

# Oil Shoreline Interactions: Deepwater Horizon

SETAC Boston, November 2011

**Erich Gundlach, Ph.D.**

*E-Tech International Inc.*

New York, USA

*ErichEti@cs.com*



[www.Oil-Spill-Info.com](http://www.Oil-Spill-Info.com)

## What's Going On

### Shorelines

#### ➤ Sandy Beaches and Marshes

### Louisiana Sand Berm Project

# Current Status: Nov 2011 – Not Over

## ❑ Working on the Response

- 1,786 people
- 328: equipment (17 Aug)

## ❑ SCAT Teams:

- 6= FL, AL, MS
- 1 = Snorkel SCAT (East)
- 6 = LA

## ❑ Shoreline:

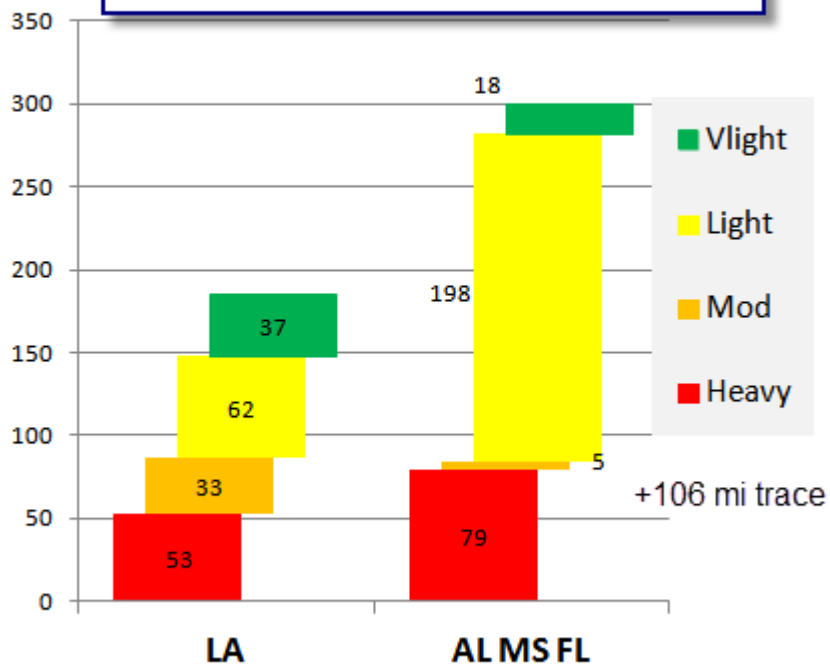
- Stage 3: 5 miles (Being worked Daily)
- Stage 4: 290 miles (Monitoring and Cleaning if oil found)



Source: JIC, Michel, NOAA as of 5 Nov 2011

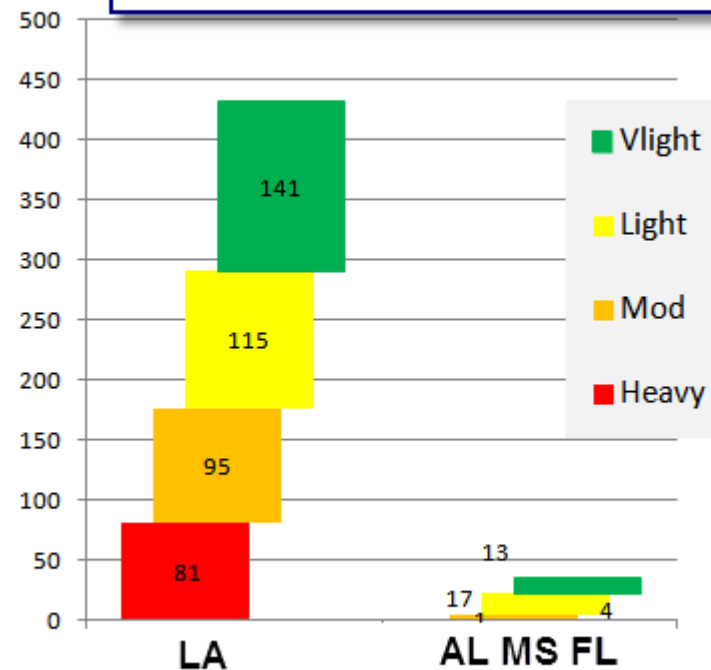
# Total Ever Oiled: 1,089 miles (5 Nov 11)

## Beach Oiling: 485 mi



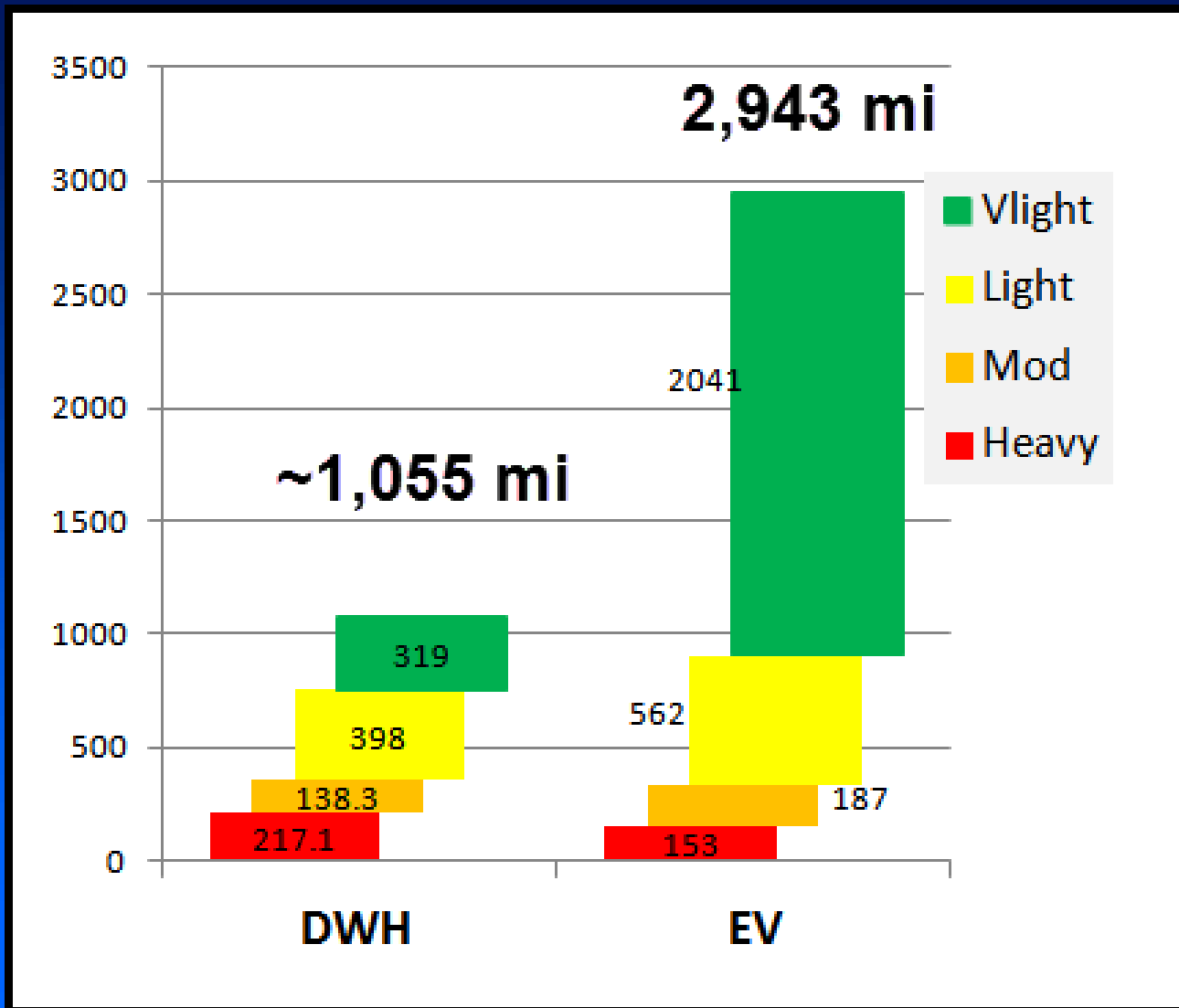
Owens et al. 2011

## Marsh Oiling: 465 mi



Zengel and Michel, 2011

# Shoreline Oiling Compared to *Exxon Valdez*



## 'Heavy' Category – Exxon Valdez



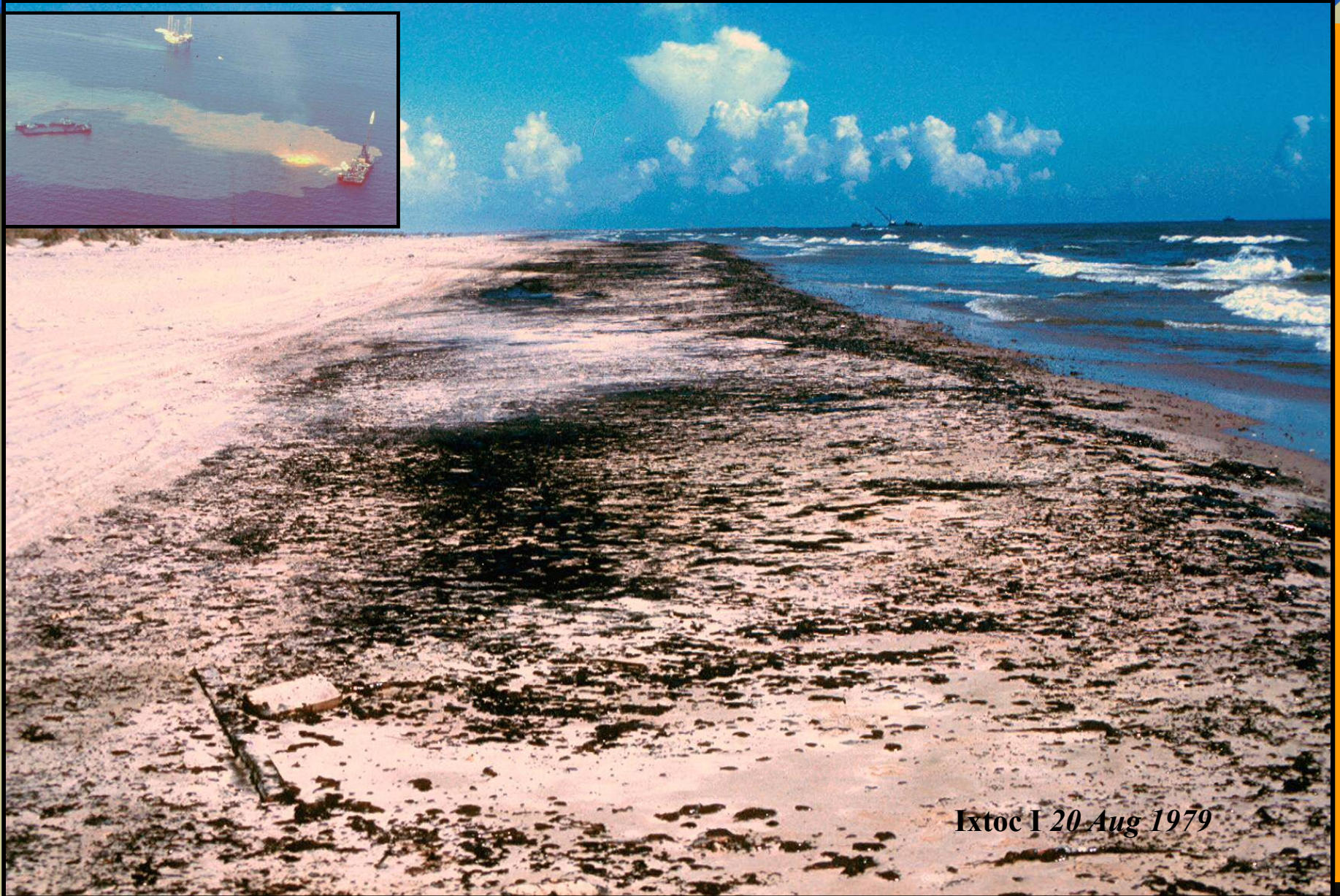
*Exxon Valdez. 9 Apr 1989*

## Heavy Category: *Alvenus* (Texas, 1984)



*Alvenus. August 1984*

# Heavy Category: Ixtoc I



*Ixtoc I 20 Aug 1979*



## Deepwater Horizon - Comparison



South Pass beach, LA  
21 May 2010 NOAA

## Deepwater Horizon - Comparison

Pensacola Beach  
23 June 2010



Photo: M. Barron

# Moderate and Heavy Categories DWH

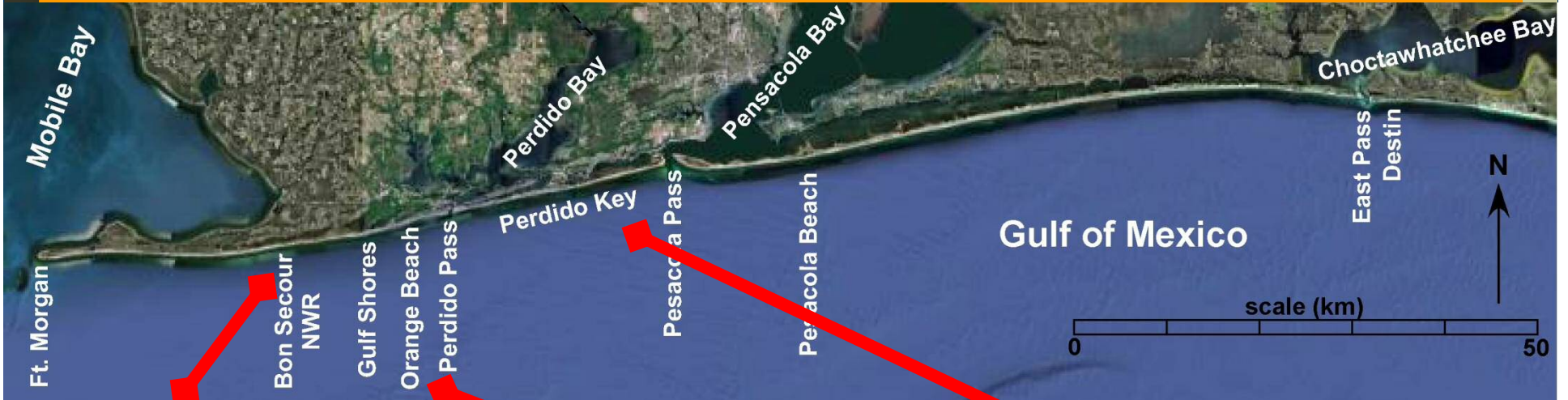
**HEAVY - >3 feet wide and >50% distribution**



**MODERATE - >6 feet  
wide and <50%  
distribution**

SCAT Oiling Categories MC-252

# East of Mobile Bay – Active Oiling (to ~July 2010)



**Oil Mats – Bon Secour NWR**



**Orange Beach, AL**



**29 June 2010**

**Eastern Perdido Key  
29 June 2010**



**Deepwater Horizon**

From: Parham, 2011

# Migrating berms, deep burial (~June-July 2010) .



Overwash into supratidal – 27 June 2010 Horn Is., MS



Burial averages 20 to 50 cm beneath berm crest



8 Sep. 2010 Gulf Shores, AL

From: Parham, 2011

# Wind exposed heavier oil lag deposits (to ~Jan 2011).



# Winter (Jan-Mar 2011) - shoreline and oil erosion

West Ship Is. 7 Oct 2010



West Ship Is. 31 Jan. 2011



From: Parham, 2011

# Seen before: Ixtoc I (Sep 1979)





# Feb 2011: NEBA Analysis of Need for Cleanup

- ❑ Highly weathered: 86-98%
- ❑ Minimal risk to groundwater
- ❑ Below EPA risks to health
- ❑ Aquatic and wildlife will likely be more affected by cleanup than the oil

Operational Science Advisory Team (OSAT-2)  
Gulf Coast Incident Management Team



## SUMMARY REPORT FOR FATE AND EFFECTS OF REMNANT OIL IN THE BEACH ENVIRONMENT

Prepared for  
Lincoln D. Stroh, CAPT, U.S. Coast Guard  
Federal On-Scene Coordinator  
Deepwater Horizon MC252

February 10, 2011

## Throughout 2011: Work continues

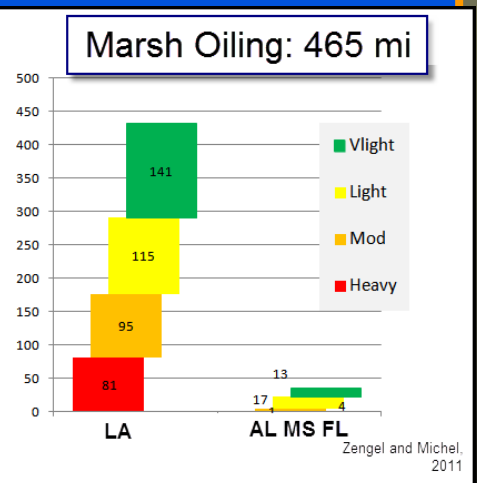
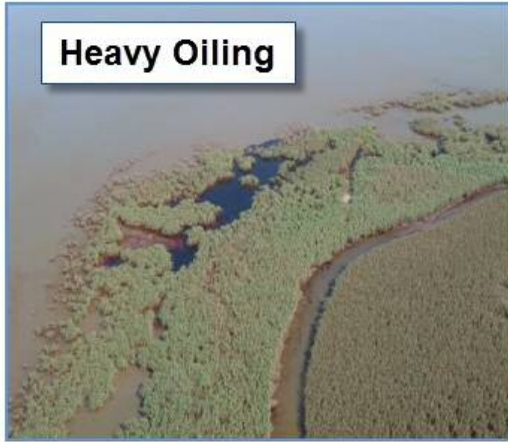
**Public demand / perception dominate.**







# Marsh Oiling



## Cleanup – Keep Out of the Marsh

- ❑ Most oiling along marsh fringe.
- ❑ May – September 2010: recovery adjacent to marsh.
- ❑ At end of re-oiling stage:
  - Very Light – Moderate Marshes = No additional treatment.
    - Naturally cleaned by wave and tidal action
  - Heavily Oiled (Barataria Bay): hard tarry debris mat (>10 cm)



Zengel and Michel, 2011

# Oil Debris Removal – Barataria Bay

## AFTER TESTING

Raking and Cutting = Preferred Technique (initiated Feb 2011)

Tested: flushing, surface washing agents, raking, cutting in various combinations.



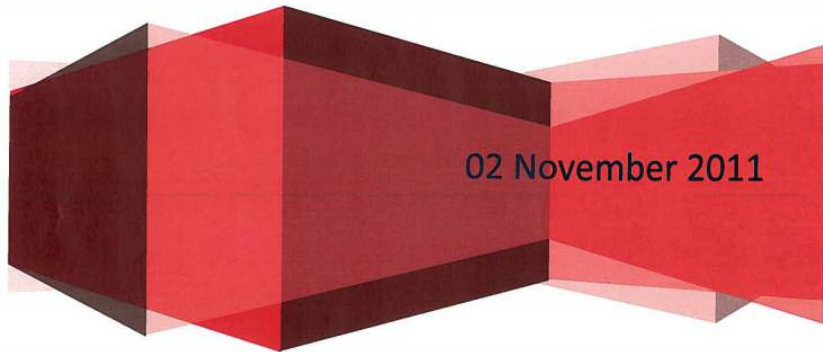
OnwingsofCare.org 6 May 2011

# An End in Sight?

## Deepwater Horizon

### Shoreline Clean-up Completion Plan (SCCP)

Unified Command - SCCP Core Group



02 November 2011

## 5. Shoreline Clean-up Endpoints

The following tables identify the Eastern States Shoreline Clean-up Endpoints. Shoreline type is as defined in the relevant STR.

Shoreline Type	Surface Oil	Subsurface Oil
Residential and Amenity Sand Beaches	No visible MC-252 oil,  or  as low as reasonably practicable, considering the allowed treatment methods and net environmental benefit	No visible MC-252 oil,  or  as low as reasonably practicable considering the allowed treatment methods and net environmental benefit

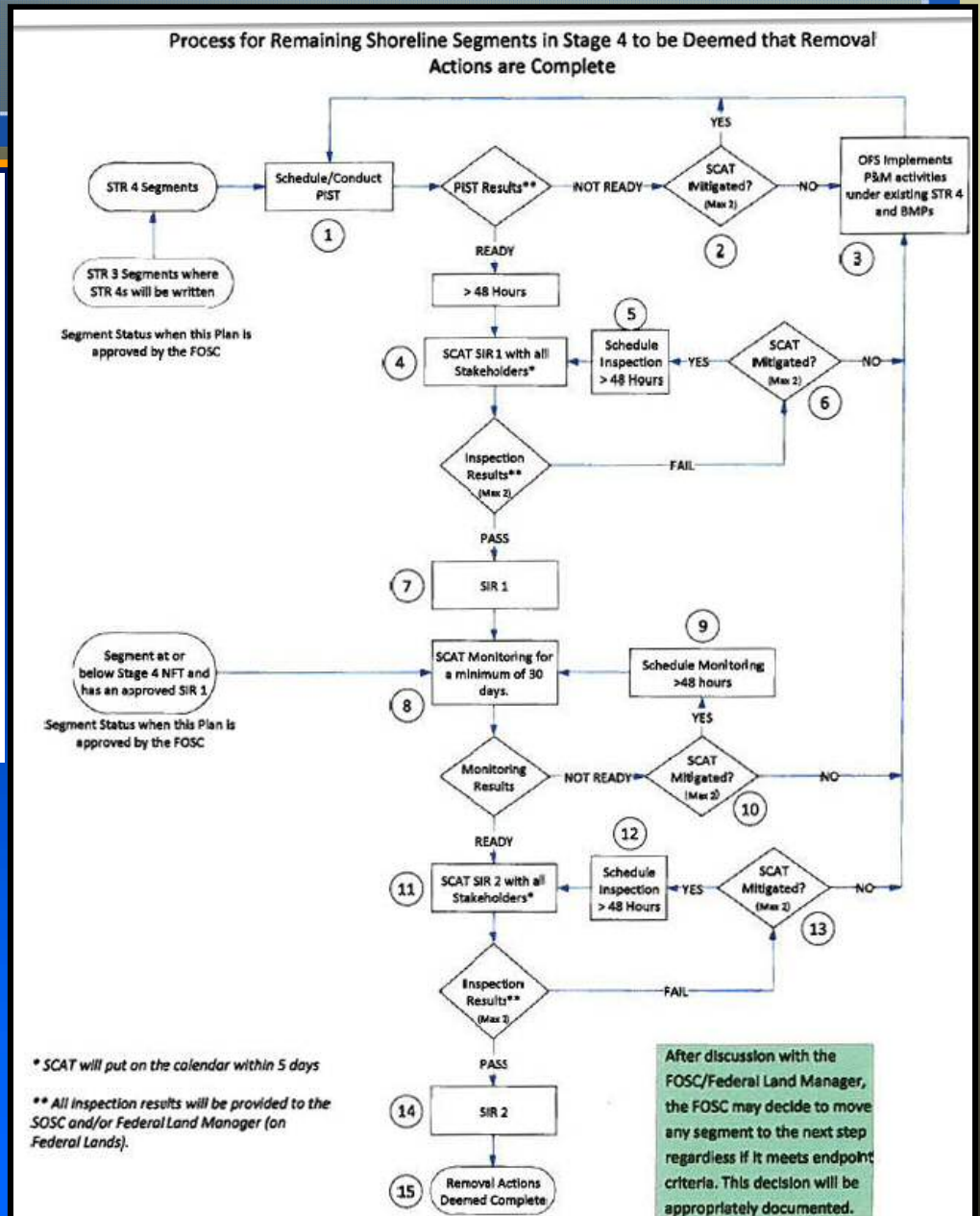


Figure 2 - Shoreline Clean-up Completion Process



## Sand Berm Project

- ❑ To stop oil from hitting the interior marshes.
  - 100 miles versus 3000 miles interior
- ❑ 11 May – Permit Application by LA.
- ❑ Approved 2 weeks later – Directed by FOSC that BP should pay for it.
- ❑ 320 ft wide at base x 6 ft high x 49 miles long.
- ❑ \$360 million.
  
- ❑ 2 collections of tar balls recorded.
- ❑ Re-authorized by FOSC in September .

From: On Scene Coordinators report, 2011

## The Louisiana Success Story

- ❑ *“This oil spill has devastated our coastal communities and our fragile ecosystem will pay a hefty price for this spill for years to come. Finally, a silver lining. The fortification of the oil barrier sand berms will result in the largest barrier islands restoration investment in Louisiana history. We’re working to convert this into a \$200 million effort to help restore the vital first line of defense.”* *Chairman Garret Graves*

COASTAL PROTECTION & RESTORATION

STATE OF LOUISIANA, GOVERNOR BOBBY JINDAL

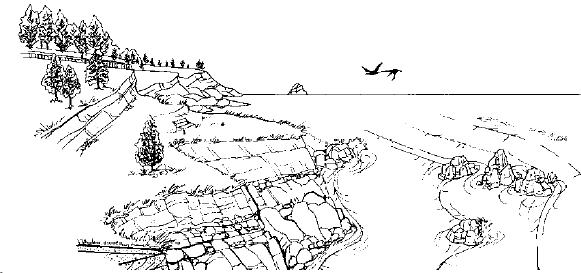


# Proven Success + NOAA Alternative



## Characteristic Coastal Habitats

### Choosing Spill Response Alternatives



U.S. DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
National Ocean Service  
Office of Response and Restoration  
Emergency Response Division

June 2010





# 17 June to 28 August 2010

June 17<sup>th</sup>, 2010 – E4



August 28<sup>th</sup>, 2010 – E4



COASTAL PROTECTION & RESTORATION  
STATE OF LOUISIANA, GOVERNOR BOBBY JINDAL

# Reach E-4

## Chandeleur Islands

November 28th, 2010 – E4

8.7 Miles, 1 Feb 2011

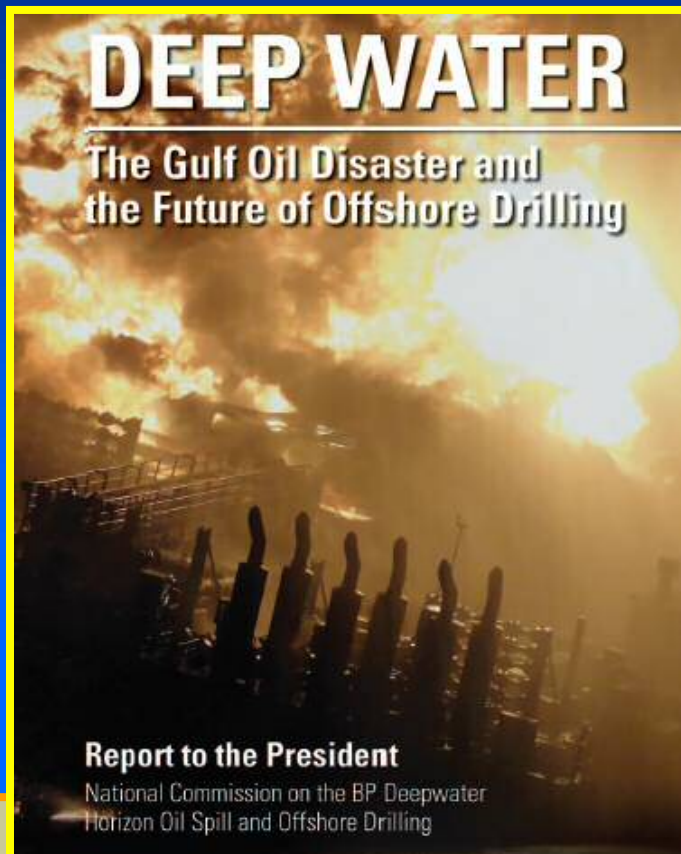
13 Apr 2011



SOUTH

## Blasted by the National Commission

- ❑ Generally not a viable spill response measure.
- ❑ Only 6% completed when well was capped.
- ❑ Trapped no more than 1,000 bbl total.
- ❑ Most expensive and controversial of all measures.



### 6. The Need to Re-evaluate the Use of Offshore Barrier Berms in Spill Response

Offshore barrier berms generally do not constitute a viable spill response measure for several reasons. These reasons include the time and cost of construction, and the highly variable and dynamic marine environment that limit effectiveness and pose the potential for negative environmental impacts resulting from dredging and filling. Thus, for instance, barrier berms constructed off the shores of Louisiana in response to the *Deepwater Horizon* spill could not be considered a success. Only a fraction of the project (approximately 6 percent) was completed by the time the well was capped, and no estimate of the amount of oil trapped by the berms is much more than 1,000 total barrels. In fact, the Louisiana berms project stands out as the most expensive and perhaps most controversial response measure deployed to fight the *Deepwater Horizon* spill. The decision to approve the project as one of the oil spill response techniques to be funded by the responsible party was based primarily on the demands of local and regional interests rather than on a scientific assessment of its likely efficacy.

## Update: 8 November 2011

- ❑ **"New holes have been breached,"**
- ❑ **"If they continue (to break apart) at this rate, more than half has disappeared on two northern (berm) sites, another year could easily take the rest of it."**

N. Plant, USGS: Associated Press, 8 Nov 2011

Nathaniel Plant, an oceanographer with the U.S. Geological Survey, has been monitoring the berms built near the Chandeleur Islands and said they have been breaking apart after storms.

"New holes have been breached," he said. "If they continue (to break apart) at this rate, more than half has disappeared on two northern (berm) sites, another year could easily take the rest of it."

USGS is tracking what happens to the berms because it wants to see if the sand transported to Chandeleur Sound winds up accumulating on the barrier islands, which scientists fear will disappear as sea levels rise and hurricanes pummel them.

"A research question is to what degree has putting that much sand out there turned the clock back (on island disintegration). We don't have a final answer on that at all," said Asbury Sallenger, a USGS oceanographer who heads up efforts to map changes along the Gulf Coast.