

**Oil Spill Forum, 2010 – A Public
Listening Session – Bureau of
Ocean Energy Management
Spill Science – The Louisiana
Perspective**

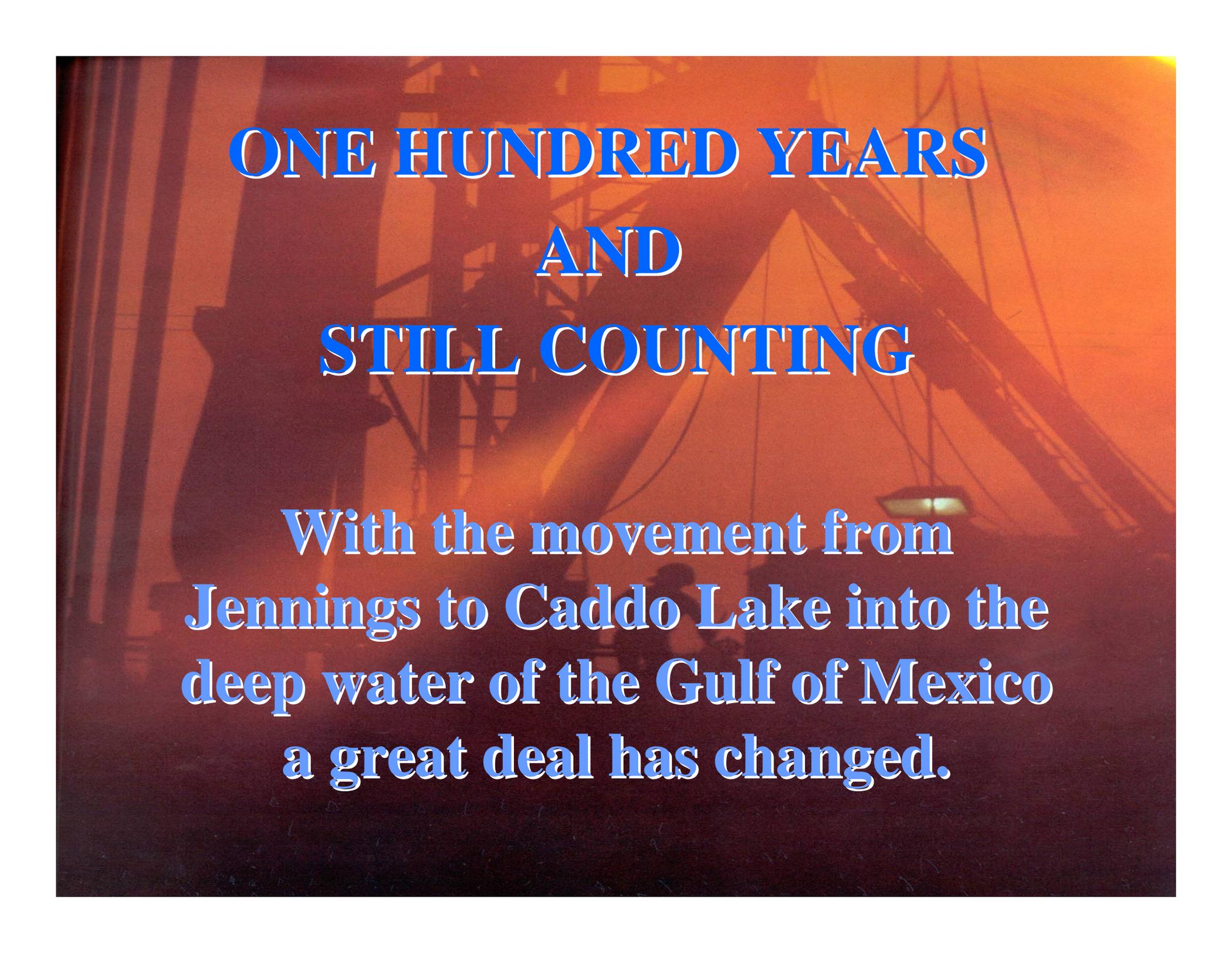
Presented by:

Donald W. Davis

Administrator, Emeritus

OSRADP

Louisiana State University



**ONE HUNDRED YEARS
AND
STILL COUNTING**

**With the movement from
Jennings to Caddo Lake into the
deep water of the Gulf of Mexico
a great deal has changed.**

Louisiana's First Oil Well

In September 1901,
less than a year after
Anthony Lucas'
discovery at
Spindletop, Texas,
W. Scott Heywood's
Jennings Oil
Company completed
Louisiana's first
producing oil well.



FROM JENNINGS TO CADDO LAKE

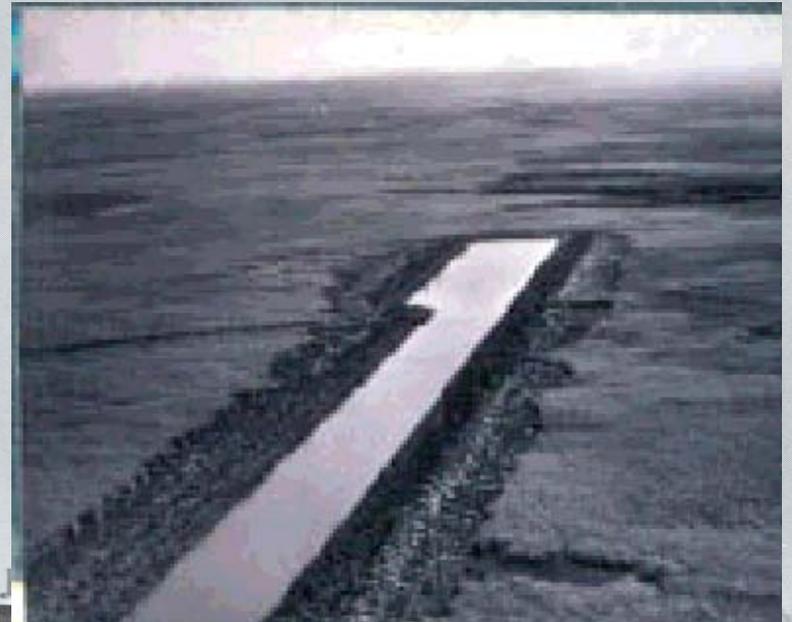
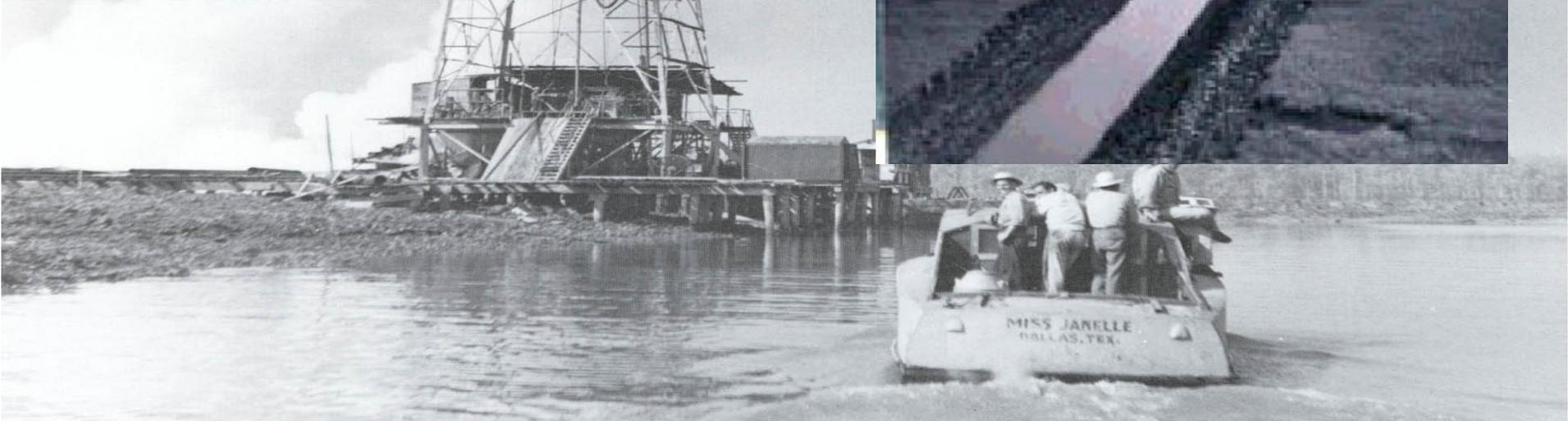


The boom was on!!!!



The Gulf Refining Company—previously known as the J.M. Guffey Petroleum Company—pioneered the nation's first marine-drilling operation in Caddo Lake.

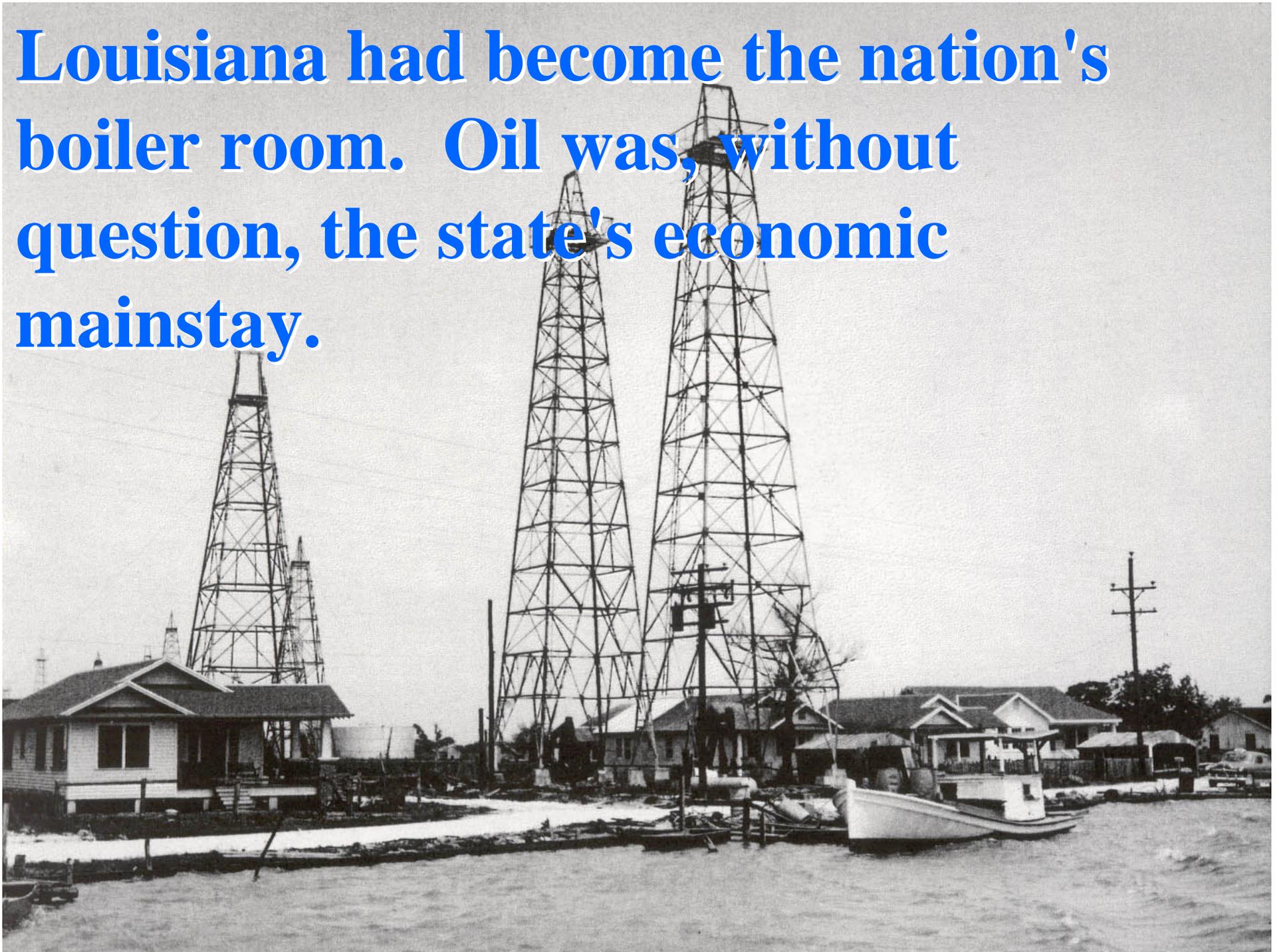
THE REBIRTH OF SOUTH LOUISIANA'S PRODUCTION

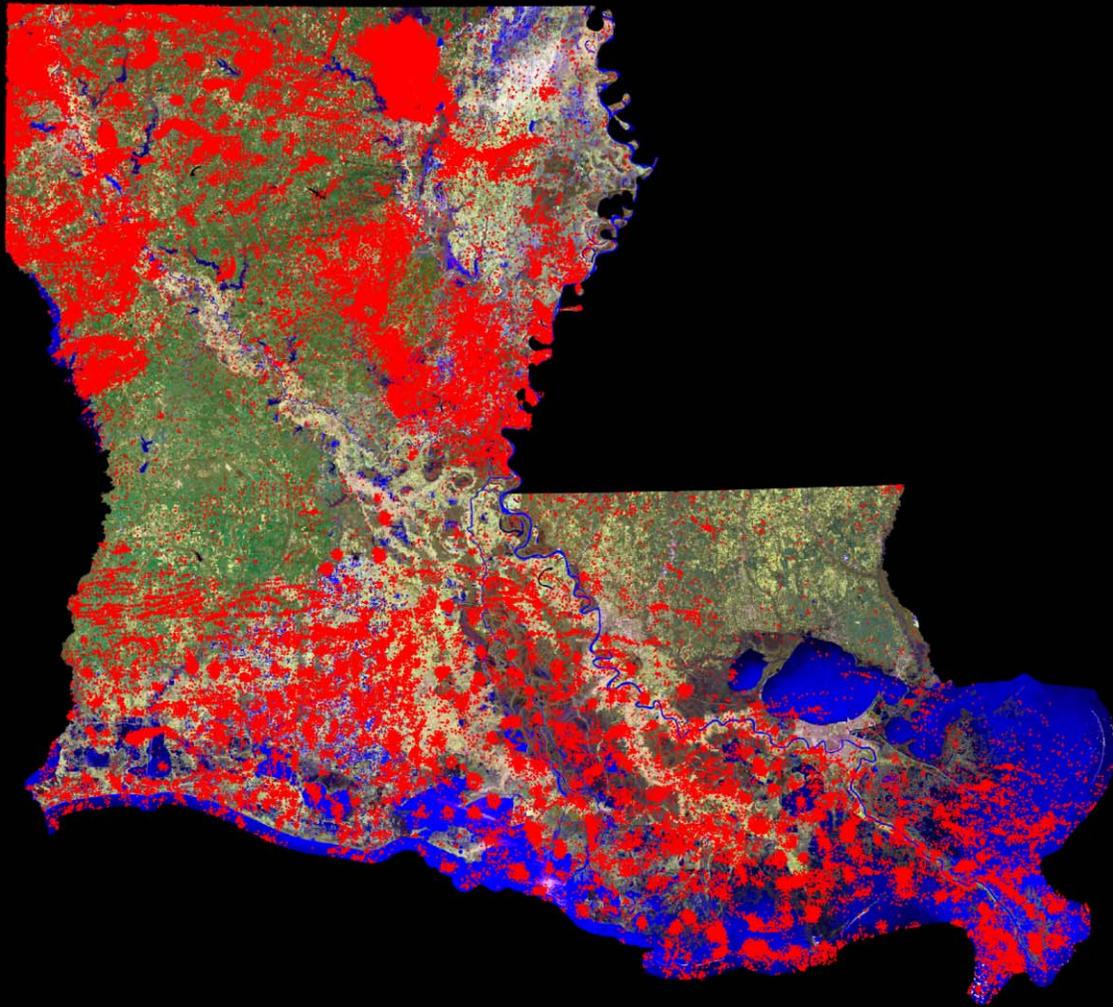




**It was not until
the 1930's that
the necessary
infrastructure-
support facilities
were sufficiently
developed to
make extensive
wetland
exploration
practical.**

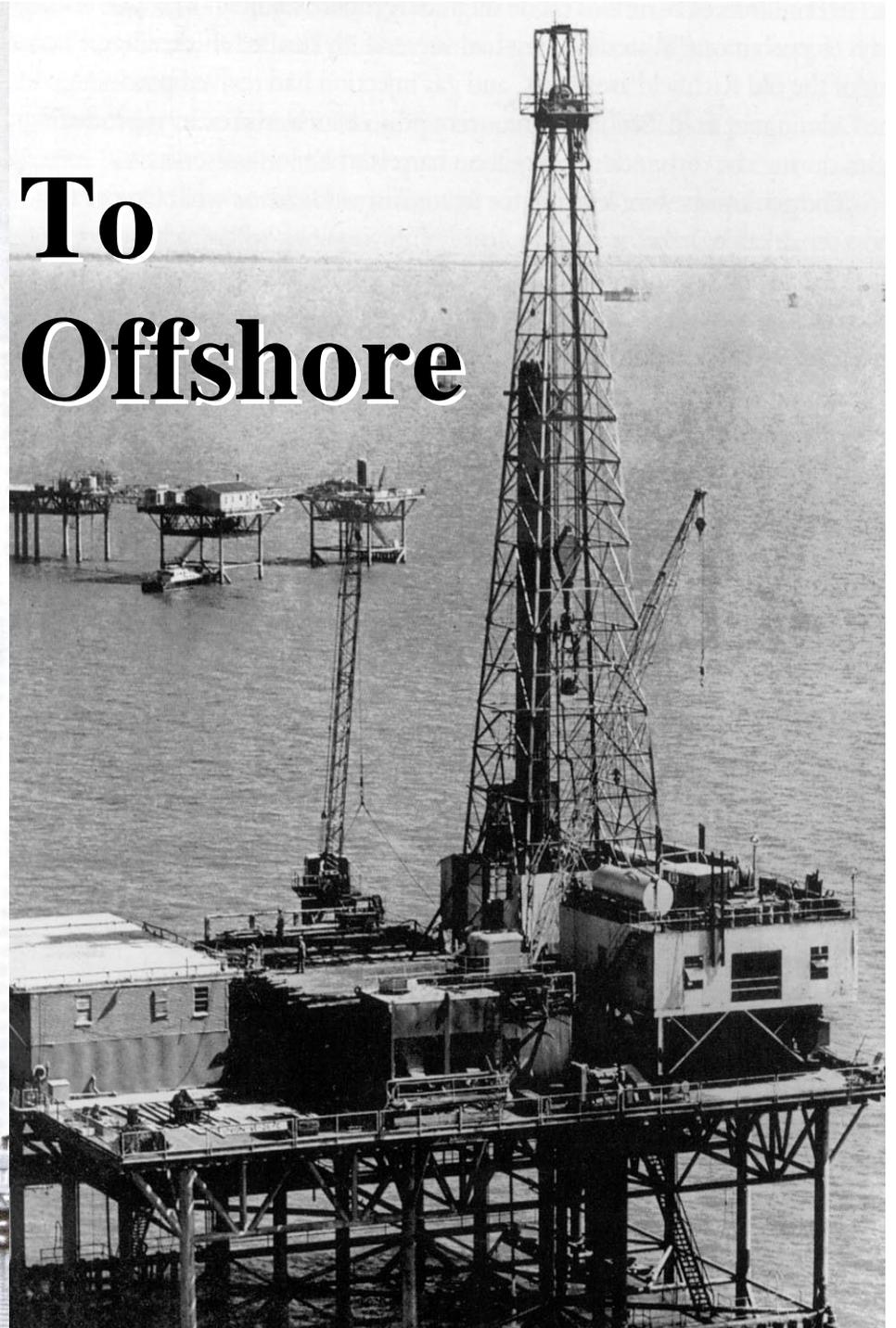
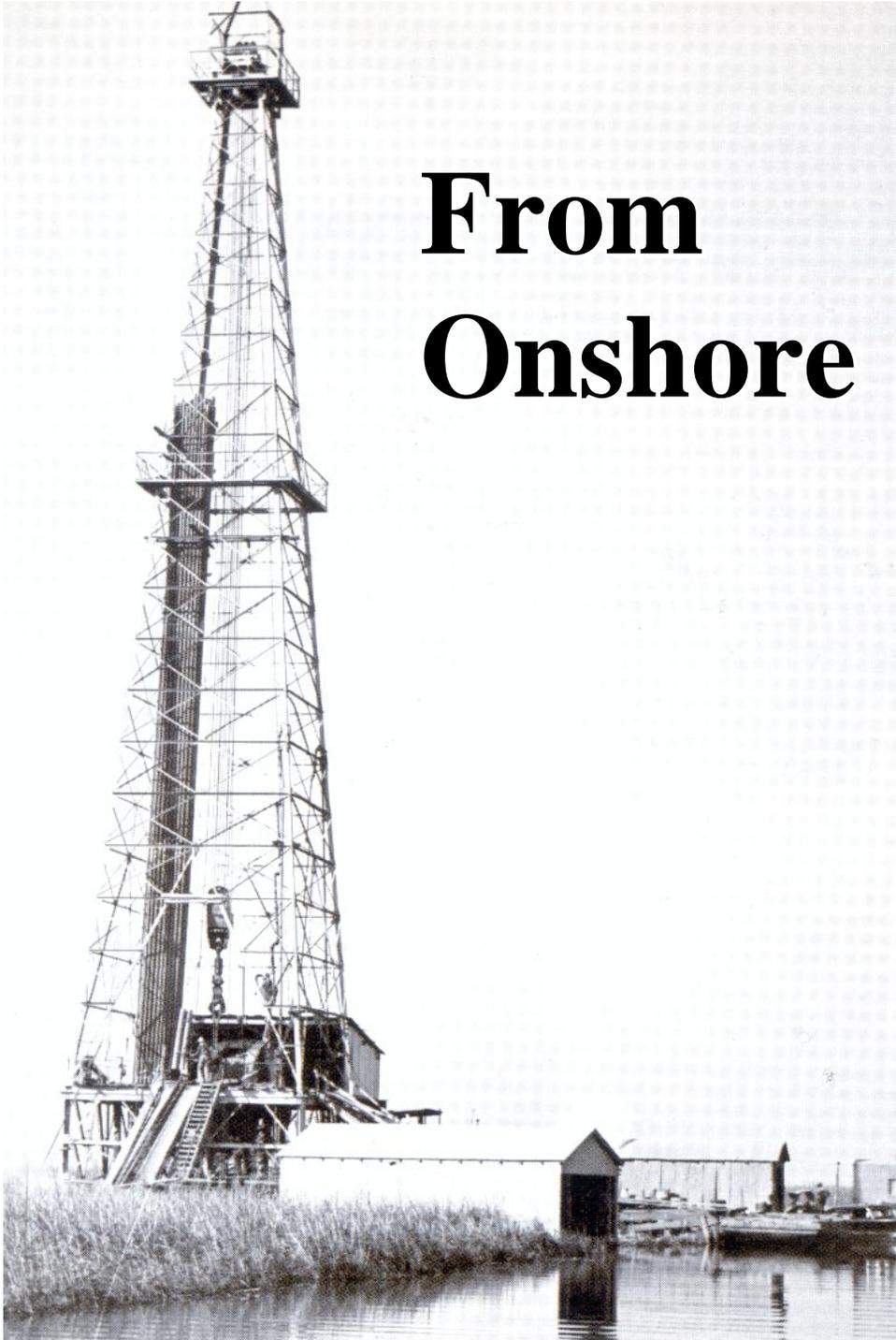
Louisiana had become the nation's boiler room. Oil was, without question, the state's economic mainstay.



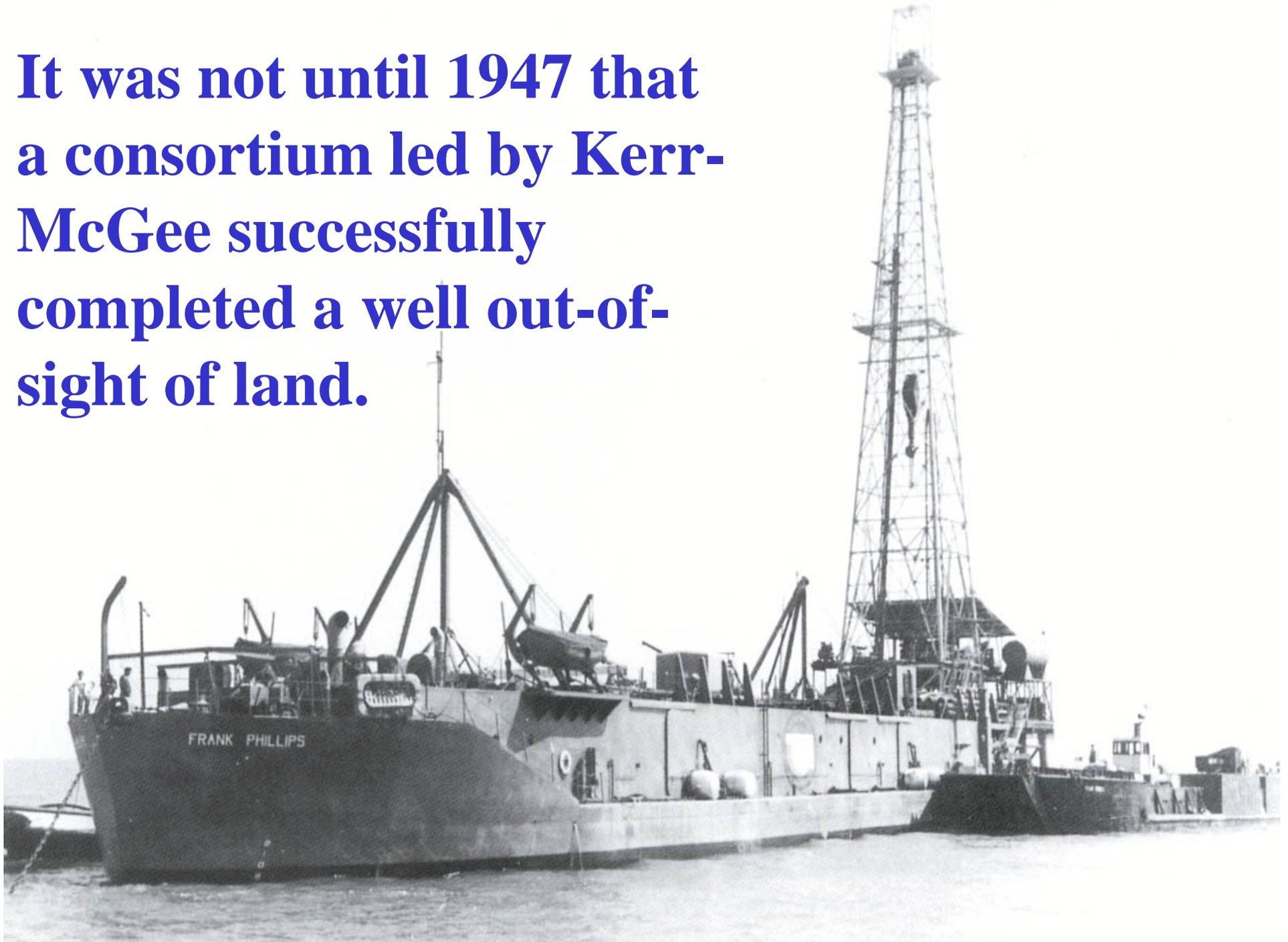


*Eventually
oil and/or
gas was
discovered
in every
parish.*

From Onshore To Offshore

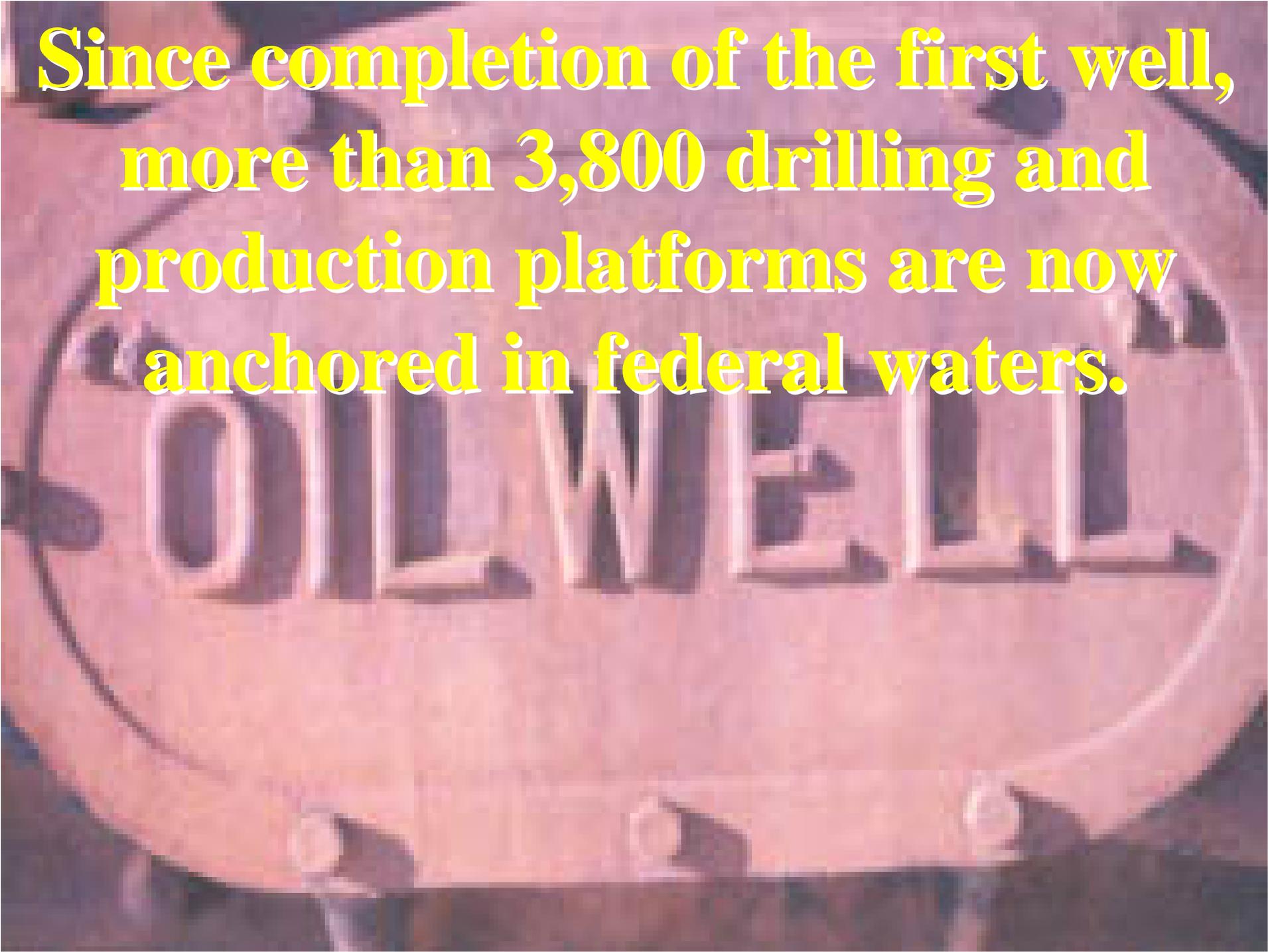


It was not until 1947 that a consortium led by Kerr-McGee successfully completed a well out-of-sight of land.

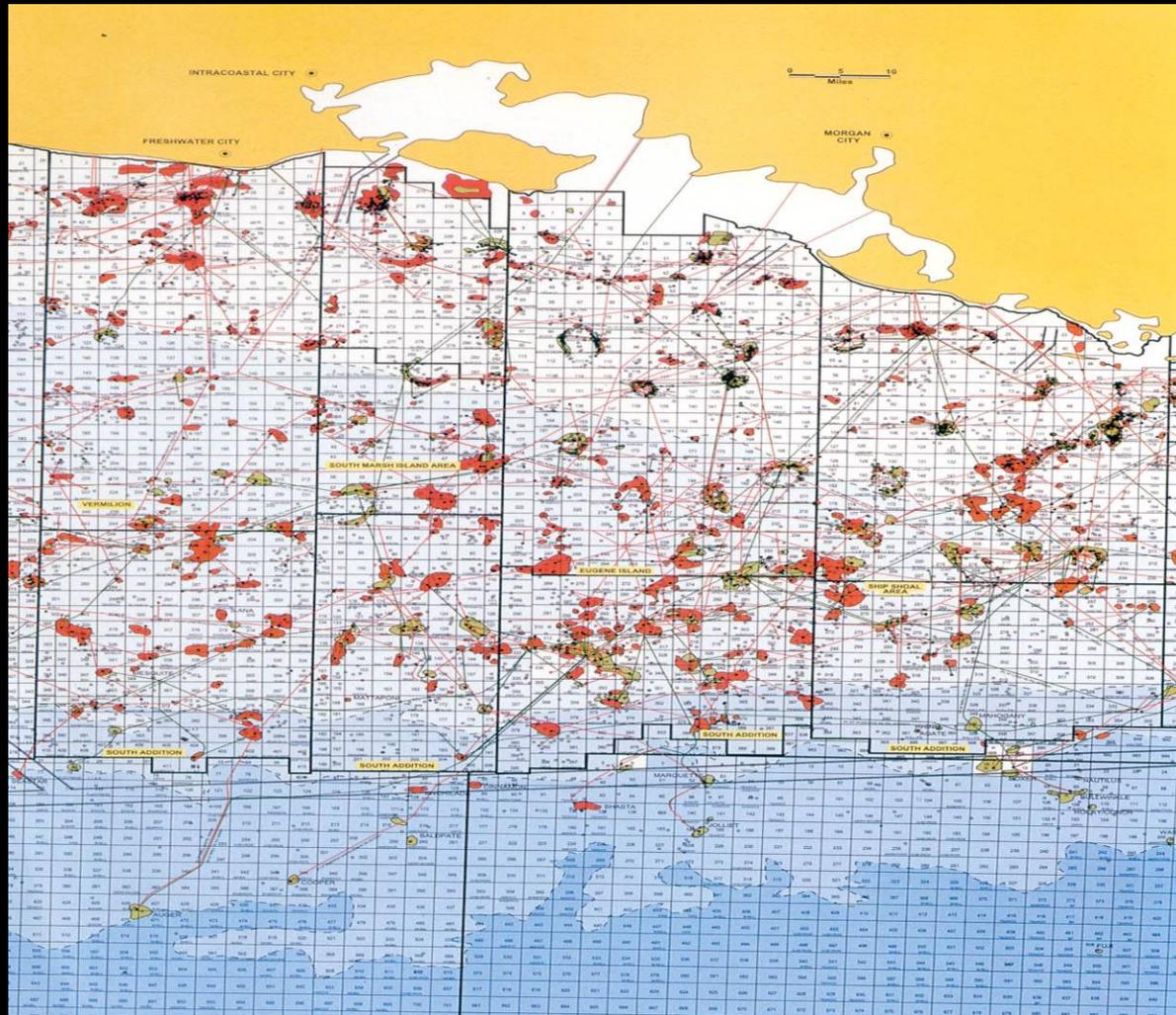




**The Gulf of
Mexico
Off Louisiana's
Coast Quickly
Became A
Major Oil and
Gas
Province.**

A large, circular, rusted metal cover, likely for a wellhead, with the words "DOWNWELL" embossed in the center. The cover is made of a reddish-brown metal, possibly steel, and shows signs of weathering and corrosion. The text is in a bold, sans-serif font. The background is a dark, textured surface.

**Since completion of the first well,
more than 3,800 drilling and
production platforms are now
anchored in federal waters.**

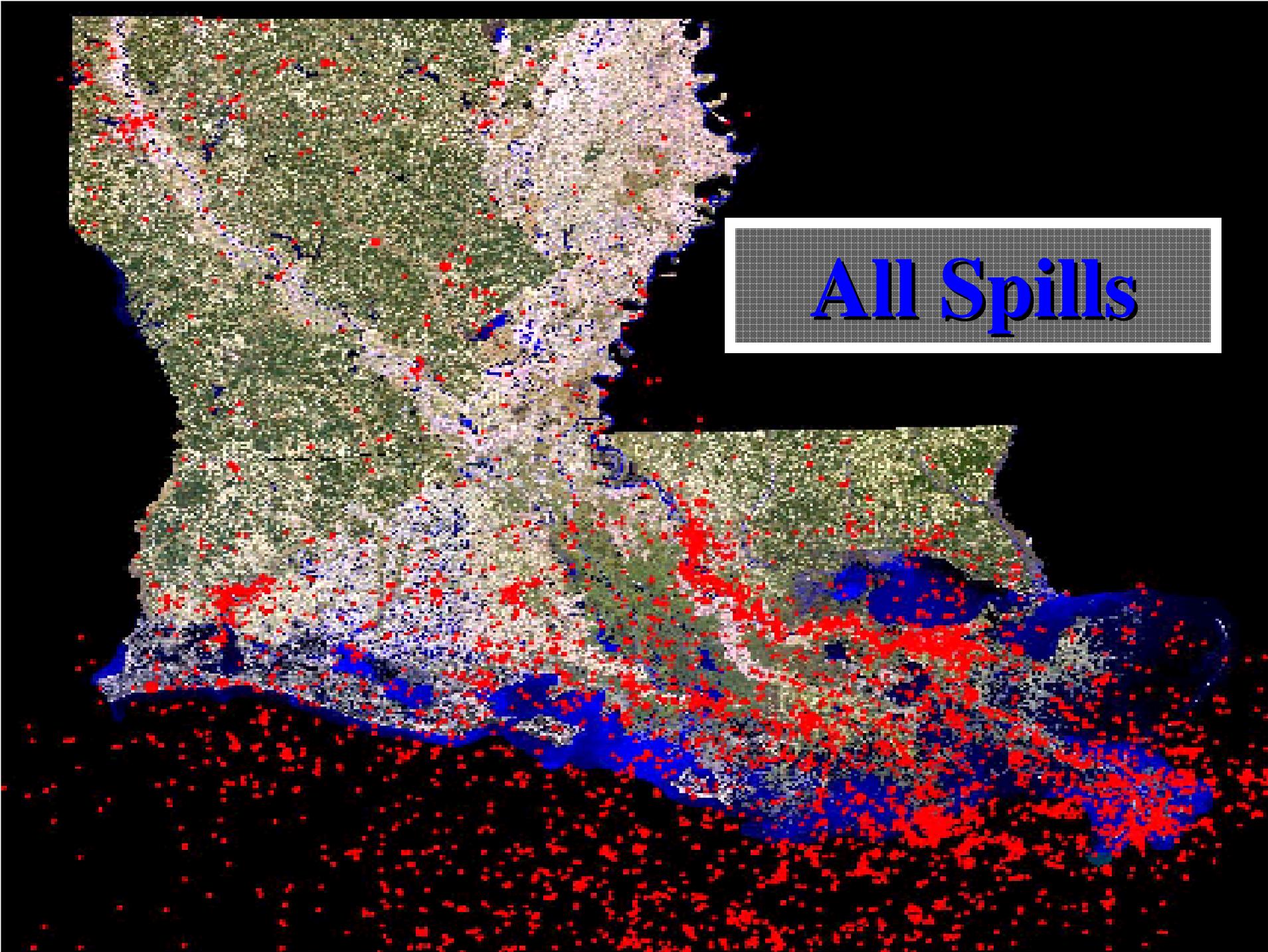


The Offshore Industry Continues To Expand

***THE LOUISIANA APPLIED
AND EDUCATIONAL OIL
SPILL RESERCH AND
DEVELOPMENT PROGRAM
OSRADP***

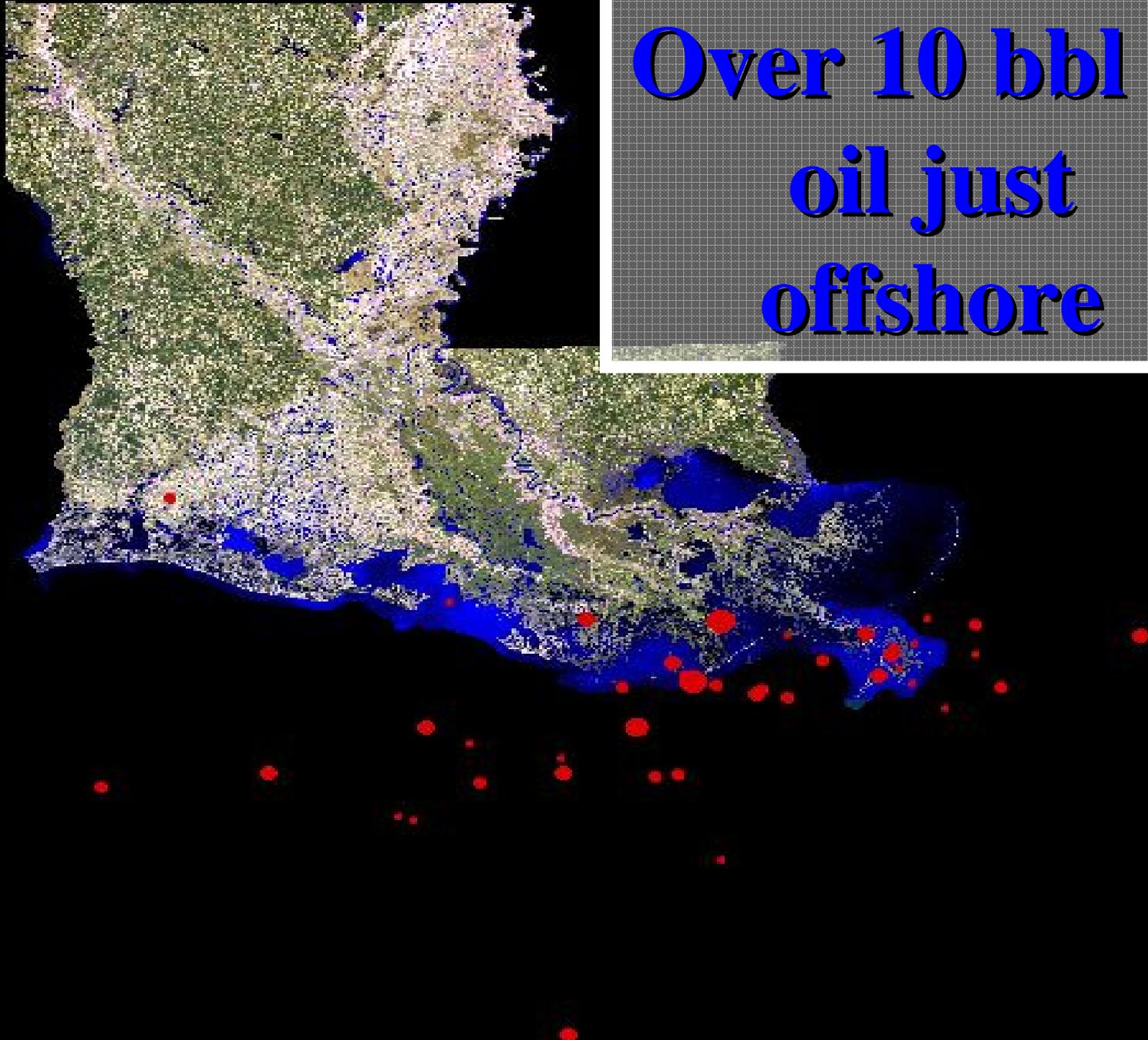


**ACCIDENTS
HAPPEN!!!**

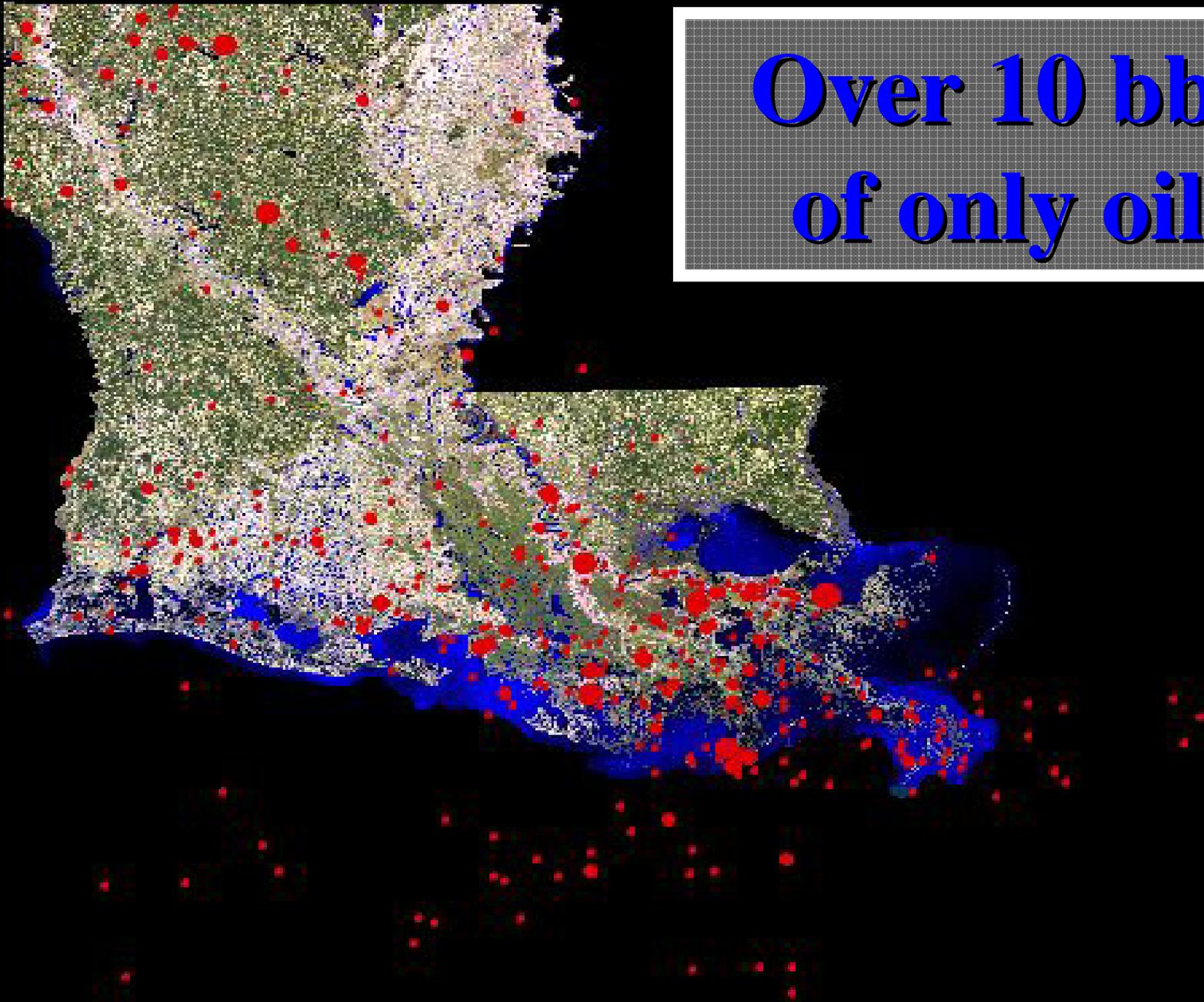


All Spills

**Over 10 bbl of
oil just
offshore**



**Over 10 bbl
of only oil**

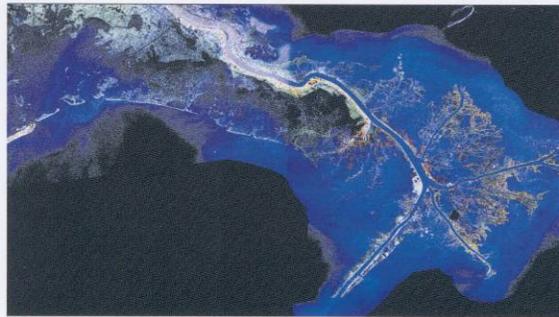




**Over 10 bbl of oil only from
pipelines**

University	Number of Awards	Percent of Total
LSU	71	52
ULL	25	18
La Tech	21	15
LSU-Ag	6	4
ULM	6	4
SLU	4	3
McNeese	2	1
Nicholls	3	2
LUMCON	1	1
	139	100

**Awards by
Academic
Institution,
1994 - 2006**



**The Louisiana
Applied and
Educational
Oil Spill Research and
Development Program**

OSRADP

**The
OSRADP
has been in
business
since 1993.**

OSRADP Awards By Year

Total Amount of Awards from 1994 to 2006:	
Year	Amount
1994-1995	\$ 496,942.18
1995-1996	\$ 482,407.37
1996-1997	\$ 524,917.92
1997-1998	\$ 446,215.18
1998-1999	\$ 536,857.00
1999-2000	\$ 579,586.00
2000-2001	\$ 525,126.00
2001-2002	\$ 522,269.00
2002-2003	\$ 513,450.00
2003-2004	\$ 413,291.00
2004-2005	\$ 573,600.00
2005-2006	\$ 453,880.55
Total	\$ 6,068,542.20

139

**AWARDS IN
SUPPORT OF
PROJECTS**

97

**(Average award
is \$43,658)**

EXAMPLES OF RESEARCH PROJECTS

- oil spill awareness through geoscience education (OSAGE);
- potential impact of used oil recycling in Louisiana's coastal fishing communities;
- Landsat Thematic Mapper (TM) and synthetic aperture radar to facilitate coastline delineation;
- environmental effects and effectiveness of *in-situ* burning in wetlands;







**With sustained winds
exceeding 155 mi/hr, offshore
waves that were more than 80
ft high , and a storm surge
that exceeded 30 ft ,
Hurricanes *Katrina* and *Rita*
will not soon be forgotten.**

**More than 8.0 million gallons of
oil was discharged in
Louisiana's coastal zone—11.0
million gallons were discharged
in Prince Williams Sound from
the Exxon Valdez.**

Chevron Empire

***In-Situ* Burn**



October 12, 2005



Chevron Empire

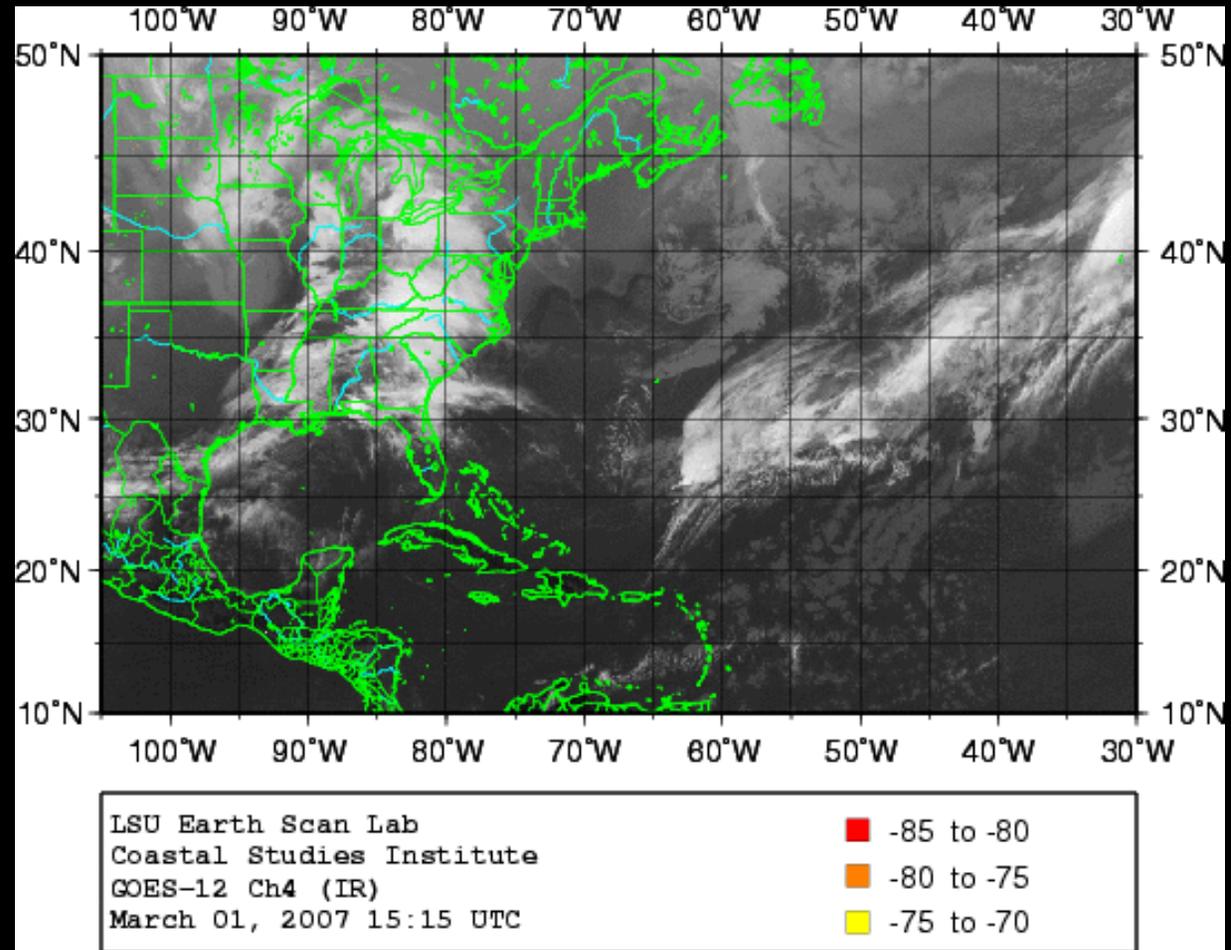
Post *In-Situ* Burn

October 13, 2005

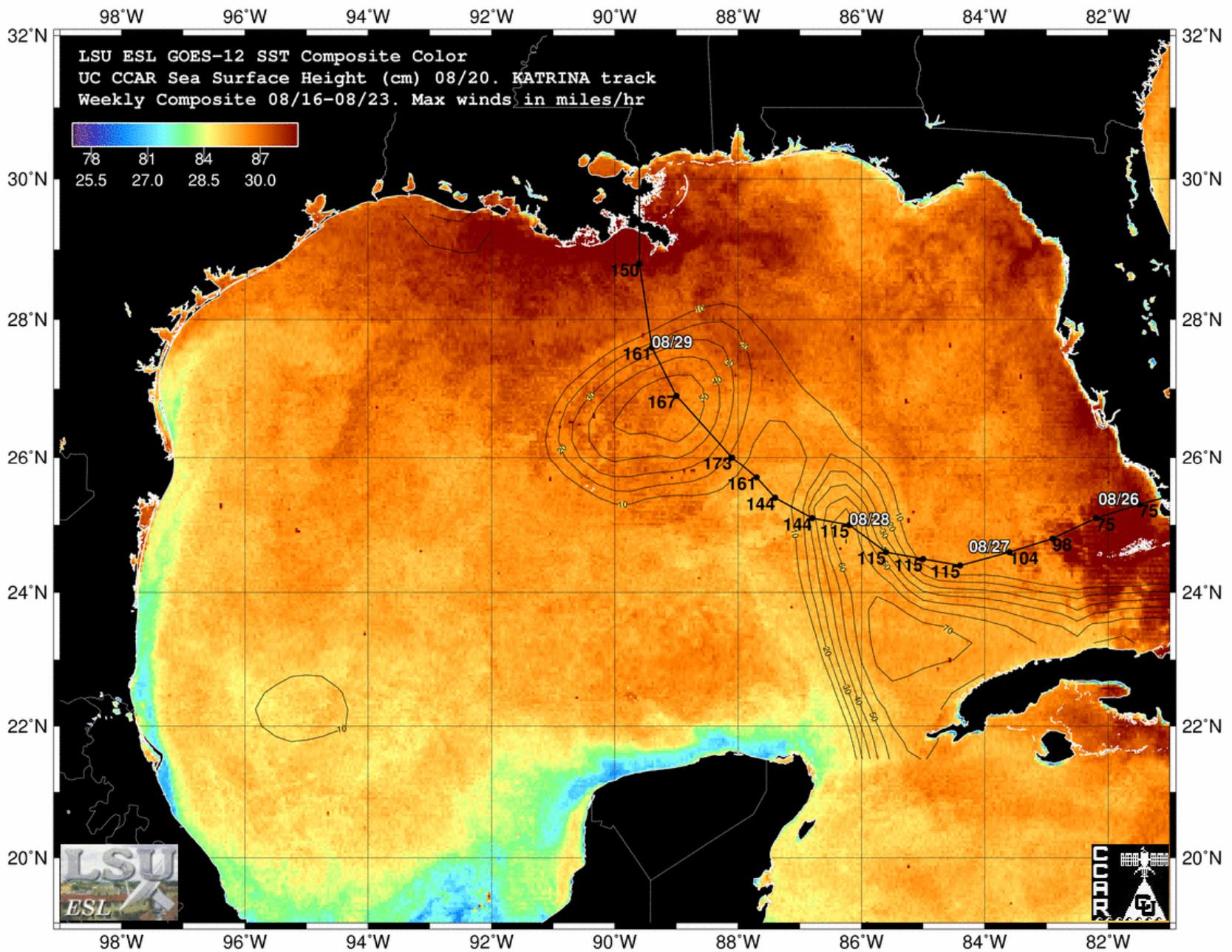
Some of the projects funded through the OSRADP include

- use of ammoniated bagasse for remediation of wetland soils contaminated with crude oil;
- composting technology for practical and safe remediation of oil spill residuals;
- predictability of oceanic and atmospheric conditions off the Mississippi Delta;
- phytoremediation for oil spill cleanup and habitat restoration in Louisiana's marshes;

Earth Scan Laboratory at LSU



<http://www.esl.lsu.edu>



Some of the projects funded through the OSRADP include

- research, compilation, and digitization of undocumented and abandoned Louisiana pipelines;
- survey of Louisiana seabird colonies to enhance oil spill research;
- effects of crude oil and spill-response-options on microbial functions and oil disappearance in salt marsh soils;
- factors controlling wetland recovery after in-situ burning for oil remediation;

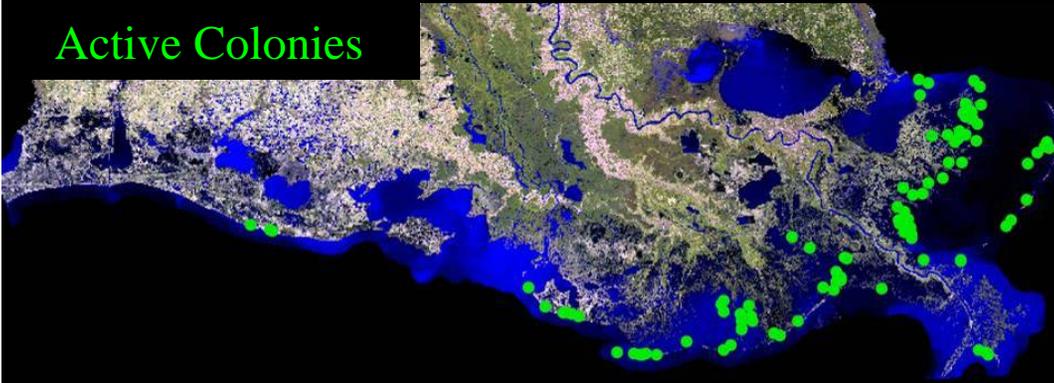
Background

Louisiana's coastal marshes and barrier islands support significant breeding populations of colonial seabirds. Because seabird nesting habitat is highly vulnerable to erosion from tropical and winter storms, the locations of these seabird (particularly Black Skimmer, Least Tern, and Forster's Tern) colonies are subject to annual changes. Due to their location and ground nesting habits, seabird colonies are also extremely vulnerable to oil spills during the nesting season.



Summary 1997 Seabird Colony Survey

Active Colonies



Inactive Colonies



Island supporting colony has disappeared

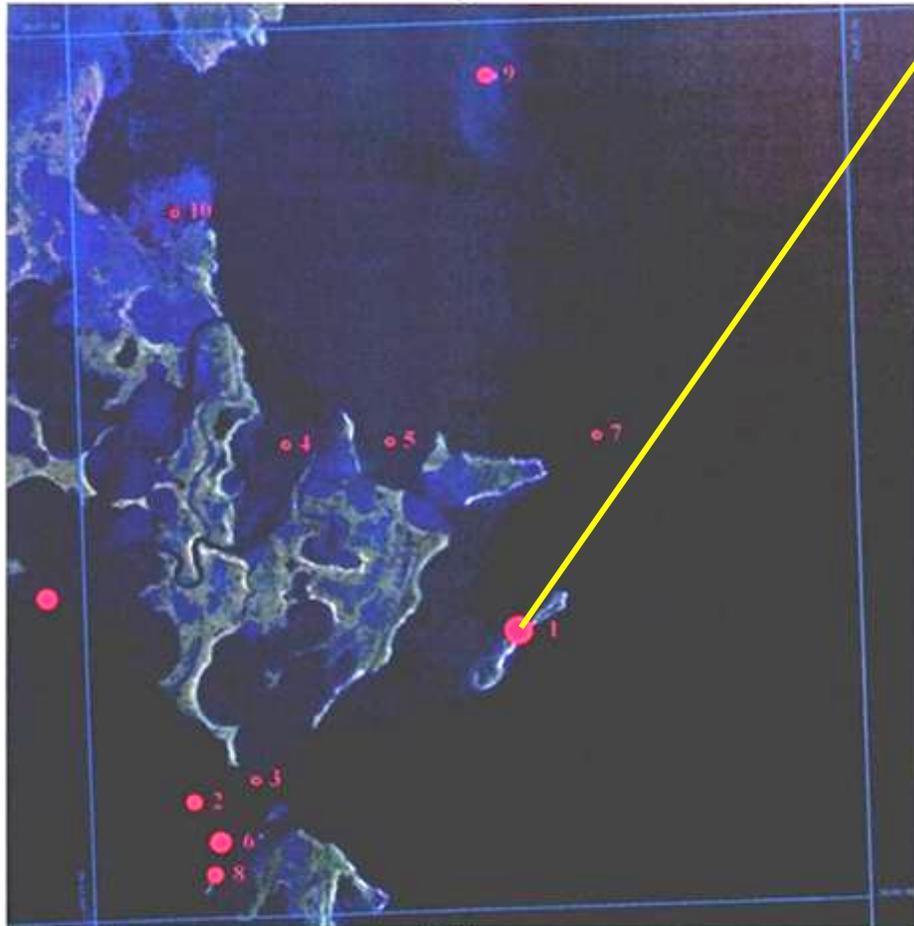


215 colony sites surveyed:

- 102 active colonies
 - 18 were new in 1997
 - 98% located in Deltaic Plain
- 83 inactive colonies
 - 30 historic colonies have disappeared since they were located on islands that no longer exist.

Atlas (GIS Database)

Seabird Colonies of Door Point, Louisiana
Quadrangle 194C



Latitude: 30° 02.362

Longitude: 89° 10.822

Number of birds present in 1997: 5700

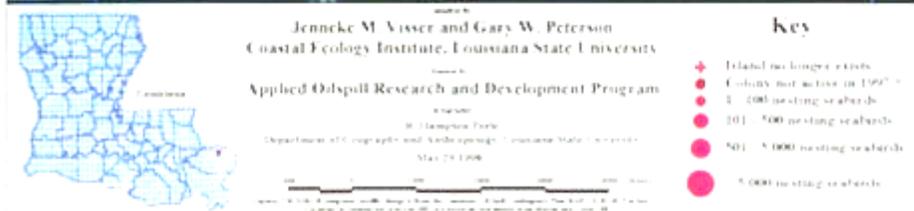
Years active: 76, 78, 83, 88, 89, 93, 94, 95, 97

Habitat: Laughing Gull in marsh; Black Skimmer, Sandwich Tern, and Royal Tern on shell; waders in marsh and shrubs. Laughing Gull throughout the island; Black Skimmer, Sandwich Tern, and Royal Tern on north end; waders on south and north ends.

Species present in 1997 (number):

**Laughing Gull (5000), Black Skimmer (570),
Sandwich Tern (70), Royal Tern (60)**

**Active nesting period: From April 1
through September 15**

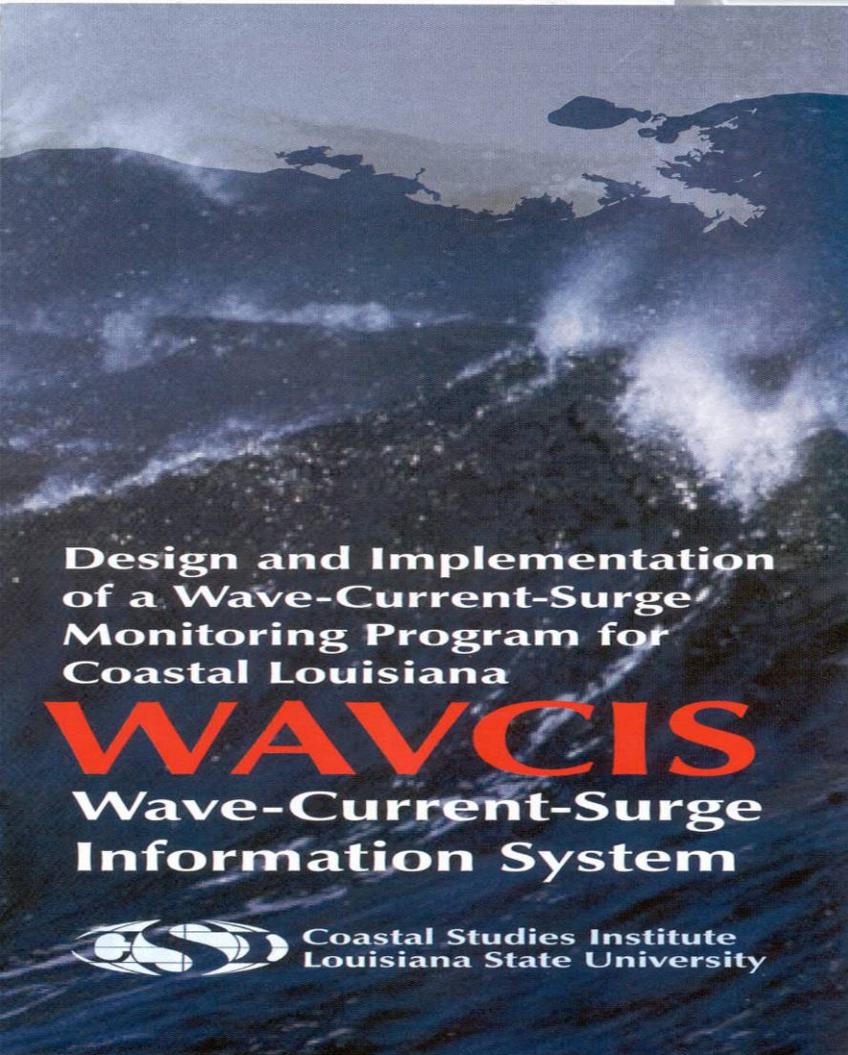


Some of the projects funded through the OSRADP include

- the interaction between oil spills, chemical responses and fresh marsh types in determining toxicity to indigenous aquatic animals and the detail of hydrocarbon analysis required to predict this toxicity;
- use of donor seed banks in terrestrial vegetation recovery after an oil spill;
- wave-current online information system for oil spill contingency planning;
- remediation and restoration of an oil contaminated wetland and pine forest site;

Poseidon - 29,000-ft well in 4,800-ft of water

Hurricane Katrina



Design and Implementation
of a Wave-Current-Surge
Monitoring Program for
Coastal Louisiana

WAVCIS
Wave-Current-Surge
Information System



Coastal Studies Institute
Louisiana State University





Hurricane Katrina

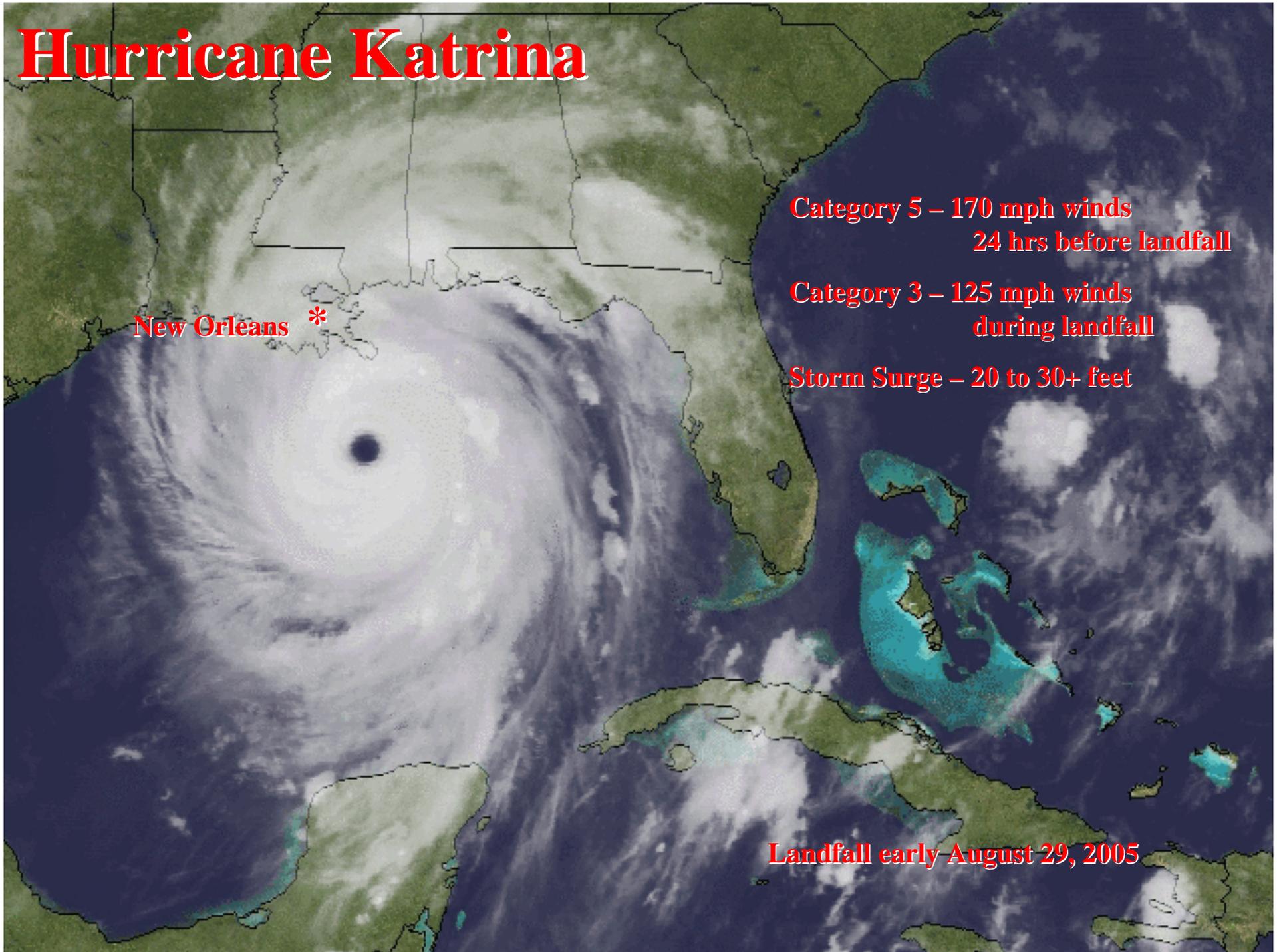
New Orleans *

Category 5 – 170 mph winds
24 hrs before landfall

Category 3 – 125 mph winds
during landfall

Storm Surge – 20 to 30+ feet

Landfall early August 29, 2005



Hurricane Rita

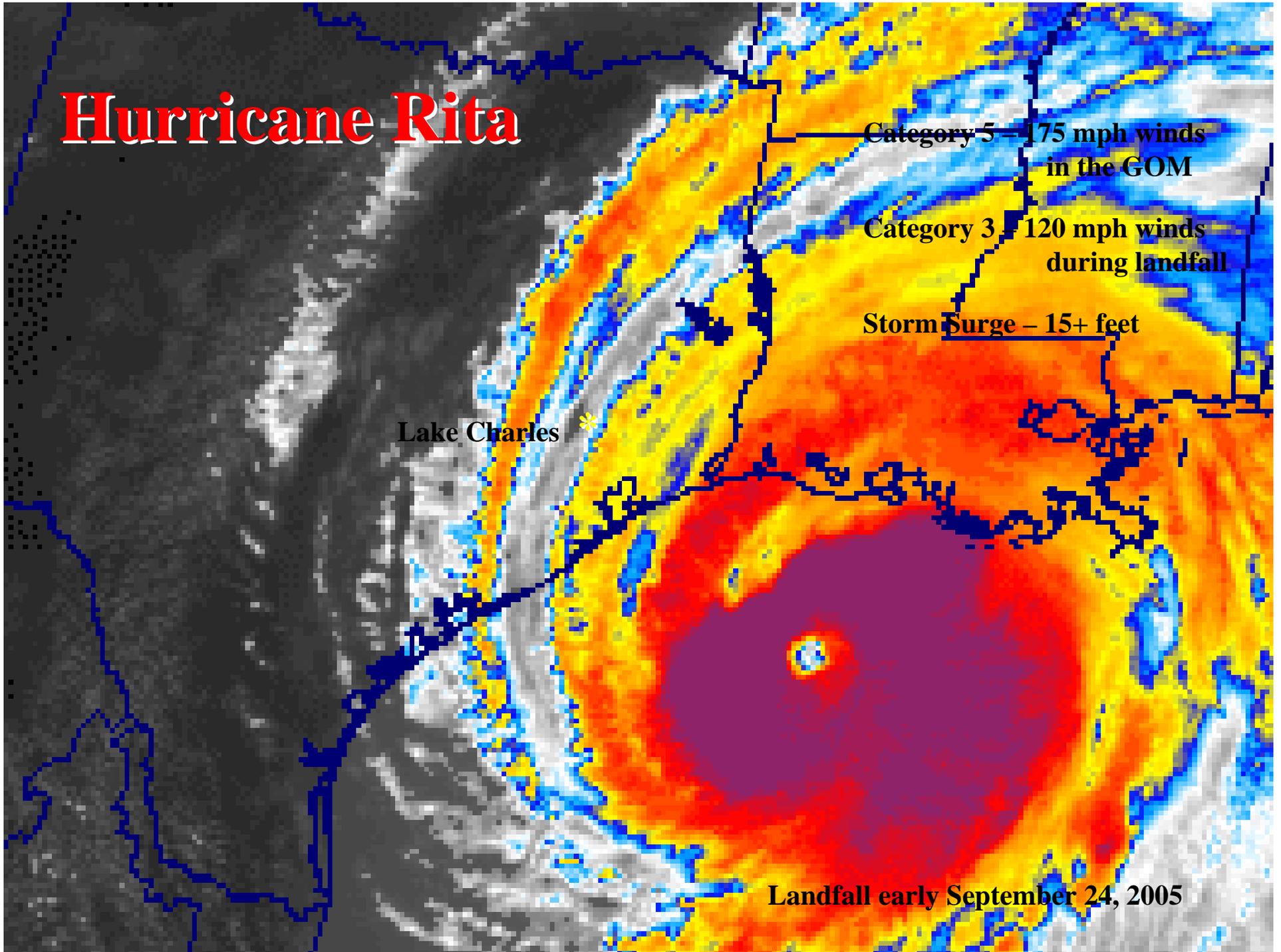
Category 5 – 175 mph winds
in the GOM

Category 3 – 120 mph winds
during landfall

Storm Surge – 15+ feet

Lake Charles *

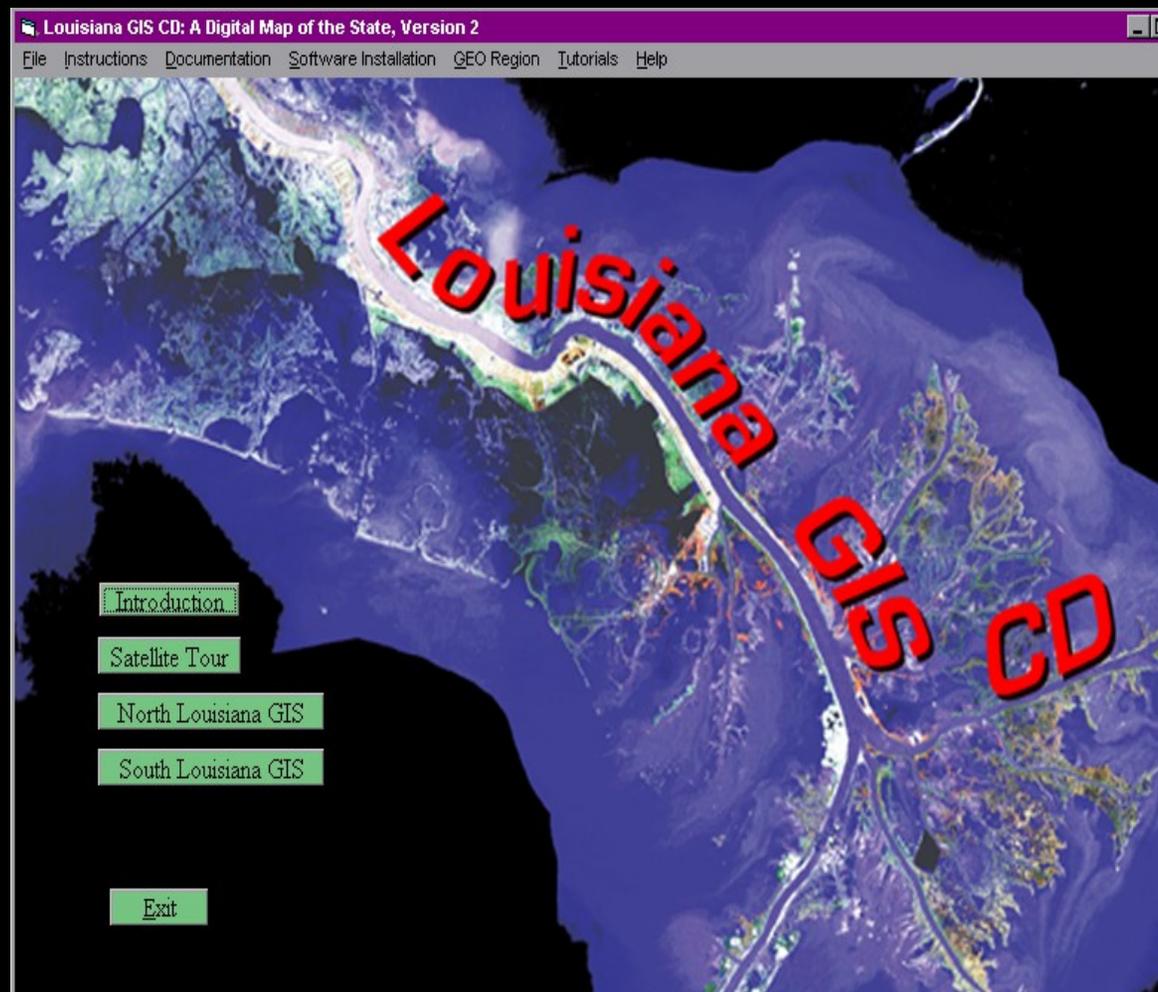
Landfall early September 24, 2005



Some of the projects funded through the OSRADP include

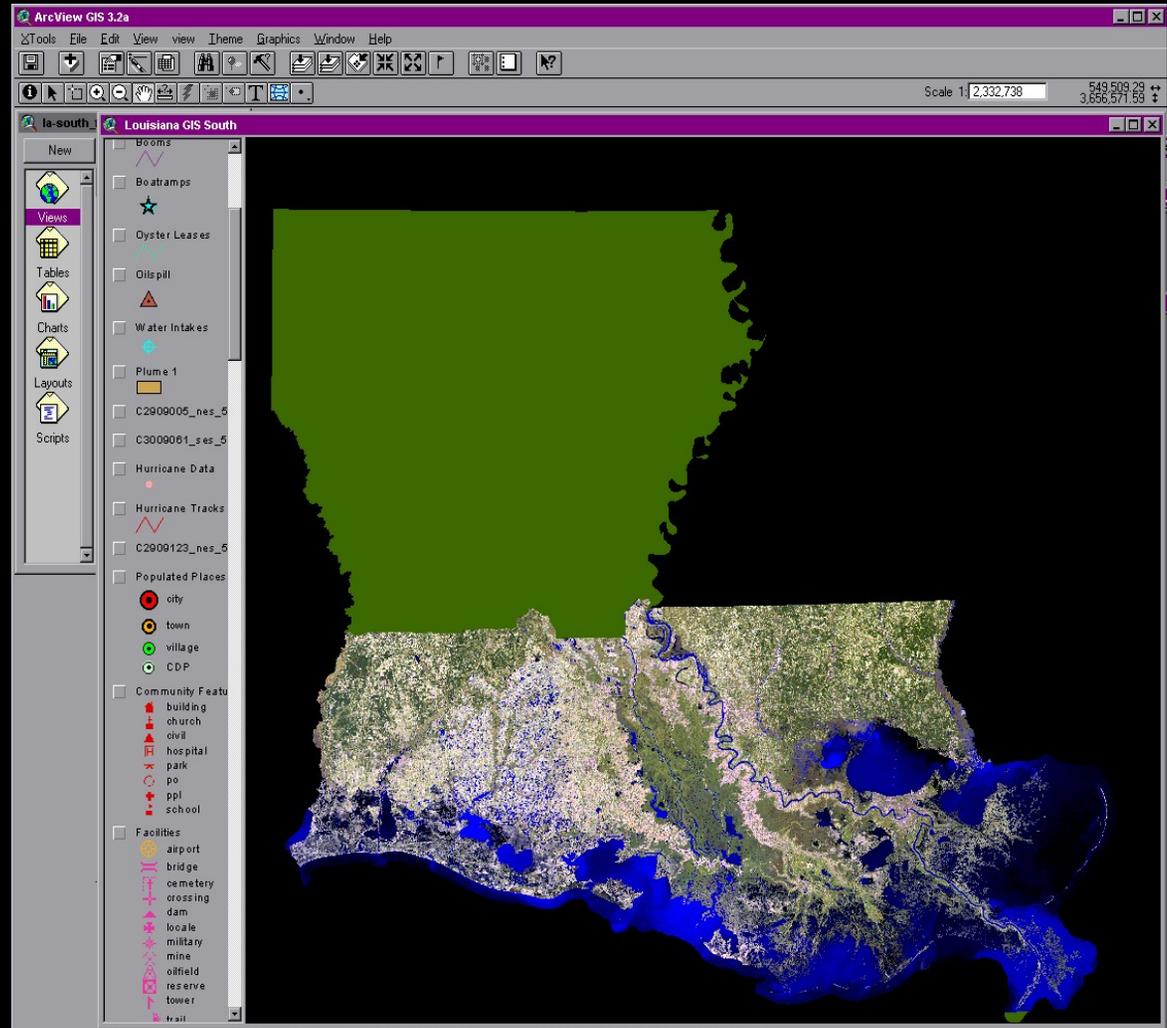
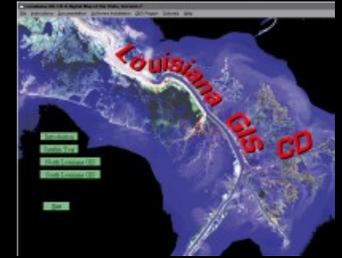
- Louisiana GIS CD: Demonstrations;
- Use of wicks to promote in-situ burning of spilled oil on open water and soil;
- The production and analysis of an oil spill database for Louisiana;
- Remediation and restoration of an oil contaminated wetland and pine forest;

Louisiana GIS CD Demonstrations



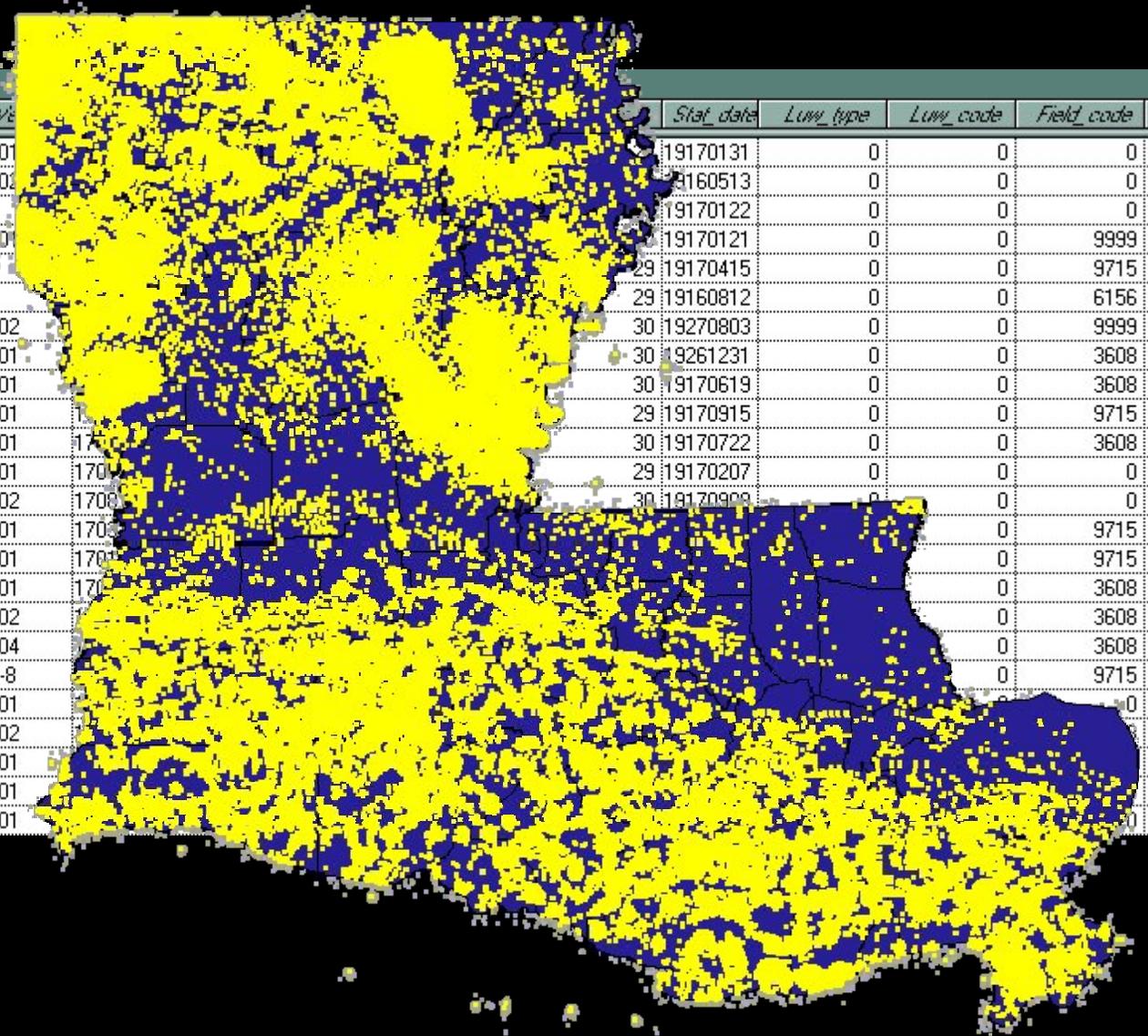
Application Scenarios

- Hurricane
- Atmospheric
Toxic Release
- Oil Spill
- Flood Zones
- Sea Level Rise
- Emergency
Routing
- Transportation
- Demographics
- Address Matching
- Crime



Attributes of Oilgaswells.shp

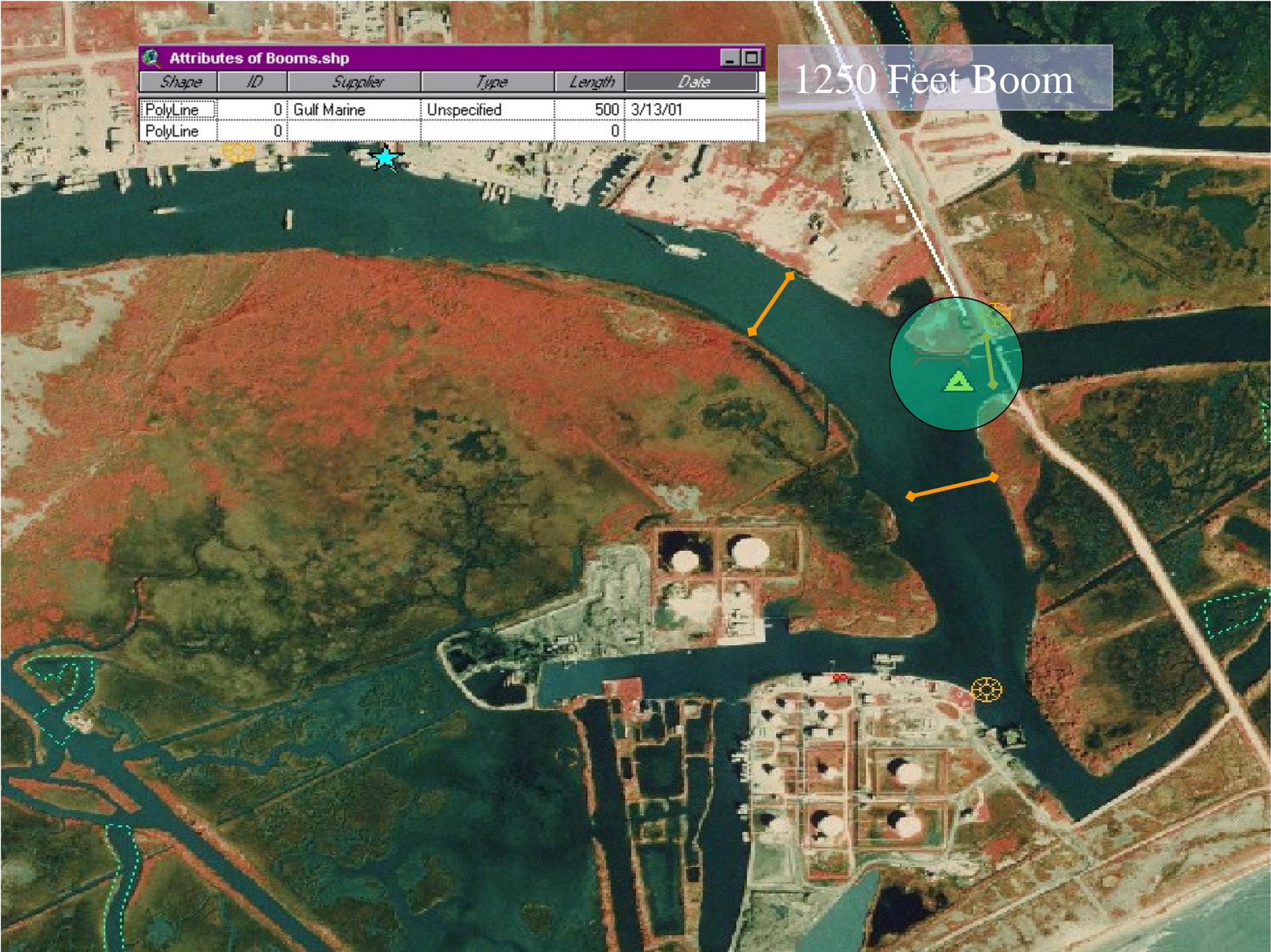
Shape	Well_ser	Well_name	Well	Stat_date	Luvv_type	Luvv_code	Field_code	Oper
Point	108	PRESTON	001	19170131	0	0	0	9999
Point	116	JOYNER	002	19160513	0	0	0	9999
Point	121	KRUMHOLTZ	001	19170122	0	0	0	9999
Point	127	ELSTON	001	19170121	0	0	9999	9999
Point	128	HERNDON	001	29 19170415	0	0	9715	9999
Point	132	STOKES	001	29 19160812	0	0	6156	9999
Point	133	ELSTON	002	30 19270803	0	0	9999	9999
Point	147	W C HORTON	001	30 19261231	0	0	3608	9999
Point	164	MOYER SANDS	001	30 19170619	0	0	3608	9999
Point	168	BARRON	001	29 19170915	0	0	9715	9999
Point	176	J T MCDADE	001	30 19170722	0	0	3608	9999
Point	196	CAPLIS	001	29 19170207	0	0	0	9999
Point	204	A N SAMPLE	002	30 19170909	0	0	0	2264
Point	206	HOOD	001	1700		0	9715	9999
Point	207	MCKNIGHT	001	1700		0	9715	9999
Point	210	HODGES SWD	001	1700		0	3608	5507
Point	211	MARCER	002	1700		0	3608	2264
Point	220	ELSTON	004	1700		0	3608	9999
Point	223	SAMPLE	A-8	1700		0	9715	5878
Point	225	WESTDALE	001	1700		0	0	9999
Point	230	CAPLIS	002	1700		0	0	2264
Point	237	PEYTON-COURTNEY	001	1700		0	0	9999
Point	238	SMITH	001	1700		0	0	9999
Point	241	STATE	001	1700		0	0	2264



Attributes of Booms.shp

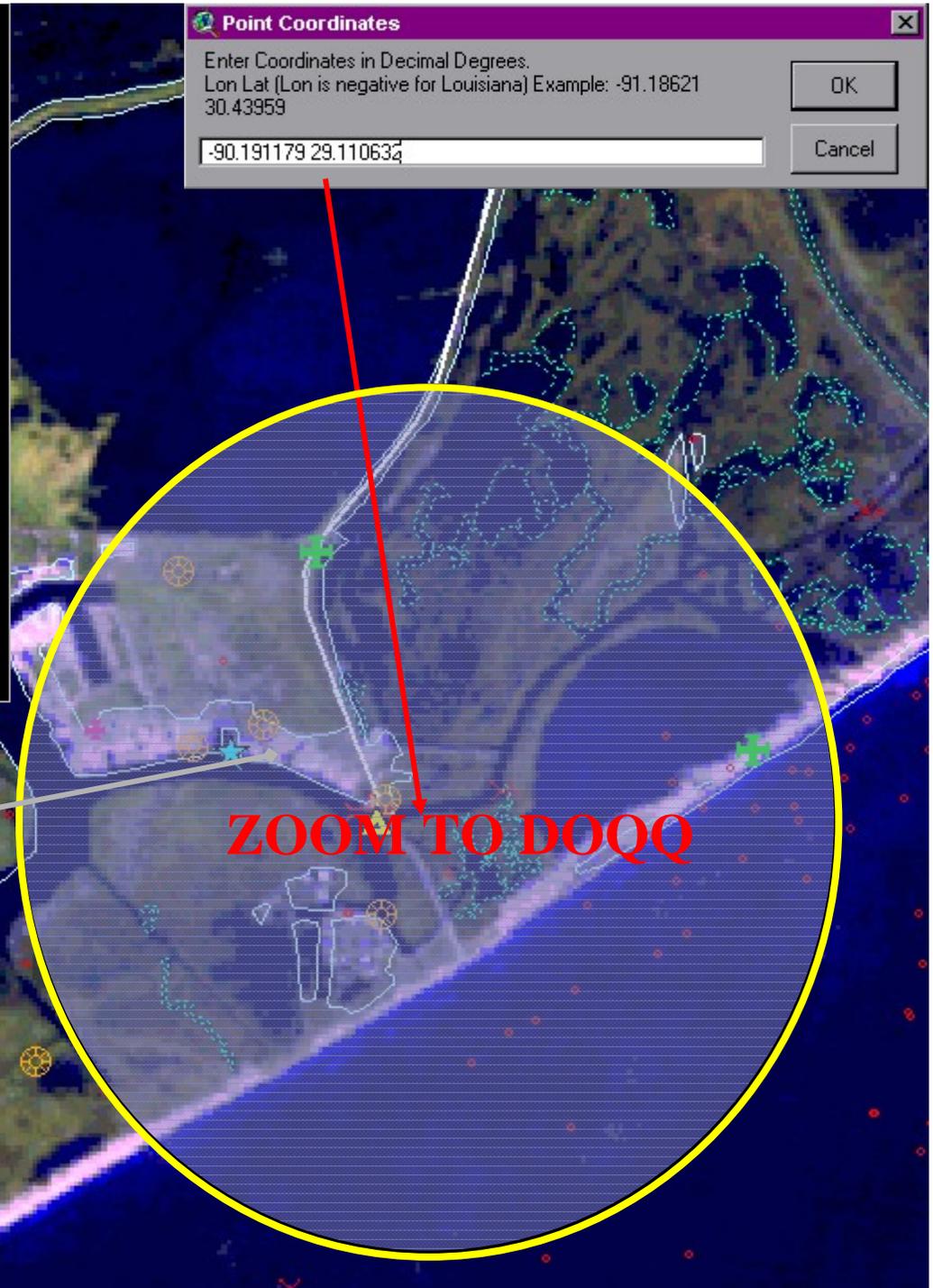
Shape	ID	Supplier	Type	Length	Date
PolyLine	0	Gulf Marine	Unspecified	500	3/13/01
PolyLine	0			0	

1250 Feet Boom



Proximity Queries

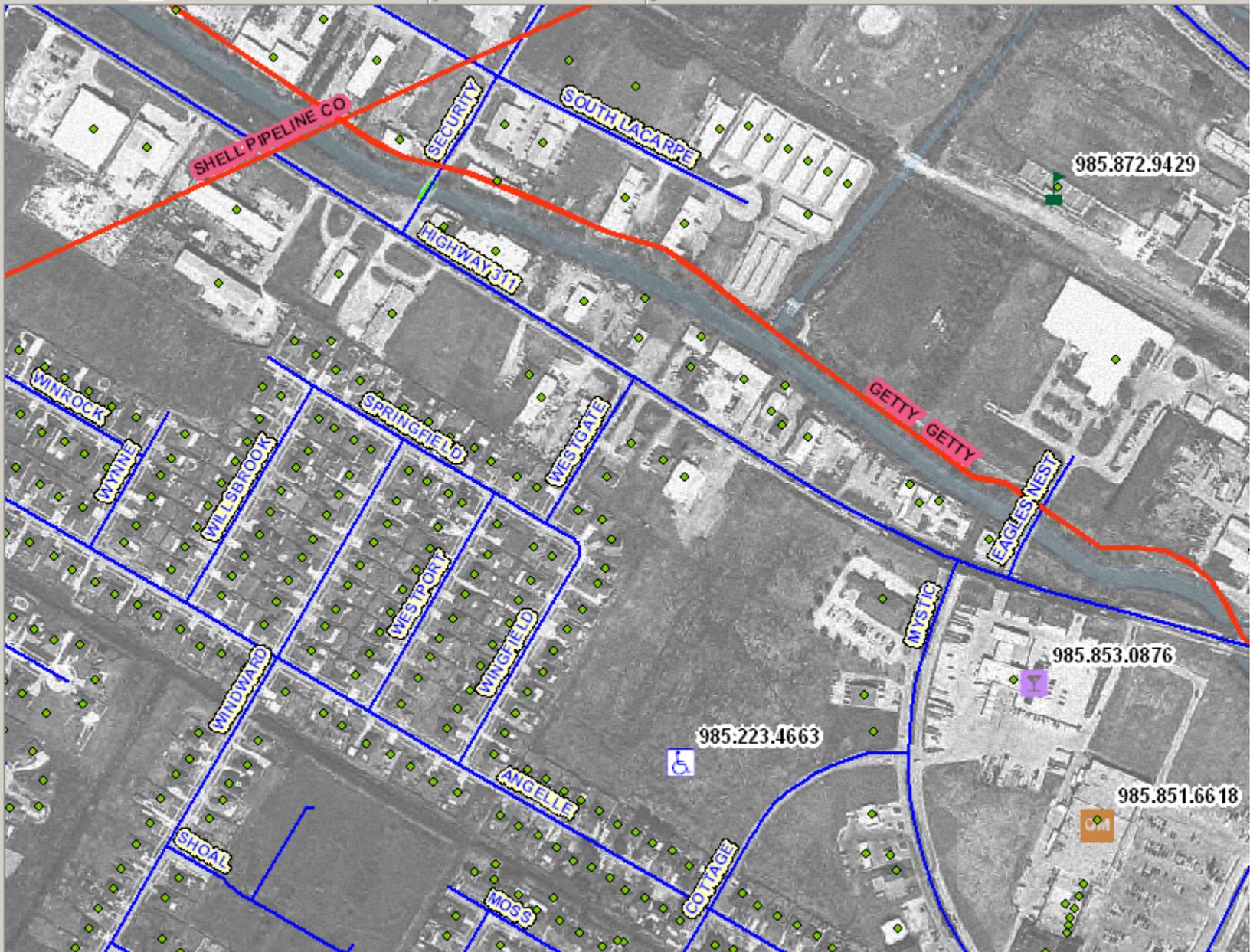
- *Oil & Gas Wells
- *Pipeline Crossing - Shell
- *Highways - La 1
- *Heliports - Air Logistics Martin Docks
- *Water Bodies - Bayou Lafourche
- *Marsh Type - Saline
- *Oyster Lease Zones
- *Seabird Colonies
- *High-Tide Line
- *Boat Ramps - Hotlink



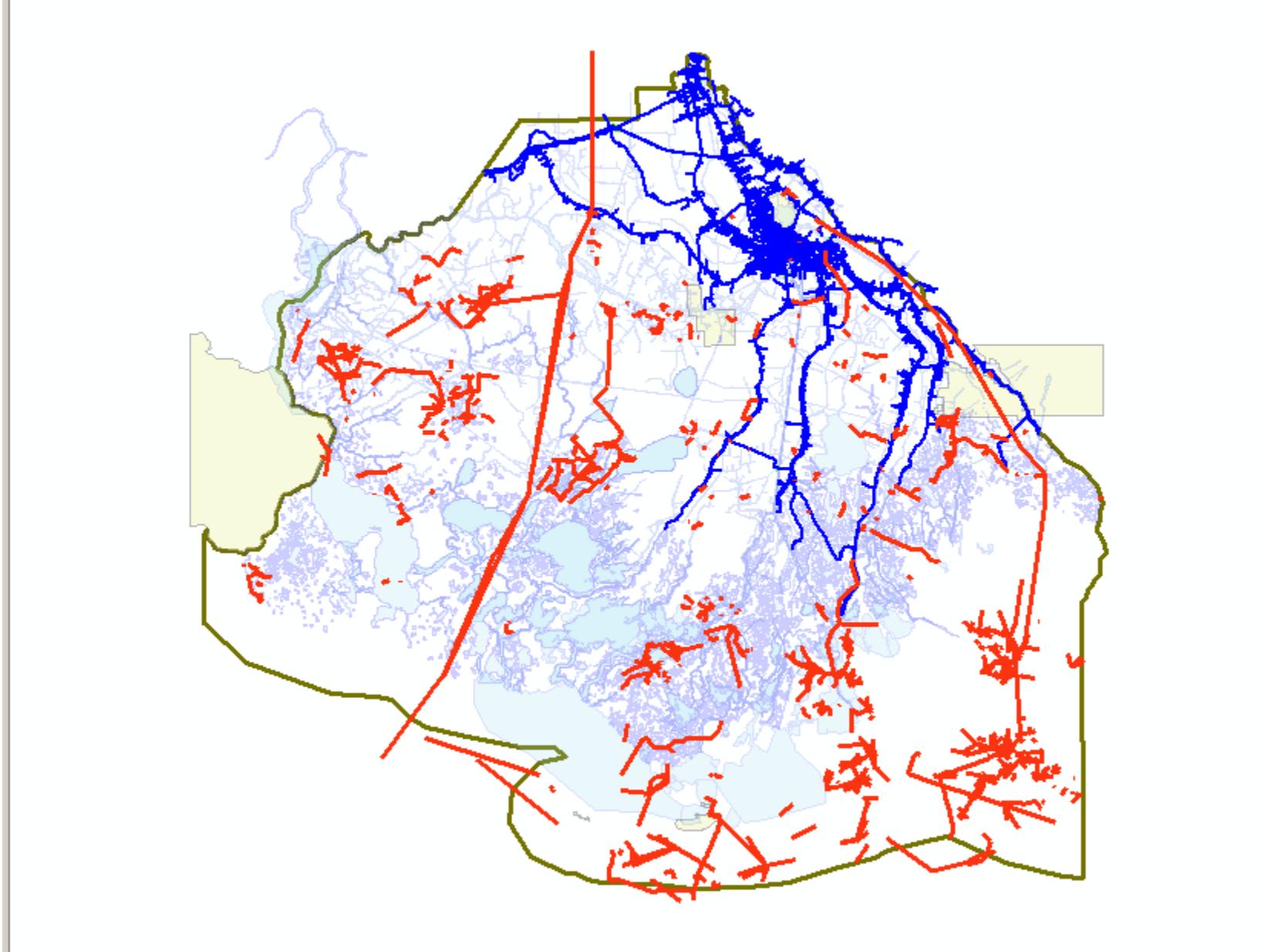
- Layers
- Marinas
- OilPlatforms
- Addresses
- TPOilWells
- CritFac
- Environmental
- PipeLines
- Streets
- Bridges
- Water
- waterbodies
- WildLifeAreas
- ParishBoundary
- Terrebonne.sid
 - Value
 - High : 255
 - Low : 0



- Layers
- Marinas
- OilPlatforms
- Addresses
- TPOilWells
- CritFac
- Type
- Airport
- Apartment
- Assisted Living
- Association
- Auditorium
- Child Care
- Church
- Entertainment
- Fed/State_Fa
- Fire Departme
- Health Club
- Hospital
- Human Service
- Justice
- Library
- Military
- Motel
- Public Safety



- Marinas
- OilPlatforms
- Addresses
- TPOilWells
- CritFac
- Enviromental
- PipeLines
- Streets
- Bridges
- Water
- waterbodies
- WildLifeAreas
- ParishBoundary
- Terrebonne.sid
Value
High : 255
Low : 0



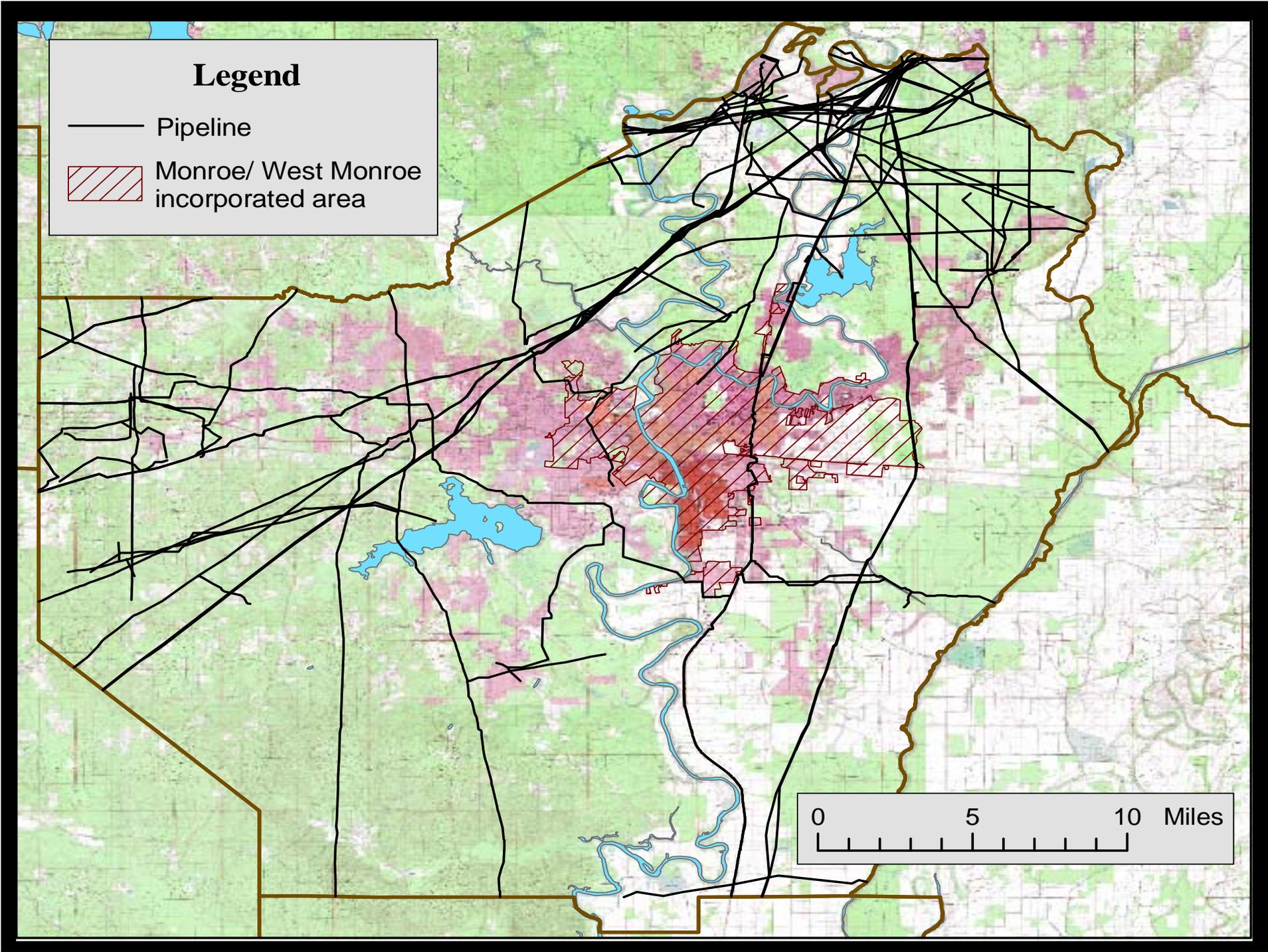
Some of the projects funded through the OSRADP include

- Assessment of the role of anaerobic biodegradation of crude oil in natural recovery;
- Follow-up surveys of inland sites where in-situ burning was used as a cleanup method;
- The role of plant-bacterial-fungal interaction in remediation of oak-hickory-pine forest habitat;
- A pipeline GIS for North Louisiana;



Legend

- Pipeline
- ▨ Monroe/ West Monroe incorporated area



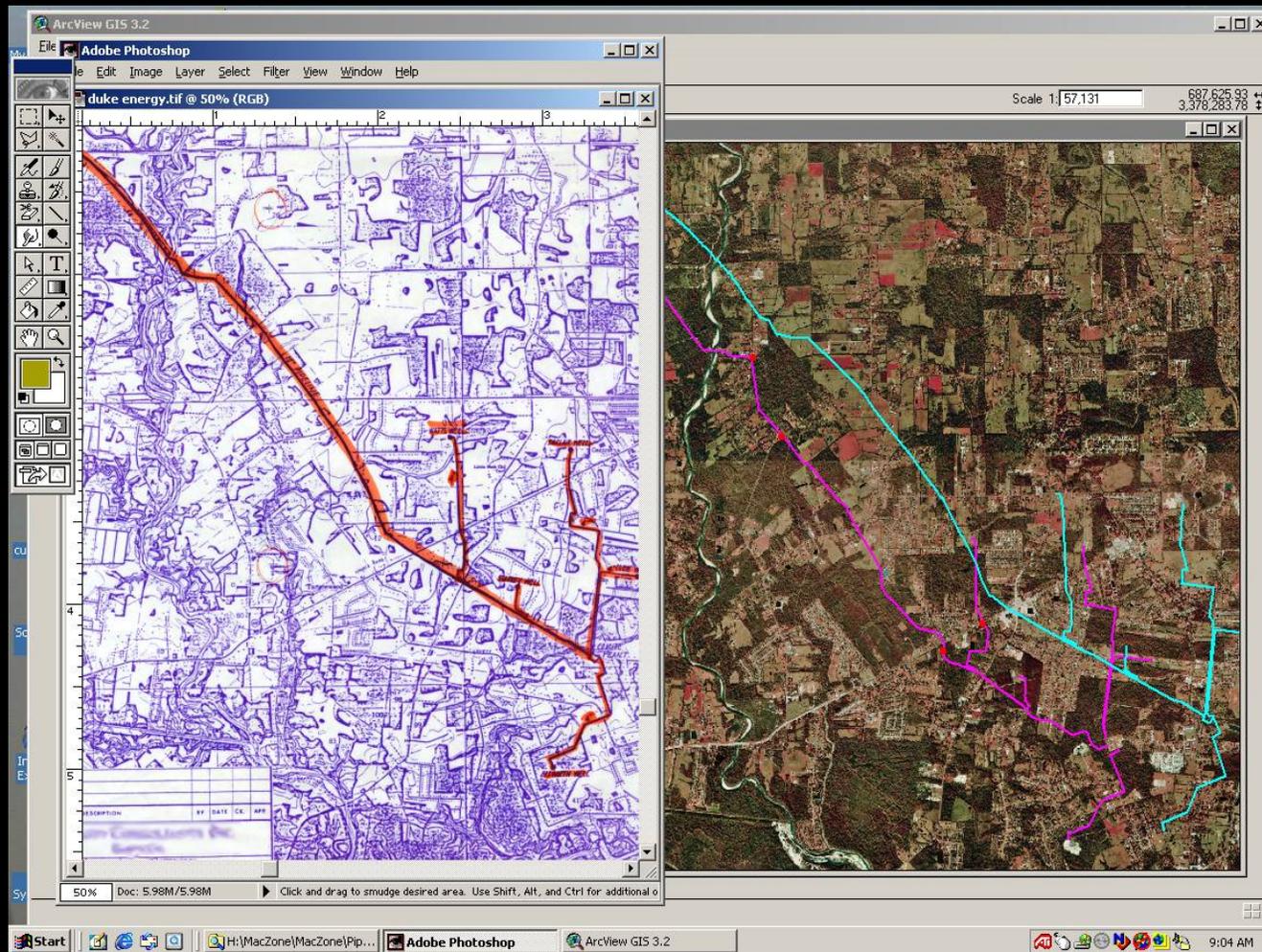
Some of the projects funded through the OSRADP include

- Remediation of oil-impacted habitats: determination of oil tolerance of coastal native dominant plants;
- A GIS for oil, gas and petrochemical transmission pipelines between Baton Rouge and New Orleans, La.;
- Field investigation and digital mapping of pipeline crossings for the coastal zone's navigation channels in Louisiana;
- Use of an in-situ light scattering and fluorescence sensor to assess the dispersion of crude and fuel oils in marine and riverine environments;

Some Witness Posts Are Clearly Visible



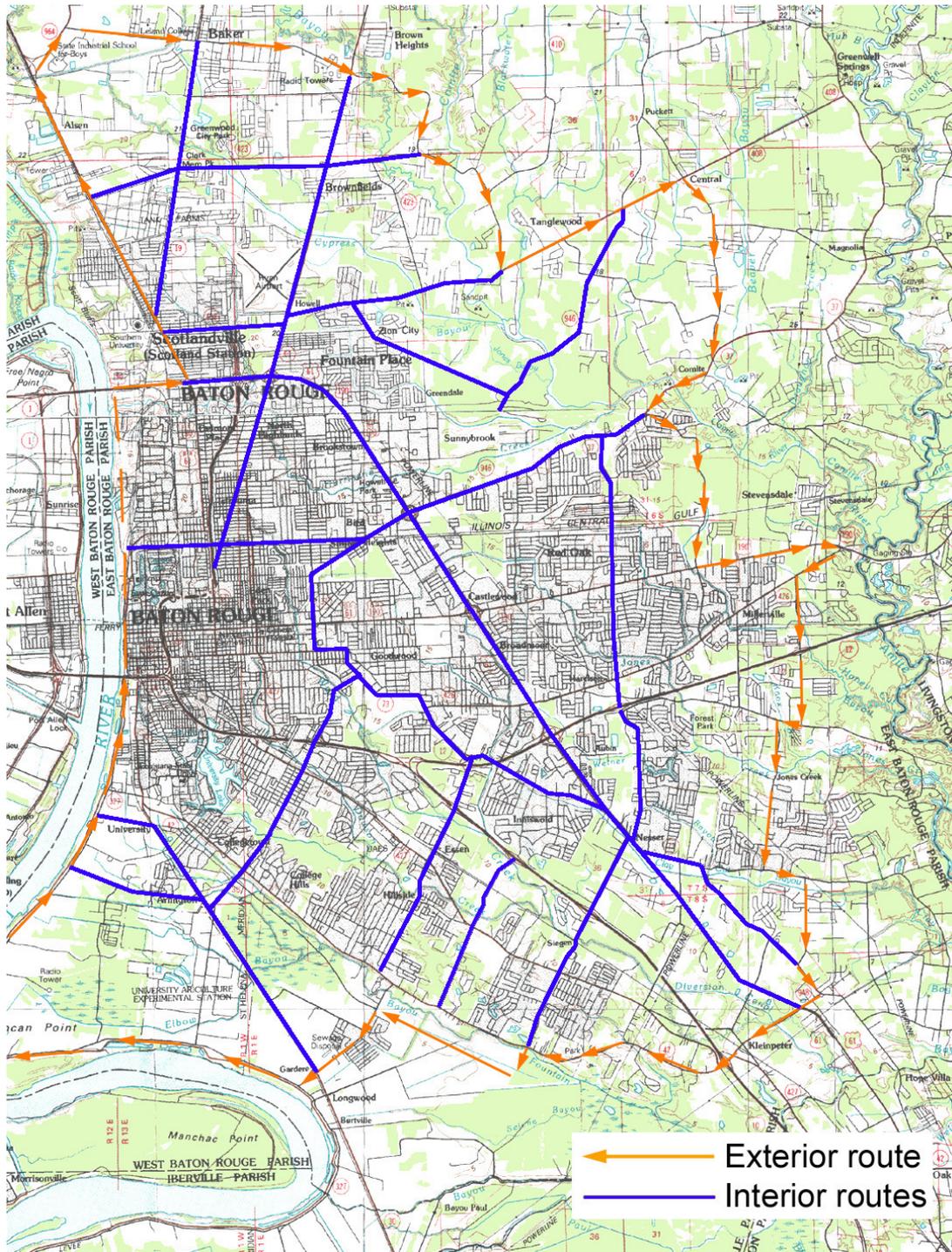
Example of Inadequate Source Maps



45 Pipeline Operators Researched

Air Liquide
Air Products
Amoco Production
Centerpoint Energy
Chalkley Transmission
Citgo
Colonial Pipeline
Columbia Gulf Transmission
Conoco
Dixie Pipeline
DOE
DOW
Dynergy
Enterprise Products
EOTT Energy
Entex
Equistar
Explorer Pipeline
Florida Gas Transmission
Hillcorp Energy
Intercontinental
Jordan Oil
Jupiter Chemicals

KOCH/Gulf South
Louisiana Gas System
Plains All American
PPG Industries
Praxair
Sabine Pipeline
Sasol America
Shell Pipeline
Tennessee Gas Transmission
Texaco Pipeline
Texaco Petrochemicals
Texas Eastern Transmission
Trunkline
Union Carbide
Union Texas (Williams)
United Gas Pipeline (KOCH)
Vallero
Varibus
Westlake Petrochemicals
Williams Natural Gas
Williams Olefins Feedstocks



**More than
660 miles of
pipelines were
found in the
greater Baton
Rouge area.**

**NEVER KNOW WHAT ONE WILL
FIND AROUND AND/OR IN A
PIPELINE**

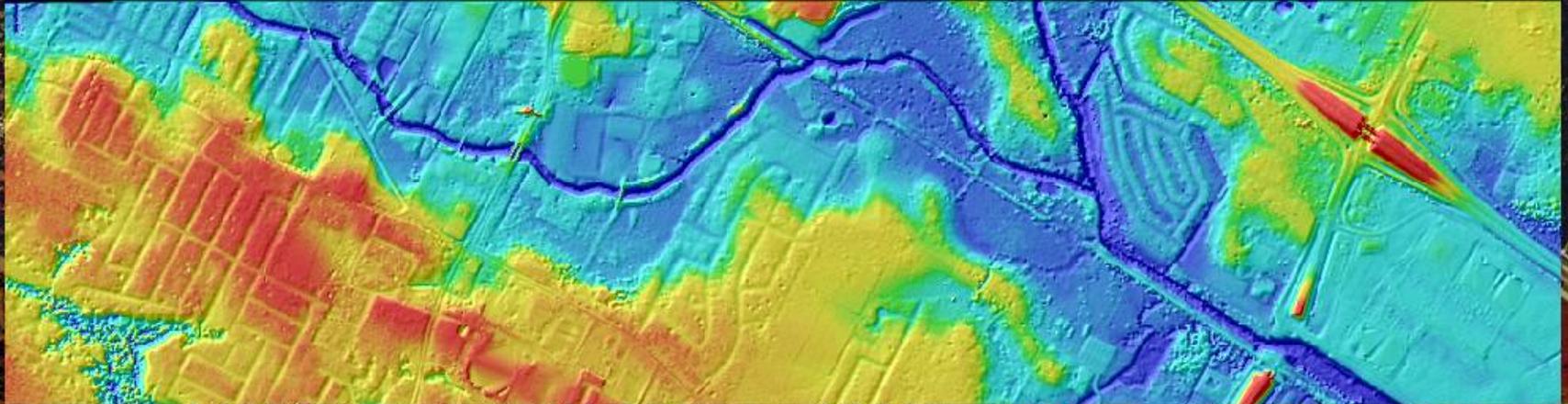


Some of the projects funded through the OSRADP include

- Derivation of an elevation tagged shoreline (land/water interface) from LOSCO/FEMA/LIDAR data in the coastal zone;
- Education-related proposal to develop oil-spill data sharing protocol with local government;
- Development of an oil brine spill restoration plan-preliminary work and meeting;
- Training and research for blow-out prevention utilizing a full-scale well facility;



Louisiana LIDAR



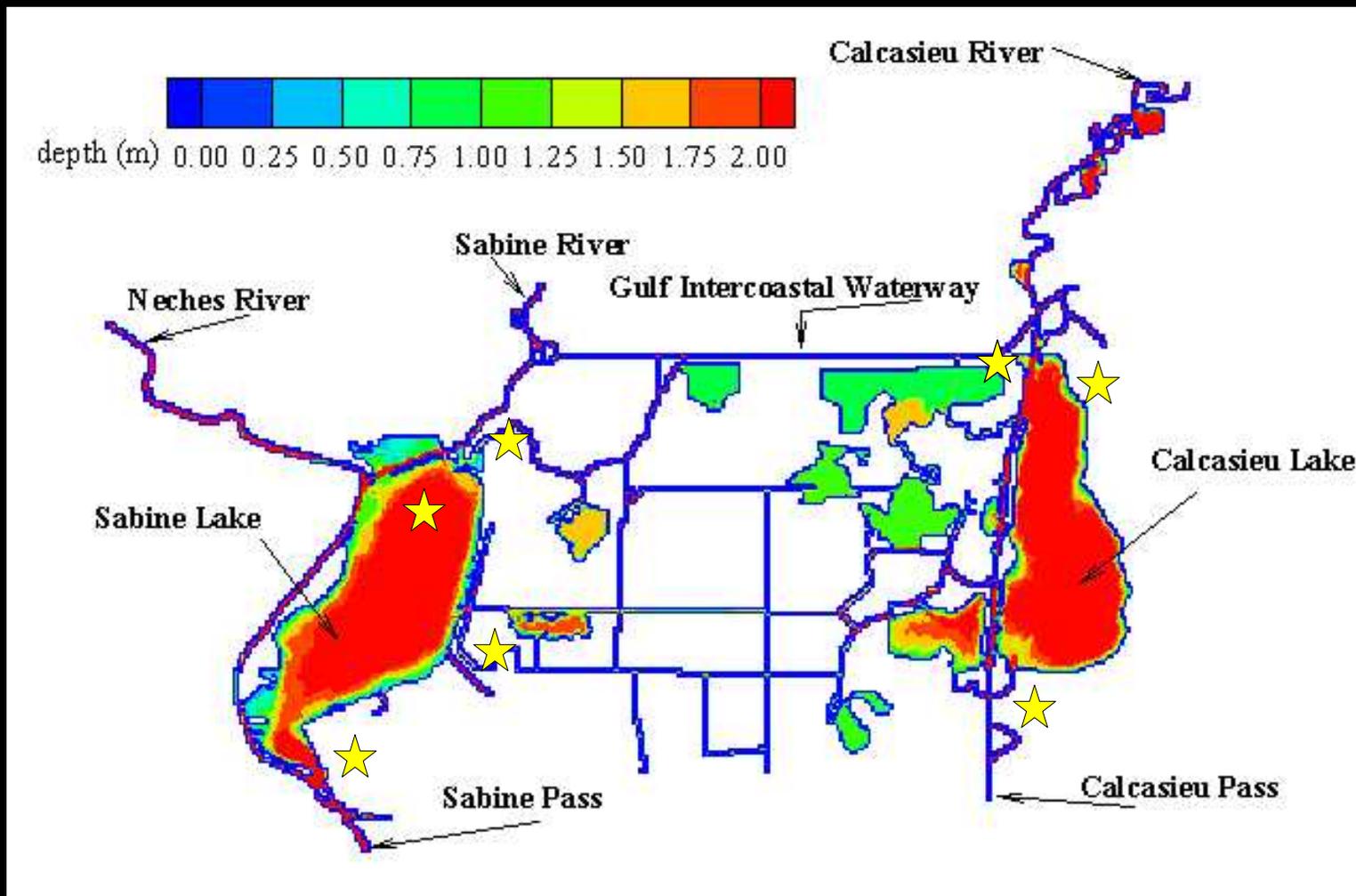
LIDAR Advantages

- **Marsh vegetation pattern follows an elevational gradient;**
- **Marsh height discrimination;**
- **Input for hydrologic models;**
 - **Model effects due to flood control, construction, storm events, etc.;**
- **Subsidence**
 - **averages ~1cm/yr (cf.USGS)**
- **Knowledge-based component in image analysis**

Some of the projects funded through the OSRADP include

- Dispersants: an electronic bibliography on effectiveness, technological advance, and toxicological effects;
- Cleaning up oil-contaminated muds in the aftermath of Hurricane Katrina using biopile-phytoremediation techniques;
- Nitrogen cycling in oil brine contaminated areas;
- A hydrodynamic model for a portion of Louisiana's Chenier Plain;

General Layout of the Calcasieu-Sabine Estuarine System



Some of the projects funded through the OSRADP include

- phytoremediation of petroleum: identification of plant traits that enhance degradation;
- trajectory analysis planner program for the Calcasieu estuary;
- boat ramp and launch site inventory;
- Interactive GIS WAVICS (wave-current information system) products for oil spill contingency planning; and
- phytoremediation studies for onshore oil spills.



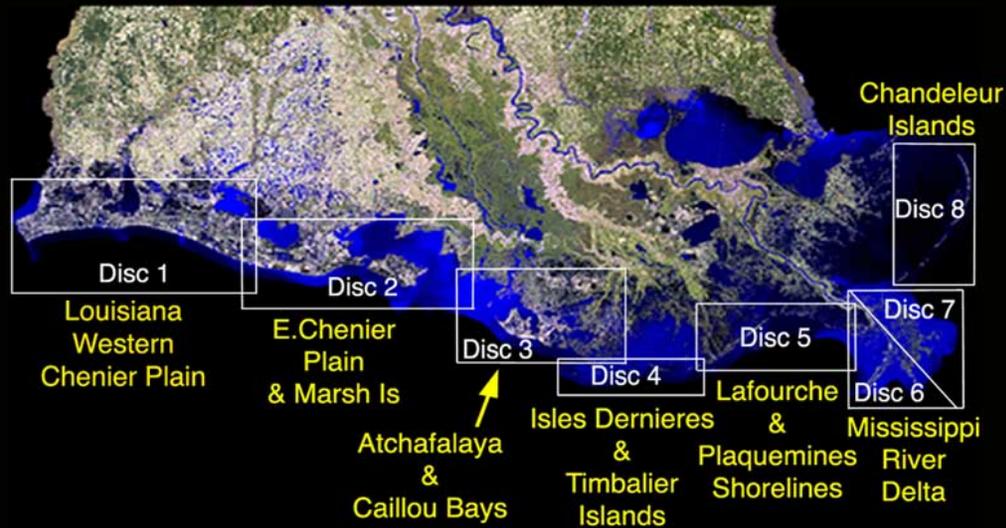
6 weeks

1000 ppm oils
Disp:Oil=1:20





Aerial Videotape Survey of Coastal Louisiana - 2001



**Surveys are
now
available on
DVD**

Converted to digital video
on 8 DVDs

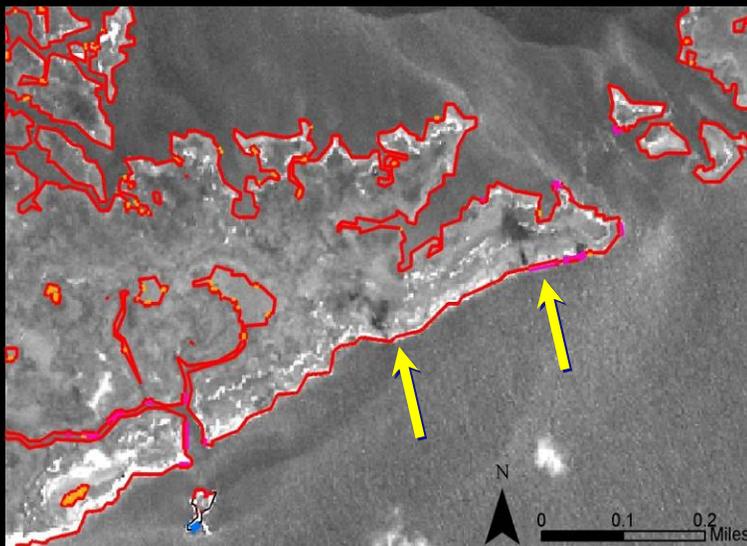
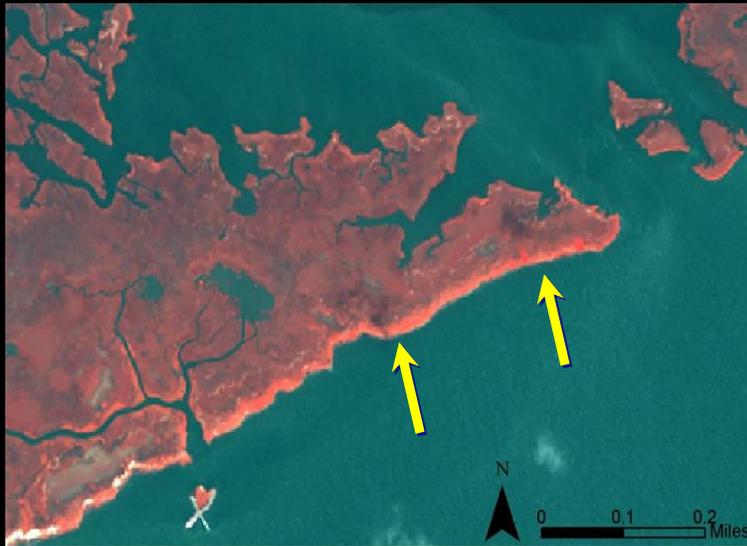
The Louisiana Applied and Educational
Oil Spill Research and Development Program

Modified ESI Shoreline Habitat Classification From 4m Multispectral High Resolution IKONOS Satellite Imagery

Class	ESI Class	Examples
Beaches and manmade structures	1B, 3A, 6A, 6B, 8B, 8C	Riprap, seawalls, urban infrastructure, sand and gravel beaches
Mud and tidal flats	2A, 2B, 8A, 9A, 7	Mud, flats, oyster beds
Salt marsh	10A	<i>Spartina alterniflora</i> , <i>S. patens</i>
Shrub-scrub	10D, 9B	Mangroves, vegetated banks, scrub-shrub

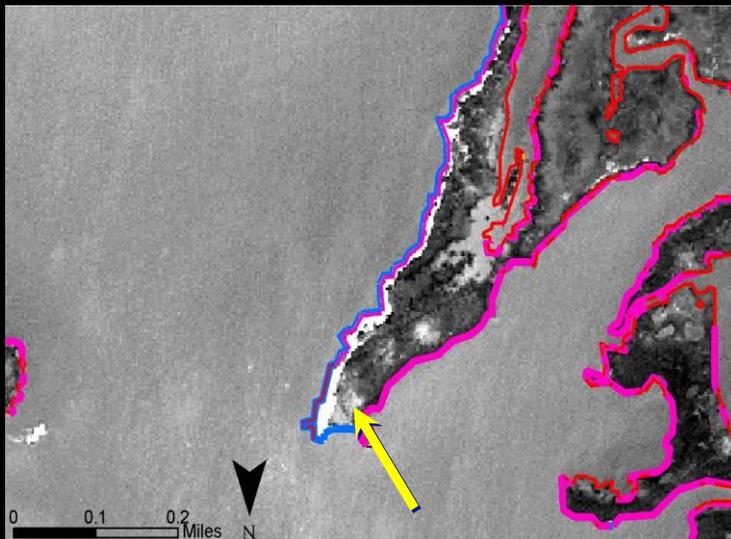
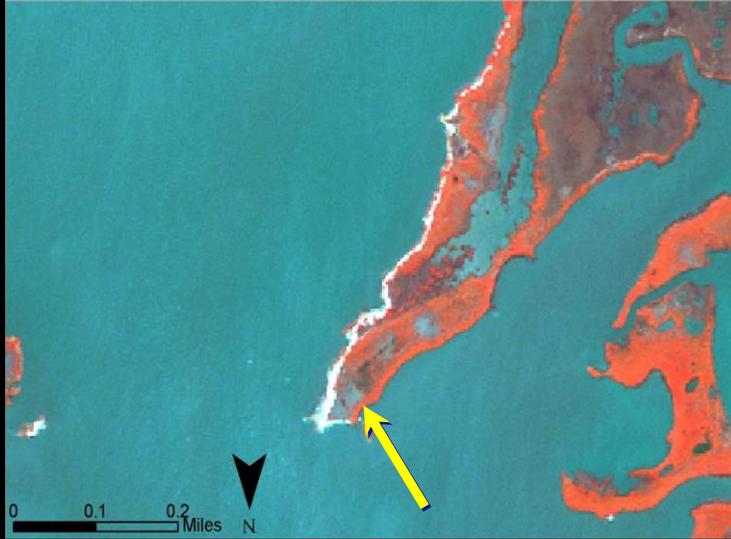
Exposed Wave Cut Platforms

Modified ESI: Mud and Tidal Flats



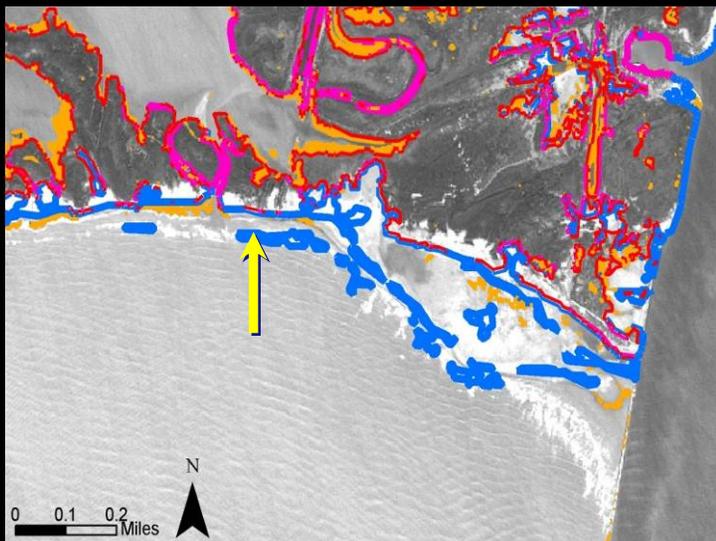
Exposed Scarps and Steep Slopes in Clay

Modified ESI: Mud and Tidal Flats

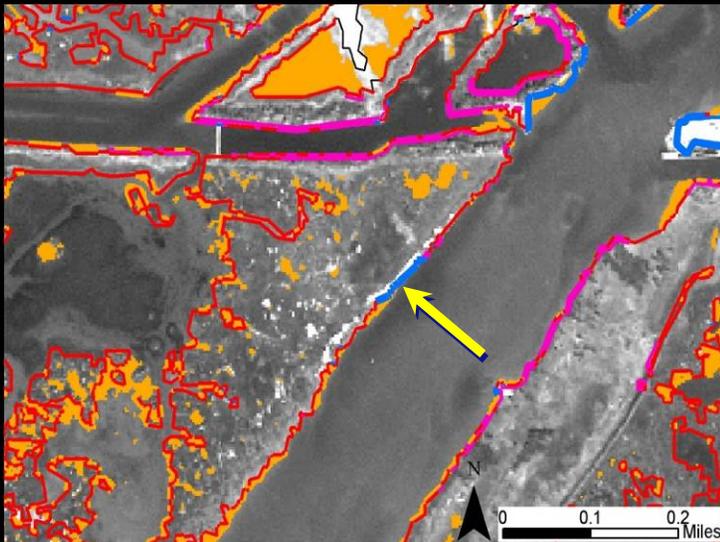


Sand Beaches

Modified ESI: Beaches and Manmade

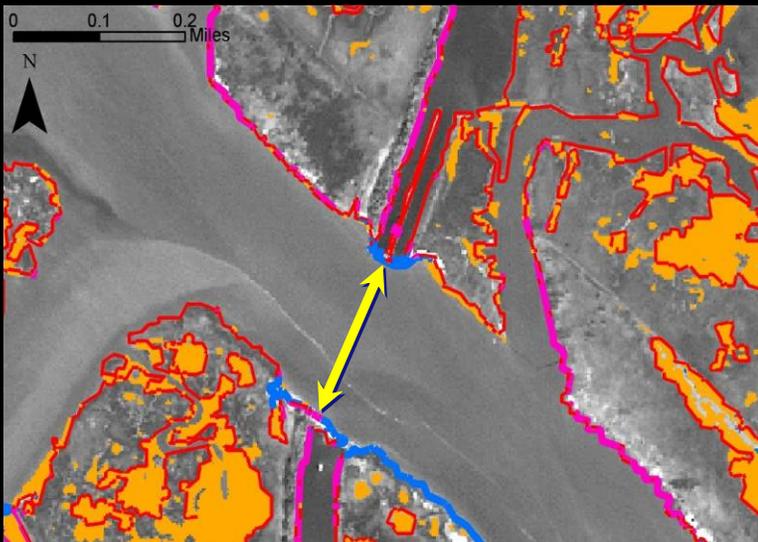


Gravel Beaches



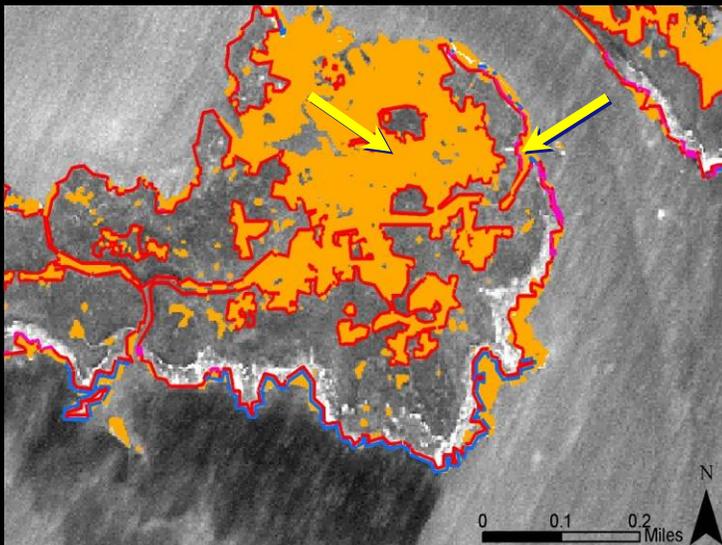
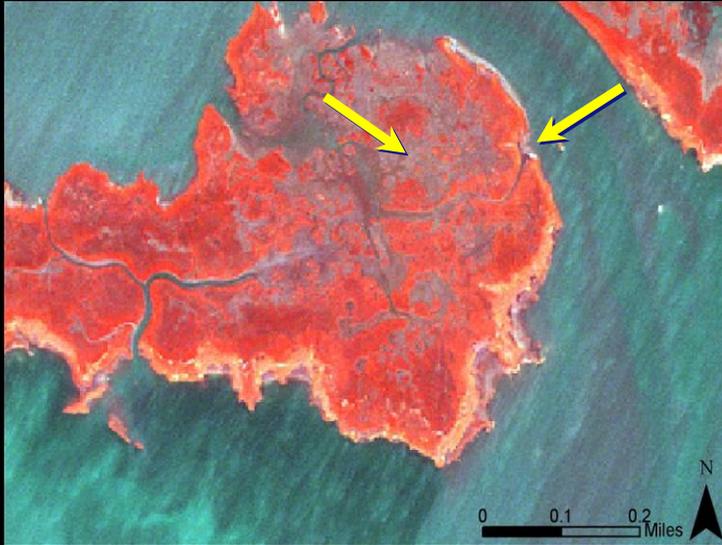
Riprap

Modified ESI: Beaches and Manmade Structures



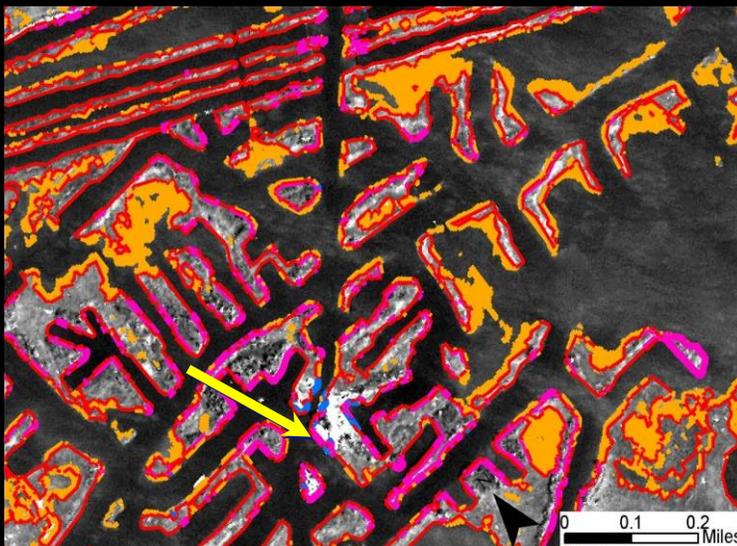
Exposed Tidal Flats

Modified ESI: Mud and Tidal Flats



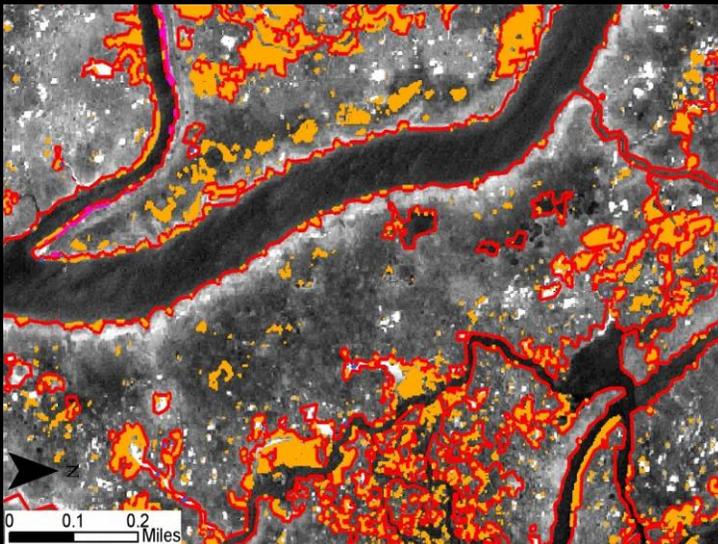
Sheltered, Solid Manmade Structures

Modified ESI: Beaches and Manmade Structures



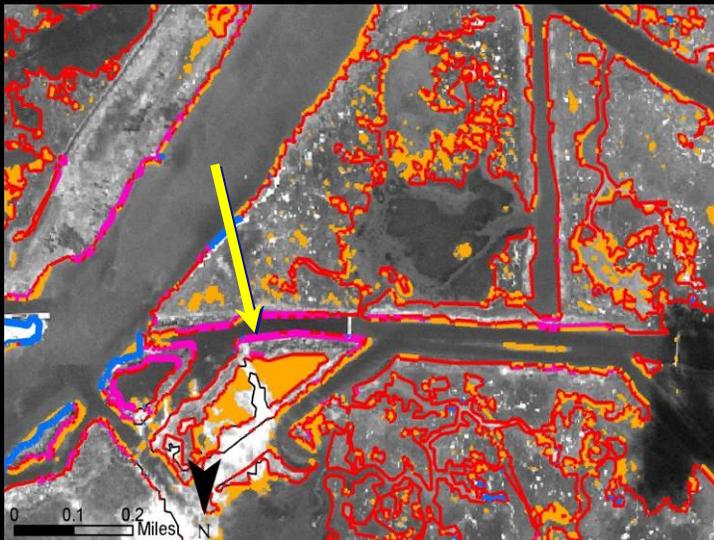
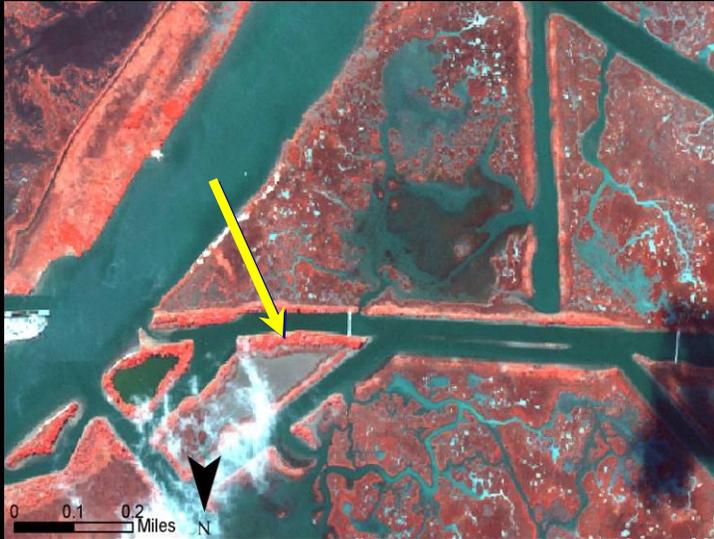
Salt- and Brackish-water Marshes

Modified ESI: Salt-marsh



Scrub-Shrub Wetlands and Mangroves

Modified ESI: Scrub-shrub



Applied and Practical Science

- After 16 years of funding highly focused research, it is critical the science developed with OSRADP support is incorporated into the oil industry's planning and response strategies with the approval and support of the various regulatory agencies.
- Results from these projects are only useful when they are implemented.
- On the shelf these research initiatives are wasted dollars and effort.



Applied and Practical Science

- Louisiana's program is a constant reminder that we always need more information and data to be effective in our efforts to prevent, respond, and clean up spills.



Applied and Practical Science

- We have relatively inexpensive talent and facilities to work on R&D projects and we like to leverage our projects.
- We are not an academic exercise, although we do fund and train the graduate students that will fill tomorrows oil patch jobs.
- We train, or inform, the state's regulatory agencies and industry personnel on what does and does not work.
- In short, our program is in business to do business.



**Oil Spill Forum, 2010 – A Public
Listening Session
Spill Science – The Louisiana Perspective**

Thank You

Presented by:

Donald W. Davis

Administrator, Emeritus

OSRADP

Louisiana State University