Hurricane Response

OFFICE OF RESPONSE AND RESTORATION • NOAA's NATIONAL OCEAN SERVICE

Cooperative Efforts to Use *In-Situ* Burning at Empire, LA, Intermediate Marsh Post Hurricanes Katrina and Rita

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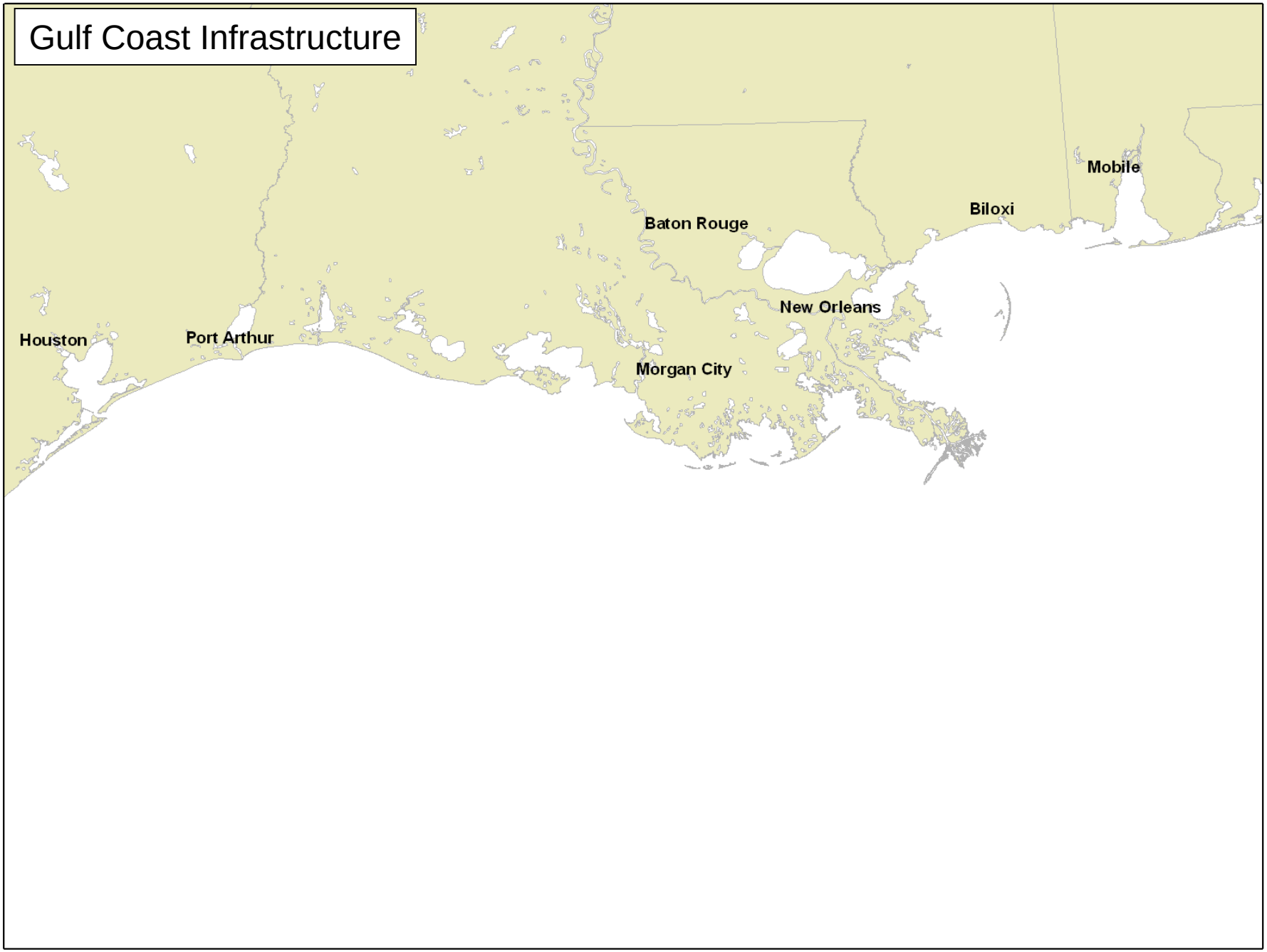
Impacts of Oil Spills

- 8,000,000 gallons released to the Gulf environment
- ~ 5500 acres of wetlands oiled (herbaceous and forested)
- Unusual response challenges resulted in slow removal of oil
- Changes in response objectives
- Opportunity for alternative response technologies


Gulf Coast Infrastructure
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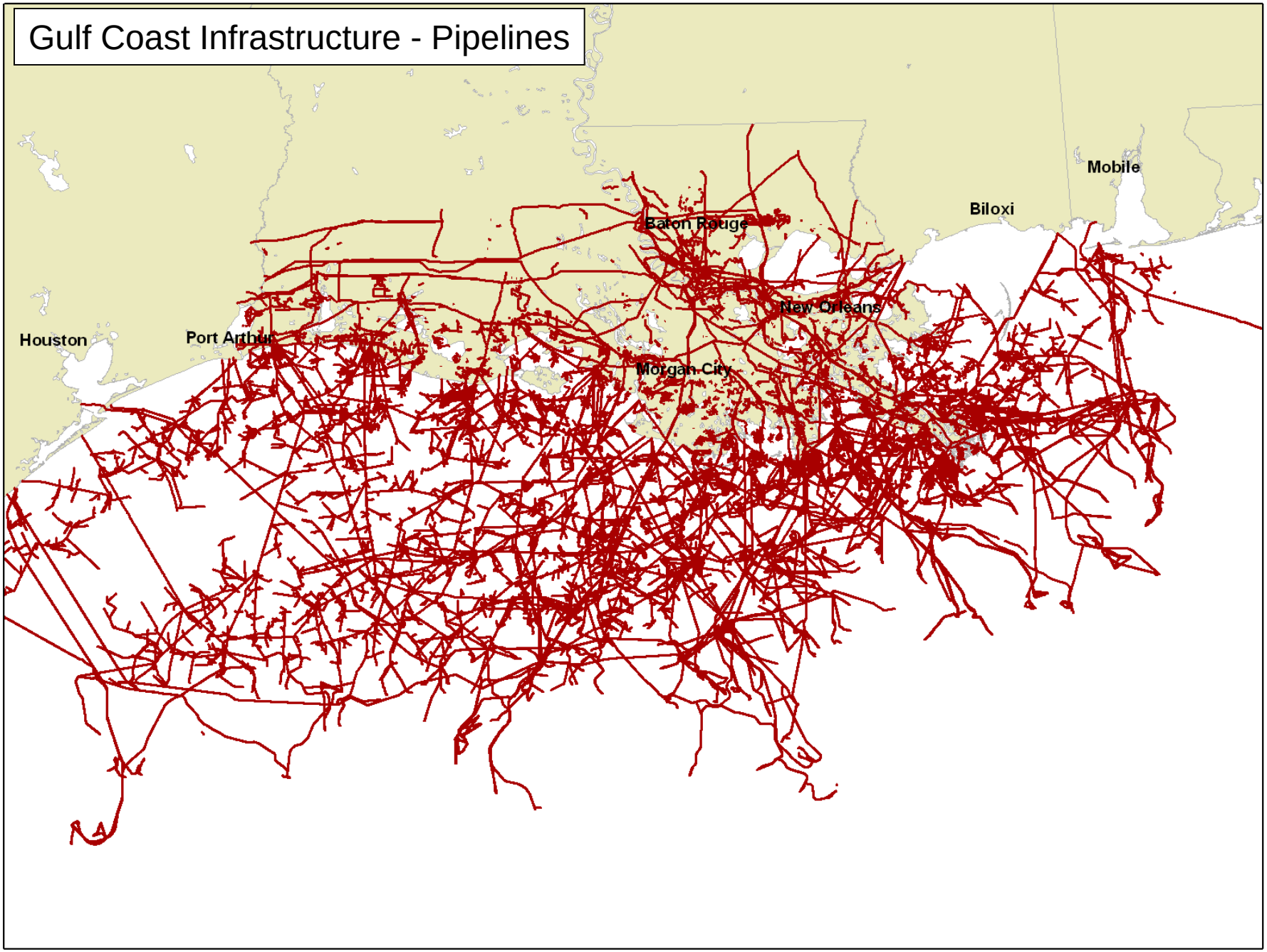
Biloxi
Baton Rouge
New Orleans
Houston
Port Arthur
Morgan City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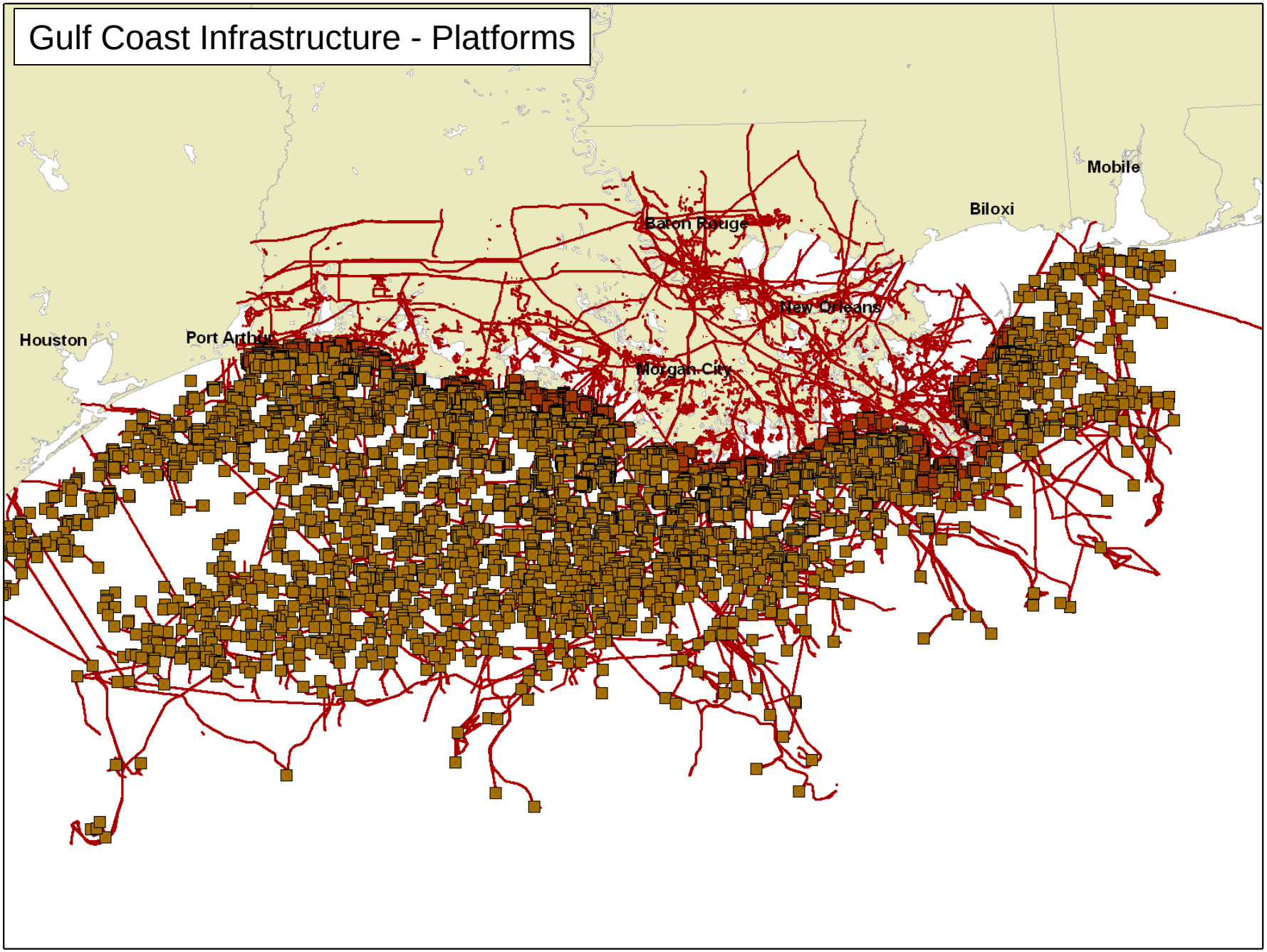
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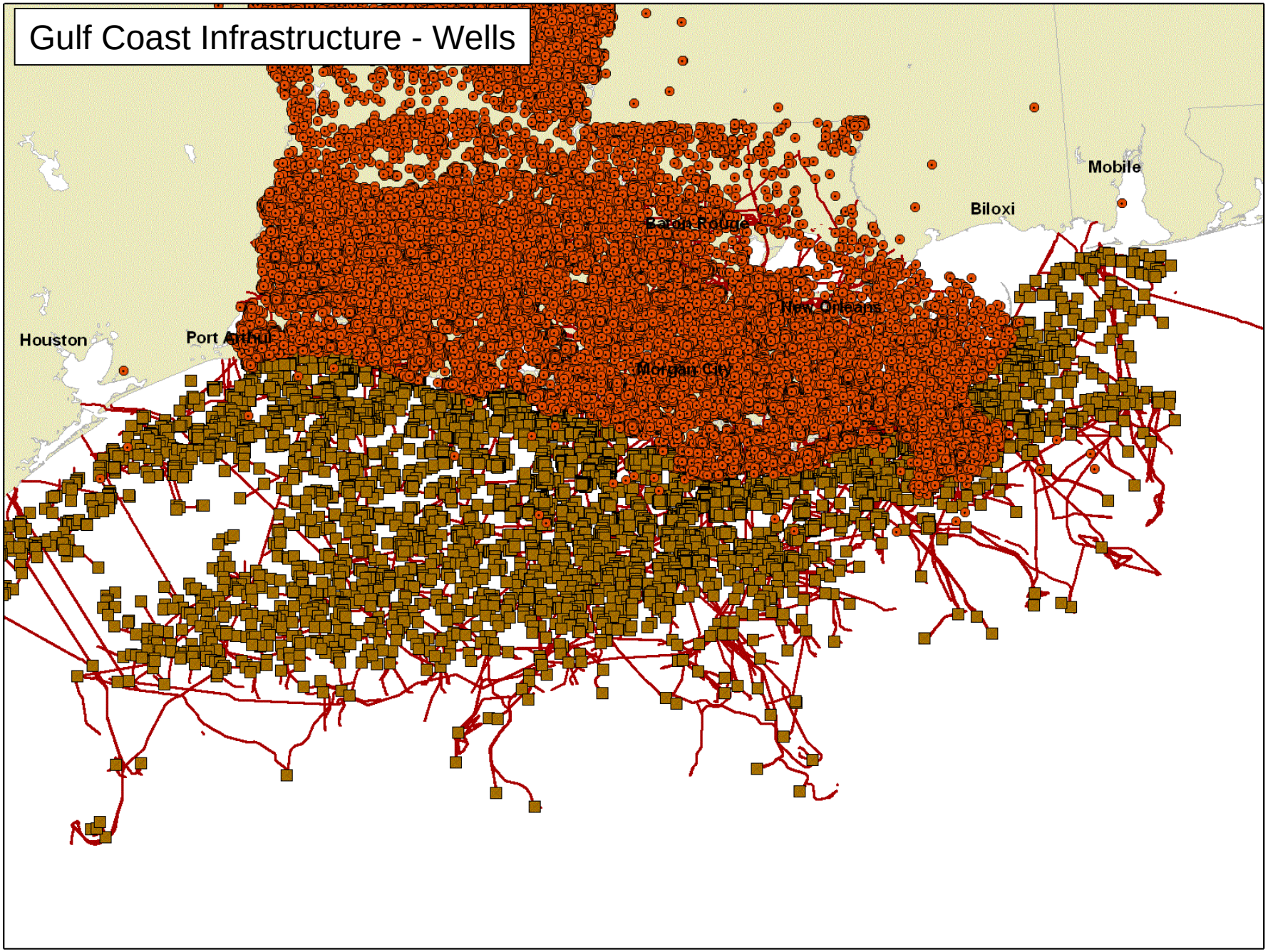
Gulf Coast Infrastructure - Wells
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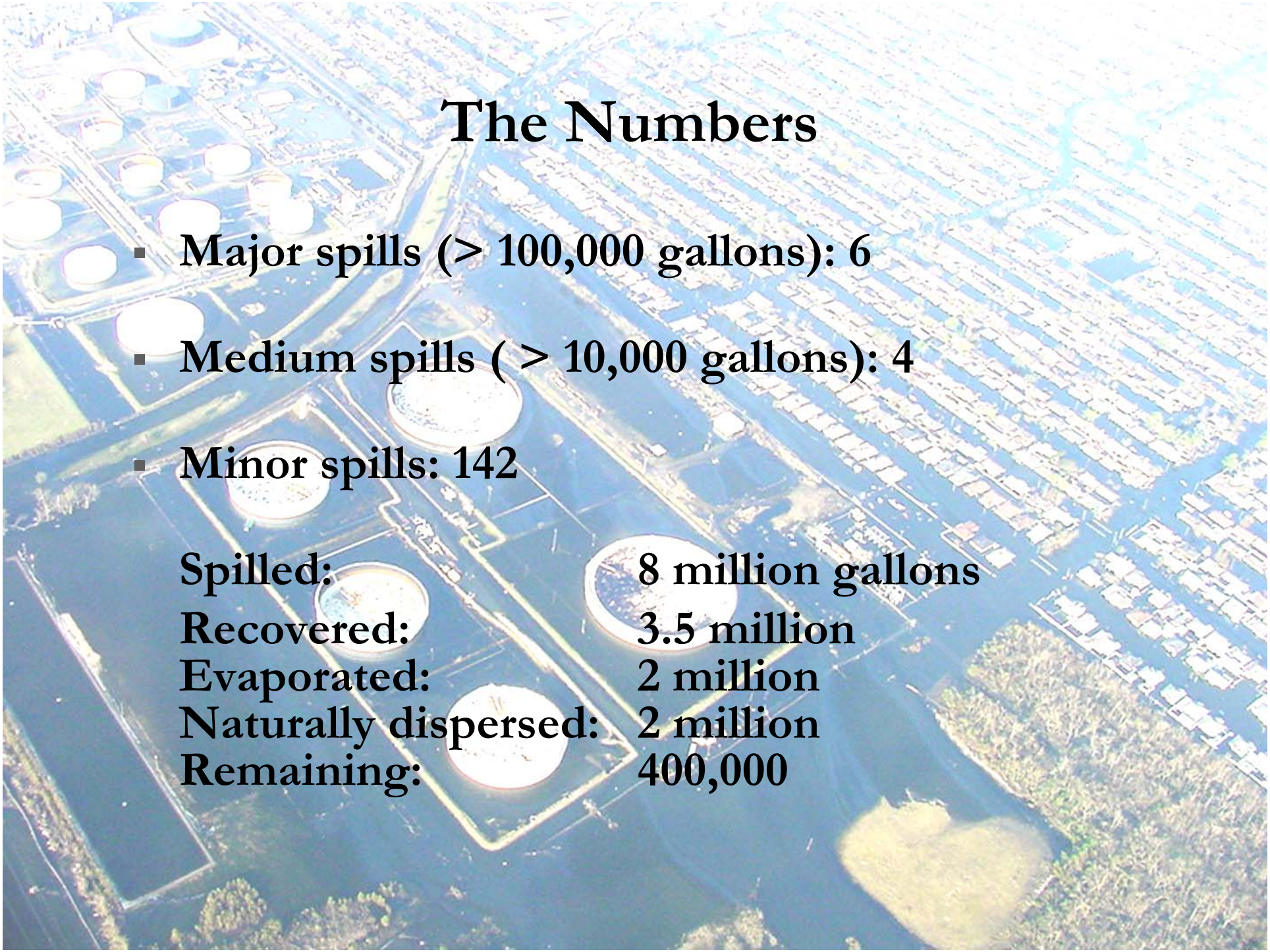
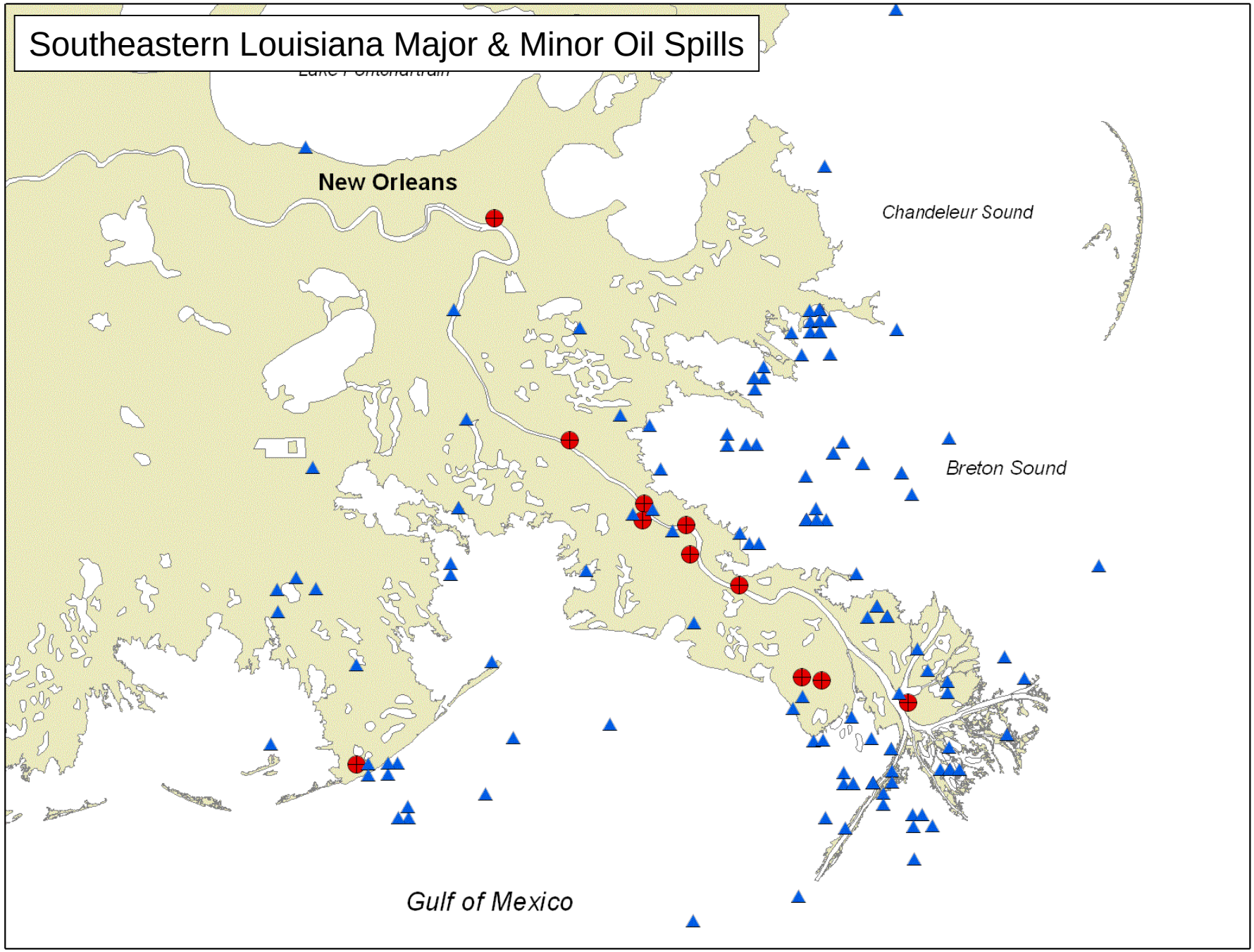


The Numbers

- Major spills (> 100,000 gallons): 6
- Medium spills (> 10,000 gallons): 4
- Minor spills: 142

Spilled:	8 million gallons
Recovered:	3.5 million
Evaporated:	2 million
Naturally dispersed:	2 million
Remaining:	400,000


Southeastern Louisiana Major & Minor Oil Spills
New Orleans
Chandeleur Sound
Breton Sound
Gulf of Mexico

Chevron Empire – Site Advantages for ISB

- Remote location, bound by water on all sides
- Limited access for removing oil with mechanical techniques
- Oil conditions:
  - Oil on water
  - Oiled vegetation (dissicated)
- Environmental conditions
  - Favorable winds and temps forecasted
  - Adequate water levels (10 – 20 cm)
- Recovery potential of vegetation deemed high from past experience (Lin et al., 2002, Michel et al., 2003, Henry et al., 2003, and API 2004)
- Without active technique, oil would continuously contaminate the marsh and wildlife and hinder recovery

Chevron Empire – Site Disadvantages

- Controlling burn – estimated collateral damage 120 acres burned (contained by water boundaries)
- Oil penetration into substrate
- Injury to biota
- Residue issues
- **Convincing people that oil that had been in the environment for 5 weeks would burn**

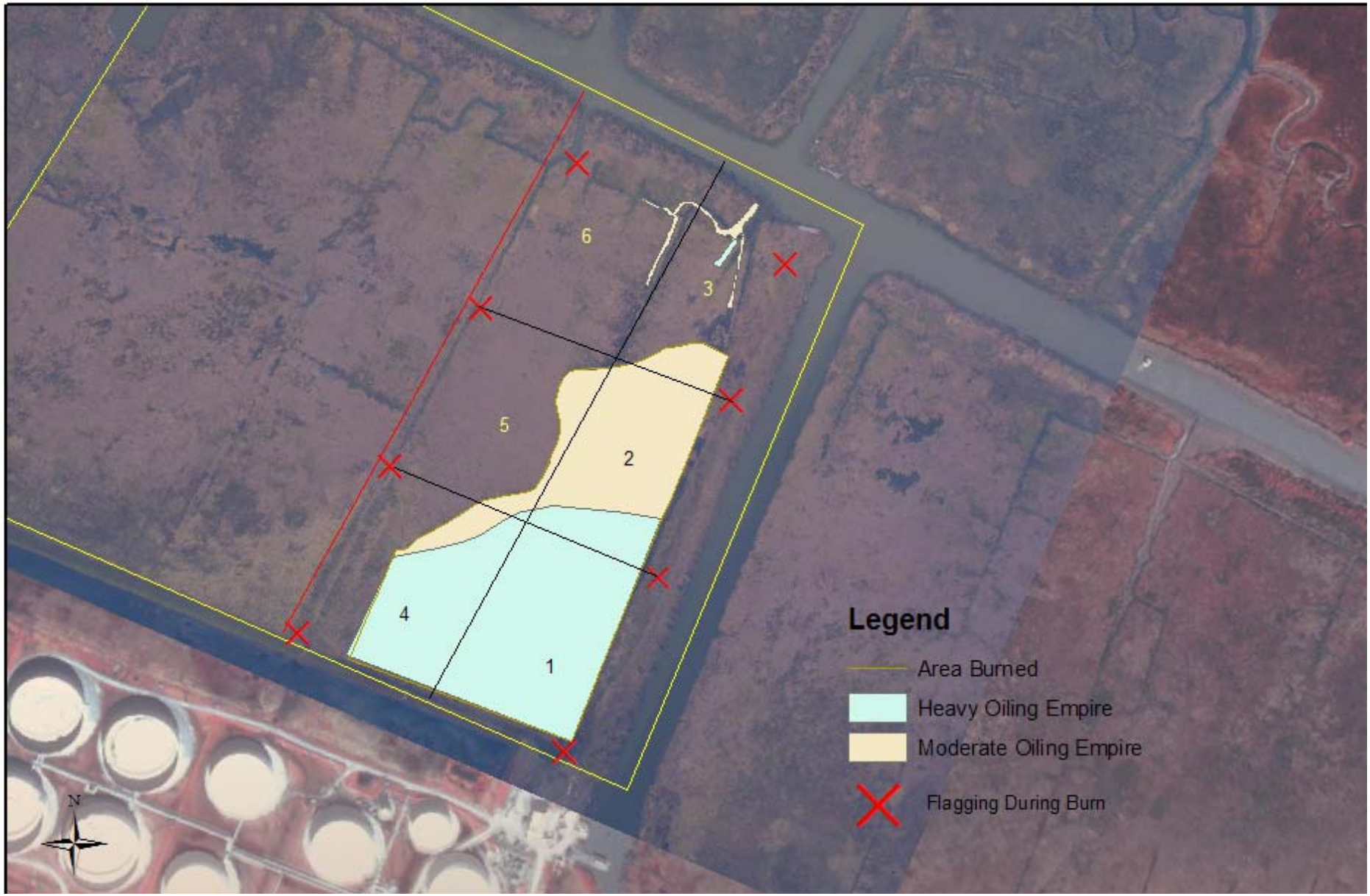
Timeline

- Oct 6: Initial ground survey; discussions with Chevron about *In-Situ* Burn (ISB)
- Oct 6 - 7: Environmental Unit suggested ISB viable option; Chevron developed initial ISB plan
- Oct 8: Chevron submitted initial plan
- Oct 9 – 10: Discussion among UC, EU, and Chevron
  - Substantial investment and effort to procure fire-fighting equipment and expertise
- Oct 10: Convened RRT VI via conference call
- Oct 11: FOSC approved plan at 0700
- Oct 12: First Burn
- Oct 13: Second Burn
- Six weeks after initial spill

Hurricane Katrina Response - Chevron Empire Burn Zones

Base Map
prepared by NOAA
USE ONLY AS A GENERAL REFERENCE

Date/Time: 04 Nov 2005
Platform: N/A
A. Merten NOAA



Burn Day 1 – Oct 12

- Weather: 85°F, partly cloudy, variable N/NE wind less than 10 mph
- Ignition source: propane torches
- Burn Plan: 1,4,2,5
- Safety plan:
  - Wetted berms; fire brakes, fire-fighting equipment
  - Cease all other work at facility
  - Stage crew onboard MSRC GULF RESPONDER


15 CM

Post-Burn – Day 1

- No back burn, just "The Burn"
- Fire quickly ignited and spread
- Natural breaks: green vegetation; lack of oil or oiled vegetation stopped the fire, not the fire breaks
  - Black smoke → white smoke, ceased to burn
- Plume loft 500 – 1000'
- Burn footprint: 100% Zone 1 and > 95% Zone 4
- Burn duration: ~ 3 hours
- Burn efficiency: 80 – 90% removal of bulk oil and oiled vegetation
- Residue: less than predicted

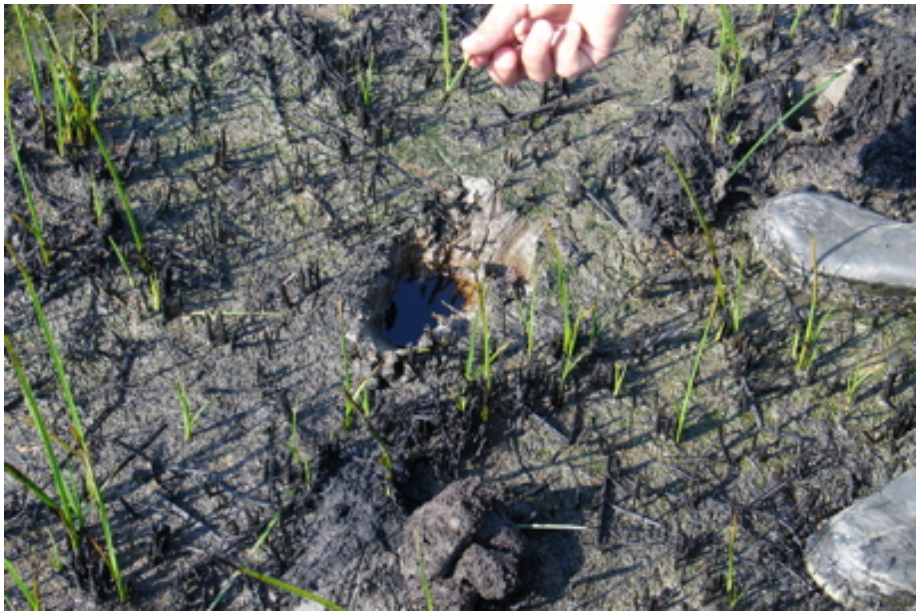
Post-Burn – Day 2

- More controlled fire
- Fire quickly ignited and spread, but less intense than Day 1
- Zones 2 and 5, moderately to lightly oiled; fire reflects degree of oiling
- Plume loft 500 – 1000', but less dense
- Burn footprint: 85% Zone 2 and < 50% Zone 5
- Burn duration: ~ 3 hours
- Total Acres burned: ~ 28 acres

Post-Burn Monitoring

Oct 17 – 4 days Post-Burn

Three Weeks Post-Burn



Dec 02, 2006 – 6 weeks post-burn

Oiled/Burned

Unoiled/Unburned

March 16, 2006 – 5 months post-burn

Apr 20, 2006 – 6 months post-burn

Oiled/Burned

Unoiled/Unburned

Lessons Learned

- Oil in the environment > 6 weeks can burn
  - Protected from weathering: thickness and vegetative cover
- Residue less than predicted; yet presents hazard
- Aerial observations important for burn operations
- Burn efficiency: 80-90% (conservative)
- Overall, burn footprint as planned; natural firebreaks over manmade
- Preliminary monitoring results: 6 months post-burn little evidence of impact
- Cooperative effort among all parties essential for approval and ultimate success of burn; all parties "took a risk and trusted each other"
- This site set the precedent for using ISB in other spills associated with the hurricanes

Acknowledgments

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Questions?