

# SUPPORTING OCEAN ENERGY PLANNING WITH MARINECADASTRE.GOV

SILVER SPRING, MD  
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Dan Richards



Christine Taylor, Bureau of Ocean Energy Management

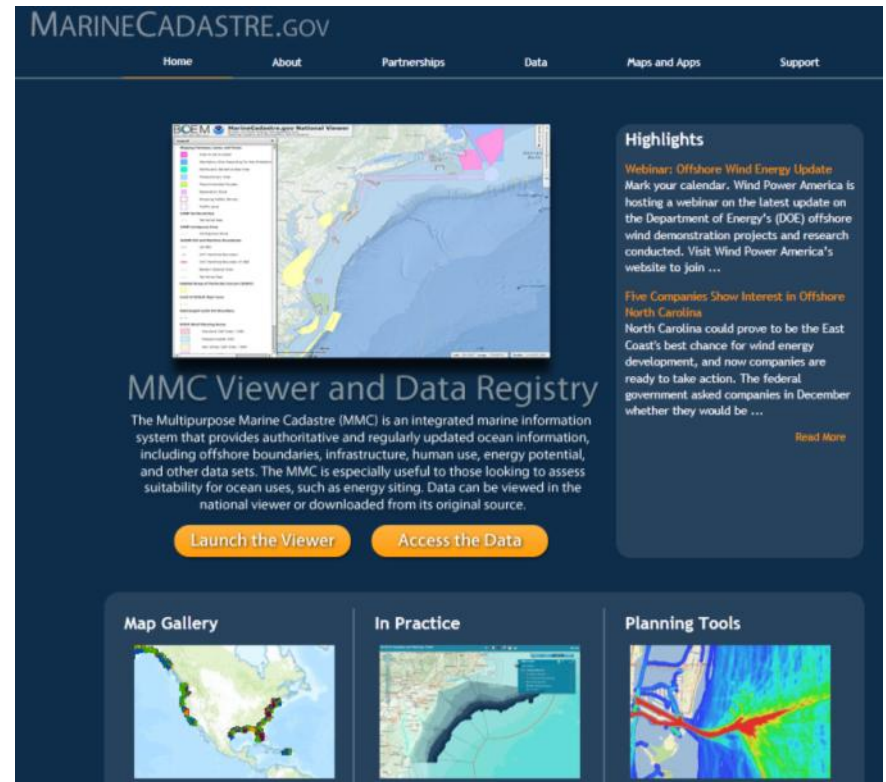
David Stein National Oceanic and Atmospheric Administration (NOAA) Coastal Services Center

# Objectives

- ❑ Introduce MarineCadastre.gov
- ❑ Discuss the core components - data, viewers, tools, support materials
- ❑ Demonstrate how MarineCadastre.gov is being applied
- ❑ Challenges
- ❑ Discuss future plans

# Why MarineCadastre.gov?

- ❑ Created to comply with Section 388 of the Energy Policy Act of 2005
- ❑ Primary focus is supporting offshore renewable energy planning.
- ❑ So much more... authoritative data integrated into marine planning portals, used in ocean advocacy efforts, data used to map ocean disposal areas and understand effects of noise on marine mammals, etc.
- ❑ Co-led by NOAA and BOEM



The screenshot shows the MarineCadastre.gov website. At the top, the navigation bar includes links for Home, About, Partnerships, Data, Maps and Apps, and Support. The main content area features a map of the United States with a legend on the left, titled "BOEM Environmental Data Resource Center". Below the map is the heading "MMC Viewer and Data Registry" and a descriptive paragraph: "The Multipurpose Marine Cadastre (MMC) is an integrated marine information system that provides authoritative and regularly updated ocean information, including offshore boundaries, infrastructure, human use, energy potential, and other data sets. The MMC is especially useful to those looking to assess suitability for ocean uses, such as energy siting. Data can be viewed in the national viewer or downloaded from its original source." Two orange buttons are present: "Launch the Viewer" and "Access the Data". To the right, a "Highlights" section contains two news items: "Webinar: Offshore Wind Energy Update" and "Five Companies Show Interest in Offshore North Carolina". At the bottom, there are three sections: "Map Gallery" with a map of the West Coast, "In Practice" with a map of the Gulf of Mexico, and "Planning Tools" with a map showing energy potential.

# Components

- ❑ Access to authoritative ocean data and analysis tools
- ❑ Interact with data in viewers and specialized maps
- ❑ Learn more from user examples, So What's and technical support materials

158 layers

Layer Name	Data	Earl Service	VMG	Description
12NM Territorial Sea	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	NDA Office of Coast Survey
2009 to 2010 National AIS at 1 Minute Intervals	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	NDA Coastal Services Center
2009 Vessel Traffic (AIS)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Bureau of Ocean Energy Management
2009-2010 Commercial Vessel Density (October - AIS)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	NDA Coastal Services Center
200NM EEZ and Maritime Boundaries	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	NDA Office of Coast Survey

Themes

- Federal Geographies (14)
- Jurisdiction and Boundaries (21)
- Marine Habitat (8)
- Marine Mammals and Turtles (6)
- Ocean Uses and Planning Areas (37)
- Physical and Oceanographic (12)

Provider

- Bureau of Ocean Energy Management (21)
- Department of Defense, U.S. Navy (6)
- DOE Federal Energy Regulatory Commission (8)
- DOE National Renewable Energy Laboratory (2)
- DOE Office of Energy Efficiency and Renewable Energy (2)
- National Geospatial Intelligence Agency (2)
- NDA Coastal Services Center (26)
- NDA National Marine Fisheries Service (1)

BOEM MarineCadastrre.gov National Viewer

Bureau of Ocean Energy Management and National Oceanic and Atmospheric Administration

Layers

- Ocean Imagery Street Gray
- Nautical Charts
- Wind Canoeed Project
- Active Renewable Energy Leases
- DoD Wind Stipulation Areas
- Wave Hydrokinetic Sites
- Tidal Hydrokinetic Sites
- BOEM Oil and Gas Planning Areas
- Active Oil and Gas Leases
- Oil and Natural Gas Wells
- Drilling Platforms
- Deepwater Ports
- OCS Oil and Gas Leasing Program 2012-2017
- Marine Habitat 2 of 8 Layers Visible
  - Critical Habitat Designations
  - Habitat Areas of Particular Concern
  - EPH Areas Protected from Fishing
  - MPA Inventory - MPAs by Fishing Restriction
    - Gray Whale Migration (California, Graphical Representation Only, Not Official)
    - Pinniped Haul Outs (California)
    - Pinniped Rookeries (California)
    - Groundfish Essential Fish Habitat
- Physical and Oceanographic 2 of 11 Layers Visible
  - Marine Mammals and Turtles 0 of 68 Layers Visible

MarineCadastrre.gov

www.marinecadastre.gov

## Tutorial: Using the MarineCadastrre.gov Services in ArcMap (Arc10)

- Navigate to [www.marinecadastre.gov](http://www.marinecadastre.gov). Please note that these instructions differ when using Google Chrome.
- Once on the home page, hover over the **Support** link along the top of the page and select **Technical Support** from the drop-down menu.
- From the support page, click on the **MarineCadastrre.gov REST Services** link.
- To add this service in ArcMap, scroll to the top of the page and click the **View In ArcMap** link.
  - A layer file (.lyr) is created which contains the symbology, and other related parameters used to display this service in ArcMap.
  - Note the location where this file is saved.
- Open ESRI ArcMap Version 10. Please note that previous versions of ArcMap are not compatible with marine cadastre services.
  - If using Chrome as your browser ArcMap may automatically open with this layer file already added in the table of contents.
- Click the **Add Data** button and navigate to the location where this file was saved. Highlight this layer and click **Add**.
- Once this service has been added to the map display, click on the check-box next to the



# Focus on Authoritative / Trusted Data

- ❑ Jurisdictions and Boundaries
- ❑ Ocean Uses
- ❑ Marine Habitat
- ❑ Physical and Oceanographic
- ❑ Marine Mammals and Turtles
- ❑ Basemaps



# National Viewer

Source: NOAA Coastal Services Center

**Description:**

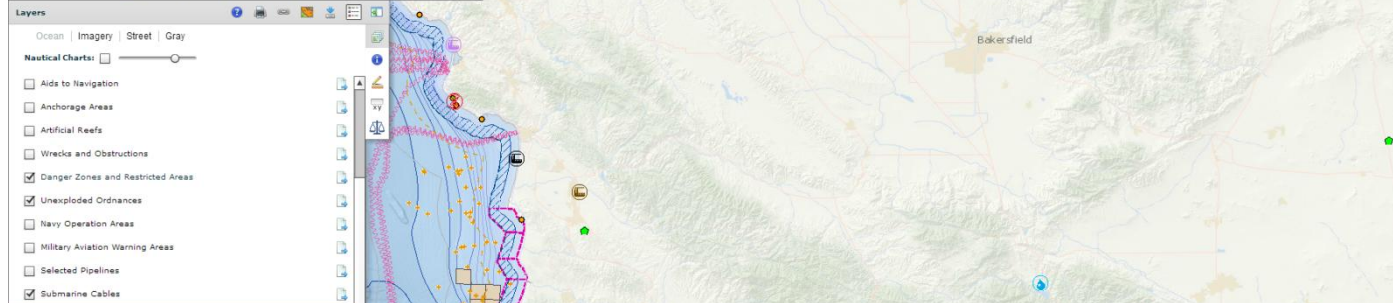
This data product depicts the locations of facilities that generate electricity. Only facilities adjacent to the coast and Great Lakes are identified. Contained within the database are records that define the fuel source and other characteristics of the facility that may benefit ocean planners. In some cases, the presence of a facility may indicate that certain power transmission infrastructure exists nearby. Absence of a facility or lack of sufficient capacity at a facility in a given area may also be an important characteristic in future energy planning activities.

**Geographic Extent:** National

**Visible Scale Range:** 0 to 0  
(Current: 1:1,155,581)

[Web Service](#) | [Metadata](#)

BOEM MarineCadastr.gov National Viewer  
Bureau of Ocean Energy Management and National Oceanic and Atmospheric Administration



BOEM MarineCadastr.gov National Viewer  
Bureau of Ocean Energy Management and National Oceanic and Atmospheric Administration

- Layers**
- Ocean
  - Imagery
  - Street
  - Gray
- Nautical Charts**
- Aids to Navigation
  - Anchorage Areas
  - Artificial Reefs
  - Wrecks and Obstructions
  - Danger Zones and Restricted Areas
  - Unexploded Ordnances
  - Navy Operation Areas
  - Military Aviation Warning Areas
  - Selected Pipelines
  - Submarine Cables
- Legend**
- Shipping Fairways, Lanes, and Zones**
    - Area to be Avoided
    - Mandatory Ship Reporting for the Protection of the Environment
    - Particularly Sensitive Sea Area
    - Precautionary Area
    - Recommended Routes
    - Separation Zone
    - Shipping Safety Fairway
    - Traffic Lane
  - Anchorage Areas**
    - Anchorage Area
  - Danger Zones and Restricted Areas**
    - Danger Zone
    - Unexploded Ordnances
    - Gray Whale Migration (California, Graphical Representation)
  - Ocean Wave Resource Potential**
    - Depths <20m require hi-res models.
    - Depths <50m require hi-res models.
    - 0.0 - 1.6 kW/m
    - 1.7 - 3.2 kW/m
    - 3.3 - 5.0 kW/m
    - 5.1 - 7.3 kW/m
    - 7.4 - 11.1 kW/m
    - 11.2 - 19.4 kW/m
    - 19.5 - 27.0 kW/m
    - 27.1 - 33.7 kW/m
    - 33.8 - 41.1 kW/m
    - 41.2+ kW/m
  - Drilling Platforms**
    - Drilling Platform
  - Oil and Natural Gas Wells**
    - Oil and Natural Gas Well

No Identify Results.  
Please click on map again.

**Identify Tolerance:**  
0  20

**Results:** (Only visible layers returned)

- ▼ Ocean Wave Resource Potential
  - Depths <50m require hi-res models.
- ▶ Bathymetric Contours
- ▼ Danger Zones and Restricted Areas
  - Danger Zone
- ▼ MPAs - nonNMFS
  - San Clemente Island ASBS State Water Quality Protection Area
- ▼ EPA Regions Large Scale (> 1:5,000,000)
  - Region 9

Attribute	Value
Service	Navy
Contact	Commander, Naval Base, San Diego
CFR ID	334.950
Type	Danger Zone
Shape	Polygon
CFR Description	Refer to (33 CFR 334.950)
CFR Title	Pacific Ocean, San Clemente Island, Cal



# Map Gallery

- Map Gallery to showcase specific data or geographic area / region
- Story Maps – help to explain data and needs

The screenshot displays the ArcGIS interface for the BOEM MMC Mapping Tool. The main map shows the Gulf of Mexico coastline with planning areas (Western, Central, Eastern) and various data layers overlaid. The contents panel on the left lists several layers, including BOEM Oil and Gas Layers, Critical Habitat Designations, and various planning areas. The interface includes standard ArcGIS navigation and toolbars.

**Work with Queries**  
**Sample Data Resources**  
MarineCadastrre.gov Data Registry  
NOAA CMSP Data Registry  
Ocean Community  
Northeast Ocean Data Portal

**Contents**

- Map Notes
- BOEM Oil and Gas Layers
- Critical Habitat Designations
- Habitat Areas of Particular Concern (HAPC)
- Marine Protected Areas Inventory
- Western Gulf of Mexico 2012-2017 OCS Oil and Gas Program Area
- Central Gulf of Mexico 2012-2017 OCS Oil and Gas Program Area
- Eastern Gulf of Mexico 2012-2017 OCS Oil and Gas Program Area
- Critical Facilities Points
- DOD Areas to Consider
- BOEM Maritime Boundaries and Leasing Areas
- NOAA - Maritime Limits and Boundaries
- MMC Navigation Layers
  - Aids To Navigation
  - Artificial Reefs

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# Data Access and Analysis Tools

## Site Suitability Prototype and AIS Data Handler

**Choose Task**

- Filter Lease Blocks
- Make Report and Perform Analysis

**Define blocks for Analysis**

- Digitize Polygon
- Select Polygon
- Clear Selection

**Report and Export**

- Create Report
- Export Blocks

**Visibility Analysis**

Analysis Direction:  To Shore  From Shore

Calculate Visibility

Clear Analysis

Wind Turbine Height: 100ft 200ft 300ft 400ft 500ft

**Other Data Of Interest**

- Habitat Areas of Particular Concern: [Hide](#)
- Critical Habitat Areas: [Hide](#)
- Marine Protected Areas: [Show](#)

**Report On Selected Lease Blocks**

Number Selected: 14

**Shallowest Depth**

- Minimum: -75 feet
- Average: -85.43 feet

**Distance From Shore**

- Minimum: 5.45 M
- Maximum: 13.72 M
- Average: 9.71 M

**Distance From Shipping Lanes**

- Minimum: 8.84 M
- Maximum: 18.32 M
- Average: 13.52 M

**NREL Wind Speed Values (At 90 meter hub)**

- Minimum: 8.38 m/s
- Maximum: 8.63 m/s
- Average: 8.52 m/s

**Types of Sediment**

- gravel-sand
- sand

**Habitat Areas of Particular Concern**

No Habitat Areas of Particular Concern found in selected lease blocks

**Marine Protected Areas**

No Marine Protected Areas found in blocks

Unsaved - ArcMap - ArcInfo

File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help 3D Analyst Layer Broadcast\_C1\_S1\_T1\_Demo Editor

Table of Contents

Layers

- Broadcast\_C1\_S1\_T1\_Demo
- Broadcast\_C1\_S1\_T1
- Basemap
- Streets

**AIS Data Handler - Version 1.0**

Clean Query Analyze Filter Aggregate Help About

Area Of Interest: Statistics Density Tracks

Input Features: Layer: Population Field: None

Density Type: PointLine

Output Parameters: Cell Size: 50 Meter

Analysis Spatial Reference: World\_Mercator

Analysis Radius: 200 Meter

Density Units:

Output same as input coordinate system

Output same as analysis coordinate system

Output Suffix: Demo

Calculate

Are there other tool or functionality needs? This is an area for future focus.



# Support and Resources

- ❑ Technical Resources
- ❑ News Updates
- ❑ Context for understanding the data and tools

**So What?**

The "So What?" series explains the importance of various data sets within MarineCadastre.gov, why they should be considered when determining ocean use, and any caveats to the dataset the user needs to know to utilize the dataset successfully.

**Access the Data**  
[Launch the Viewer Data Registry](#)

**Habitat Areas of Particular Concern - 4/3/2013**

There are many ways to protect marine life. No-take and fishing gear restrictions, adding to the endangered or threatened list, and setting aside critical areas where a species is known to live can all help. A Habitat Area of Particular Concern is a designation that encompasses discrete subsets of Essential Fish Habitat, which provide extremely important ecological functions or are especially vulnerable to degradation.

**Zones, Limits, and Maritime Jurisdictions - 2/22/2013**

A boundary seems like a simple concept. Draw a line on a map and there it is. Unfortunately, boundaries are much more complicated. Even more so in the ocean.

**Ocean Wave Resource Potential - 2/5/2013**

Energy from the ocean can be harnessed in many ways and forms. Wind energy, tidal energy, and wave energy are all worthwhile possibilities. MarineCadastre.gov's Ocean Wave Resource Potential dataset shows the predicted mean wave energy density within U.S. waters.

MarineCadastre.gov

*www.marinecadastre.gov*

## Web Services

### Frequently Asked Questions

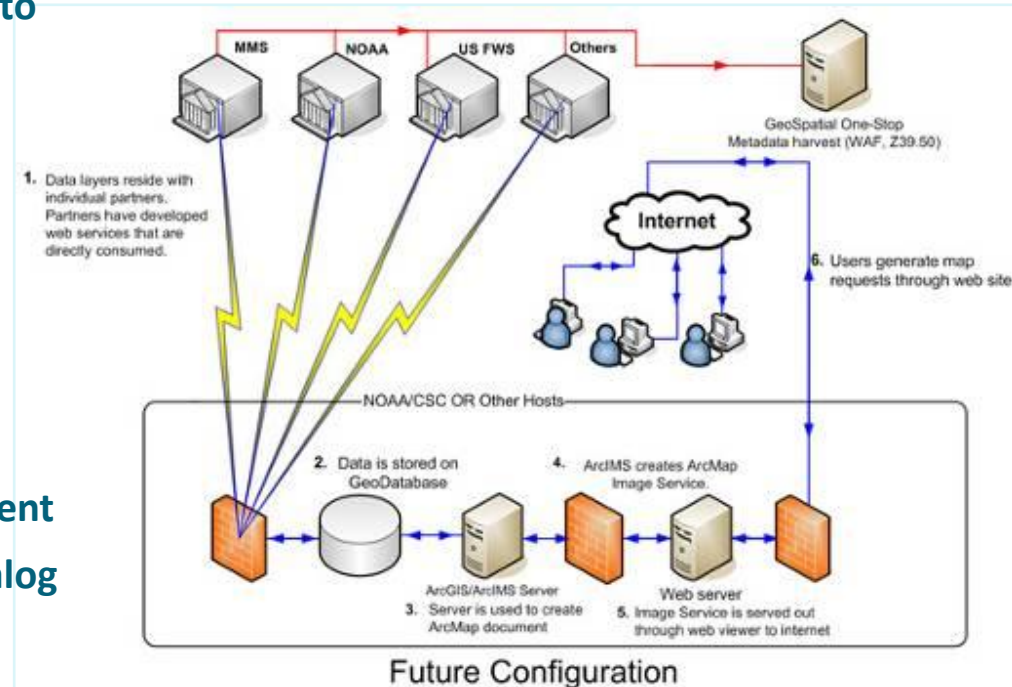
**Q:** Are the MarineCadastre.gov Web map services available for public use?

**A:** Yes. A full list of MarineCadastre.gov Web services is available from the following locations – [www.csc.noaa.gov/ArcGISPUB/rest/services/MultipurposeMarineCadastre/MultipurposeMarineCadastre/MapServer](http://www.csc.noaa.gov/ArcGISPUB/rest/services/MultipurposeMarineCadastre/MultipurposeMarineCadastre/MapServer) and [www.csc.noaa.gov/ArcGISPUB/rest/services/MarineCadastre](http://www.csc.noaa.gov/ArcGISPUB/rest/services/MarineCadastre).

**Q:** What types of Web map services are available through MarineCadastre.gov?

# System Design and Architecture

- ❑ Hybrid system
- ❑ MMC harvests most data on a periodic basis to keep the viewers up to date
- ❑ Consumes 47 external map services from 14 service providers
- ❑ Provides direct access to authoritative data
- ❑ System Details:
  - ❑ ArcGIS Server 10.0
  - ❑ Custom Flex Viewer
  - ❑ SQL relational database for meta- content
  - ❑ Rest-based dynamic Web Services Catalog (Arc Image Services, WMS, KLM)
  - ❑ Tiered Development Infrastructure – Development , QA, and Production



# Current, Accurate and Trusted Data: Critical for Informed Decision Making

## Sample data added in FY13:

- ❑ Artificial Reefs
- ❑ Coastal Energy Facilities
- ❑ Deepwater and Principal Ports
- ❑ Department of Defense Wind Stipulation Areas
- ❑ High-Frequency Radar Locations and Ranges
- ❑ Tidal and Wave Hydrokinetic Sites
- ❑ Unexploded Ordnances
- ❑ Weather Radar Stations and Impact Zones
- ❑ AIS by Aliquots
- ❑ Marine mammal, bird, turtle survey areas
- ❑ Marine mammal, bird, turtle survey, tracklines
- ❑ North Carolina Viewshed Point Locations
- ❑ OCS Block Aliquots
- ❑ OCS Oil and gas leasing program 2012-2017

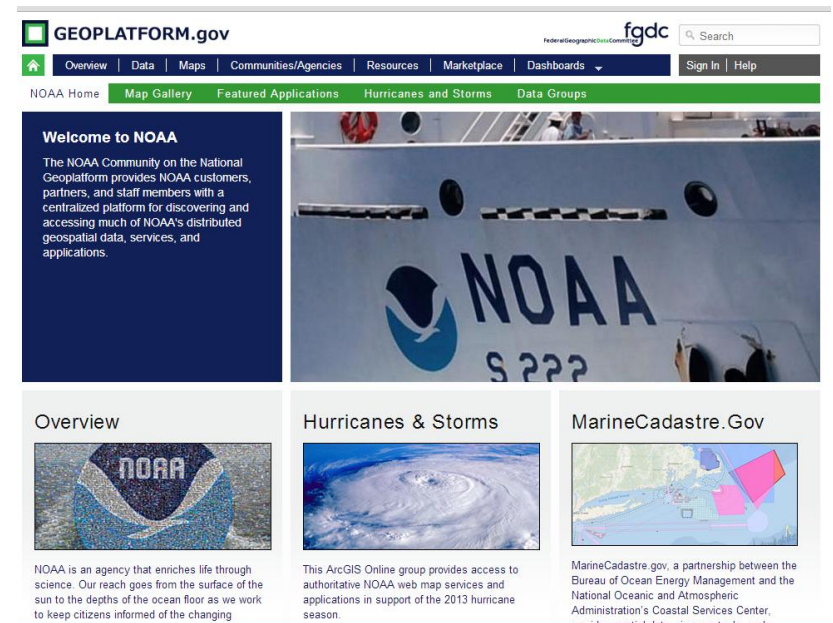


# Integration

- ❑ Strategically aligned with the White House Digital Government Strategy, and a major contributor to the Ocean.Data.gov (NOP/NOC) and the National GeoPlatform.

<http://www.data.gov/ocean/>

- ❑ Focus on strategic data partnering and utilizing a systems design infrastructure that stresses efficient use of data development resources with maximized data reuse and minimized data duplication.



# Sharing Data and Web Services

- ❑ The focus is on partnering with data providers to consume data from the authoritative source when possible, and providing access to our services for ingestion into other portal efforts (Data.gov, Regional Ocean Partnerships).
- ❑ 47 services are ingested into the National Viewer / Map Gallery
  - ❑ 13 services from The Nature Conservancy
  - ❑ 11 services from NOAA CSC
  - ❑ 10 services from University of New Hampshire
  - ❑ 1 service from each of the following agencies: USCG, USFWS, NOAA NGDC, BOEM, NOAA OCS, EPA, USACE
  - ❑ 2 services from each of the following agencies: NMFS, MPA, USGS
- ❑ Can access over 752 total map layers
  - ❑ 294 are CSC hosted and 23 are BOEM hosted; others are from partners.

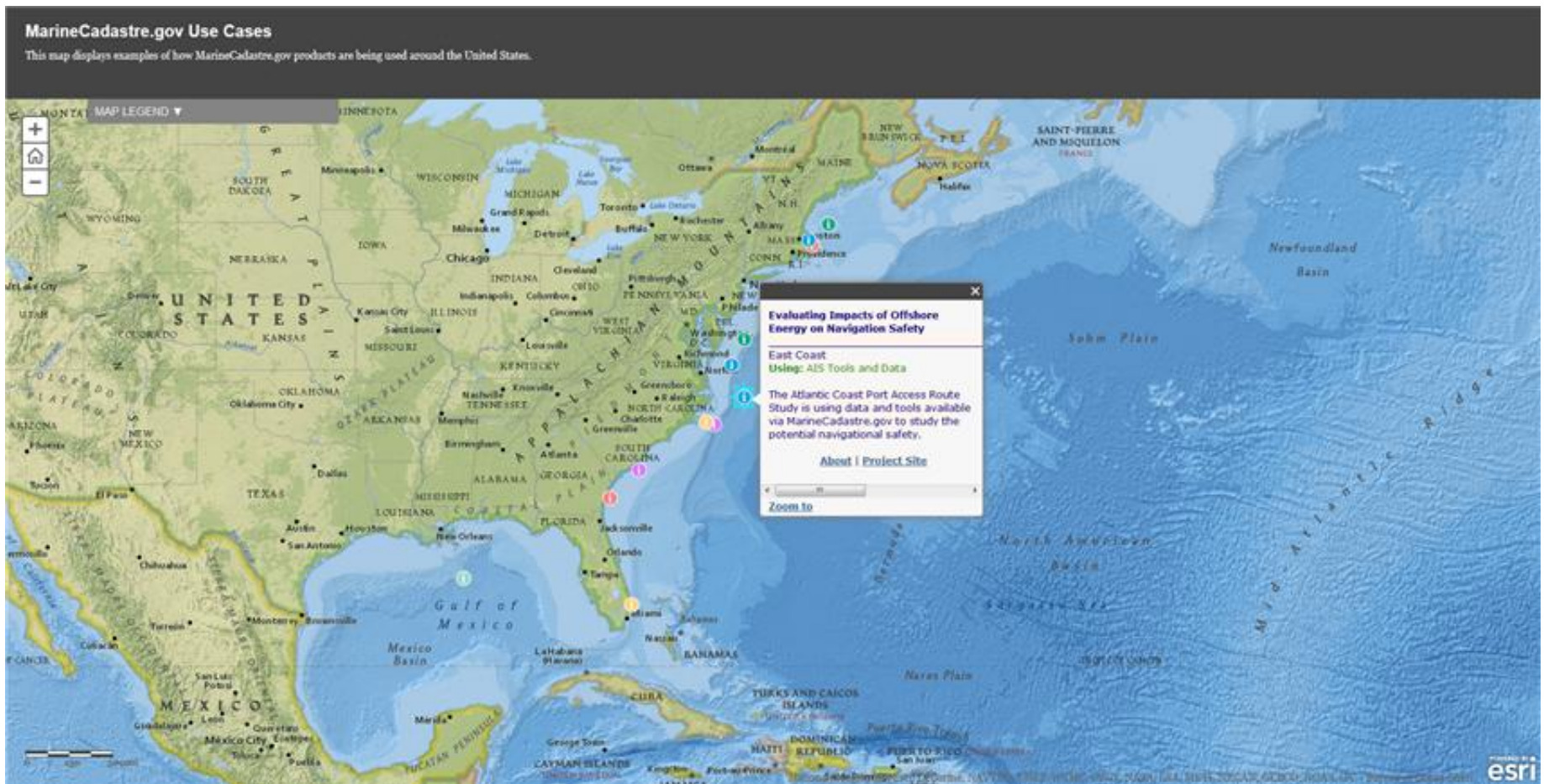
# Active Partnerships

- Bureau of Ocean Energy Management
- NOAA – Fisheries, Ocean Service
- U.S. Fish and Wildlife Service
- U.S. Geological Survey
- National Park Service
- Army Corps of Engineers
- Department of Defense
- U. S. Coast Guard
- Department of Energy
- Regional Ocean Governance Groups
- State of NC, SC, MA
- The Nature Conservancy



# Who is using it and how?

Industry and Consultants; Regional Ocean Partnerships;  
Federal and State Agencies; Academia; NGOs...



# Use by Industry and Consultants

- ❑ Screening Potential Locations for Offshore Wind Energy Projects
- ❑ Providing Access to Information for Environmental Assessments



# Regional Ocean Partnerships

- ❑ Authoritative National level data being integrated into regional portals
- ❑ Many data layers being consumed as web services
- ❑ Collaboration on portal design and data management
- ❑ Sharing lessons learned

## NORTHEAST OCEAN DATA

HOME MAPS » DATA VIEWER DATA » ABOUT » CONTACT NEWS

Search this site...

**INTERACTIVE MAPS**

- AQUACULTURE
- MARITIME COMMERCE
- ENERGY
- PLANKTON
- FISH
- RECREATION
- MARINE MAMMALS & SEA TURTLES
- Coming soon: COMMERCIAL FISHING

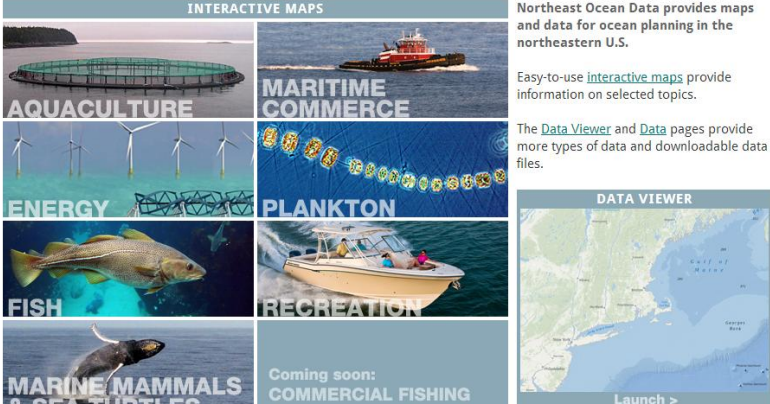
Northeast Ocean Data provides maps and data for ocean planning in the northeastern U.S.

Easy-to-use [interactive maps](#) provide information on selected topics.

The [Data Viewer](#) and [Data](#) pages provide more types of data and downloadable data files.

**DATA VIEWER**

Launch >



The Northeast Ocean Data Working Group is developing an interactive atlas of human and environmental

## NEWS

MARCO

Help Sign In / Register

DATA ACTIVE (4)

- Marine Jurisdictions
- OCS Lease Blocks
- Regional Ocean Partnerships

**Fishing**

- Artificial Reefs
- Commercial Fishing
- Fathom Lines
- Recreational Fishing

**Marine Life**

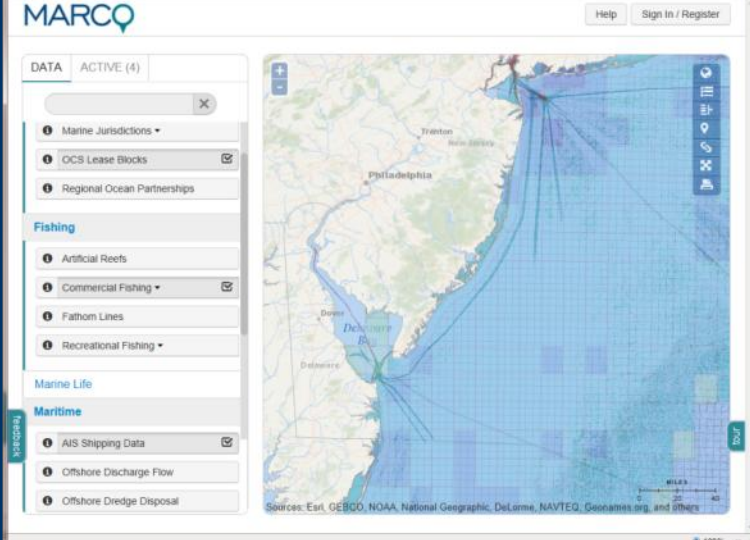
**Maritime**

- AIS Shipping Data
- Offshore Discharge Flow
- Offshore Dredge Disposal

Map showing the Northeast Ocean region with various data layers overlaid.

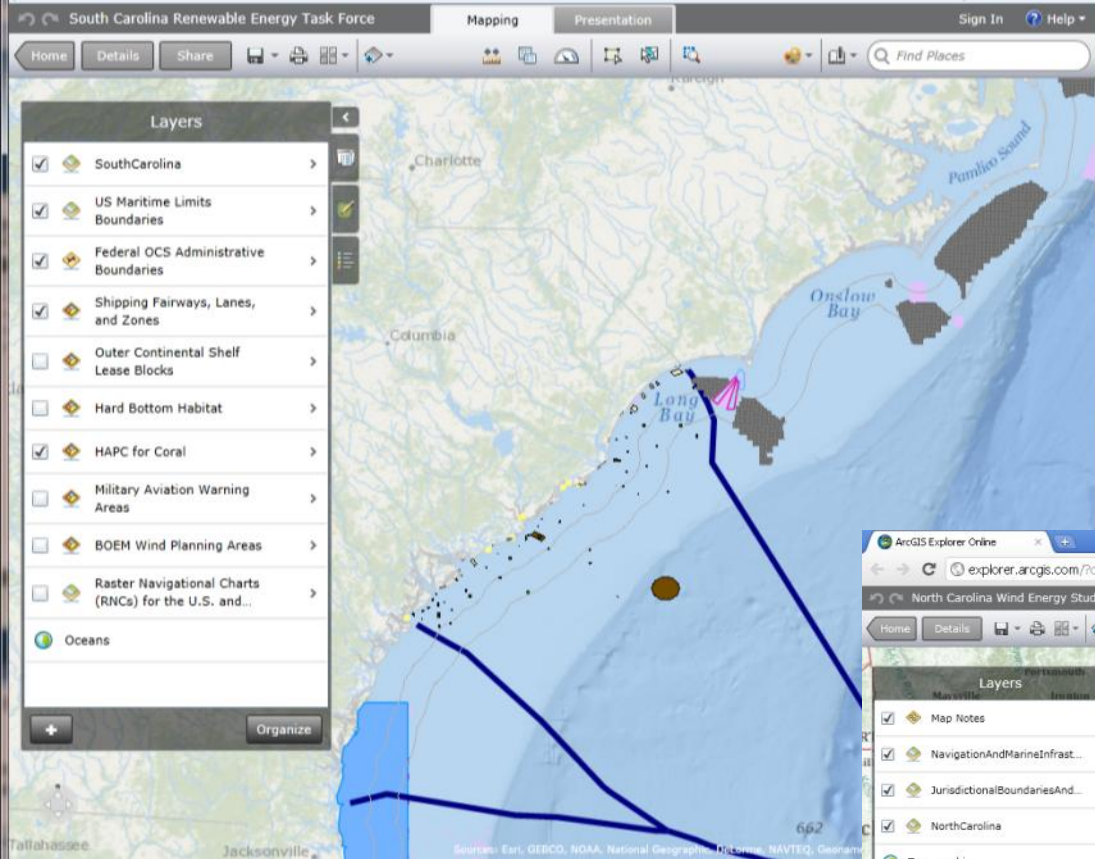
Sources: Esri, GEBCO, NOAA, National Geographic, DeLorme, NAVTEQ, Geonames.org, and others

100%

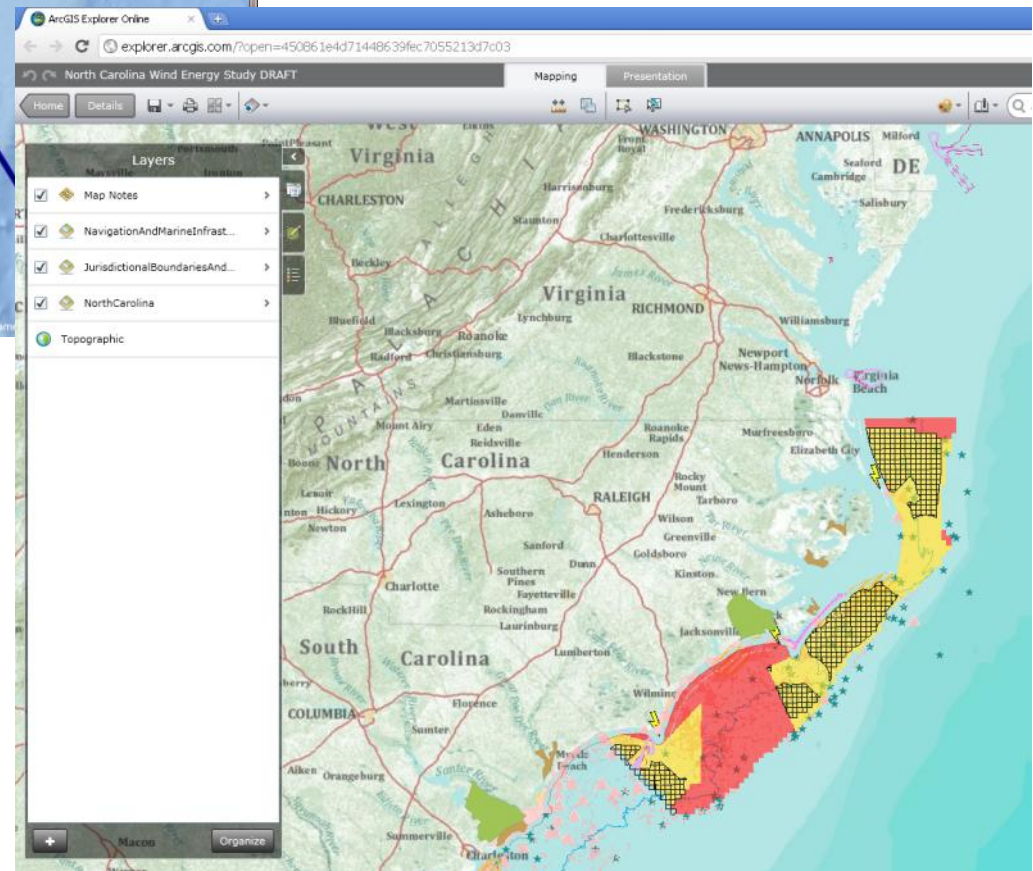


data website  
for regional  
Council





# Example BOEM Uses



# State Renewable Energy Task Forces

# Procuring Map Layers -Challenges

- Determine what is really in demand or needed for our audience
- Find out who is responsible and ask if we can provide it via [MarineCadastre.gov](http://MarineCadastre.gov)
- Try to convince the responsible party to make the data available (WMS service is preferable but not always possible from the source)
- Assign a data liaison
- Determine strategy for data
- Make information and surrounding materials available via the [MarineCadastre.gov](http://MarineCadastre.gov) site (various possibilities)

# Other Challenges

- Inconsistent Budget & Support
- Data is often not available when you really want it.
- Security and unintended use issues
- Unknown use cases
- Multiple data source configurations
- Keeping up with technology
- Everyone wants the system to do exactly what they need
- How to represent everything cartographically together in a single viewer
- Interpreting the data for any possible user



# Near Future

- New Web Design – Mobile Friendly
- New Data Registry – shopping cart to create your own Map
- Atlantic Avian Modeled Data
- Corals Data (Atl & GOM)
- Updated Marine Mammal Modeled Maps (Atl & GOM)
- AIS 2012 Data
- Updated Information for select data sets
- Focus outreach and determining user needs
- Tutorials for best practices in using web services and tools from [MarineCadastre.gov](http://MarineCadastre.gov)

# Preview of New Data Registry Tool

**Data Registry**

The data registry provides direct access to data currently available through [MarineCadastr.gov](http://MarineCadastr.gov). Users of the registry can filter the data by provider, thematic category, and service us.

Sign up to receive email updates on changes to the registry.

**ArcGIS - My Map**

Details | Basemap

Search

Active Filters: **Atlantic**

**2009 Vessel Traffic (AIS)**  
Bureau of Ocean Energy Management  
Derived from 2009 Automatic Identification System (AIS) data, this map represents the number of vessels traveling through the OCS leasing block or 1200 x 1200 meters. data.

**2009-2010 Commercial Vessel Density**  
NOAA Coastal Services Center  
These data was generated to provide insight into vessel activity across the coastal waters of the Continental Shelf. The map shows the unique vessel intersecting a 1 kilometer square grid cell from October 2009 - October 2010.

**2010 Vessel Traffic (AIS)**  
Bureau of Ocean Energy Management  
Derived from 2010 Automatic Identification System (AIS) data, this map represents the number of vessels traveling through the OCS leasing block or 1200 x 1200 meters. Diagrams will contain the aliquot AIS coordinates.

**Active Renewable Energy Leases**  
Bureau of Ocean Energy Management

Commercial Vessel Density October 2009-2010

Commercial Vessel Density
1 - 25
26 - 50
51 - 75
76 - 100
101 - 250
251 - 500
501 - 750
751 - 1500
More than 1500

**FOR MORE INFORMATION**

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