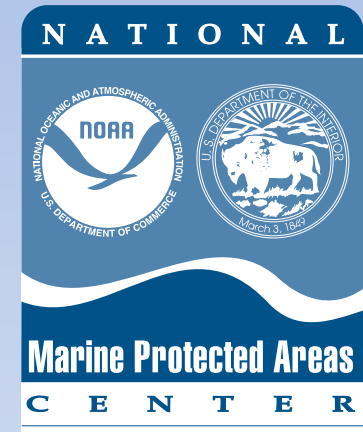


# Ocean Uses Atlas:

## Informing Comprehensive Coastal and Marine Spatial Planning

### NOAA National Marine Protected Areas Center

Charles Wahle  
Mimi D'lorio  
Nicholas Hayden  
Jordan Gass  
Cheryl Butner



### Marine Conservation Biology Institute

Lance Morgan  
John Guinotte  
Fan Tsao  
Larissa Sano

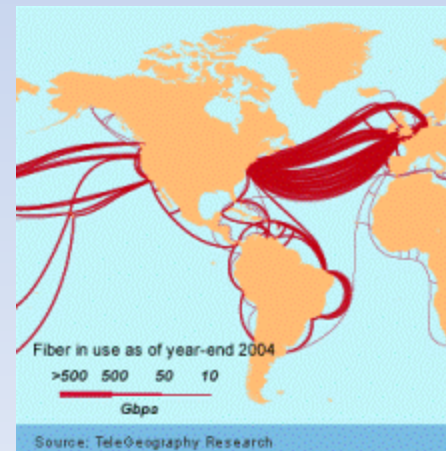
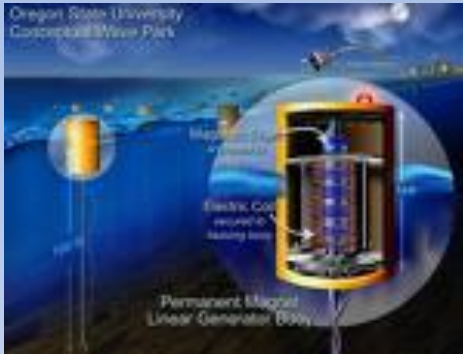


ONMS MSP Science Symposium  
Nov. 16, 2009

# Oceans Are Becoming Crowded Places: *Fishing Uses*



# Oceans Are Becoming Crowded Places: *Industrial and Military Uses*



# Oceans Are Becoming Crowded Places: *Non-Consumptive Uses*

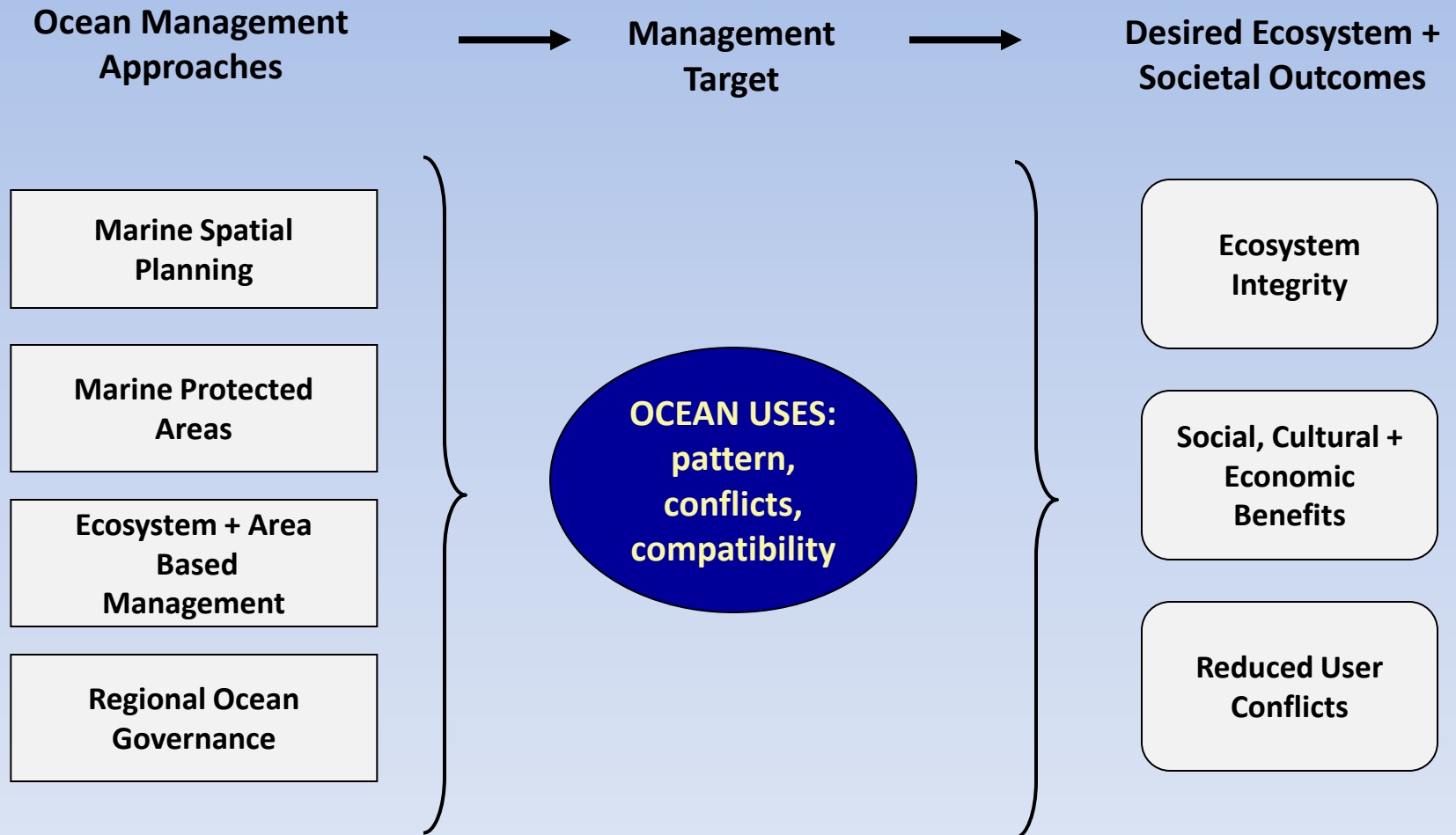


# Emerging Uses

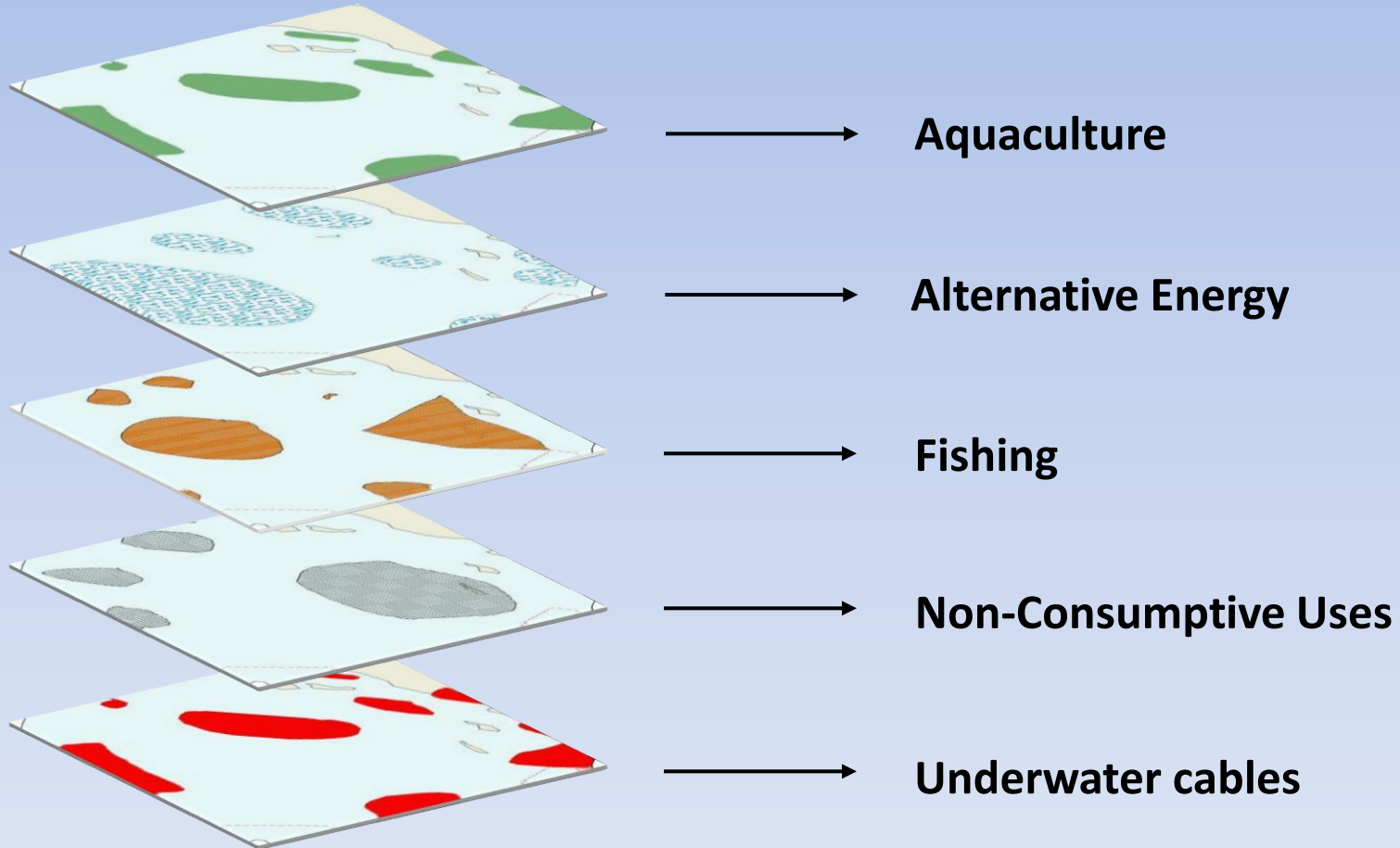
## *Spreading Out from Florida Keys NMS*



# CMSP is Comprehensive and Requires Planning for All Ocean Uses



# The Missing Puzzle Piece of CMSP: Comprehensive, Continuous and Consistent Spatial Data on Current and Planned Ocean Uses



# Filling the CMSP Knowledge Gap: The California Ocean Uses Atlas

- **Purpose** – to enhance California’s ocean management and CMSP by filling key data gap on the full range of human uses
- **Approach** – participatory GIS mapping of 30 ocean uses in 3 sectors by regional ocean experts
- **Partners** –
  - NOAA Marine Protected Areas Center
  - Marine Conservation Biology Institute
  - *Gordon and Betty Moore Foundation*
  - *Resources Legacy Fund Foundation*
- **Status** – All regions mapped; data being packaged for distribution
- **Timeline** – Jan 2008 – Nov 2009





# 30 Significant Human Uses Mapped by the CA Ocean Uses Atlas Project

## Industrial and Military (8)

Offshore oil and gas  
Offshore alternative energy  
Mining + mineral extraction  
Underwater cables  
Maritime shipping  
Cruise ships  
Military operations  
Aquaculture

## Fishing (12)

Recreational pelagic fishing from boats  
Recreational benthic fishing from boats  
Recreational fishing from shore  
Recreational dive fishing  
Kayak fishing  
Commercial pelagic fishing  
Commercial fishing w/ benthic fixed gear  
Commercial fishing w/ benthic mobile gear  
Commercial dive fishing  
Hunting  
Commercial algae harvesting  
Shore-based recreational harvest

## Non-Consumptive (10)

Swimming  
Surface water sports  
Paddling  
SCUBA and snorkeling  
Motorized boating  
Sailing  
Tide pooling  
Beach use  
Wildlife viewing from charter boats  
Tribal spiritual/cultural places

# Workshop Design and Technology

## Process

Participants in **3-4 balanced groups based on expertise**

Groups are paired with a **facilitator and GIS specialist**

Provided **orientation to technology, basemap**



## Software

ESRI ArcGIS 9.2

ESRI ArcSketch 1.2 Extension

## Hardware

E-Beam Electronic Whiteboard

Symposium Digital Tablet

## Data

Basemap – bathymetry, cities, coastal access points, underwater features, kelp, shipwrecks, etc.



# Post-workshop Steps

## **GIS Processing**

- Systematic edits of raw workshop files
- Data normalization
- Boundary Issues

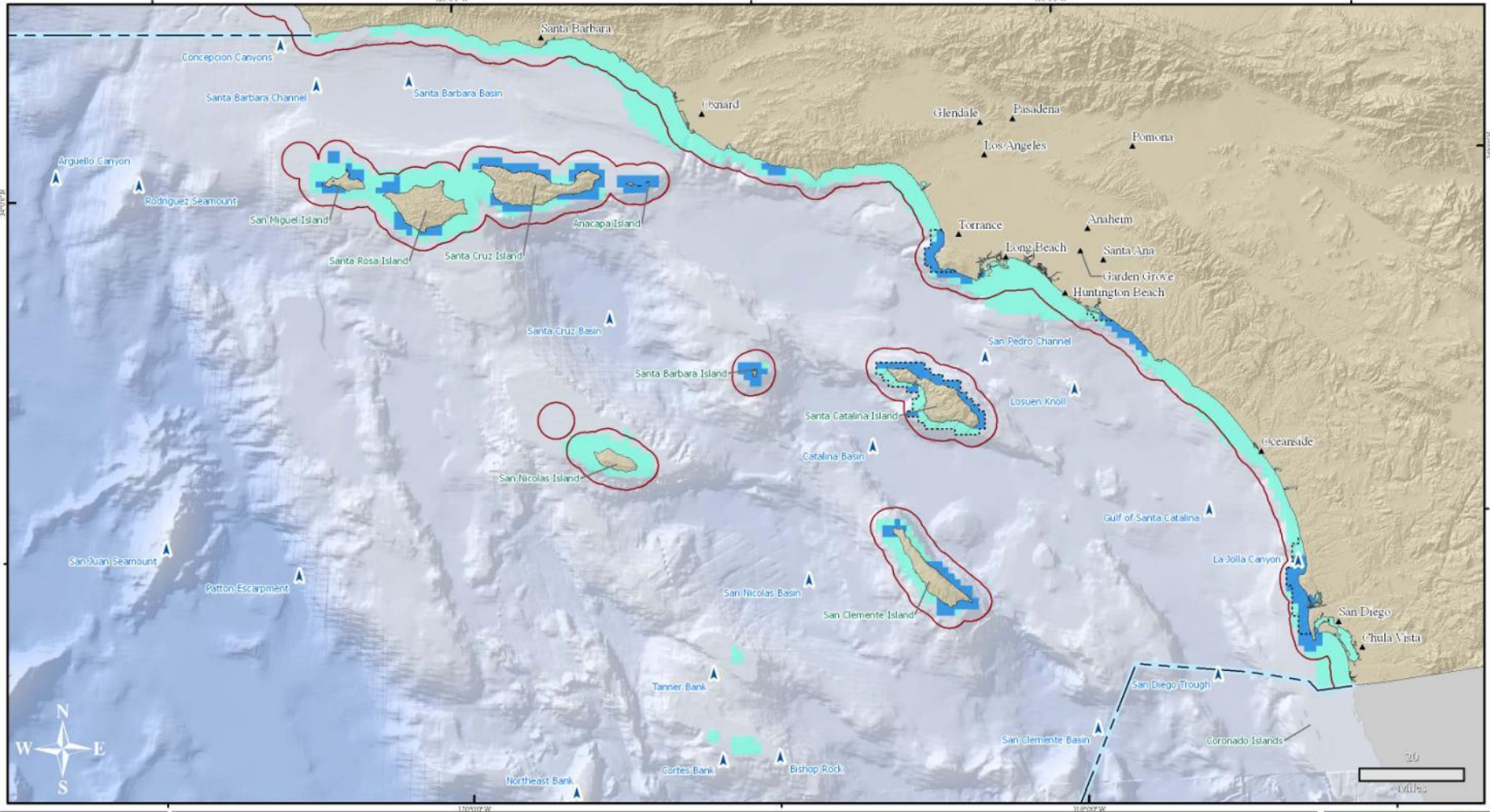
## **Distributed Products**

- Individual Use and Sector maps for each region of California
- Geodatabase for end-user analysis and cartography
- Analytical maps of potential applied uses of data
- Interactive web tool for public visualization

## **Next Steps**

- Best Available Data to QC where applicable
- Repeat (or update) to assess changes in use patterns

# Sample Product: Single Use, SoCal Region



- ▲ Major Cities
- ▲ Submerged Features
- State Waters
- Atlas Southern California Region
- Workshop Collected Data**
- Dominant Use Area
- Use Footprint
- Future Use Area

All workshop collected data gathered in a participatory GIS setting with regional expert input. Visit <http://mapsc.org> for project methodology, GIS data, map products, and metadata.



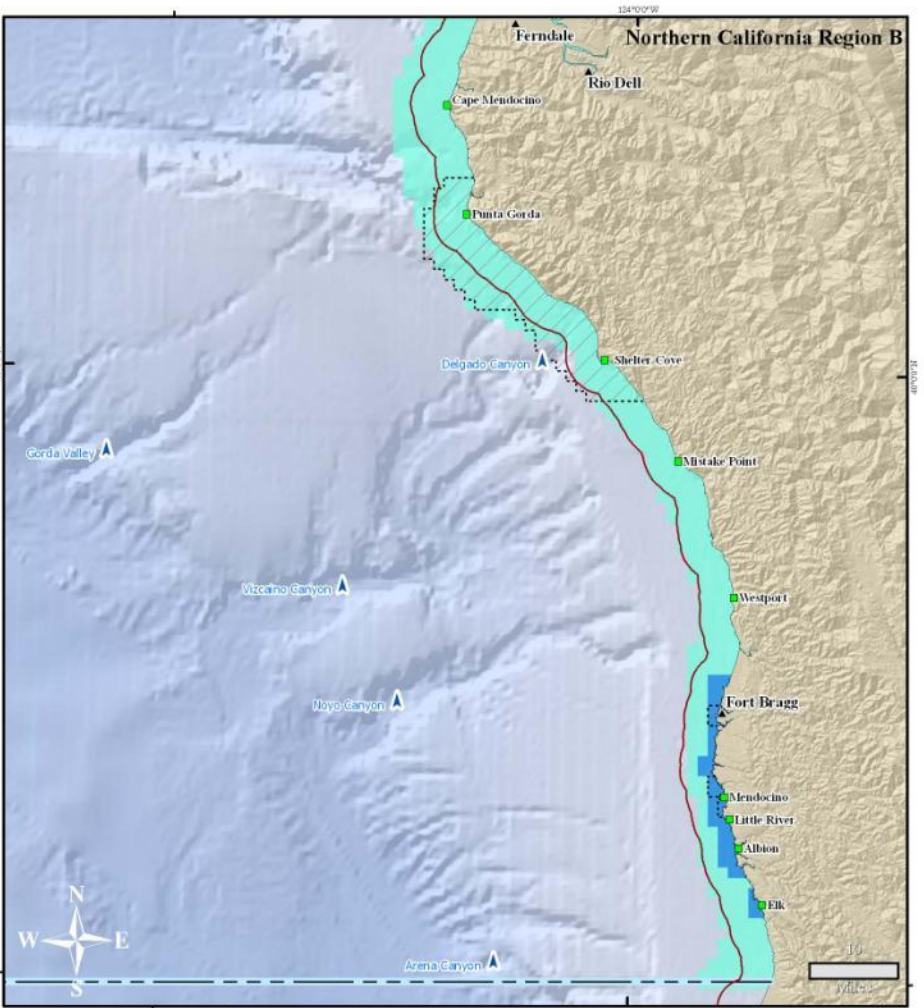
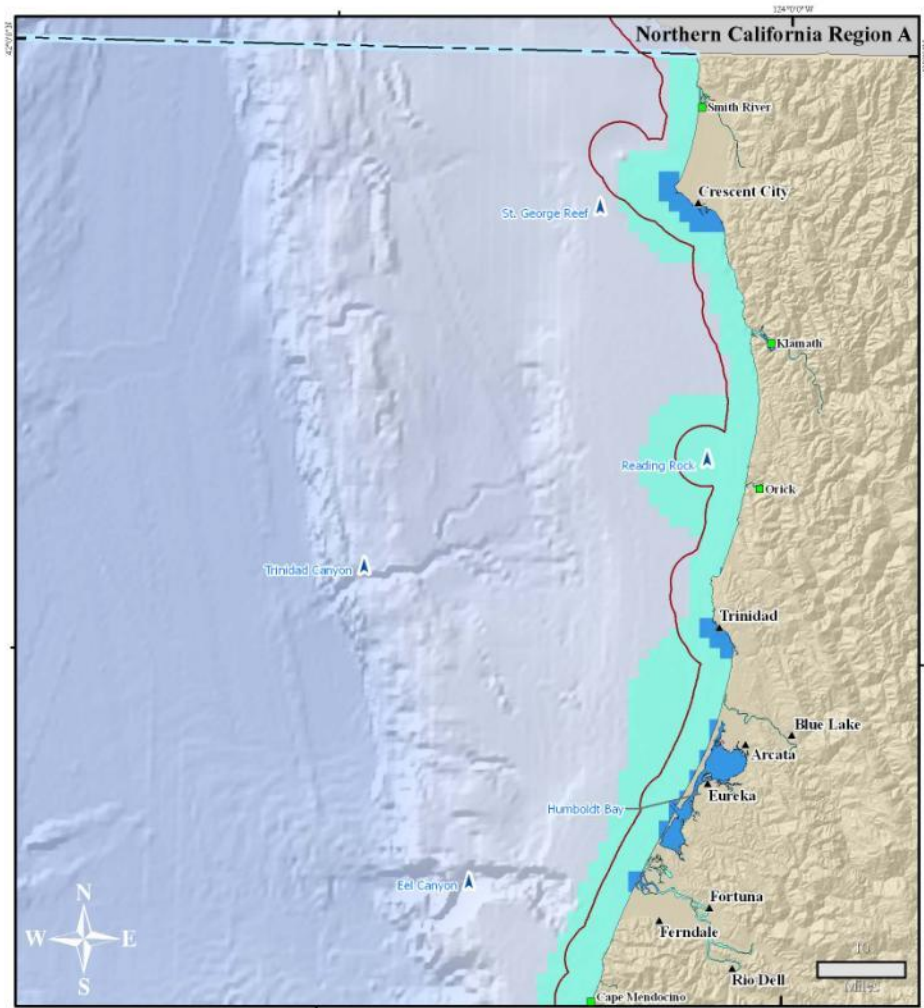
## Ocean Uses Atlas: Southern California Region SCUBA / Snorkeling



Draft mapping product for the California Ocean Uses Atlas Project. With funding provided by The Gordon and Betty Moore Foundation, The Resources Legacy Fund Foundation and NOAA's National MPA Center.



# Sample Product: Single Use, Zoomed In




- Other Landmarks
- ▲ Cities
- ▲ Submerged Features
- State Waters
- Atlas Northern California Region
- Workshop Collected Data**
- Dominant Use Area
- Use Footprint
- Future Use Area

All workshop collected data gathered in a participatory GIS setting with regional expert input. Visit <http://maps.gov> for project methodology, GIS data, map products, and metadata.



**Ocean Uses Atlas: Northern California Region**  
**Paddling**

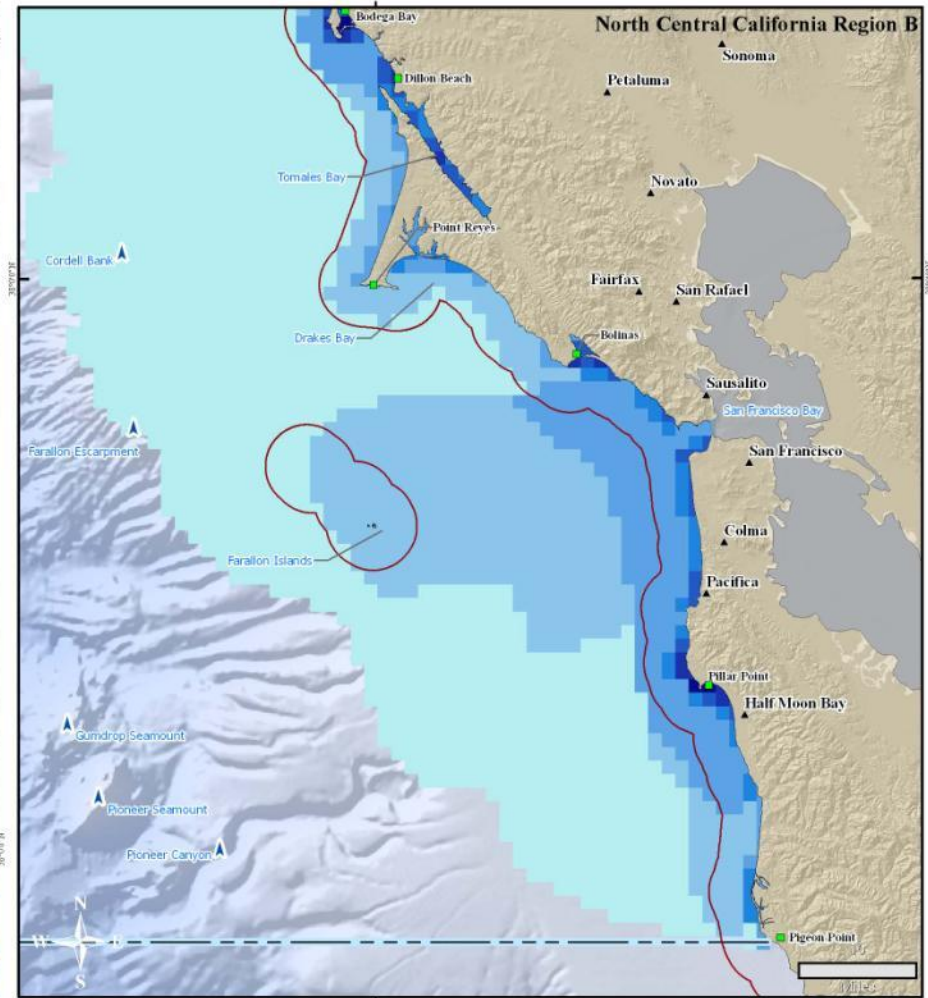
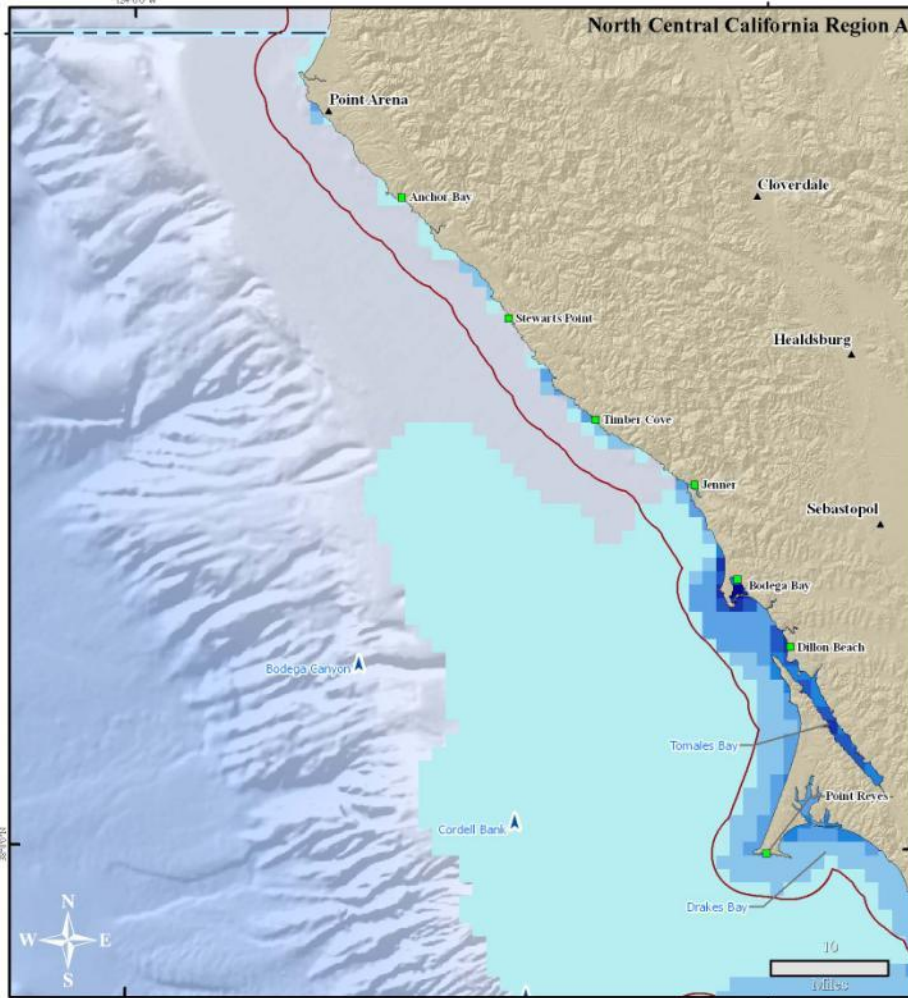
October 2009



Draft mapping product for the California Ocean Uses Atlas Project. With funding provided by The Gordon and Betty Moore Foundation, The Resources Legacy Fund Foundation and NOAA's National MPA Center.



# Sample Product: Aggregated Sector, Zoomed In



- Other Landmarks
  - ▲ Cities
  - ▲ Submerged Features
  - State Waters
  - Atlas North Central California Region
  - Dominant Use Areas - Non-consumptive**
- 

All workshop collected data gathered in a participatory GIS setting with regional expert input. Visit <http://mus.gov> for project methodology, GIS data, map products, and metadata.



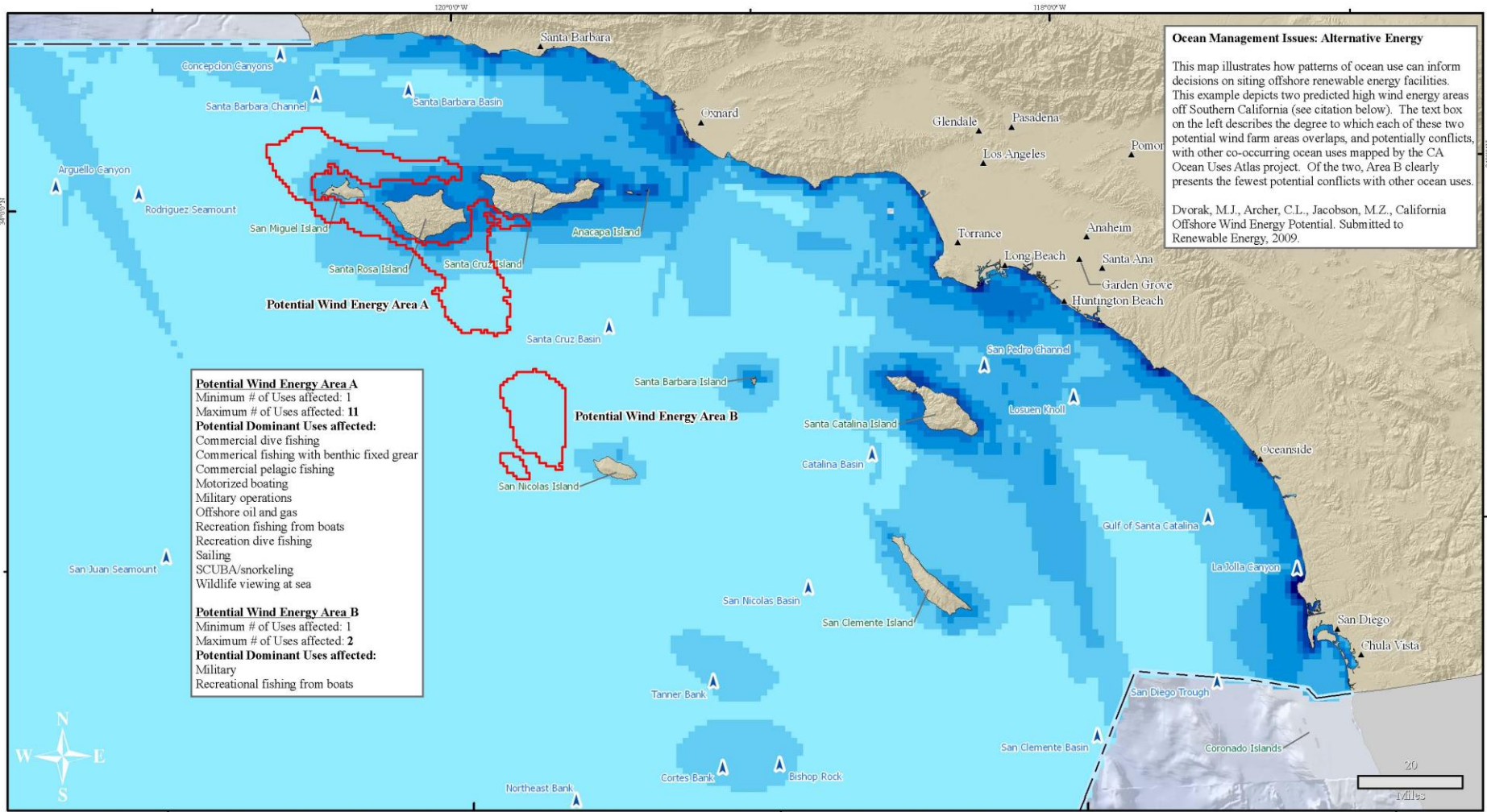
## Ocean Uses Atlas: North Central California Region Dominant Use Areas: Non-Consumptive Sector



Drift mapping product for the California Ocean Uses Atlas Project. With funding provided by The Gordon and Betty Moore Foundation, The Resources Legacy Fund Foundation and NOAA's National MPA Center.



# Sample Product: Alternative Energy Siting



**Ocean Management Issues: Alternative Energy**

This map illustrates how patterns of ocean use can inform decisions on siting offshore renewable energy facilities. This example depicts two predicted high wind energy areas off Southern California (see citation below). The text box on the left describes the degree to which each of these two potential wind farm areas overlaps, and potentially conflicts, with other co-occurring ocean uses mapped by the CA Ocean Uses Atlas project. Of the two, Area B clearly presents the fewest potential conflicts with other ocean uses.

Dvorak, M.J., Archer, C.L., Jacobson, M.Z., California Offshore Wind Energy Potential. Submitted to Renewable Energy, 2009.

**Potential Wind Energy Area A**  
 Minimum # of Uses affected: 1  
 Maximum # of Uses affected: 11  
**Potential Dominant Uses affected:**  
 Commercial dive fishing  
 Commercial fishing with benthic fixed gear  
 Commercial pelagic fishing  
 Motorized boating  
 Military operations  
 Offshore oil and gas  
 Recreation fishing from boats  
 Recreation dive fishing  
 Sailing  
 SCUBA/snorkeling  
 Wildlife viewing at sea

**Potential Wind Energy Area B**  
 Minimum # of Uses affected: 1  
 Maximum # of Uses affected: 2  
**Potential Dominant Uses affected:**  
 Military  
 Recreational fishing from boats

- ▲ Major Cities
- ▲ Submerged Features
- Atlas Southern California Region
- # Overlapping Dominant Uses

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

All workshop collected data gathered in a participatory GIS setting with regional expert input. Visit <http://dmgas.org> for project methodology, GIS data, map products, and metadata.

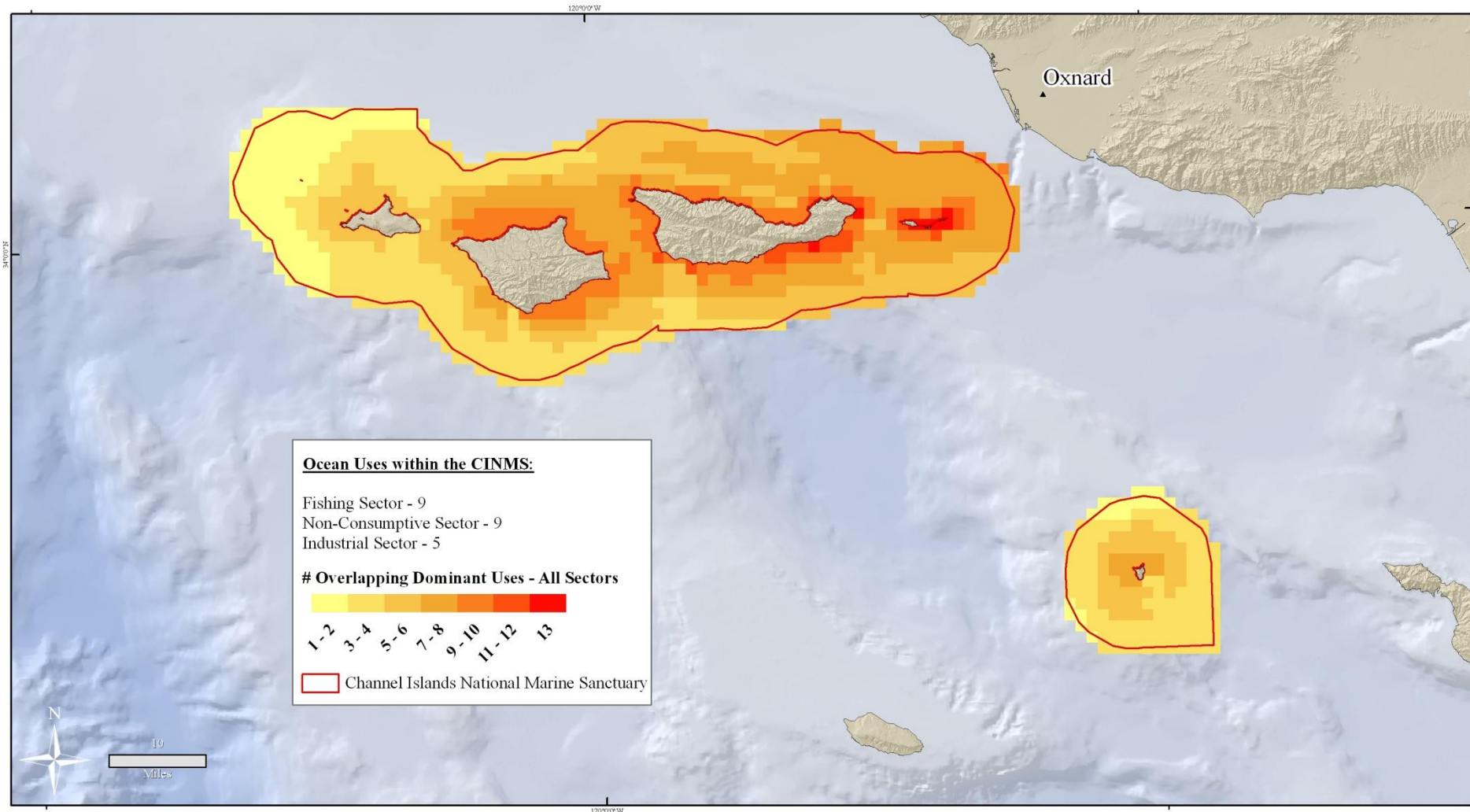
**Ocean Uses Atlas: Southern California Region**  
**Ocean Management Issues: Alt. Energy Siting**

**DRAFT**  
 August 2009

Draft mapping product for the California Ocean Uses Atlas Project. With funding provided by The Gordon and Betty Moore Foundation, The Resources Legacy Fund Foundation and NOAA's National MPA Center.



# Sample Product: Overlapping Uses in Channel Islands NMS





# Nice Maps, But What Are They Good For?

- **CMSP:** ID areas of potential conflict or compatibility among uses (e.g. Rigs to Reefs)
- **MPA Design and Adptv. Mgmnt.:** siting and restrictions addressing key threats tracked over time (e.g. CA MLPA)
- **Offshore Energy / Aquaculture:** Streamline infrastructure by targeting areas with compatible ocean uses (e.g. current project proposals)
- **Emergency Response:** planning for threats to human uses (e.g. NH/So. Maine)
- **Education, Outreach and Research Priorities:** ID key uses and threats and target relevant local user groups and demographics
- **Coastal Economic Development:** ID opportunities for developing coastal economies and infrastructure to support ocean uses
- **Strategic Conservation Targets:** ID important ocean areas that could be conserved w/out major stakeholder impacts

# Lessons Learned

## **Strengths:**

- Workshop setting
  - Explain uses and drawing methods in person
  - Group quality-checks the work of individuals
  - Typically get complete coverage of study area
  - Portability
- Ignore existing data that is of varying quality/currency, often hard to find, not continuous for entire region

## **Challenges:**

- Workshop setting
  - Expensive travel and facility costs
  - Expected attendance not always met
- Some uses are poorly known, might need to rely on existing data

## **Alternative Approach = Web-based mapping tool:**

- Either as a stand alone or to augment workshop data
- Expensive to build, host, manage; need to keep technology current
- Hard to QC incoming data, bias towards computer-savvy individuals

# Contact Information

## NOAA Team

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