

Using GIS to Evaluate the Need for Marine Protected Areas in the Monterey Bay National Marine Sanctuary



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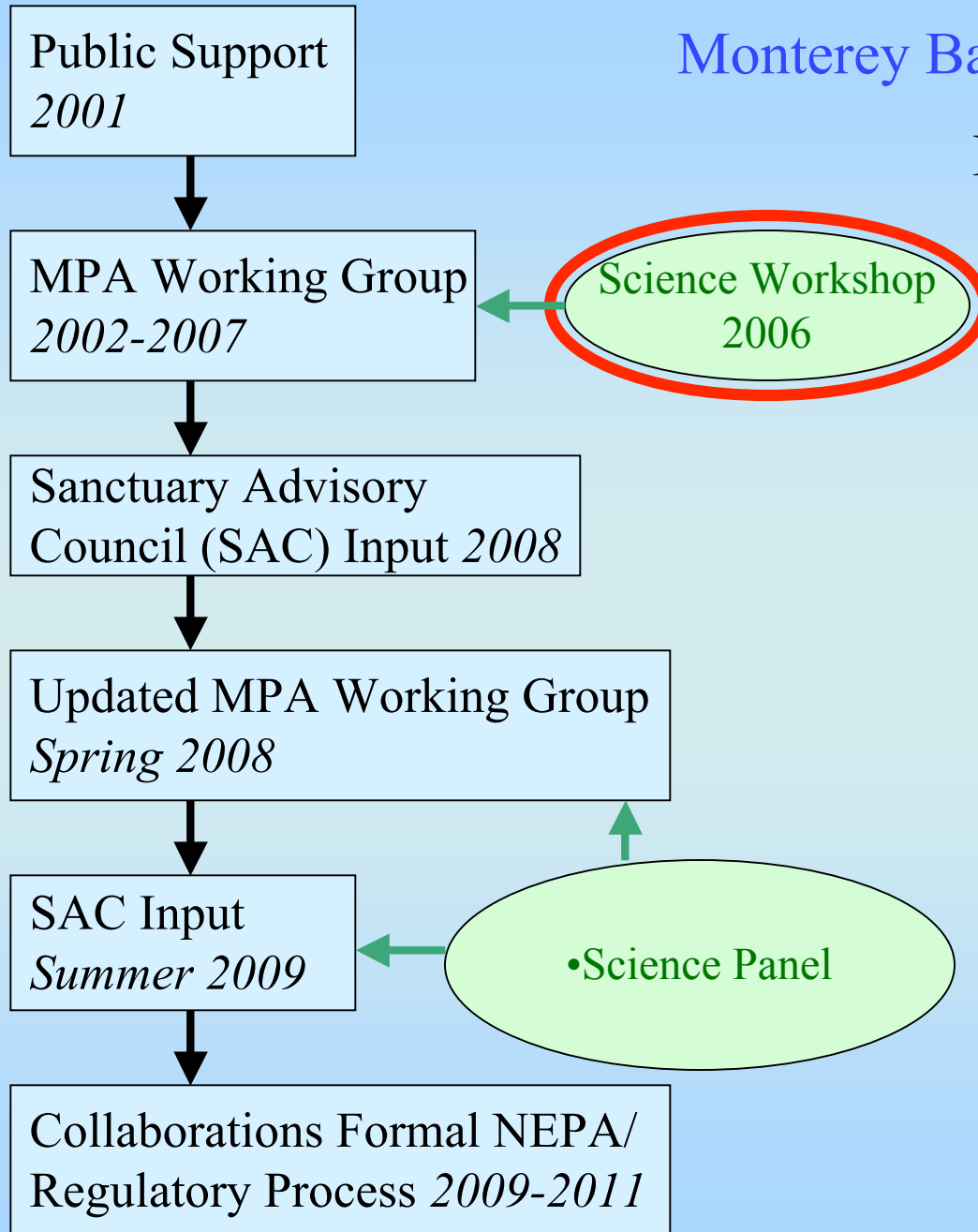
Association of American Geographers Annual Meeting, April 15-19, 2008

Outline

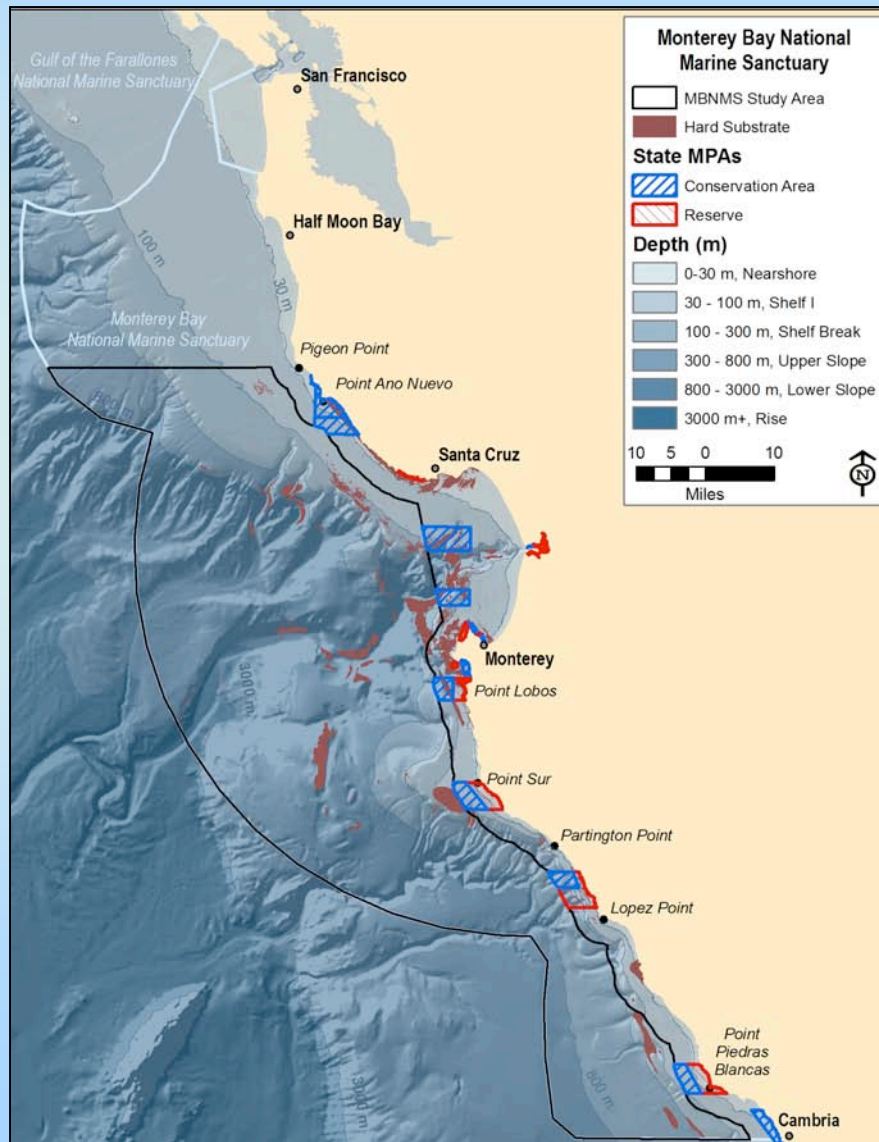
1. Design guidance for offshore MPAs
2. Developing a GIS database for the MPA process
3. Stakeholder participation using GIS tools

Monterey Bay National Marine Sanctuary

MPA Consideration Timeline

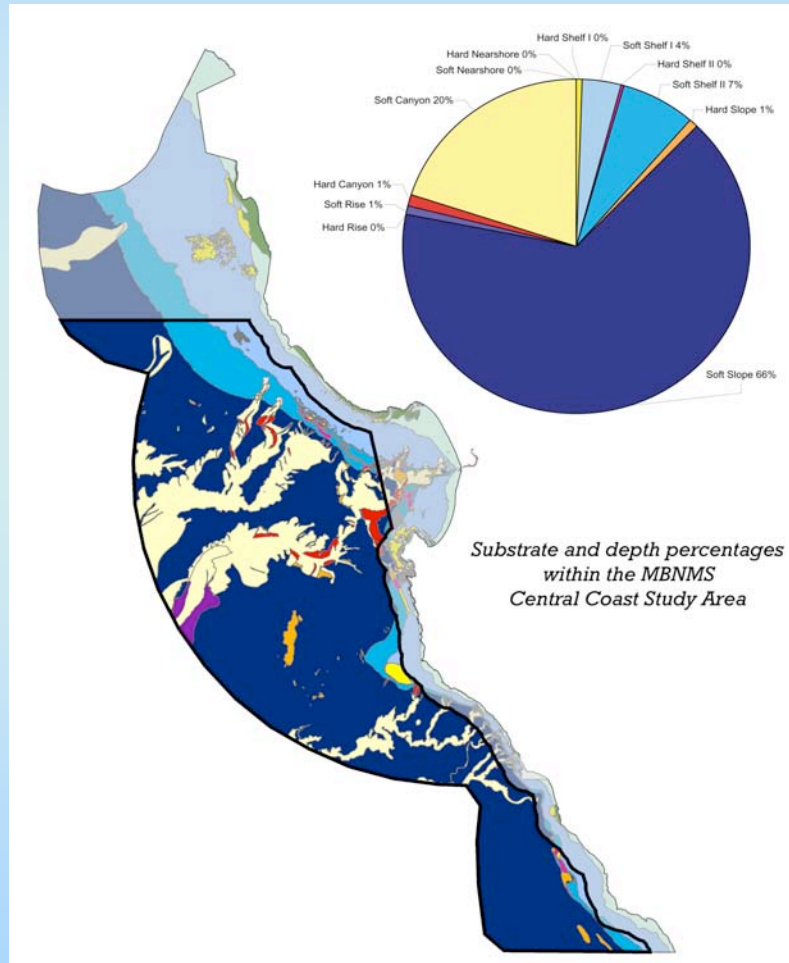


Science Workshop Design Guidance for offshore MPAs



- Continuity with existing nearshore MPAs
- Larger MPAs to capture adequate, suitable habitats
- Fewer but larger widely distributed MPAs within the network

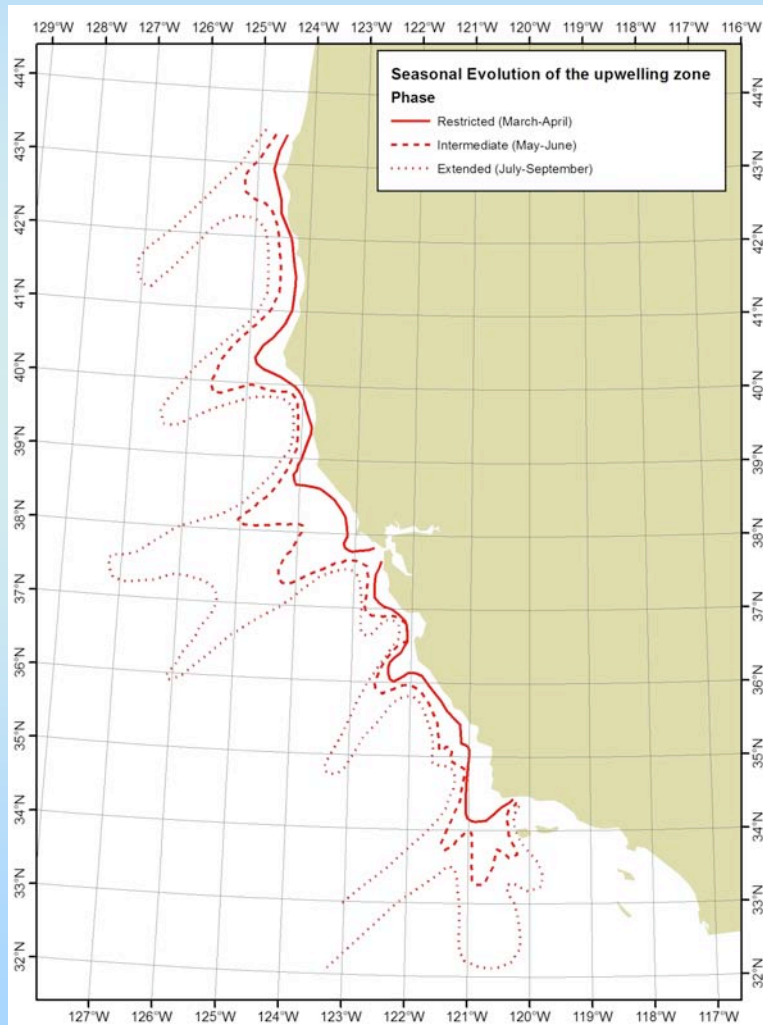
Science Workshop Design Guidance for offshore MPAs (cont.)



Habitats

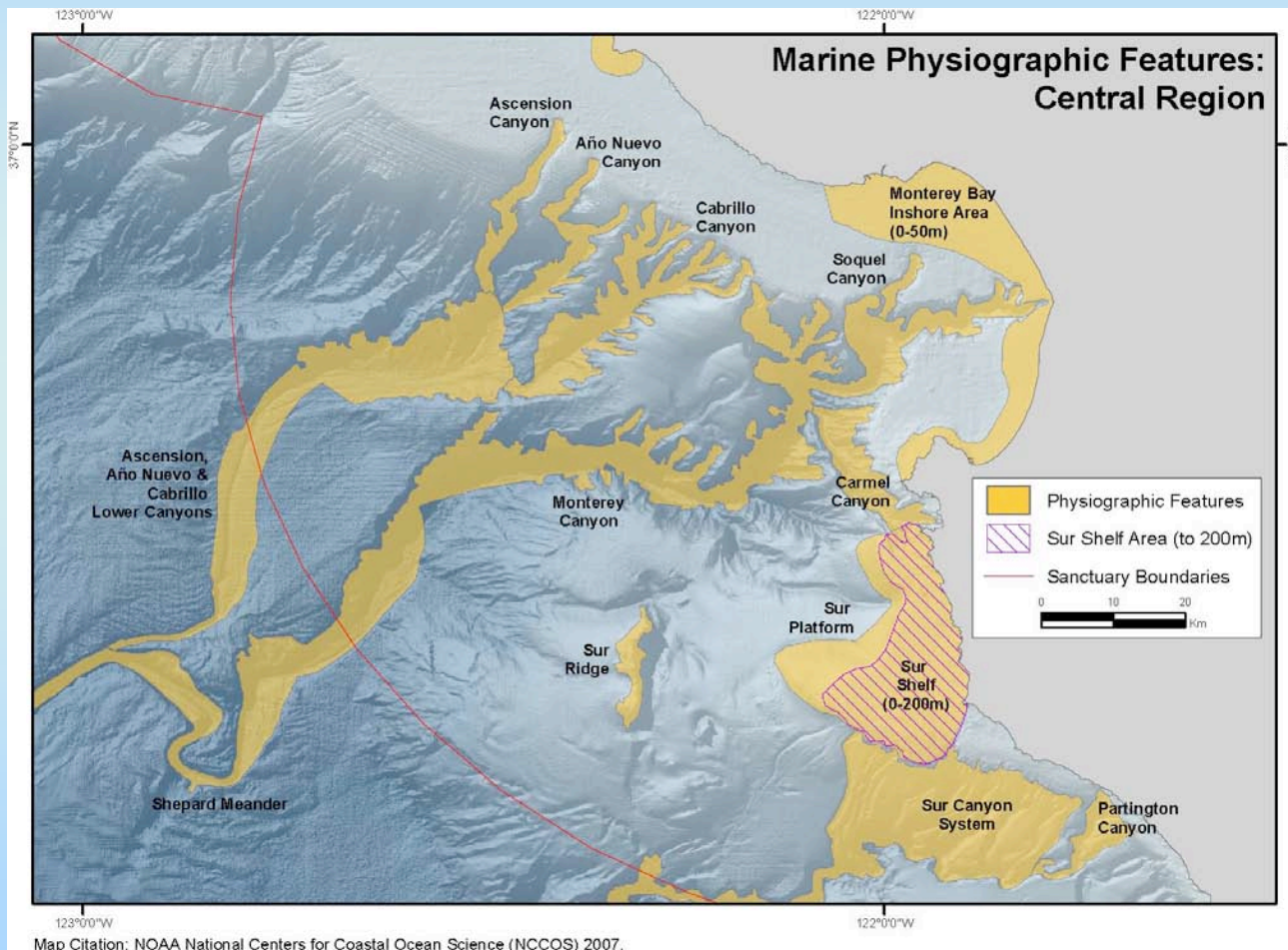
- Use as proxies for species
- Areas with high habitat heterogeneity may indicate areas of high species diversity

Science Workshop Design Guidance for offshore MPAs (cont.)



- Overlay persistent pelagic features or processes

Science Workshop Design Guidance for offshore MPAs (cont.)

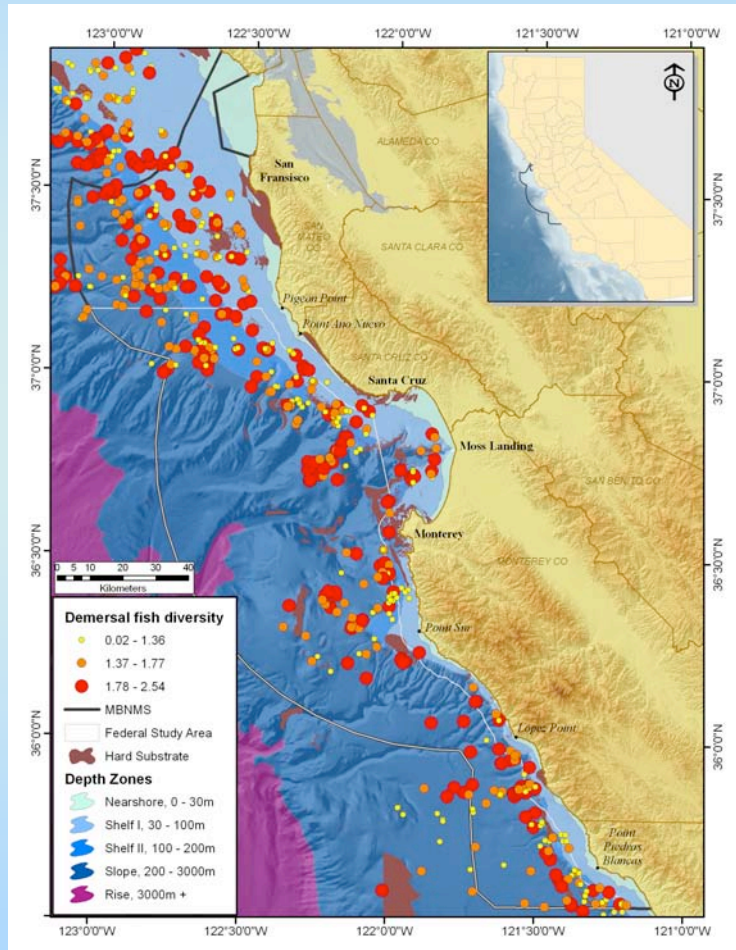


- Protect unique or rare habitats

Expanding the GIS database

■ Biological Data

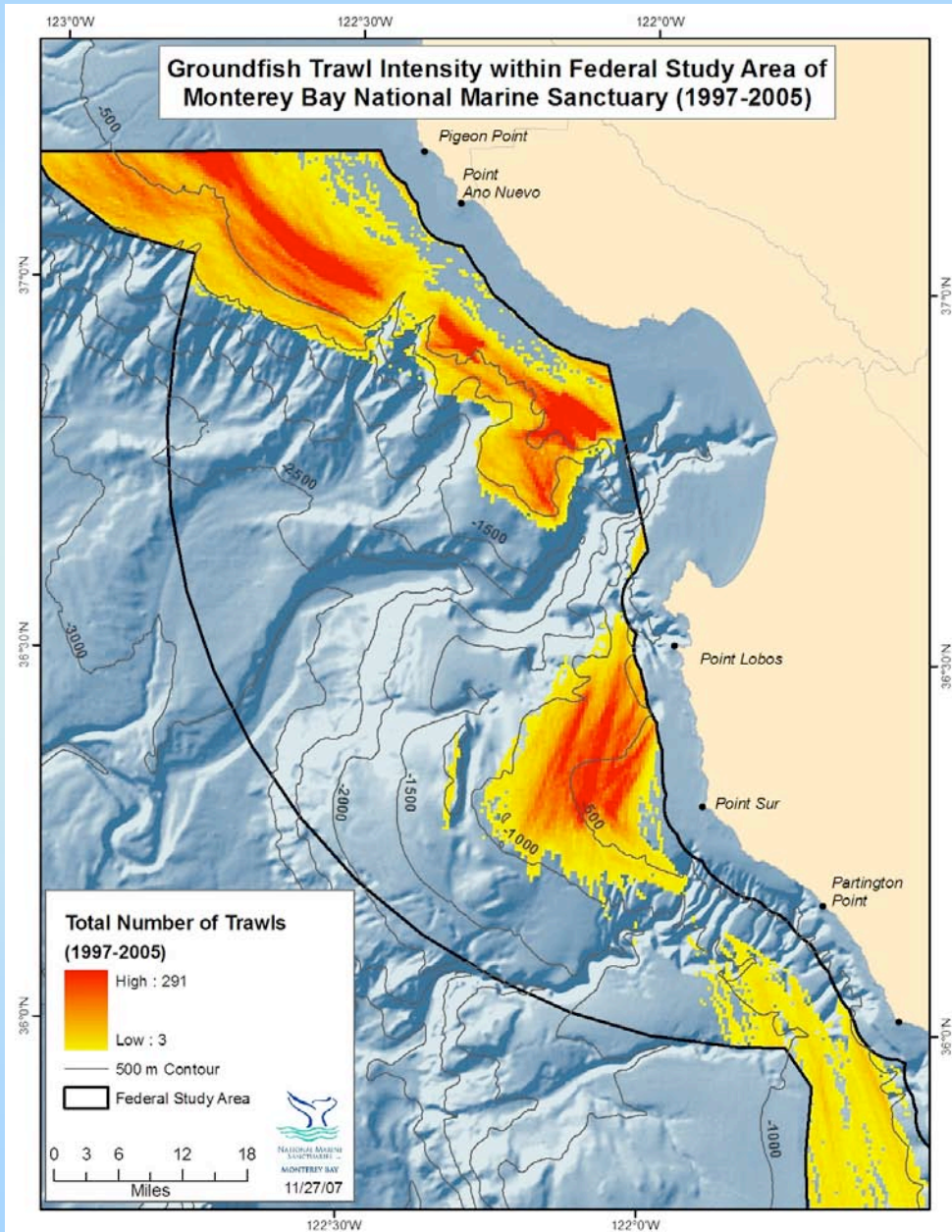
Example: Species Diversity of Demersal Fish per Trawl (1977-2001)



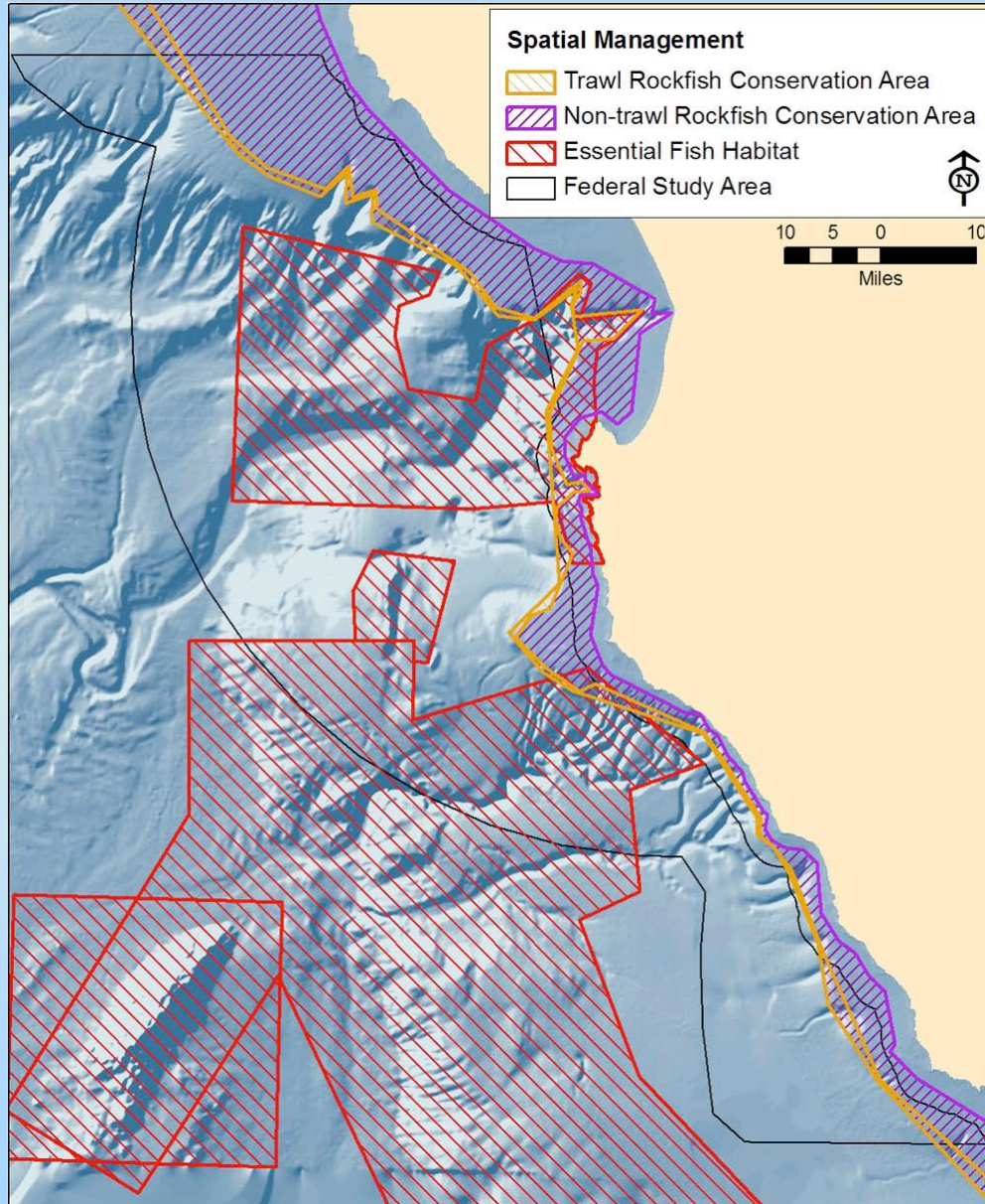
Expanding the GIS database (cont.)

■ Consumptive Data

Example: Groundfish Trawl Intensity (1997-2005)



Expanding the GIS database (cont.)



■ Management Data

Example: Fishing Regulations

Habitat/Management Calculations

	State and Federal Area*	Habitats included in other management measures				
	Square Miles	% habitat encompassed by MLPA	% habitat in an SMR	% habitat within trawl RCA	% habitat within non-trawl RCA	% habitat within EFH trawl closure
Shelf Soft (30-100m)	498.55	12.05	2.62	0.04	68.97	0.05
Shelf Hard (30-100m)	39.37	12.86	3.31	1.14	75.41	6.47
Shelf Canyon (30-100m)	4.51	10.73	5.59	2.63	96.98	
Shelf Break Soft (100-300m)	349.50	3.10	0.21	18.06	93.68	1.75
Shelf Break Hard (100-300m)	32.04	18.97	0.03	21.57	94.24	1.88
Shelf Break Canyon (100-300m)	18.09	8.84	2.07	29.64	83.71	1.83
Slope 1 Soft (300-800m)	789.26	1.33	0.48	3.18	3.46	9.58
Slope 1 Hard (300-800m)	14.57	8.32	0.20	38.86	41.73	0.69
Slope 1 Canyon (300-800m)	93.56	8.27	3.29	16.61	17.41	15.50
Slope 2 Soft (800-3000m)	1493.62	0.00				50.25
Slope 2 Hard (800-3000m)	20.64			0.01	0.01	88.59
Slope 2 Canyon (800-3000m)	626.93	0.17		0.02	0.02	64.76
Rise (>3000)	70.33					28.09

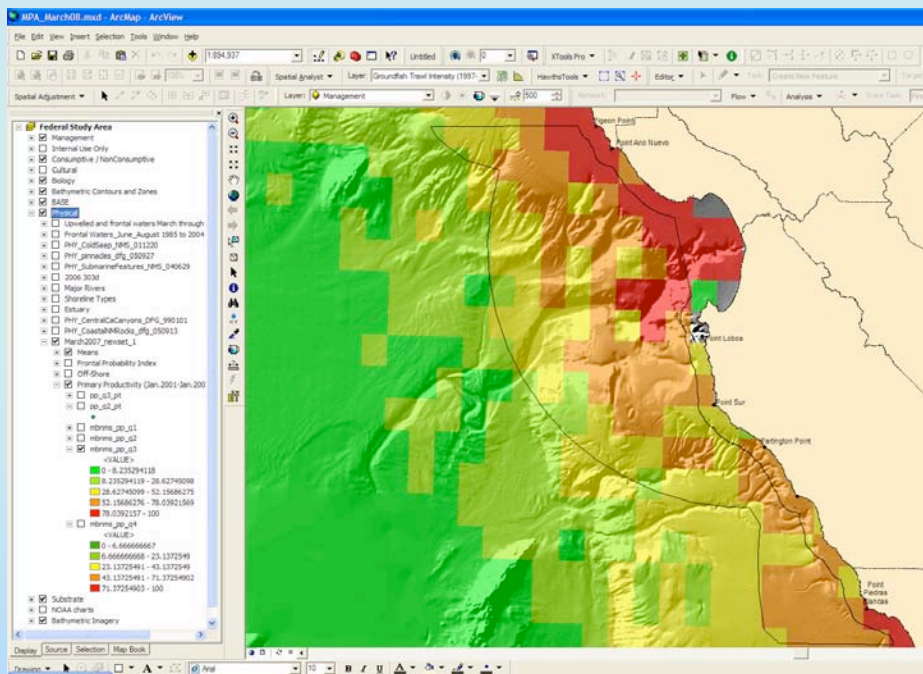
Live GIS

Pro's

- Connections are evident
- Data to address questions that arise during the meeting
- Metadata immediately available

Con's

- Takes time to load
- Distraction



Doris: Power to the Stakeholders

Doris

MARINE PROTECTED AREAS DECISION SUPPORT TOOL



Username:

Password:

[Forgot password?](#)

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Welcome

The Doris Marine Protected Areas Decision support tool is a collaborative effort between Federal and California State Agencies, the Resources Legacy Fund Foundation (RLFF) and the Marine Sciences Institute located at the University of California in Santa Barbara.

The tool is named after Doris a Sea Nymph from Greek mythology who was associated with a "bountiful" ocean. Together with her husband the sea god Nereus, she was the mother to 50 beautiful nymphs known as the Nereids.

For problems accessing this site, please contact the [webmaster](#).

For best results, please use Internet Explorer 5+



MARINEMAP

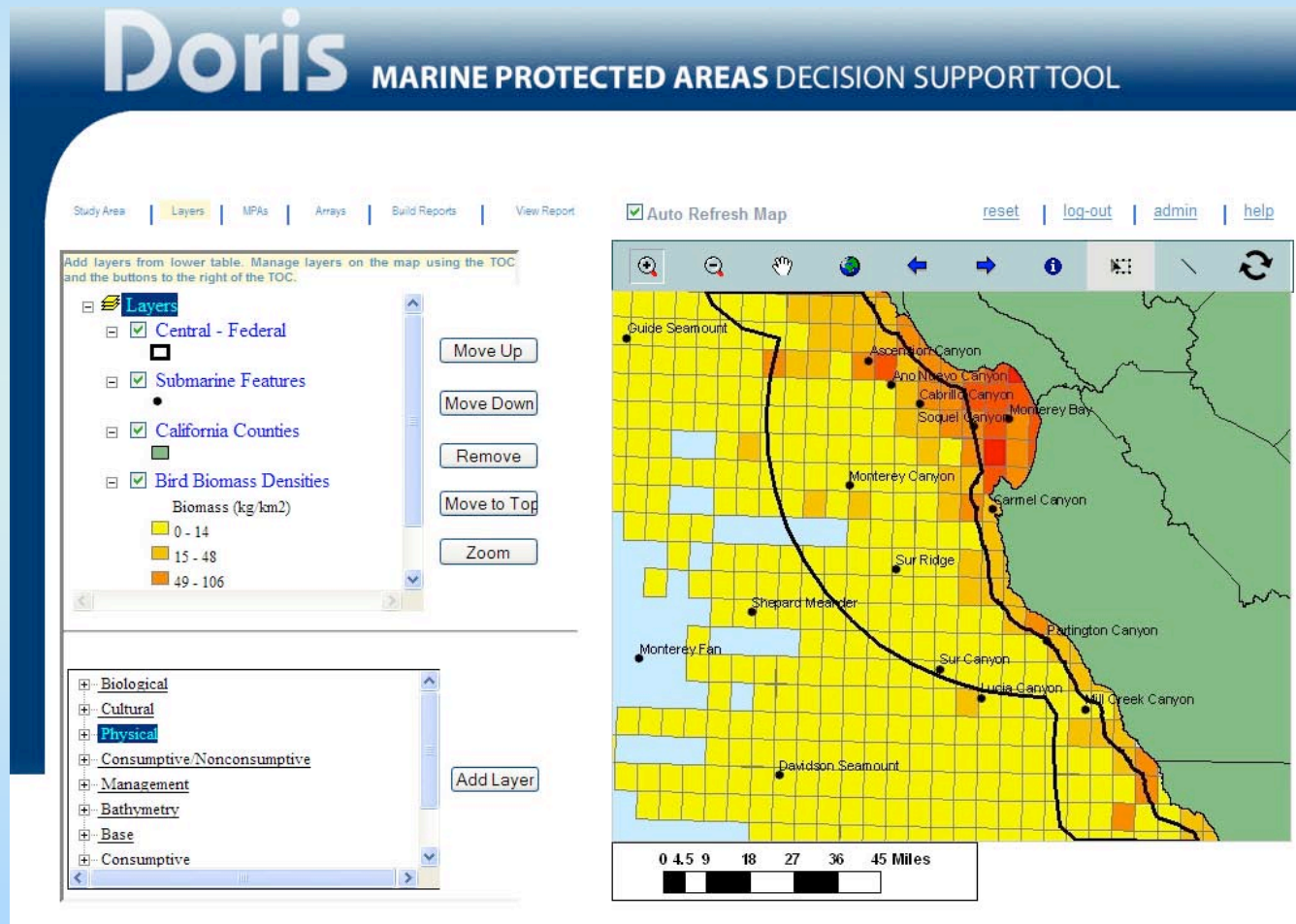
Doris: Study Area Selection

The screenshot displays the Doris Marine Protected Areas Decision Support Tool interface. The header features the "Doris" logo and the text "MARINE PROTECTED AREAS DECISION SUPPORT TOOL". Below the header, a navigation bar includes links for "Study Area", "Layers", "MPAs", "Arrays", "Build Reports", and "View Report". A "Study Area" tab is currently selected. To the right of the navigation bar, there is a checkbox for "Auto Refresh Map" (checked), and links for "reset", "log-out", "admin", and "help".

The main content area is divided into two sections. On the left, a text box instructs the user: "Please choose a study area from the list below by selecting the text and clicking on the 'Select' button". Below this instruction is a list box containing four options: "Central - Federal", "Central - State and Federal", "Central - State", and "North Central - State". The "Central - Federal" option is currently selected. Below the list box is a "Select" button.

On the right side of the interface is a map of the Gulf of Mexico. The map shows the coastline of the United States and the surrounding waters. A scale bar at the bottom of the map indicates distances in miles: 0, 4.5, 9, 18, 27, 36, and 45 miles. The map also includes a toolbar with various navigation and map controls.

Doris: Review Layers



Doris: Reports

Include:

- Values (e.g. area or count) for selected layers per MPA and for the array
- Metadata for all files in report
- Report definitions and functions outline
- Distance between MPAs

MPA Candidate Name: Offshore of Piedras Blancas
Description:

Created By: Sophie De Beukelaer
Created Date: 04-20-2006

Coral: Sponges and Anemones:	Count	Count As % Of Study Area	Total	Total As % Of Study Area	Mean	Range	Area(Mi ²)	Area As % Of MPA	Area As % Of Study Area	Area(Mi ²) Of Study Area
Occurrence	0	0.00 %								

Course Scale Hard and Soft Bottom Habitat:	Count	Count As % Of Study Area	Total	Total As % Of Study Area	Mean	Range	Area(Mi ²)	Area As % Of MPA	Area As % Of Study Area	Area(Mi ²) Of Study Area
Habitat										
hard							0.272	0.59 %	0.27 %	100.429
soft							46.064	99.41 %	1.37 %	3,365.160

MLPA Depth Zones in Meters:	Count	Count As % Of Study Area	Total	Total As % Of Study Area	Mean	Range	Area(Mi ²)	Area As % Of MPA	Area As % Of Study Area	Area(Mi ²) Of Study Area
Maximum Depth in Meters							46.336	100.00 %	1.34 %	3,465.571
Minimum Depth in Meters							46.336	100.00 %	1.34 %	3,465.571

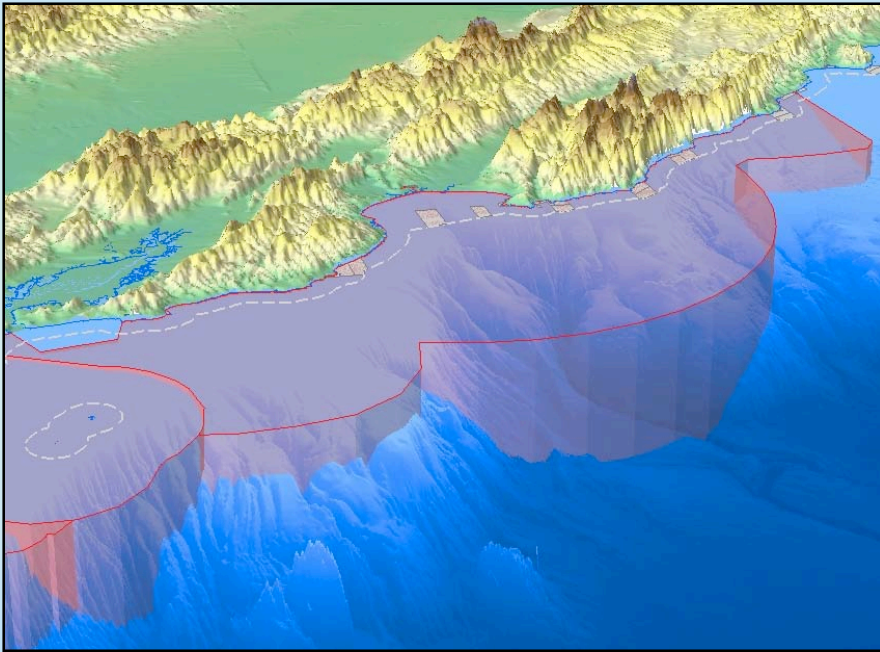
ARRAY SUMMARY

Coral: Sponges and Anemones:	Count	Count As % Of Study Area	Total	Total As % Of Study Area	Mean	Range	Area(Mi ²)	Area As % Of MPA	Area As % Of Study Area	Area(Mi ²) Of Study Area
Occurrence	29	31.35 %								

Course Scale Hard and Soft Bottom Habitat:	Count	Count As % Of Study Area	Total	Total As % Of Study Area	Mean	Range	Area(Mi ²)	Area As % Of MPA	Area As % Of Study Area	Area(Mi ²) Of Study Area
Habitat										
soft							758.263	91.67 %	21.94 %	3,365.160
hard							67.098	8.33 %	66.81 %	100.429

MLPA Depth Zones in Meters:	Count	Count As % Of Study Area	Total	Total As % Of Study Area	Mean	Range	Area(Mi ²)	Area As % Of MPA	Area As % Of Study Area	Area(Mi ²) Of Study Area
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Utility of GIS in MPA process



- Spatial representation
- Integration of data
- Editing capacity
- Modeling available
- Stakeholders involvement

Questions?

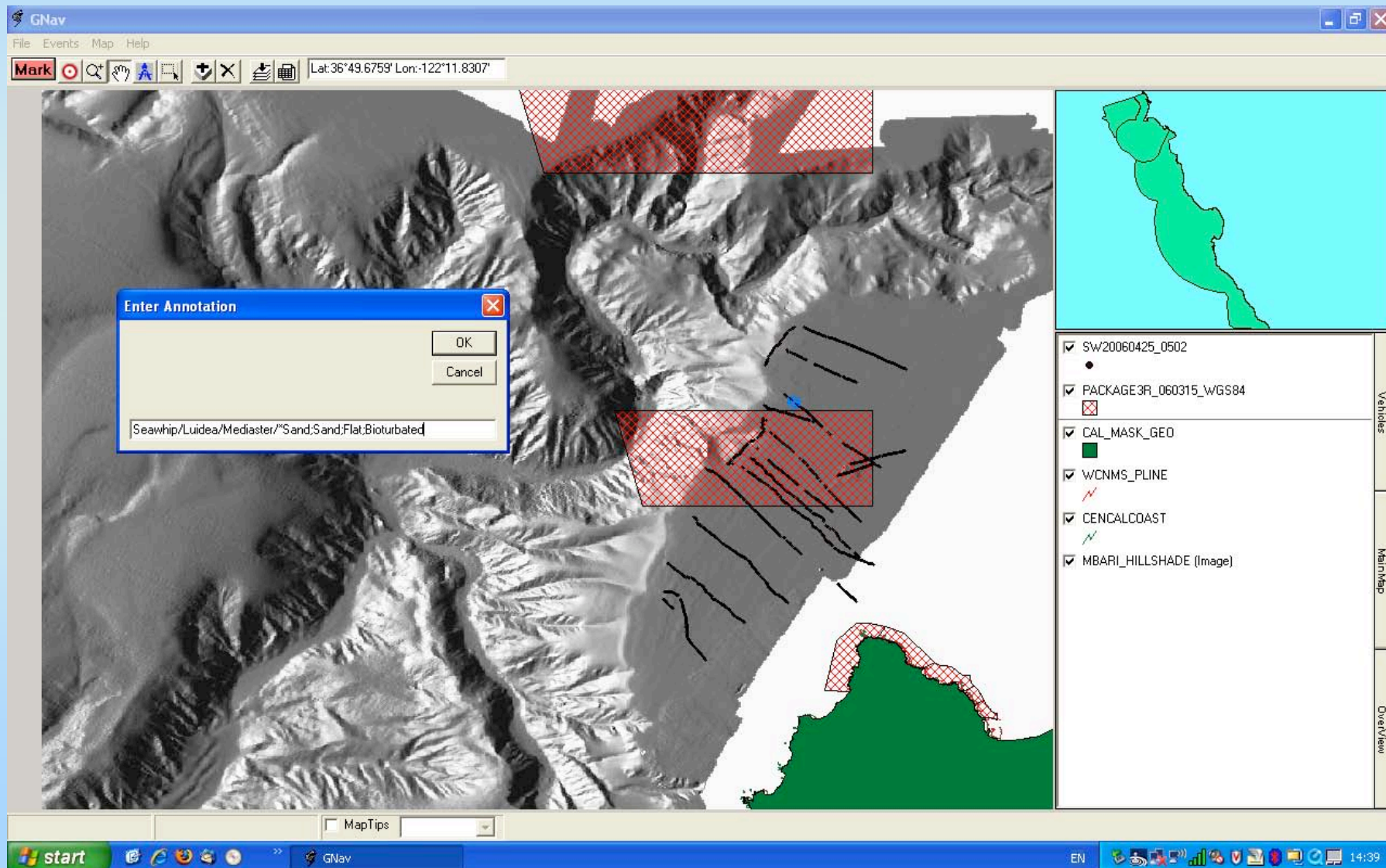
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Expanding the GIS database (cont.)

Research: Towed camera sled locations



Expanding the GIS database (cont.)

Research: Camera sled transects

