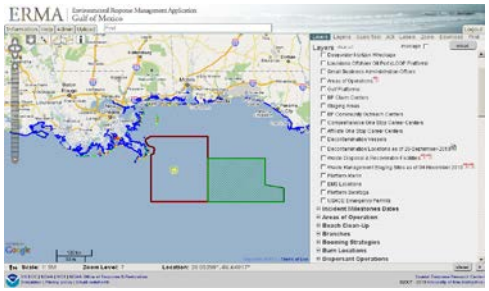


ERMA and GeoPlatform.gov:

Online Mapping Tools to Track Gulf Response

WWW.GEOPLATFORM.GOV/GULFRESPONSE

Powered By: ERMA®

Environmental Response Management Application

George Graettinger, Michele Jacobi, Ben Shorr, Amy Merten,
NOAA's Office of Response and Restoration (NOS),
Kari Sheets, NOAA's Office of Science and Technology (NWS)
***Development Team- Bob St. Lawrence, Phil Collins, Aaron Racicot,**
Allison Bailey, & Chander Gansen

NOAA Coastal GeoTools Conference
March 23rd, 2011
Myrtle Beach, SC

Continuum of "Response" Framework for ERMA

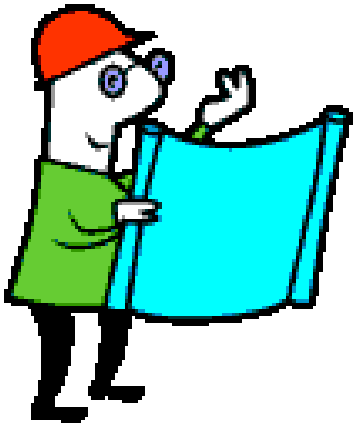
Response (24 hours) → **Restoration - Recovery (Years/Decades)**

Emergency Response Division (ERD)

Assessment and Restoration Division (ARD) / Restoration Center (RC)

Concept for ERMA

Open Source, Web-based mapping tools



↓

Planning & Analysis

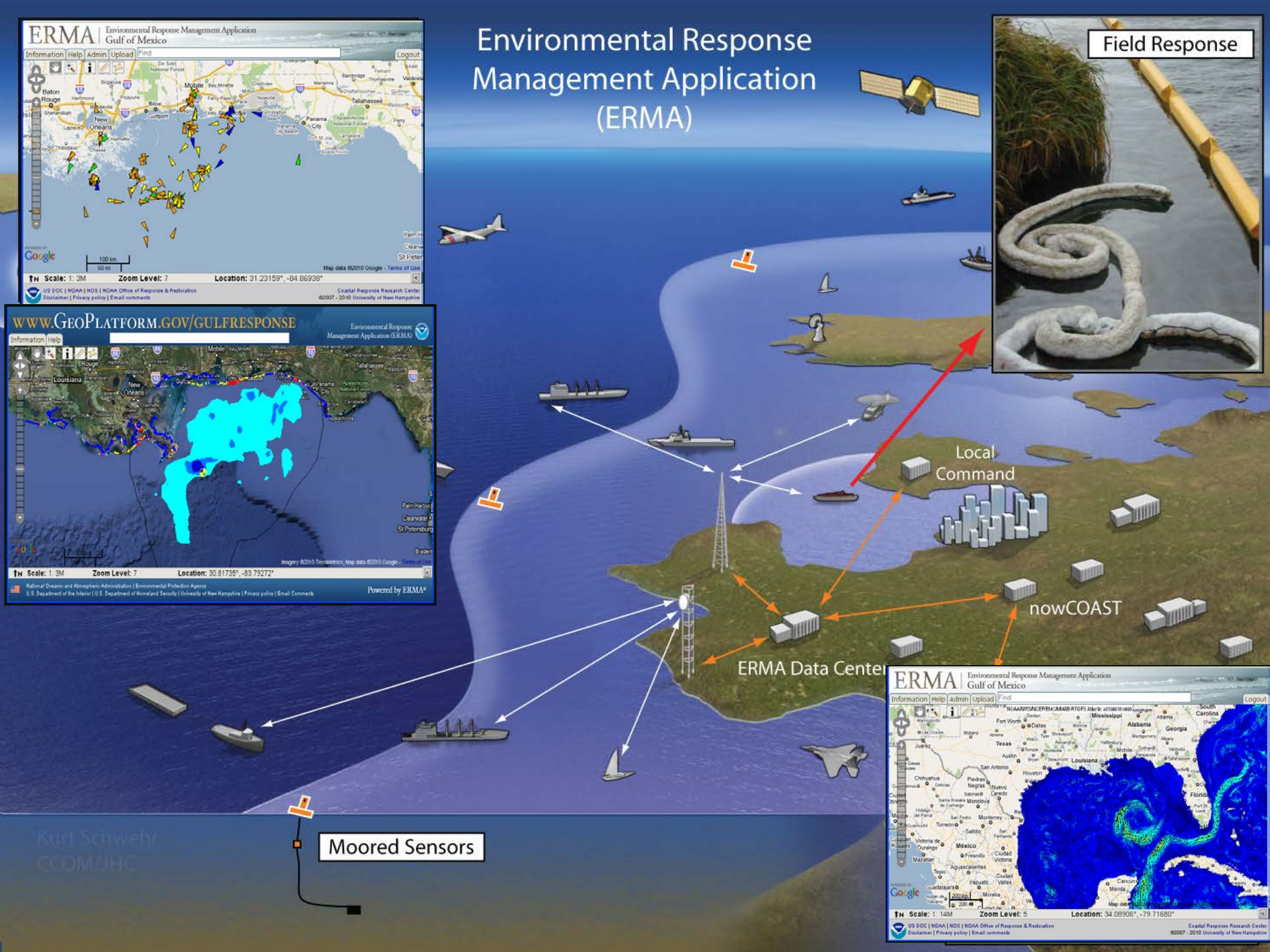
↓

Integrate & Analyze Information
On the fly

↓

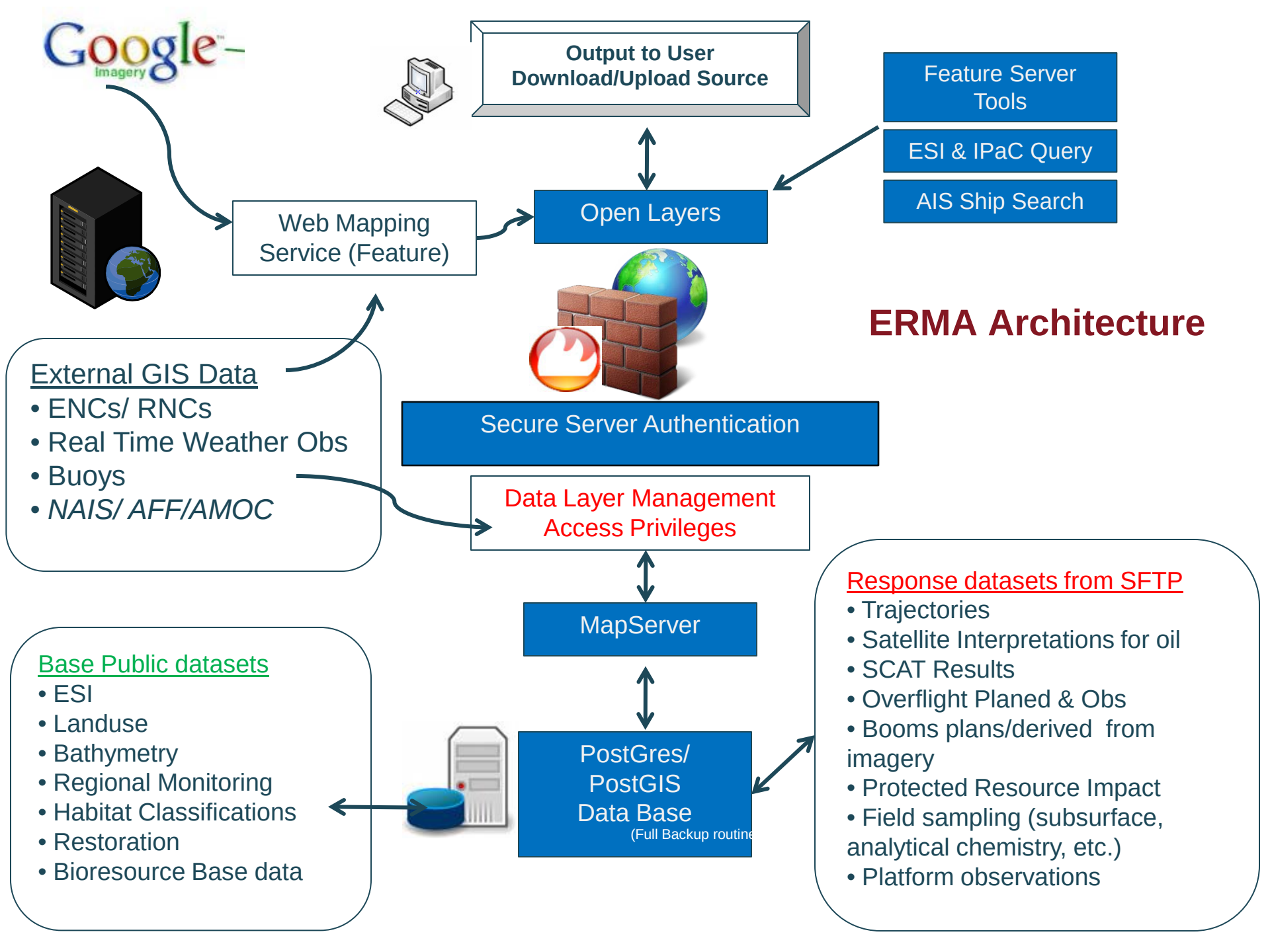
Improved Communication & Coordination

Environmental Response Management Application (ERMA)



Kurt Schwehr
CCOM/JHC

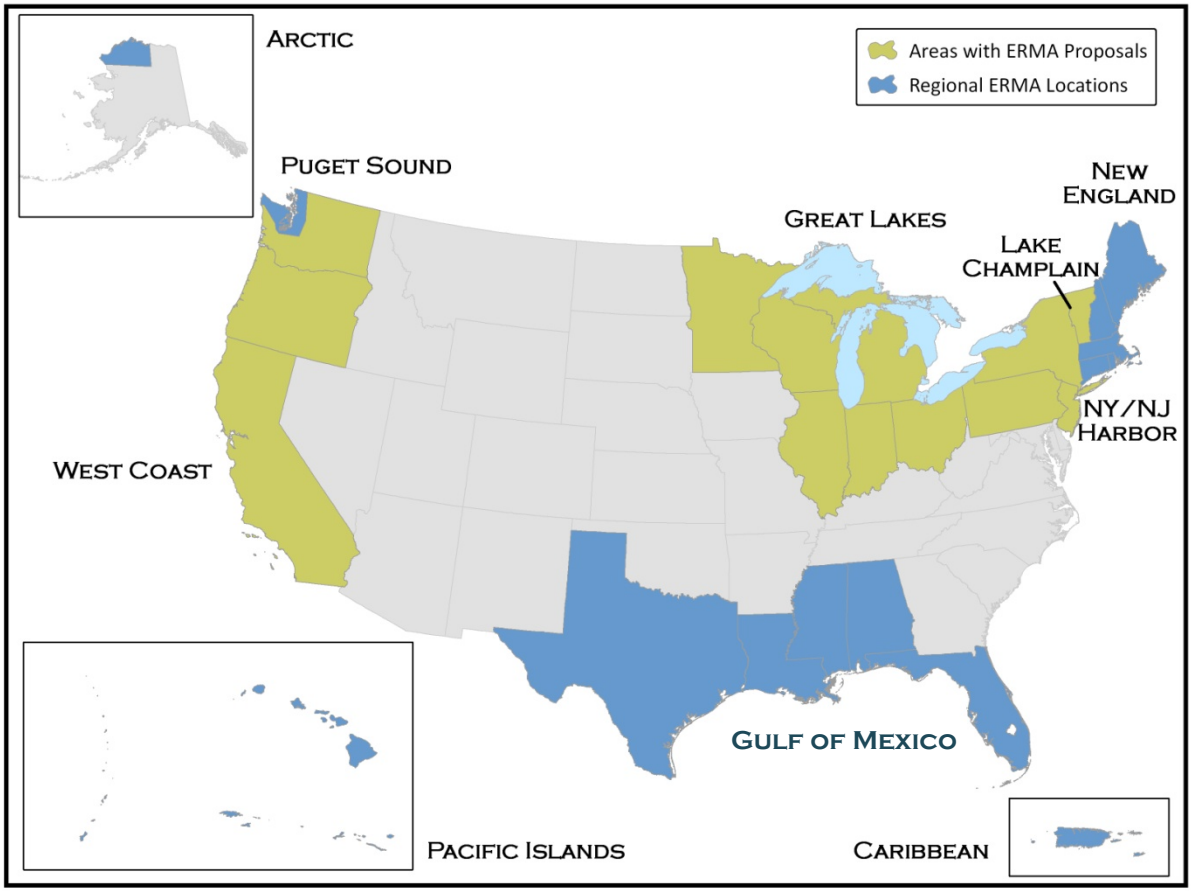
ERMA Architecture



Site Overview

- **Secure access**
  - Username/Password
  - Various levels of access (Public, Responder, NRDA, Trustee)
- **Background Layers**
  - Google aerial, terrain, roads
  - Nautical charts
- **Incident information**
  - Trajectories
  - Field teams, aircraft, and vessel tracking
  - Shoreline Oiling
  - Geographic Response Plans Priorities
  - Analytical Chemistry Data
- **Weather & Buoys Observations**
  - Real-time feeds
  - Hurricane/Storms
  - Remote-sensing Imagery
- **Resources at Risk**
  - NOAA ESI data layers
  - Fisheries Closures
  - Local habitat and species datasets
  - Seafood Safety
  - Marine Protected Areas
- **Document & photo links**
  - ESI and GRPs PDFs
  - Field Photos
  - External links

Current ERMA Development



- New England (SONS)
- Caribbean –
  US territories, Groundings, Haiti
- GOM & DWH MC252
- Puget Sound WA –
  Focus on climate change impacts
- Pacific Islands –
  In development, FY '11
- Arctic –
  NOAA OCRM Energy Initiative
- Lake Champlain –
  funded FY '11
- NJ/ NY Harbor w/EPA R2
- Great Lakes
- West Coast

Coastal Response Research Center

ERMA Background

2007: Developed concept Pilot site: Portsmouth Harbor, NH

2008: - Pilot was used in Response Industry- PREP Drill

- Presented to National Response Team/EPA Region 2 funding for U.S. Caribbean ERMA

2009: Delivered Model ERMA: Caribbean

2010:

- **March 23-25th**,
  Spill of National Significance (SONS) Drill -
  Expanded Pilot Project with assistance from regional stakeholders
- ***May 3-8th***,
  Planned Internal Drill –
  How fast could we stand-up an ERMA site from scratch?
- **April 20th**,
  Deepwater Horizon Explosion
- **April 22nd**,
  NOAA deployed GOMEX ERMA for command posts on April 24th
- **June 23rd**,
  ADM Allen designated ERMA as the Common Operational Picture (COP) for the Deepwater Horizon Incident

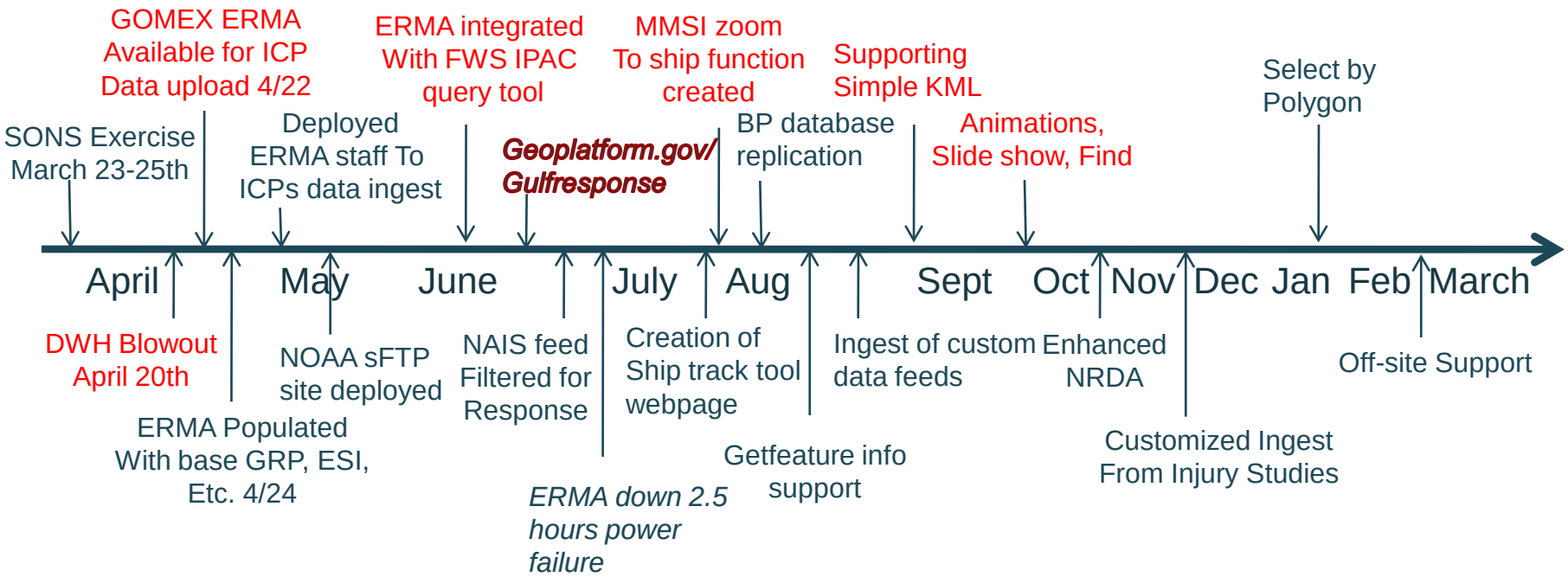
Facts About Deepwater Horizon

- **11 men perished**
- **220 million gallons of oil spilled**
- **587 miles of shoreline oiled**
- **1.74 million gallons dispersants applied**
  - 669,000 subsurface
  - 1.07 million surface
- **400 controlled burns**
- **4.2 million feet of containment boom and 9.1 million feet of sorbent boom**
- **Day 336 (March 22nd, 2011)**

More information at restorethegulf.gov

Coastal Response Research Center

ERMA GOMEX: Deployment Timeline



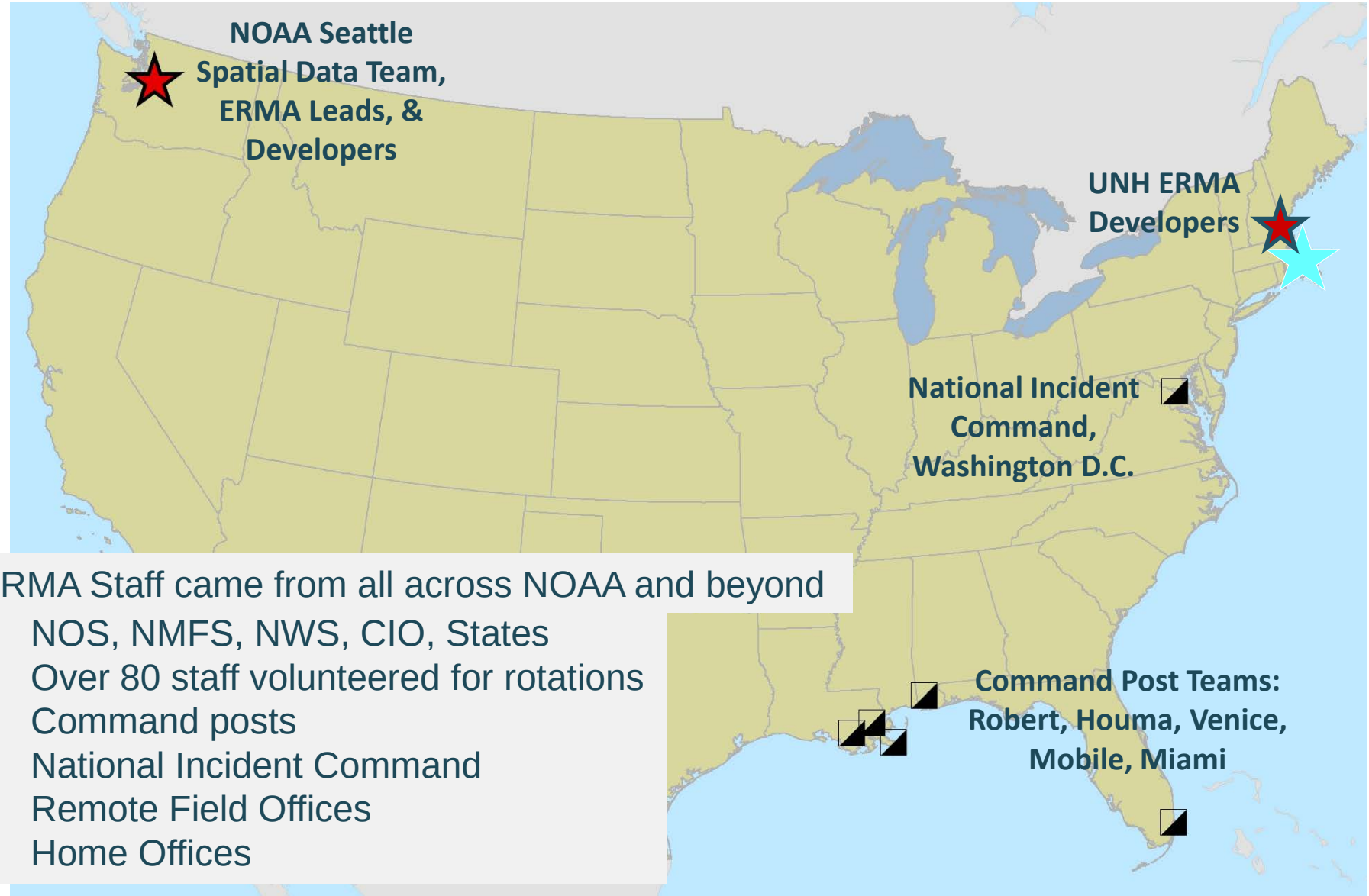
Key to development timeline was ERMA Adaptability in scaling:

- Customizable, free Open Source software
- Ability to code for non-OGC and customized vendor feeds

Completely cloned backend software architecture to cloned/replicated databases after Geoplatform.gov release and redeployed overnight because 3.4 million hits on first day of launch

Coastal Response Research Center

NOAA DWH ERMA Team



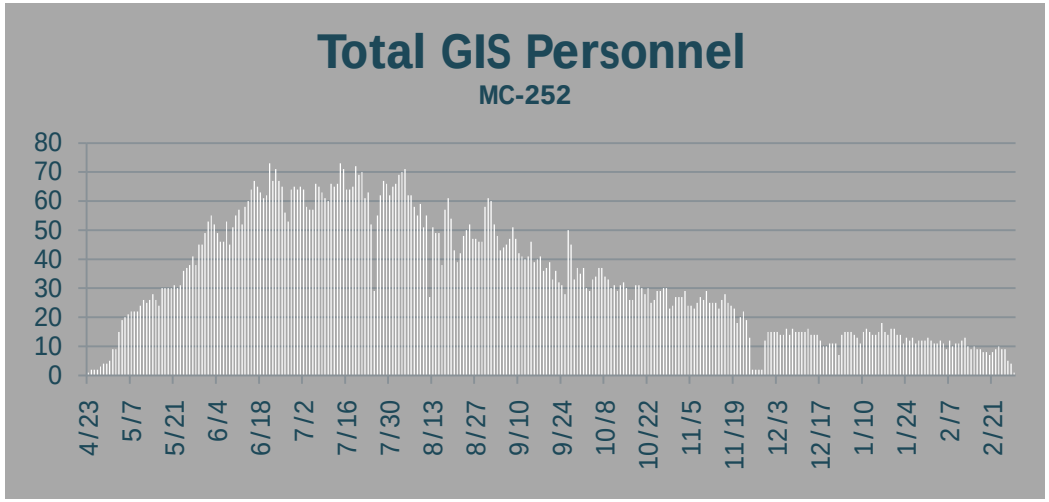
ERMA Staff came from all across NOAA and beyond

- NOS, NMFS, NWS, CIO, States
- Over 80 staff volunteered for rotations
- Command posts
- National Incident Command
- Remote Field Offices
- Home Offices

DWH On-scene Staffing

A
GIS PERSONNEL
Employer -> Title -> Employee
The Response Group
NOAA
URS
Resource Data Inc.
Infosys
MMG
NGA
Entriz, Inc.
Aerometric
BP
Polaris
USCG
Polaris Applied Sciences Inc.
NRDA
PSN
FL Fish & Wildlife Conservation Comm
US Fish & Wildlife Service
Contractor
Resource Property Services
MSRC
US Environmental Protection Agency
Anderson Engineering
Environmental Standards, Inc.
Versar
Industrial Economics
Talon Security
ESRI
Adams Harris
US National Park Service
Icaros
USES/St. Bernard YOO
US Dept. of Interior
TestAmerica
US Army
NOAA Industrial Economics
Clean Harbors
Unknown Supplier
HDR/E2M
US Dept. of Defense
The Shaw Group Inc.
TPC
Days Worked

- Over 180 Individual GIS Staff
- Fewer than 40 ERMA Team
- Total GIS Staff Days = 10000+
- BP/Contract Staff Days = 6161
- NOAA/Contract Staff Days = 2026

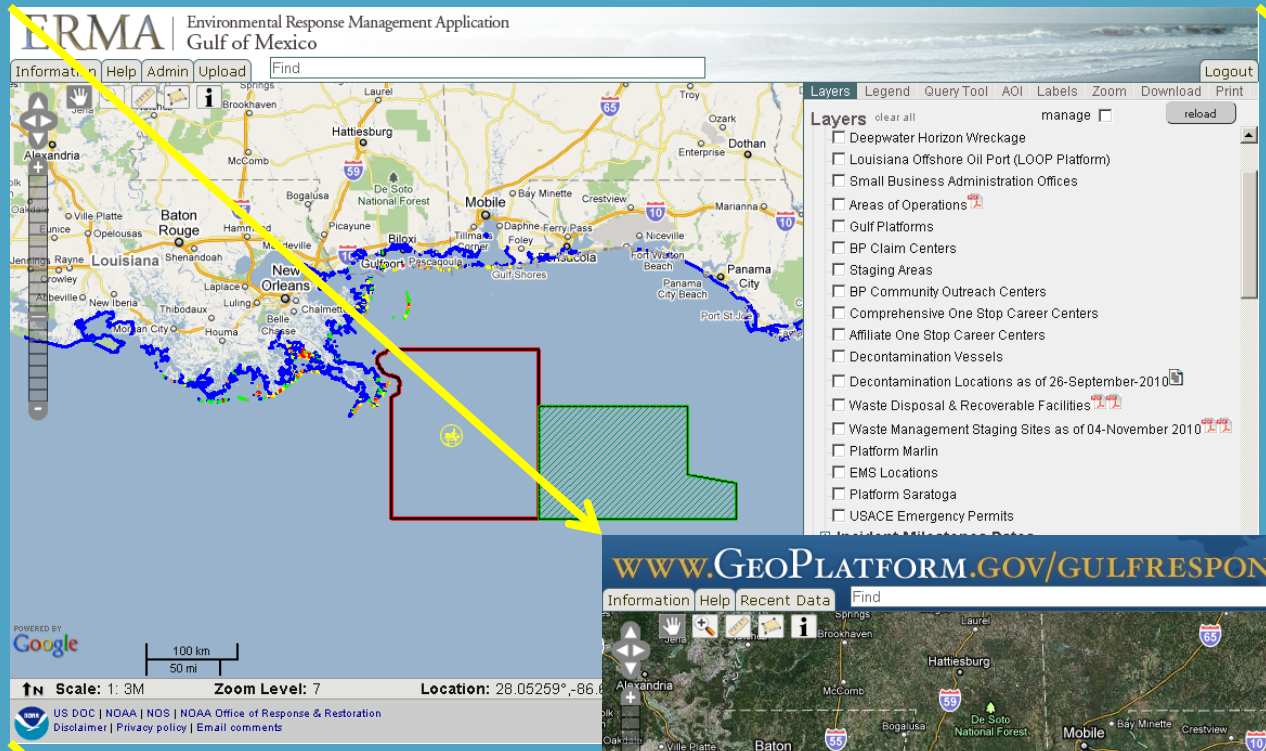


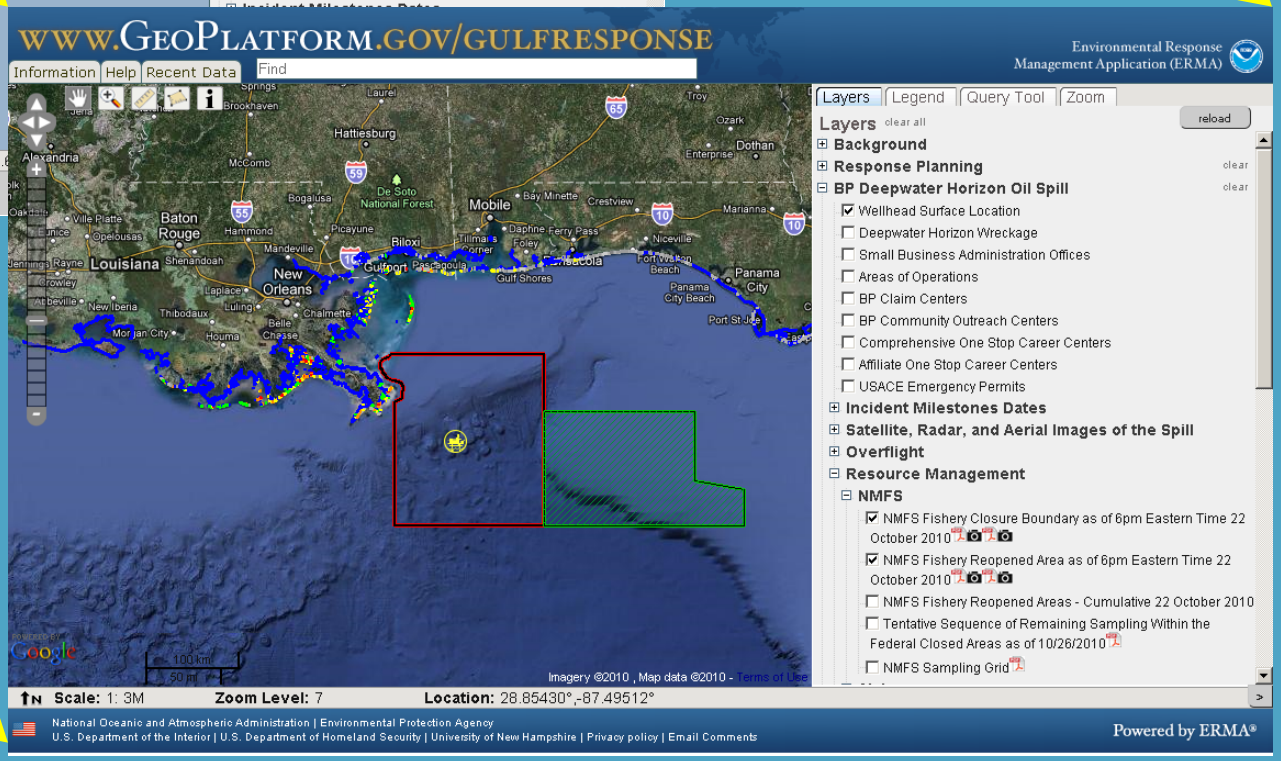
Deep Water Horizon Daily Data pushed into ERMA from various sources

Primary Source	Response Daily Data	Source Location	Display Location	
BP/ ICPs	Task Force	SFTP/ Replicate feed	ERMA Responder	
BP/ ICPs	Decon locations/ Waste Area	Replicate feed	ERMA Responder	
BP/ ICPs	Emergency Response Teams	Replicate feed	ERMA Responder	
BP/ICPs	Beach Cleanup	SFTP/ Replicate feed	ERMA Responder	
BP/ ICPs	Field Boom Data	SFTP/ Replicate feed	ERMA Responder	
BP/ ICPs	Burn/ Dispersant	SFTP/ Replicate feed	ERMA Responder	
BP/ ICPs	WEBEOC/ Phone log	Replicate feed	ERMA Responder	
BP	Platform Observations	SFTP		
NOAA	NESDIS Anomaly Analysis	SFTP	ERMA Responder	ERMA Public
NOAA	Fishery Closures	SFTP	ERMA Responder	ERMA Public
NOAA	Trajectories	SFTP	ERMA Responder	ERMA Public
NOAA	Protected Resources Impacts	SFTP	ERMA Responder	ERMA Public
NOAA	Loop Current	SFTP	ERMA Responder	ERMA Public
NOAA	Subsurface Monitoring	SFTP	ERMA Responder	ERMA Public*
NOAA	Helo Oil Obs & Photos	SFTP	ERMA Responder	
NOAA/ University	Buoy/ AXBT Data	FTP	ERMA Responder	ERMA Public
NOAA/ BP	SCAT Obs and Photos	SFTP	ERMA Responder	ERMA Public*
BP/ ICPs	VOOs tracking	Modified WMS	ERMA Responder	
USCG	NAIS Feed	Modified WMS	ERMA Responder	ERMA Public*
IRSCC	Planned Remote Sensing	Email KML	ERMA Responder	
AFS/ AMOC	Air Operations Feed	Modified WMS	ERMA Responder	
NGA	NGA Satellite Analysis	SFTP	ERMA Responder	
NGA	NGA Imagery Derived Booms	SFTP		
EPA	Monitoring data	SFTP/WMS		

* Slightly modified for public

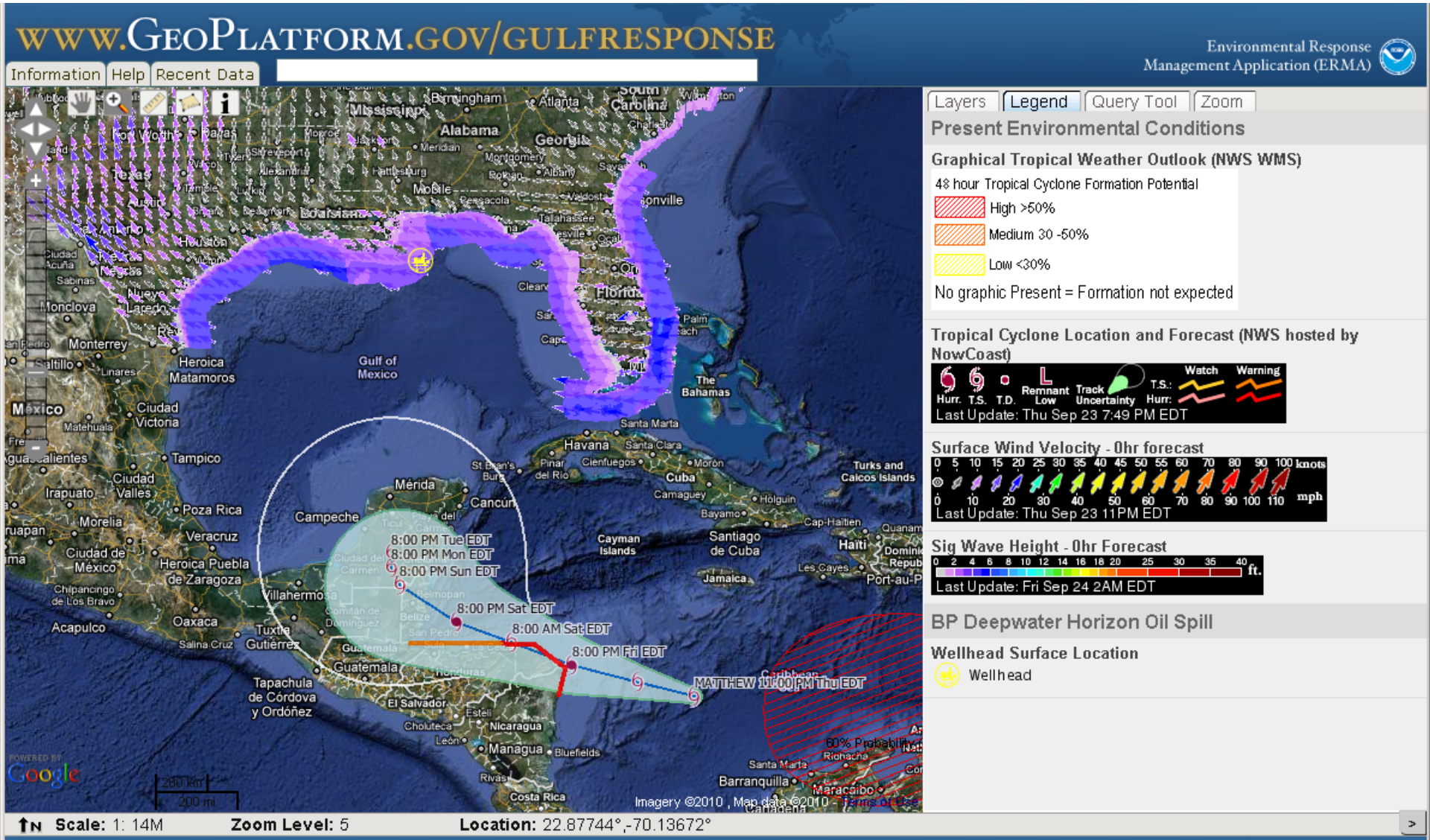
ERMA Provides Data to the Public



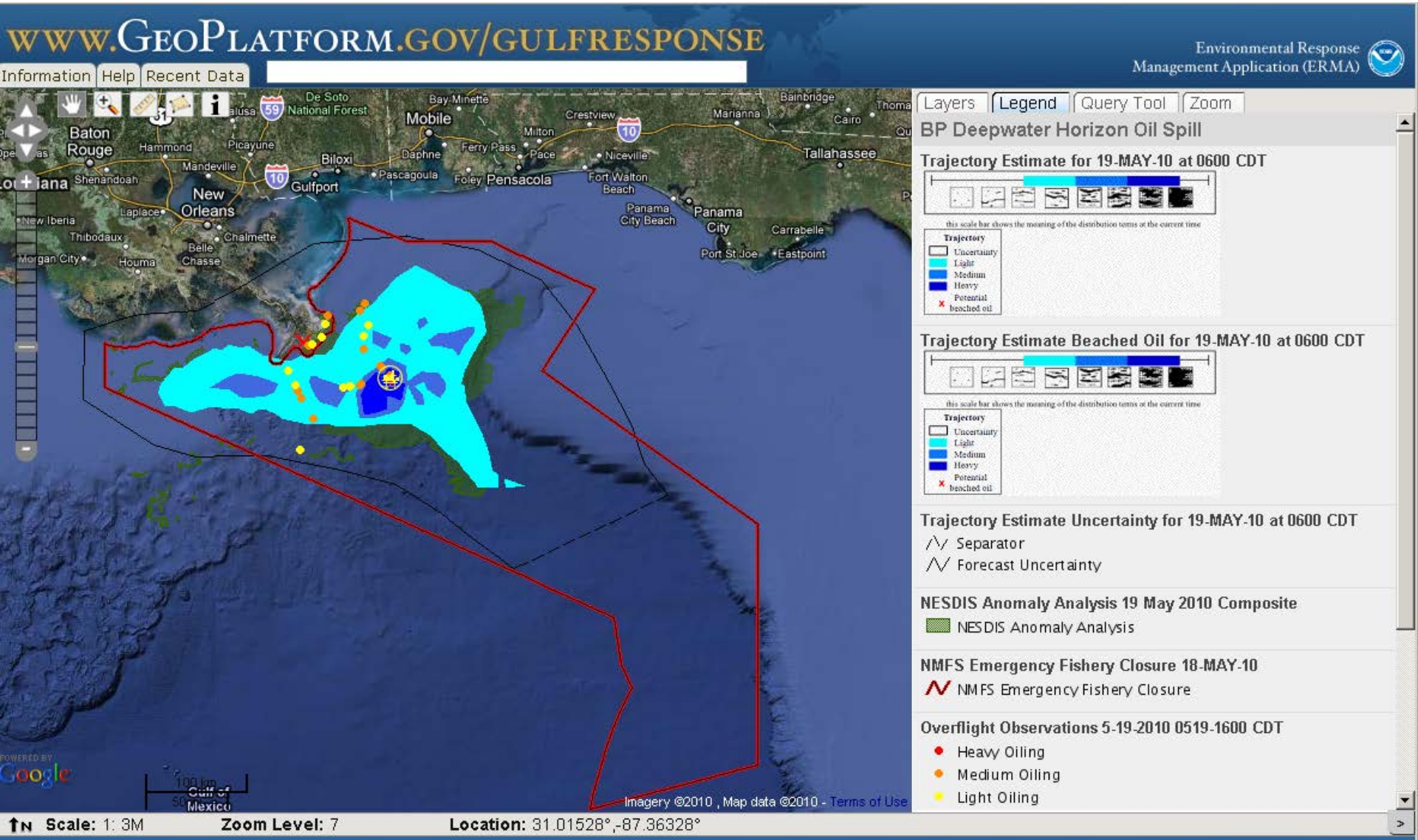


Coastal Response Research Center

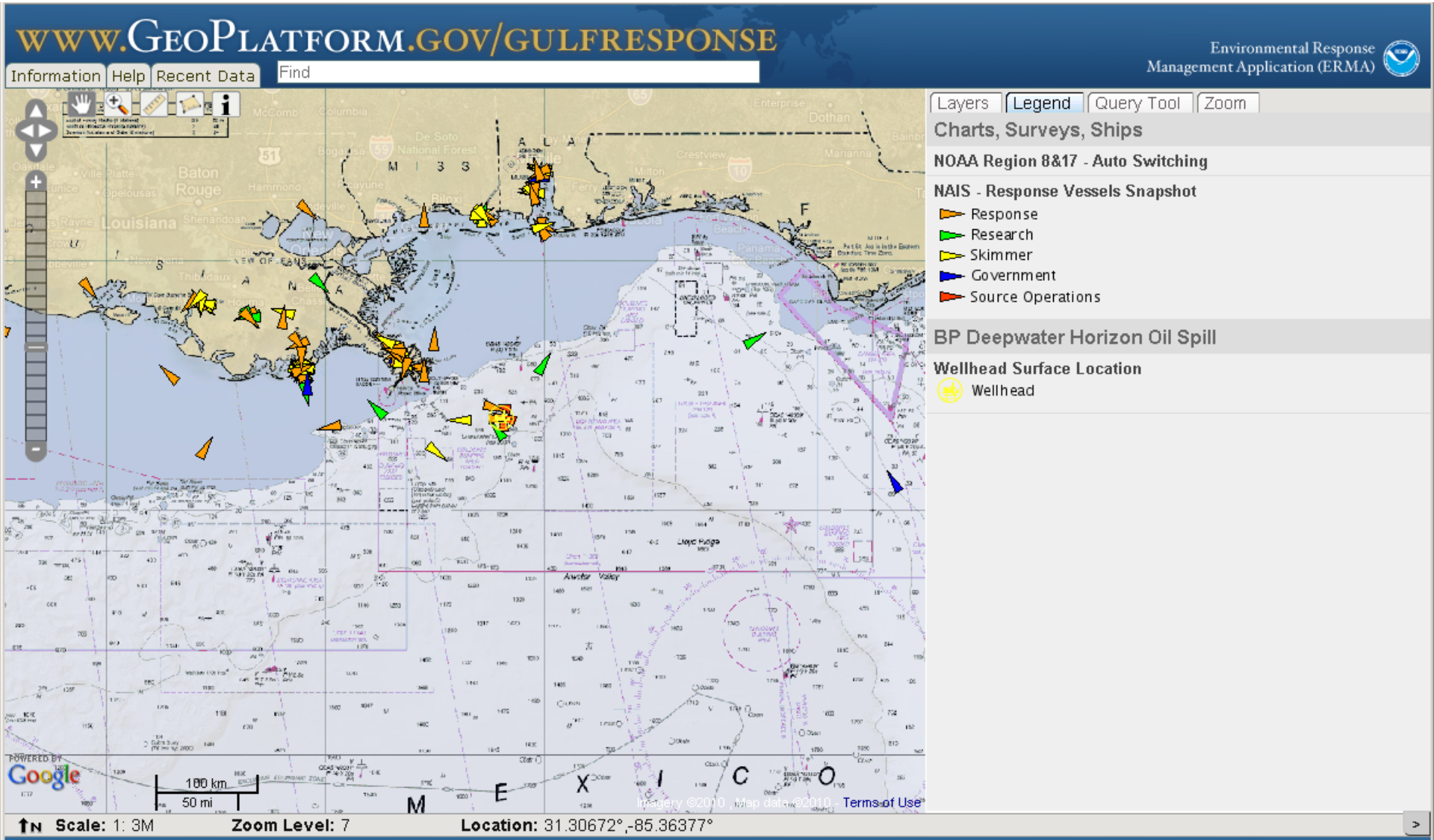
Current Weather Conditions



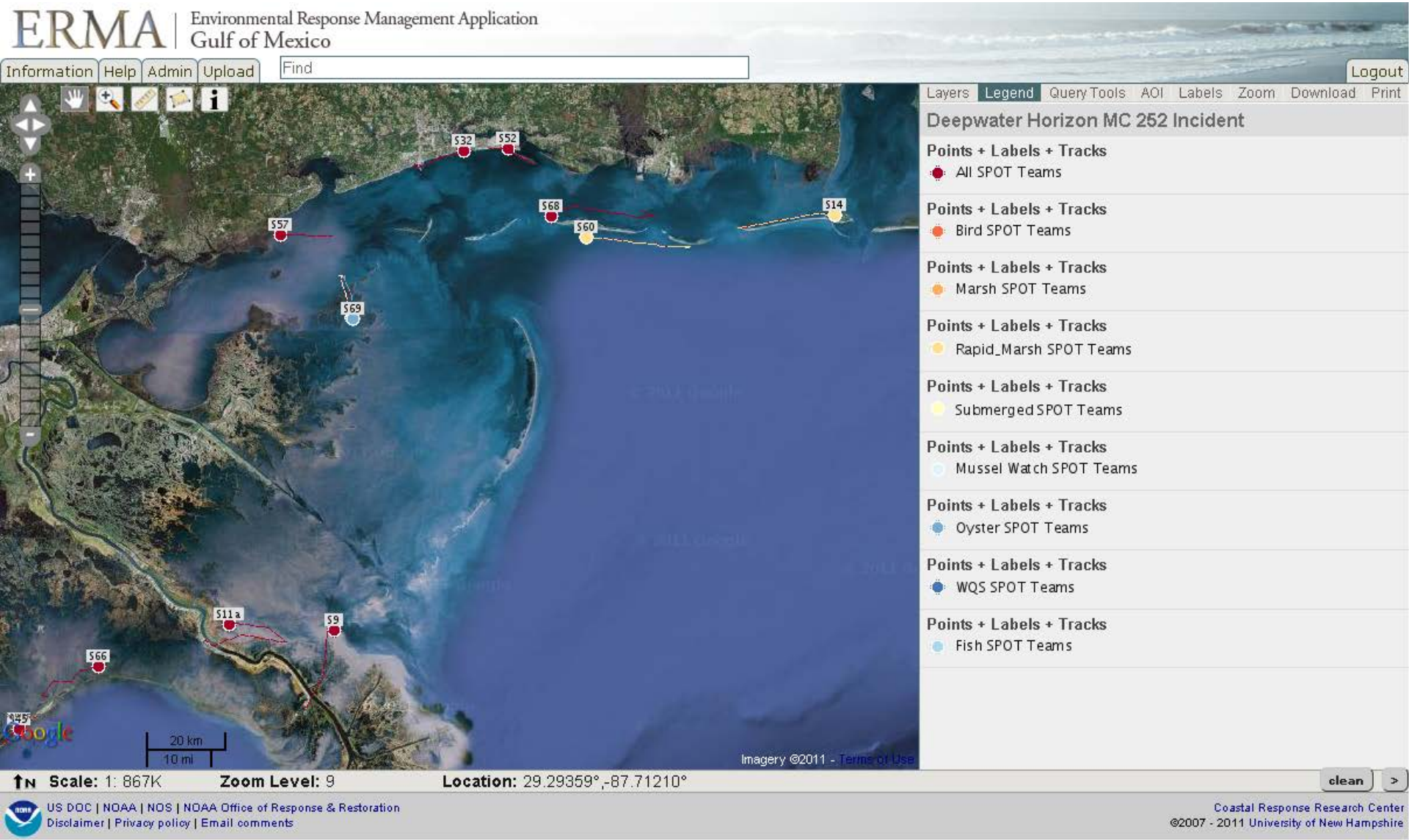
Operational Response Data



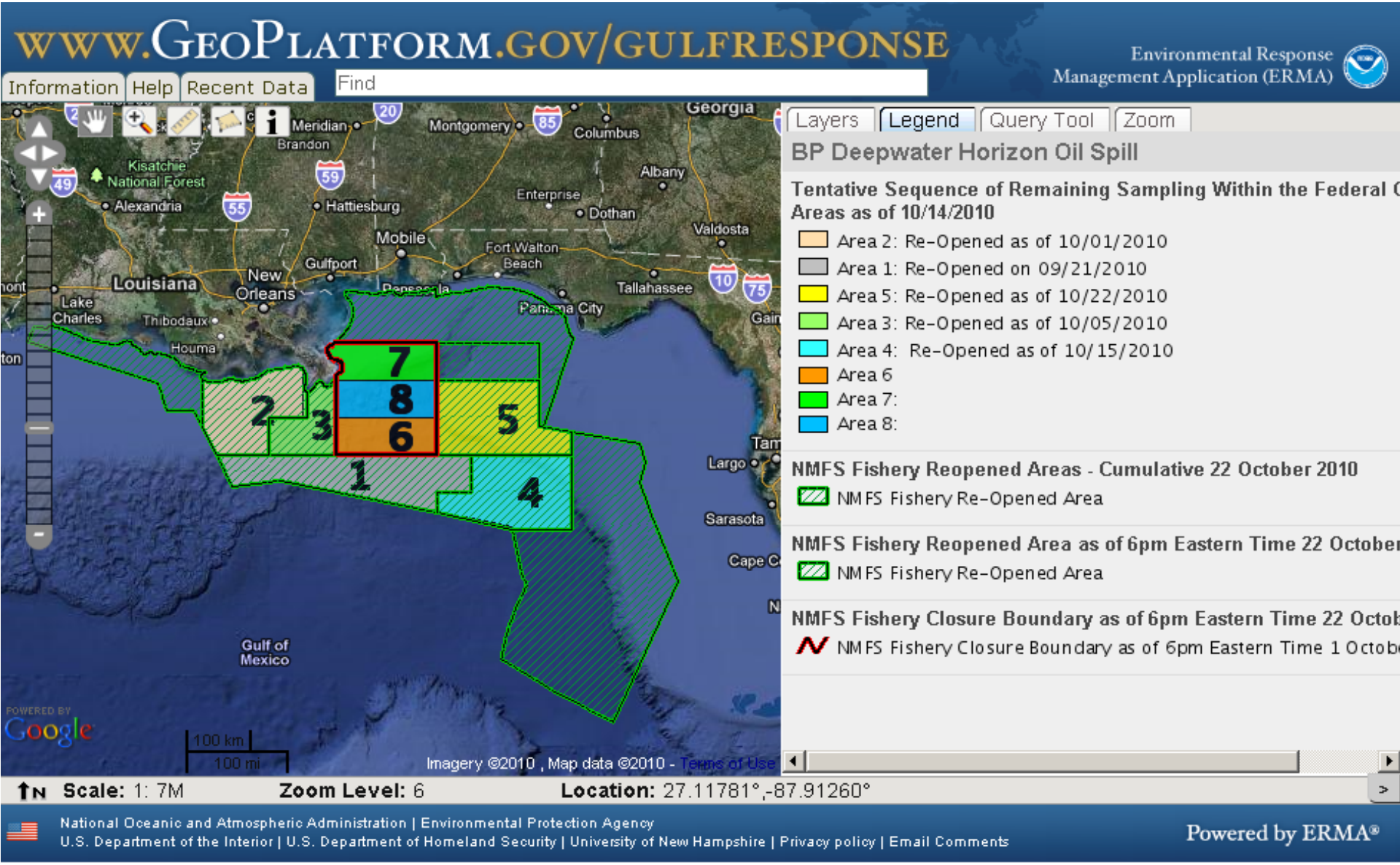
Response and Research Ships Tracking



Field Personnel Tracking



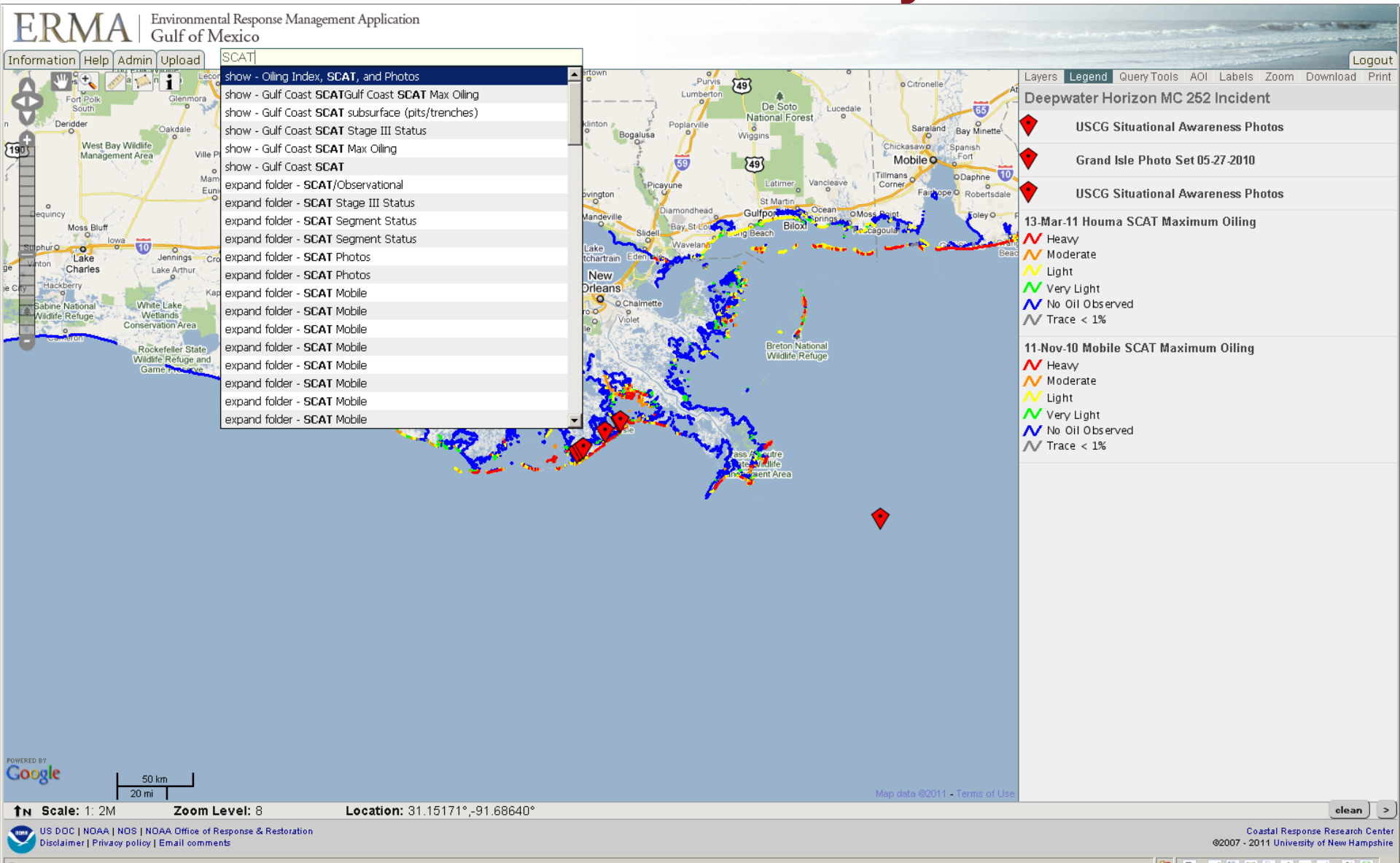
NMFS Fishery Closures & Re-Openings



User Tools

- **Zoom To**
  - Lat/Long
  - Place name
  - Ship – MMSI Find
- **Bookmark Map Views**
  - Saves layers and location
  - Customizable slideshow
- **Areas of Interest**
  - User-made map features
- **Measurement Tools**
  - Length/Area
- **Animations**
  - Show key layers across time
- **Full Metadata Access**
- **Find tool**
  - Automated search of all layers
- **Map Labels**
  - User-made feature labels
- **Print Tools**
  - Timestamp
  - Various page sizes
- **Interactive Query Tools**
  - Layer Query by Polygon
  - NOAA ESI
  - US Fish and Wildlife IPAC
- **Identify tool**
  - Analytical chemistry results
  - Status of ship locations

"Find" Feature Layers



Single Click Full Metadata Access

ERMA | Environmental Response Management Application Gulf of Mexico

Information | Help | Admin | Upload | Find | Logout

Layers | Legend | Query Tools | AOI | Labels | Zoom | Download | Print

Layers clear all collapse all manage reload

http://www.restorethegulf.gov/)

- Water
- Sediment
  - Location of Sediment Chemistry Reference Stations
  - Qualitative Observations
  - All Sampling (23-Apr-2010 to 25-Oct-2010)
    - PAH Aquatic Life Benchmark Analysis
      - Aquatic Life Benchmark Analysis - PAH Exceedance Not Consistent with MC-252 For All Sediment Samples
      - Aquatic Life Benchmark Analysis - PAH Exceedances For All Sediment Samples (06 Dec 2010)
      - Aquatic Life Benchmark Analysis - PAH Detects For All

download lite meta data

ERMA: SedPAHNC2522010_1206AllFinal - Mozilla Firefox

unh.edu https://gomex2.erma.unh.edu/ERMA/metadata?layer_id=14298

Parent Group: Deepwater Horizon MC 252 Incident>Subsurface Oil and Dispersant Detection (OSAT 1 - Analysis)>Sediment>All Sampling (23-Apr-2010 to 25-Oct-2010)>PAH Aquatic Life Benchmark Analysis
Layer Name: Aquatic Life Benchmark Analysis - PAH Exceedance Not Consistent with MC-252 For All Sediment Samples
Full Metadata: AquaPAH.htm
Last Modified: 03/17/2011
Last Modified By: Graettinger, George (NOAA ORR ARD)
Shapefile: SedPAHNC2522010_1206AllFinal
Date Created: 12/14/2010 2:56 pm
Created By: Dorsey, Mathew (NMFS)
Geometry: POINT
Additional Information: This layer represents samples that w
where fingerprinting results suggest that the exceedances are nc

Done

Mozilla Firefox

unh.edu https://gomex2.erma.unh.edu/layerfiles/14298/metadata/AquaPAH.htm

Aquatic Life PAH Benchmark Analysis - Deepwater Horizon Spill Response - Gulf of Mexico - OSAT Report

Metadata:

- Identification_Information
- Data_Quality_Information
- Spatial_Data_Organization_Information
- Spatial_Reference_Information
- Entity_and_Attribute_Information
- Distribution_Information
- Metadata_Reference_Information

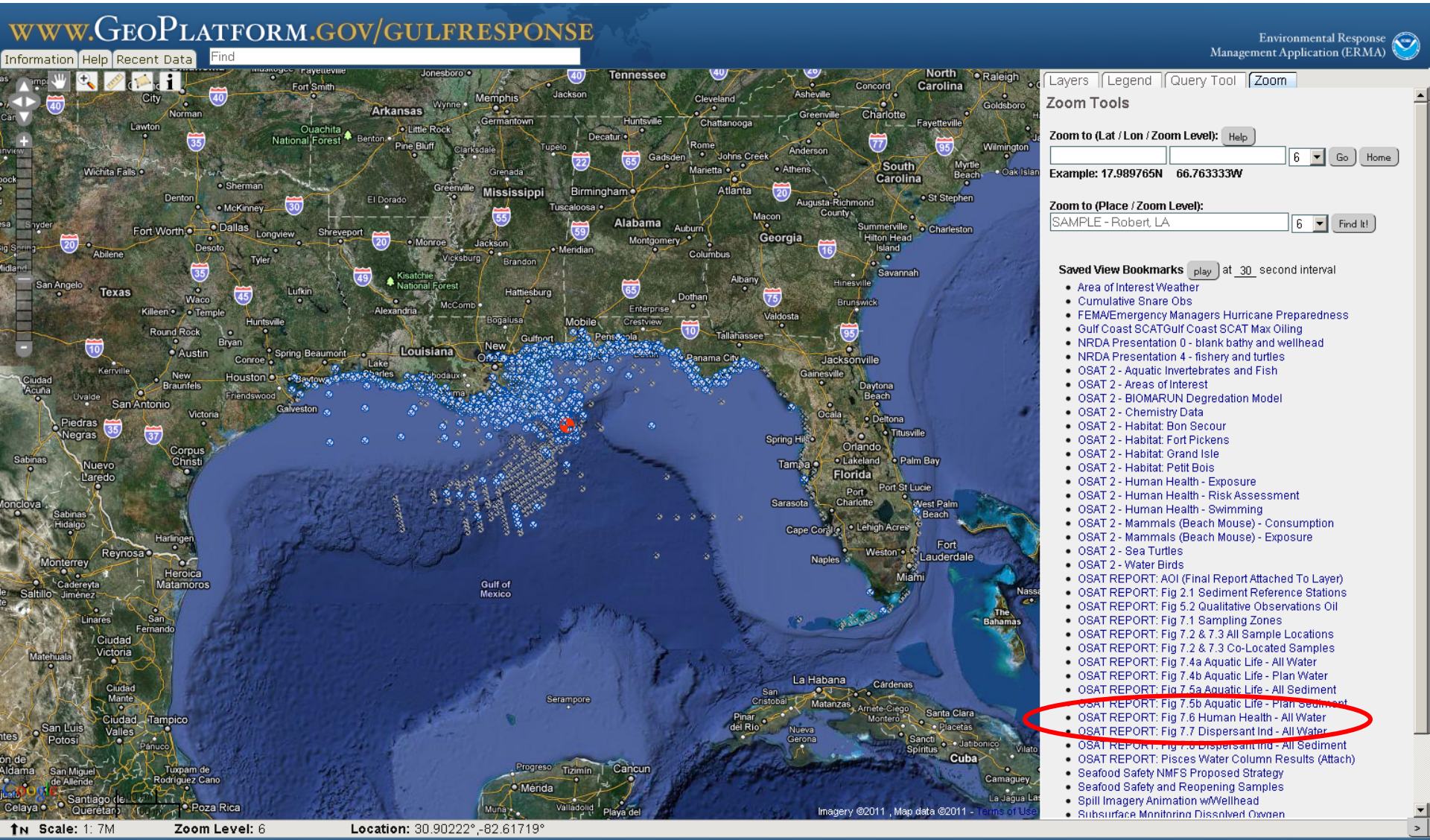
Identification_Information:
Citation:
Citation_Information:
Originator: BP/Environmental Standards, CTEH, NOAA, EPA, USGS, LA, MS, AL, FL, Others.
Publication_Date: 2010
Title:
Aquatic Life PAH Benchmark Analysis - Deepwater Horizon Spill Response - Gulf of Mexico - OSAT Report
Geospatial_Data_Presentation_Form: vector digital data
Publication_Information:
Publication_Place: New Orleans, LA
Publisher: Deepwater Horizon - Unified Area Command
Online_Linkage: http://www.geoplatform.gov
Online_Linkage: https://gomex2.erma.unh.edu/erma

Done

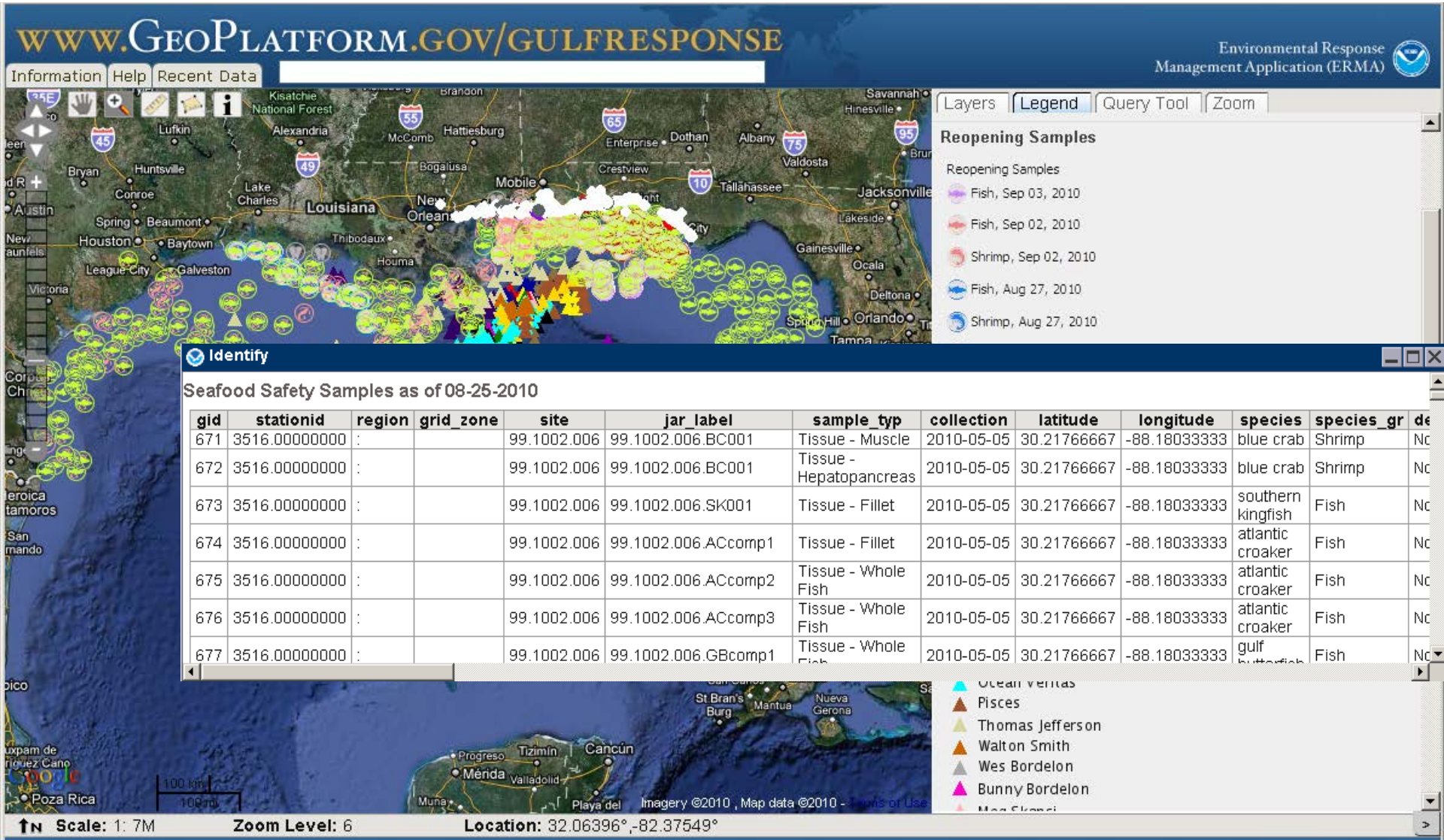
POWERED BY Google 100 km 50 mi

Scale: 1: 3M Zoom Level: 7 Location: 27.36201°,-88.30811°

Spatial Bookmarks

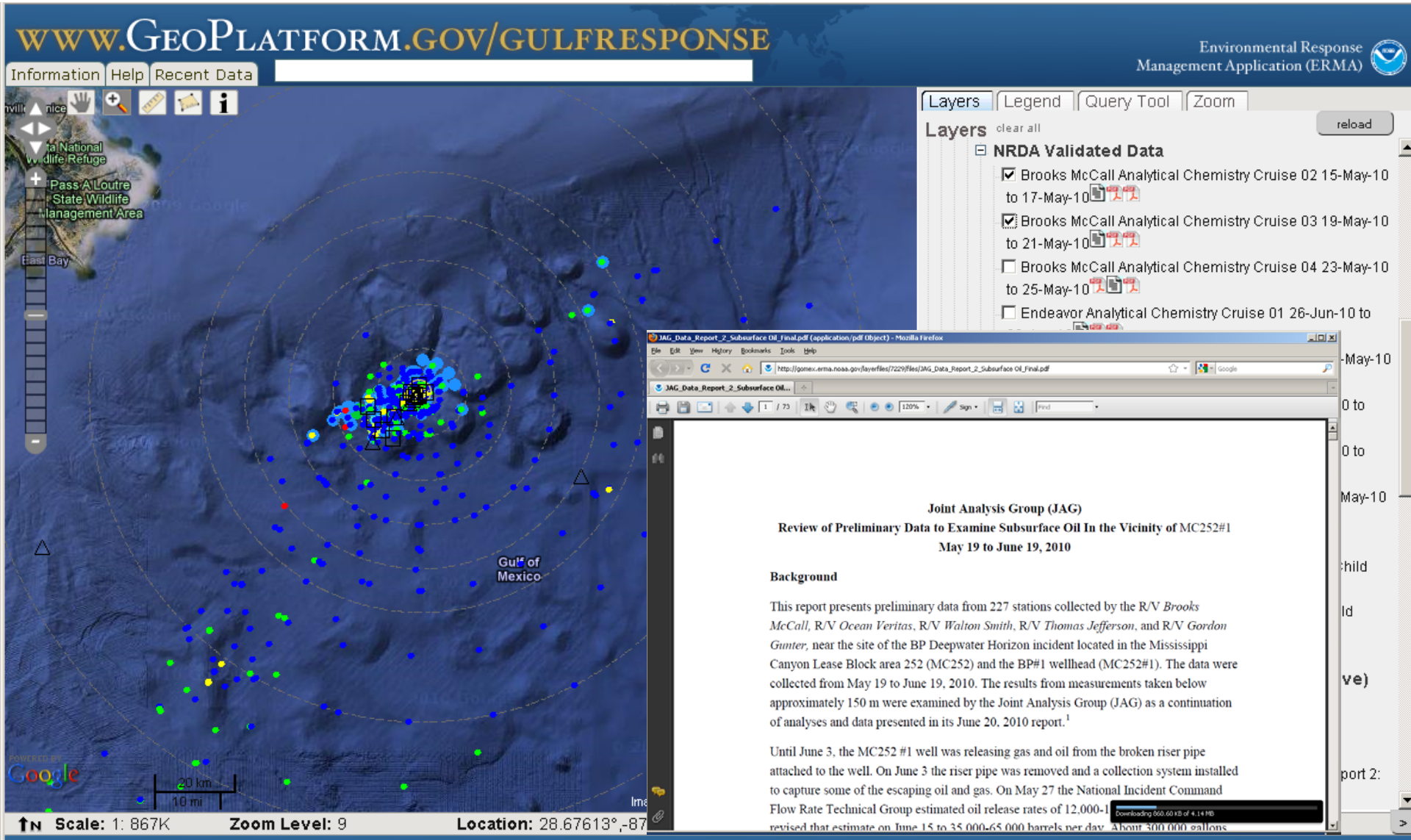


Field Sampling Results



gid	stationid	region	grid_zone	site	jar_label	sample_typ	collection	latitude	longitude	species	species_gr	de
671	3516.00000000	:		99.1002.006	99.1002.006.BC001	Tissue - Muscle	2010-05-05	30.21766667	-88.18033333	blue crab	Shrimp	No
672	3516.00000000	:		99.1002.006	99.1002.006.BC001	Tissue - Hepatopancreas	2010-05-05	30.21766667	-88.18033333	blue crab	Shrimp	No
673	3516.00000000	:		99.1002.006	99.1002.006.SK001	Tissue - Fillet	2010-05-05	30.21766667	-88.18033333	southern kingfish	Fish	No
674	3516.00000000	:		99.1002.006	99.1002.006.ACcomp1	Tissue - Fillet	2010-05-05	30.21766667	-88.18033333	atlantic croaker	Fish	No
675	3516.00000000	:		99.1002.006	99.1002.006.ACcomp2	Tissue - Whole Fish	2010-05-05	30.21766667	-88.18033333	atlantic croaker	Fish	No
676	3516.00000000	:		99.1002.006	99.1002.006.ACcomp3	Tissue - Whole Fish	2010-05-05	30.21766667	-88.18033333	atlantic croaker	Fish	No
677	3516.00000000	:		99.1002.006	99.1002.006.GBcomp1	Tissue - Whole	2010-05-05	30.21766667	-88.18033333	gulf	Fish	No

Link to Data Reports & Documentation

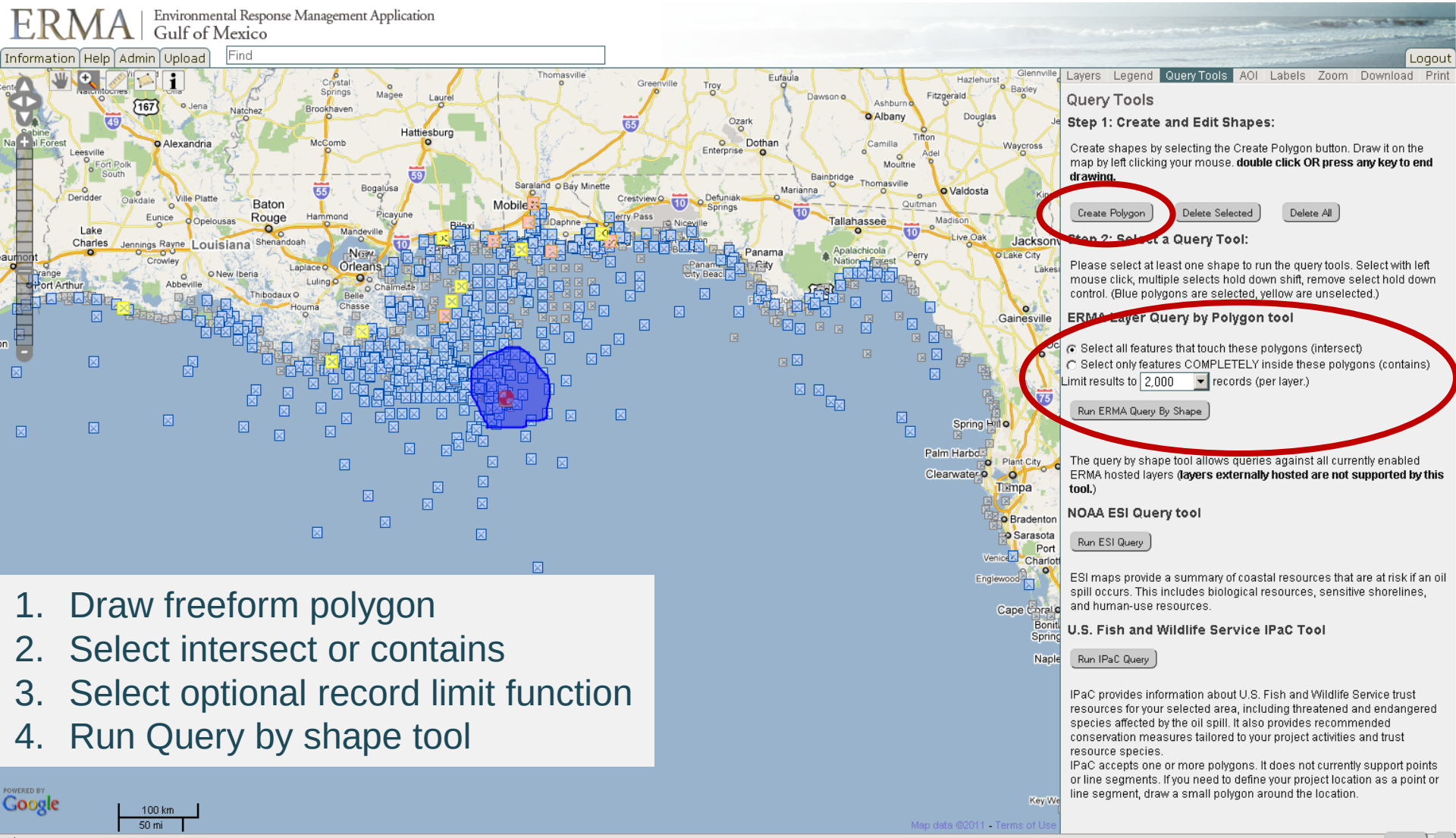


Display of Field Photos

ERMA Query Tools

- **Layer Query by Polygon**
  - **Selects all drawn features**
- **NOAA ESI Query**
  - **Selects All NOAA ESI data**
- **US FWS IPaC Query**
  - **Selects All FWS Species/Habitat data**
- **Return multi-format datasets**
  - **Excel, KML, Shapefile, PDF**

Query by Polygon – Select Area



1. Draw freeform polygon
2. Select intersect or contains
3. Select optional record limit function
4. Run Query by shape tool

Query by Polygon – Results Tables

Query Layers by Polygon Results

Results Summary | Layer 14296 | Layer 14295 | Layer 14297 | Layer 7706

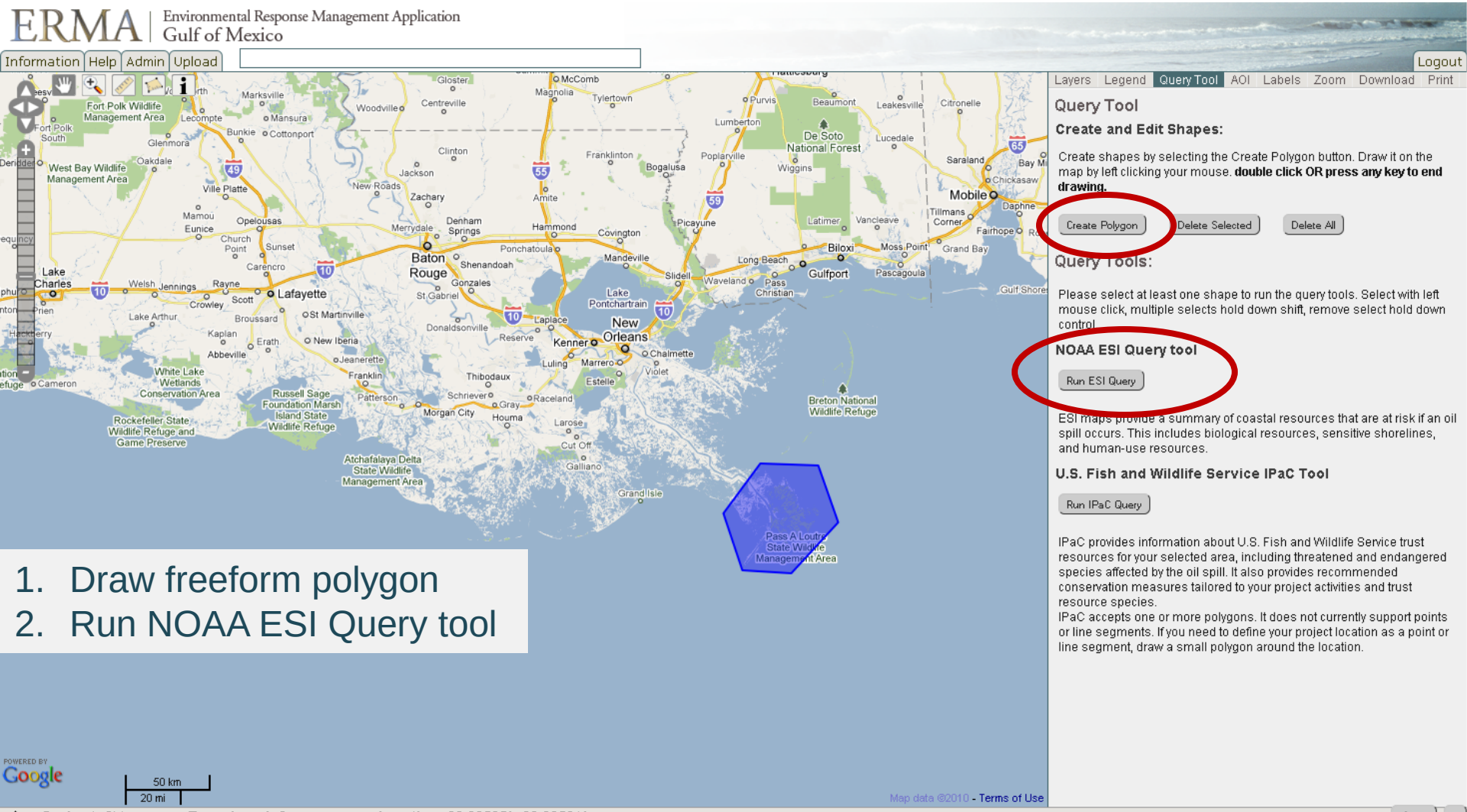
Layer Name	Layer ID	Result Count	Comments	Metadata
Aquatic Life Benchmark Analysis - PAH Detects For All Sediment Samples (06-Dec-2010)	14296	64		Metadata
Aquatic Life Benchmark Analysis - Locations For All PAH Tested Sediment Samples (06-Dec 2010)	14295	68		Metadata
Aquatic Life Benchmark Analysis - PAH Exceedances For All Sediment Samples (06-Dec-2010)	14297	7		Metadata
Aquatic Life Benchmark Analysis - PAH Exceedance Not Consitent with MC-252 For All Sediment Samples	14298	0	Your polygon(s) did not intersect any of the features in this layer, you might consider a larger polygon.	Metadata
Deepwater Horizon Wreckage	7706	1		Metadata

Select your desired extract format Excel KML Shapefile

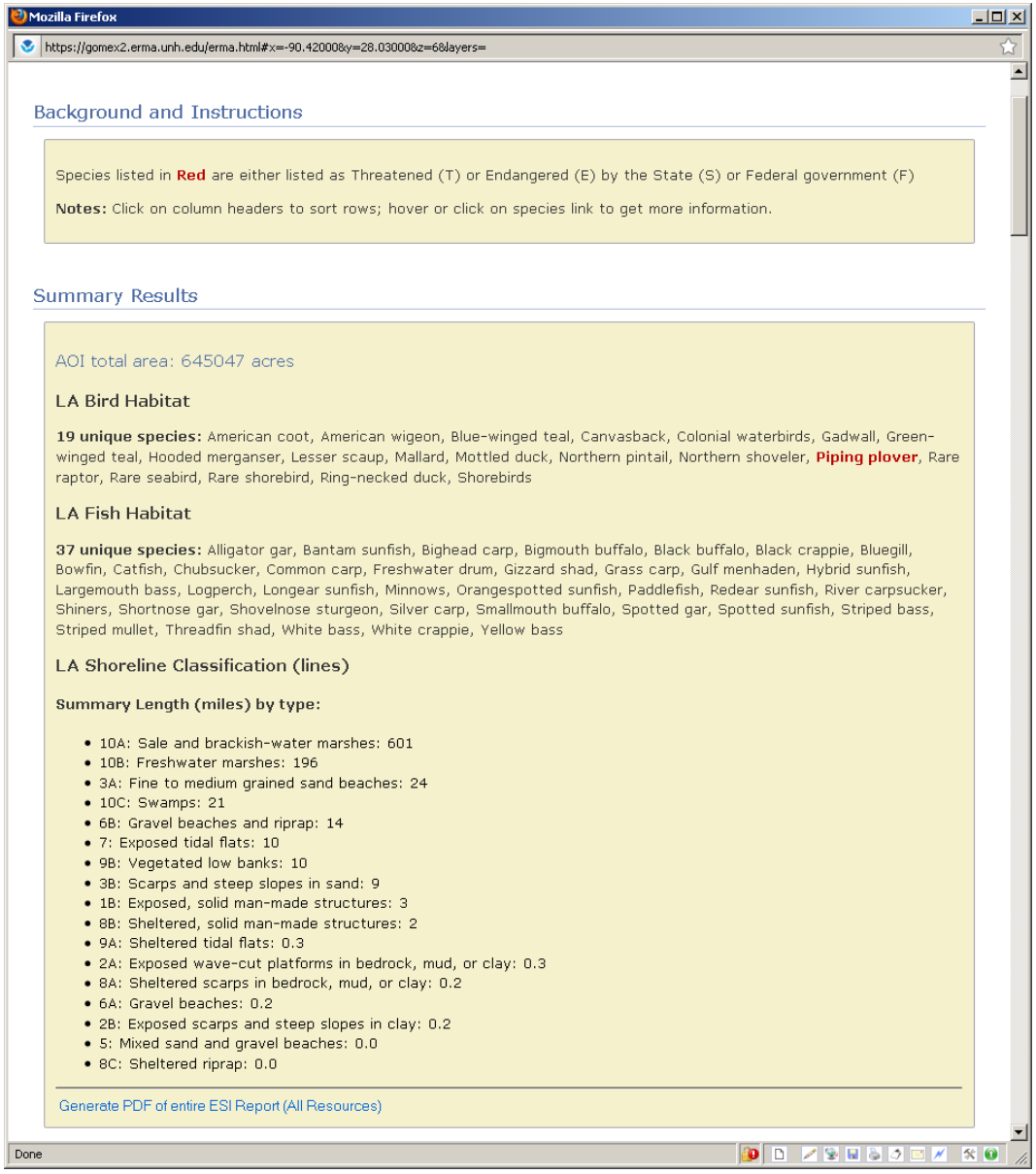
- Summary results for all drawn features
- Complete attributes for each layer selection
- Multiple export formats (excel, KML, shapefile)
- Direct access to metadata-lite and FGDC metadata

Coastal Response Research Center

ESI & IPaC Query Tools – Select Area



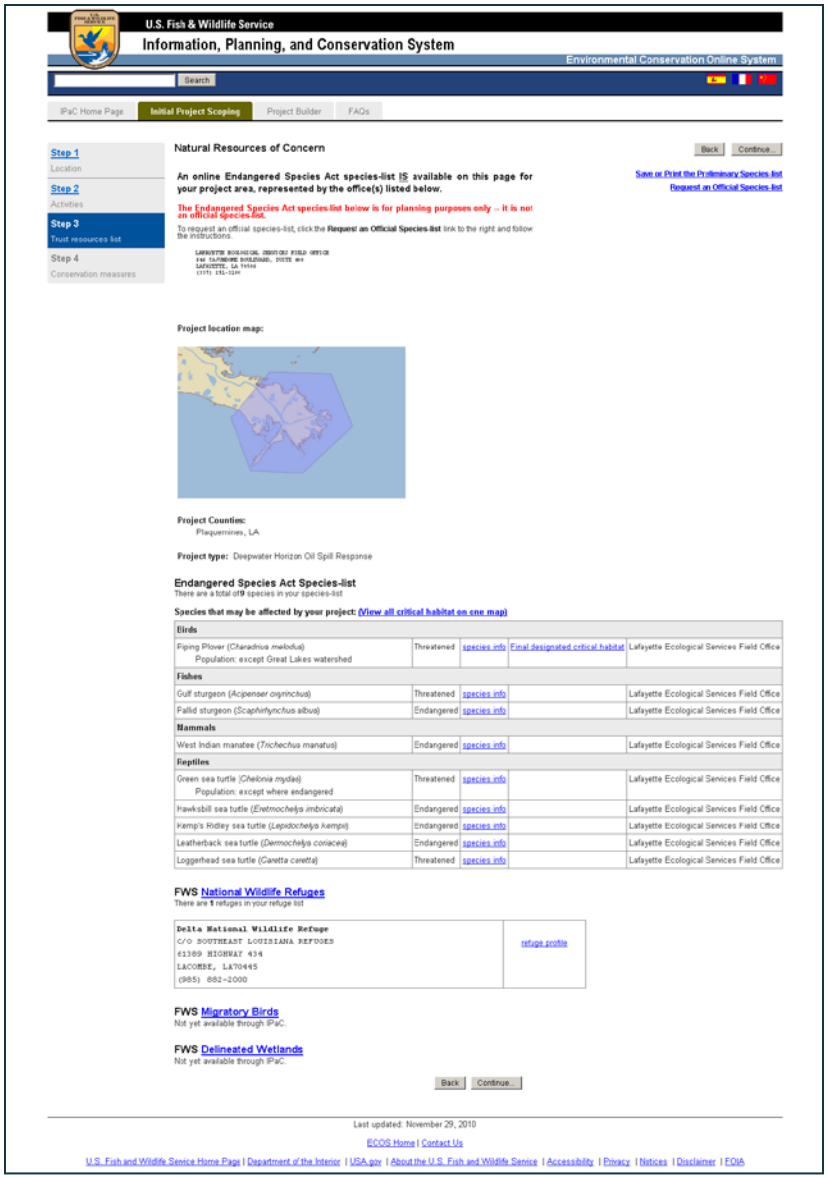
1. Draw freeform polygon
2. Run NOAA ESI Query tool



ESI Query Tool – Report

- Selected Habitat & Species summary
- Shoreline Classification
- Detailed information on species life histories
- PDF, excel file output

Coastal Response Research Center



U.S. Fish & Wildlife Service

Information, Planning, and Conservation System

Environmental Conservation Online System

Search

IPaC Home Page | Initial Project Scoping | Project Builder | FAQs

Step 1
Location

Step 2
Activities

Step 3
Trust resources list

Step 4
Conservation measures

Natural Resources of Concern

Back | Continue...

Save or Print the Preliminary Species-list
Request an Official Species-list

An online Endangered Species Act species-list IS available on this page for your project area, represented by the office(s) listed below.

The Endangered Species Act species-list below is for planning purposes only -- it is not an official species-list.

To request an official species-list, click the **Request an Official Species-list** link to the right and follow the instructions.

LAFAYETTE ECOLOGICAL SERVICES FIELD OFFICE
646 CAJUNDOME BOULEVARD, SUITE 400
LAFAYETTE, LA 70506
(337) 291-3100

Project location map:

Project Counties:
Plaquemines, LA

Project type: Deepwater Horizon Oil Spill Response

Endangered Species Act Species-list
There are a total of 9 species in your species-list

Species that may be affected by your project: (View all critical habitat on one map)

Birds				
Piping Plover (*Charadrius melodus*) Population: except Great Lakes watershed	Threatened	species info	Final designated critical habitat	Lafayette Ecological Services Field Office
Fishes				
Gulf sturgeon (*Acipenser oxyrinchus*)	Threatened	species info		Lafayette Ecological Services Field Office
Pallid sturgeon (*Scaphirhynchus albus*)	Endangered	species info		Lafayette Ecological Services Field Office
Mammals				
West Indian manatee (*Trichechus manatus*)	Endangered	species info		Lafayette Ecological Services Field Office
Reptiles				
Green sea turtle (*Chelonia mydas*) Population: except where endangered	Threatened	species info		Lafayette Ecological Services Field Office
Hawksbill sea turtle (*Eretmochelys imbricata*)	Endangered	species info		Lafayette Ecological Services Field Office
Kemp's Ridley sea turtle (*Lepidochelys kempii*)	Endangered	species info		Lafayette Ecological Services Field Office
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered	species info		Lafayette Ecological Services Field Office
Loggerhead sea turtle (*Caretta caretta*)	Threatened	species info		Lafayette Ecological Services Field Office

FWS National Wildlife Refuges
There are 1 refuges in your refuge list

Delta National Wildlife Refuge C/O SOUTHEAST LOUISIANA REFUGES 61389 HIGHWAY 434 LACOMBE, LA70445 (985) 882-2000	refuge profile

FWS Migratory Birds
Not yet available through IPaC.

FWS Delineated Wetlands
Not yet available through IPaC.

Back | Continue...

Last updated: November 29, 2010

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IPaC Query Tool – Report

- Endangered Species summary
- Detailed information on species life histories
- PDF output

Coastal Response Research Center

User Benefits

- Platform that easily display across jurisdictional boundaries and scaled to area of interest
- Planning and preparedness tool
- Improves data sharing and communication
- Easy to use for non-GIS users
- Real-time data sets overlaid with baseline and operational data
- Access from anywhere via web browser
- Distributed upload capabilities for users
- Flexible query tools to interact with data and other systems
- Customizable for on the fly development

ERMA Functionality and Applications

- **ERMA is designed to:**
  - Assist with spill preparedness
  - Assist in coordinating response efforts and situational awareness
  - Can help to define the extent of potential impacts and NRDA
  - Assist in Recovery and Restoration
- **ERMA can:**
  - Be accessed from anywhere you have an internet connection
  - Visualize data from a variety of sources complete with metadata (including field photos, linked scientific reports, etc.)
  - Tell a story or event history using animated layers
- **ERMA has been:**
  - Designated by USCG Common Operational Picture for DWH
  - The visualization tool for the Subsurface Monitoring Plan
  - The power behind GeoPlatform.gov/Gulfresponse

ERMA DWH Lessons Learned

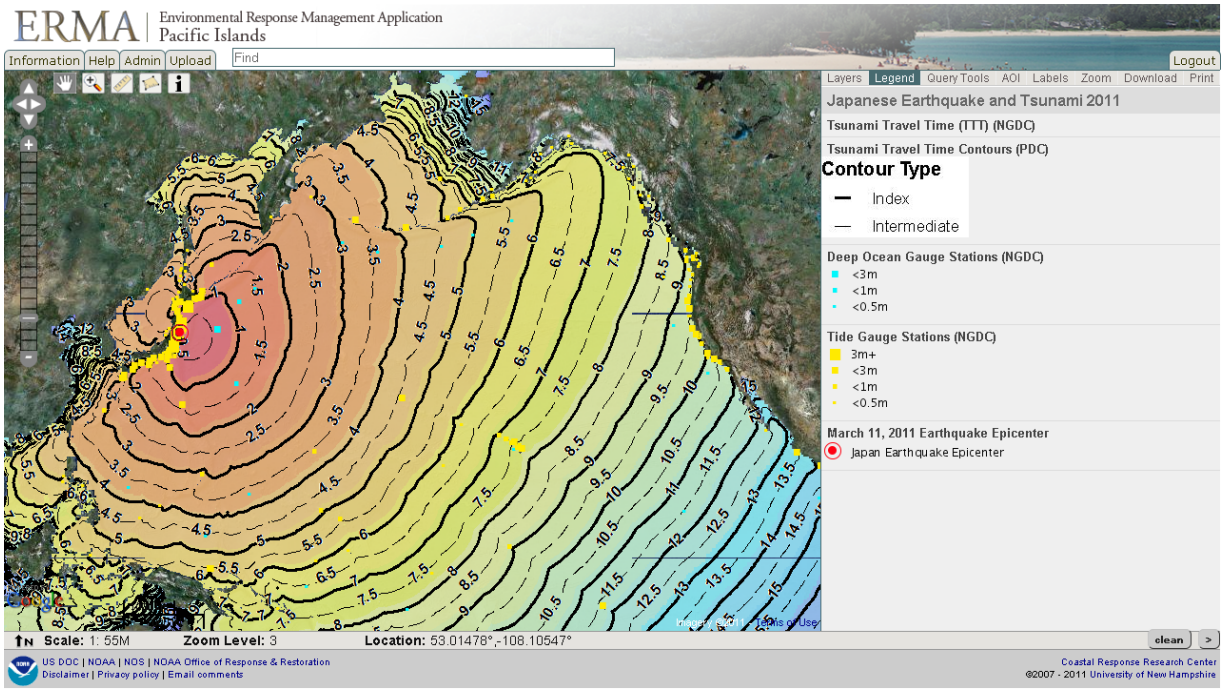
- **Non-technical Interface**
  - GIS background not necessary to navigate
  - "How to" sessions in command posts to socialize ease of use
- **Scalable Access**
  - Quick to stand up foundation
  - Public Facing data needed- Geoplatform.gov/Gulfresponse
  - Varying data access levels based on account type (Public, Responder, NRDA, Trustee)
- **Cost Effective Open Source Software**
- **Customizable Programming & Modular development Public Facing or specialized sites**
  (Climate Change, Wildfires, Marine Debris, Tsunami)

ERMA DWH Lessons Learned

- **Customization & Flexibility is key**
  - **Vessel tracking and asset customization**
  - **Plug & Play with other systems**
    - All systems need to be OGC truly compliant
    - Support various data formats (WMS, GeoRSS, KML, etc)
    - Expansion of Tool Capabilities (IPaC & other agency tool integration, AOI points, Labels, etc.)
    - Additional Functionality
      - Auto-refresh
      - Ship Search
      - Customized reports
    - Download data for desktop GIS project use

Next Steps

- Expanding on DWH experience, implement ERMA for Disaster and Emergency Response
- Pacific Islands/Japan –
  - Site Fast tracked Thursday
  - PI Response site deployed Saturday in the cloud



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Coastal Response Research Center

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Questions?

Come see our ERMA demonstration in the Tools session Tomorrow at 4:00pm