

Visualization of Spatially Explicit Habitat and Species Data in Support of Renewable Energy Siting – a use case for the Multipurpose Marine Cadastre Tool

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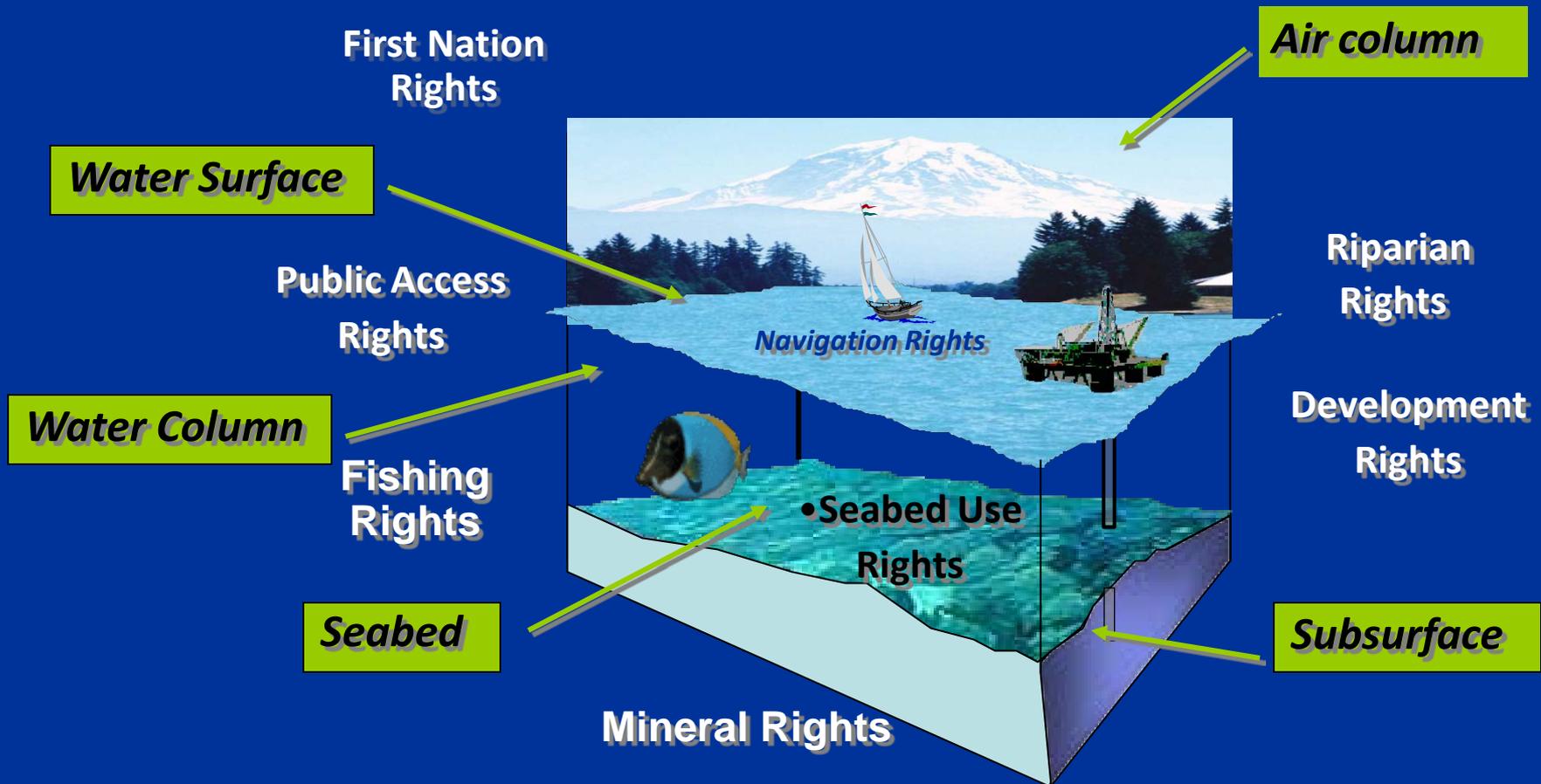
Presentation Outline

- Background and Issue Statement
- Multi-purpose Marine Cadastre Tool
- NMFS/Wave Energy Case Study Example
- Summary



Competing Uses of Marine Resources

Multiple and often Overlapping Rights



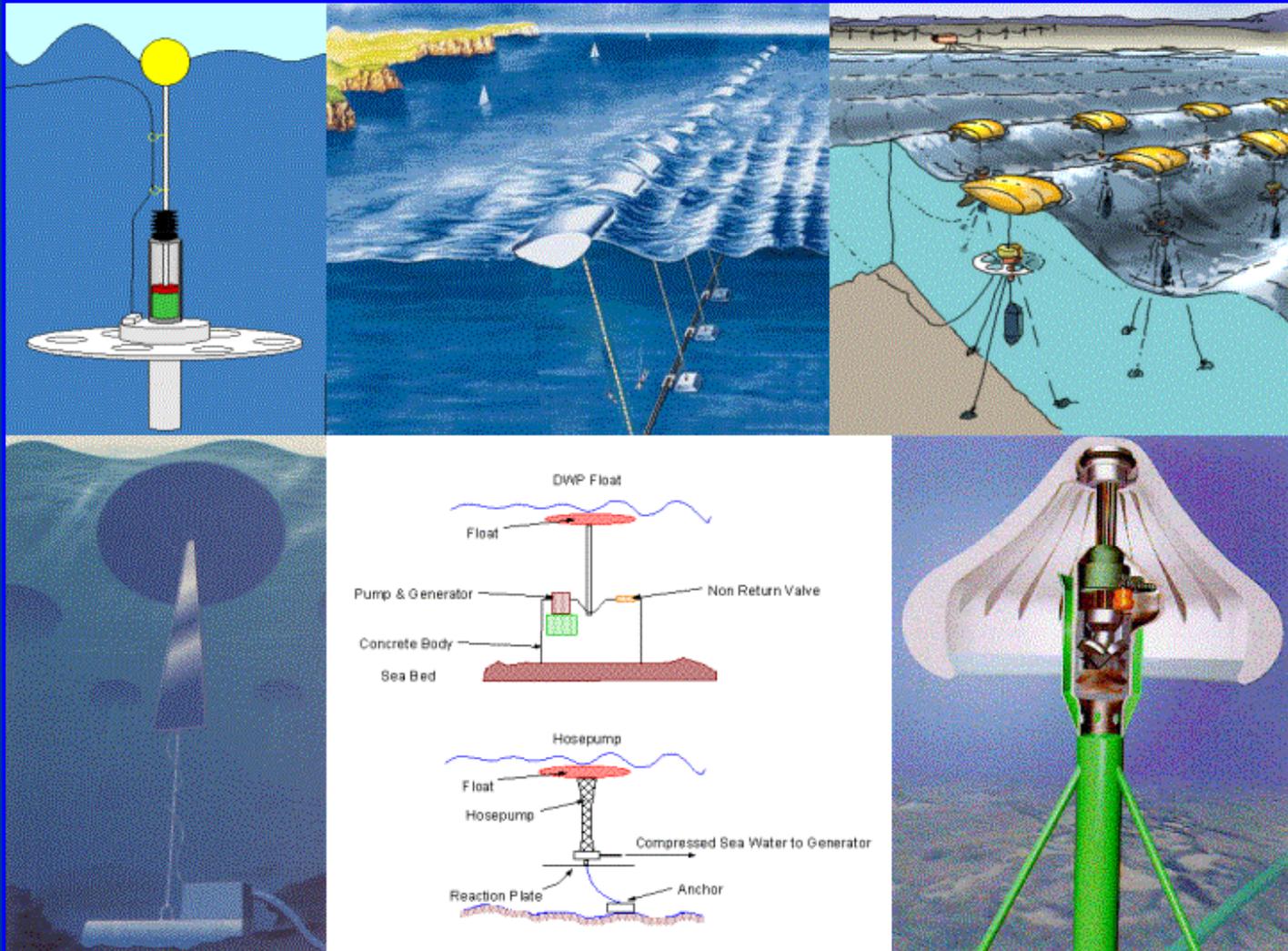
So, Things Like:



©AMEC Border Wind

Offshore Wind Farms





Alternative forms of wave energy

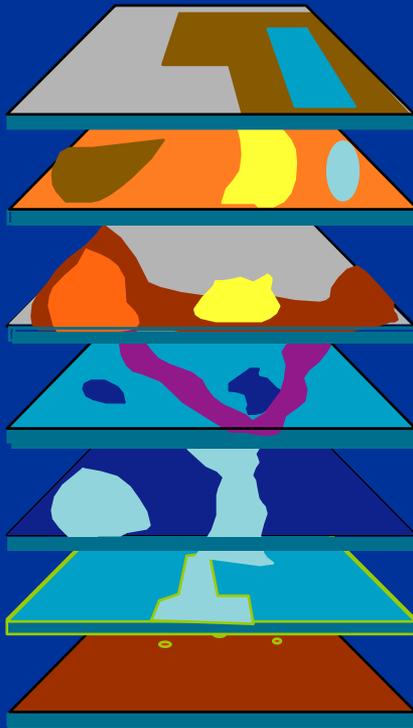
Multipurpose Marine Cadastre

A marine information system for the outer continental shelf and state waters that provides a data framework to support decision making.

The screenshot displays the 'U.S. Marine Cadastre' web application. At the top left is the 'MMS Minerals Management Service' logo. The main title 'U.S. Marine Cadastre' is centered at the top, with a NOAA logo and 'About Project' link on the right. Below the title is a navigation bar with 'Legend', 'Find', 'Results', 'Print', 'Help', and 'Info' tabs. A toolbar with icons for zooming, panning, and other map functions is located below the navigation bar. On the left side, there is a 'LAYERS' panel with a tree view showing categories like 'Jurisdictional Boundaries and Limits', 'Federal Georegulations', 'Navigation and Marine Infrastructure', 'Proposed Energy Projects', 'Geology and Seafloor Data', 'Marine Habitat and Biodiversity', and 'Base Maps'. Below the layers list are buttons for 'Refresh Map', 'Auto Refresh' (checked), and 'Data Download'. A 'Toggle All Symbology' section follows, with a 'Help:' section providing a legend for layer symbols. The main map area shows a map of the United States and surrounding regions, including Canada, Mexico, and the Caribbean Sea. A red outline highlights the U.S. marine cadastre area. A scale bar at the bottom right indicates 0 to 211 miles. At the bottom of the page, there is a 'Privacy policy' link, 'Questions or Comments Contact Us' link, and 'Updated on July 20, 2009'. Logos for 'FGDC MARINE BOUNDARY WORKING GROUP', 'NOAA', and 'MMS' are also present.



Multipurpose Marine Cadastre Data Themes



- *Marine Cadastre*
- *Georegulations*
- *Marine Navigation & Infrastructure*
- *Geology and Seafloor **
- *Marine Habitat and Biodiversity **
- *Human Uses **
- *Base Maps*

•* Denotes significant gaps in data



Partners and Providers

- **Current Partnerships**
- Minerals Management Service (lead)
- NOAA Coastal Services Center (technical lead)
- NOAA Office of Coast Survey
- NOAA National Marine Sanctuaries
- NOAA Marine Protected Areas
- NOAA Fisheries
- Federal Energy Regulatory Commission
- U.S. Fish and Wildlife Service
- National Park Service
- The Nature Conservancy
- California Coastal Conservancy
- **Potential Partnership Opportunities**
- Department of Defense (DoD)
- Coast Guard
- Massachusetts Coastal Zone Mgmt.
- Rhode Island CRMC
- Department of Energy
- South Carolina OCRM
- Northeast Regional Ocean Council
- Other States



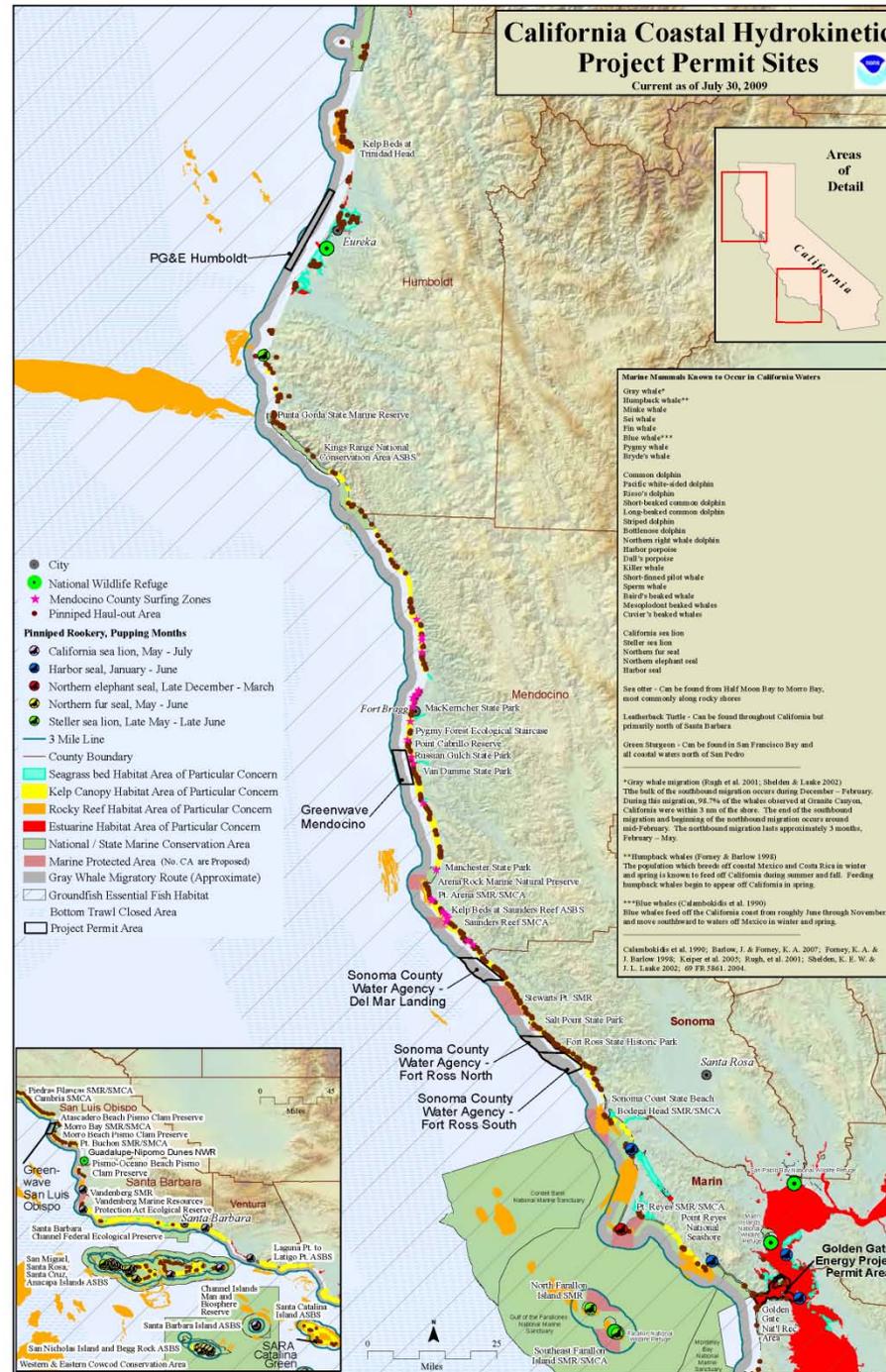
Why is the Multipurpose Marine Cadastre Important?

- Improves coordination and decision making
- Venue to resolve and modernize boundaries
- Venue for new data
- Relevant to all ocean planning issues
- Reduces data costs for states



California Coastal Hydrokinetic Project Permit Sites

Current as of July 30, 2009



Marine Mammals Known to Occur in California Waters

Gray whale
Humpback whale**
Minke whale
Sea whale
Fin whale
Blue whale***
Pygmy whale
Bryde's whale

Common dolphin
Pacific white-sided dolphin
Bianco's dolphin
Short beaked common dolphin
Long beaked common dolphin
Striped dolphin
Bottlenose dolphin
Northern right whale dolphin
Hawaiian monk seal
Dall's porpoise
Killer whale
Short finned pilot whale
Sperm whale
Hain's beaked whale
Mesoplodon beaked whales
Cuvier's beaked whales

California sea lion
Steller sea lion
Northern fur seal
Northern elephant seal
Harbor seal

Sea otter - Can be found from Half Moon Bay to Morro Bay, most commonly along rocky shores

Leatherback Turtle - Can be found throughout California but primarily north of Santa Barbara

Green Sturgeon - Can be found in San Francisco Bay and all coastal waters north of San Pedro

*Gray whale migration (Rugh et al. 2001; Sheldon & Luske 2002)
The bulk of the southbound migration occurs during December - February. During this migration, 98.7% of the whales observed at Granite Canyon, California were within 3 km of the shore. The end of the southbound migration and beginning of the northbound migration occurs around mid-February. The northbound migration lasts approximately 3 months, February - May.

**Humpback whales (Forney & Barlow 1993)
The population which breeds off coastal Mexico and Costa Rica in winter and spring is known to feed off California during summer and fall. Feeding humpback whales begin to appear off California in spring.

***Blue whales (Calmakidis et al. 1990)
Blue whales feed off the California coast from roughly June through November, and move southward to winter off Mexico in winter and spring.

Calmakidis et al. 1990; Barlow, J. & Forney, K. A. 2007; Forney, K. A. & J. Barlow 1998; Koop et al. 2005; Rugh, et al. 2001; Sheldon, E. E. W. & J. L. Luske 2002, 07/18/2001, 2004

- City
 - National Wildlife Refuge
 - ★ Mendocino County Surfing Zones
 - Pinniped Haul-out Area
- Pinniped Kookery, Popping Months**
- California sea lion, May - July
 - Harbor seal, January - June
 - Northern elephant seal, Late December - March
 - Northern fur seal, May - June
 - Steller sea lion, Late May - Late June
- 3 Mile Line
 - County Boundary
 - Seagrass bed Habitat Area of Particular Concern
 - Kelp Canopy Habitat Area of Particular Concern
 - Rocky Reef Habitat Area of Particular Concern
 - Estuarine Habitat Area of Particular Concern
 - National / State Marine Conservation Area
 - Marine Protected Area (No CA are Proposed)
 - Gray Whale Migratory Route (Approximate)
 - Groundfish Essential Fish Habitat
 - Bottom Trawl Closed Area
 - Project Permit Area

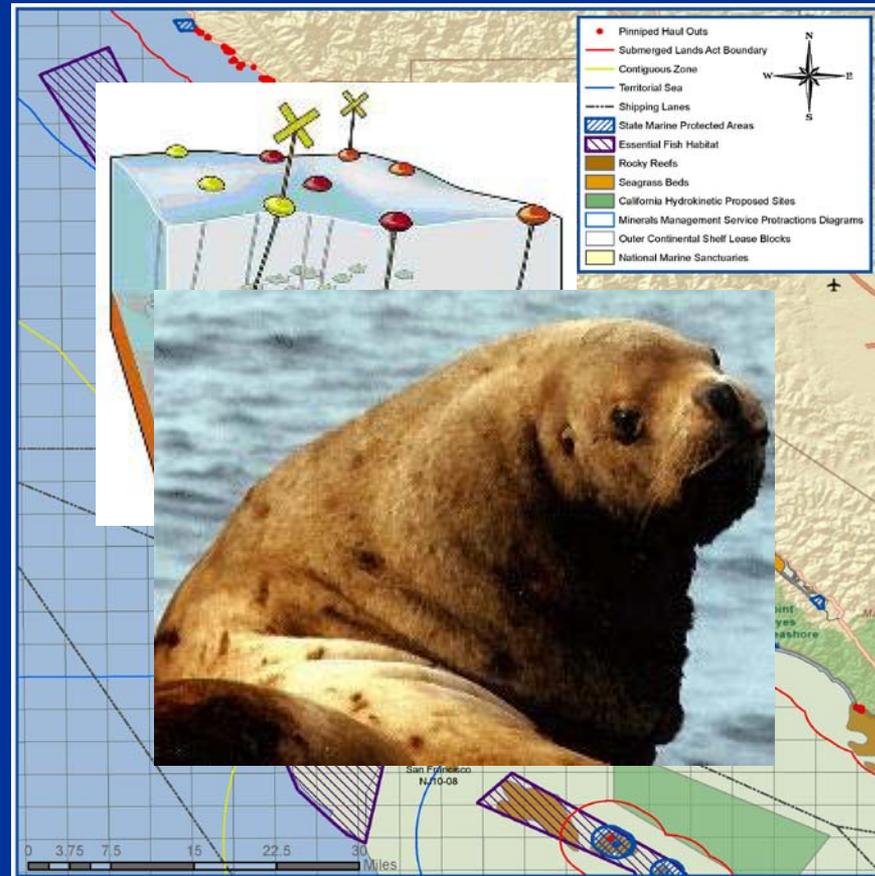


Case Studies

Partner: NOAA NMFS Habitat Conservation Division

Issues: Map hydrokinetic projects and critical habitat data; system to support permit review

Status: Ongoing; figuring out best way to collaborate



Legend Find Results Print Help Info

Zoom In         

LAYERS

- All Layers
- Jurisdictional Boundaries and Limits
- Federal Georegulations
- Navigation and Marine Infrastructure
- Proposed Energy Projects
- Geology and Seafloor Data
- Marine Habitat and Biodiversity
- Base Maps

Refresh Map

Auto Refresh

Data Download

Toggle All Symbology

Help:

-  A closed group, click to open.
-  An open group, click to close.
-  A hidden group/layer, click to make visible.
-  A visible group/layer, click to hide.
-  A visible layer, but not at this scale.
-  A partially visible group, click to make visible.
-  An inactive layer, click to make active.
-  The active layer.
-  Additional information about this layer is available.



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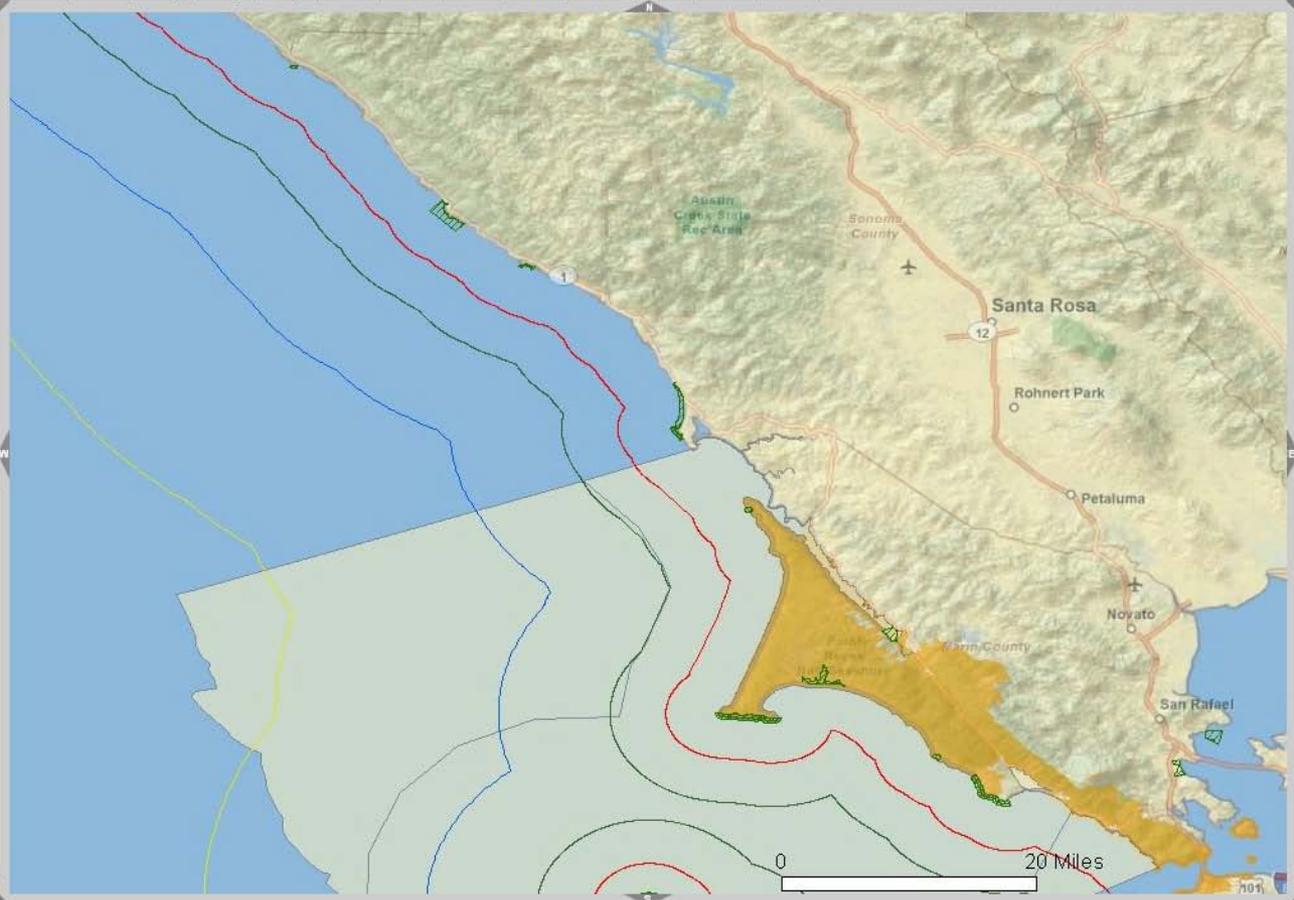
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Legend Find Results Print Help Info



- LAYERS**
- All Layers
 - Jurisdictional Boundaries and Limits
 - Submerged Lands Act Bound
 - Limit of '8(g) Zone'
 - Contiguous Zone
 - Territorial Sea
 - Exclusive Economic Zone
 - Marine Protected Areas
 - Federal
 - Local
 - State
 - Territorial
 - Federal Fishery Management
 - National Estuarine Research I
 - National Marine Sanctuaries
 - Coastal National Forests
 - Coastal National Park Service
 - Coastal Indian Lands
 - Coastal National Wildlife Refu
 - Minerals Management Service
 - Outer Continental Shelf Leas
 - Minerals Management Service
 - Hawaii Three Nautical Mile Lit
 - Unofficial Limit of '8(g) Zone'



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Legend Find Results Print Help Info

Map navigation toolbar including zoom in, zoom out, pan, and other navigation tools.

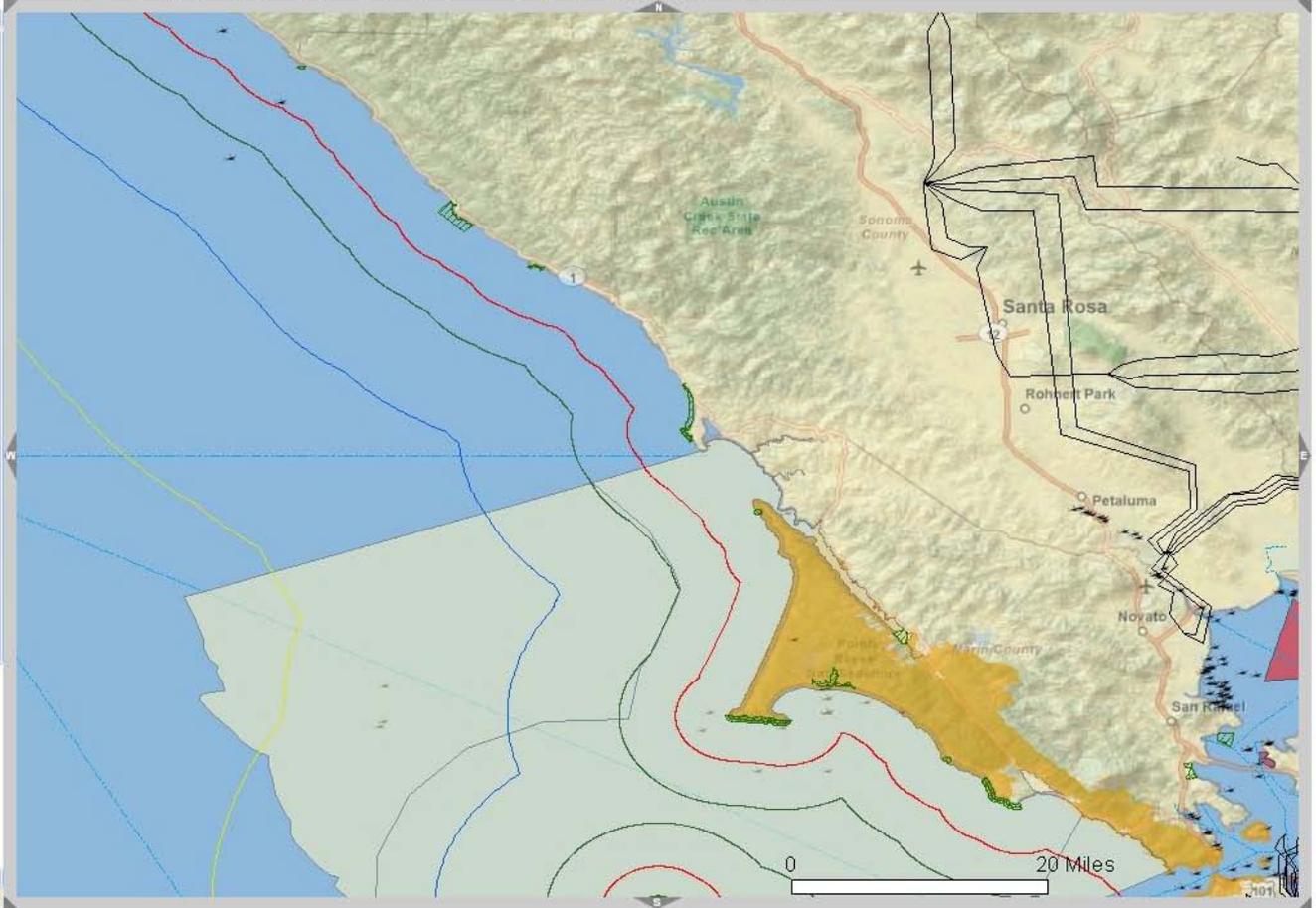
LAYERS

- All Layers
- Jurisdictional Boundaries and Limits
- Federal Georegulations
- Navigation and Marine Infrastructure
 - Deep Stratigraphic Wells
 - Wells
 - Liquefied Natural Gas Sites
 - Drilling Platforms
 - Transmission Lines
 - Ports
 - Shipping Lanes
 - Pipelines
 - Fairways
- Minerals Management Service
- Wrecks and Obstructions
- Military Danger Zones
- Proposed Energy Projects
- Geology and Seafloor Data
- Marine Habitat and Biodiversity
- Base Maps

Refresh Map

Auto Refresh

Data Download



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- Geology and Seafloor Data
- Marine Habitat and Biodiversity
 - Pinniped Haul Outs (California)
 - Rookeries (California)
 - Essential Fish Habitat Points
 - Kelp Canopy (California)
 - Essential Fish Habitat (California)
 - Gray Whale Migration (California)
 - Rocky Reefs (California)
 - Seagrass Beds (California)
- Base Maps

Refresh Map

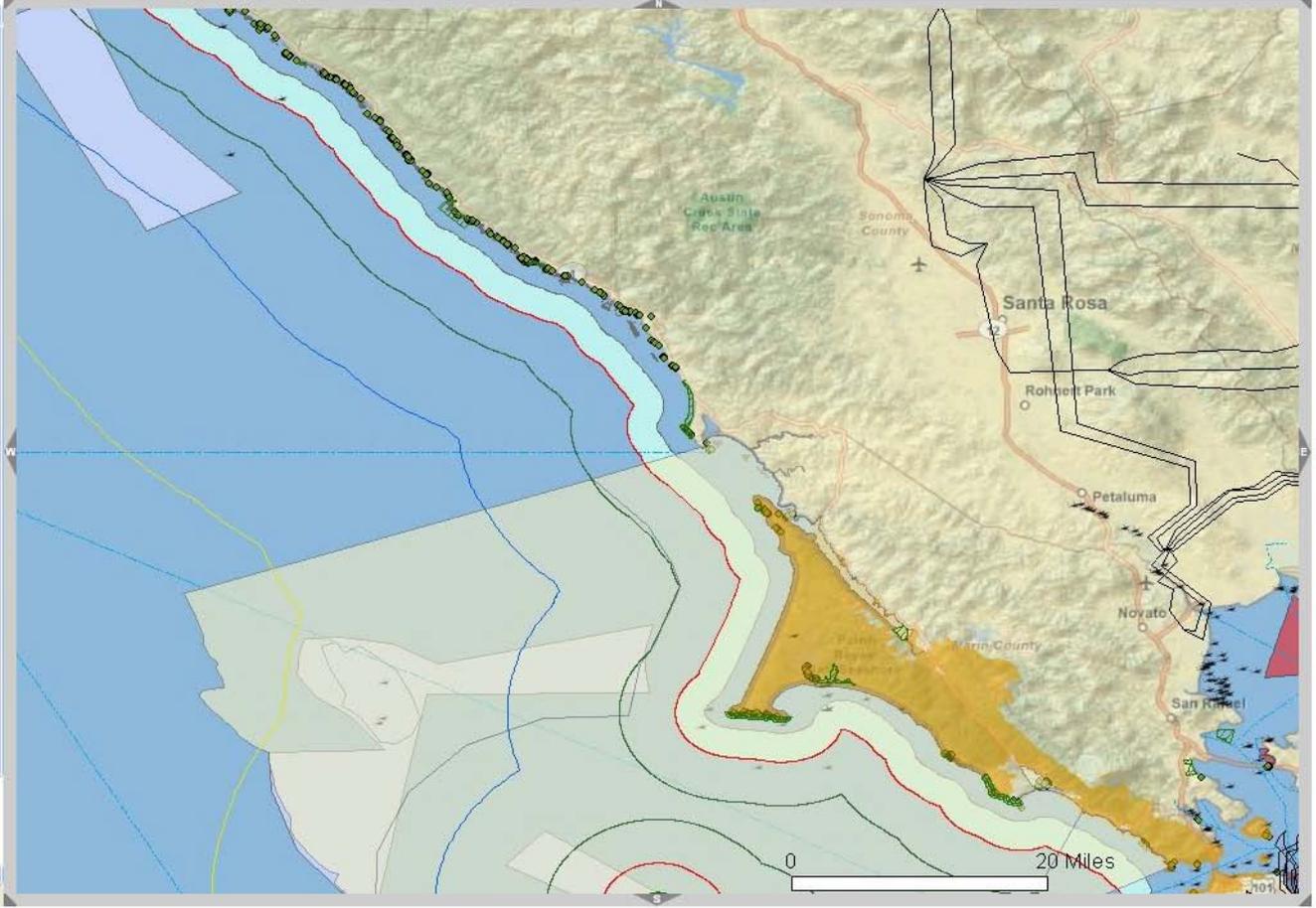
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Legend Find Results Print Help Info

Zoom In [Map Navigation Icons]

- LAYERS**
- All Layers
 - Jurisdictional Boundaries and Limits
 - Federal Georegulations
 - Navigation and Marine Infrastructure
 - Proposed Energy Projects
 - FERC Proposed Hydrokinetic Sites
 - Alternative Energy Nominated C...
 - Geology and Seafloor Data
 - Marine Habitat and Biodiversity
 - Base Maps

Refresh Map

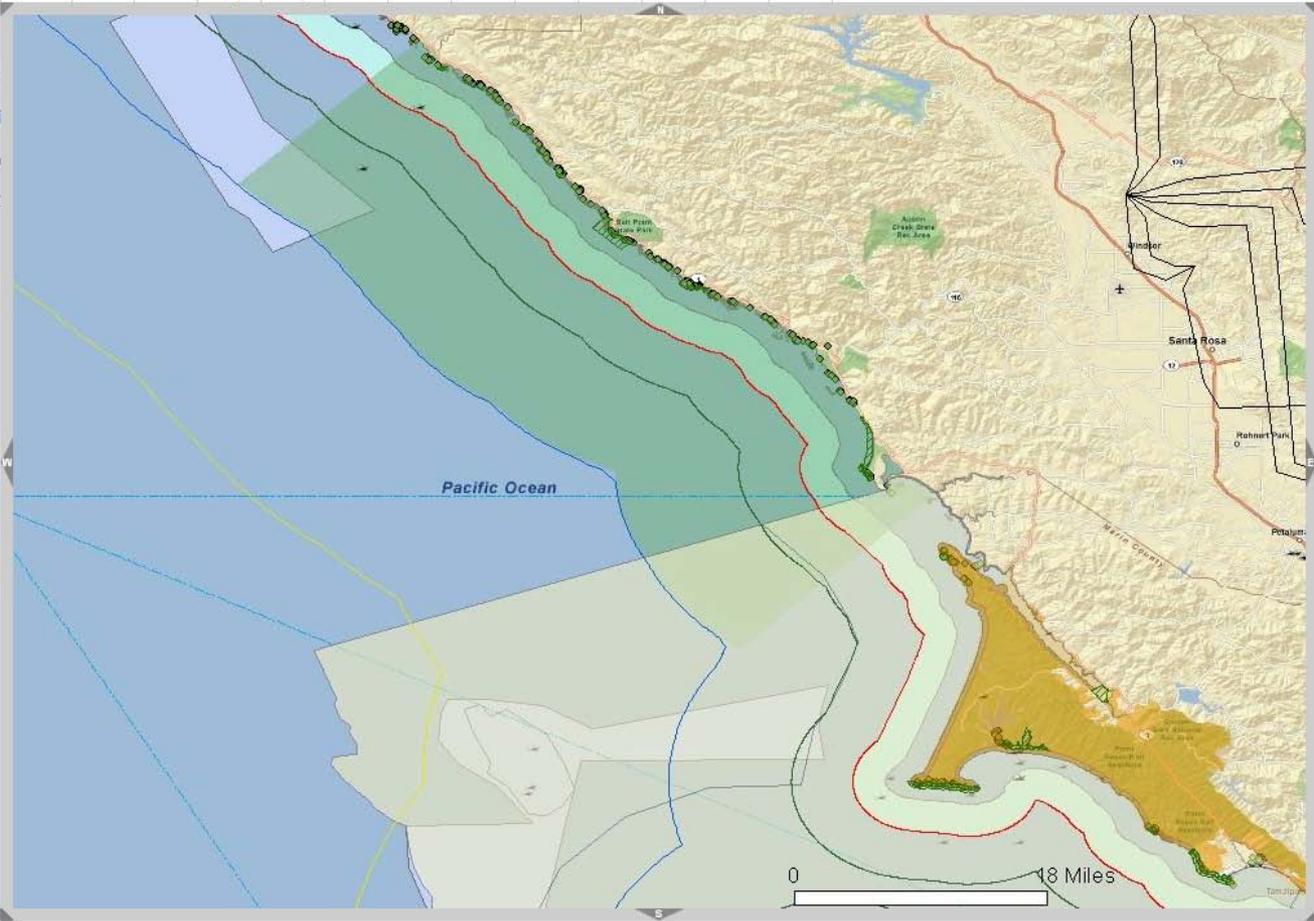
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MARINE BOUNDARY WORKING GROUP



Summary

- Increases in ocean use vs change in management approach
- MSP is a platform for EBM implementation
- MMC supporting efficient permit review
- MMC gaining momentum via case studies and partnerships
- Partnering to increase data access
- Distributed data vision



Contacts

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- David White, NOAA Fisheries – Dave.K.White@noaa.gov
- Christine Taylor, MMS – Christine.Taylor@mms.gov

Web access points:

- www.csc.noaa.gov/digitalcoast/tools/mmc/
- www.mms.gov/offshore/mapping/

