

Understanding the Known Statistics of Disaster Damage and How They Apply in Forecasting the Damage from the Gulf Oil Spill

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Roadmap

- The Anatomy of a Environmental Disaster
- Reflecting Back
 - Exxon Valdez
 - Ixtoc 1
- Deepwater Horizon Spill
 - Background
 - By the Numbers
 - Additional Problems
 - Compromised Ecosystems
 - The Fishing Industry
 - Costs
 - Tourism
- Comparison
- Hurricane Season

The Anatomy of an Environmental Disaster - Damage

- Extensive – Environmental disasters present issues that radiate throughout the environment, government, business and personal lives.
- Long Term – Local economies, ecosystems and government entities can take decades to recover from an environmental disaster. Some environmental damages are permanent.
- Expensive – Testing and remediation of environmental impact alone is very expensive. Major oil disasters present a legitimate threat to fishing, tourism and gulf-reliant economies that easily encompass billions in lost revenue. Governments stand to lose a substantial amount of revenue from lost bed tax and diminished property values.
- Litigation – Environmental disasters create litigation for diminishment of property value, lost profits, personal injury, destruction of natural resources, destruction of business property and lost government revenue.

Reflecting Back - Exxon Valdez



Reflecting Back - Exxon Valdez History

- On March 24, 1989, the oil tanker Exxon Valdez ran aground on the Bligh Reef, causing a breach of the supertanker's hull and a release of oil into Prince William Sound.
- 10.8 million gallons of oil released
- Oil Covered 1,300 miles of coastline and 11,000 square miles of ocean
- Cleanup continues to this day
- Considered the worst oil spill in United States History

Reflecting Back - Exxon Valdez

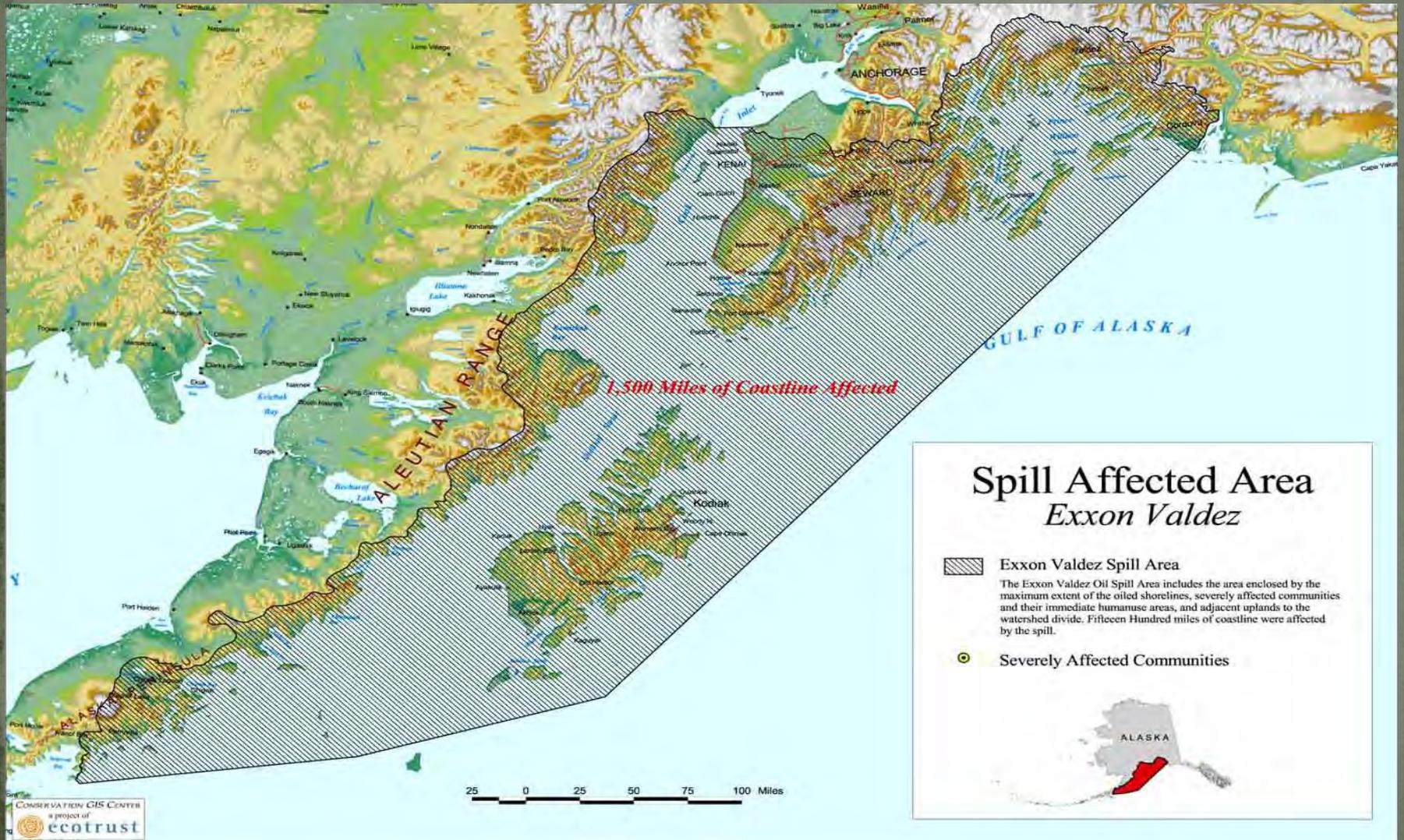
Cost by the Numbers

- \$7 Billion - Total Estimated Cost
- \$3.15 Billion - Total Cleanup and Fine Costs spent by Exxon
- \$300 Million - Economic Harm on Local Communities
- \$31 Million - Costs to Recreational Fishing
- 32,000 - Number of Local Residents Directly Impacted
- 8% - Total Oil Recovered from Spill

Reflecting Back – Exxon Valdez Picture of Spill



Reflecting Back - Exxon Valdez Plume Map



Reflecting Back – Exxon Valdez 20 Years Later

- Oil is weathering away at 3% to 4% per year.
- Oil will be readily detectable for years.
- Bird populations have not recovered, and the oil continues to be a “far ranging” problem for fish and wildlife.



Kim Trust

Science director of Exxon Valdez Oil Spill Trustee Council

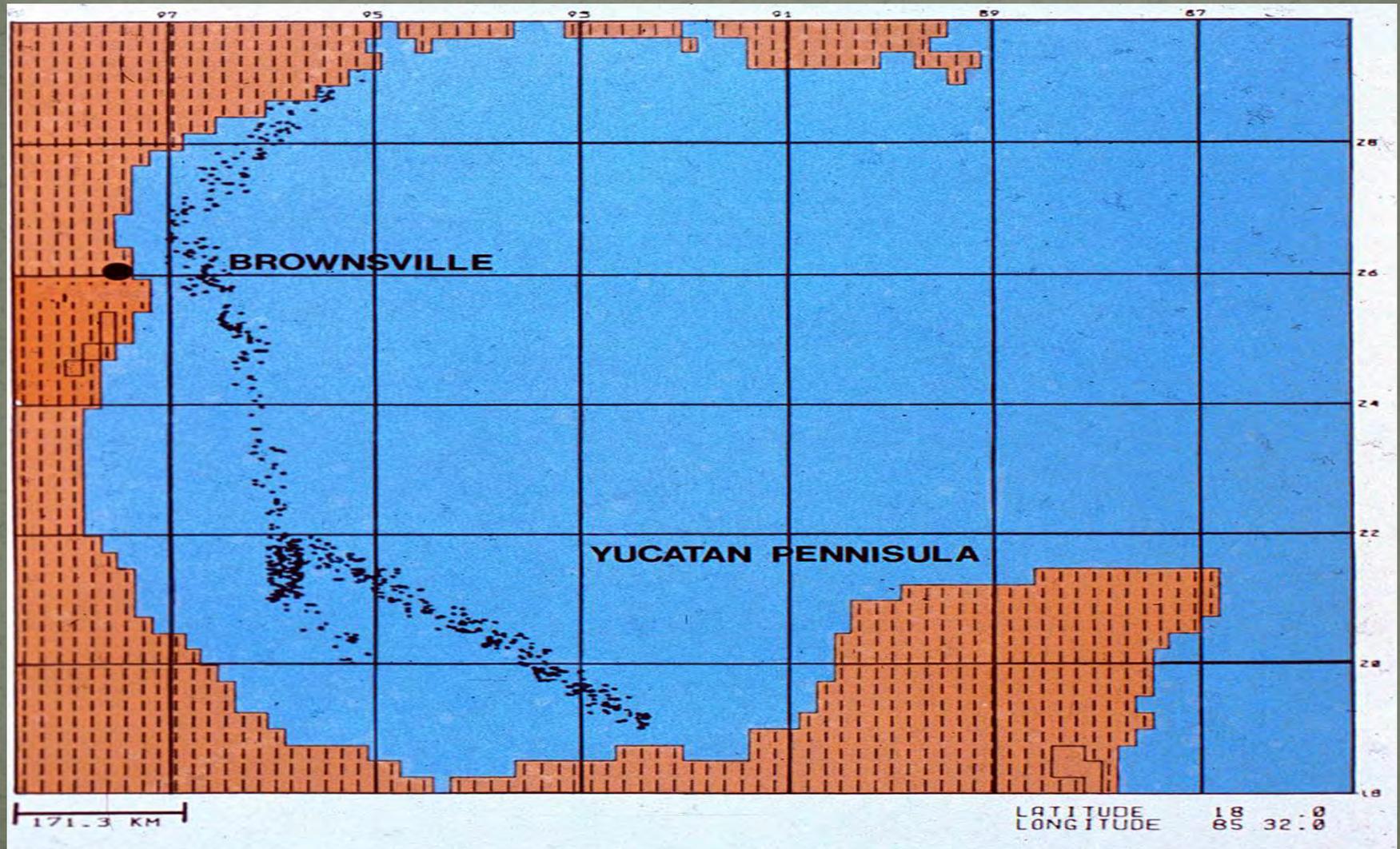
Reflecting Back - Ixtoc 1 Spill



Reflecting Back - Ixtoc 1 Spill History

- June 3, 1979 - Bay of Campeche in the Gulf of Mexico, 62 miles northwest of Ciudad del Carmen, Campeche and 600 miles south of Texas.
- Failure of a blowout preventer causes explosion and oil spill. The platform collapsed into the sea.
- Water depth was 164 feet. The drilling depth at the time of explosion was 11,800 feet below the seafloor.
- Considered the second largest oil spill in history

Reflecting Back - Ixtoc 1 Plume Map



Reflecting Back - Ixtoc 1

By the Numbers

- \$1.5 billion - Estimated total cost of spill.
- \$4 million + - Estimated tourism cost incurred by Texas
- 3 – 5 million - Estimated spill in barrels
- 10,000 – 30,000 - Estimated range of barrels lost per day.
- 162 - Miles of Texas beachfront property affected after the state had 2 months to prepare booms.

- June 3, 1979 - March 23, 1980 - It took nearly a year to stop the leak. Marine life in the affected areas was completely devastated.

- Note: The Mexican Government never released numbers indicating the total damage. We will never know what the exact ramifications of the spill were.

The Deepwater Horizon Oil Spill



Out of Control



The Deepwater Horizon Oil Spill

- Timeline of Events

- April 20: Explosion occurs at 11 p.m. EST.
- April 22: Deepwater Horizon collapses in ocean. No leak expected because platform was an exploration rig.
- April 23: U.S. Coast Guard says no oil leaking from platform
- April 24: Oil leak discovered – estimated to be at 1,000 barrels per day, or 42,000 gallons.
- April 25: Robots fail to stop leak
- April 28: Control burn begins. NOAA announces oil leak is five times worse at 5,000 barrels of oil per day (210,000 gallons).
- April 29: La. Gov. Bobby Jindal issues emergency declaration
- May 1: Booms mobilized. Strong winds stall deployment.
- May 2: President Obama travels to gulf. Offshore fishing in oil spill area closes.

The Deepwater Horizon Oil Spill

- Timeline of Events cont...
 - May 3: BP announces use of chemicals at source to reduce oil spill reach. BP states not responsible for accident, but will pay cleanup.
 - May 4: BP says spending likely limited by Oil Pollution Act cap. BP attaches shut off valve to stop oil flow.
 - May 5: BP caps 1 of the 3 leaks but flow remains. Containment box begins route to leak site.
 - May 6: Oil fumes delay lowering of containment box. Discovery that safety fluid was removed before oil rig exploded.
 - May 7: Oil spill reaches Chandeleur Islands. Containment box placed over spewing oil well.
 - May 8: BP discovers frozen crystals clogging containment box. Measure fails.
 - May 10: BP prepares second, smaller containment box. Discussions amongst drill personnel of natural gas pocket concerns at site prior to explosion surface.

The Deepwater Horizon Oil Spill

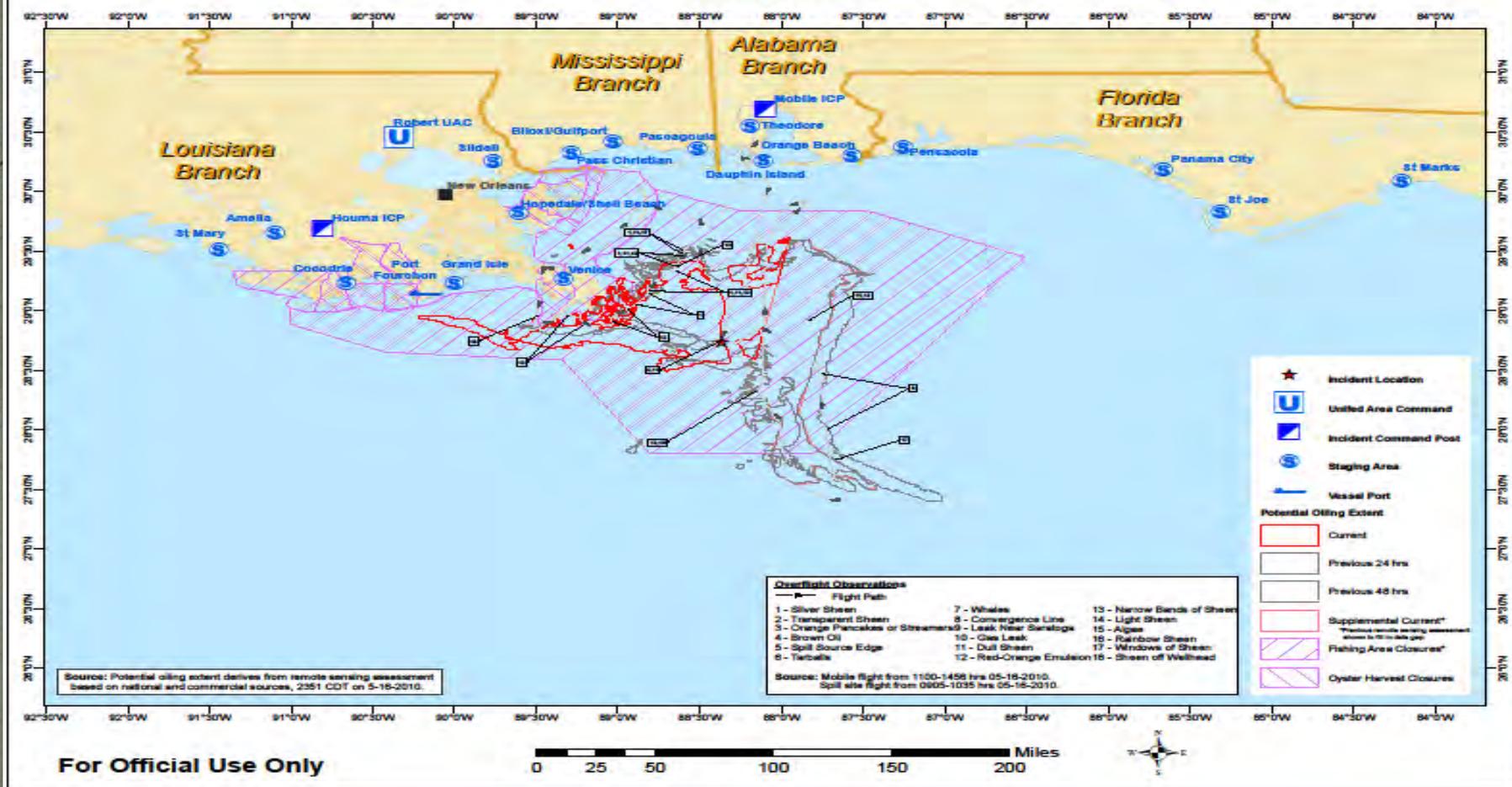
- A Grave Concern



The Deepwater Horizon Oil Spill Trajectory as of May 17, 2010

Deepwater Horizon Incident - Situation Status Map

5/17/2010 0600 Hrs



The Deepwater Horizon Oil Spill

72 Hour Trajectory as of May 16, 2009

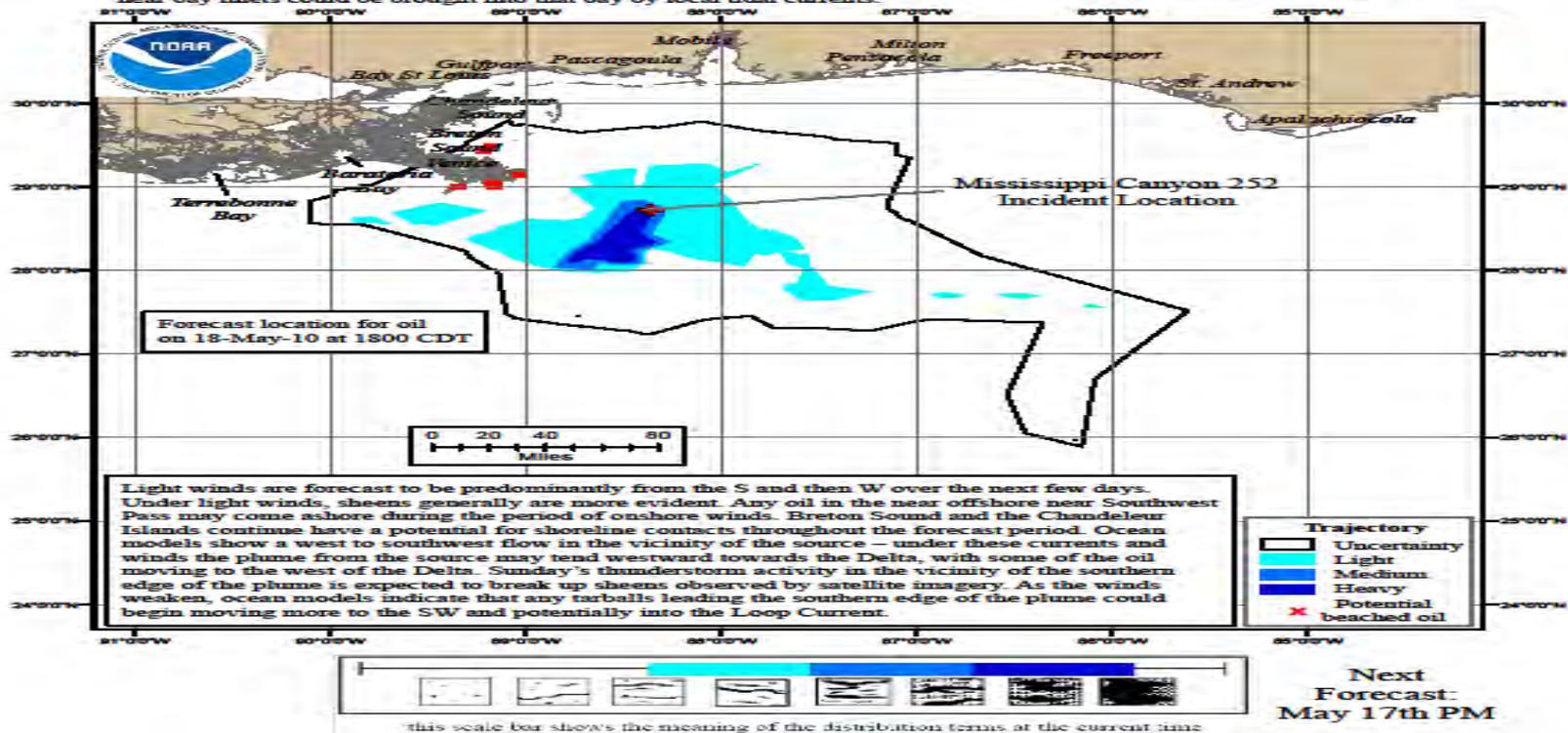
Trajectory Forecast Mississippi Canyon 252

NOAA/NOS/OR&R

Estimate for: 1800 CDT, Tuesday, 5/18/10

Date Prepared: 2100 CDT, Sunday, 5/16/10

This forecast is based on the NWS spot forecast from Sunday, May 16 PM. Currents were obtained from several models (NOAA Gulf of Mexico, West Florida Shelf/USF, Texas A&M/TGLO, NAVO/NRL) and HFR measurements. The model was initialized from Saturday morning satellite imagery analysis (NOAA/NESDIS). The leading edge may contain tarballs that are not readily observable from the imagery (hence not included in the model initialization). Oil near bay inlets could be brought into that bay by local tidal currents.



Deepwater Horizon Spill Observed from the International Space Station



Deepwater Horizon

By the Numbers

- 4 million gallons plus – Estimated leak as of May 10, although officials admit it could be substantially more.
- 5,000 – 7,000 – The Range of barrels that leak into the gulf per day based on various expert estimates.
- 42 – Number of gallons in each barrel of oil.
- 9,000 – Miles of immediate coast line threatened
- 2,500+ - number of square miles the oil spill occupies on the surface
- 4 – Number of state coastlines threatened (Alabama, Florida, Louisiana and Mississippi)

Additional Problems

Dispersant Chemicals

- Toxic at 2.61 ppm, Corexit 9500 dispersant chemicals are being used to battle the oil slick
- Reports suggest Corexit 9500 is nearly 4 times more toxic to humans and wildlife than crude oil, which is toxic at 11 ppm.
- NOAA reports 600,000 gallons of dispersant have been deployed in the Gulf with an additional 280,000 gallons available.
- The Southern Shrimp Alliance has demanded BP cease using the chemical.
- Dispersant chemicals may be causing massive underwater oil plumes not viewable from the surface. This makes oil movement unpredictable and difficult to track.

Additional Problems

Dead Zones

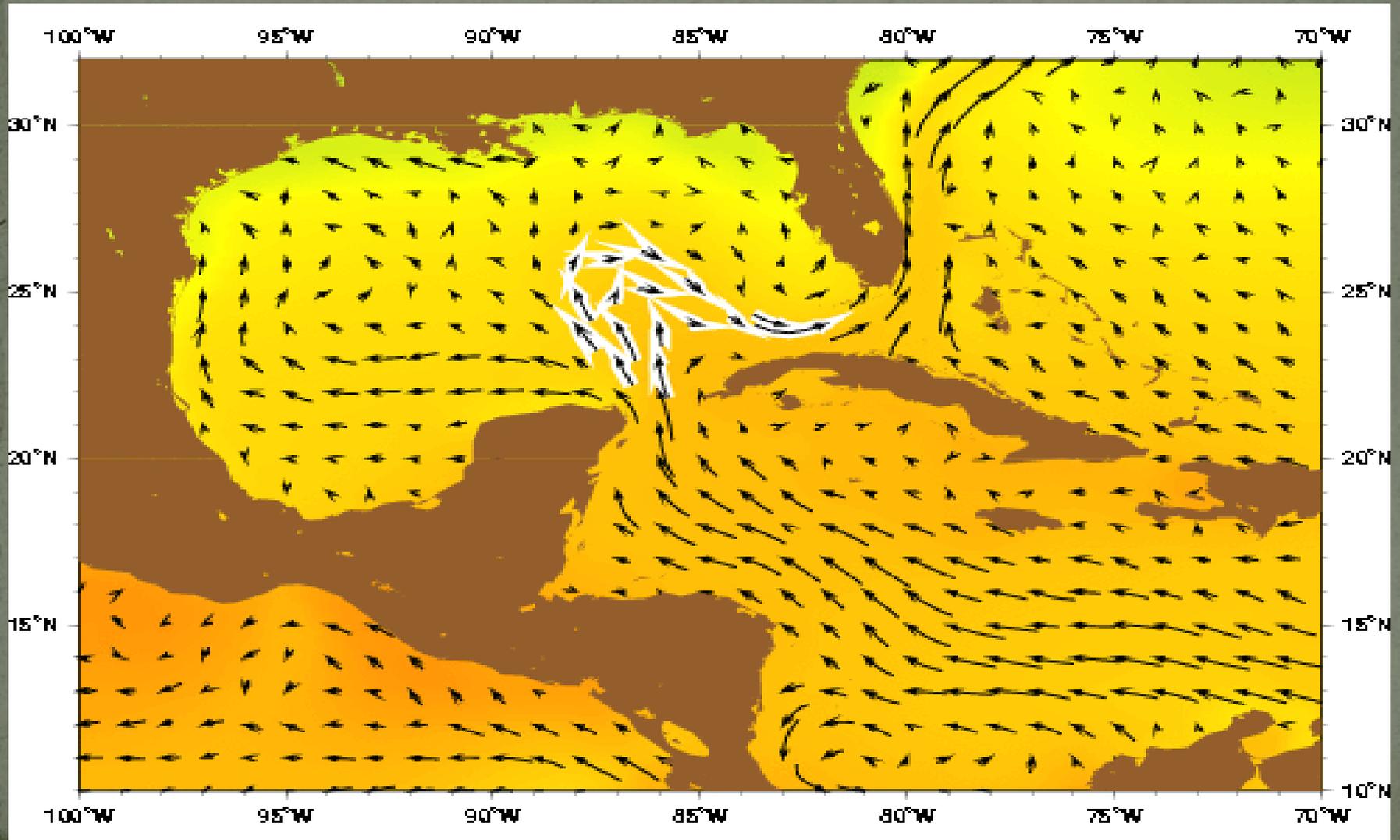
- Tiny organisms feast on the oil slick and engulf a substantial amount of oxygen in the process.
- Dead zones form where the organisms completely deplete the water oxygen levels.
- The lack of oxygen creates zones where no marine life can sustain.

Additional Problems

The Loop Current

- The Northern Gulf of Mexico consists of numerous warm ocean currents that intertwine with colder currents. The result is a large, powerful loop current, with several spin off currents.
- If the oil slick gets into the loop current, the current may pull it around the tip of Florida and up the Eastern seaboard.
- Some experts believe this is already happening.

Loop Current Map



Additional Problems

The Loop Current

- As of Sunday, May 16, the oil slick was located here:

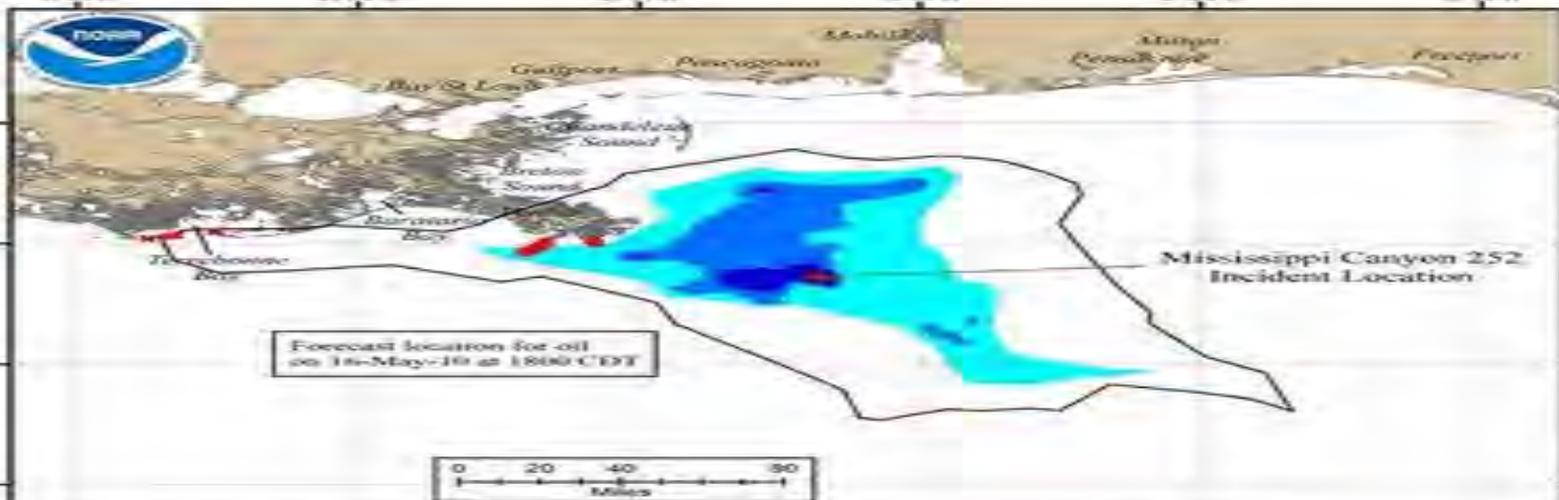
Trajectory Forecast Mississippi Canyon 252

NOAA/NOS/OR&R

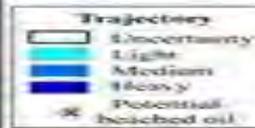
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Winds overnight were slightly stronger than forecast and from the ESE moving the leading edge of the oil towards the Mississippi Delta. Light winds are forecast to be predominantly from the S over the next few days. Under light winds, sheens generally are more evident. Any oil in the near offshore between Terrebonne Bay and Southwest Pass may come ashore during this period of onshore winds. Breton Sound and the Chandeleur Islands continue to have a potential for shoreline contacts throughout the forecast period. Ocean models show a west to southwest flow in the vicinity of the source - under these currents and winds the plume from the source may tend westward towards the Delta, with some of the oil moving to the west of the Delta. As the winds weaken, ocean models indicate the southern edge of the plume could begin moving more to the SW and potentially into the Loop Current.



This color bar shows the mapping of the distribution terms of the forecast.

Next Forecast:
May 16th PM

Comparing the Two

- Look at the bottom edge of the plume ...

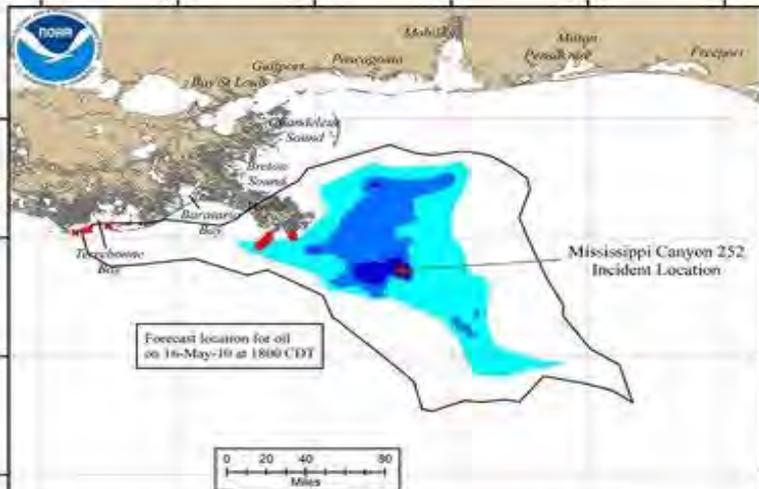
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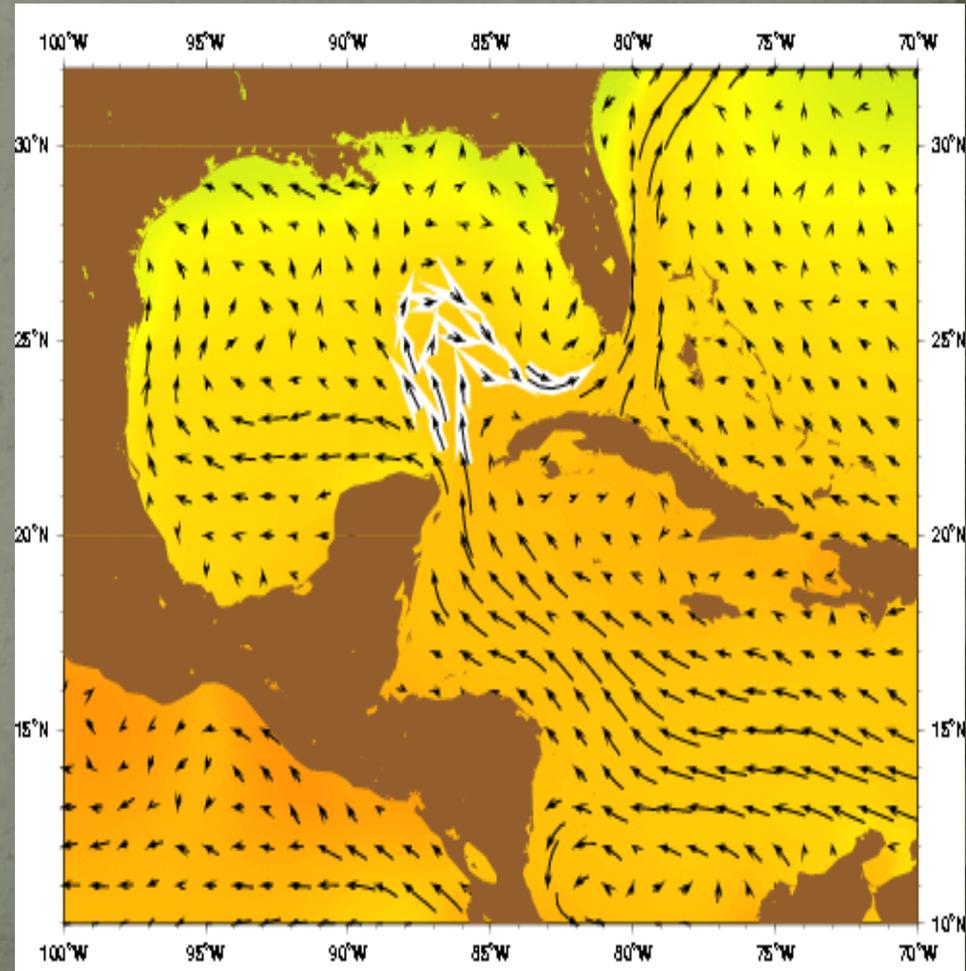


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Trajectory
 □ Uncertainty
 □ Light
 □ Medium
 □ Heavy
 * Potential beached oil



Next Forecast:
May 16th PM



Compromised Ecosystems



Marine Life Threatened By the Numbers

- More than 600 animal species threatened by oil spill
- 445 species of fish and crustaceans, including fishing industry animals such as bluefin tuna, red snapper, tarpon, cobia along with crabs, shrimp, scallops and oysters.



Marine Life Threatened By the Numbers

- 134 species of birds, including pelicans, terns and sandpipers.



Marine Life Threatened By the Numbers

- 45 mammals, including bottlenose dolphins, manatees and various whales.



Marine Life Threatened By the Numbers

- 32 reptiles and amphibians, including severely endangered sea turtles.



Fishing Industry



- Previous oil spills devastated marine life and local fishing industries.
- Cost estimates to the Louisiana fishing industry alone are at \$2.5 billion.

The Gulf Fishing Industry at a Glance

- The Gulf yields more finfish, shrimp and shellfish annually than the South and Mid Atlantic, Chesapeake and New England Areas combined.
- Gulf coast yields 75% of the domestic shrimp output.
- The Gulf beaches are considered the best shelling beaches in America.
- The Gulf contains four of the top seven fishing ports in the nation.
- All of the above are threatened by the oil spill in the Gulf.

Gulf of Mexico Fishing Statistics

- 1.3 billion pounds of commercial fish and shellfish harvested at a value of \$661 million
- Shrimp: Led the nation with 188.8 million pounds valued at \$367 million, accounting for 73% of U.S. total.
 - Louisiana: 89.3 million pounds
 - Texas: 63.8 million pounds
 - Alabama: 17.2 million pounds
 - Florida (west coast): 9.9 million pounds
 - Mississippi: 8.6 million pounds

Gulf of Mexico Fishing Statistics

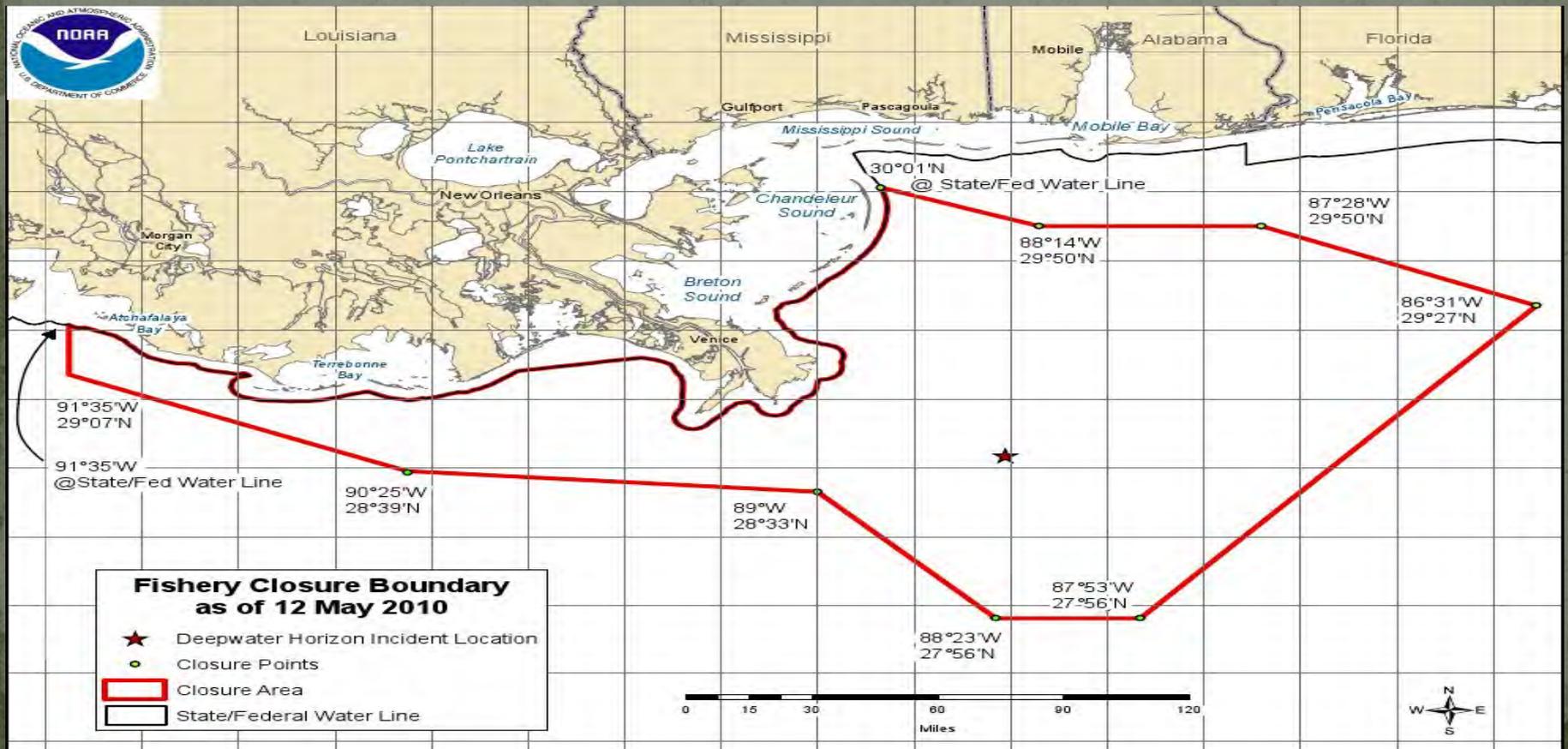
- Oysters: 20.6 million pounds valued at \$60.2 million led the nation and represented 59% of national total
- Recreational Fishing: 24.1 million trips catching 190 million fish with a total weigh in pounds over 73.6 million.

A Way of Life

- For many gulf coast communities, fishing is a family heritage - a way of life.



On May 2nd NOAA closed commercial and recreational fishing in affected federal waters.



COST

- On May 13, BP reported the cost of the oil spill alone had reached \$450 million.
- From May 10 – May 13, BP's costs rose \$100 million.
- The price tag for this spill is increasing \$10,000,000 a day.
- BP has paid \$12 million in temporary payments to small businesses
- BP has made grants totaling \$25 million to the gulf states.
- Shares of BP stock have fallen by about 20% since spill.

Did you know.....

- The money BP has spent in response to the oil spill in the Gulf is minimal compared to the \$5.6 billion profit it made the first quarter this year alone.



Tourism Revenue and Employment

- Tourism to beaches in Alabama, Florida, Louisiana and Mississippi accounts for a \$20 billion industry.



Alabama Gulf Tourism Background

- Baldwin County
 - 4.5 million tourists visit yearly
 - \$2.3 billion tourist revenue generated yearly
- Mobile County
 - 2.7 million visitors a year
 - \$890 million in tourist revenue generated yearly
- 40,000 travel – related jobs

Florida Tourism

- 2,276 miles of beaches and tidal shorelines
- 2009 tourist sector accounted for \$65 billion of state economic activity.
- Florida's local and state governments rely heavily on sales and real estate taxes, which could be directly impacted by damages resulting from the Gulf Oil Spill.
- Initial tourism impact of oil spill estimated at \$3 billion. Obviously, this number could grow.

Florida Gulf Tourism Case Studies

- Escambia County
 - 3.7 million tourists visit yearly
 - 18,000 employed by tourist industries
 - \$1.2 billion tourist revenue yearly
- Bay County
 - At least 7 million tourist yearly
- Walton County
 - 22.3% of work force is employed in leisure and hospitality.
- Okaloosa County:
 - Number 2 travel destination for drive-to tourism in Florida

Louisiana and Mississippi Tourism

- Louisiana and Mississippi coastlines stretch a collective 441 miles.
- Oil spill impact on the two state's fishing industries, major tourist attractions, is expected to exceed \$2 billion.

Comparison to Other Oil Spills

Spill	Volume	Shoreline Impacted	Cost of Spill	Shoreline Composition	Total Impact
<p>Gulf Oil Spill</p> <p>April 20 - present</p>	<p>Unknown. Estimated 4 mil gallons plus. Giant underwater plumes suggest much more.</p>	<p>9,000 miles of immediate coastline. 2,500+ square miles of ocean currently.</p>	<p>Unknown at time. Est. \$10 mil / day to stop leak. Multi-billion tourism and fishing industry threatened.</p>	<p>Deltas, saltwater marshes, pristine beaches, bays, large sea ports, and natural grass beds.</p>	<p>Unknown.</p> <p>Heavily populated area; massive tourism and fishing economy threatened.</p>
<p>Exxon Valdez</p> <p>March 24, 1989</p>	<p>10.8 million gallons.</p>	<p>1,300 miles of shoreline and 11,000 square miles of ocean</p>	<p>\$7 billion total (\$3.15 B in cleanup; \$300 M to local communities). 35% drop in tourism.</p>	<p>Rocky coves</p>	<p>Sparsely populated area (32,000 affected); devastated marine life food chain.</p>
<p>Ixtoc 1 Spill</p> <p>June 3, 1979 - March 23, 1980</p>	<p>3 - 5 million barrels estimated. 2nd largest spill in history.</p>	<p>162 miles of Texas shoreline. Mexican coast severely impacted.</p>	<p>\$1.5 billion estimated. \$4 million plus in tourism lost in Texas.</p>	<p>Bays, lagoons, and beaches.</p>	<p>Leak lasted nearly a year in 164 feet of water. Marine life and coast lines devastated.</p>

What this Chart Tells Us

- The Gulf Oil Spill already rivals, and in many respects, could surpass previous major oil spills in volume.
- The Gulf Oil Spill may already dwarf previous cleanup and economic costs associated with other major spills.
- The Gulf Oil Spill will affect more populated areas
- It took 1 year to plug the Ixtoc 1 leak in 164 feet of water. The current spill is 1 mile below the surface.
- Fishing, tourism and local economies stand to be more severely impacted in the current spill due to greater populations and a more sensitive environment.
- Marine life will be devastated.

The Wildcard

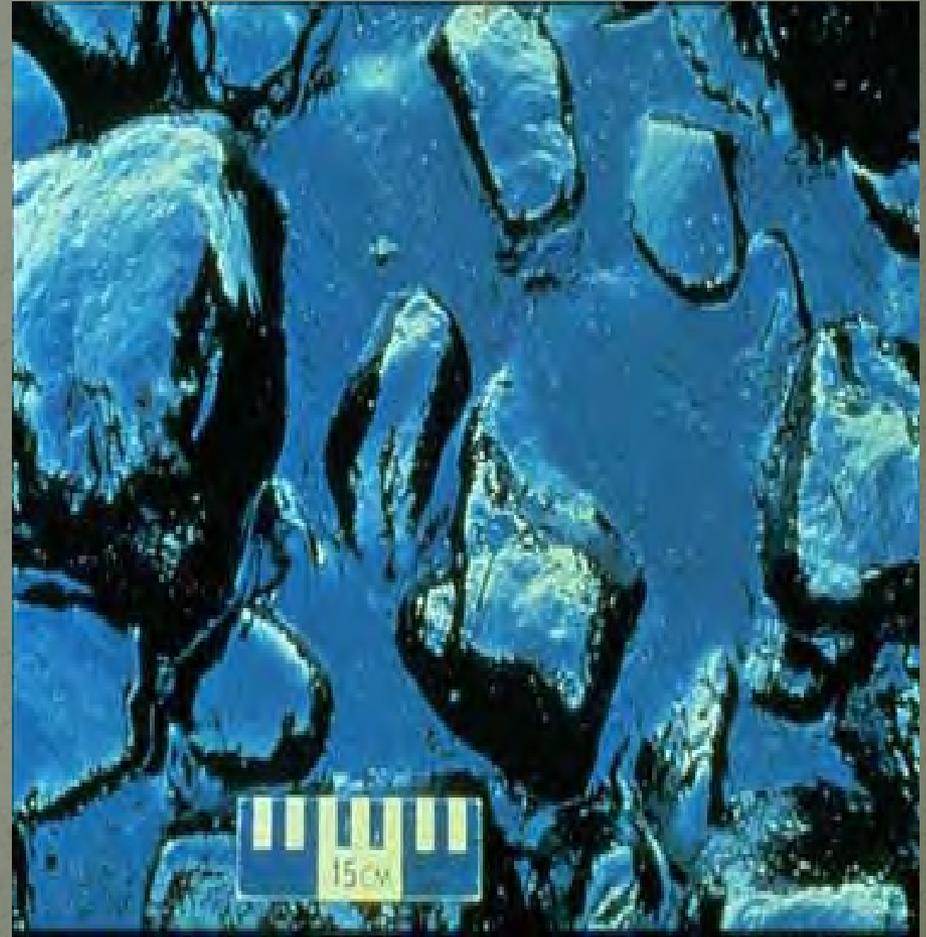
Only Weeks from Hurricane Season

- The Gulf Spill is located in hurricane alley



Reflecting Back on Exxon Valdez

- Storms pushed large quantities of oil onto the beaches in Exxon Valdez, forming the pooled oil shown to the right.
- A hurricane could theoretically push the oil deep into the gulf coast line and devastate local habitats further.



The Unknown

- Currently, the oil leak has not been rectified.
- Past oil spills indicate marine life and local economies will be devastated by the spill.
- In the interim, the tourism, real estate, and fishing industries will be impacted the greatest.
- Long term impact will depend on a couple of key factors:
 - How long the leak continues
 - Whether the loop current exposes additional coastlines to oil
 - Impact of hurricane season
 - Long term affects of dispersant chemicals.
- Expect long term damage and costs in the tens of billions.

Government Help is On the Way

- “We don’t wash our face in it, but it doesn’t stop us from jumping off the boat to ski.”
 - Governor Haley Barbour of Mississippi, likening much of the oil spill to gasoline sheen commonly found around ski boats.
- “From time to time there are going to be things that occur that are acts of God that cannot be prevented”
 - Governor Rick Perry of Texas, suggesting the oil spill was just an act of God and is being “politically driven”



In All Seriousness

BP Comments on Spill Over Time

- April 23: There is no oil spill ... nothing to see here.
- April 24: Well ... there is a spill, but its only 1,000 barrels of oil per day.
- April 28: Actually – looks like it is 5,000 barrels.
- May 14: (After experts suggest the leak could be up to 100,000 barrels per day) “We’ve said all along that there’s no way to estimate the flow coming out of the pipe accurately,” said BP spokesman Bill Salvin.

BP CEO Tony Hayward on May, 14:

The Oil Spill is
“relatively tiny”
compared to the
“very big
ocean”

