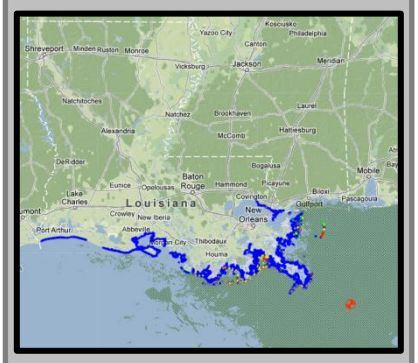
Title: *Vegetation- Finding What's Lost*
Authors: Brandon Coleman and Jason Weick
Organization: Coastal Waters Consortium, GoMRI
Dept.: Marine Education

Background Information

Coastal wetland vegetation is essential to the coastal area because it provides a barrier for the local community, a nursery habitat for juvenile organisms, and a highly productive environment for the marine life. This form of vegetation has a very high potential to come in contact with pollution, originating from inshore or offshore sources, because it is in areas usually separating ocean from land. The most recent and notable offshore drilling incident was the BP Deepwater Horizon oil spill which was responsible for releasing millions of barrels of oil into the Gulf of Mexico and the surrounding coast. Crude oil is toxic to vegetation and when this pollutant is introduced to wetlands, there can be acute and chronic plant loss. Scientists are trying to identify the extent to which the oil has penetrated the coast, so that they can predict vegetation loss.



http://gomex.erma.noaa.gov/erma.html

Louisiana State Standards (Grade-Level Expectations)

SI GLE: Generate testable questions about objects, organisms, and events that can be answered through scientific investigations (SI-M-A1)
Describe how investigations can be observation, description, literature survey, classification, or experimentation (SI-H-A2)
SI GLE: Design, predict outcomes, and conduct experiments to answer guiding questions (SI-M-A2)
SI GLE: Use computers and/or calculators to analyze and interpret quantitative data (SI-MA-3)
SI GLE: Construct, use, and interpret appropriate graphical representations to collect, record, and report data (e.g., tables, charts, circle graphs, bar and line graphs, diagrams, scatter plots, symbols) (SI-M-A4)
Choose appropriate models to explain scientific knowledge or experimental results (e.g., objects, mathematical relationships, plans, schemes, examples, role-playing, computer simulations) (SI-H-A4)
SI GLE: Develop models to illustrate or explain conclusions reached through investigation (SI-M-A5)
Identify and explain the limitations of models used to represent the natural world (SIM-A5)
Use evidence to make inferences and predict trends (SI-M-A5)
SI GLE: Distinguish between *observations* and *inferences* (SI-M-A7)

SI GLE: Identify areas in which technology has changed human lives (e.g., transportation, communication, geographic information systems, DNA fingerprinting) (SI-M-B7)
SE GLE: Explain how the use of different energy resources affects the environment and the economy (SE-M-A6)
SE GLE: Explain how species in an ecosystem interact and link in a complex web (SE-HA7) (SE-H-A10)
SE GLE: Give examples and describe the effect of pollutants on selected populations (SEH-A11)
SE GLE: Determine the interrelationships of clean water, land, and air to the success of organisms in a given population (SE-H-C1)
SE GLE: Relate environmental quality to quality of life (SE-H-C2)
LS GLE: Analyze positive and negative effects of human actions on ecosystems (LS-H-D4) (SE-H-A7)

Ocean Literacy Principles

Principle 5i: Estuaries provide important and productive nursery areas for many marine and aquatic species.

Principle 6b: From the ocean we get foods, medicines, and mineral and energy resources. In addition, it provides jobs, supports our nation's economy, serves as a highway for transportation of goods and people, and plays a role in national security.

Principle 6e: Humans affect the ocean in a variety of ways. Laws, regulations and resource management affect what is taken out and put into the ocean. Human development and activity leads to pollution (such as point source, non-point source, and noise pollution) and physical modifications (such as changes to beaches, shores and rivers). In addition, humans have removed most of the large vertebrates from the ocean.

Principle 7d: New technologies, sensors and tools are expanding our ability to explore the ocean. Ocean scientists are relying more and more on satellites, drifters, buoys, subsea observatories and unmanned submersibles.

Time Requirement

This activity requires minimal setup, but the time may vary depending on internet connectivity (i.e., speed). Teachers should set up the computer(s) or laptop(s) so the students may start on the ERMA page (http://gomex.erma.noaa.gov/erma.html). Depending on the skill level/age of the students, teachers may have to complete the steps 1-3 in the Lesson Description (below).

Materials

Computer or laptop (with internet connection)

Microsoft Word 2007 or 2010

Lesson Description

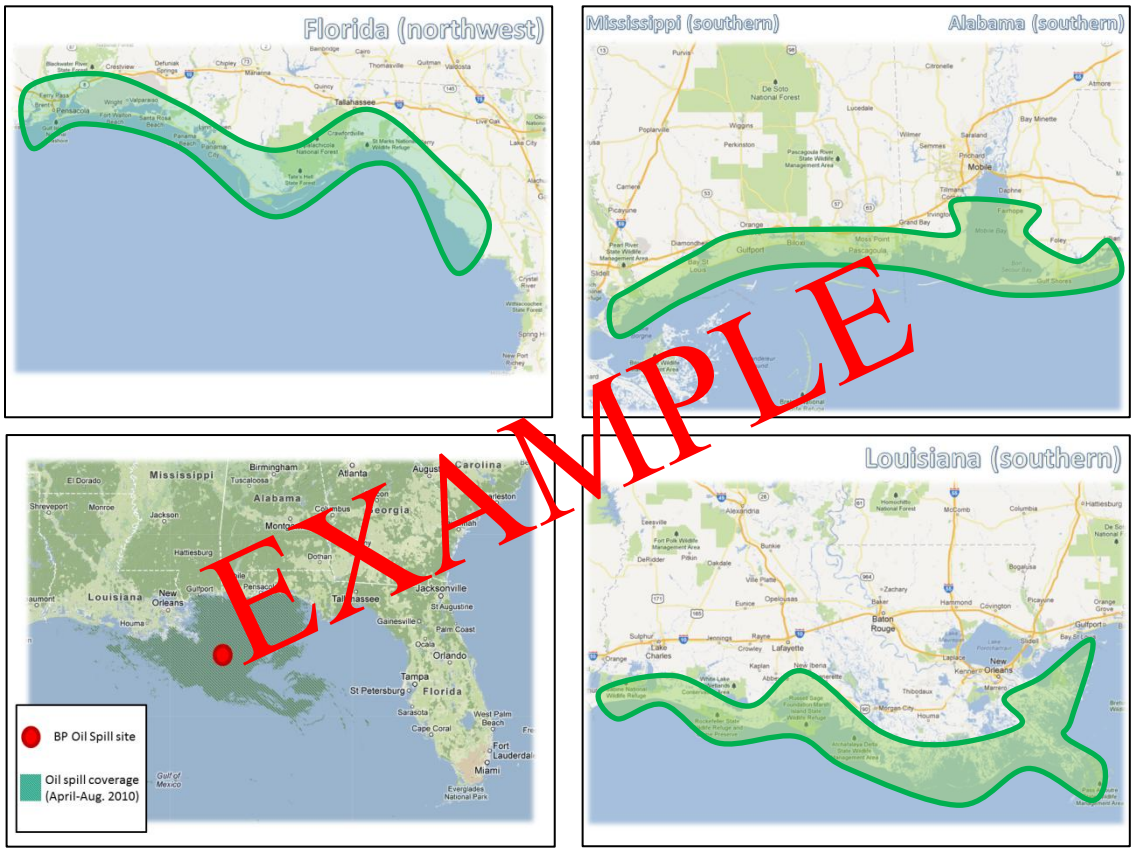
Creating the Vegetation- Finding What's Lost Project

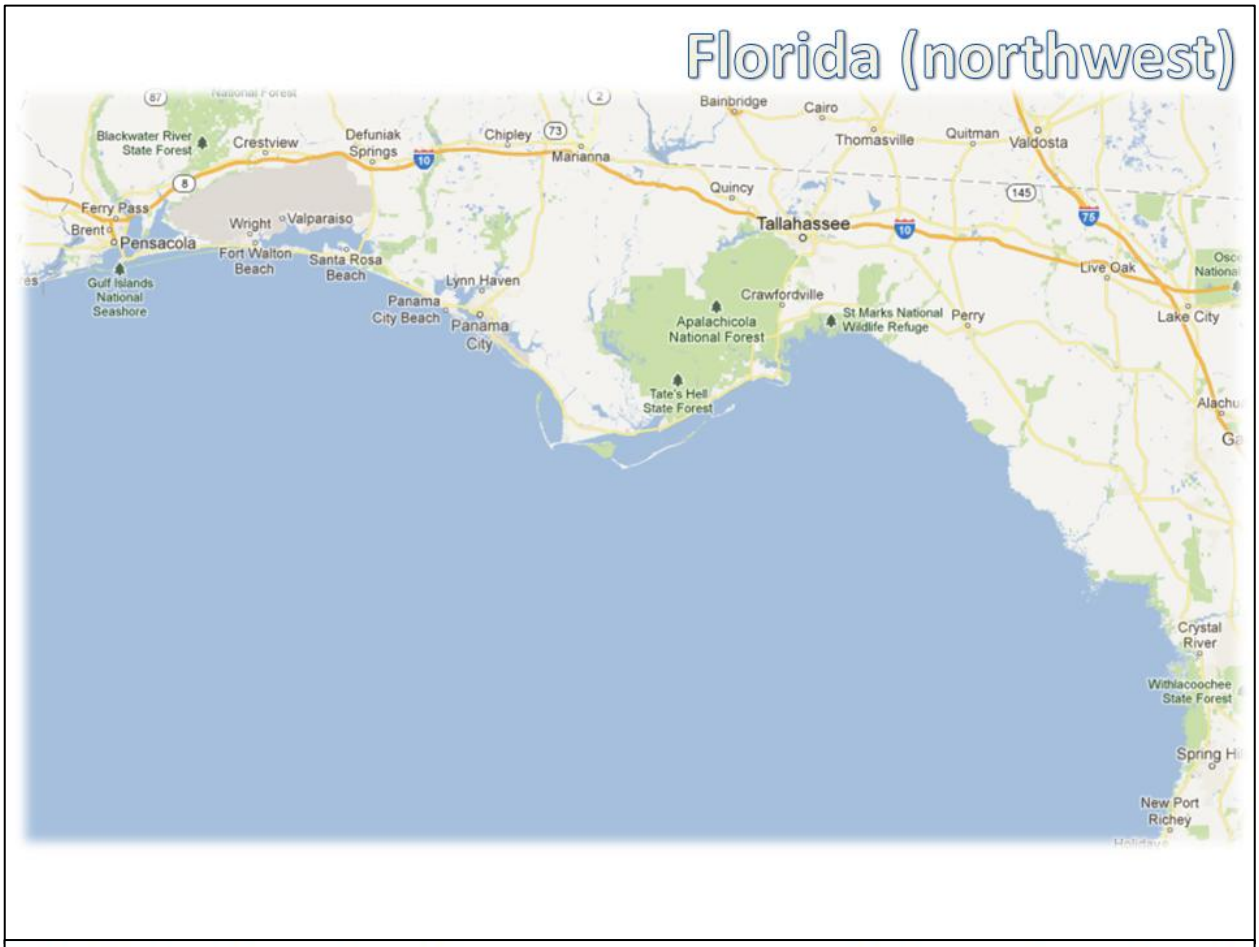
1. Students will go to the NOAA website for the Environmental Response Management Application (ERMA) (http://gomex.erma.noaa.gov/erma.html). This is an interactive web mapping application that allows users to manipulate different data layers on a Google map. Depending on the skill level/age of the students, teachers may have to complete the steps 1-3.
2. Once on the interactive map, click on the BP Deepwater Horizon Oil Spill category to the right. Scroll down and click on SCAT, then Louisiana, and unclick the checked box (10-Mar-13 SCAT Oiling Ground Observations). Depending on the skill level/age of the students, teachers may have to complete the steps 1-3.
3. Scroll further down and click on the Sector Mobile category. Unclick the checked box (12-Mar-13 SCAT Oiling Ground Observations). Depending on the skill level/age of the students, teachers may have to complete the steps 1-3.
4. Scroll all the way to the top and click on the Background category. Select the Google Physical map. This is the last step for the interactive map. Instruct students to observe the oil coverage from the blown BP oil spill (denoted by a yellow circle.
5. Students must zoom in to see the oil impact along the Gulf of Mexico shore, especially Louisiana, Mississippi, Alabama, and Florida. Instruct students to take enough time to see where or how far inland oil contamination has reached.
6. Open Microsoft Word. Allow students to use the pictures below (these pictures can be copied and pasted on a new document or you can 'cut' the whole document page below) to predict vegetation loss for each state due to oil contamination.
7. To make the oil prediction image: Go to the Insert heading at the top of MS Word, click on the Shapes tab, under the Lines category students can either use the Curve or Freeform shapes. Once they are done with the shape(s), have them right-click on the object and scroll to the bottom to select Format Shape. In the Fill section, students may choose a color, gradient, or texture for their layer (this layer symbolizes predicted vegetation loss, due to oil contamination). Once the students choose their 'fill' make sure they set the Transparency to a range between 30-70%. This will allow the object to act as a layer on top of the map image.

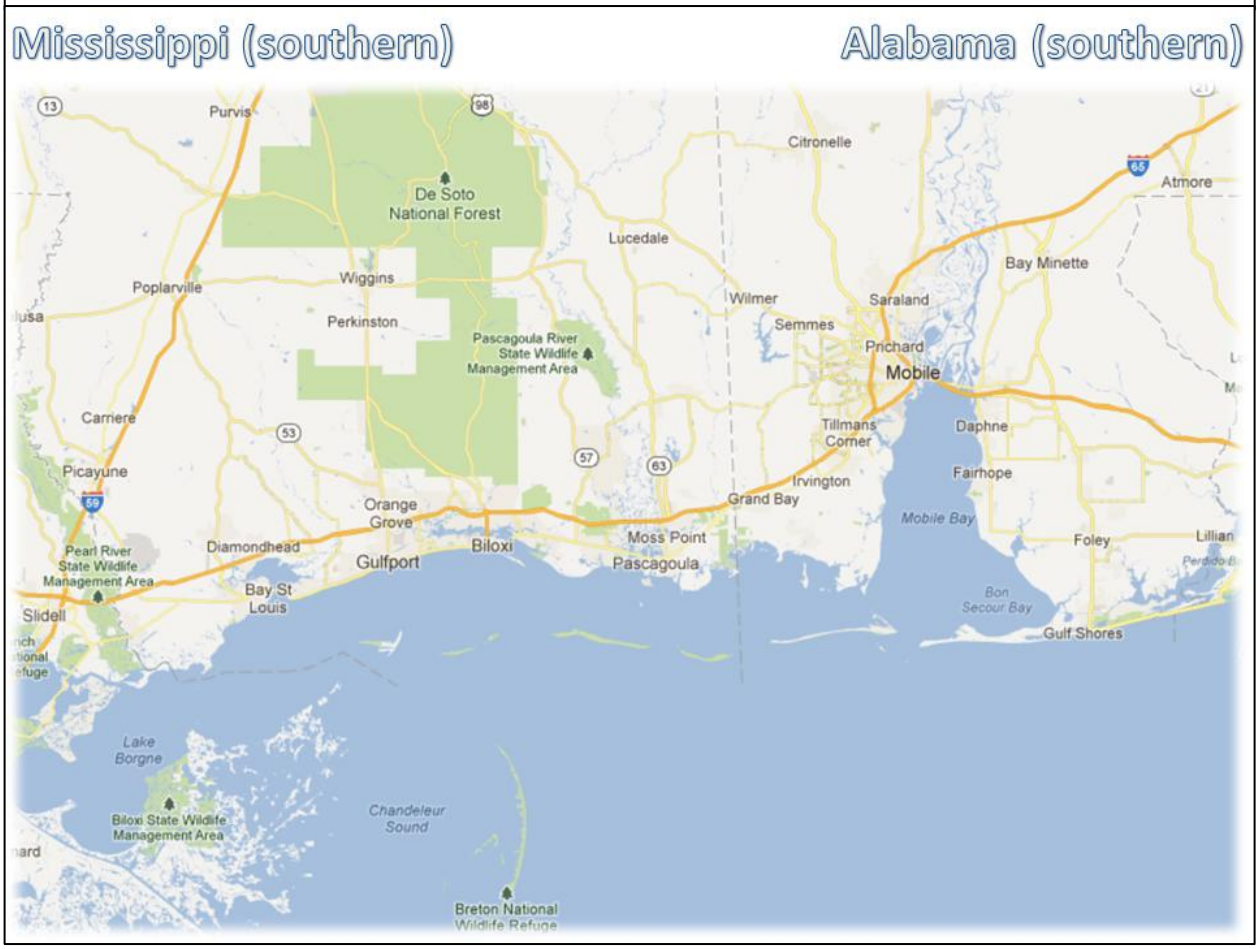
Methodology

The concept of this activity is to predict shoreline erosion (e.g., marsh vegetation loss) along the Gulf States that had noticeable oil contamination along the coast. The students will be reenacting essentially what some researchers are completing present day. The Environmental Response Management Application (ERMA) is an interactive map tool that was generated from a collaboration of environmental agencies that helped perform observations and environmental quality tests within the Gulf of Mexico. It was made to

assist emergency responders and environmental resource managers who deal with problems that affect the environment. Students must infer which regions will lose vegetation based on oil contamination and abundance within a specified area. Students may be able to deduct how other factors may increase or decrease vegetation loss, but that depends on the detail, scrutiny, and time (i.e., attention) paid to the ERMA. Instruct students to create a coverage map using shape manipulations in MS Word.




Florida (northwest)
Blackwater River State Forest
Crestview
Defuniak Springs
Chipley
Marianna
Bainbridge
Cairo
Thomasville
Quitman
Valdosta
Quincy
Tallahassee
Ferry Pass
Brent
Pensacola
Wright
Valparaiso
Fort Walton Beach
Santa Rosa Beach
Gulf Islands National Seashore
Lynn Haven
Panama City Beach
Panama City
Crawfordville
Apalachicola National Forest
St Marks National Wildlife Refuge
Perry
Live Oak
Lake City
Tate's Hell State Forest
Crystal River
Withlacoochee State Forest
Spring H
New Port Richey


Mississippi (southern)
Alabama (southern)
Purvis
De Soto National Forest
Lucedale
Poplarville
Wiggins
Perkinston
Pascagoula River State Wildlife Management Area
Carriere
Picayune
Pearl River State Wildlife Management Area
Slidell
Orange Grove
Diamondhead
Gulfport
Biloxi
Bay St Louis
Moss Point
Pascagoula
Citronelle
Atmore
Bay Minette
Wilmer
Saraland
Semmes
Prichard
Mobile
Tillmans Corner
Daphne
Irvington
Grand Bay
Fairhope
Mobile Bay
Foley
Lillian
Bon Secour Bay
Gulf Shores
Lake Borgne
Biloxi State Wildlife Management Area
Chandeleur Sound
Breton National Wildlife Refuge

Standard Evaluation (Student Deductions)

1. Compare your coverage maps with another student. How do they differ and how are they the same?
2. Did you zoom in as much as you could on the ERMA? How do you think the level of magnification could determine how well you made your coverage map?
3. Botanists are people who study plants; ecologists are people who study the relationships between the environment and living things. Why would botanists have a need for ERMA? Why would ecologists have a need for ERMA?
4. There were other layers that could have been added to the ERMA (e.g., aerial images from planes, currents, hurricane tracker, fishery closures, precipitation, etc.). What is the importance of having all these layers that could possibly go onto the map?

The evaluation can be in the form of a test, essay, questions and answers worksheet, or any other mode of measuring retainment or comprehension of material.