GEOGRAPHIC INFORMATION SYSTEMS

Applications to Oil and Gas Regulation and Sand Resource Assessment

STATE OF ALABAMA
GSA
GEOLOGICAL SURVEY

STATE OF ALABAMA
OGB
OIL AND GAS BOARD

Topics

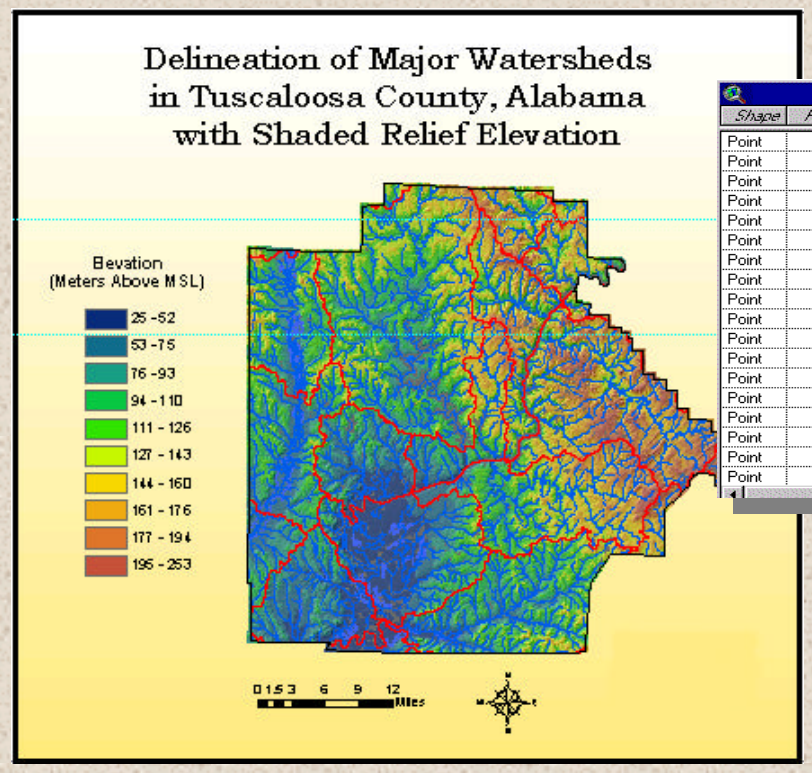
- Definition of Geographic Information System (GIS)
- Application of GIS Technology to Oil and Gas Regulation
- Application of GIS Technology to Sand Resource Assessment
- Digital Information Transfer: Interactive CD-ROM, Internet Map Server (IMS)

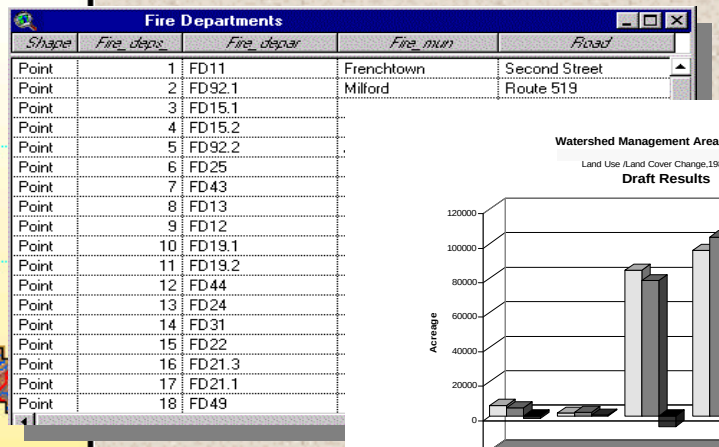
Geographic Information System

- A computer-based data collection, storage and analysis tool that combines data from different sources into a comprehensive picture, usually visualized as a map or other graphic.
  - GEOGRAPHIC—where something is and how it relates to where other things are.
  - INFORMATION—what we know (the database).
  - SYSTEM—the computer hardware and software that allow us to analyze the data in a geographic framework, visualize the results, and use the results to make informed decisions.

To make *informed decisions*, we have to gather the right information

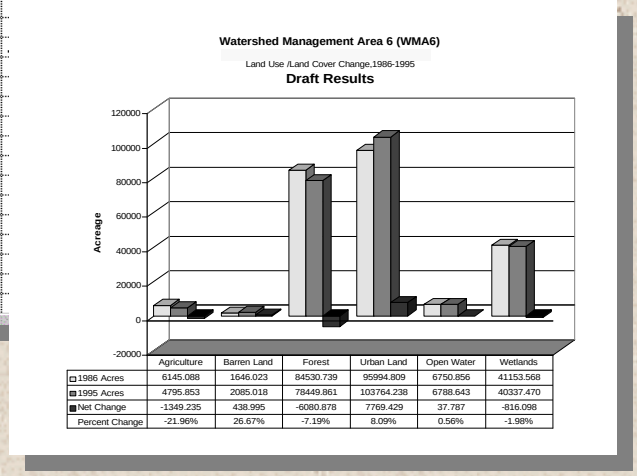
…using the best data available



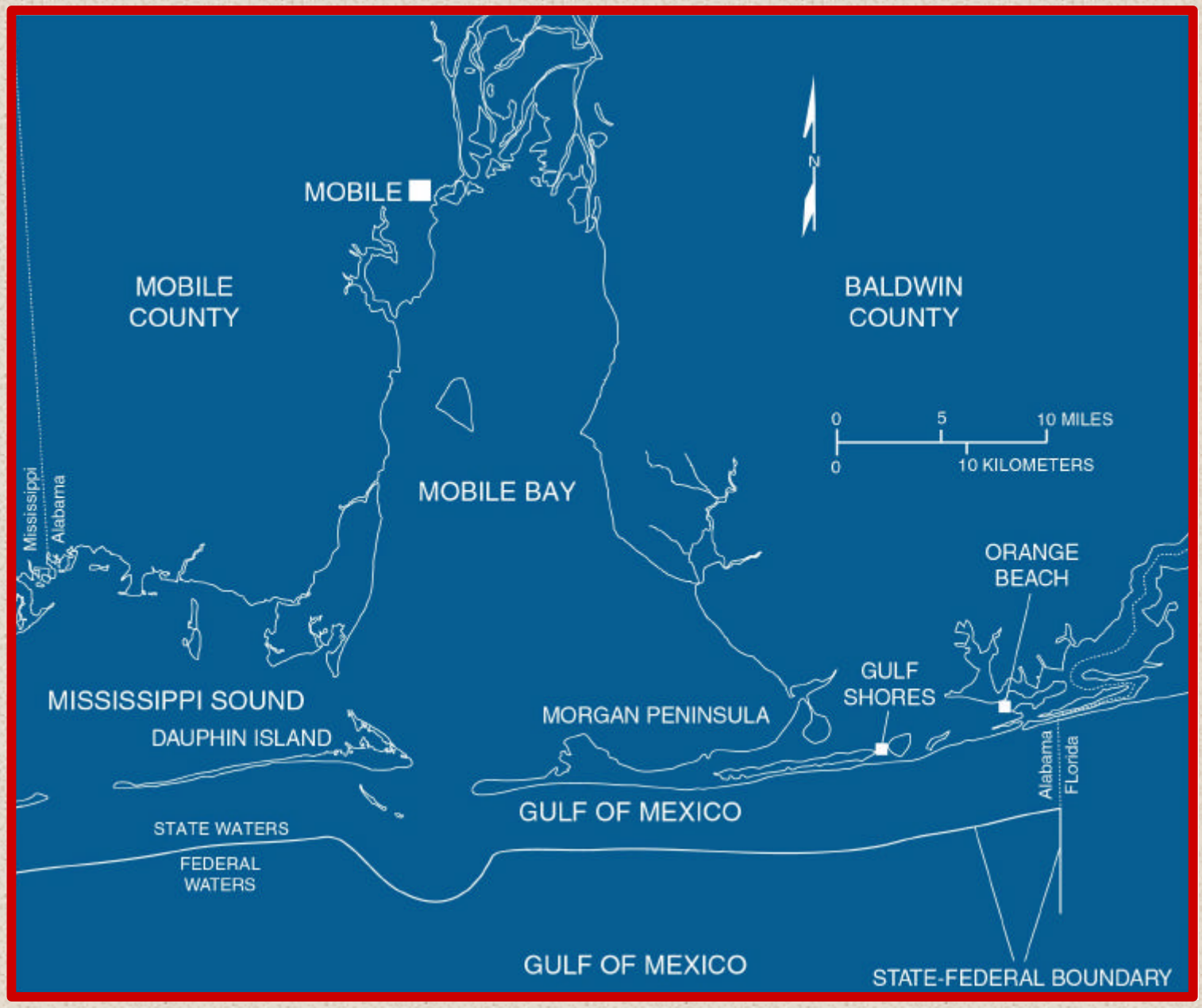


Fire Departments

Shape	Fire_deps_	Fire_depar	Fire_mun	Road
Point	1	FD11	Frenchtown	Second Street
Point	2	FD92.1	Milford	Route 519
Point	3	FD15.1		
Point	4	FD15.2		
Point	5	FD92.2		
Point	6	FD25		
Point	7	FD43		
Point	8	FD13		
Point	9	FD12		
Point	10	FD19.1		
Point	11	FD19.2		
Point	12	FD44		
Point	13	FD24		
Point	14	FD31		
Point	15	FD22		
Point	16	FD21.3		
Point	17	FD21.1		
Point	18	FD49		



	Agriculture	Barren Land	Forest	Urban Land	Open Water	Wetlands
1986 Acres	6145.088	1646.023	84530.739	95994.809	6750.856	41153.568
1995 Acres	4795.853	2085.018	78449.861	103764.238	6788.643	40337.470
Net Change	-1349.235	438.995	-6080.878	7769.429	37.787	-816.098
Percent Change	-21.96%	26.67%	-7.19%	8.09%	0.56%	-1.98%


MOBILE
MOBILE COUNTY
BALDWIN COUNTY
N
0
5
10 MILES
0
10 KILOMETERS
MOBILE BAY
Mississippi
Alabama
ORANGE BEACH
GULF SHORES
MISSISSIPPI SOUND
DAUPHIN ISLAND
MORGAN PENINSULA
Alabama
FLorida
GULF OF MEXICO
STATE WATERS
FEDERAL WATERS
GULF OF MEXICO
STATE-FEDERAL BOUNDARY

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ArcView GIS 3.2

File Edit View Theme Graphics Window Help Metadata Tools

Scale 1: 1,203,723,450

371,907.35
3,354,278.44

View1

Pipelines utm
EXXON
LEGACY
MOBIL
OTHERS
SHELL

Pipelines utm.shp
EXXON
LEGACY
MOBIL
OTHERS
SHELL

Welllocutm

Structureutm

Mobayplatforms.shp

Ocspiplines

Ocsplatforms

Field-dis

Onshorewells.shp

Coalbed

Fieldlimit

Islands

Missblocks.shp

Alablocks.shp

d:\3rd-partition\shapefile\scans\Callon.bmp

Scale Image

d:\3rd-partition\shapefile\scans\mobilaux.bmp

Scale Image

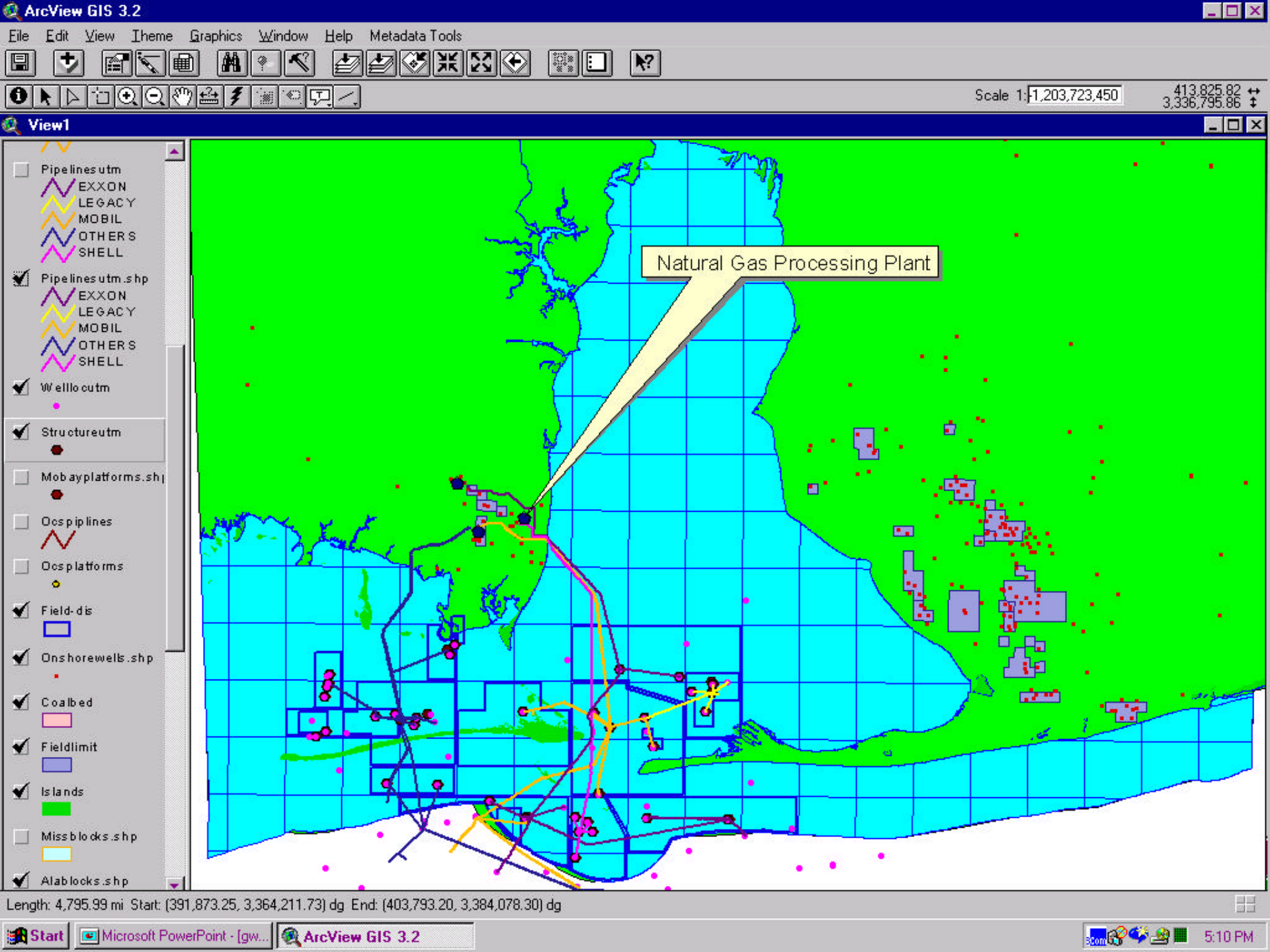
Identify Results

1: Structureutm - 27	
2: Structureutm - 28	
3: Structureutm - 29	
4: Structureutm - 0	

Structureutm-id	29
Structure_	LMB/MA-2
Operator	Mobil Exp & Prod SE
X	325665
Y	92724
Tract	76
Field	Lower Mobile Bay/Mar
Well_permi	2543-OS-3-B
Type	Bridge-connected Wel

Clear Clear All

Start Microsoft PowerPoint - [g... ArcView GIS 3.2 d:\3rd-partition\shapefile\... d:\3rd-partition\shap... 5:07 PM


ArcView GIS 3.2
File Edit View Theme Graphics Window Help Metadata Tools
Scale 1:1,203,723,450
413,825.82
3,336,795.86
View1
Pipelinesutm
EXXON
LEGACY
MOBIL
OTHERS
SHELL
Pipelinesutm.shp
EXXON
LEGACY
MOBIL
OTHERS
SHELL
Welllocutm
Structureutm
Mobayplatforms.shp
Ocspiplines
Ocsplatforms
Field-dis
Onshorewells.shp
Coalbed
Fieldlimit
Islands
Missblocks.shp
Alablocks.shp
Natural Gas Processing Plant
Length: 4,795.99 mi Start: (391,873.25, 3,364,211.73) dg End: (403,793.20, 3,384,078.30) dg
Start
Microsoft PowerPoint - [gw...
ArcView GIS 3.2
5:10 PM

ArcView GIS 3.2

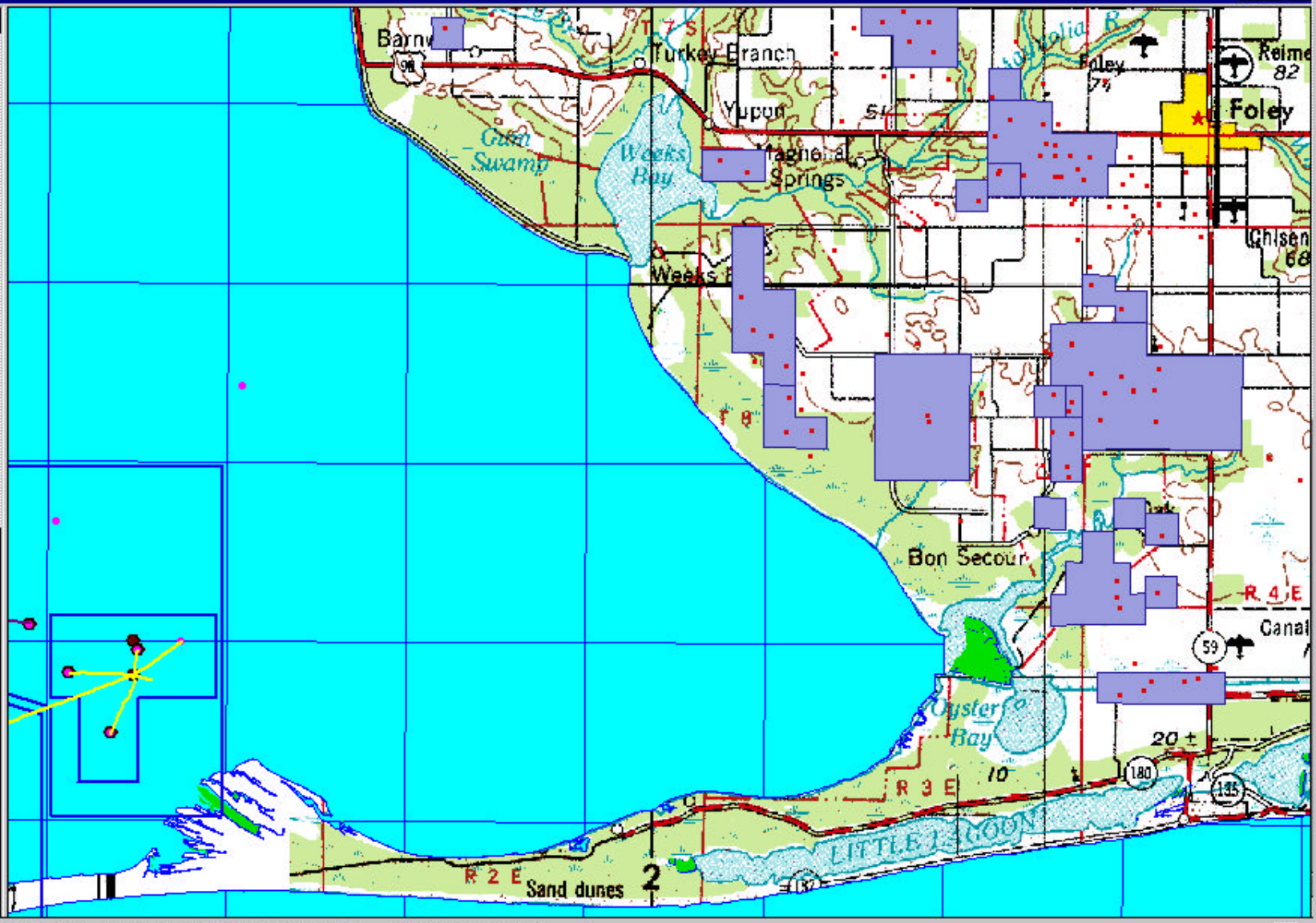
File Edit View Theme Graphics Window Help Metadata Tools

Scale 1: 1,081,801,358

412,718.94
3,344,660.44

View1

- Fieldlimit
- Islands
- Missblocks.shp
- Alablocks.shp
- Ocsblocksutm
- C30088a1.tif
- C30086a1.tif
- Ala_aquifers.shp
- Ala_aquifers.shp
  - Bangor aquife
  - Coker aquifer
  - Confining unit
  - Crystal River
  - Eutaw aquifer
  - Fort Payne-T
  - Gordo aquifer
  - Hartselle aqui
  - Lisbon aquife
  - Metagranite a
  - Metasedimen
  - Miocene-Plioc
  - Monteagle aq
  - Nanafalia aqu
  - Nashville-Sto
  - Pottsville aqu
  - Ripley aquifer
  - Valley and Ri
  - Watercourse
- Counties-2



Origin: (405,024.39, 3,343,626.21) dg Extent: (2,108,686.39, 1,619,715.63) mi Area: 3,415,472,298,351.51 sq mi

Start | Microsoft PowerPoint - [gw... | ArcView GIS 3.2 | 5:26 PM

ArcView GIS 3.2

File Edit View Theme Graphics Window Help Metadata Tools

Scale 1: -772,859,549

415,086.97
3,344,842.57

View1

- Fieldlimit
- Islands
- Missblocks.shp
- Alablocks.shp
- Ocsblocksutm
- C30088a1.tif
- C30086a1.tif
- Ala_aquifers.shp
- Ala_aquifers.shp
  - Bangor aquife
  - Coker aquifer
  - Confining unit
  - Crystal River
  - Eutaw aquifer
  - Fort Payne-Ti
  - Gordo aquifer
  - Hartselle aqui
  - Lisbon aquife
  - Metagranite a
  - Metasedimen
  - Miocene-Plioc
  - Monteagle aq
  - Nanafalia aqu
  - Nashville-Sto
  - Pottsville aqu
  - Ripley aquifer
  - Valley and Ri
  - Watercourse
- Counties-2

Origin: (354,048.03, 3,315,012.66) dg Extent: (6,624,025.71, 4,015,121.73) mi Area: 26,596,269,587,979.12 sq mi

Start | Microsoft PowerPoint - [gw... | ArcView GIS 3.2 | 5:25 PM

ArcView GIS 3.2

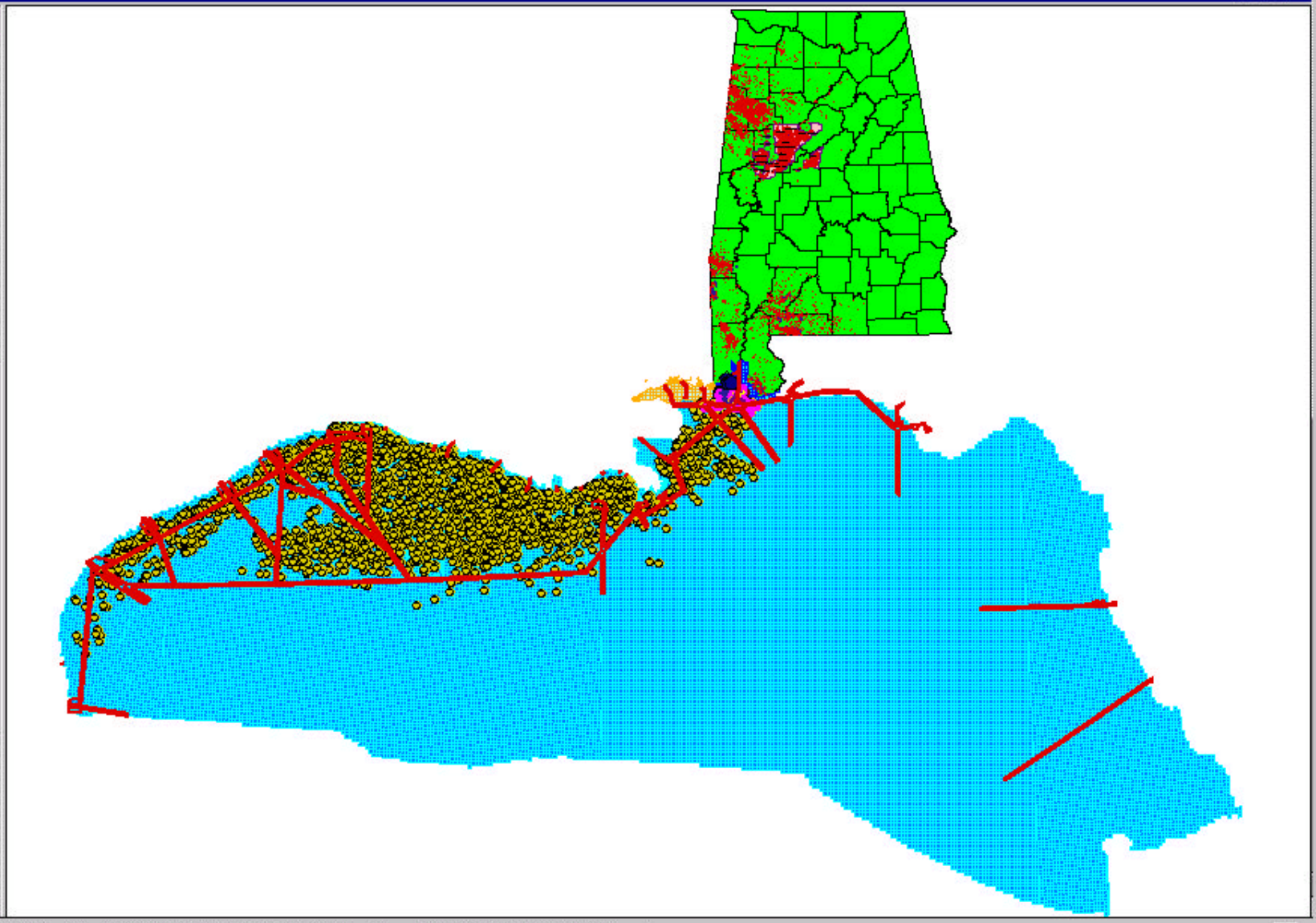
File Edit View Theme Graphics Window Help Metadata Tools

Scale 1: 1,967,878,561

-523,962.06
3,876,549.21

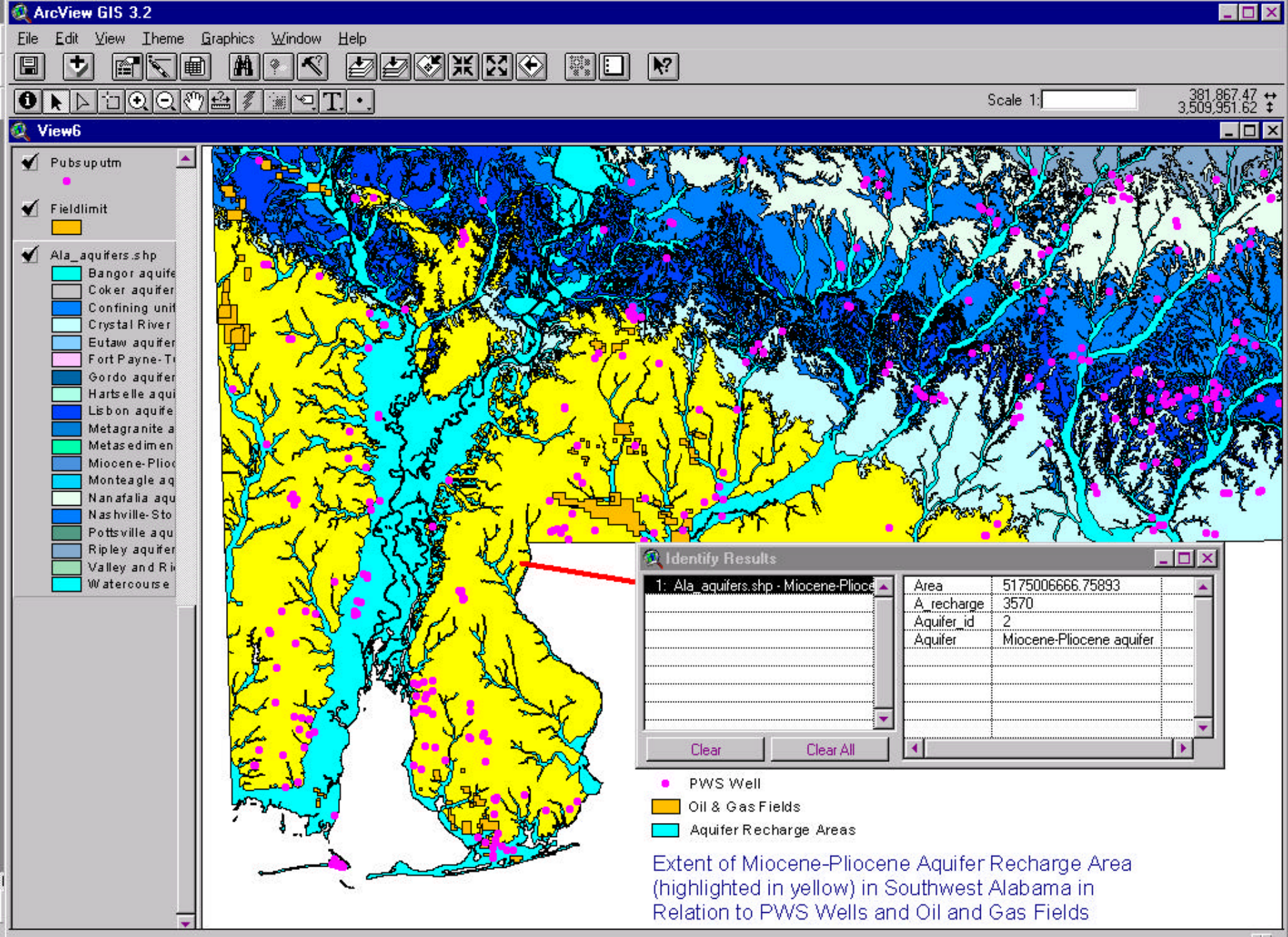
View1

- Welllocutm
- Structureutm
- Mobayplatforms.shp
- Ocspiplines
- Ocsplatforms
- Field-dis
- Onshorewells.shp
- Coalbed
- Fieldlimit
- Islands
- Missblocks.shp
- Alablocks.shp
- Ocsblocksutm
- C30088a1.tif
- C30086a1.tif
- Ala_aquifers.shp
- Ala_aquifers.shp
  - Bangor aquife
  - Coker aquifer



Origin: (-538,944.00, 2,620,133.21) dg Extent: (114,638,341.35, 87,094,364.03) mi Area: 9,984,353,434,026,240.00 sq mi

Start | Microsoft PowerPoint - [gw... | ArcView GIS 3.2 | 5:49 PM



Extent of Miocene-Pliocene Aquifer Recharge Area (highlighted in yellow) in Southwest Alabama in Relation to PWS Wells and Oil and Gas Fields

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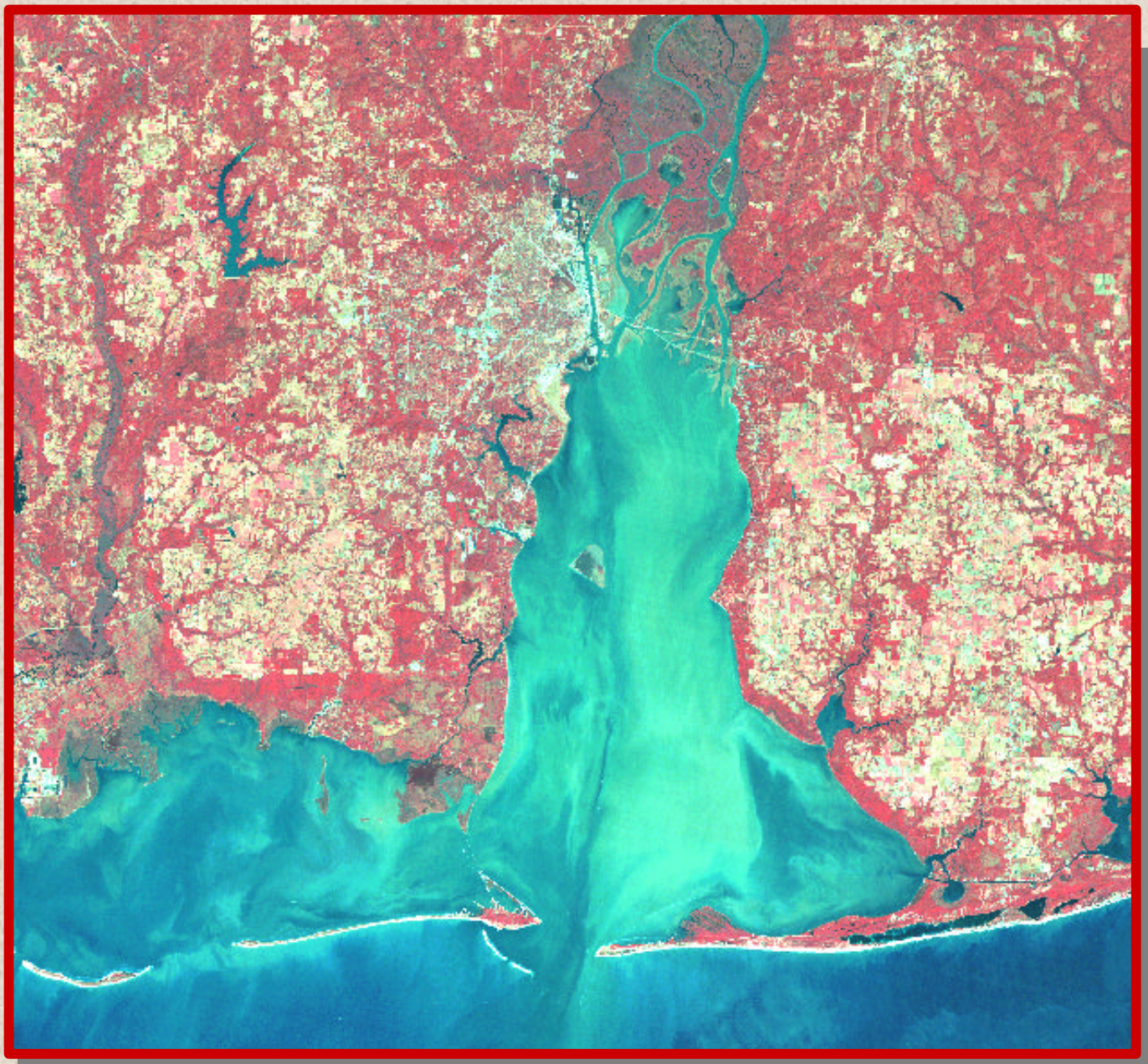
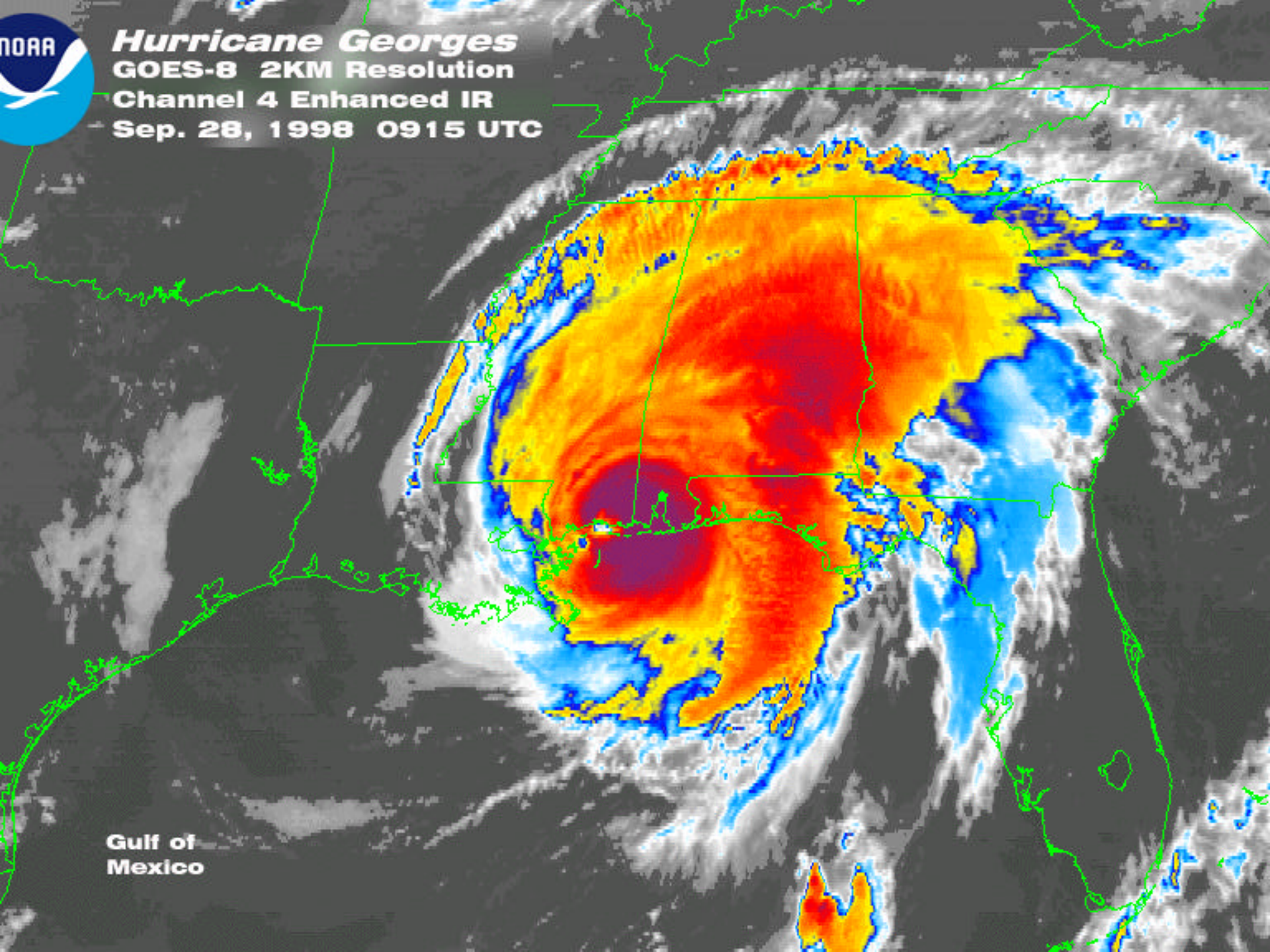
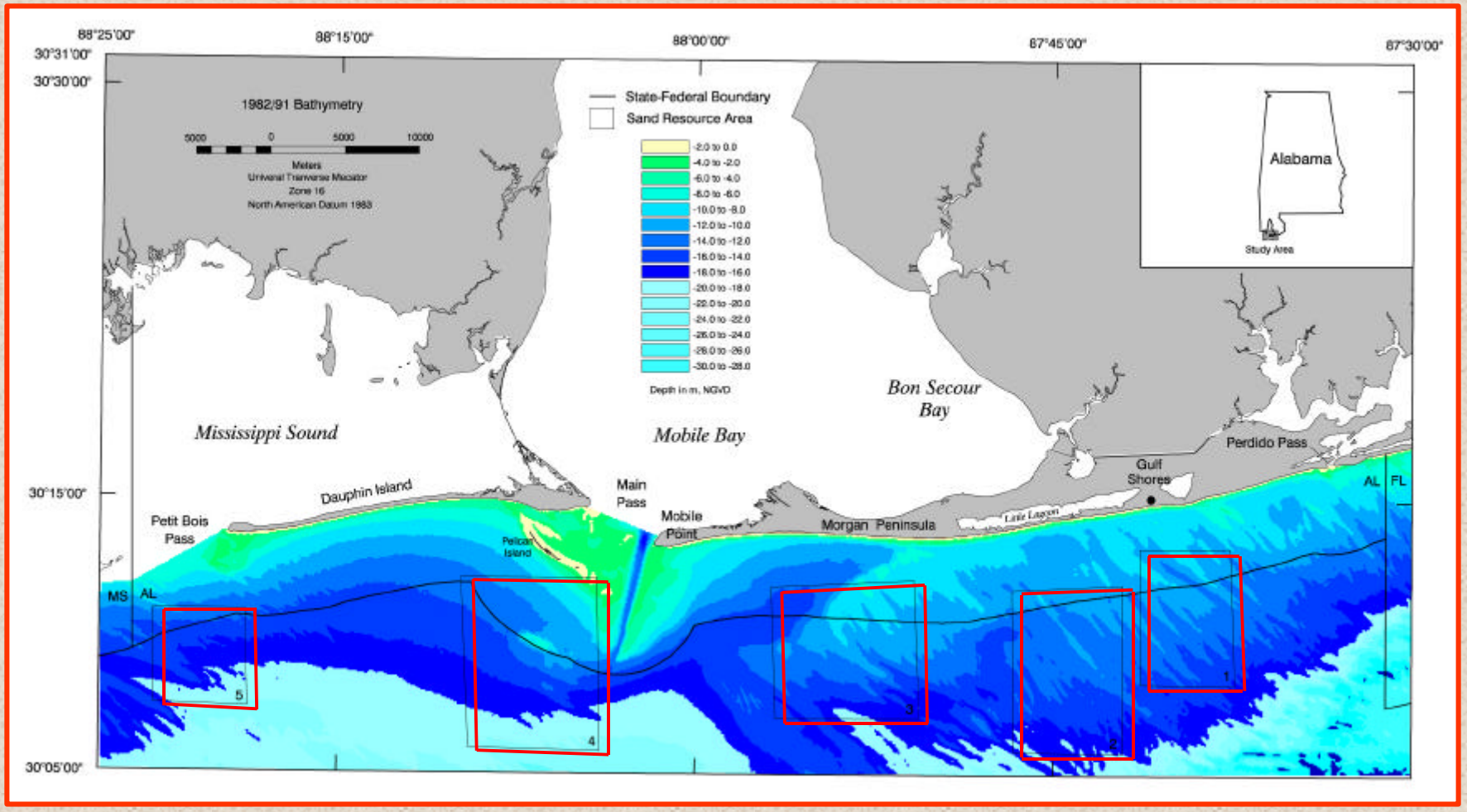



NOAA
Hurricane Georges
GOES-8 2KM Resolution
Channel 4 Enhanced IR
Sep. 28, 1998 0915 UTC
Gulf of
Mexico

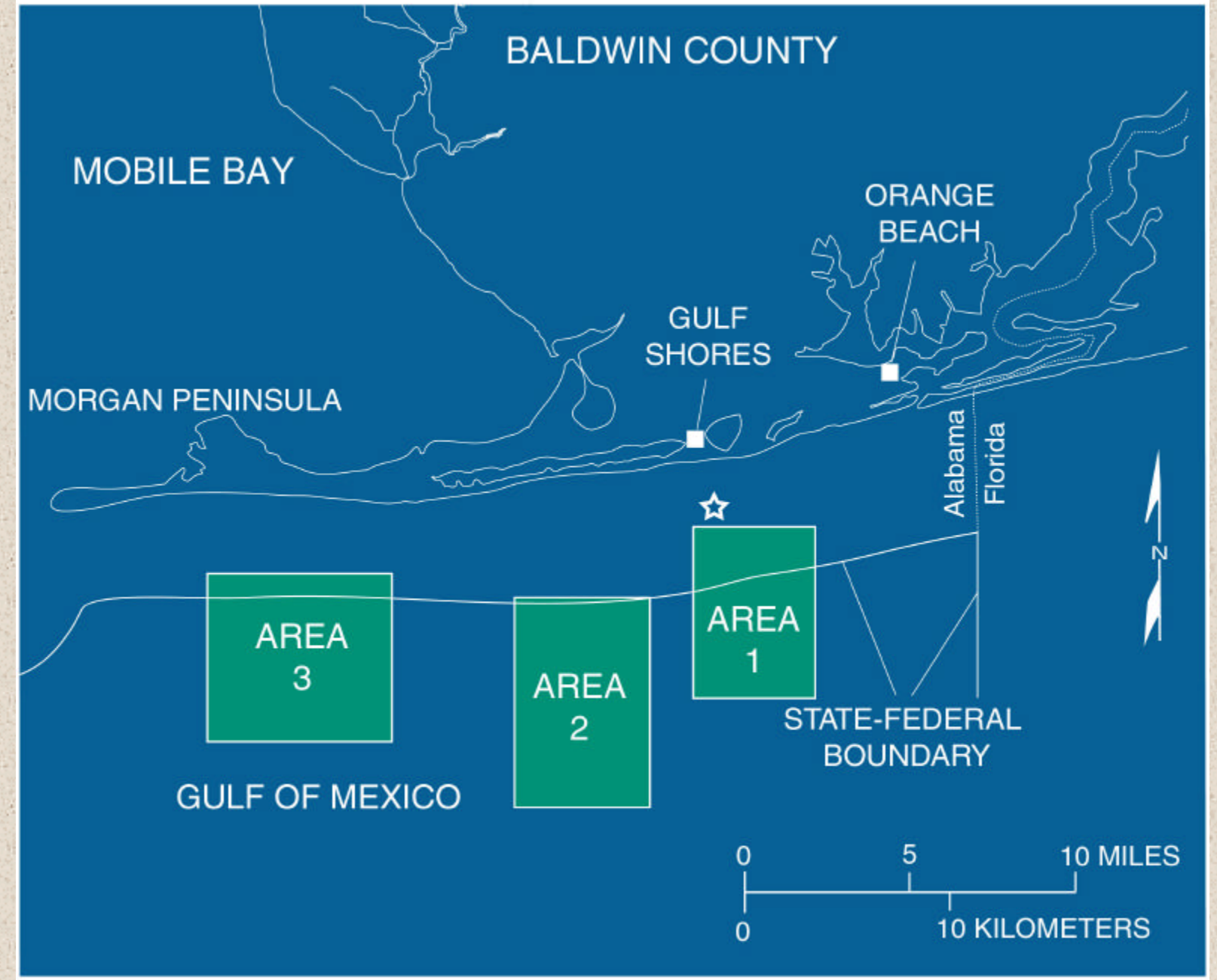
Cooperative Project Goals

- Assessment of Coastal Erosion
- Assessment of Sand Resources Available for Beach Renourishment
- Networking
- Information Transfer
  - Analog to Digital
  - Information Dissemination

Study Location

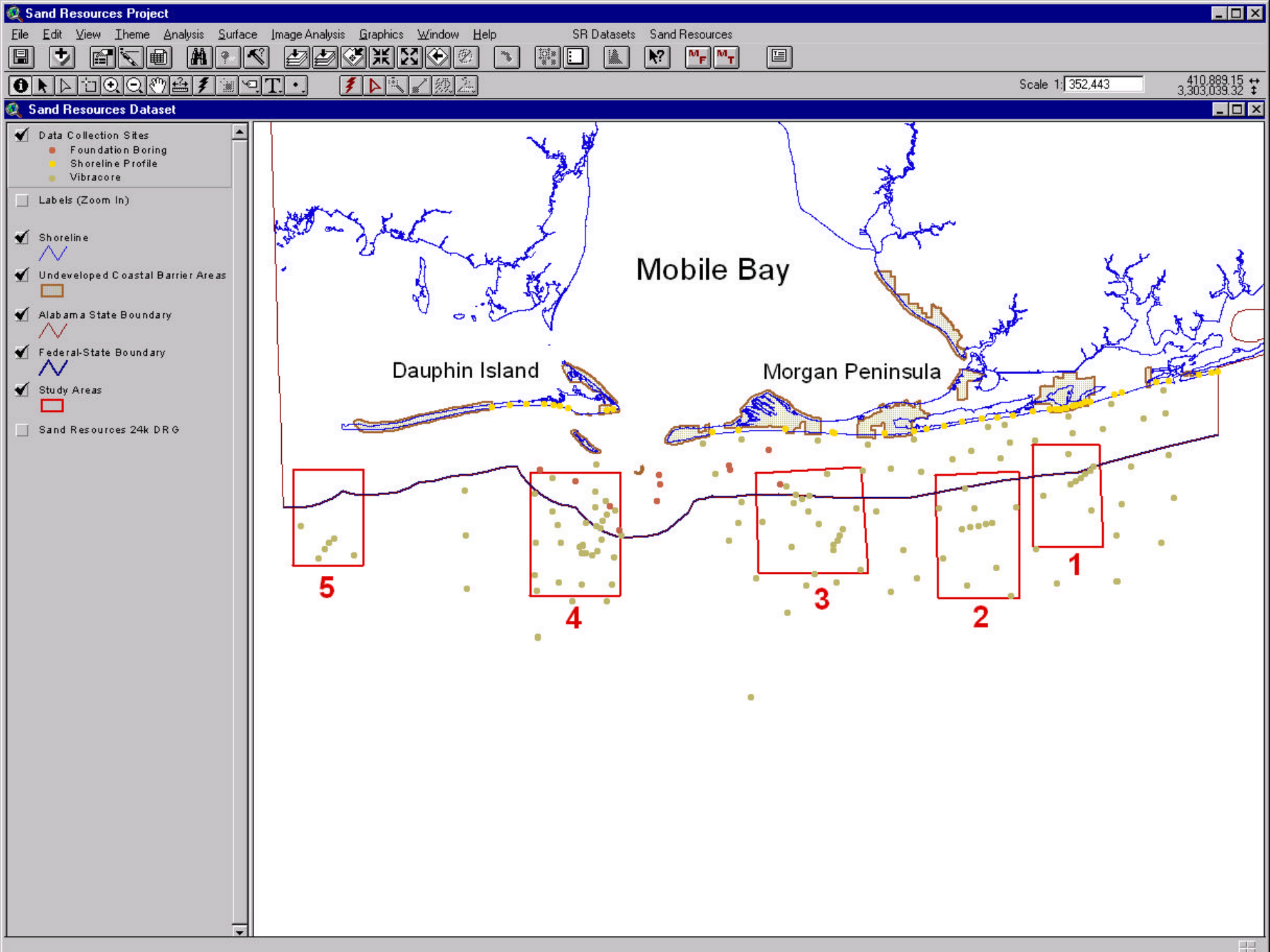


Courtesy of Mark Byrnes


BALDWIN COUNTY
MOBILE BAY
ORANGE BEACH
GULF SHORES
MORGAN PENINSULA
Alabama
Florida
N
AREA 3
AREA 2
AREA 1
STATE-FEDERAL BOUNDARY
GULF OF MEXICO
0
5
10 MILES
0
10 KILOMETERS

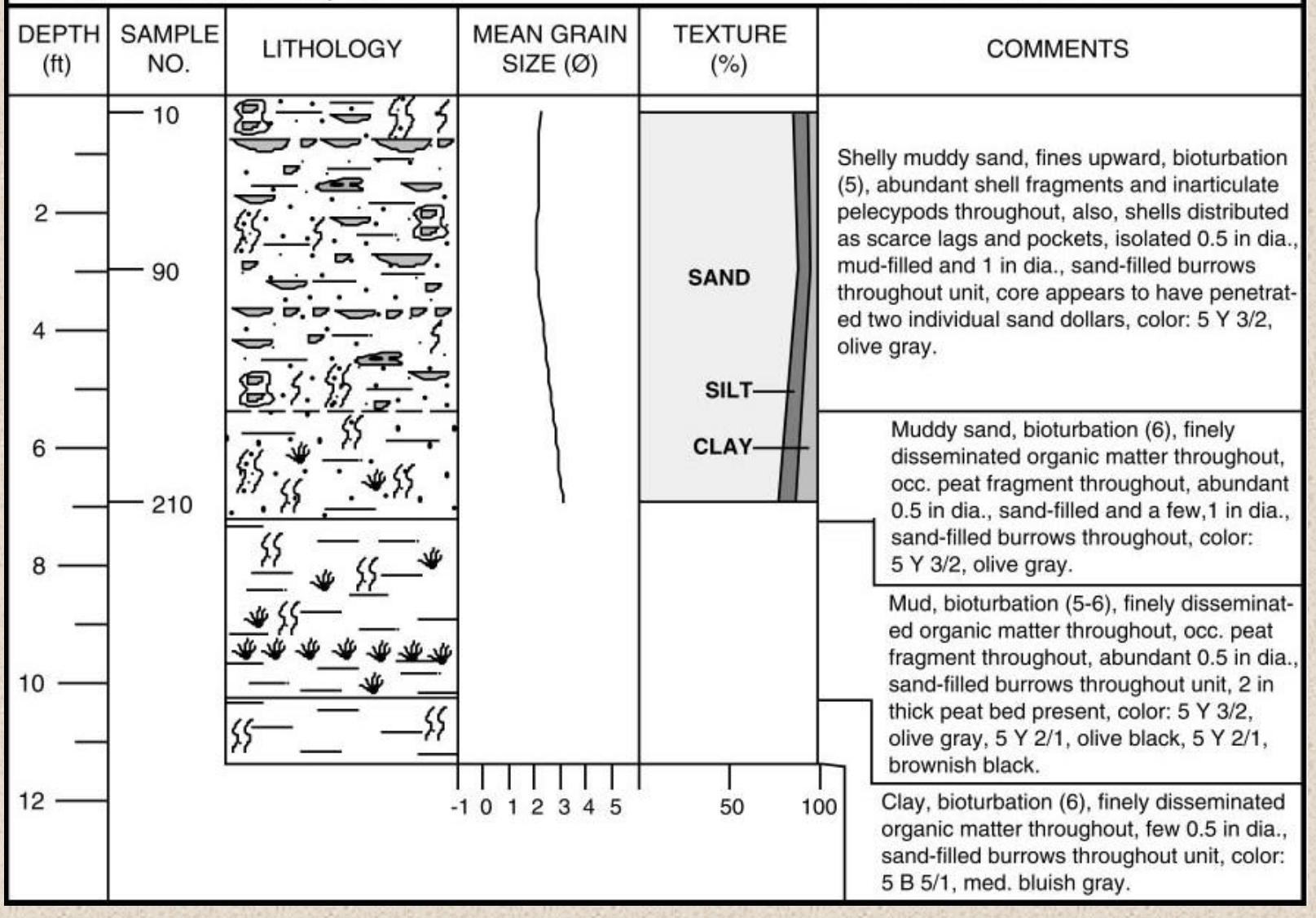
Gulf Shores Beach Nourishment Project
Looking West from Sea & Suds Restaurant
02/06/2001
Photos by ADEM Coastal Programs

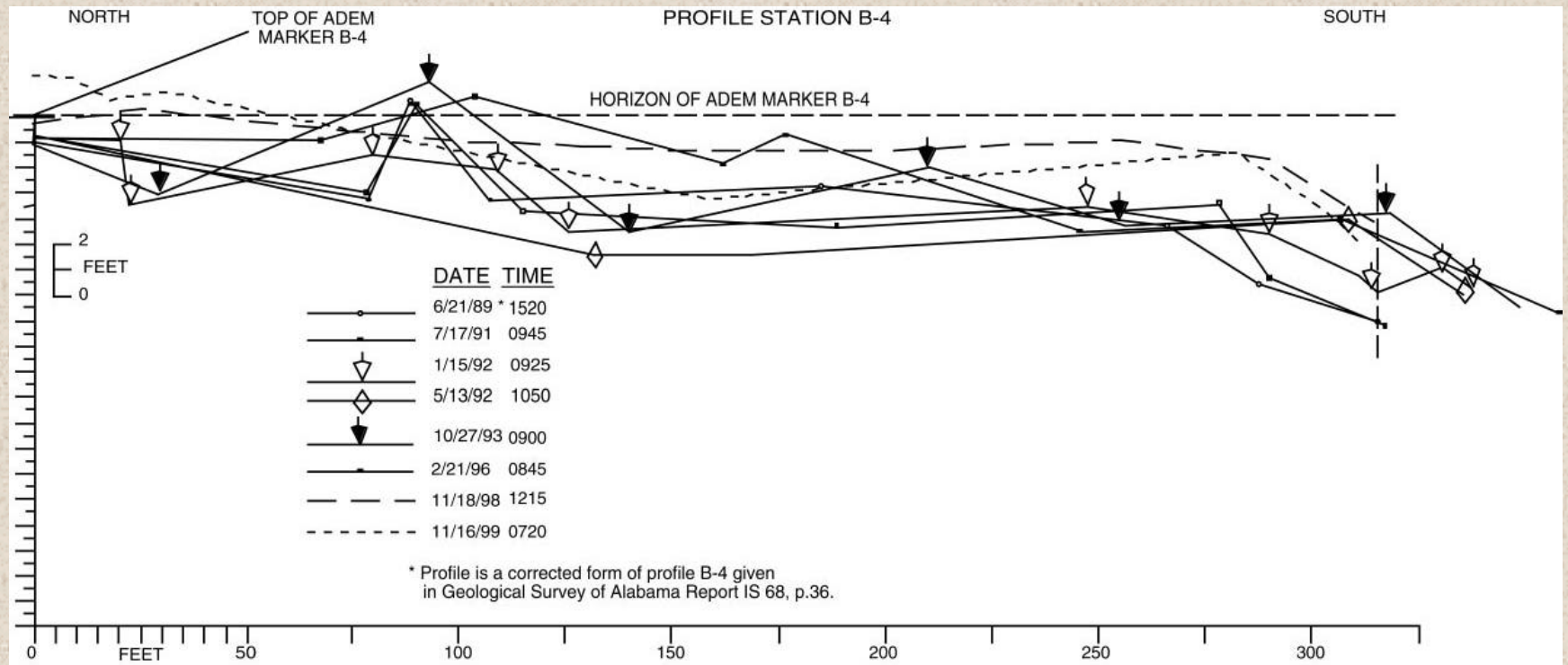
Gulf Shores Beach Nourishment Project
Looking west from Sea & Suds
June 12, 2001
Photo by ADEM-Coastal Section


Sand Resources Project
File Edit View Theme Analysis Surface Image Analysis Graphics Window Help
SR Datasets Sand Resources
Scale 1: 352,443
410,889.15
3,303,039.32
Sand Resources Dataset
Data Collection Sites
Foundation Boring
Shoreline Profile
Vibracore
Labels (Zoom In)
Shoreline
Undeveloped Coastal Barrier Areas
Alabama State Boundary
Federal-State Boundary
Study Areas
Sand Resources 24k DRG
Mobile Bay
Dauphin Island
Morgan Peninsula
5
4
3
2
1

CORE: SR-64
LOCATION: 30 06' 24", 88 07' 42"

TOTAL LENGTH: 11.4 ft
WATER DEPTH: -64.2 ft





To reach the station from the junction of Al. 59 and Al. 180 in Gulf Shores, Al.: drive west on Al. 180 for 18.70 miles to Mile Post 2.25 and a shell road left; turn left on the shell road and drive south for 0.20 mile to the end of the road and the station on the right.

The station is located on the highest point of a sand dune near the southwest corner of a large frame beach house with double steps, three palm trees, and a stone chimney on top.

From the center of the shell road-West-143 feet.

From the southwest corner of the beach house-S 40W-29 feet.

From the northwest corner of the beach house-S 20W-81 feet.

The station is an aluminum disk set in the top of a six-inch square concrete post, projecting eight inches, and stamped ADEM B-4 1985.

Plane Coordinates: X=346,070.573 feet; Y=83,318.732 feet.

Sand Resources Project

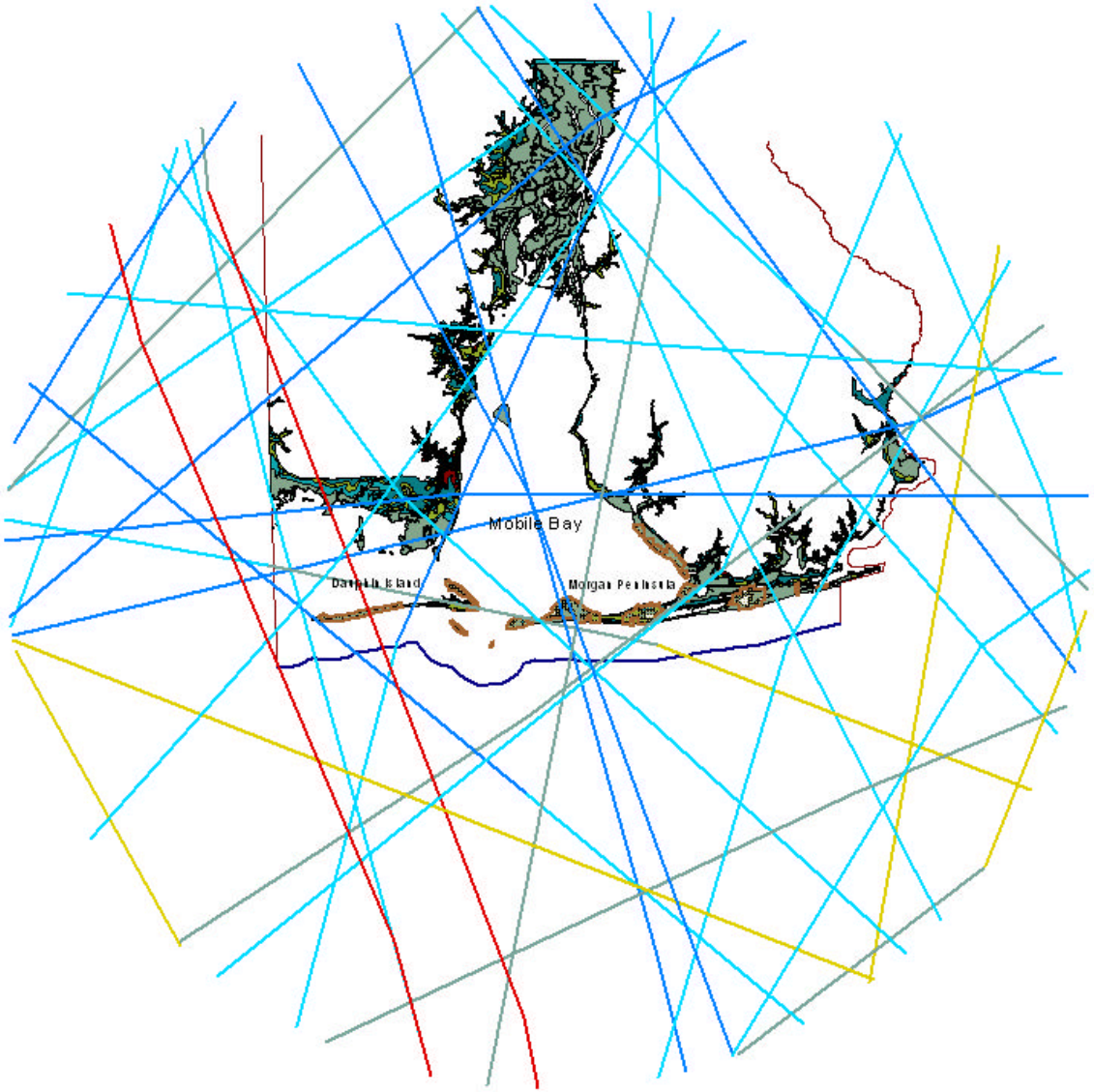
File Edit View Theme Analysis Surface Image Analysis Graphics Window Help SR Datasets Sand Resources

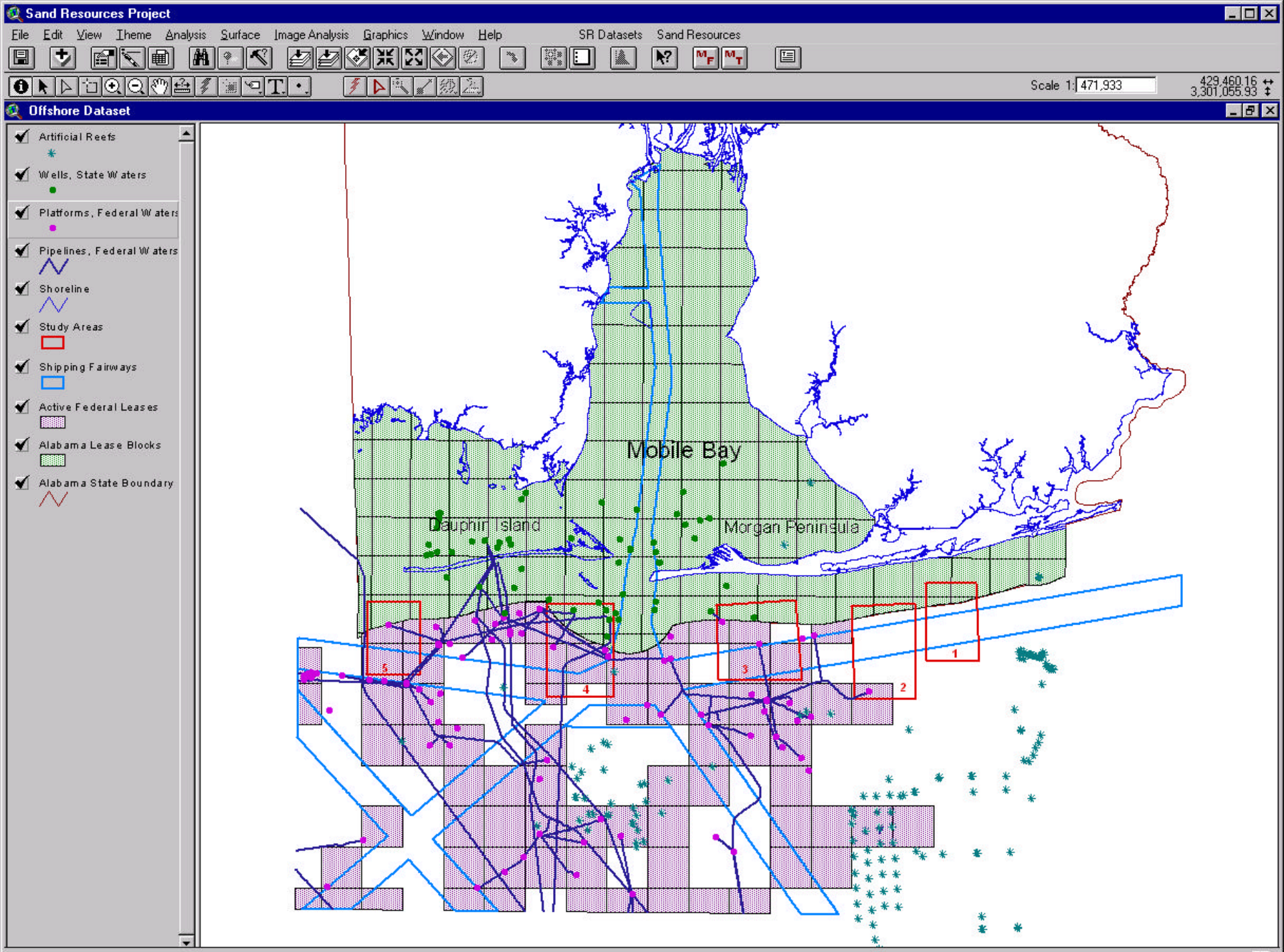
Scale 1: 855,804

449,544.72
3,271,044.90

Hurricanes and Inundation Dataset

- Historic Hurricane Tracts
  - Category 1 Hurricane
  - Category 2 Hurricane
  - Category 3 Hurricane
  - Tropical Depression
  - Tropical Storm
- Undeveloped Coastal Barrier Areas
- Category 1 Storm Surge
- Category 2 Storm Surge
- Category 3 Storm Surge
- Category 4 Storm Surge
- Category 5 Storm Surge
- Federal-State Boundary
- Alabama State Boundary
- Sand Resources 24k DRG




Sand Resources Project
File Edit View Theme Analysis Surface Image Analysis Graphics Window Help
SR Datasets Sand Resources
Scale 1: 471,933
429,460.16
3,301,055.93
Offshore Dataset
Artificial Reefs
Wells, State Waters
Platforms, Federal Waters
Pipelines, Federal Waters
Shoreline
Study Areas
Shipping Fairways
Active Federal Leases
Alabama Lease Blocks
Alabama State Boundary
Mobile Bay
Dauphin Island
Morgan Peninsula
1
2
3
4
5

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Sand Resources and Shoreline Profile Geospatial Data and Interactive Maps

Fiscal Year 2000/2001 Project Deliverable for
Minerals Management Service Cooperative Agreement
No. 1435-01-98-CA-30935

STATE OF ALABAMA
GEOLOGICAL SURVEY

Sand Resources and Shoreline Profile Geospatial Data and Interactive Maps

Exit

GIS and CD-ROM Developed by Jeffrey A. Natharius,
Geological Survey of Alabama, GIS/Remote Sensing Group

Next >

STATE OF ALABAMA
GEOLOGICAL SURVEY

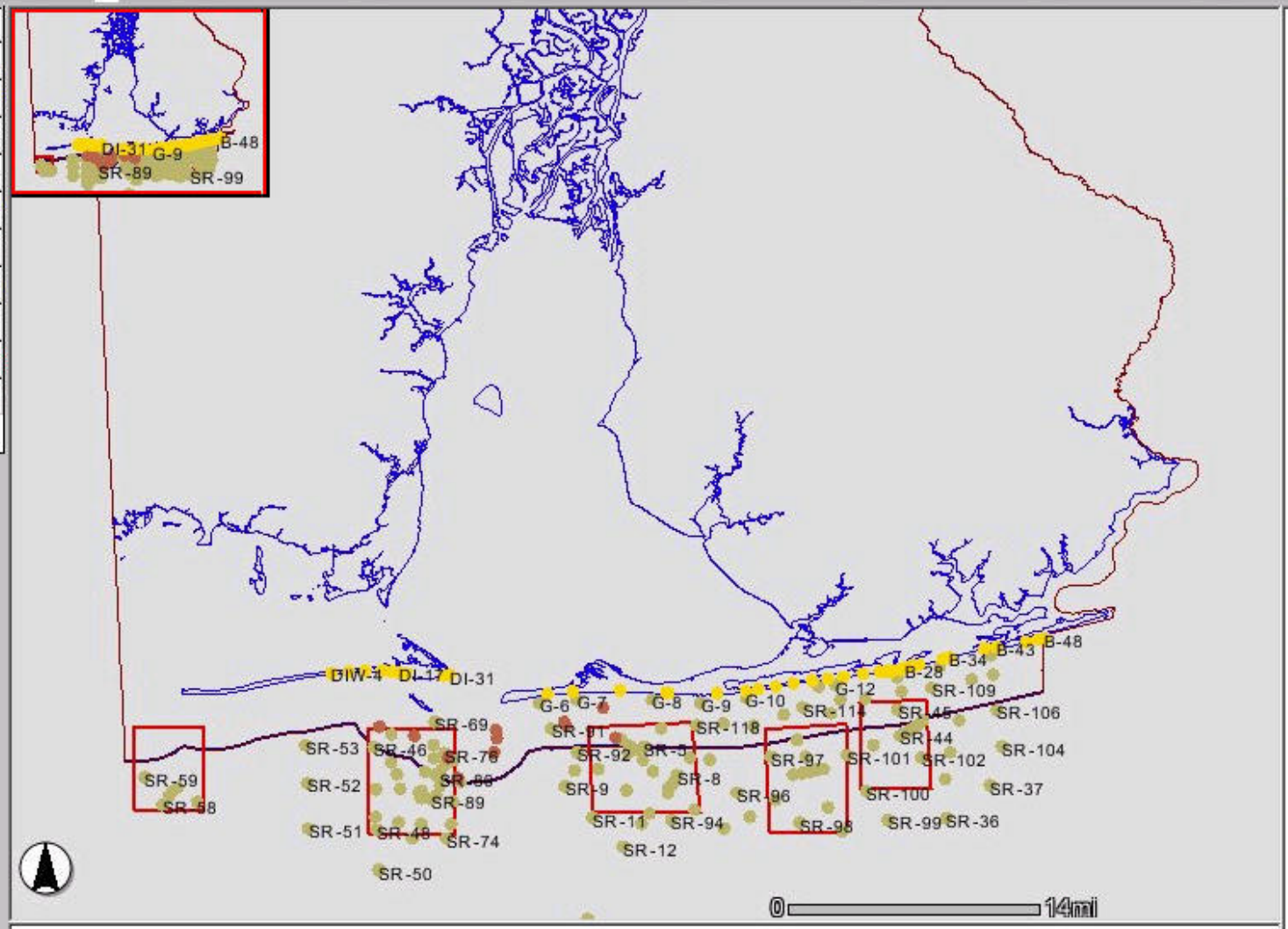
Coastal Resources

Sand resource information collected and compiled by the Geological Survey of Alabama through cooperative studies with the U.S. Department of the Interior Minerals Management Service has been integrated with the GSA shoreline profile database and developed into a GIS of the 181 data collection sites. The sand resource data consist of 129 vibracore and 11 foundation boring columnar section diagrams. The vibracore samples were collected and diagramed between 1992 and 1999 by the GSA under cooperative agreements with MMS. Exxon Company, U.S.A. provided hydrocarbon industry platform foundation boring logs to the GSA and these were used to develop columnar section diagrams.

The map is comprised of sampling locations linked to foundation boring logs, shoreline profile, and vibracore boring logs. Click here to view the Sand Resource Map.

Sand_Resources - Microsoft Internet Explorer

Sand_Resources



Legend
Data Collection Sites

- Foundation Boring
- Shoreline Profile
- Vibracore
- labels (zoom in)
- Study Areas
- Alabama State Boundary
- Federal-State Boundary
- Shoreline

Zoom In

Presented by

Robert M. Mink
Geological Survey of Alabama

With contributions by

Jeff Natharius and Nick Tew
Geological Survey of Alabama

Henry Moore
State Oil and Gas Board of Alabama

Mark Byrnes
Applied Coastal Research and Engineering, Inc.