A Biogeographic Assessment of Living Marine Resources of the Channel Islands National Marine Sanctuary:

In Support of the CINMS Management Plan Review

A Presentation to the Sanctuary Advisory Council

By:

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NOAA's National Centers for Coastal Ocean Science
Biogeography Program
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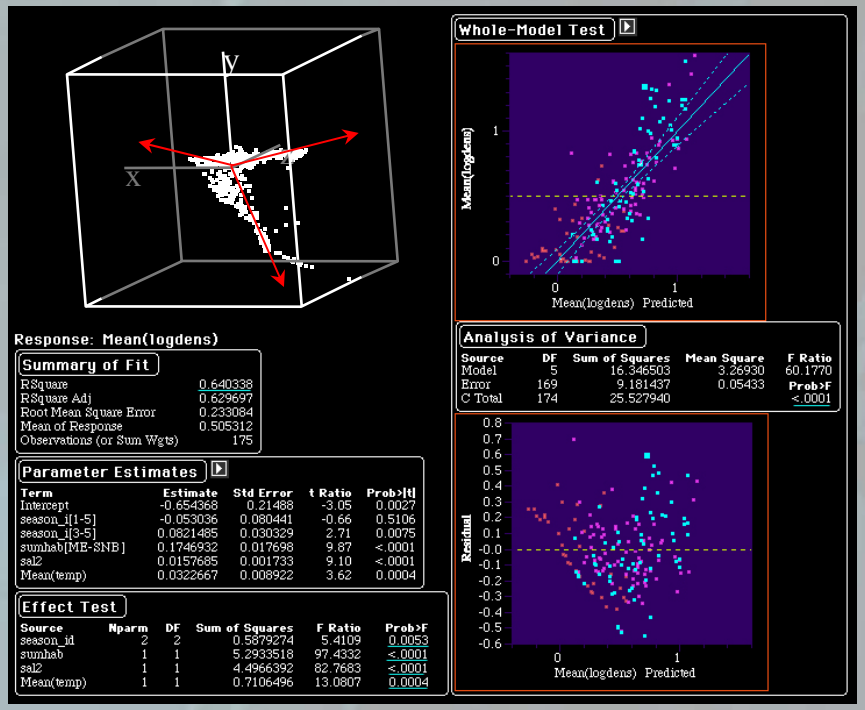
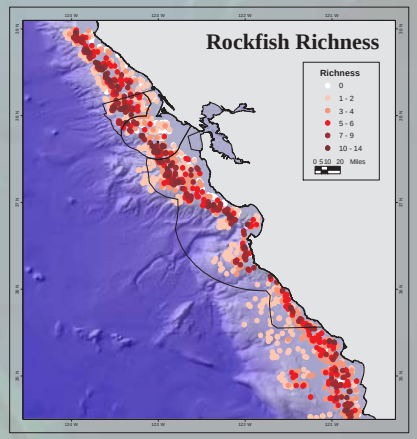
NOAA's National Centers for Coastal Ocean Science (NCCOS)

Formed within the National Ocean Service (NOS) in March 1999, it puts all of NOS's coastal research centers into one group. Each Center has specific capabilities and research expertise in important ocean and coastal issues.

Mission: To provide Coastal Managers with scientific understanding and tools needed to balance NOAA's environmental, social, and economic goals.

Strategy: conduct and support research, monitoring, assessment, and technical assistance to people managing coastal ecosystems and society's use of them.



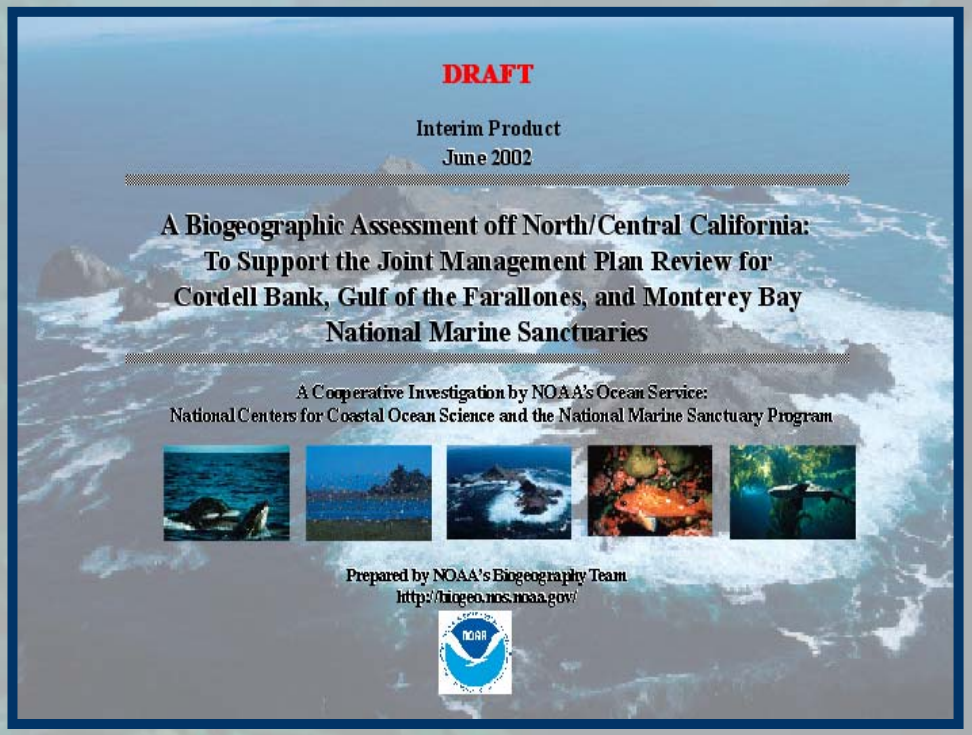


Our Strengths:

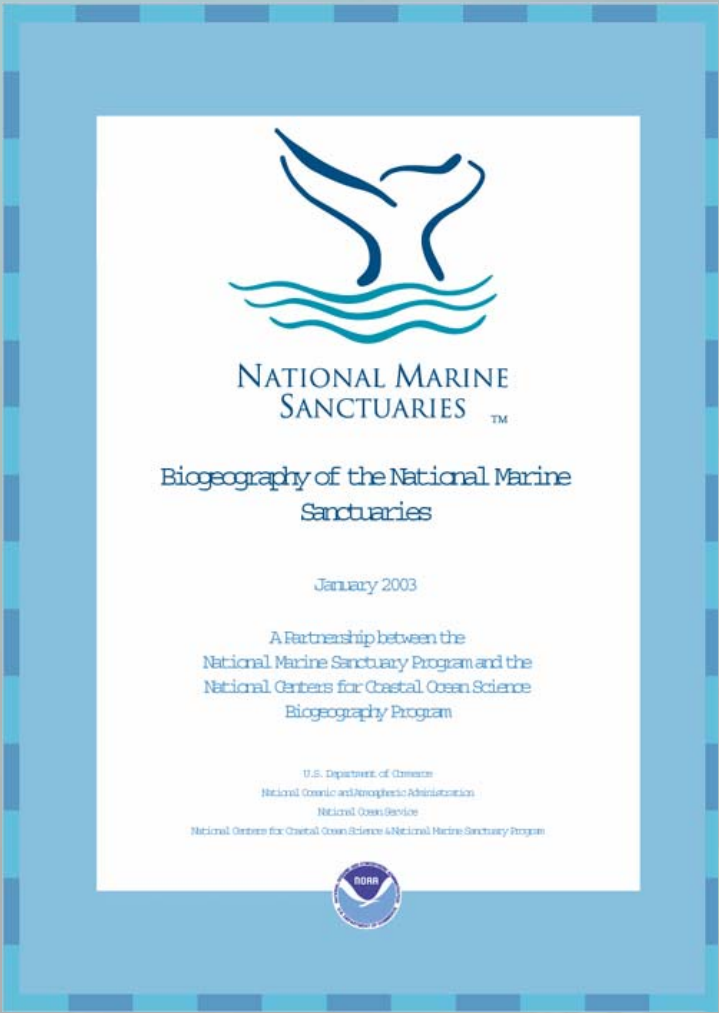
robust spatial analysis and integrated assessments

NCCOS's Biogeography Program

Mission: Develop knowledge and products on living marine resource distributions and ecology throughout the Nation's estuarine, coastal and marine environments, and to provide managers and scientists with an improved ecosystem basis for making decisions



How and Why are we Working with the National Marine Sanctuaries



Developed a 5-yr. plan with NMSP to work with each individual Sanctuary to incorporate the latest data and technology in an effort to address:

- **Management Plan Revisions**
- **environmental characterizations**
- **boundary evaluations**
- **zoning**
- **threat assessment.**

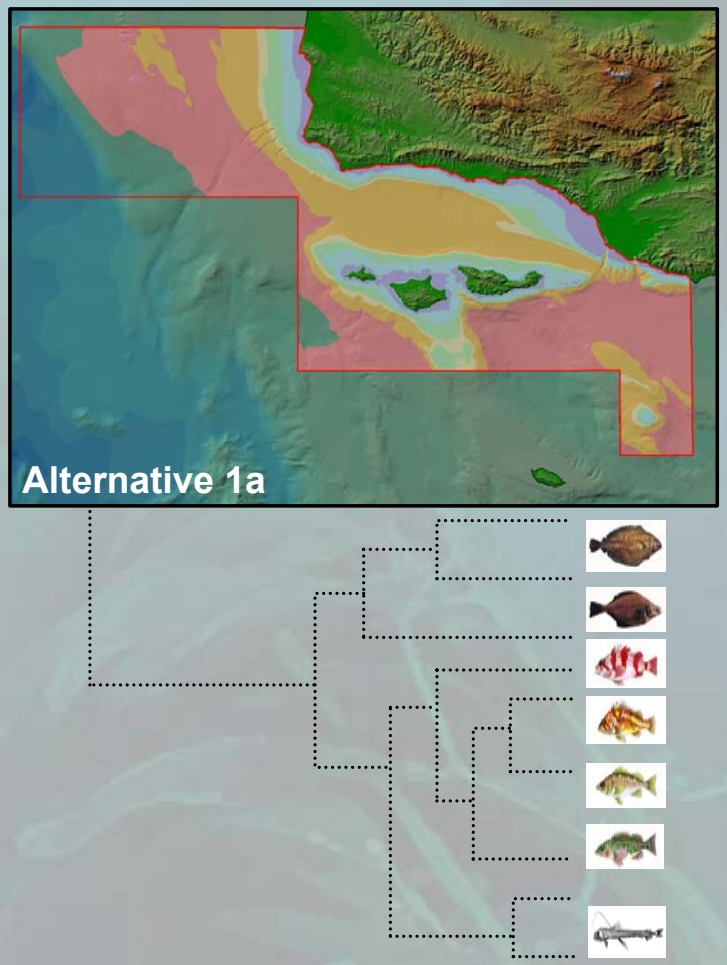
Since original designation, numerous field studies coupled with advancements in remote sensing have produced new spatial data that can be used to address boundary options.

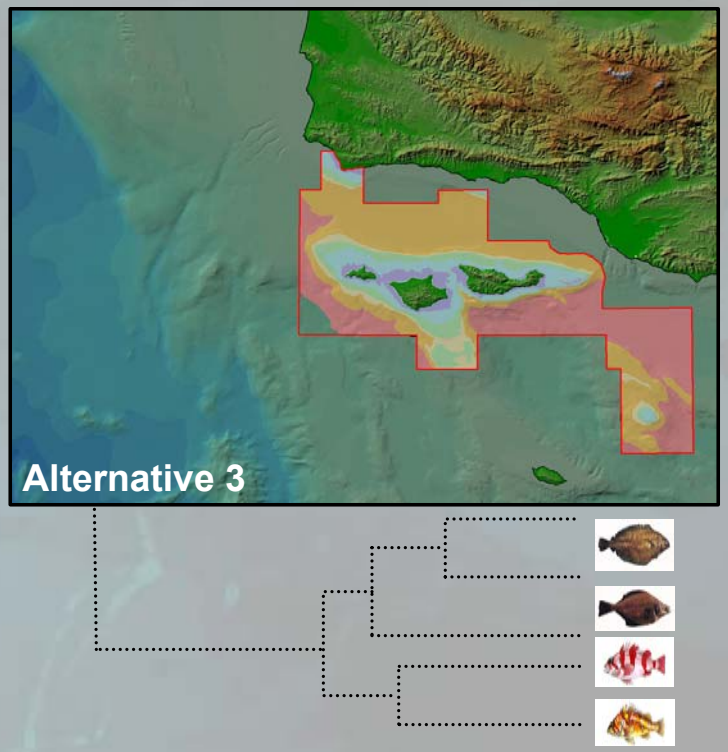
Three steps to our work with each Sanctuary:

- **develop a biogeographic characterization plan**
- **conduct joint biogeographic characterizations**
- **address future management needs and challenges**

A Collaboration with the Channel Islands National Marine Sanctuary

Goal: Assimilate and analyze relevant and comprehensive spatial data to evaluate potential implications of boundary alternatives from a biogeographic perspective

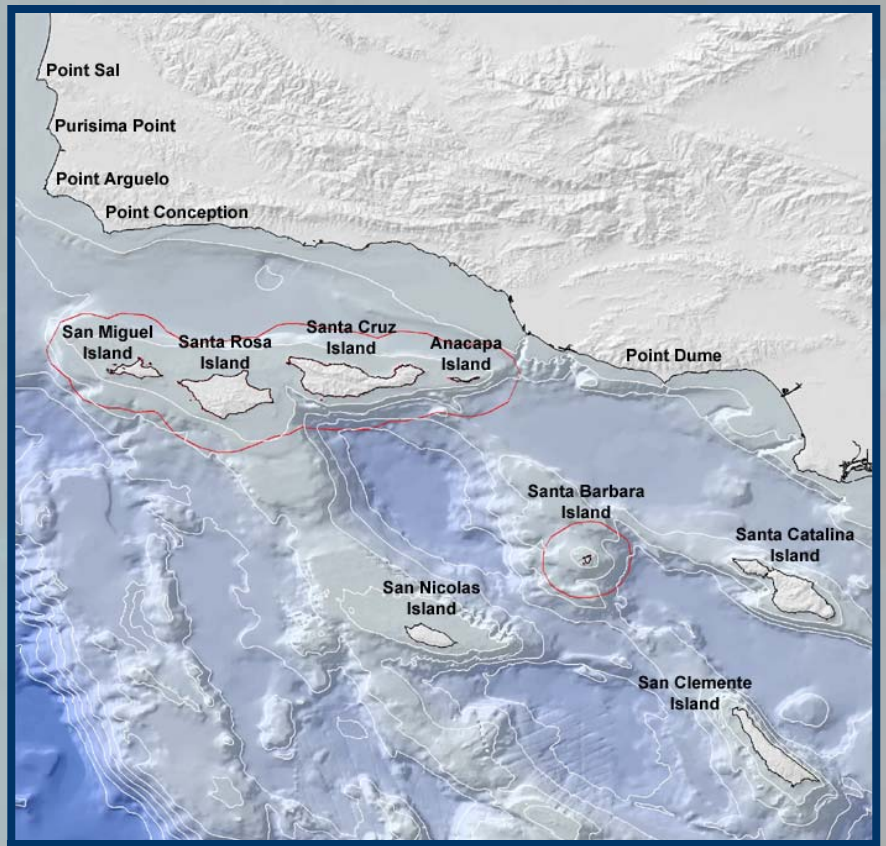




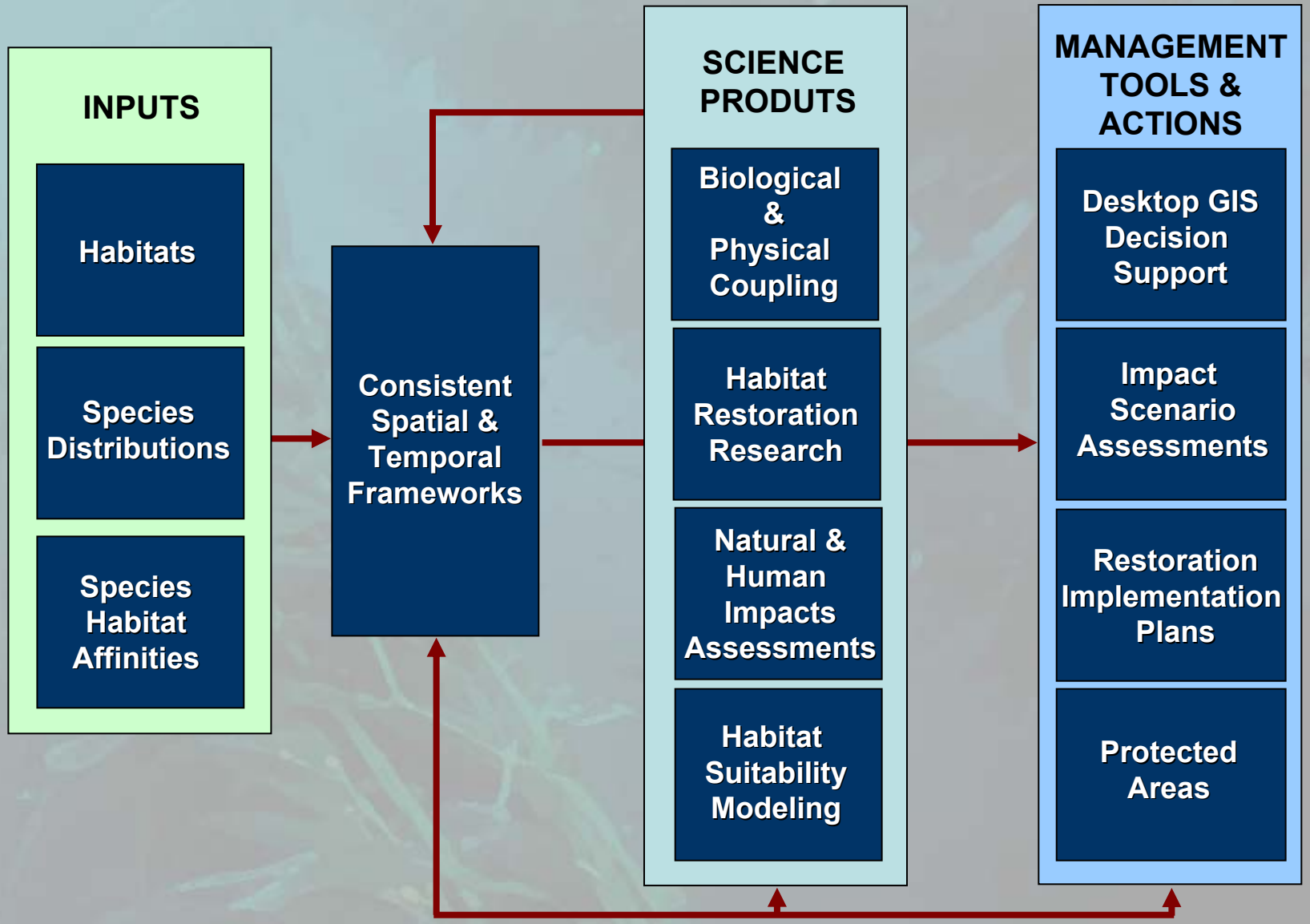
Results will NOT be the final answer or recommendation on boundaries; rather, they will provide additional context for review

Questions to be Addressed in this Study: A Plan of Attack

- What data currently exists allowing us to identify regions spatially important to species or communities?
- Does analysis of the existing data reveal patterns or trends in the distribution of marine associated fauna?
- Where existing data is insufficient can we model the distribution of selected species to reveal useful distributional information?
- What can these patterns and trends tell us about the biogeography of the region in general?
- How do these patterns and trends relate to proposed Sanctuary boundary alternatives?

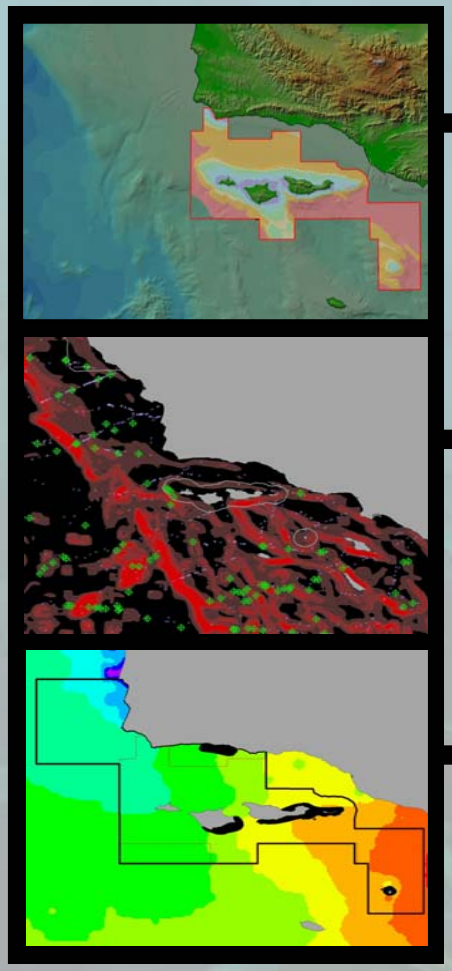


The Analytical Framework



Conceptual Models: CINMS Study Area Examples

The Following are Examples of the Type of Analyses That we will Explore to Assess the Biogeography of the Region



Quantifying Spatial Distributions

- A Nearshore Fish Analysis

A Spatially-explicit Correlative Model

- Blue Whales

Exploring the Effects of Oceanography

- Yellowtail Distribution & Abundance

Conceptual Models: CINMS Study Area

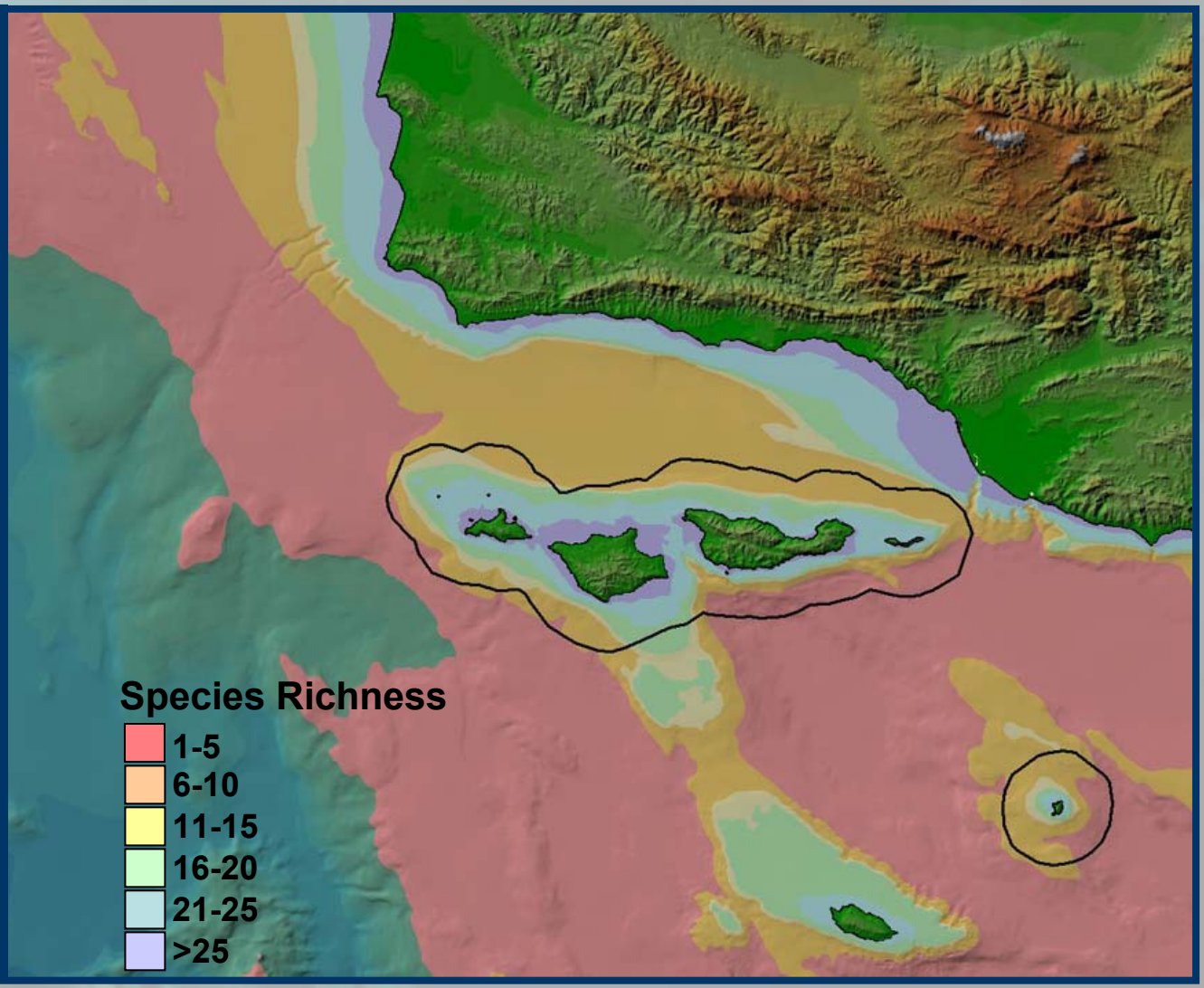
A Nearshore Fish Distribution Analysis:

What is the estimated species richness (S) of "important" nearshore fishes in the study region, and how does it compare to the entire southern California coast as a whole?

What is the total estimated number of these species that Would be "captured" within each of the boundary alternatives?

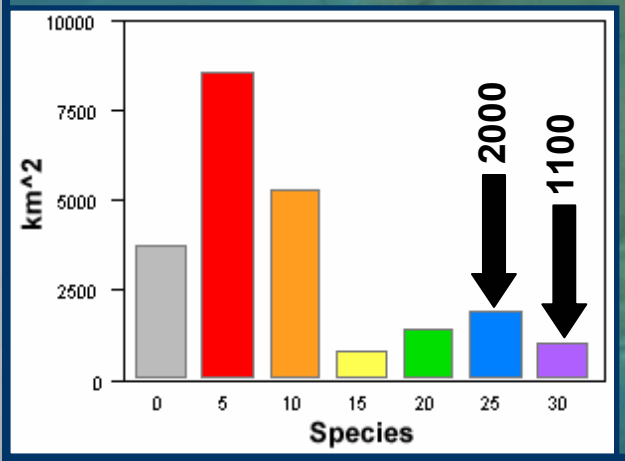
Do any other patterns become apparent in this analysis that might suggest Further alternatives?

Source:
Wright et al. 2000
Marine Fishery Profiles
Volume I: Nearshore Version 1



Conceptual Models: CINMS Study Area Nearshore Fishes

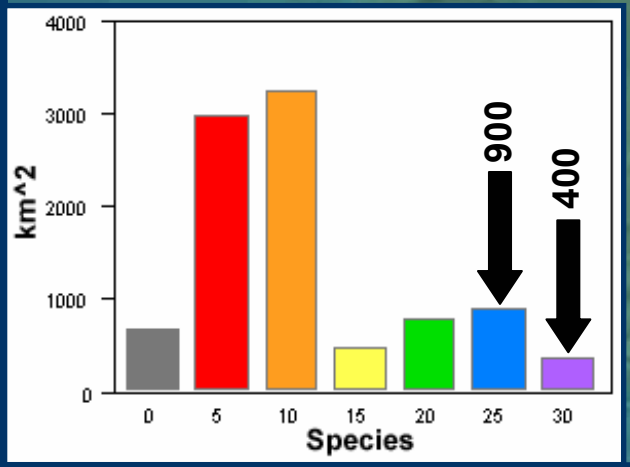
Source:
Wright et al. 2000
Marine Fishery Profiles
Volume I: Nearshore Version 1



Alternative 1a

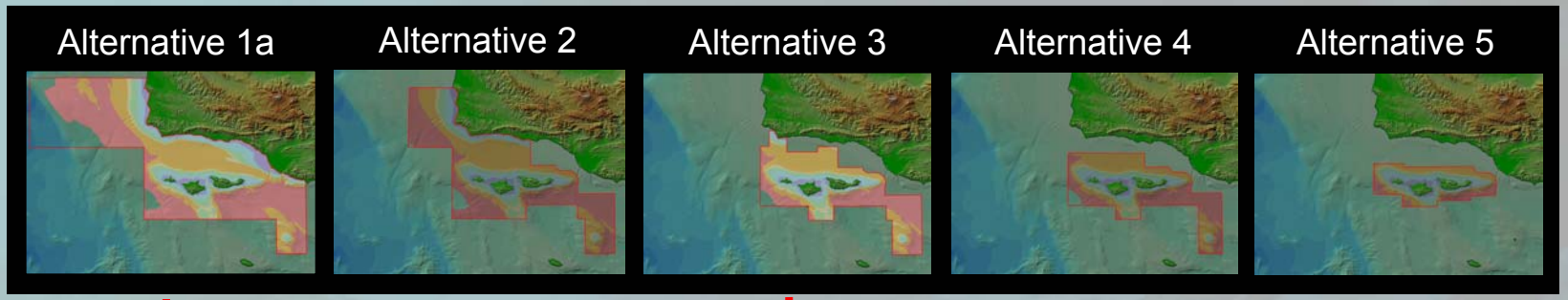
Conceptual Models: CINMS Study Area Nearshore Fishes

Source:
Wright et al. 2000
Marine Fishery Profiles
Volume I: Nearshore Version 1



Alternative 3

Conceptual Models: CINMS Study Area Nearshore Fishes



Source:
Wright et al. 2000
Marine Fishery Profiles
Volume I: Nearshore Version 1

	BOUNDARY ALTERNATIVE					
Species Richness	1a	2	3	4	5	no_act
0	3767.44	777.64	683.4	685.08	508.16	0
1--5	8562.56	5123.84	2989.8	2652.76	680	520.76
6--10	5294.6	4378.24	3246.64	2734.16	1189.08	1182.08
11--15	876.16	690.36	516.84	483.2	264.2	295.48
16--20	1413.44	1149.88	802.12	747.28	591.52	571.72
21--25	1947.04	1424.64	910.44	826	801.44	815.28
>25	1111.52	651.12	388.92	356.88	356.88	356.24

Conceptual Models:
CINMS Study Area Blue Whale Distribution Patterns

Exploring the Seascape for Significant and Relevant Spatial Correlations:

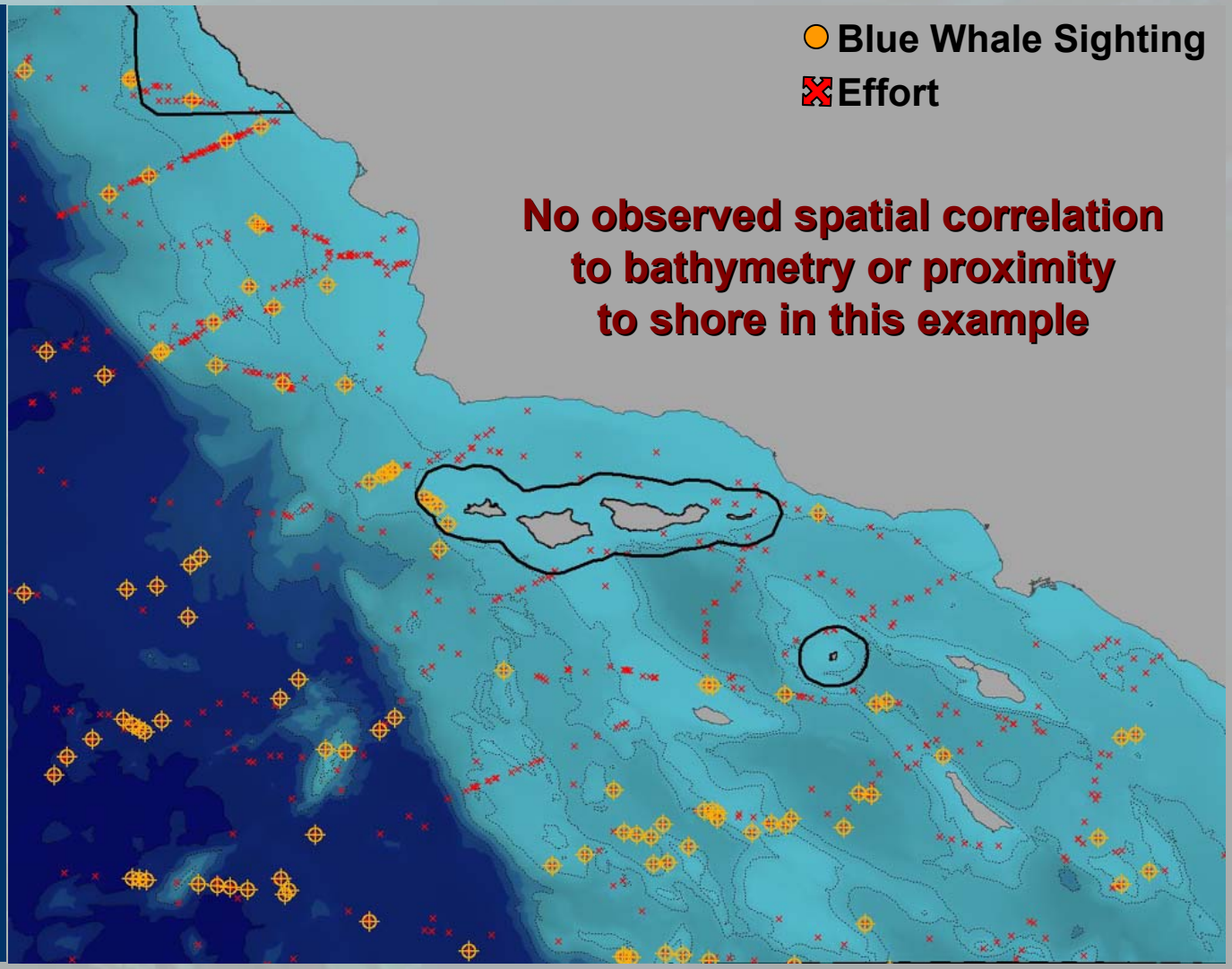
Is the density of Blue Whales correlated to identifiable features in the seascape?

If so, can these features be used to develop spatially-articulated models of expected distribution?

Can these correlated features be easily mapped and used To "guide" boundary Delineation?

How do densities within the study area compare to the estimates derived from the entire extent of data?

Source:
Calambokidis
Cascadia Research



Conceptual Models:
CINMS Study Area Blue Whale Distribution Patterns

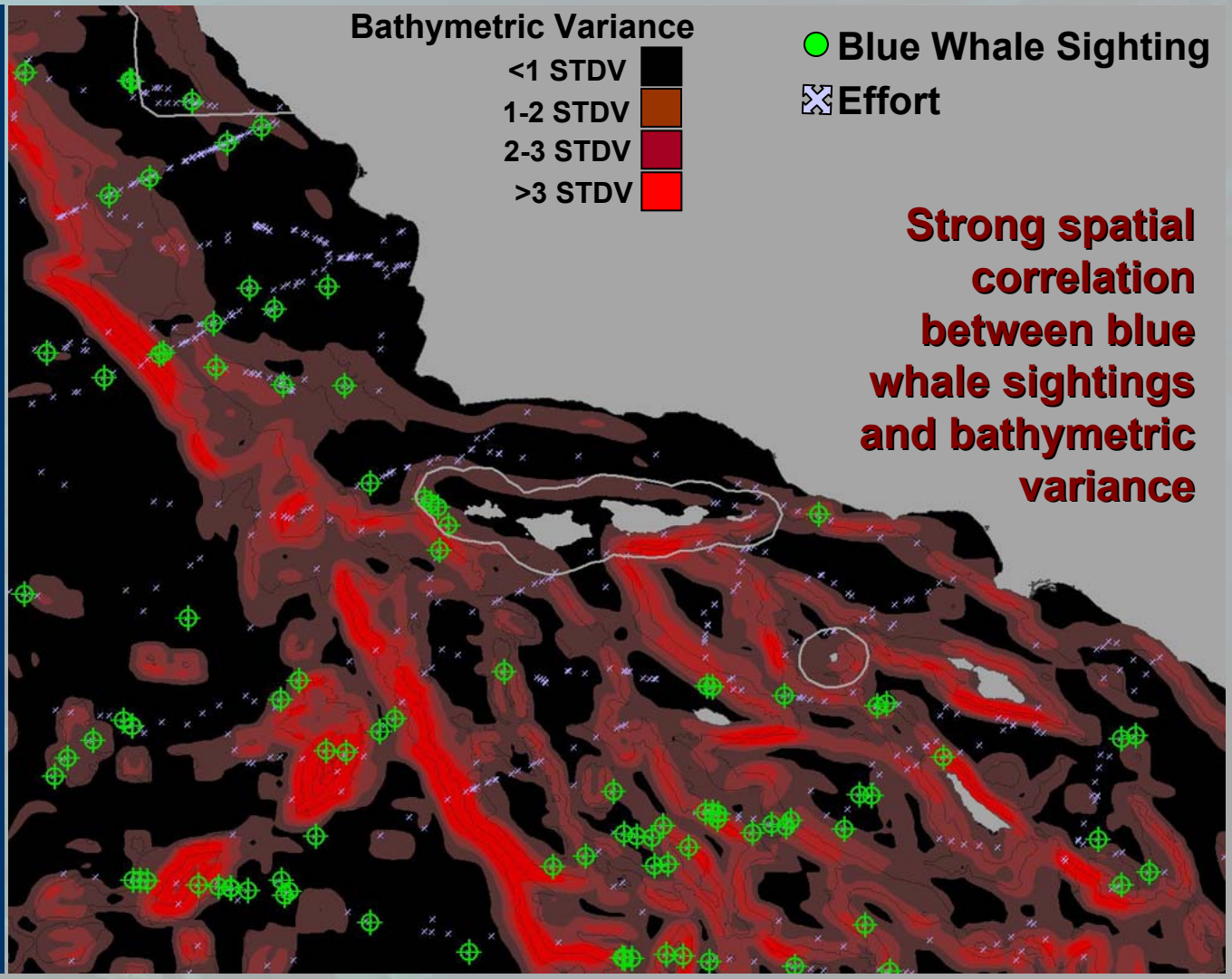
Exploring the Seascape for Significant and Relevant Spatial Correlations:

In this example analysis we calculated the variation In bathymetry (spatial Variance) to develop a new map product.

This derived map product Is highly correlated to blue Whale sightings within the Study region.

As such, the bathymetric variance might be used as a "PROXY" to guide boundary delineation if blue whale distribution is considered an important criterion.

Source:
Calambokidis
Cascadia Research



Conceptual Models:
CINMS Study Area Oceanographic Features & Biogeography

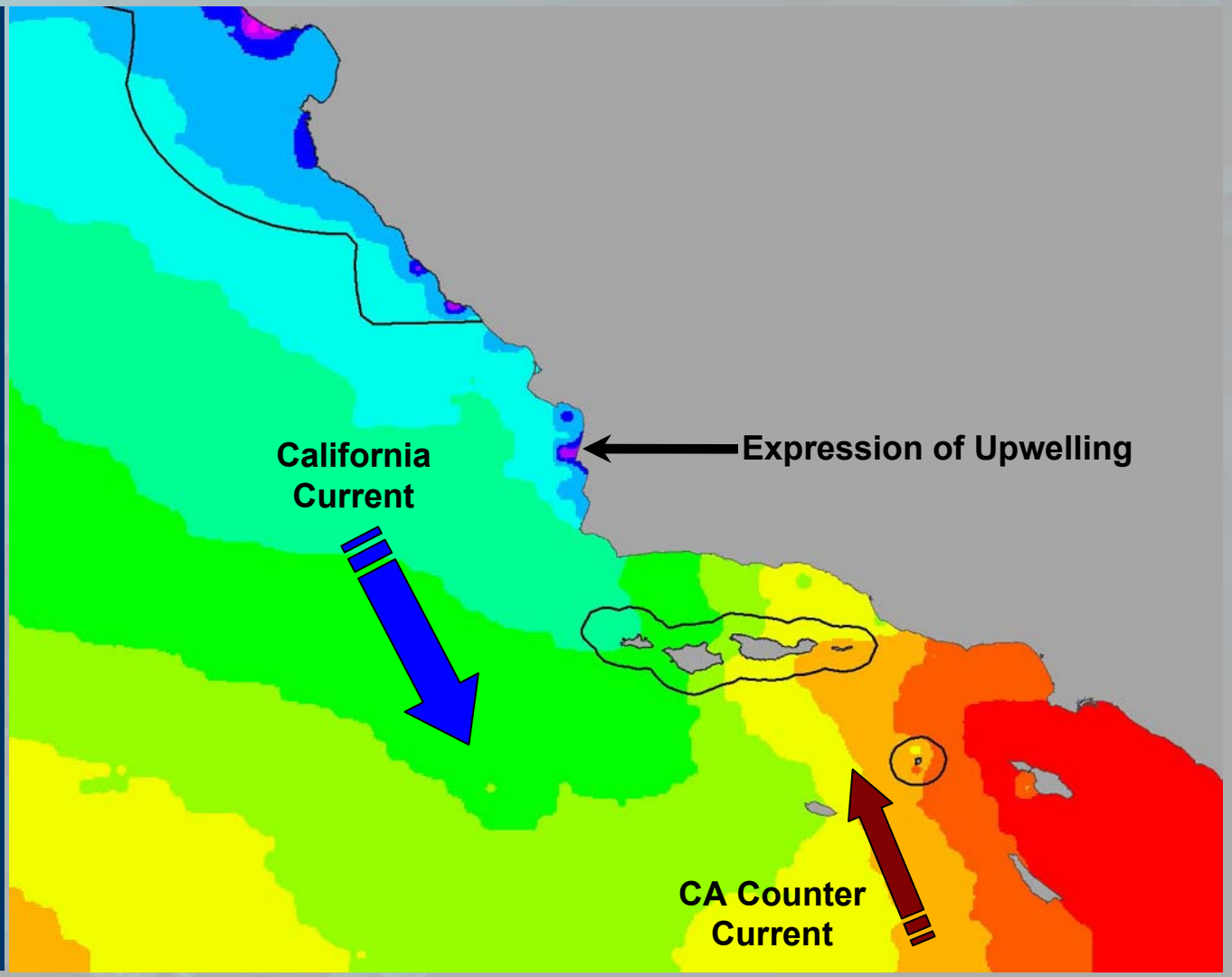
Capturing snapshots of dynamic physical features for interpretive context (and modeling):

In this map of annual average sea surface temperature, we can clearly see the influence of both the California - and California counter currents. One can also see likely areas of upwelling.

This can be used in many ways, including estimating ranges of Oregonian and San Diegan province taxa.

We can relate these features to known or observed distributions to estimate "habitat" preferences

Source:
NOAA/NOS



Conceptual Models:
CINMS Study Area Oceanographic Features & Biogeography

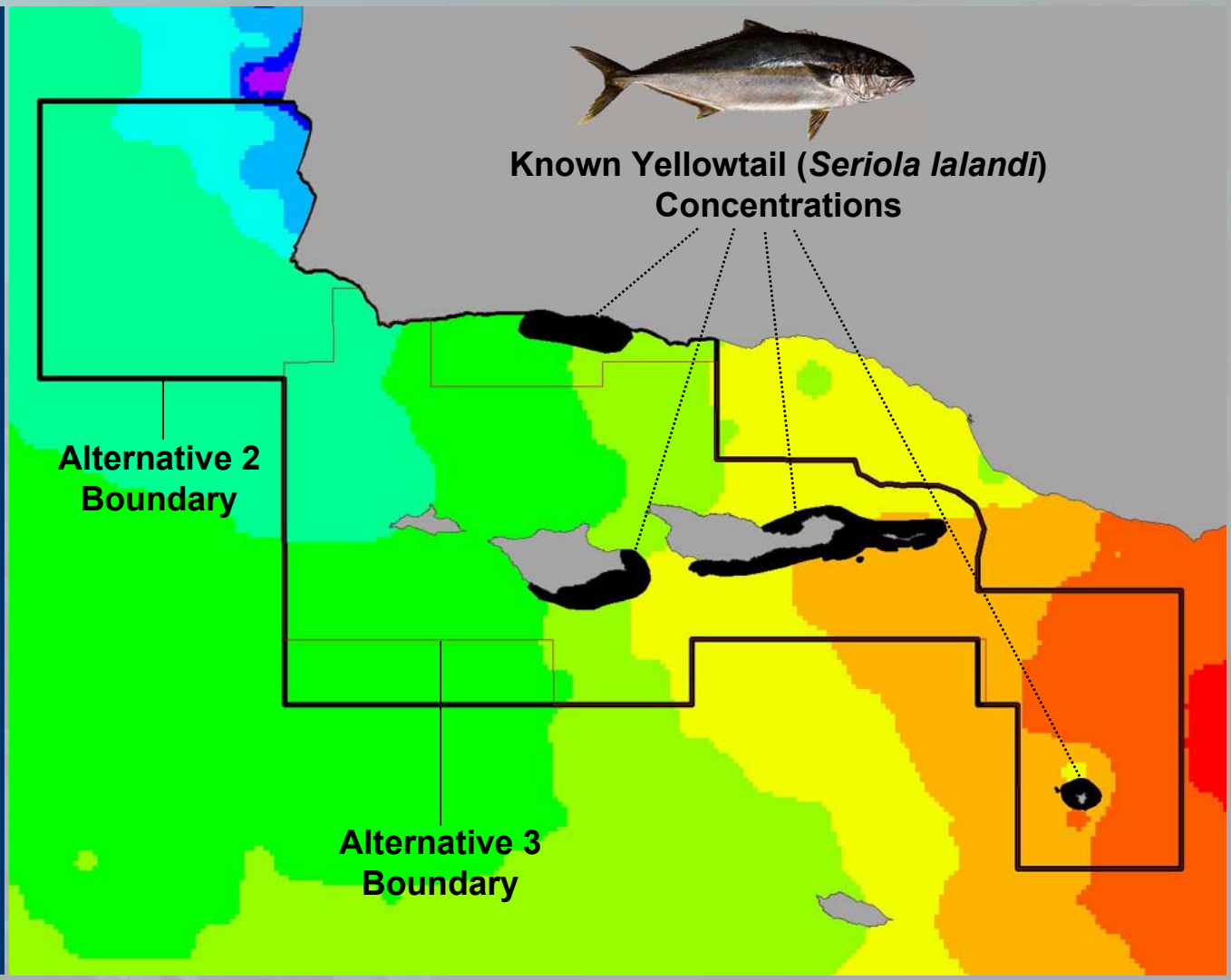
Capturing snapshots of dynamic physical features for interpretive context (and modeling):

Known Yellowtail concentrations (black) are restricted to water temperatures averaging 60 degrees or higher.

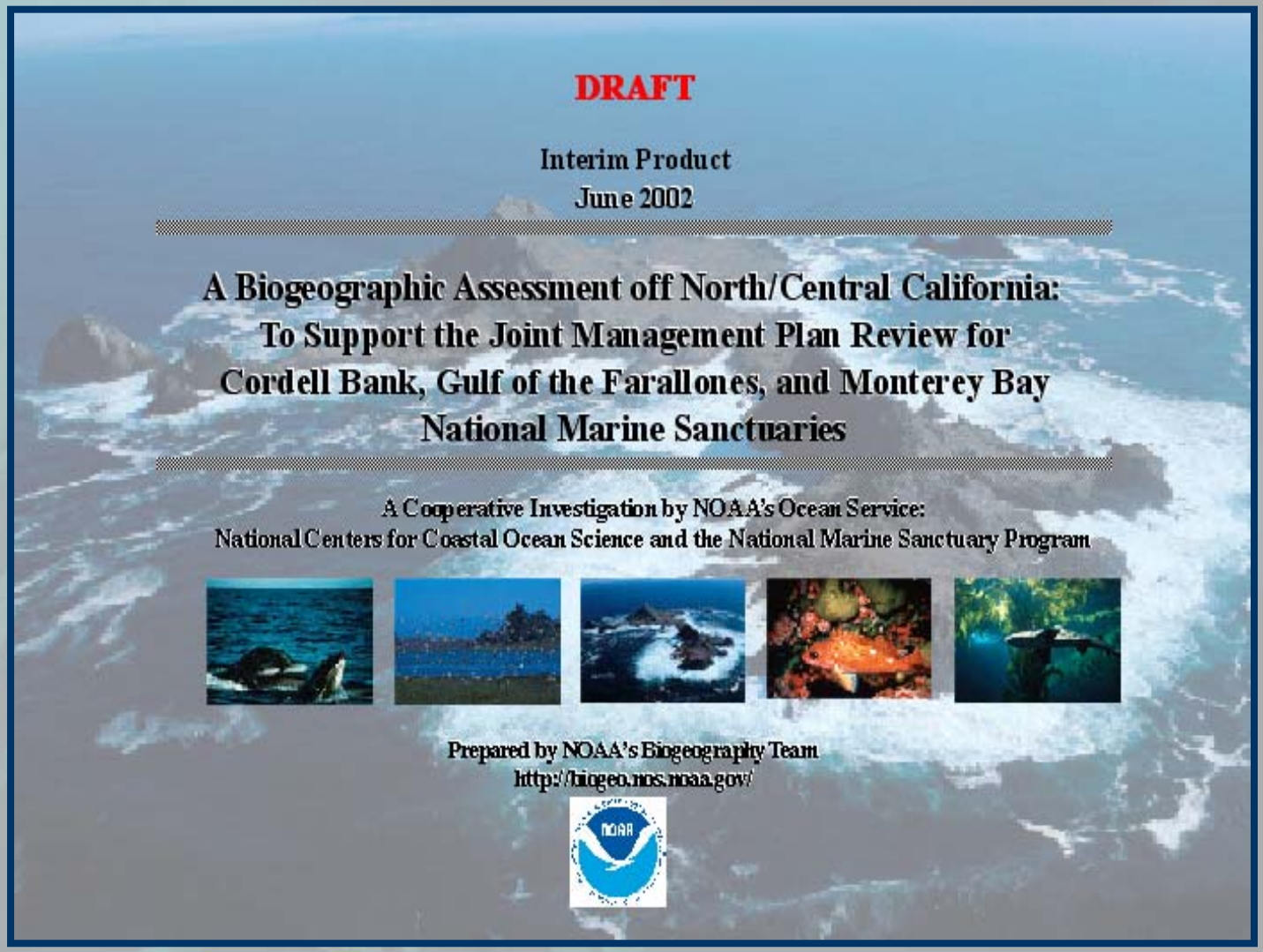
This information, coupled with a knowledge of the distribution of preferred habitats (kelp mats, rocky outcrops) can be used to model potential distribution patterns.

"Oceanographic Seasons" (Davidson, Oceanic, etc.) and El Nino / La Nina events can be parsed out and modeled separately for greater specificity.

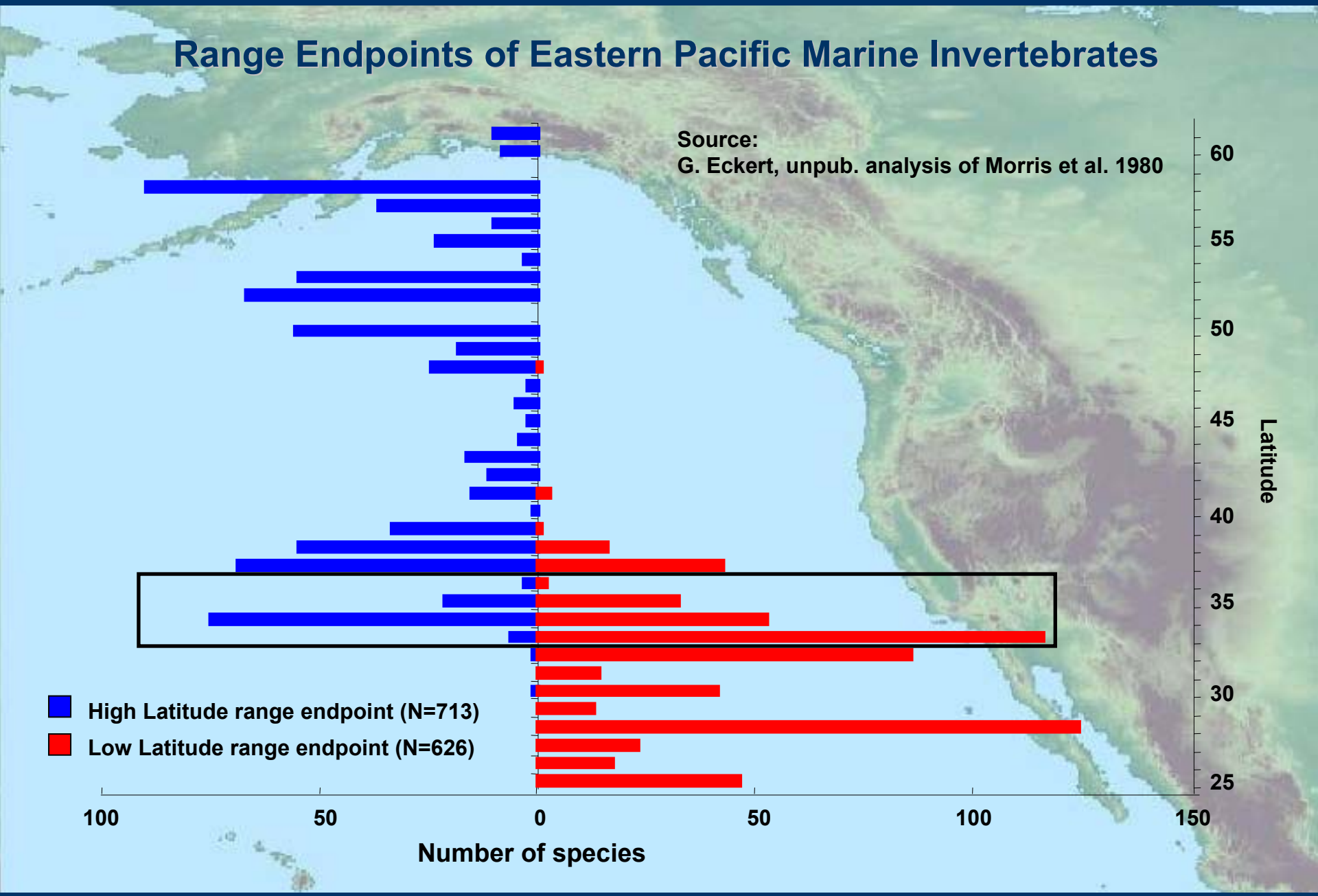
Source:
NOAA/NOS



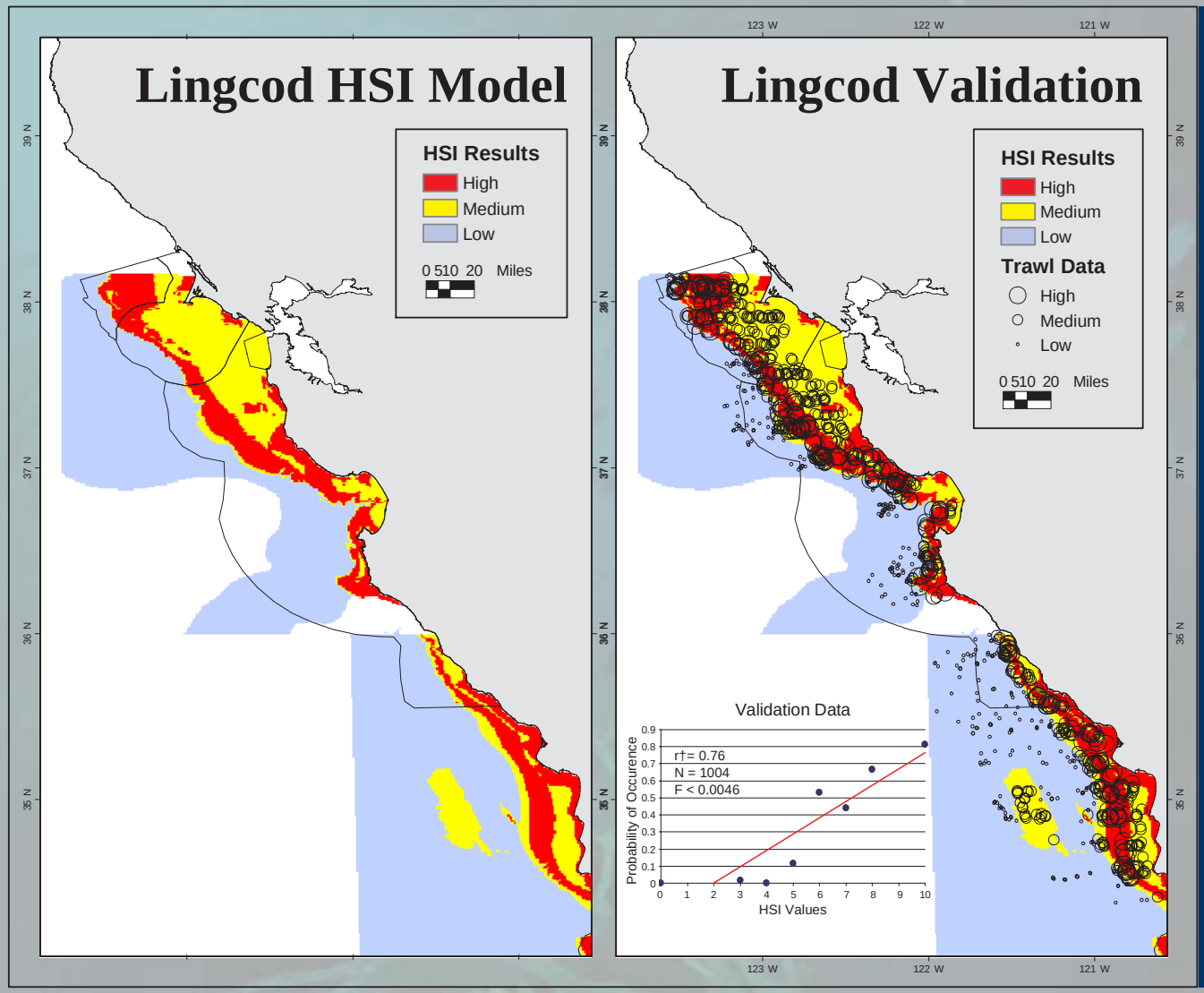
Building Upon a Robust Body of Work:
A Biogeographic Assessment off North/Central California



Range Endpoints of Eastern Pacific Marine Invertebrates



Habitat Suitability Index (HSI) Modeling

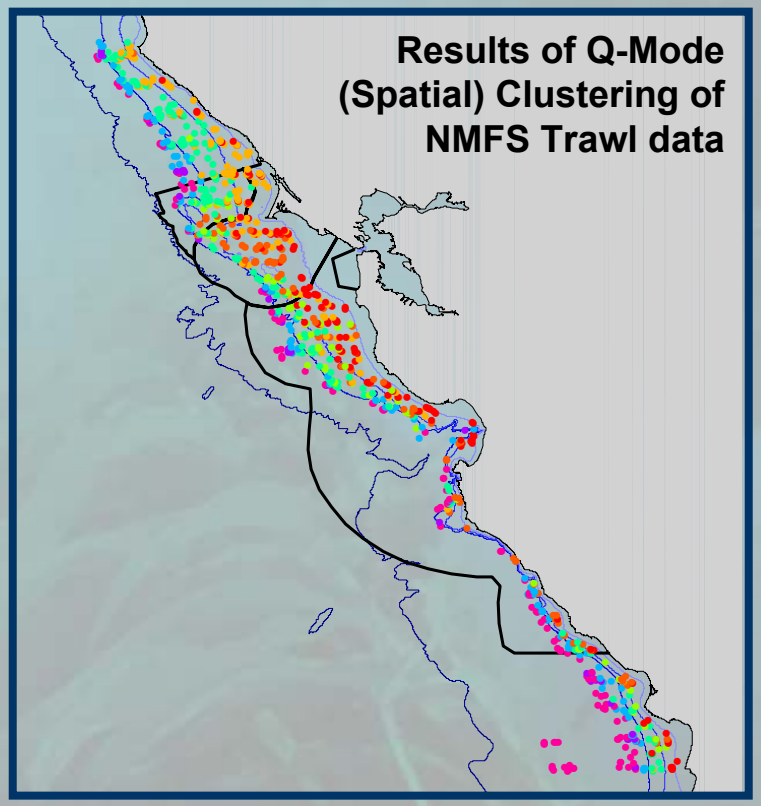


OBJECTIVE:

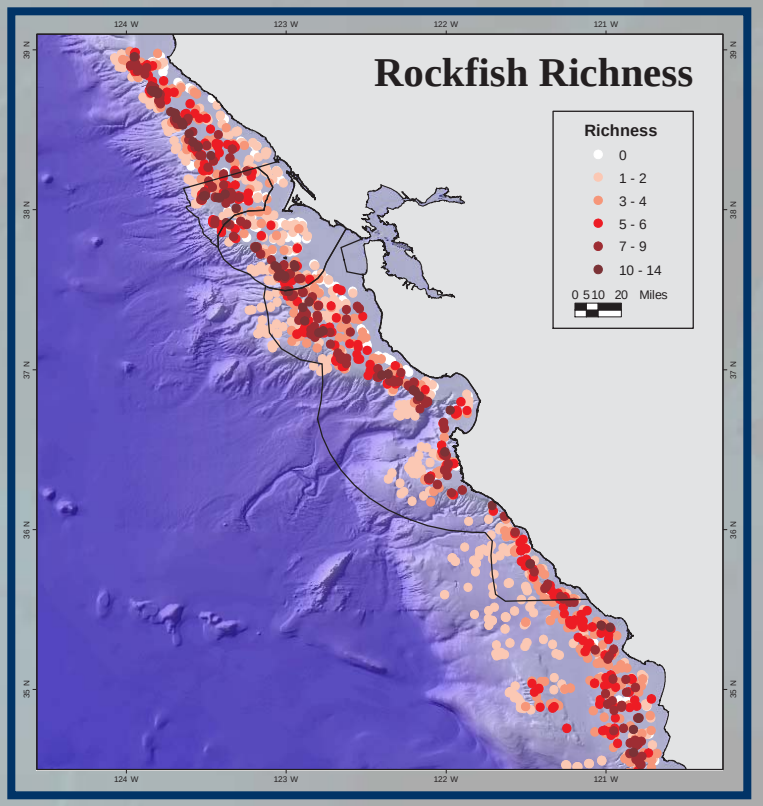
Provide a comprehensive species-specific profile of the POTENTIAL distribution of important fish & invertebrate species based on habitat affinities to bathymetry, bottom type, and water temperature.

Models are then validated using fisheries independent and fisheries dependent data

Community Structure:
An Example Using Fisheries-independent Data

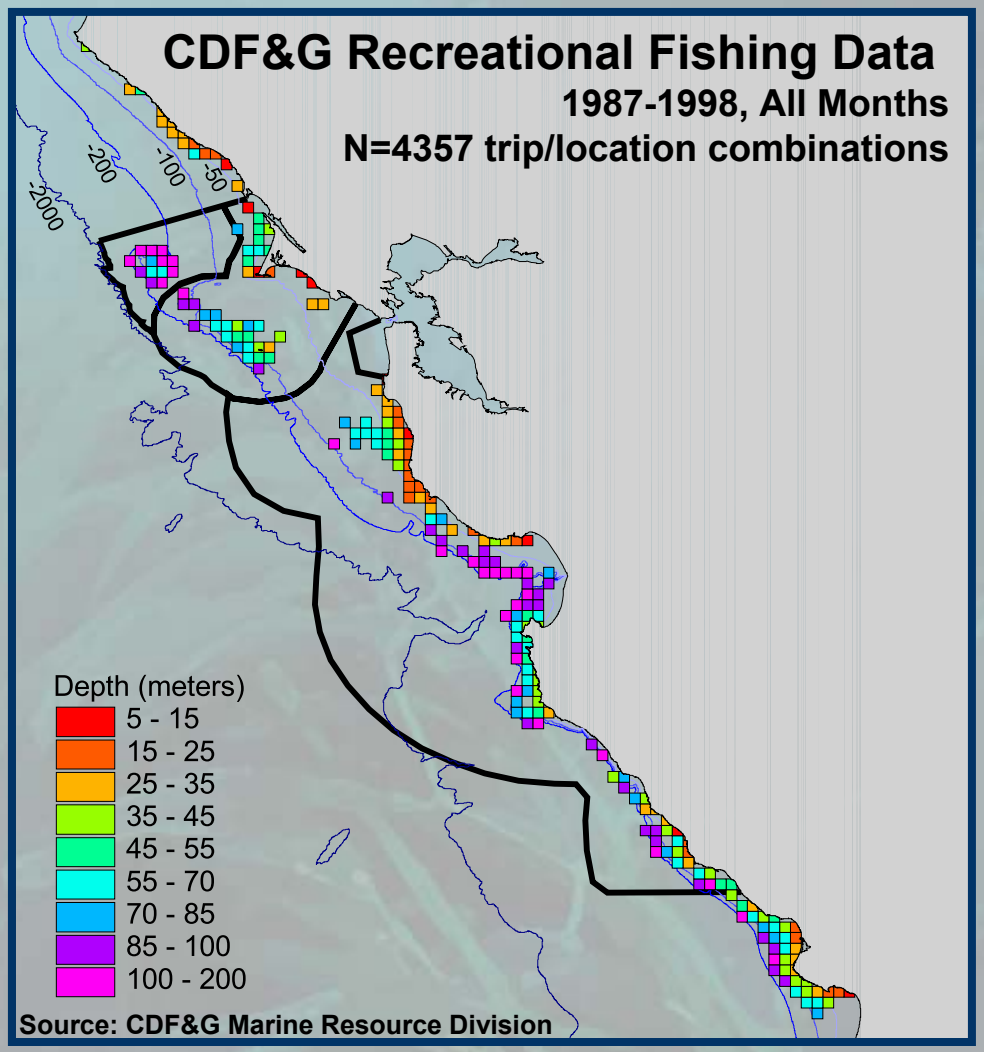


- How many assemblages exist within a boundary?
- Can the boundary be optimized to contain most or all assemblages in the region?



- What is the estimated total number of Rockfish species within each boundary?
- Can the boundary be optimized to contain most or all species in the region?

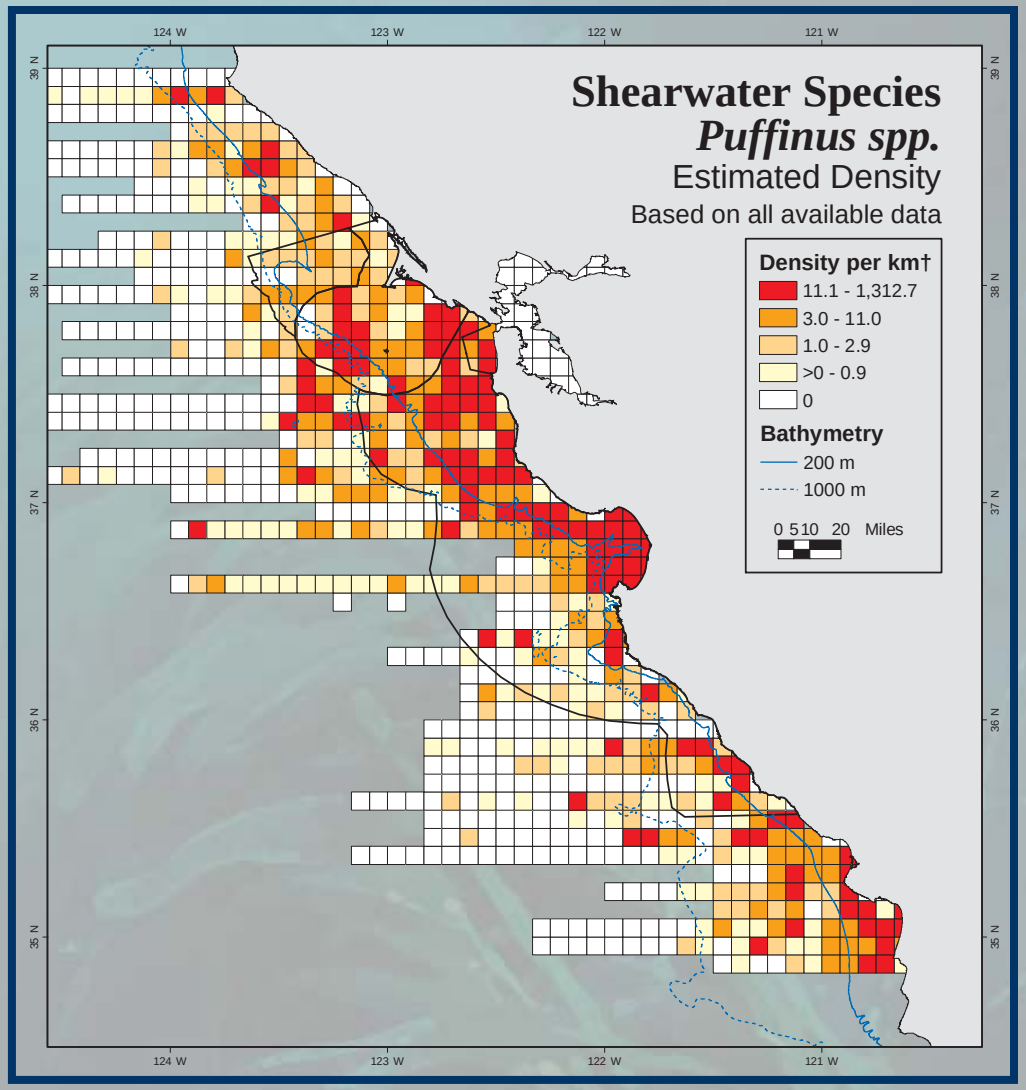
Community Structure:
An Example Using Fisheries-dependent Data



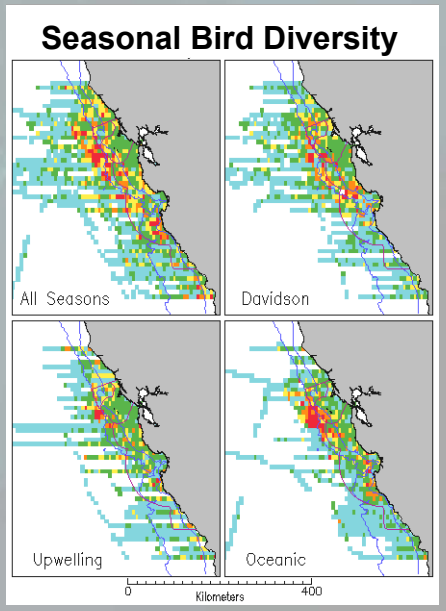
Onboard Sampling of the Commercial Passenger Fishing Vessel Industry.

- Observers recorded species caught and exact location of the boat.
- Between 1987 and 1998 observers joined 2167 fishing trips which fished 4357 different trip/location combinations.
- More information on methods is available in Wilson-Vandenberg et al. (1995).
- Analyses were run on presence/absence data of 27 fish species .

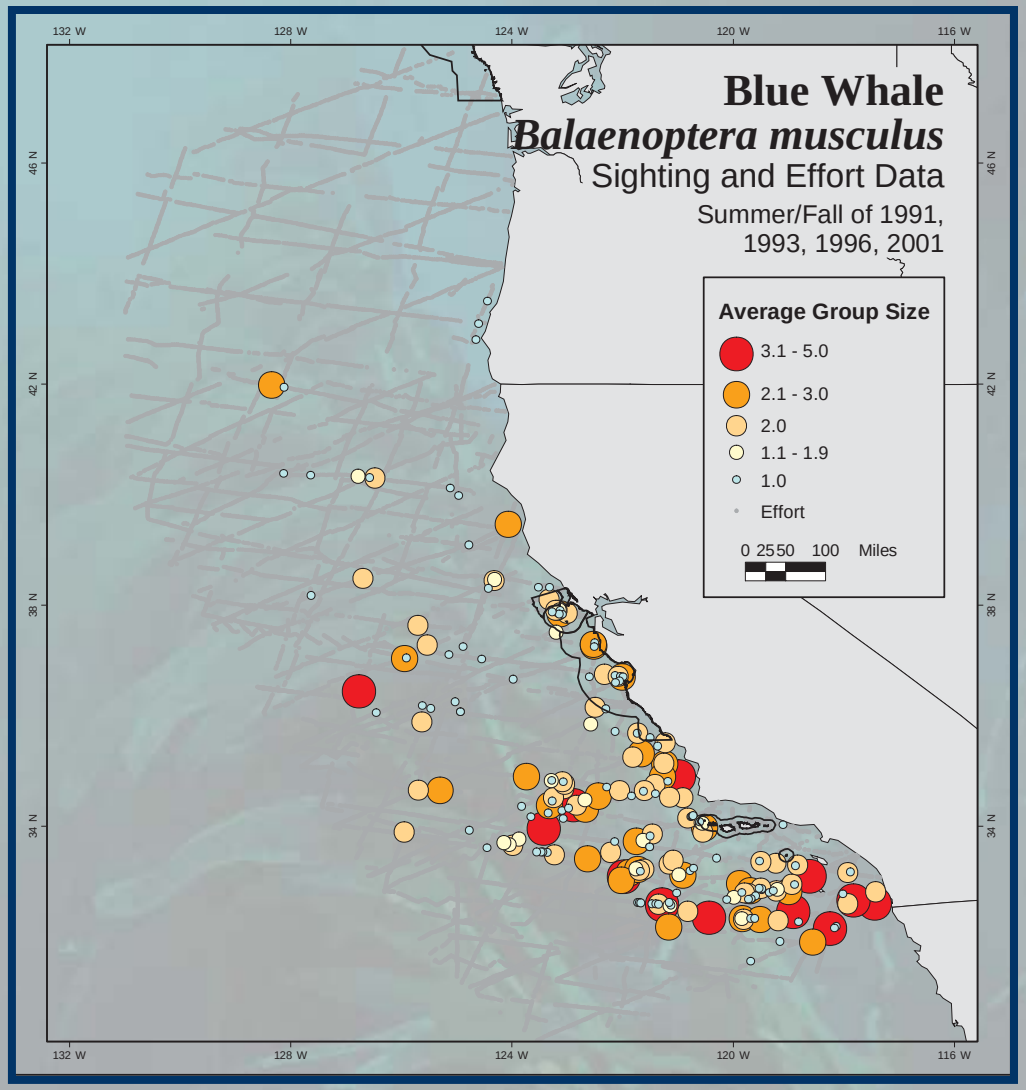
Birds:
A Comprehensive and Robust Spatial Analysis



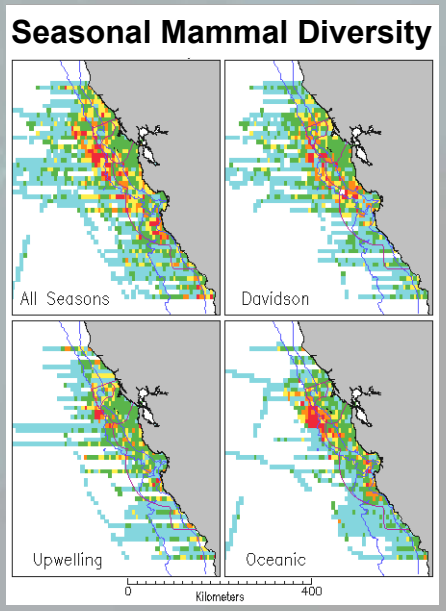
- CDAS database, a compilation of aerial & vessel surveys from 1975-1997
- Seasonal density estimates (Davidson, Oceanic, etc.)
- El Niño/La Niña induced spatial shift
- Measures of bird community structure (Richness, Diversity)



Mammals:
A Comprehensive and Robust Spatial Analysis



- CDAS database, a compilation of aerial & vessel surveys from 1975-1997
- Seasonal density estimates (Davidson, Oceanic, etc.)
- El Niño/La Niña induced spatial shift
- Measures of mammal community structure (Richness, Diversity)



Next Steps: Where Do We Go From Here?
(2-3 Month Horizon)

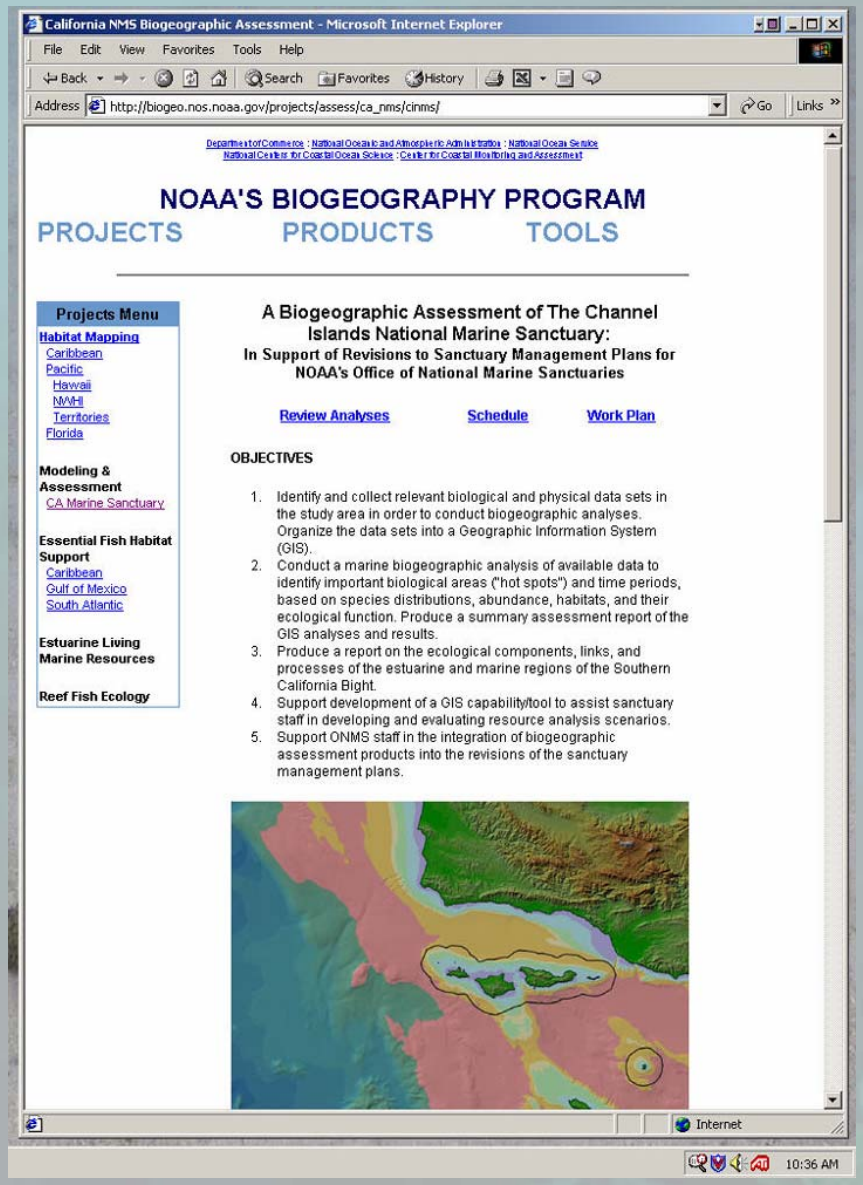
- Now that we have been given specific guidelines from the National Marine Sanctuaries Program Headquarters and Channel Islands National Marine Sanctuary Staff, we will develop a detailed project **WORKPLAN**, including expected products, milestones, and timelines.

- NCCOS Staff will begin to **gather** any **reliable and relevant spatial data** that can be used for the biogeographic analysis.

- **Much the legwork for this activity has already been done** by Channel Islands National Marine Sanctuary Staff.

- A **website will be developed** over the next few months to communicate all activities related to this project. All interim products and publications will be posted here for all interested parties to review.

http://biogeo.nos.noaa.gov/projects/assess/ca_nms/cinms/



- Online Product Reviews
- Schedule of Milestones & Deliverables
- Work Plan & Other Documentation
- Contact Lists

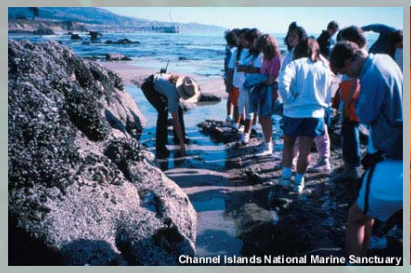
We need your guidance, and hope you will all choose to be involved throughout the duration of this project.

Are there specific biogeographic processes that you as a group feel we need to focus on?

Are there specific taxa, habitats, or other issues that we should pay particular attention to?

Are there any experts or other individuals that you feel we MUST contact to ensure we get the job done right?

Would you be willing to participate in a series (1-2) of workshops throughout the next year to help with analytical interpretation, and to provide any "mid-course" corrections if necessary?



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