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# Environmental Response Management Application (ERMA) - Web-based GIS Data Display and Management System for Oil Spill Planning and Environmental Response

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# Environmental Response Management Application

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2009 Geotools  
Myrtle Beach, SC  
March 5<sup>th</sup>, 2009



# Outline

- Background and design process
- Discuss of how internet based GIS technology can assist in a environmental response effort
- Highlight capabilities of the Environmental Response Management Application



# Office of Response and Restoration's Continuum of "Response"

Response  
(24 hours)



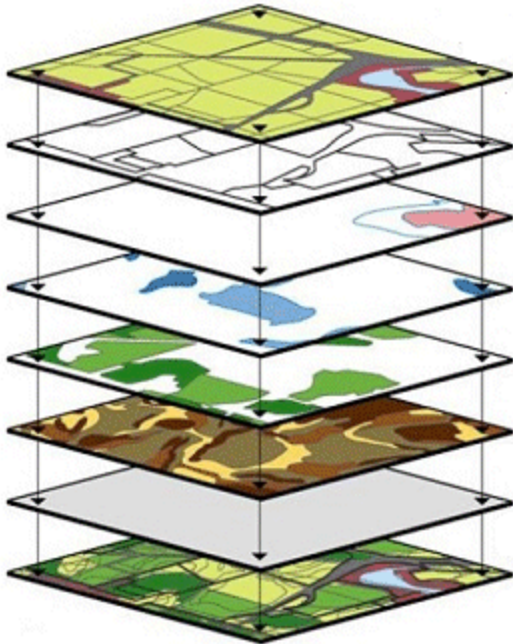
Restoration -  
Recovery  
(Years to  
Decades)

Emergency  
Response Division  
(ERD)

Assessment and  
Restoration Division  
(ARD)



# A Picture is Worth a Thousand Words...



- Diverse datasets can be interlaced on a single map to better visualize a the complex nature of an area



# Functional Web GIS Platform for Response

- Package data in a well-designed management, visualization, and analysis tool:
  - Easily accessible - field and command
  - User friendly
  - Quick to display
  - Capable of real-time data display
  - Simple to update/ download from
  - Secure

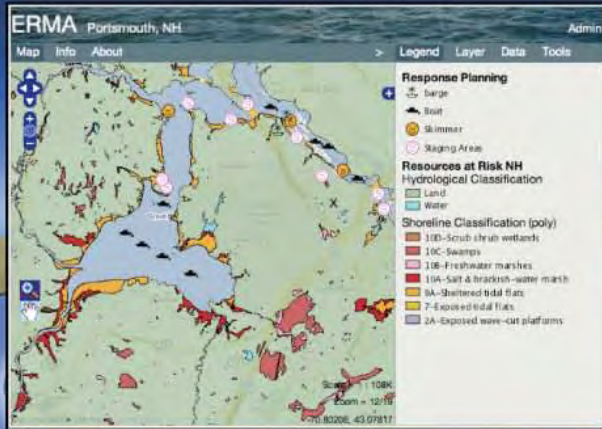


# Concept for ERMA

- Take advantage of open-source, web-based mapping tools
- Integrate and synthesize various types of information (static and real-time)
- Provide fast visualization of current information
- Improve communication and coordination among responders and stakeholders
- Provide integrated and timely information to improve decision-making

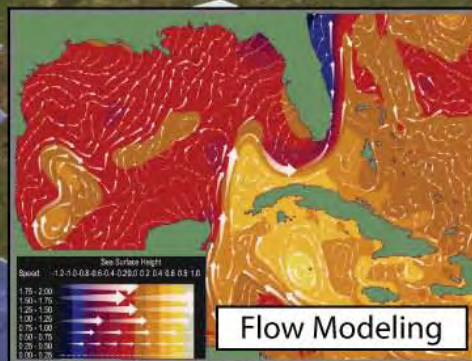


# Environmental Response Management Application (ERMA)



MIT SPURCH  
TC 01/10

Moored Sensors





# Project Partners: Technical Advisers

## NOAA

- Office of Response and Restoration
- Coastal Services Center
- Office Coast Survey
- Weather Service
- Gulf of ME Ocean Observing System

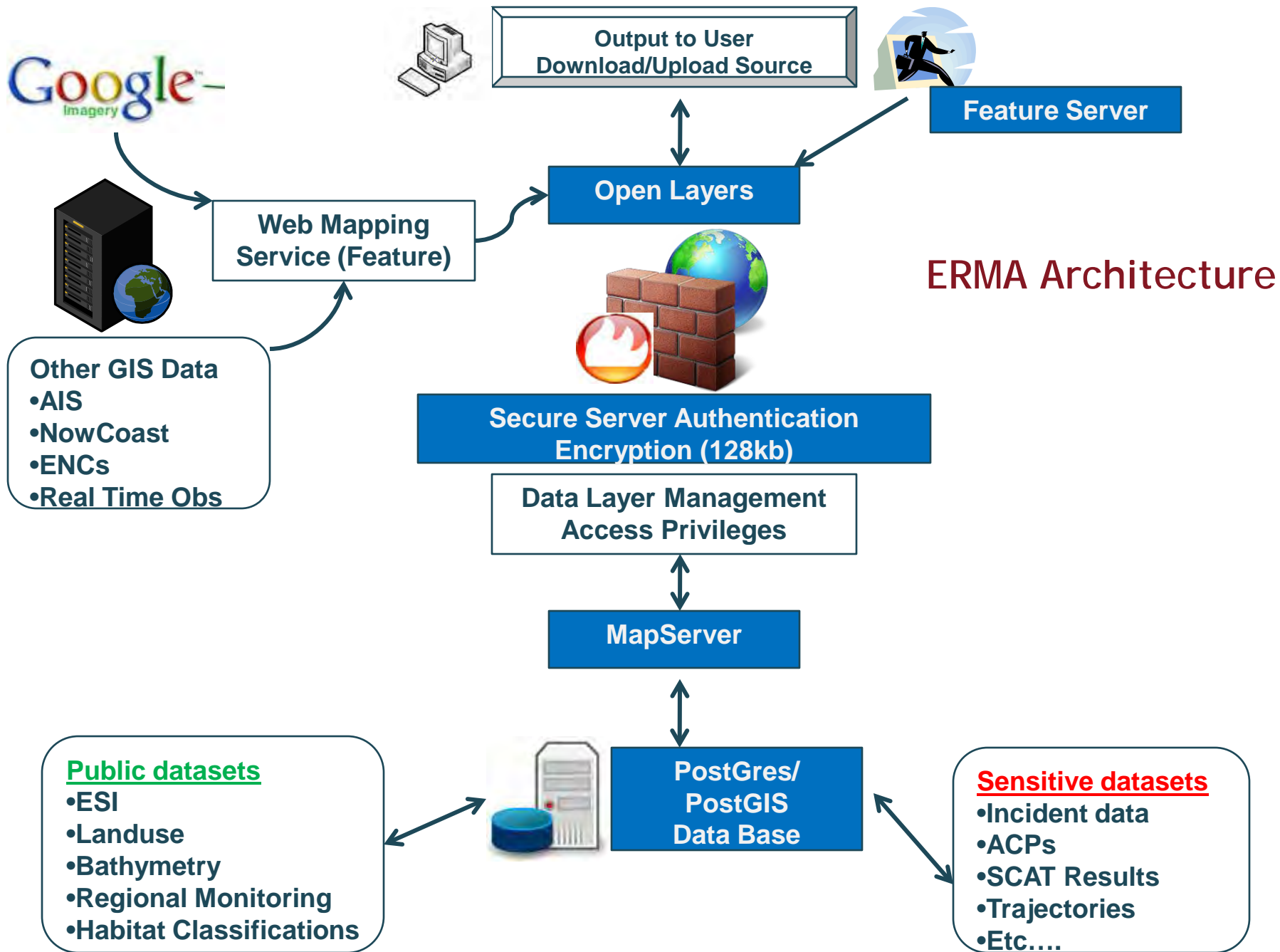
## UNH

- Joint Hydrographic Center
- Joint Center for Ocean Observing Technology
- Cooperative Institute for Coastal and Estuarine Environmental Technology
- Coastal Ocean Observing and Analysis
- Research Computing Center
- Earth Systems Data Collaborative

## Additional Partners

- US Coast Guard
- US EPA
- NH Dept. Environmental Services
- ME Dept. Environmental Protection
- NH Fish and Game
- NH Coastal Manager
- NH Div. Emergency Services
- Piscataqua River Cooperative
- FL Fish and Wildlife Research Institute





# Easy to Access Data Types

The screenshot displays the ERMA Portsmouth, NH web application interface. At the top, the title "ERMA Portsmouth, NH" is visible on the left, and "Admin" is on the right. Below the title is a navigation bar with "Map", "Print", "Info", and "Help" on the left, and "Legend", "Layer", "Data", and "Tools" on the right. The main area is a map of the Portsmouth, NH region, showing towns like Rochester, Somersworth, Durham, Exeter, Hampton, Amesbury, and Newburyport. A vertical toolbar on the left side of the map includes navigation and zoom controls. On the right side, there is a list of data layers with expand/collapse icons and "Clear | All" links. An "Authentication Required" dialog box is overlaid on the map, containing the following text and fields:

**Authentication Required**

Enter username and password for "phri" at <https://portsmouthresponse.unh.edu>

User Name:  
Michele.Jacobi

Password:  
\*\*\*\*\*

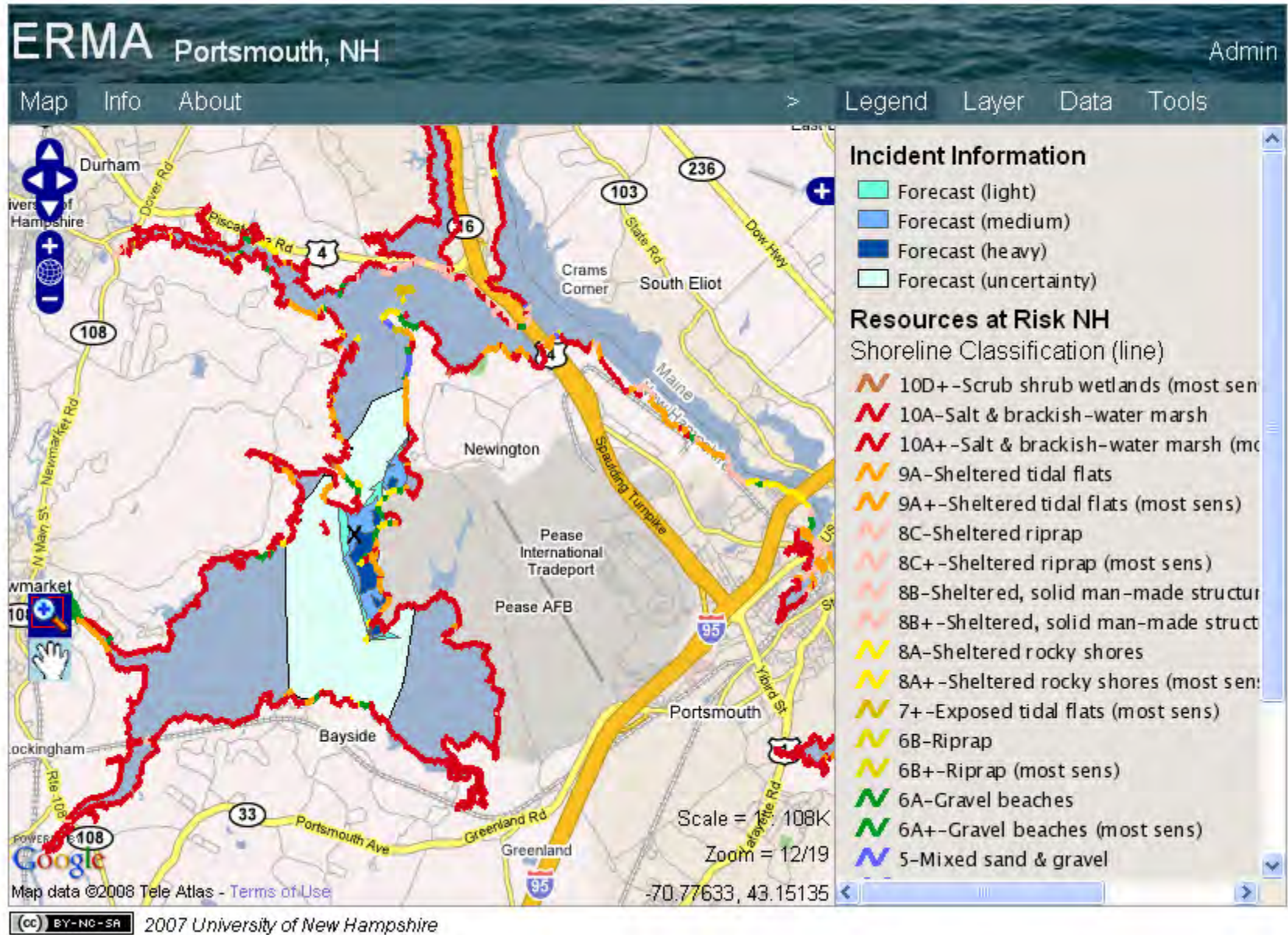
Use Password Manager to remember this password.

OK Cancel

At the bottom of the map, the scale is "Scale = 1 : 433K", the zoom level is "Zoom = 10/19", and the coordinates are "-70.45612, 42.81972".



# Critical Datasets for Environmental Response



# Link to documents and Download data

## Hypothetical Scenario - Seavey Island

Scat\_sheet.pdf (application/pdf Object) - Mozilla Firefox  
 https://portsmouthresponse.unh.edu/data/rendezvous/Scat\_sheet.pdf

Page 1 of 1

### SHORELINE OILING SUMMARY (SOS) FORM - M/V SELENDANG AYU Spill Response

1 GENERAL INFORMATION  
 Date: 25 Apr-05 Time (24hr): 11:20 hrs to 19:15 hrs Tide Height: rising/falling  
 Segment ID: AWD-06 Operations Division:   
 Survey by: FOB/AV/Boat/Helicopter/Overlook/   
 Surf: Clouds/Fog/Rain/Snow/Windy/Calm

2 SURVEY TEAM #   
 Name organization contact phone number  
 Jeani Nelson Palamas Catherine Williams Arch  
 Ruth Yender NOAA  
 Jordan Stout FEW  
 Jennifer Henderson ABEC  
 Darcy Harris DNR

3 SEGMENT Total Segment Length: 1266 m Segment Length Surveyed: 1260 m  
 Start GPS: LATITUDE 43.7001 deg. min. LONGITUDE -71.09429 deg. min.  
 End GPS: LATITUDE 43.69898 deg. min. LONGITUDE -71.09449 deg. min.  
 Differential GPS Yes/No

4A SHORELINE TYPE select only one primary (P) oiled shoreline type and any number of secondary (S) types  
 BEDROCK:  cliff/vertical  sloping  platform  SEDIMENT BEACH: Sand  Pebble/Cobble  Eoulder  Sand Flats  Sand-Gravel   
 Winter Only: Ice Foot  Snow  Mixed Sand-Gravel  MARSH: Pet-Cob  Boulder   
 4B COASTAL CHARACTER backshore character — select only one primary (P) and any number of secondary (S) types  
 CLIFF or HILL: est. height m  Bouch  Delta  Tidal inlet  Marsh/Wetland   
 slope: gentle (<45°) medium steep (>30°)  Barrier beach  Dune  Channel  other   
 5 OPERATIONAL FEATURES debris  oiled?   
 direct backshore access Y/N suitable backshore staging Y/N like  
 alongshore access from next segment  access restrictions

6 SURFACE OILING CONDITIONS begin with "A" in the lowest tidal zone

OIL ID	TIDAL ZONE				OIL COVER			OIL THICKNESS					OIL CHARACTER							SURST. TYPE(S)				
	LI	MI	UI	SU	Length	Width	Distrib	PO	CV	GT	ST	FL	FR	MS	TB	PT	TC	SR	AP		NO			
A			<input checked="" type="checkbox"/>		1255	2	1		<input checked="" type="checkbox"/>															b.c,alg

Medium Heavy

this scale bar shows the meaning of the distribution terms at the current time

(cc) BY-NC-SA 2007 University of New Hampshire

13

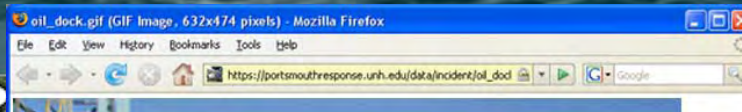
# Data Table Access

ERMA Portsmouth, NH

Admin

Map Info About

Tools



Mozilla Firefox

File Edit View History Bookmarks Tools Help

https://portsmouthresponse.unh.edu/erma/directions/irving.txt

RT 4 & 16 TO WOODBURY AVE EXIT IN NEWINGTON, EAST ON MARKET ST., NORTH ON KEARSAGE WAY, SE ON PREBLE WAY AT IRVING ENTERANCE, UNDER I-95 BRIDGE.



SEASONAL\_C: NO, RESTROOMS: YES,  
TELEPHONE: YES,  
LIGHTING: EXCELLENT, LOCATION: 400  
GOSLING RD, TOWN: PORTSMOUTH,  
CONTACT\_IN: LEO QUINN,  
PHONE: 603-669-4000,  
RAMP\_DIMEN: NA, DOCK\_DIMEN: 400' X  
50', PHOTO\_1: m:\coastoil\Coastal  
Photos\5,8mar02\p1010006.jpg,  
PHOTO\_2: m:\coastoil\Coastal



# Real-time vessel traffic from AIS

**ERMA** Portsmouth, NH Admin

Map Info About > Legend Layer Data Tools

**ships Feature info:**  
(1 of 1 items selected)  
key: 4, name: 308413000, cog: 328,  
cog\_mapserver: 238, sog: 5.1,  
time\_utc: 2008-02-09 07:00:21

**shiptrack Feature info:**  
(1 of 1 items selected)  
ogc\_fid: 3, userid: 308413000,  
name: 308413000

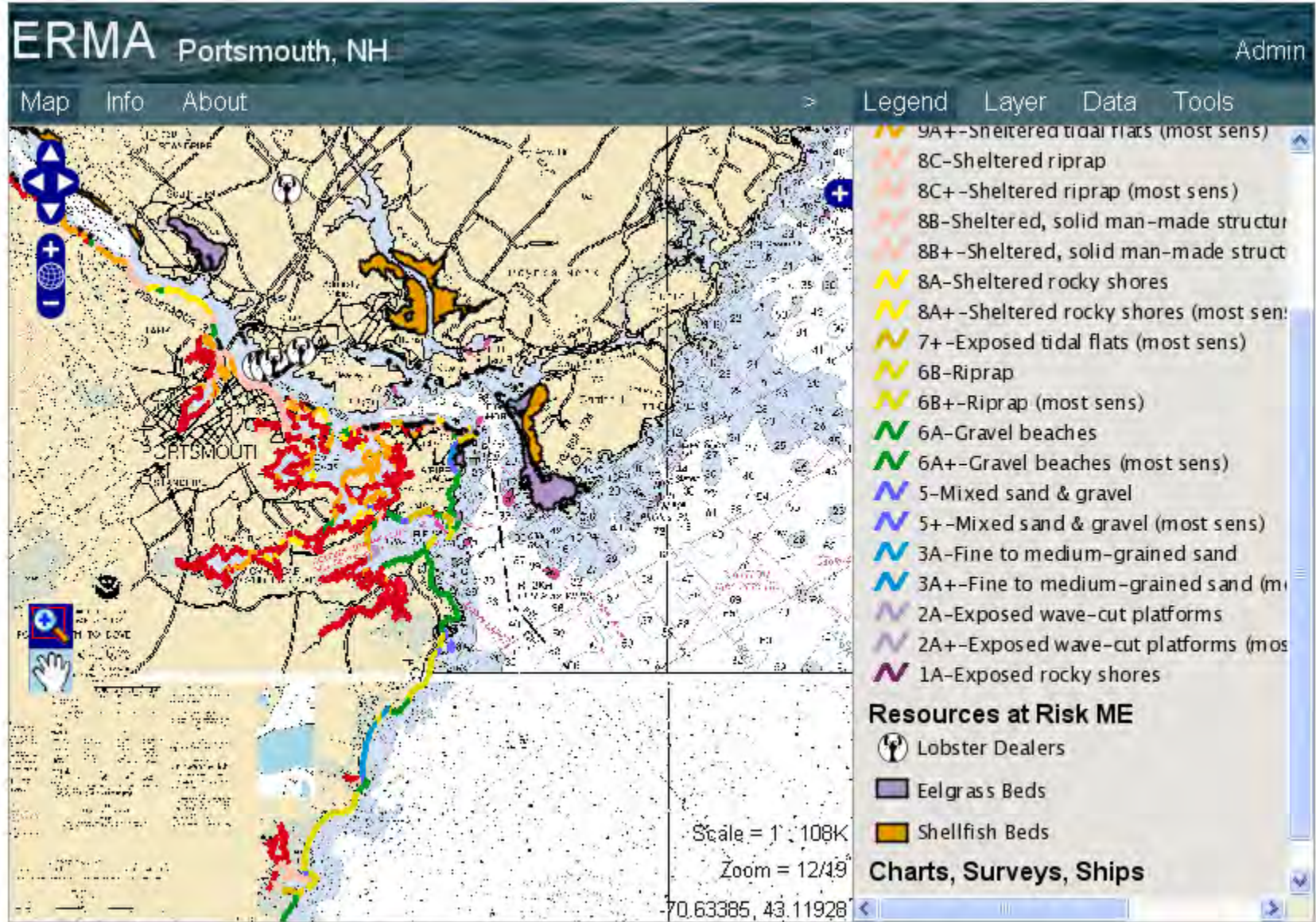
Scale = 1 : 14K  
Zoom = 15/19  
-70.77556, 43.10528

Map data ©2008 Tele Atlas - [Terms of Use](#)

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# NOAA Navigational Charts





# Weather and Buoy Observations

ERMA Portsmouth, NH Admin

Map Print Info Help Legend Layer Data Tools

- Response Planning (Clear | All)
- Public Safety (Clear | All)
- Incident Information (Clear | All)
- Field Photographs (Clear | All)
- Resources at Risk NH (Clear | All)
- Resources at Risk ME (Clear | All)
- Restoration (Clear | All)
- Marine Debris (Clear | All)
- Environmental Quality (Clear | All)
- Charts, Surveys, Ships (Clear | All)
- Environmental Conditions/ Weather
  - NOAA Weather Forecast ME/NH
  - Sfc Wind & Weather Obs
  - Weather Radar Mosaic (NWS)
  - Sea Surface Temp Anal (NWS)
  - Visibility (mi)
- Data Buoys & Observations (Clear | All)
- Predicted Conditions (Clear | All)
- Uploaded Layers (Clear | All)
- ERMA Tools (Clear | All)

Scale: 1 : 433K    Zoom Level: 10    Location: -70.49652°, 43.34216°



# Weather and Buoy Observations

**ERMA** Portsmouth, NH Admin

Map Info About Legend Layer Data Tools

### Tide Level

NOAA/NOS/CO-OPS  
Preliminary Water Level (A1) vs. Predicted Plot  
8423898 Fort Point, NH  
from 2008/06/10 - 2008/06/11

Height relative to MLLW

Date/Time (GMT)

Predicted WL (blue line) (Obs-Pred) (green line)  
Observed WL (red line)

**Buoys Feature info:**  
(1 of 1 items selected)  
LONG: -70.711700, LAT: 43.071700,  
BUOY\_NAME: NOAA Tides,  
DESC\_TEXT: NOAA Fort Point, NH  
collects Primary Water Level data.,  
BUOY\_URL: [NOAA Tides](#)

---

**NC\_Obs Feature info:**  
(1 of 1 items selected)  
AUTONO: 15893, ID: 8423898,  
INTERNALID: 8423898, AGENCY: NOS,  
TYPE: NWLON, AVAIL: 1,  
MESONETROO: 0, STNNAME: Fort Point,  
STATE: NH, LATITUDE: 43.07170,  
LONGITUDE: -70.71170,  
URL: <http://tidesonline.nos.noaa.gov/plotcomp>  
OBS\_WX: 0, OBS\_OC: 1, OBS\_RIV: 0,  
OBS\_WQ: 0, LLEST: 0,  
ELEV\_FT: 0.00000, ELEV: 0.00000,  
DEPTH\_BOT: 0.00000,  
DEPTH\_SURF: 0.00000,  
ANEMHT: 0.00000, WINDS: 0,  
AIRTEMP: 0, DEWPT: 0, PRECIP: 0,  
RELHUM: 0, MSLP: 0, SOLARRAD: 0,  
SOILTEMP: 0, WEATHER: 0,  
SNOWFALL: 0, CLDCVR: 0, VIS: 0,  
SSURTMP: 1, SALINITY: 0, WLEVEL: 1,  
CURRENTS: 0, WAVES: 0, SSIURTMP: 0

Scale = 1 : 217K  
Zoom = 11/19

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POWERED BY Google

Map data ©2008 Tele Atlas - Terms of Use

Scale = 1 : 217K  
Zoom = 11/19

Map data ©2008 Tele Atlas - Terms of Use

Scale = 1 : 217K  
Zoom = 11/19

Map data ©2008 Tele Atlas - Terms of Use



# Layer/ User Privileges

The screenshot displays the ERMA web application interface. A central window titled "Layer Information - Mozilla Firefox" is open, showing the "Data Layer Administration" form. The form fields are as follows:

- Layer Group: Incident Information
- Name: SCAT
- Map Type: wms
- URL: https://portsmouthresponse.unh.edu/cgi-bin/mapserve
- Description: SCAT
- Metadata: /metadata/layers/2/SCAT.html
- Metadata File: [ ] Browse...
- Opacity: [ ]
- Display by Default?: No
- Display Layer Name in Legend?: No
- Legend Graphic: [ ]
- Gutter: [ ]
- Privilege (Layers): Responders
- Privilege Name (new): [ ]
- Extraction Information:
  - DB Name: [ ]
  - Table Name: [ ]
  - Geometry Column: [ ]

A "submit" button is located at the bottom of the form.

In the background, the "ERMA: User List - Mozilla Firefox" window is visible, showing a table of users with columns for Name, edit, and Privilege. The "User List" table includes the following entries:

Key:	add	
Sort:	[Name]	
Name		Privilege
edit Alvarez,		
edit Armstro		
edit Bailey-M		
edit Batema		
edit Bodnar,		
edit Braswel		
edit Brown, t		
edit Dadiset		
edit Dehne,		
edit Dix, Ma		
edit Gallo, M		
edit Glidden		
edit Graettin		
edit Gray, Donald		
edit Greenlaw, Jason		
edit		

Logos for the Coastal Response Research Center, University of New Hampshire, and NOAA are visible in the bottom left corner.

# Interactive Tools

ERMA Portsmouth, NH Admin

Map Info About Legend Layer Data Tools

Zoom to location  
43.08 -70.72 Zoom Go Home

Create Region of Interest  
Name Color  
Comment  
Draw Clear Update Commit  
 Show Regions of Interest  
List Go

Scale = 1 : 217K  
Zoom = 11/19  
-70.60776, 43.13256

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# Interactive Tools

**ERMA** Portsmouth, NH Admin

Map Print Info Help > Legend Layer Data Tools

**Zoom to location:**  
-70.82 43.13 12

**Create Region of Interest:**  Off  
Name  Color   
Comment   
    
 Show Regions of Interest

- 143 Fishery Closure 6-18-08 Comment r
- 146 Exclusion zone described 15HRS r
- 168 sheen sept.18th black R/W

There are uncommitted changes.

**Manage Map Labels**  On

Scale: 1 : 108K Zoom Level: 12 Location: -70.86903°, 43.16788°



# Interactive Tools

**ERMA Portsmouth, NH** Admin

Map Print Info Help > Legend Layer Data Tools

**Zoom to location:**  
-70.82 43.13 12 Go  
Home

**Create Region of Interest:** Off  
Overflight Cyan  
sheen update 10/23  
Update Delete Commit  
 Show Regions of Interest

List  
null Overflight sheen update 10/23 cyan  
143 Fishery Closure 6-18-08 Comment r  
146 Exclusion zone described 15HRS r  
168 sheen sept 18th black RW  
Go

There are uncommitted changes.

**Manage Map Labels** On

Scale: 1 : 108K Zoom Level: 12 Location: -70.74371°, 43.16788°

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POWERED BY Google

Coastal Response Research Center  
University of New Hampshire  
NOAA

# Interactive Tools

**ERMA Portsmouth, NH** Admin

Map Print Info Help > Legend Layer Data Tools

**Zoom to location:**  
-70.82 43.13 12 Go  
Home

**Create Region of Interest:** Off  
Name Color  
Comment  
Update Delete Commit  
 Show Regions of Interest

List

- 143 Fishery Closure 6-18-08 Comment r
- 146 Exclusion zone described 15HRS r
- 168 sheen sept 18th black RW
- 214 Overflight sheen update 10/23 cyar

Go

There are uncommitted changes.

**Manage Map Labels** On

Scale: 1 : 108K Zoom Level: 12 Location: -70.74371°, 43.16788°

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POWERED BY Google

Logos: Coastal Response Research Center, University of New Hampshire, NOAA

# Interactive Tools

ERMA Portsmouth, NH Admin

Map Print Info Help > Legend Layer Data **Tools**

**Zoom to location:**  
Lon Lat 10 Go  
Home

**Create Region of Interest:** On

**Manage Map Labels** On

Manage Uploads

Download

**ERMA: Upload Shapefiles - Mozilla Firefox**  
https://portsmouthresponse.unh.edu/ERMA/Upload/Manage

**Upload New Shapefile**

Layer Name: lobster\_102008  
Used on data tab as well  
Text for Legend: Oiled Lobster Pots  
Projection: NAD 83 / UTM zone 19N  
Color: black  
Symbol (point-only): select a symbol  
Shapefile (zipped): Browse...  
Save  
Close and reload map





# Interactive Tools

**ERMA** Portsmouth, NH Admin

Map Info About > Legend Layer Data Tools

**Legend**

- Incident Information (Clear | All)
- Response Planning (Clear | All)
- Resources at Risk NH (Clear | All)
- Resources at Risk ME (Clear | All)
- Marine Debris (Clear | All)
- Field Photographs (Clear | All)
- Restoration (Clear | All)
- Public Safety, Regulated (Clear | All)
- Charts, Surveys, Ships (Clear | All)
- nowCOAST Weather/Water (Clear | All)
- Weather/Buoys (Clear | All)
- NEXRAD Observations (Clear | All)
- Environmental (Clear | All)
- Base Layers (Clear | All)
- Uploaded Layers (Clear | All)
  - NMFS\_restoration Layer

Scale = 1 : 217K  
Zoom = 11/19  
-70.60638, 43.11953

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Exeter

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**Coastal Response Research Centre**

**University of New Hampshire**

**NORR**

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# ERMA Function Highlights

## Site basics

- Secure access
- Document & data links
  - ESI information
  - GRPs
- Real-time feed for weather, ships, etc.
- Incident information
  - Trajectories
  - Asset Movements
  - SCAT data

## Interactive Tools

- Data Layer Management (access privileges)
- Zoom to location
- Interactive drawing areas of interest
- Upload/ Download capacity
- Measurement Tools
- Print User/ Timestamp



# Practical Implementation of ERMA

- Assist with spill preparedness
  - Display jurisdictional boundaries, specially regulated areas, areas of socio-economic importance
  - Access points for cleanup
  - Staging areas and command centers
  - Regional documentation, points of contact, etc.



# Practical Implementation of ERMA

- Assist in coordinating response efforts
  - Visualize magnitude and extent
  - Triage sites for action
  - Track progress of clean-up
  - Access real-time data
  - Upload data from the field and access forms
  - Increase communication



# Practical Implementation of ERMA

- Define the extent of potential impacts
  - General habitat and land use information
  - Areas of biological significance - haul outs, rookeries, nesting grounds, essential or critical habitat
  - Species-specific data - biological resources in the region - threatened or endangered?
  - Where is there current monitoring data



# Practical Implementation of ERMA

- Assist in Recovery and Restoration
  - Access existing environmental monitoring sites
  - Assist with sampling design
  - Inventory restoration projects
  - Locate long-term monitoring sites
  - Coordinate with regional projects



# Next steps for ERMA

- Operational in Portsmouth Harbor NH
- Developing with U.S. EPA Region 2 in the Caribbean for 2009
- Integrating with the National Response Team
- Applying ERMA in a proactive response manner towards climate change impacts in Puget Sound, WA



Coastal Response  
Research Center



University of  
New Hampshire



# Environmental Response Management Application

**ERMA Portsmouth, NH** Admin

Map Info About Legend Layer Data Tools

- Incident Information (Clear | All)
- Response Planning (Clear | All)
- Resources at Risk NH (Clear | All)
- Resources at Risk ME (Clear | All)
- Marine Debris (Clear | All)
- Restoration (Clear | All)
- Public Safety, Regulated (Clear | All)
- Charts, Surveys, Ships (Clear | All)
- NowCoast Weather (Clear | All)
- Weather (Clear | All)
- Environmental (Clear | All)
- Base Layers (Clear | All)

Scale = 1 : 217K  
Zoom = 11/19  
-70.94627, 43.06788

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