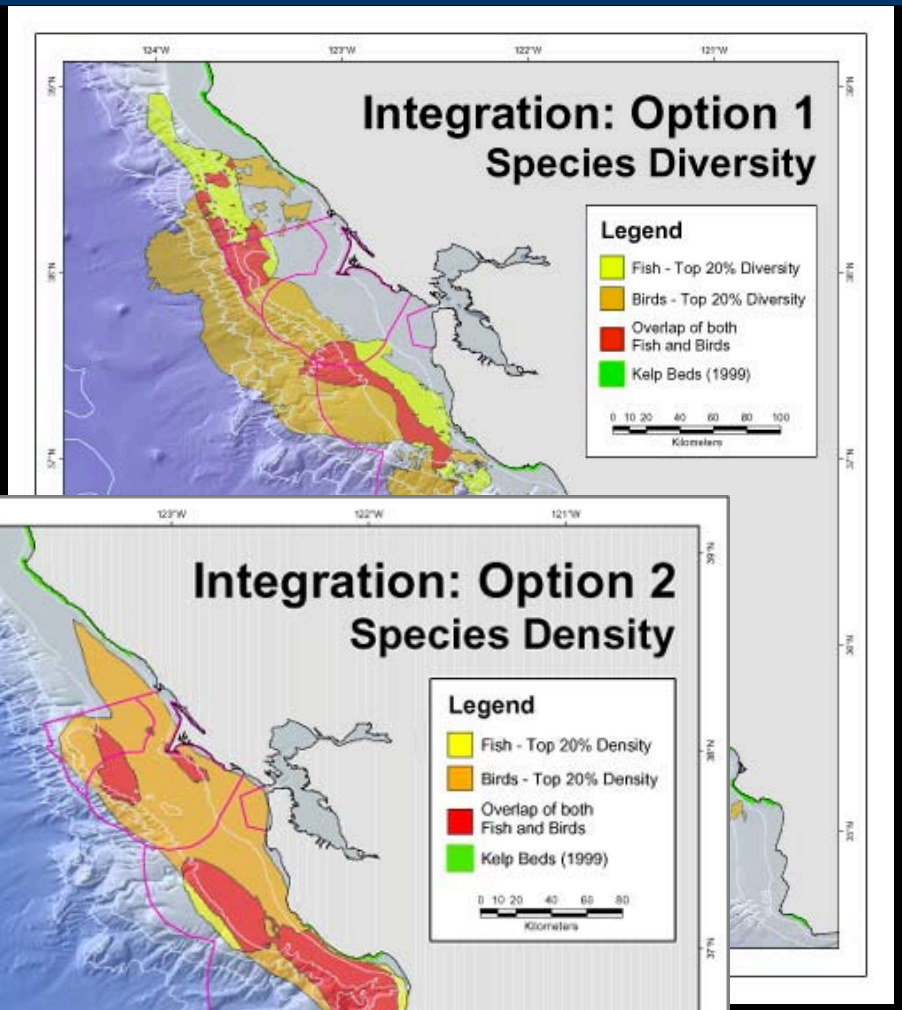




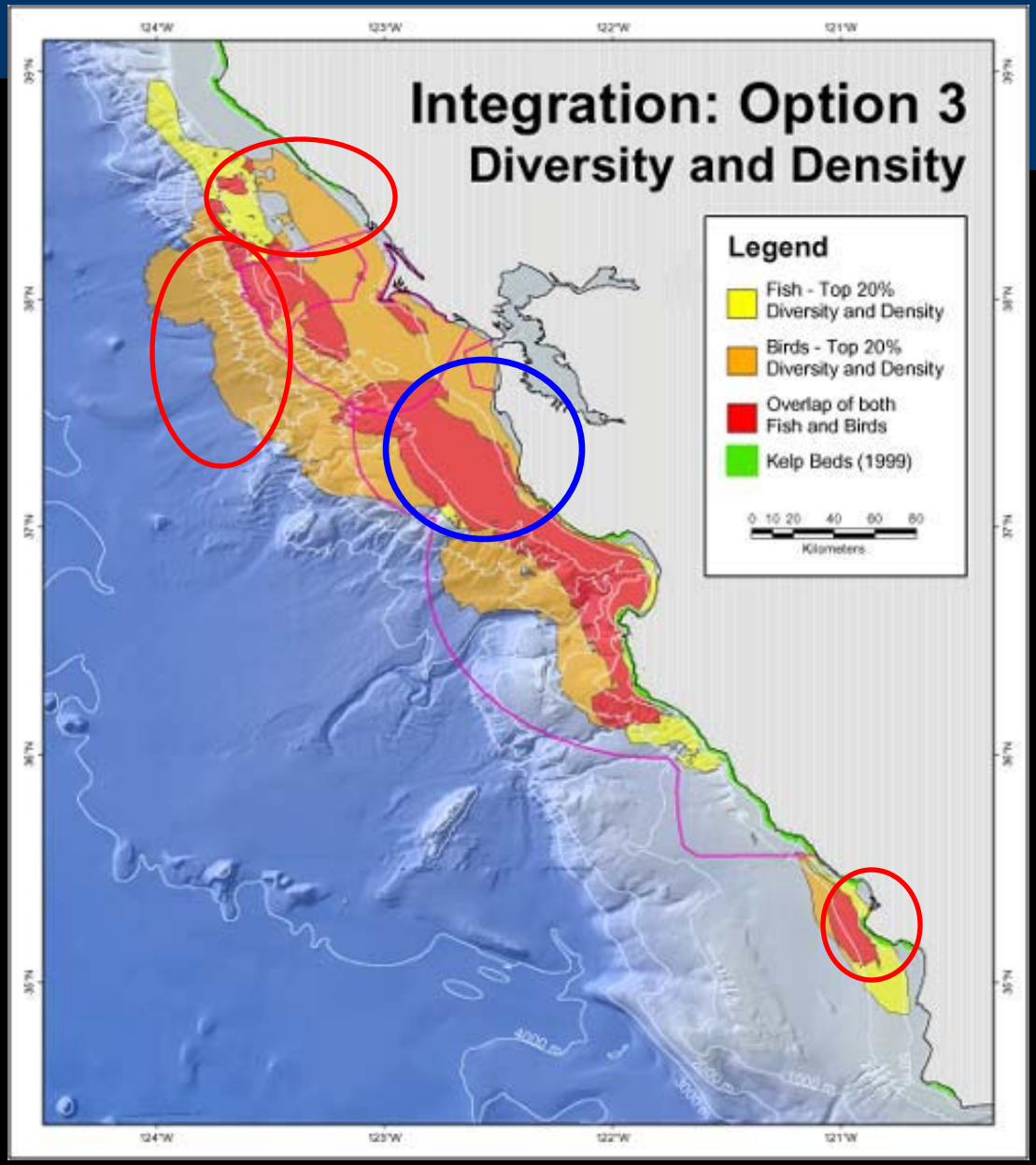


Integrating Metrics Across Species Groups





Integrated Assessments to Support Spatial Planning



- Sanctuaries (pink lines) include a large portion of ecologically important areas for marine birds and fishes.
- Areas the north have been suggested for sanctuary expansion. Areas to the west and south also appear significant.
- Some management of the northern “lobe” (blue) of Monterey Bay NMS has shifted to Gulf of Farallones NMS.

Lessons Learned

- What information is required to develop sound management?
  - Layers related to species distribution (e.g., bathymetry, benthic habitats, etc.)
  - Layers related to human uses and stressors
  - Layers that define ecological connectivity

- How can this information support MSP?
  - Existing data:
    - large scale or multi-disciplinary assessments
    - Allows immediate analysis and provides historical context
  - Synthesis and data collection:
    - Data specifically address questions of interest
    - Collected at appropriate spatial and temporal scales
    - Use local partners for assessment and review

Partnerships

- California Cooperative Oceanic Fisheries Investigations
- California Department of Fish and Game
- Carter Biological Consulting
- H.T. Harvey and Associates
- Marine Conservation Biology Institute
- National Aeronautics and Space Administration
- NOAA National Marine Fisheries Service
- NOAA National Ocean Service
- NOAA National Centers for Coastal Ocean Science
- NOAA Office of National Marine Sanctuaries
- The Nature Conservancy
- Occidental College
- Oikonos
- Pacific Fishery Management Council
- Partnership for Interdisciplinary Studies of Coastal Oceans
- R.G. Ford Consulting Company
- Southern California Coastal Water Research Project Authority
- Southwest Fisheries Science Center
- U.S. Fish and Wildlife Service
- U.S. Geological Survey
- U.S. Minerals Management Service
- U.S. National Park Service
- University of California, San Diego
- University of California, Santa Barbara
- University of California, Santa Cruz

http://ccma.nos.noaa.gov/about/biogeography