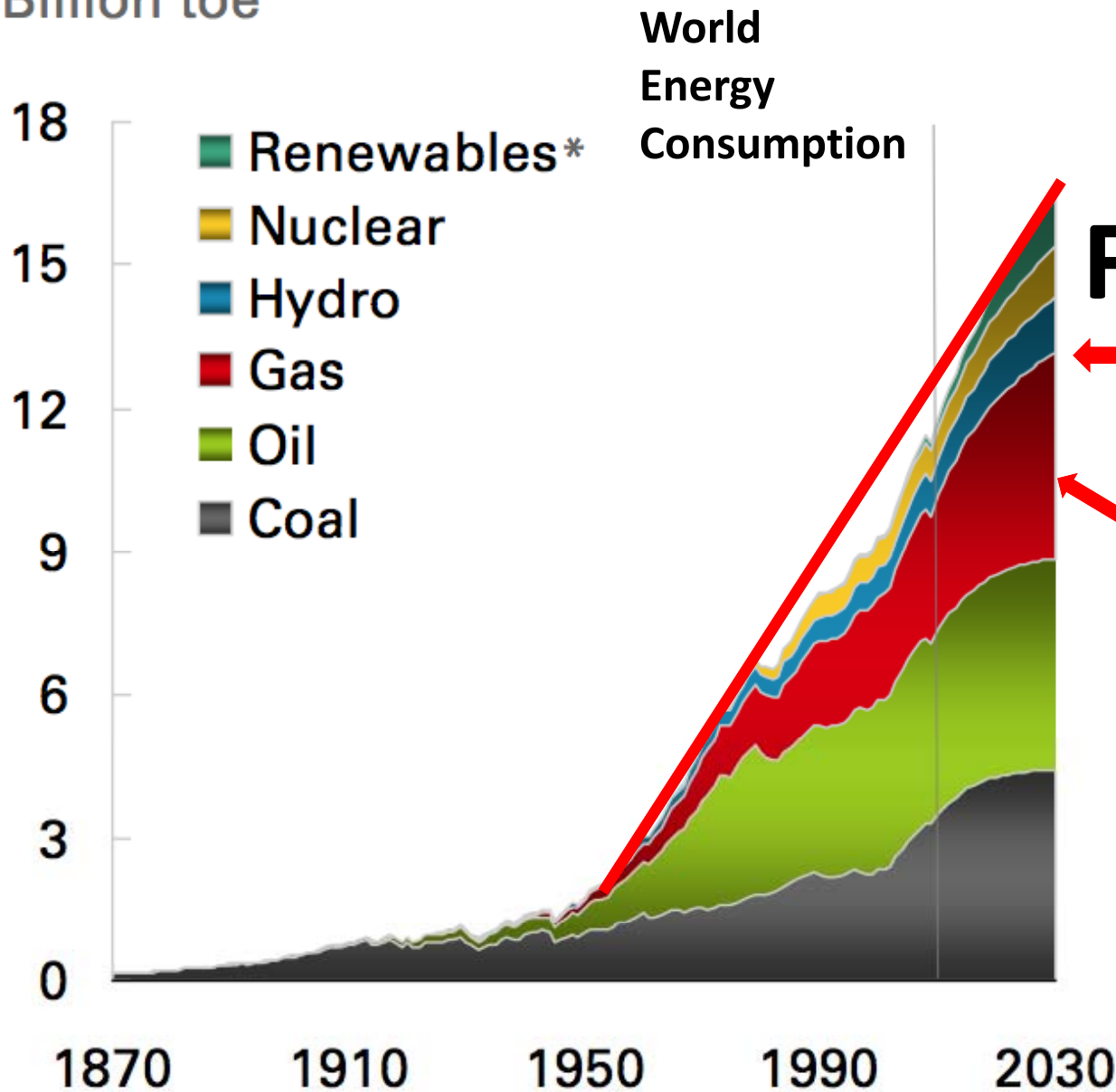


# Overview of the DH Oil Spill

- Began April 20, 2010 with the explosion of the Deepwater Horizon drilling platform in the Gulf of Mexico, 11 people perished
- Capped on July 15, 2010, killed on September 17, 2010
- Estimates of ~55,000 barrels of crude oil/gas flowed from the well per day, covering 2,500 square miles
- >170M gallons of oil spilled – Largest marine spill in US history
- Current estimates are that perhaps >50% was dispersed at depth
- >1.8M gallons of dispersant used at depth and on the surface
- Impact possible to: **people, environment, economy, and geology**
- Some impacts will be seen in coming years (chronic), most impacts are short lived (acute)
- An estimated 50M gallons of oil seep naturally into the Gulf of Mexico every year for the past thousands of years

# Deepwater Horizon Oil Spill: how did we get here?

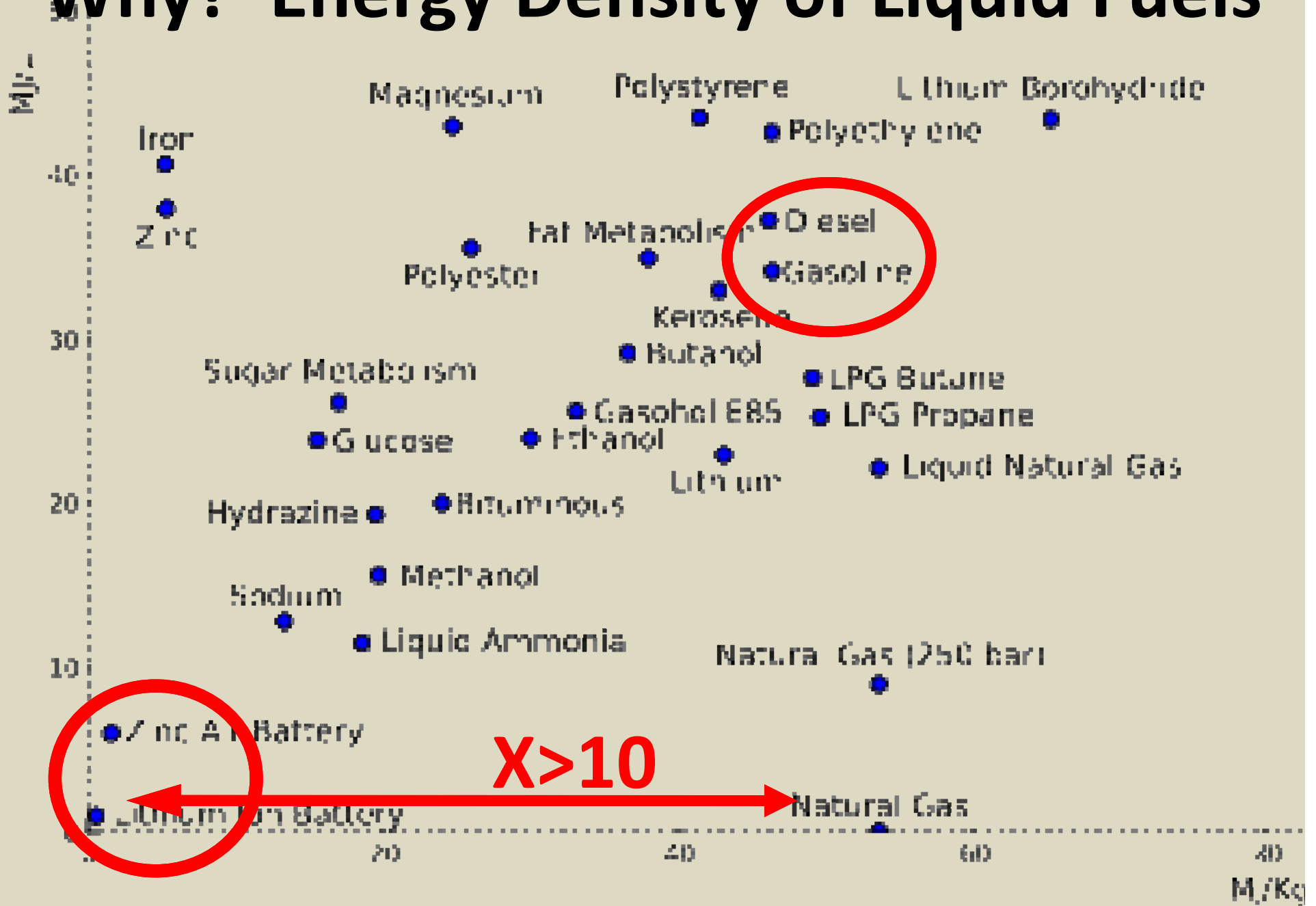
Billion toe

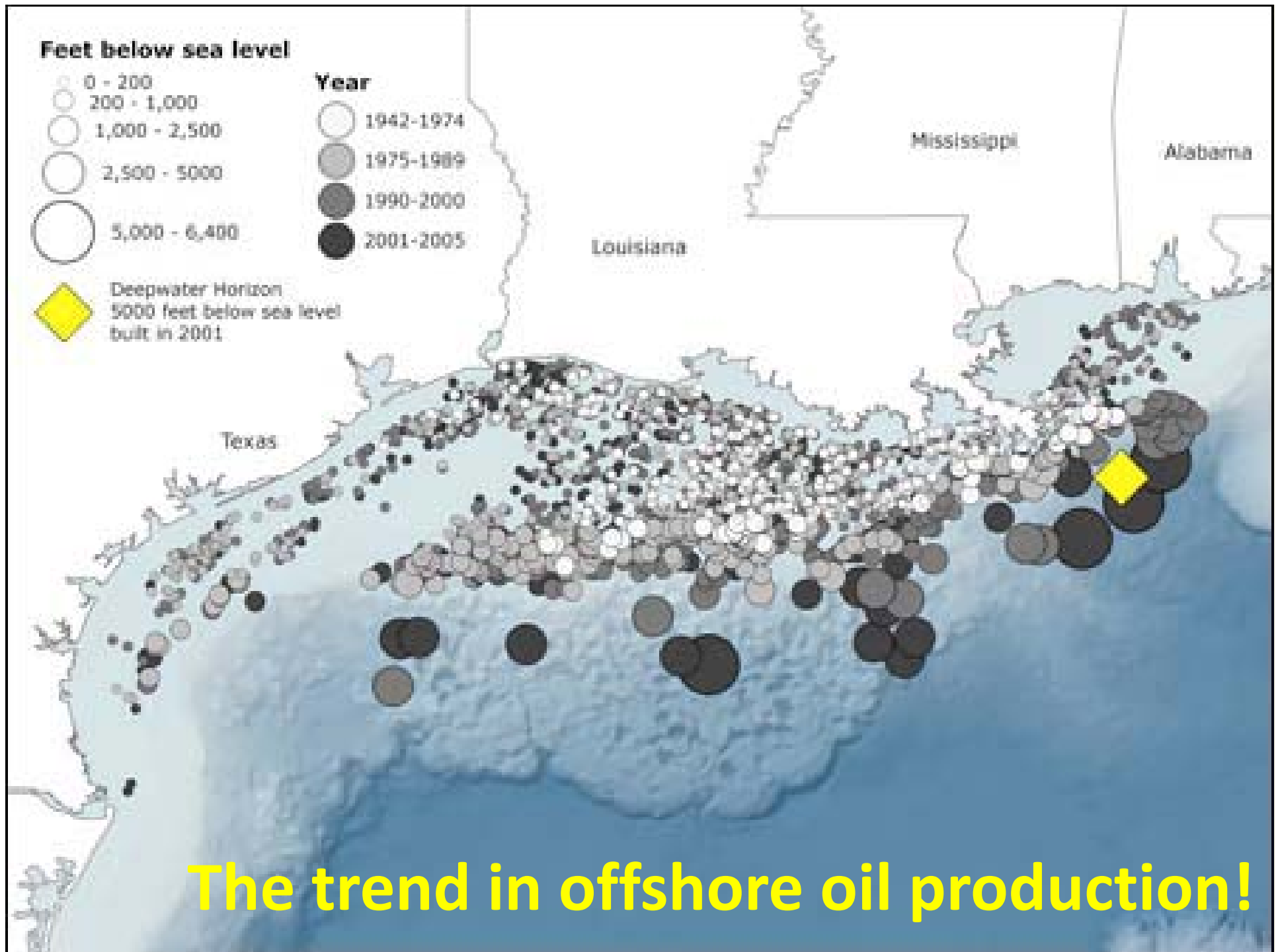


**>75%**  
**Fossil Fuels**

**80% used for  
transportation  
fuels**

# Why? Energy Density of Liquid Fuels





**The trend in offshore oil production!**



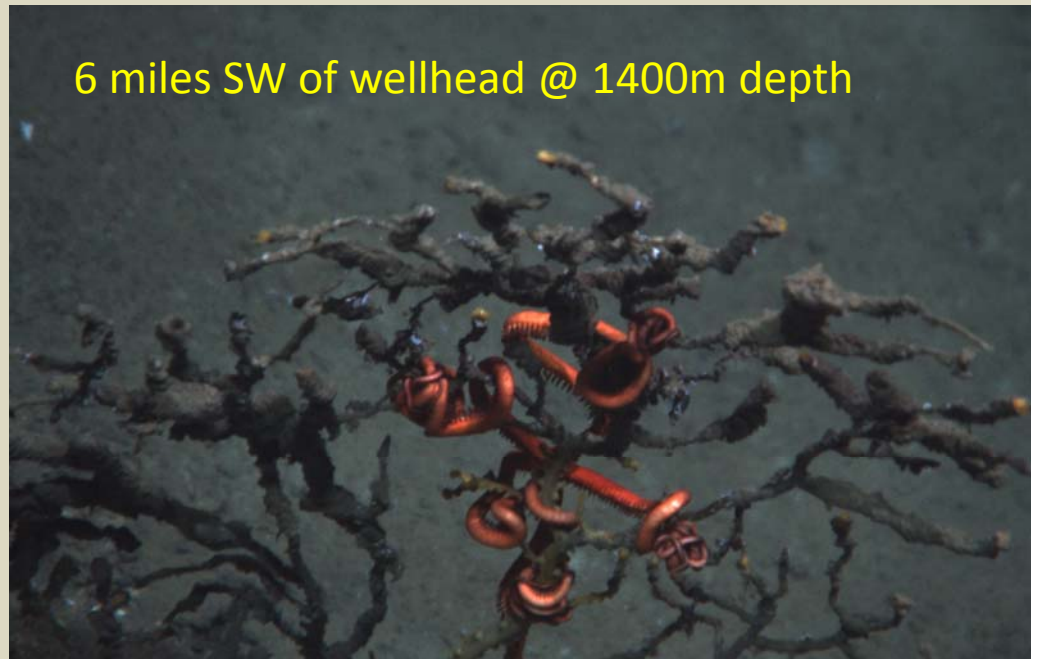
**Deepwater Platform**

# Mechanisms to cause Environmental Impacts from Oil Spills

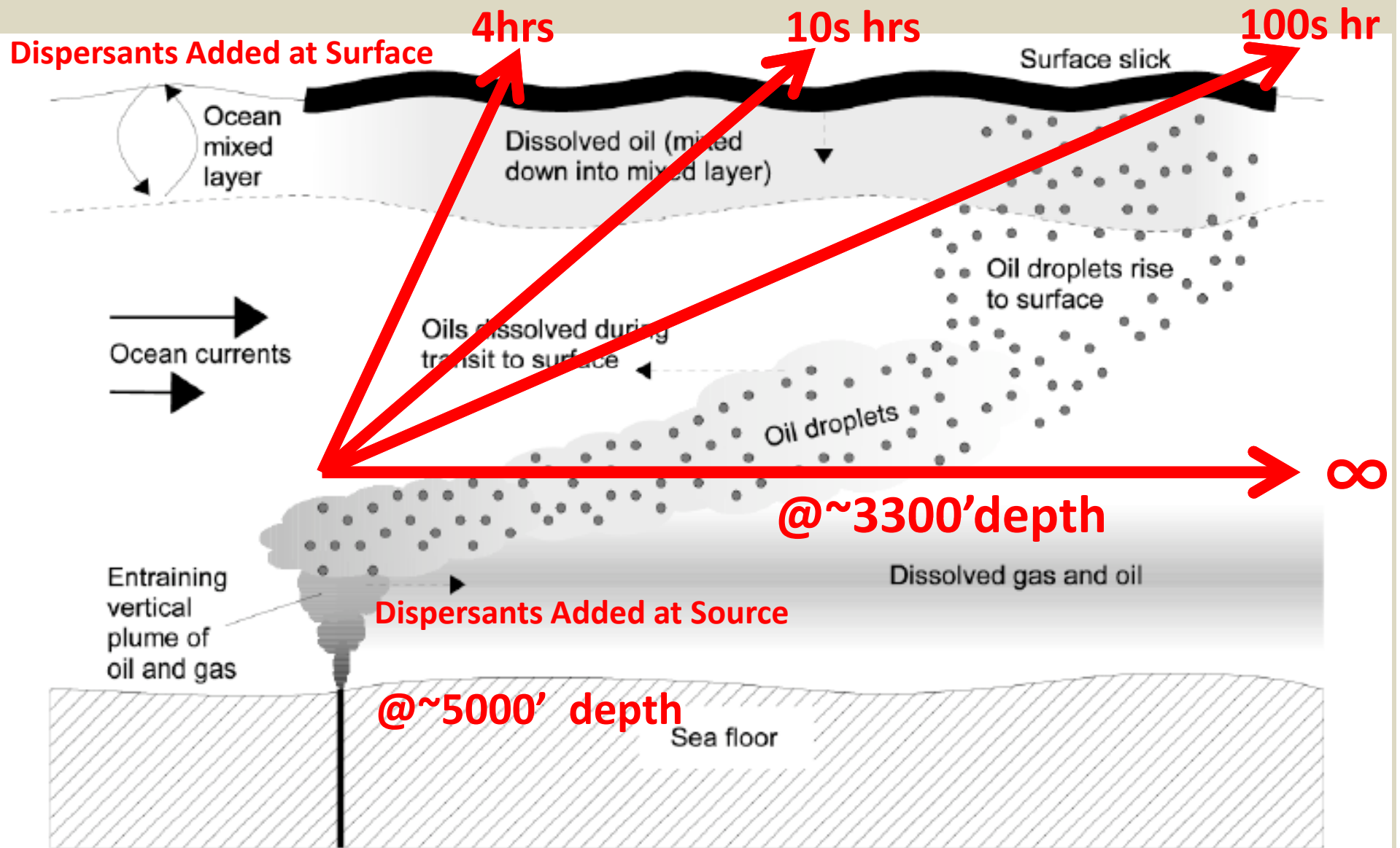
- Toxicity
- Smothering/coating
- Oxygen depletion
- (carbon enrichment)
- Remedial actions



6 miles SW of wellhead @ 1400m depth



# What happens after oil left the wellhead?

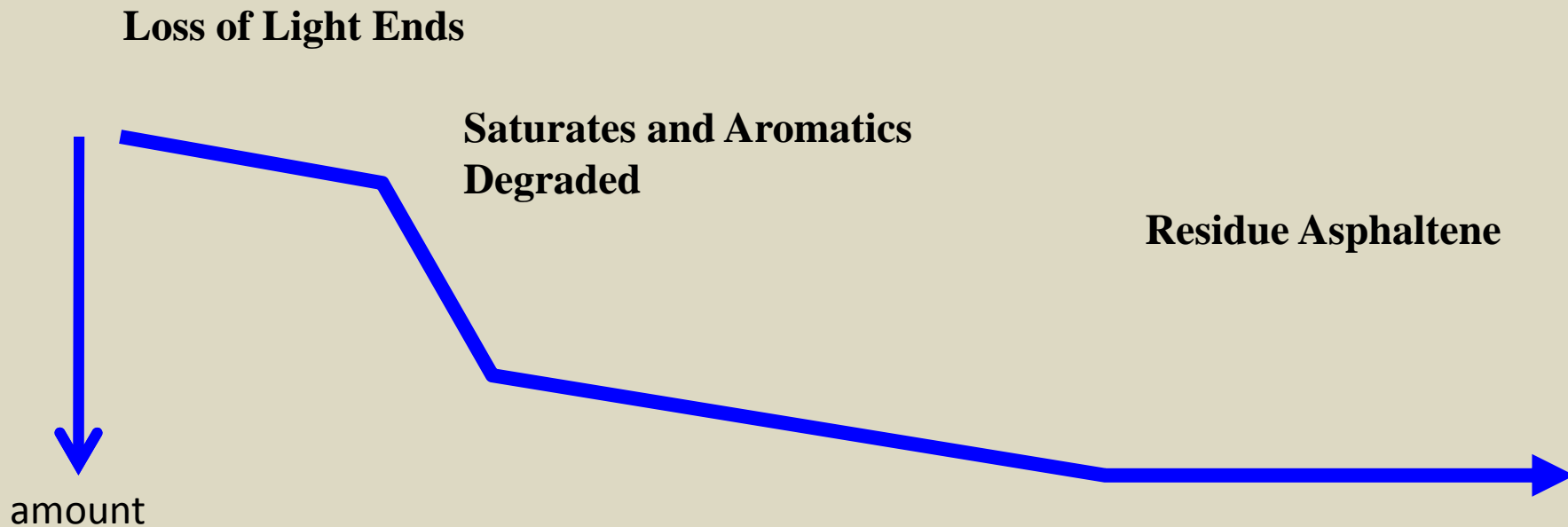


Adcroft, A., R. Hallberg, J. P. Dunne, B. L. Samuels, J. A. Galt, C. H. Barker, and D. Payton (2010), Simulations of underwater plumes of dissolved oil in the Gulf of Mexico, *Geophys. Res. Lett.*, doi:10.1029/2010GL044689, in press.

# The Effects of Weathering on Spilled Oil



$$\text{Harm} = \{ \text{Toxicity} + \text{Dose} \} + \text{Route of Exposure}$$



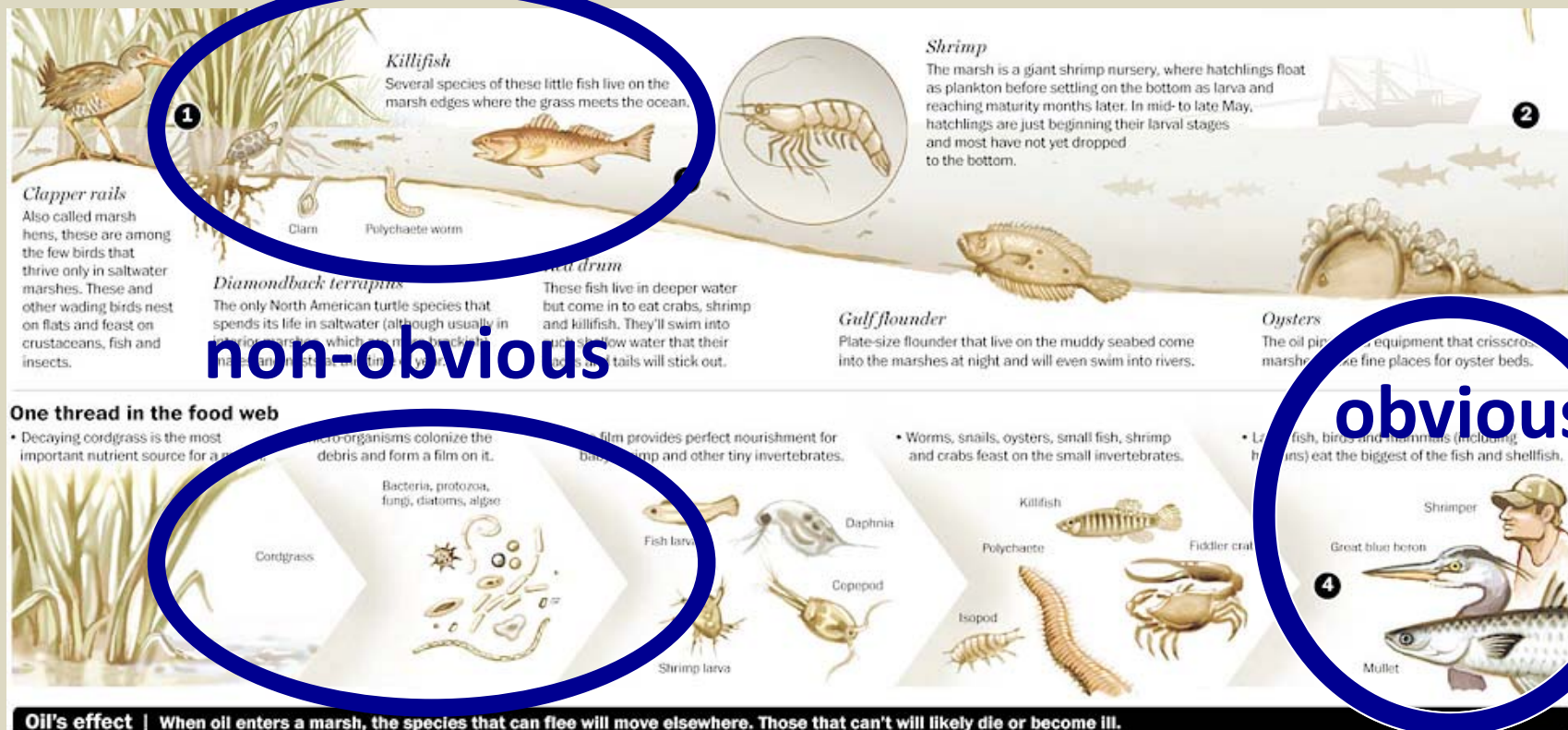


## Oil Spills are:

- Mostly an acute event, some impacts obvious, many are not obvious
- Chronic impacts less obvious, difficult to measure

## MC252 impacts are difficult to predict because:

- Near shore and near surface impacts typical of most oil spills
- Deep water impacts difficult to measure
- Unusual weathering pattern due to deep water release/dispersants





**Surface Weathered Oil**



**Just below Surface Slick**



**oil/water emulsions**

**Photos Source: OceanFutureSociety**

LSU Earth Scan Laboratory  
School of Coast and Environment



Goes SST 3-day Composite June 29, 2010  
Radarsat1 Microwave June 27, 2010  
Radarsat2 Microwave June 27, 2010



Oil entering Barataria Bay

# The Effects of Weathering on Spilled Oil

Days

Weeks

Months

Surface Oil Weathering

Toxic & Sticky  
Floating

Sticky  
Floating  
Sinking?

Gunky  
Floating  
Sinking

Tarball Nuisance



**Harm = {Toxicity + Dose} + Route of Exposure**



# The Effects of Weathering on Spilled Oil



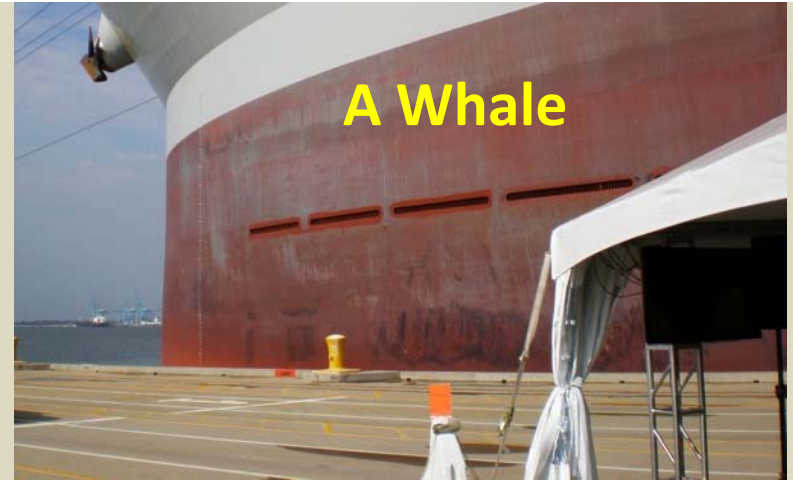
## Offshore Response Option Effectiveness

- 1) Skimming with oil/water separation
- 2) Dispersing in deep water
- 3) In-Situ-Burning well offshore

Light oils (API 35)

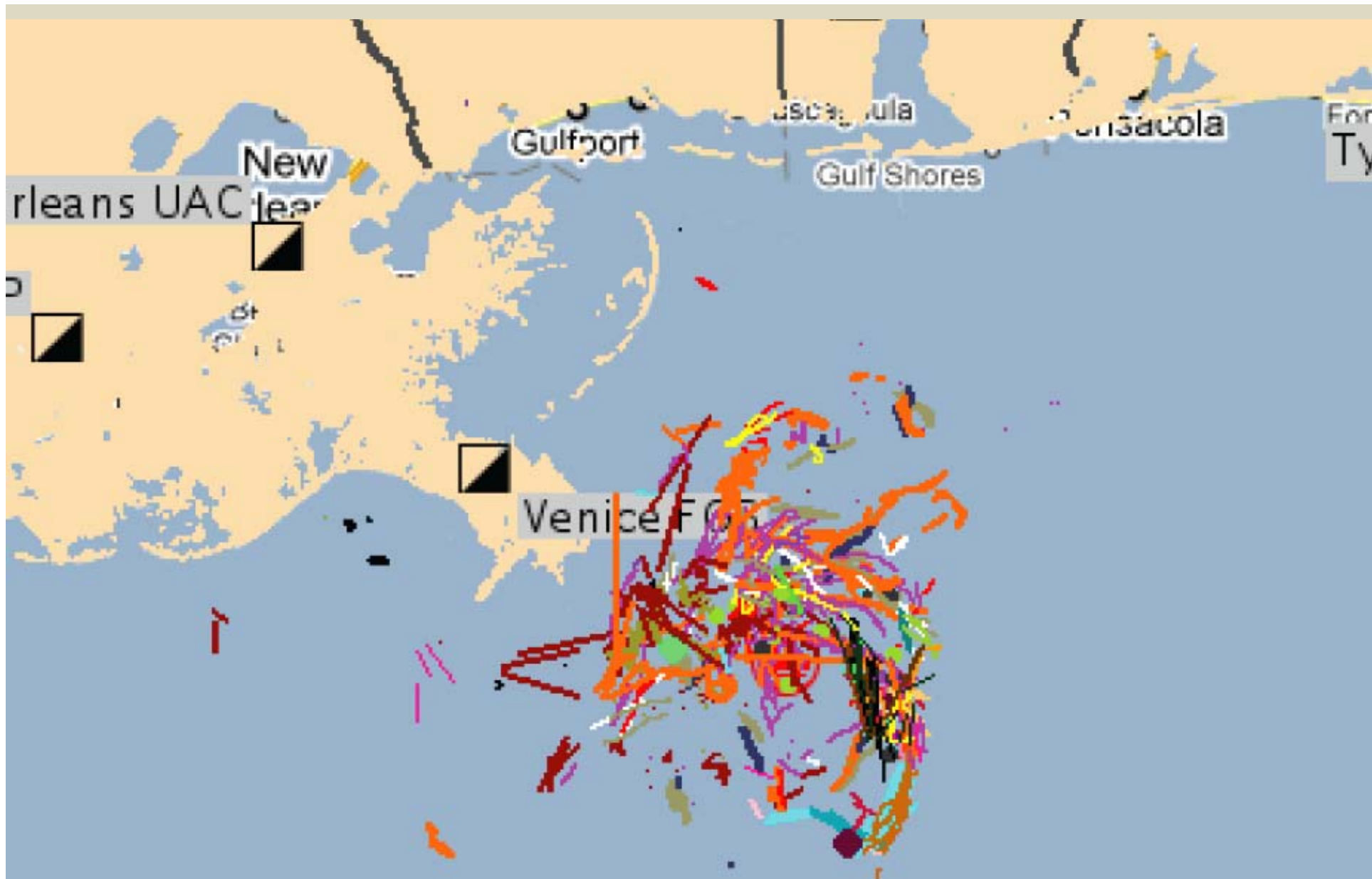
**Oil Types**

Heavy oils (API 10)



- Skimming with oil/water separation: allows **recovery from the water and recycling**
- Fairly slow and methodical, required areal guidance, and many skimmers with oil/water separation, large storage capacity for offshore operations,
- small shallow draft and fast skimmers with oil/water separation and containment storage bladders for near shore recovery





# Aerial Dispersant Fight Paths



## In-Situ Burning

(if oil is thick enough to burn, it's thick enough to skim)





**Tarball in MV Our Mother's Big Red Shrimp Trawl  
40 miles south of well head, matched to MC252 Oil**



Near Shore Oil

Most Vulnerable  
Marsh Impact  
Mostly ecological

Beach Impacts  
Mostly economic



# Pass a Loutre

Original Assessment: HEAVY

Habitat: Marsh, Phagmites

Response Action:

- Skimming
- Sorbents
- Natural Attenuation



# Land Lost caused by Oil Spill



**Photo courtesy of Dr. Irv Mendelssohn  
June 2010**





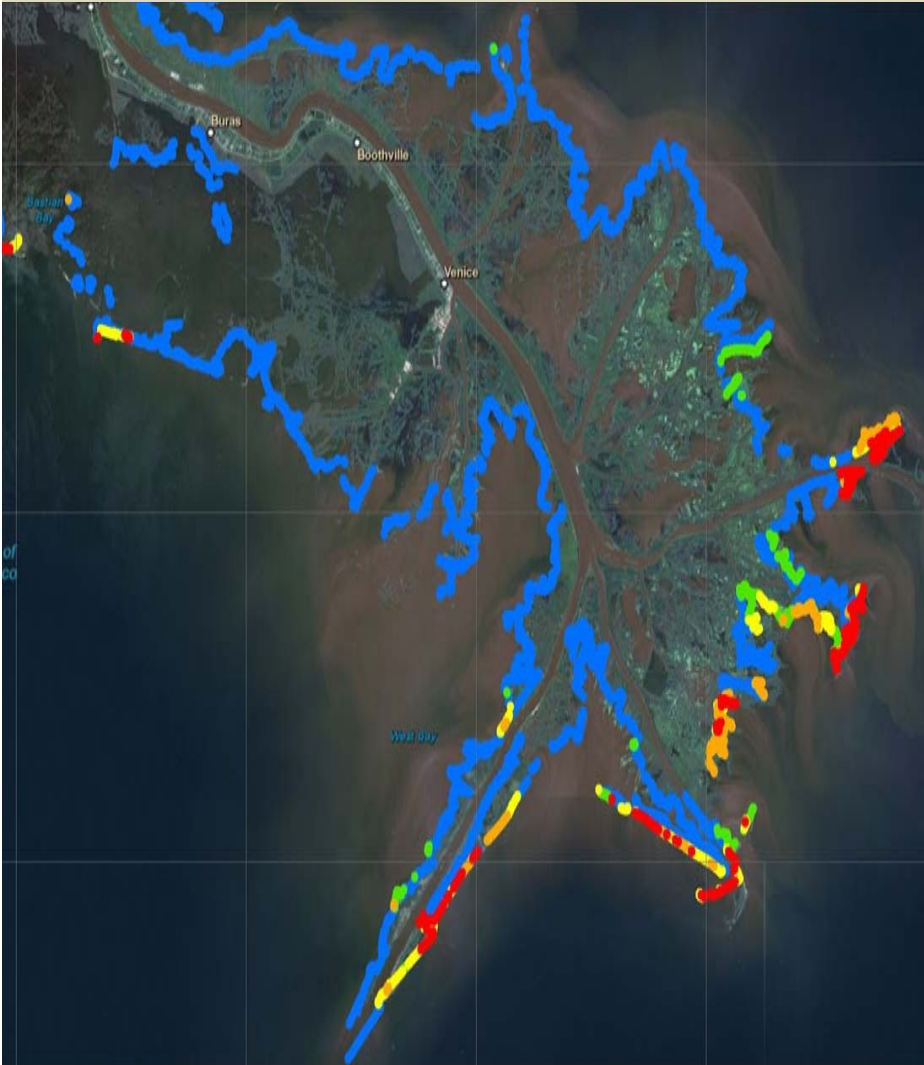
**Bay Jimmy  
May 15, 2011**

Dr. Jacqui Michel, RPI

# Mississippi River Birdsfoot

Maximum oiling

January 2011

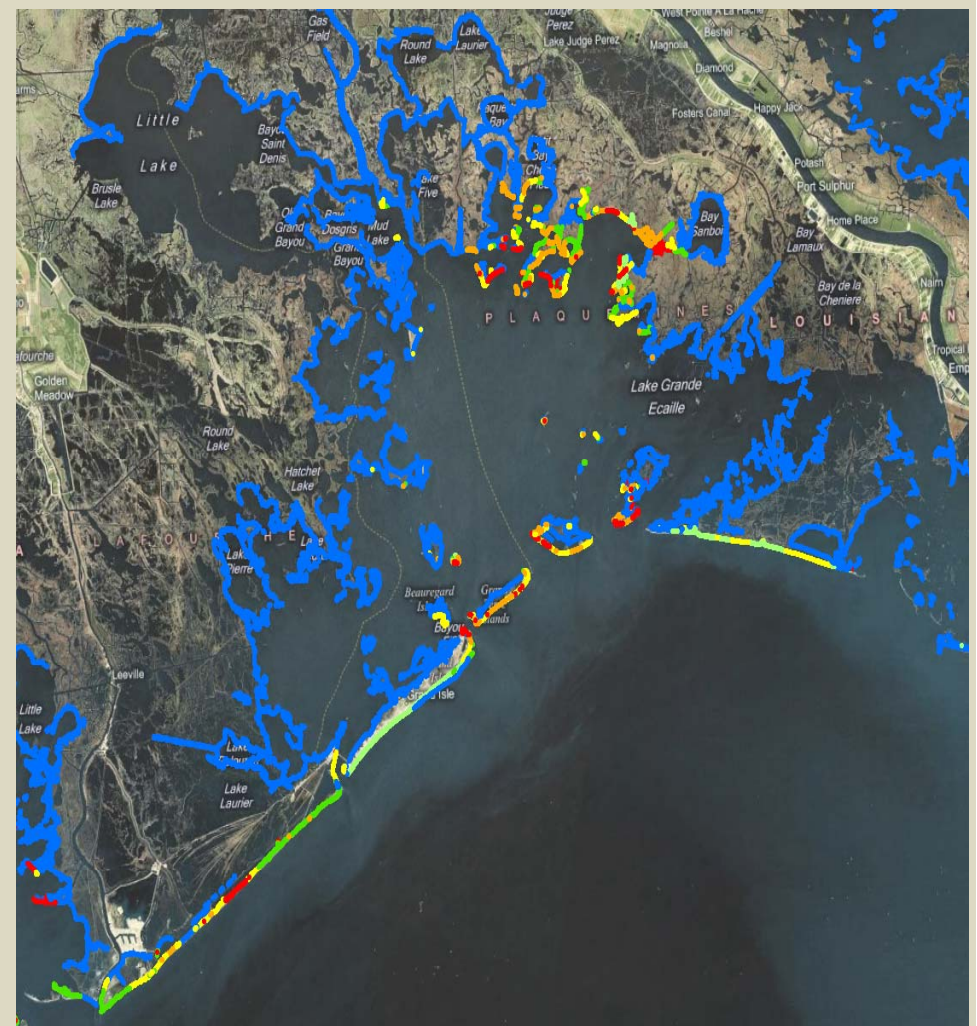
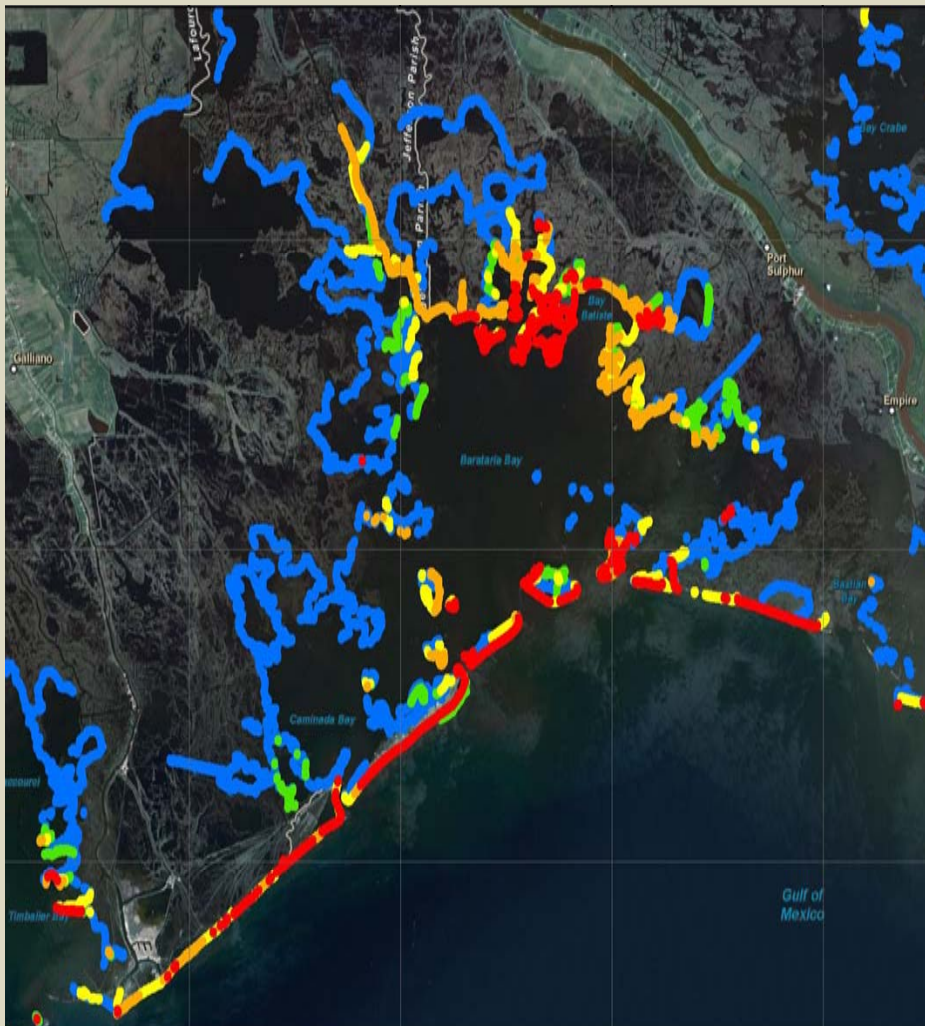


Dr. Jacqui Michel, RPI

# Barataria Bay

Maximum oiling

January 2011

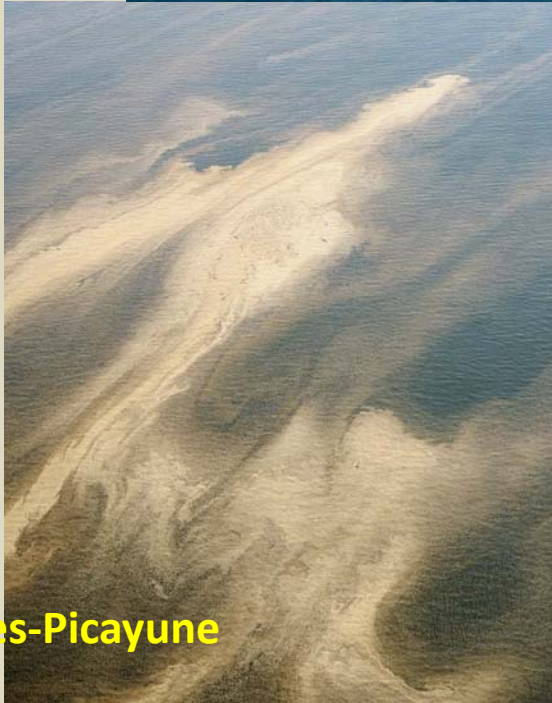






# Oil or ?

10/22/10



Matthew Hinton, The Times-Picayune



**Submerged Oil Mats  
in intertidal zone  
along sandy beaches**

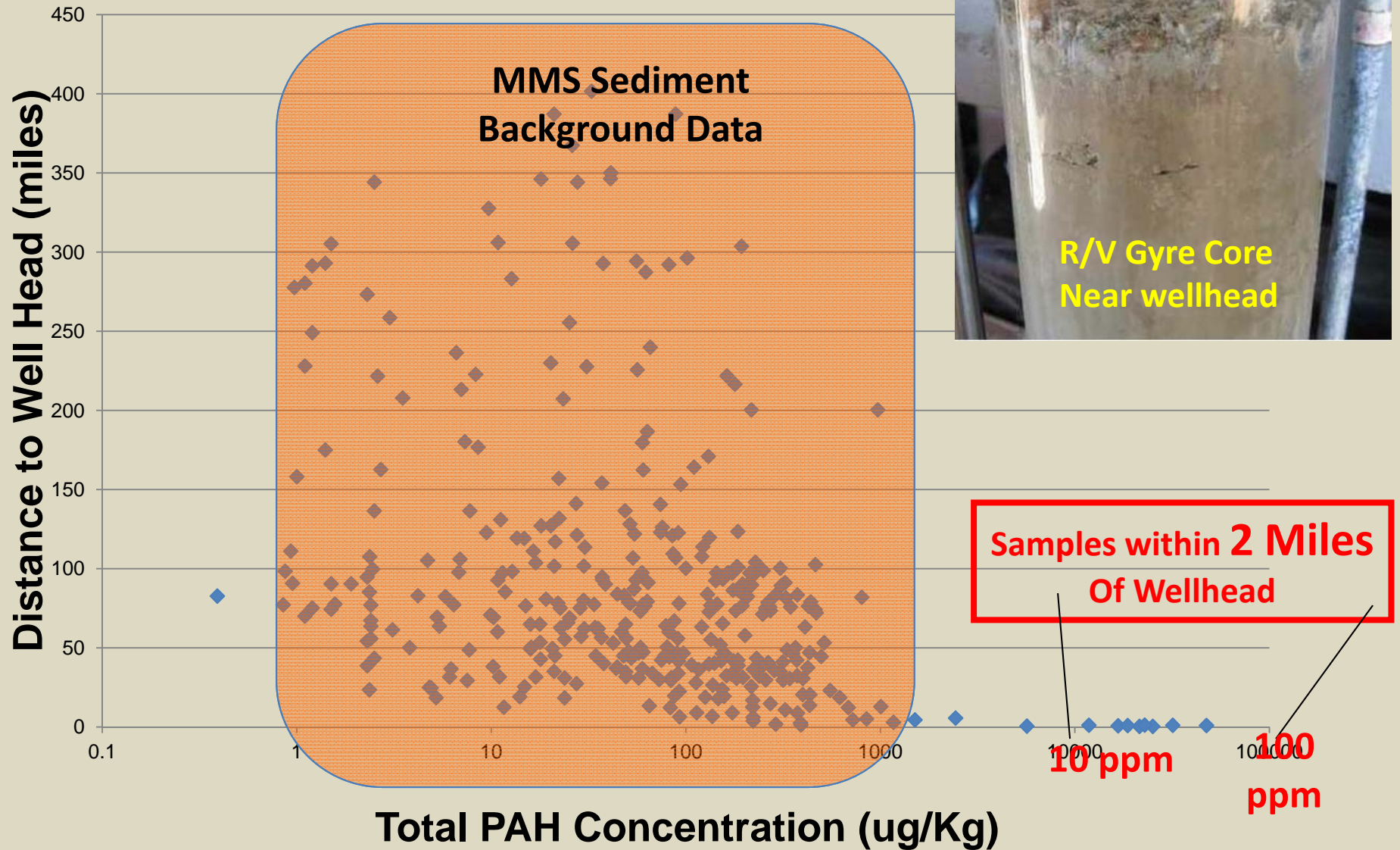


Dr. Jacqui Michel, RPI

# TPAH With Distance from Wellhead

All OSAT Report Samples

## OSAT Sediment Samples





**Oiled Deep-sea Coral 6 miles SW  
of MC252 Well**

Pictures courtesy of  
Dr. Erik E Cordes  
Biology Department  
Temple University

Thank you