GIS Corps and Hurricane Katrina

Richard J. Kotapish

GIS Director, Lake County

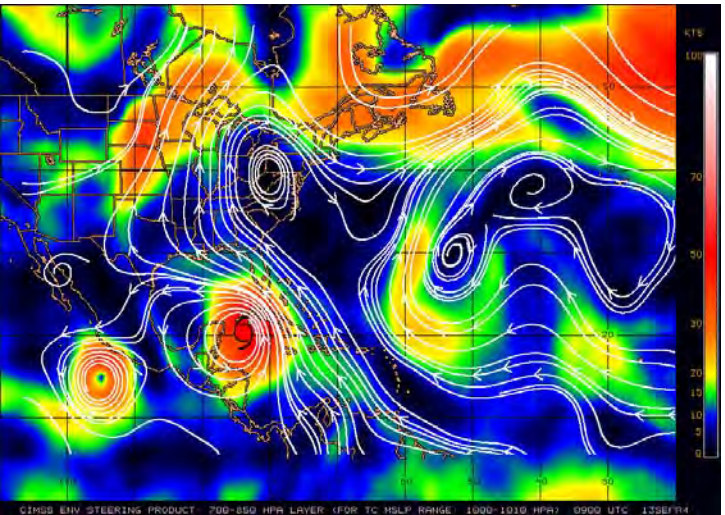
(Volunteer GISCorps)

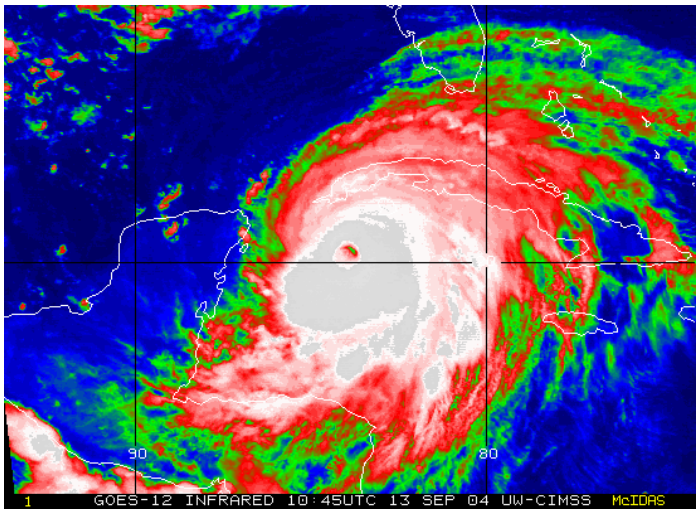
Overview

GISCorps overview

Hurricane Katrina Mission

Lessons learned






MISSISSIPPI
EMERGENCY MANAGEMENT
AGENCY
STATE
EMERGENCY OPERATIONS
CENTER
EMERGENCY MANAGEMENT
AGENCY
ENTRANCE
MISSISSIPPI
EMERGENCY MANAGEMENT
AGENCY
STATE
EMERGENCY OPERATIONS
CENTER

Mission of GISCorps

Operating under the auspices of URISA, GISCorps coordinates short-term volunteer GIS services to under-served communities worldwide.

GISCorps volunteers contribute to the well-being of communities in development by providing GIS expertise in areas such as humanitarian relief, economic development, sustainable development, indigenous capacity building, aboriginal rights, health, and education.

Model of GISCorps

- GISCorps operates under URISA and it is run by a committee
- GISCorps coordinates on a project-by-project basis between sponsoring agencies and volunteers
- GISCorps does not pay for its volunteers' expenses, the partner agency does
- GISCorps guards strongly against promotion of private interests or business goals of its volunteers or sponsors
- GISCorps is responsible for:

  establishing relationships and partnerships with recognized agencies, and associations such as UN, GSDI, Peace Corps, ICMA, etc.

  screening projects in host countries to make certain they match the GISCorps' objectives

  screening and evaluating volunteers

  matching volunteers' expertise with project needs

Who are the GISCorps?

We currently have over 800 registered volunteers (345 registered ‘friends’)

Volunteers have an average of more then 8 years GIS experience

Over 40% of them teach or have taught GIS

They are almost equally distributed across the following sectors

Governmental | Educational | Private | Non Governmental

They have a wide variety of skills and expertise, but top ones are:

Environmental analysis, database design, training, strategic planning and needs assessment and map production

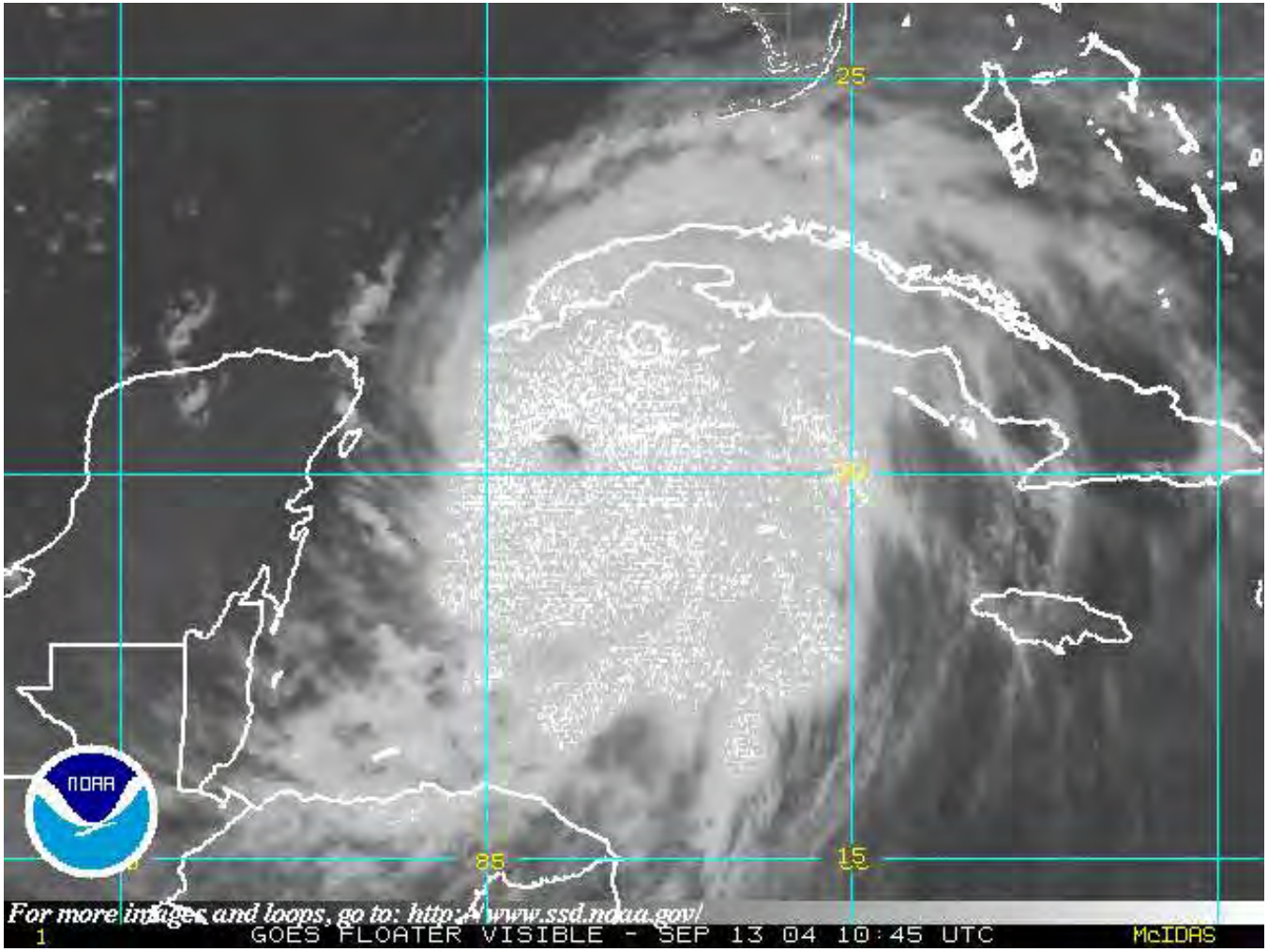
They reside in 35 countries and in all 5 continents

69% of them reside in the US

10% of the US based volunteers are non US born

The US based volunteers reside in 36 different states

“OPERATION KATRINA”



“We are prepared for any unforseen event that may or may not occur.”

President Bush

Chronology highlights

September 1

GISCorps alert sounded at 900. Confirmation rec'd at 1300. Airborne at 1700.

No answer at EOC from Jackson airport.

September 2

Arrive at SEOC, baptism by fire. Immediate LAT/LONG coordinates for triaged calls for help. Mapblast to geo-code, ArcMap for x,y. Discover generators for GIS bus were now out of gas. No gas anywhere. Airport/hotel pickups determined by who had the most gas. Not many volunteers yet luckily. Someone siphons gas from somewhere and GIS bus is back up. Ad-hoc map support, taking/running map requests, set-up staff, logistics sheet, org chart for LtCmdr, develop map request form, secure GC lodging.

Router and network connectivity problems plague us. Everyone starts using shapefiles and separate folders, mxd folders, etc. Reactionary, hectic.

Katrina web site up by ESRI, data from Talbot, others. In the **GROOVE.**

Groove P2P groupware

Groove is a unique peer-to-peer groupware application designed by the creator of Lotus Notes. When the application is running, it communicates with other Groove users and allows the sharing of information. Through a network of relay servers, information can be stored for later distribution to users who are not currently online.

Groove P2P groupware

1. A newsgroup style tool
2. An announcement system
3. A file sharing system
4. A "to do list" tool
5. A timeline tool, that listed important dates/milestones and what was due then
6. A shared whiteboard style tool
7. A buddy list to see who's online when you are
8. A text chat system
9. A voice chat system
10. A video conferencing system

Out of gas!

Chronology highlights

Sept. 3

More GISCorps arrive. Router and network connectivity problems still prevent transition to disconnected SDE editing. Everyone still using shapefiles and separate folders, mxd folders, etc. Maps on demand is working.

Sept. 4

More GISCorps arrive. GPS group. Security situation in south precludes GPS deployment. They work data entry into missing persons database (8,000 and climbing until merged with Red Cross db), they filled in when needed and train on Garmin GPS hw. Network connectivity still problematic. Shapefiles filling in, JD and others help organize the multitude of mxd's, layers, folder spread.

Learning, pre-loading GPS units

Chronology highlights

Sept. 5

GPS group forward deployment is on since troops finally had arrived in force. Disconnected editing is finally stable and up. Routine maps, data development and imagery downloading hammered our network. Mapping is really underway more efficiently thanks to JD Overton and others efforts.

Sept. 6

More of the same, dealing with data offers from many sectors, still trying to get imagery. Contact made with FEMA guys who worked over the Space Shuttle recovery effort. They also were going to bring classified credentials and access to DOD, Defense Threat Reduction Agency (predators, satellite data, etc.)

In action

Top Gun
LCDR Thompson
Ens. Jake McMillan

Operations Manager
Talbott Brooks
James Brown
Wade Givens

Logistics
Dick Kotapish
James Brown

Data Development
JD Overton
Wade Givens
Greg Easson
Heather Milton
Mark Hollingshead

SAR
Kimani Waweru
Mathew Cieri

Mapping Distribution
Wade Givens
James Brown
Ed Vigil
Mark Hollingshead
Heather Milton
Molly Reif
Kim Holden
Louis Wasson
Pete Kohn

Tech Support
Craigon Knox
JD Overton

GPS/Forward
Paul McKnight
Bruce Willette
Michelle Alexander
Ray DeLeon
Leeanne Pacatte
Sean Bohac
Ann Hooper
Laura Horton
Hanna Ford
Charles Hill
Wes Burger
Lee Meeks
Robby Dudley
Jason Kandrick
Matt Wilson

Establish organizational structure

GIS ORGANIZATIONAL CHART DESCRIPTIONS

- **Top Gun** - Determine on-site SAR Command and control.
- **Operations Management** – Tasked with the management and coordination of all aspects of the response and recovery efforts being supported with GIS products and technology. One general, one manager of Mapping and Data Development.
- **Logistics/Laison** – Tasked with personnel resource scheduling, project scheduling, meeting GISCorps station (trailer) needs, lodging/travel coordination, personnel issues, Action Request Forms, ad-hoc problem resolution. Stationed in control room, laison between agencies.
- **Data Development** – This group is tasked with enhancing existing geographic databases or creating new data sets. These data are from a variety of sources. This group will provide the GIS data for use by the Mapping/Distribution group.
- **Mapping/Distribution** – This group is tasked with creating GIS maps in sufficient number, format and size for hardcopy output and serving up on the Internet. Strong Production Chief here.
- **Search and Recovery** – This group is tasked with coordinating mapping information for search and recovery efforts. This includes lat long coordinates for missions, grid maps for search area delineation and SAR progress monitoring.
- **Tech Support** – This area provides software and geo-data technical support for anyone in need of hardware or software problems and other technology questions. Information Technology pro. Coordinates off site tech support, elevating as needed.
- **GPS/Forward** – Dependant upon conditions, this group is tasked with enhancing existing geographic databases or creating new data sets, in the field. Forward staff also produce mapping products during down time.

M.E.M.A.
KATRINA MAP REQUEST

Date: 9/ /05

Requesting Agency: _____ Name: _____

Phone: _____ Email: _____

Date/Time needed by: _____/_____

Description: _____

_____

Area: ___ Statewide ___ Quant. Size __ E (3'x4') __ D (2'x3')__ 11 x 17 __ 8x11

___ By County ___ Quant. Size __ E (3'x4') __ D (2'x3')__ 11 x 17 __ 8x11

___ Other _____ Size __ E (3'x4') __ D (2'x3')__ 11 x 17 __ 8x11

___ Digital format: ___ PDF ___ BMP ___ OTHER: _____

Layers

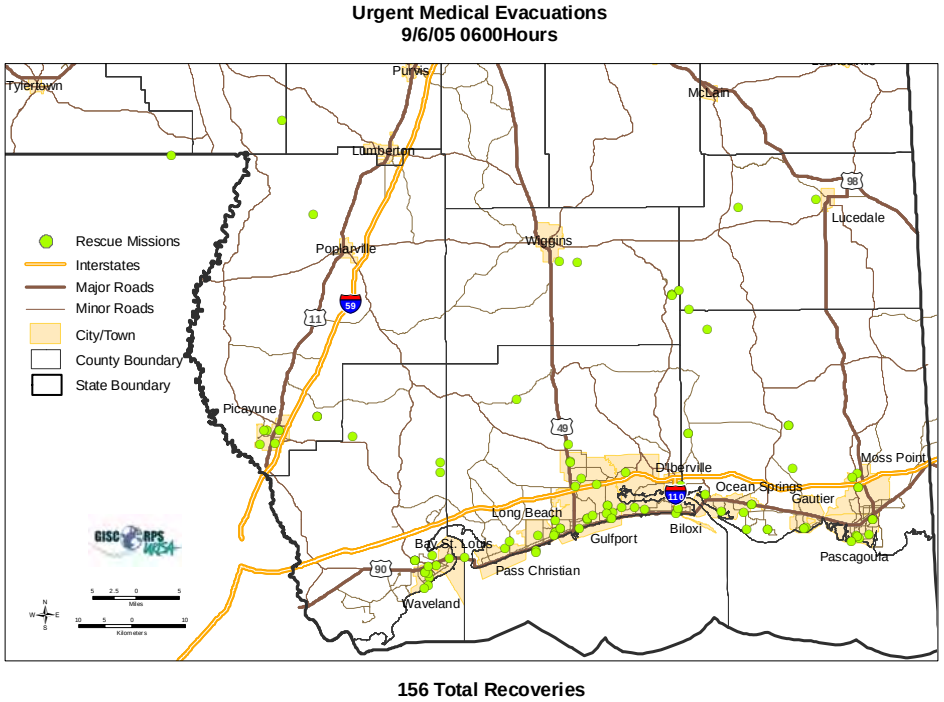
Health	Thematic	Planimetric	Hazus/Utilities
___ Ice	___ Closed Roads	___ Counties	___ Cell Towers/Buffers
___ Water	___ Population Density	___ Primary Roads	___ Transmission Lines
___ Food	___ Winds	___ Detail roads	___ Power Outages
___ Hospitals	___ Inundation	___ Streams	___ Power Restored
___ MSAT	___	___ Cities	___ % Power
___ Care Centers	___	___	___
___ Healthcare	___	___	___
___	___	___	___
___	___	___	___

Completed By: _____

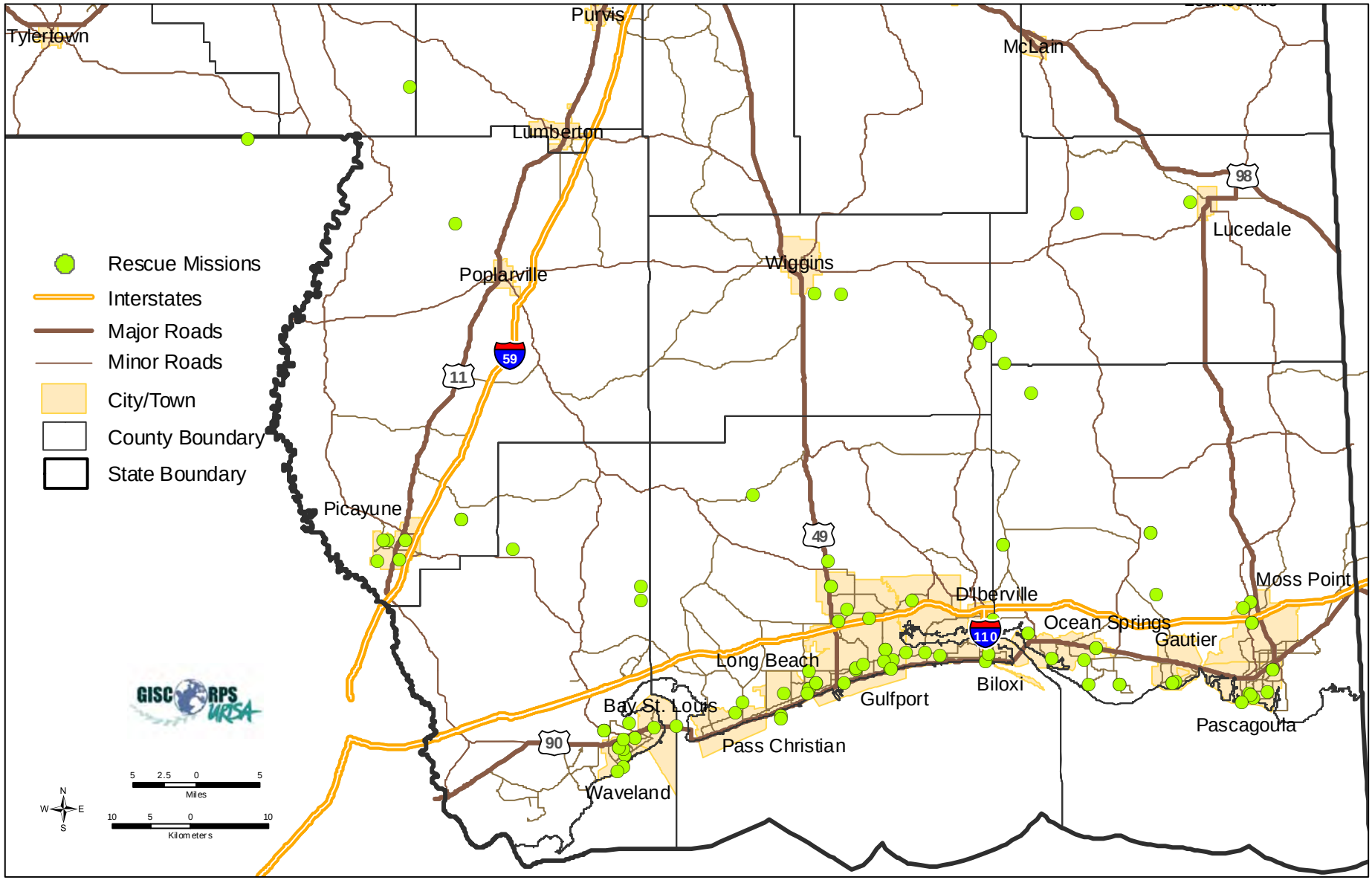
Date/Time: _____

GIS Desk PC

Search and Rescue. We translated more than 200 addresses & locations into GPS coordinates for the US Coast Guard rescue helicopter evacuation missions. Many of these location to GPS translations could only be done fast enough using GIS - (calls like "I'm trapped at the water treatment plant in _____" or "I'm about 1 mile north of _____ and I can see a church steeple."



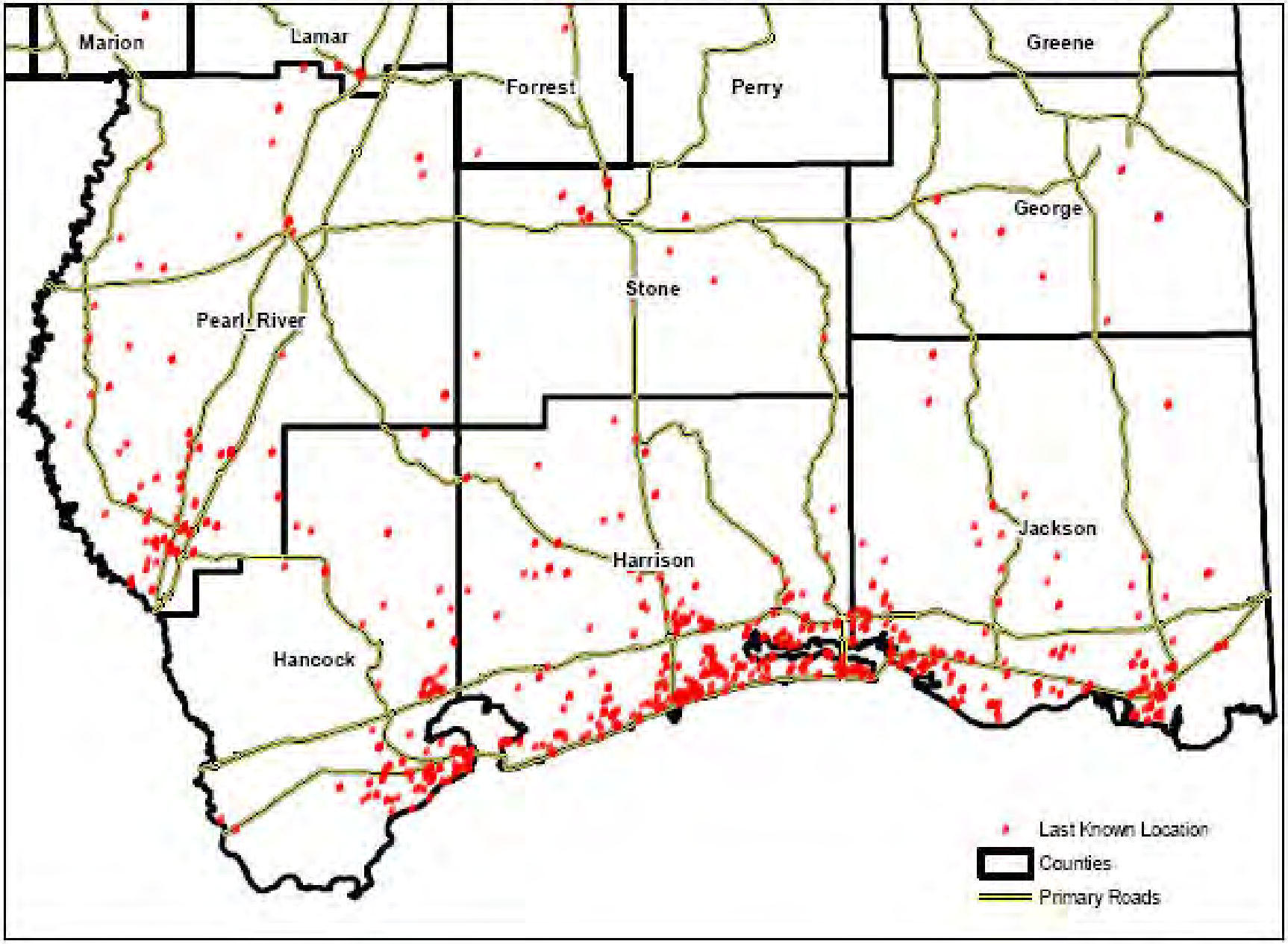
Urgent Medical Evacuations
9/6/05 0600Hours



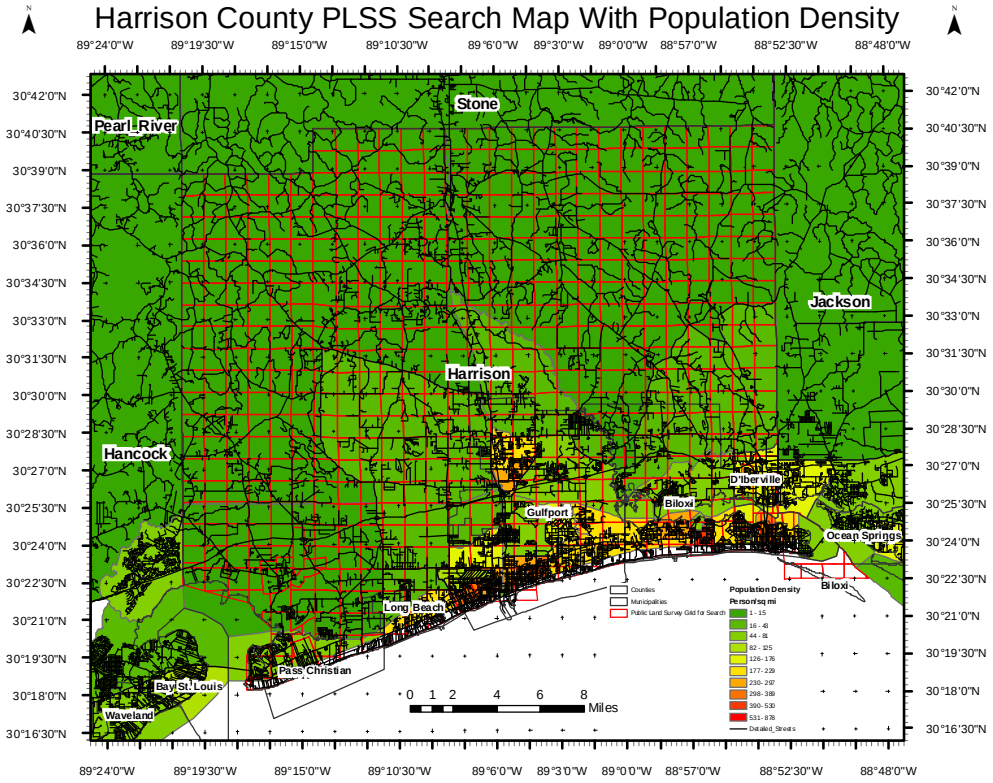
156 Total Recoveries

Developed the missing persons website report and database to assist with the taking of missing persons reports (8,000 and climbing rapidly). These reports spit out a geocodable table that is letting us build a missing persons feature class. This feature is the "Last known location" layer helping to map and direct emergency response.

Last Known Positions of Missing Persons (as reported through MEMA, 4 Sept 05)



Talbot & Co. built the initial indexed search maps for the initial responders and strike teams - printed nearly 200 maps in under 10 hours. We then finished a revised and expanded search map set that covers eight county areas and will be used for house-to-house.



Lessons learned

Need a strong, organized personality for production chief

Contact information roster critical for communications between management, volunteers, external resources and basic logistics

Prepare volunteers for reality of massive emergency response workflow issues (power, connectivity, disorganization, hurry up and wait) Down time is inevitable, due to technical infrastructure, I-net, network connectivity problems, gasoline shortages, power outages, router or other hardware stability. “That’s why they call it a disaster!”

Formalize shift change and knowledge transfer of projects, procedures at every shift change.

Lessons learned

Use National Grid (UTM) grid for search zones

Decision to set-up a remote network caused problems.

Use organizational structure like that for Katrina. Stagger arrivals, 5 per day.

Bell South rep pointed out how # of users and terrain really distort the coverage area. We need to learn how to approximate the coverage better. Map was really appreciated.

Note numbers used as symbols for layperson interpretation.

Planning for the future…

- Initial assessment of existing conditions:
  - Define existing local geospatial data
  - Define GIS capacity infrastructure
    - EOC integration, none to operational?
    - Control room desk?
    - Hardware assessment
      - Network/server capacity, output devices?
    - Existing GIS Director, staffing level?
    - Physical space for GC work?

Planning for the future…

Decision to set-up a remote network made huge problem. GISCorps should have it's own server(s) and cache of networking components, preloaded with Framework layers (civil boundaries, national centerlines, hydrography etc.), FCC cellular db, ArcInfo (5 floating), ArcSDE.

Volunteer laptops preloaded with basic MXD's, layer files, symbol sets, SDE connections, numerous HP and Epson printer/plotter drivers

Be prepared to work locally.

We need a Deployment Plan which is geared for GisCorps self-sufficiency and non-reliance on the Internet. Connectivity problems, bandwidth bottlenecks and actual web availability impacted our effectiveness. The GISCorps Deployment Plan would make possible GisCorps hardware to be brought on-site to facilitate rapid deployment and stable operating environment.

Planning for the future…

Operationalize GIS Support into the Emergency Operation Centers through formal EFS status or at least through informal inclusion into the EOC Control Room.

Perform an initial assessment to determine resource requirements.

Establish Common Operational Plan (COP) with Local Resources, FEMA, NGA, Military (incl. DTRA), National Guard, Coast Guard, DOT, others.

Planning for the future…

GROOVE for communication, FTP file transfers

GIS for the Nation and FEMA Resource Typing for feature classes

Prepare for power mapping, digital dissemination. Blackberries, memory sticks, cell phones rule

Favorites folder preloaded with data sites, Katrina ntkb sites. Privacy signature commitment.

Planning for the future…

Accept the fact that an “NGO” entity (GISCorps, etc.) is inherently flexible and can mobilize immediately, faster than a speeding bureaucracy!

Use GISCorps as your rapid-deployment Strike Force, the union is imminent.

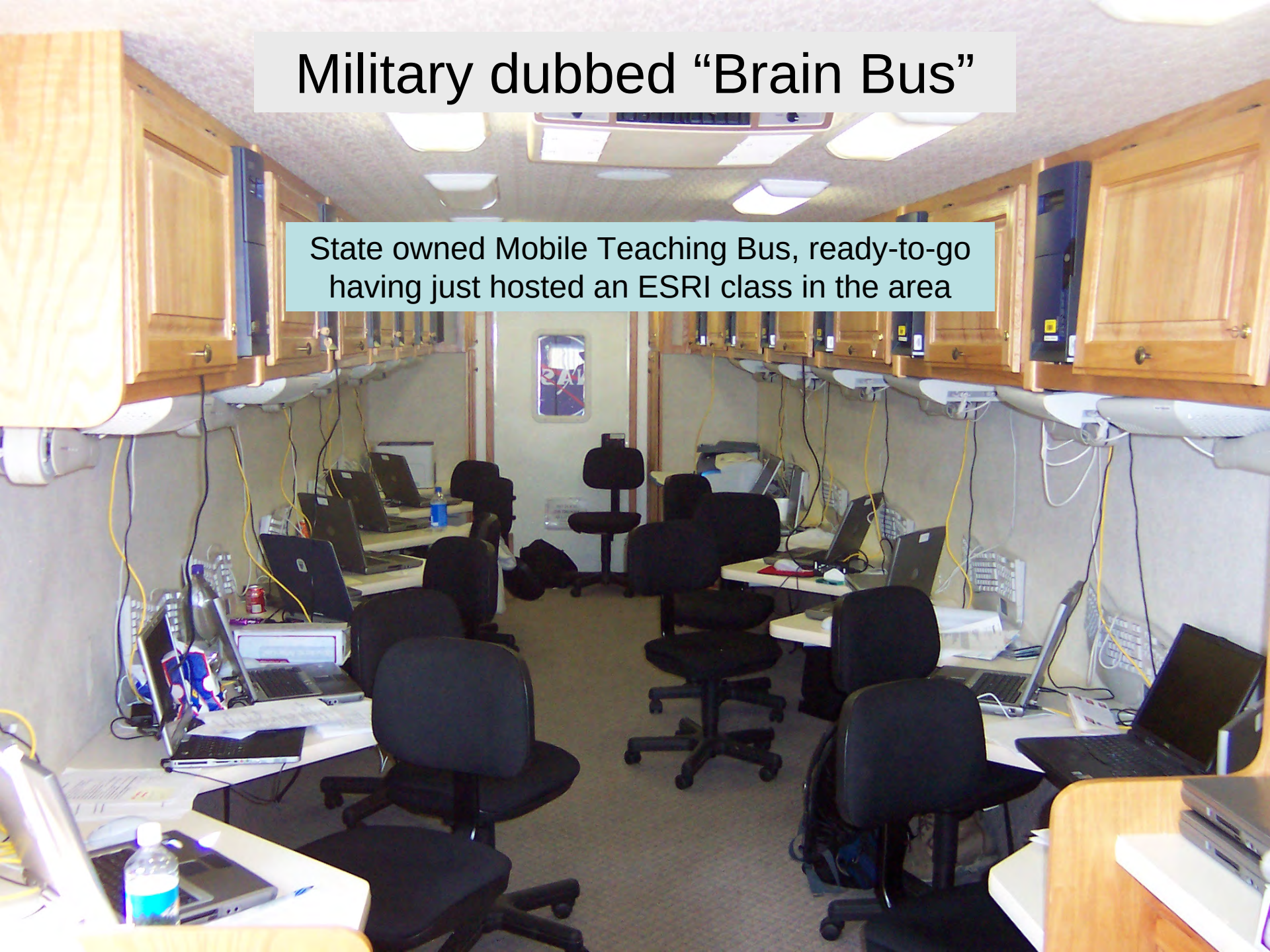
Allow (plan for) this bureaucracy-free entity to deliver initial assistance

GISCorps and Ole Miss Volunteers


MISSISSIPPI


NT FORCE HEADQUARTERS
NATIONAL GUARD
N ENTRANCE
26

Military dubbed “Brain Bus”



State owned Mobile Teaching Bus, ready-to-go having just hosted an ESRI class in the area


Data Development
Mapping Distribution
SANJEEV ARYA
GIS CORPS
KISSIMMEE
MATTHEW CHERI

GIS Desk in SEOC Control Room


Talbot Brooks, multi-tasking at the
GIS Desk in SEOC Control Room

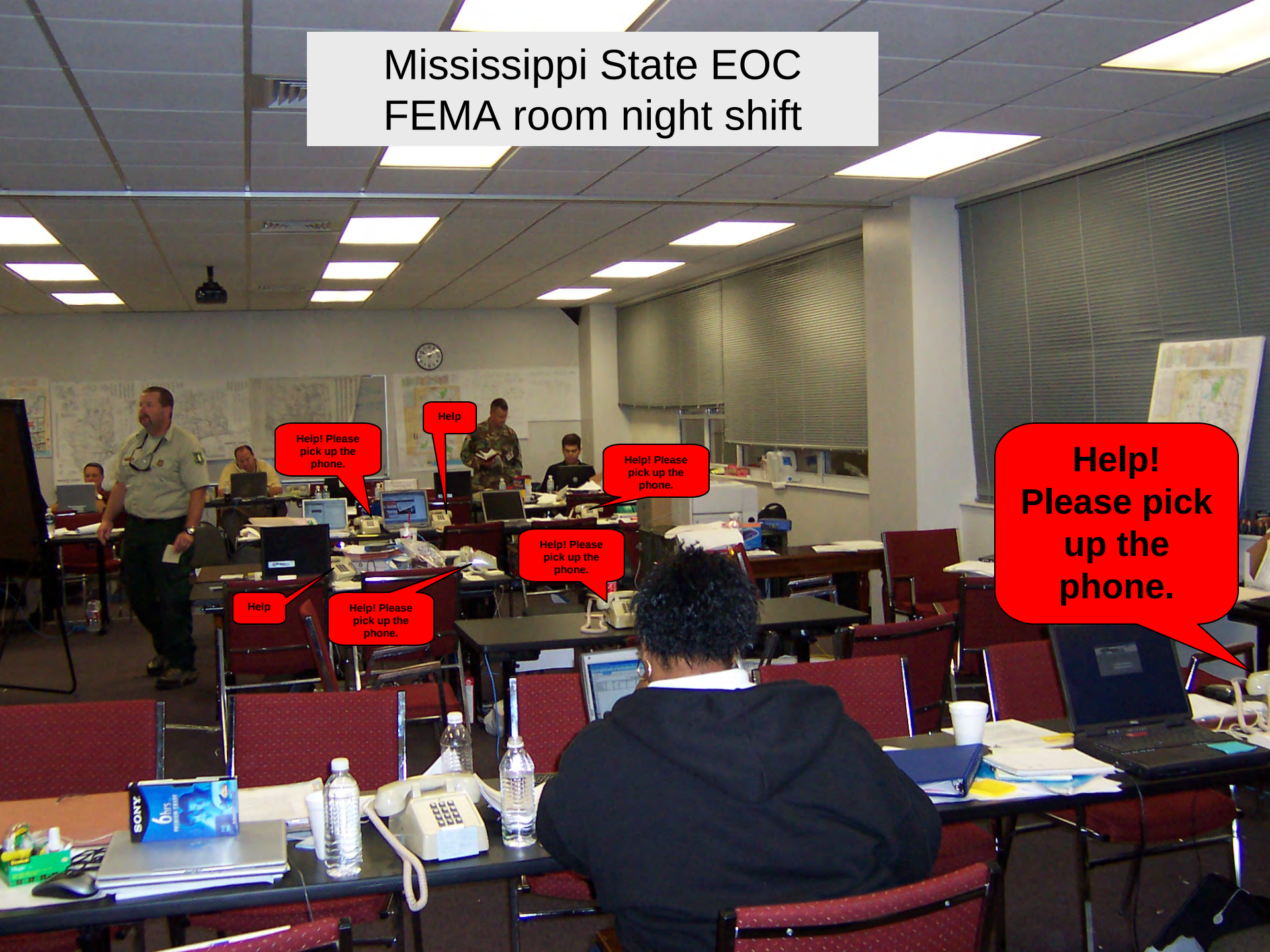
JD Overton, instrumental to success

“Local Talent”

Alabama - I10 & US 98 open
Florida - I10 open
Logistics 360-0944
Transportation 960-9016
I 110 accessible from I10 to US90
57 SB Between I-10 & US90
43 SB Between I-10 & US90
Hospitals
MS 605 SB between I10 + US90
Airports OPEN
Mobile Regional open, ATCT open
Pensacola Regional open, ATCT open
Shelter Location
Capacity
Population
1 Sept 05

Mississippi State EOC 0700 Control Room Briefing

Mississippi State EOC
FEMA room night shift



Shift change organizational briefing

Forward deployment w/plotter


TURN IN
MISSING
PERSONS
FORMS HERE

King Kong’s hair net

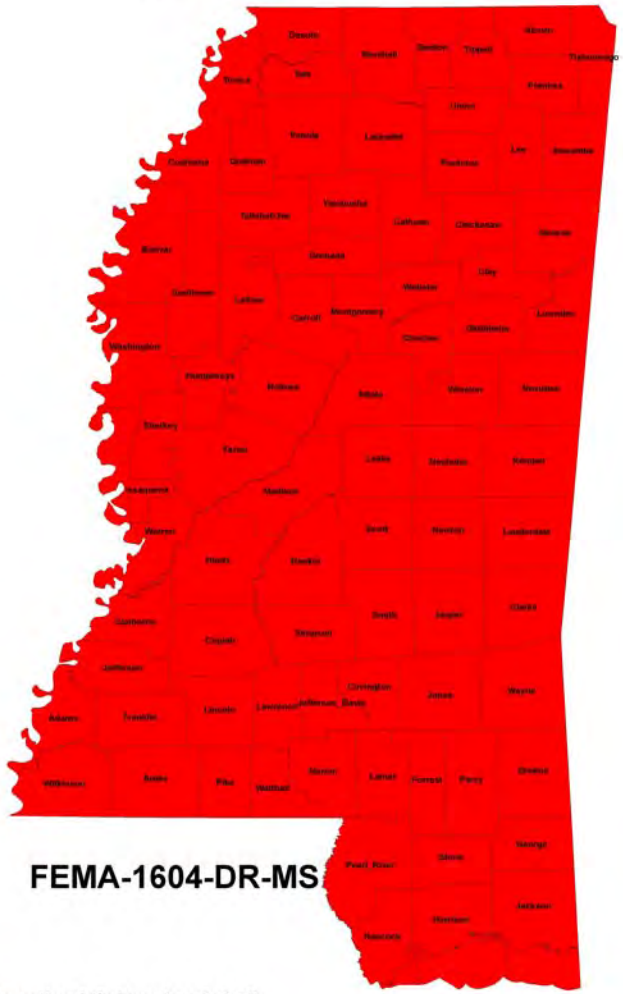

PEACE
EXCUSES
To Be Graded
IMPACT

Donations

captured by J.D. Overton's wife volunteering in Miss.

Hurricane Katrina

Public Assistance



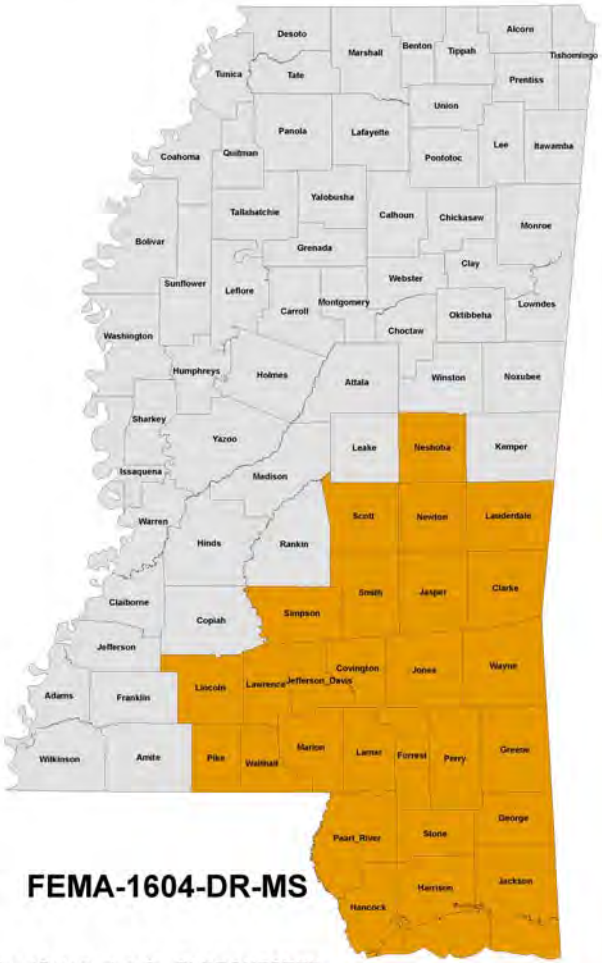
FEMA-1604-DR-MS

82 Counties (Catagories A & B)

Catagory A: Debris Removal
Catagory B: Emergency Protective Measures

Date: 9/6/05 0700

Hurricane Katrina
Public Assistance



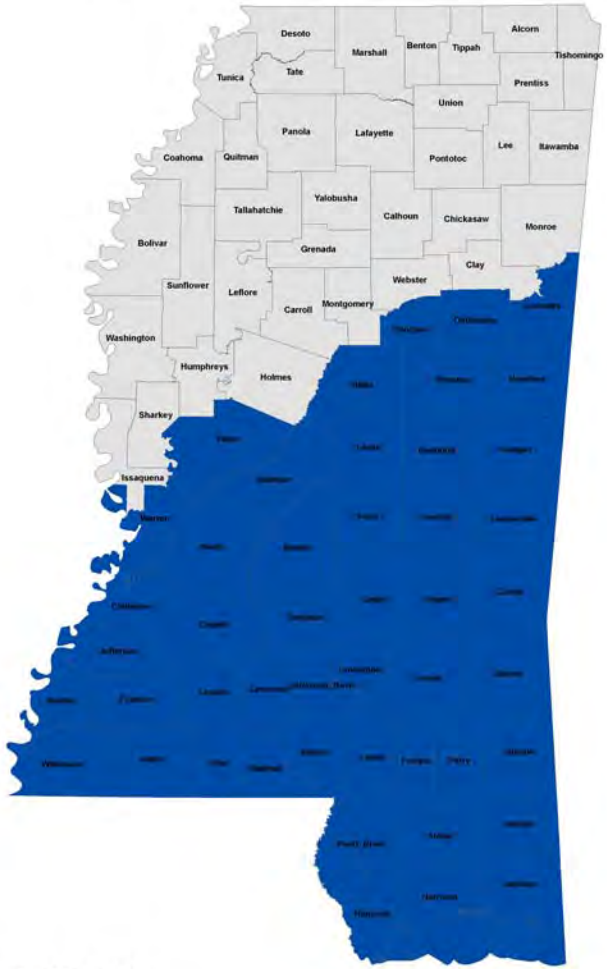
FEMA-1604-DR-MS

25 Counties (Catagories C - G) REQUESTED

Catagory C: Roads and Bridges
Catagory D: Water Control Facilities
Catagory E: Building and Equiptment
Catagory F: Utilities
Catagory G: Parks, Recreational Facilities, and Other

Date: 9/6/05 0700

Hurricane Katrina
Individual Assistance

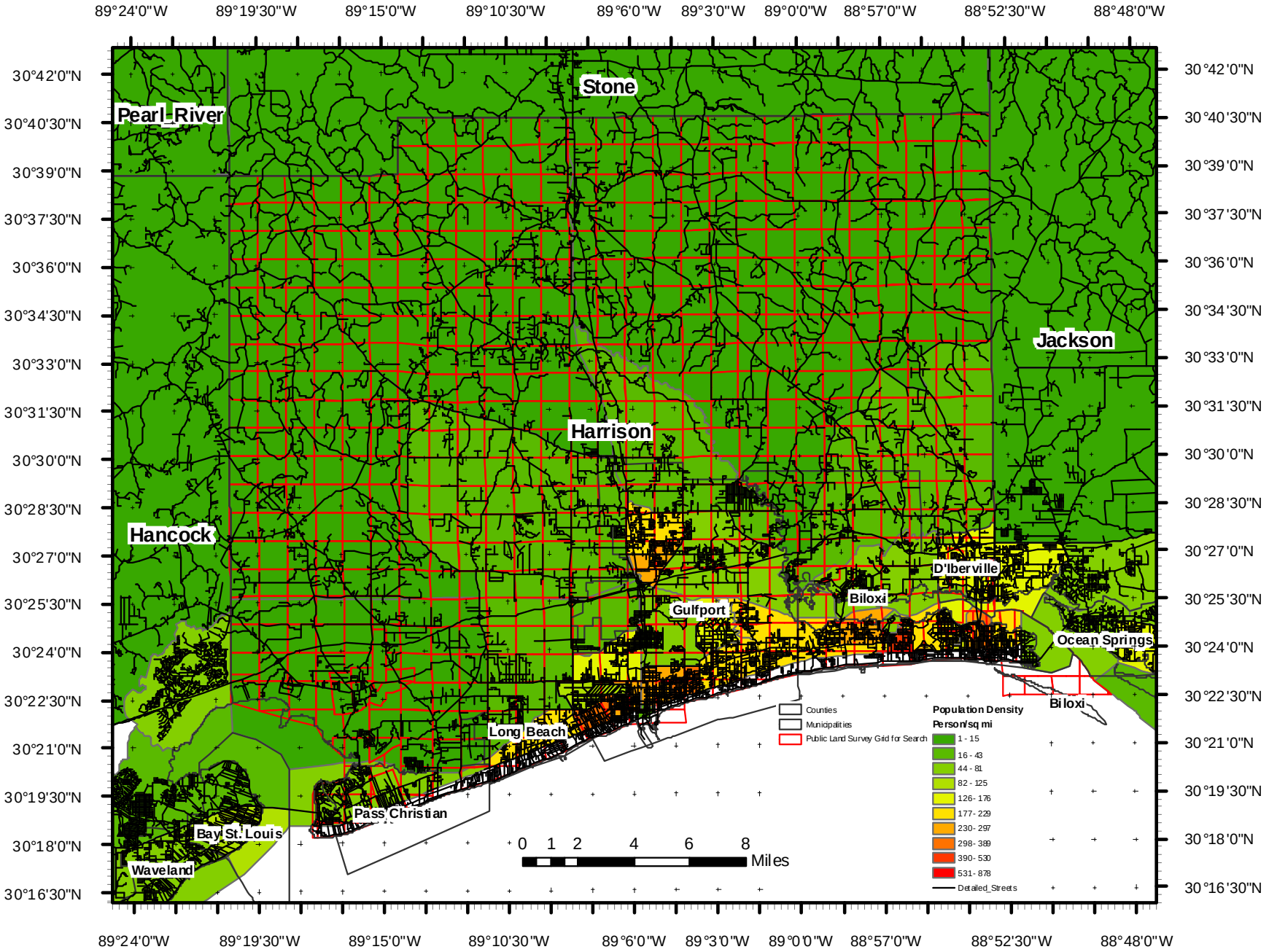


FEMA-1604-DR-MS

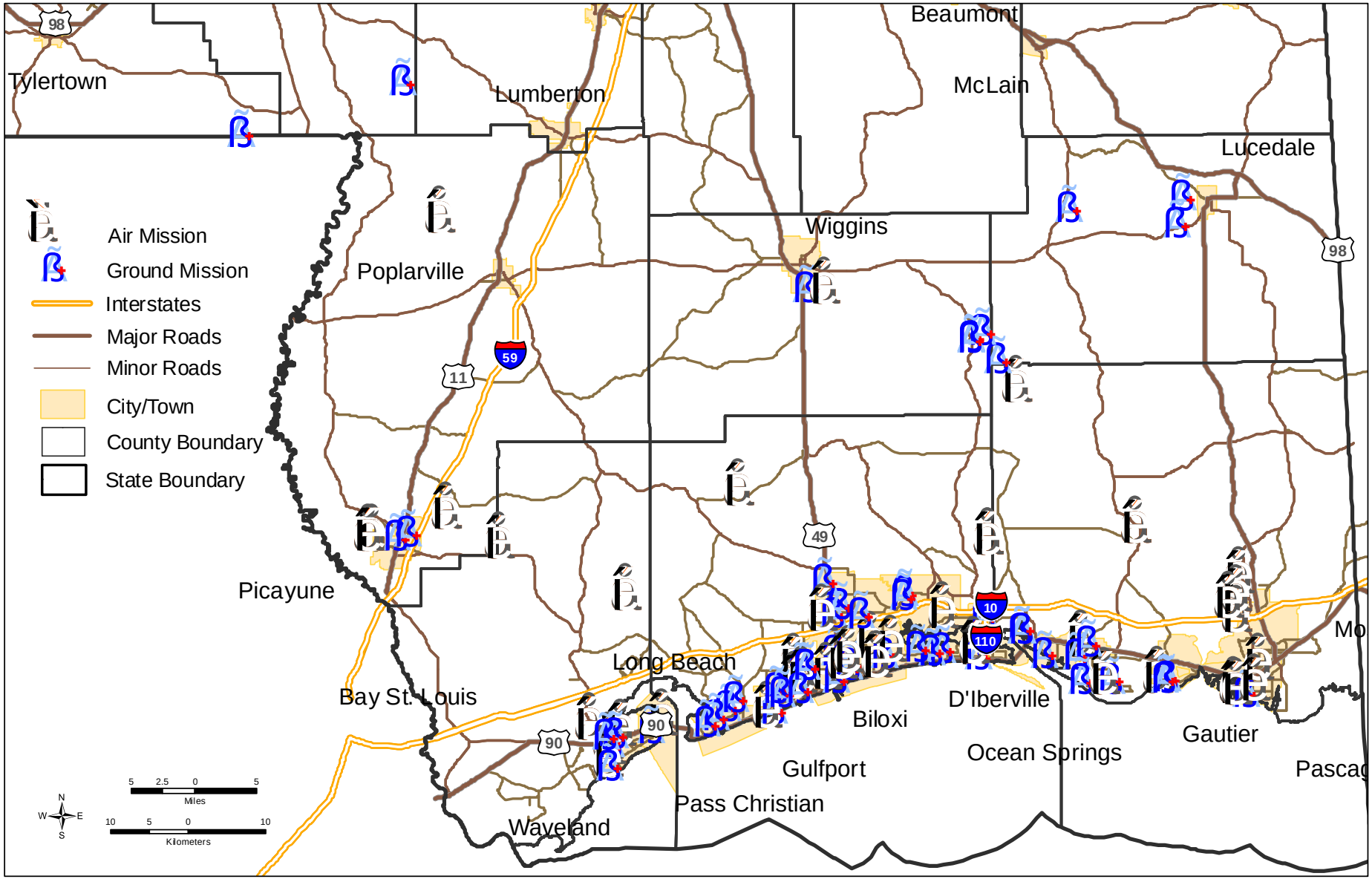
46 Counties - Individual Assistance

Date: 9/6/05 0700

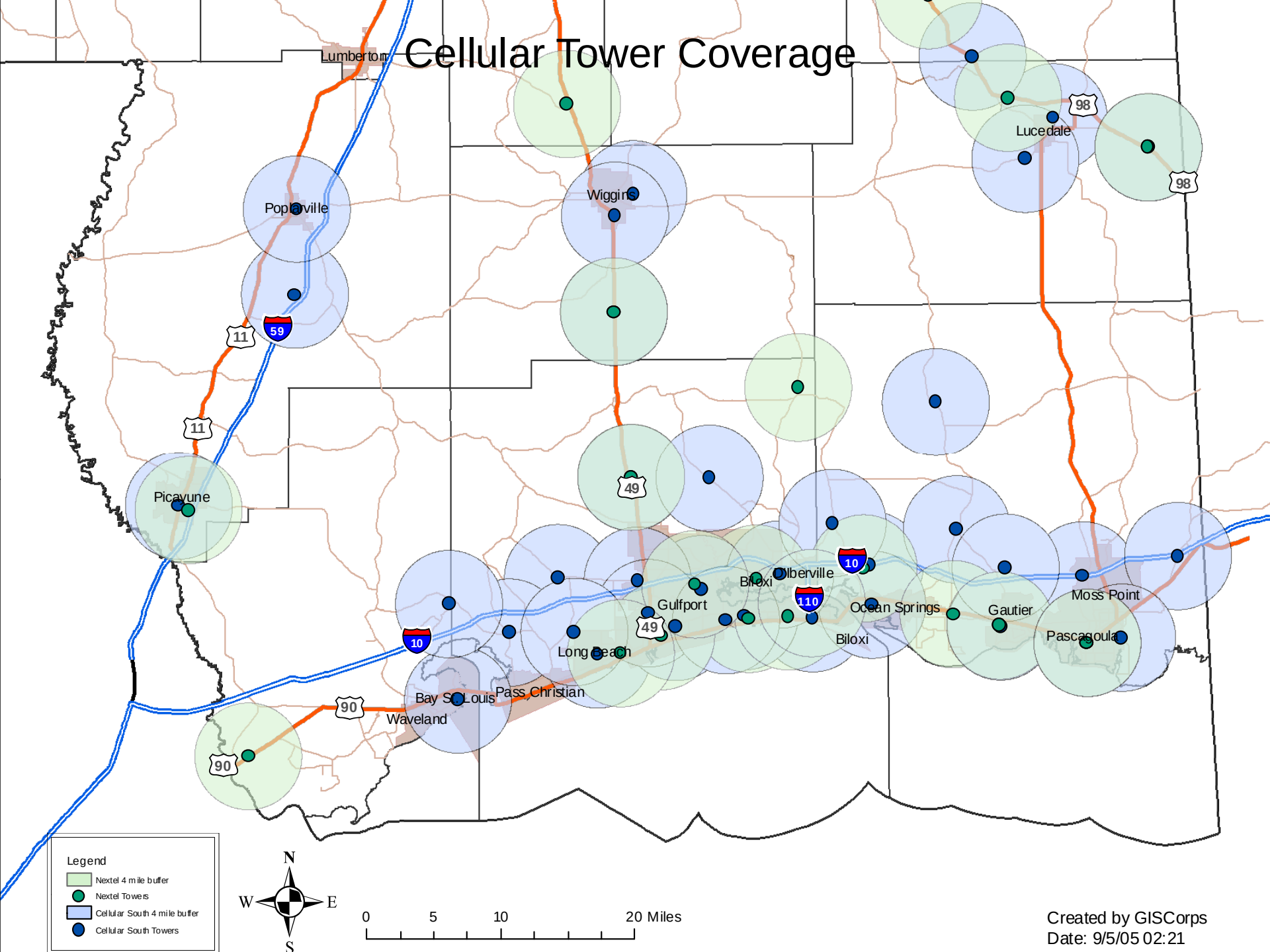
Harrison County PLSS Search Map With Population Density



Urgent Medical Evacuations
9/5/05 0638 Hours

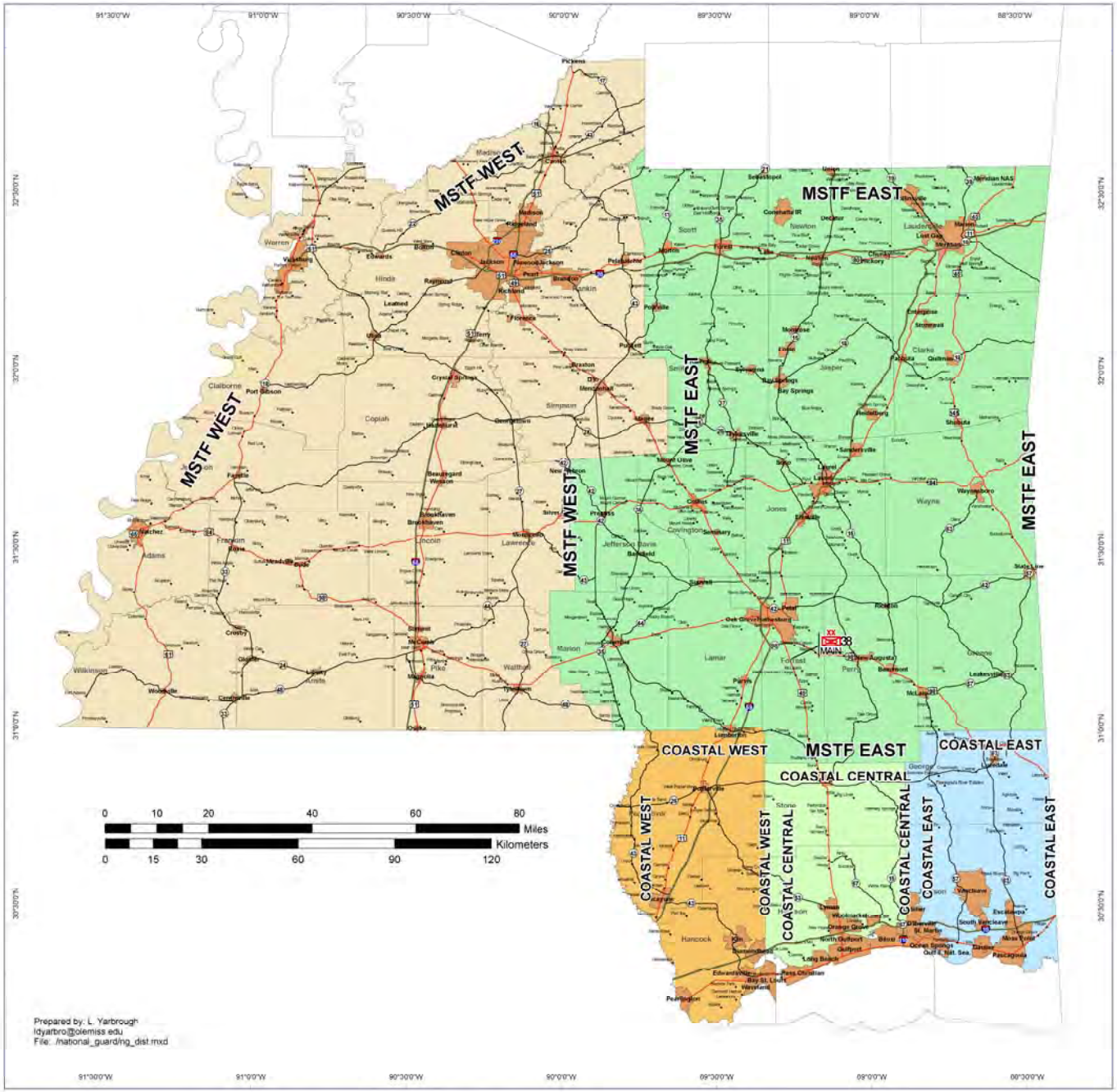


Cellular Tower Coverage

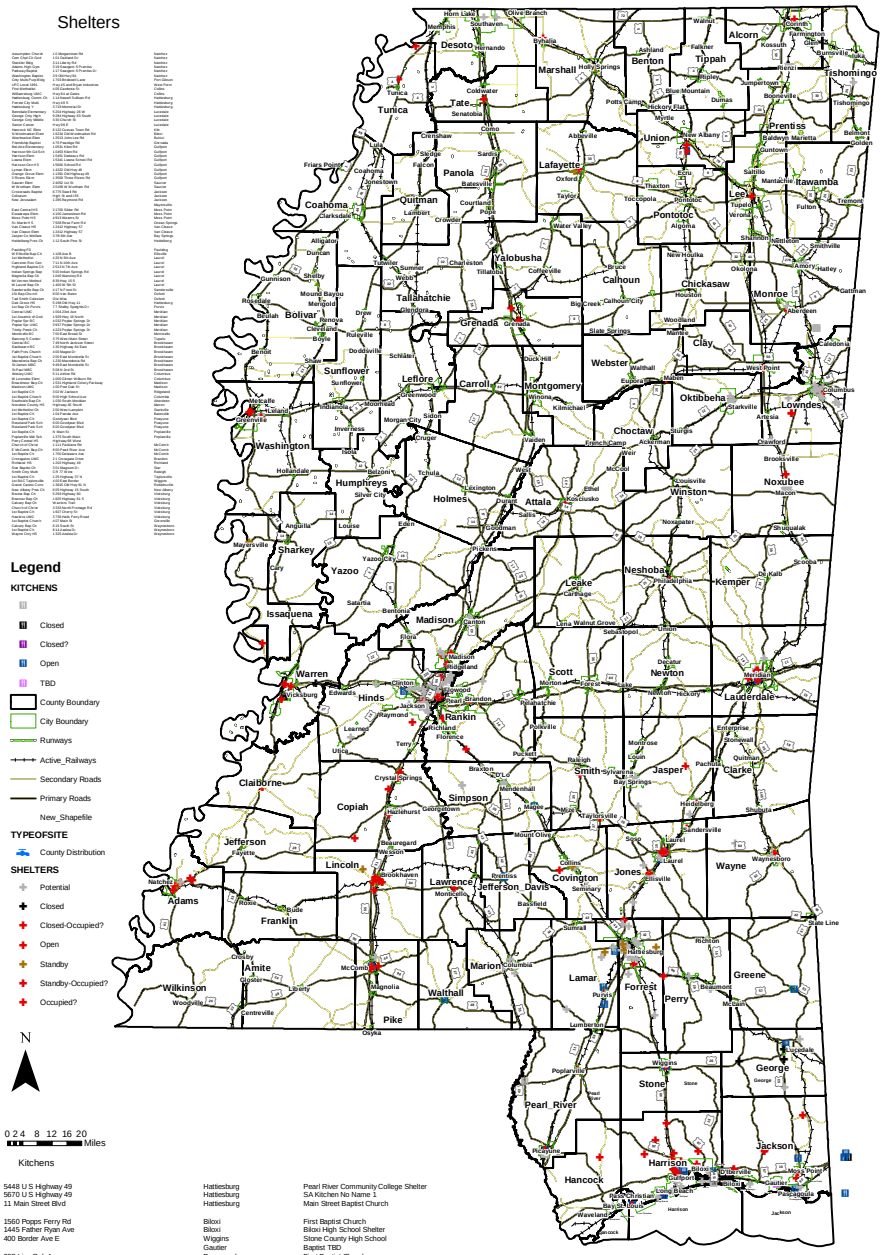


Created by GISCorps
Date: 9/5/05 02:21

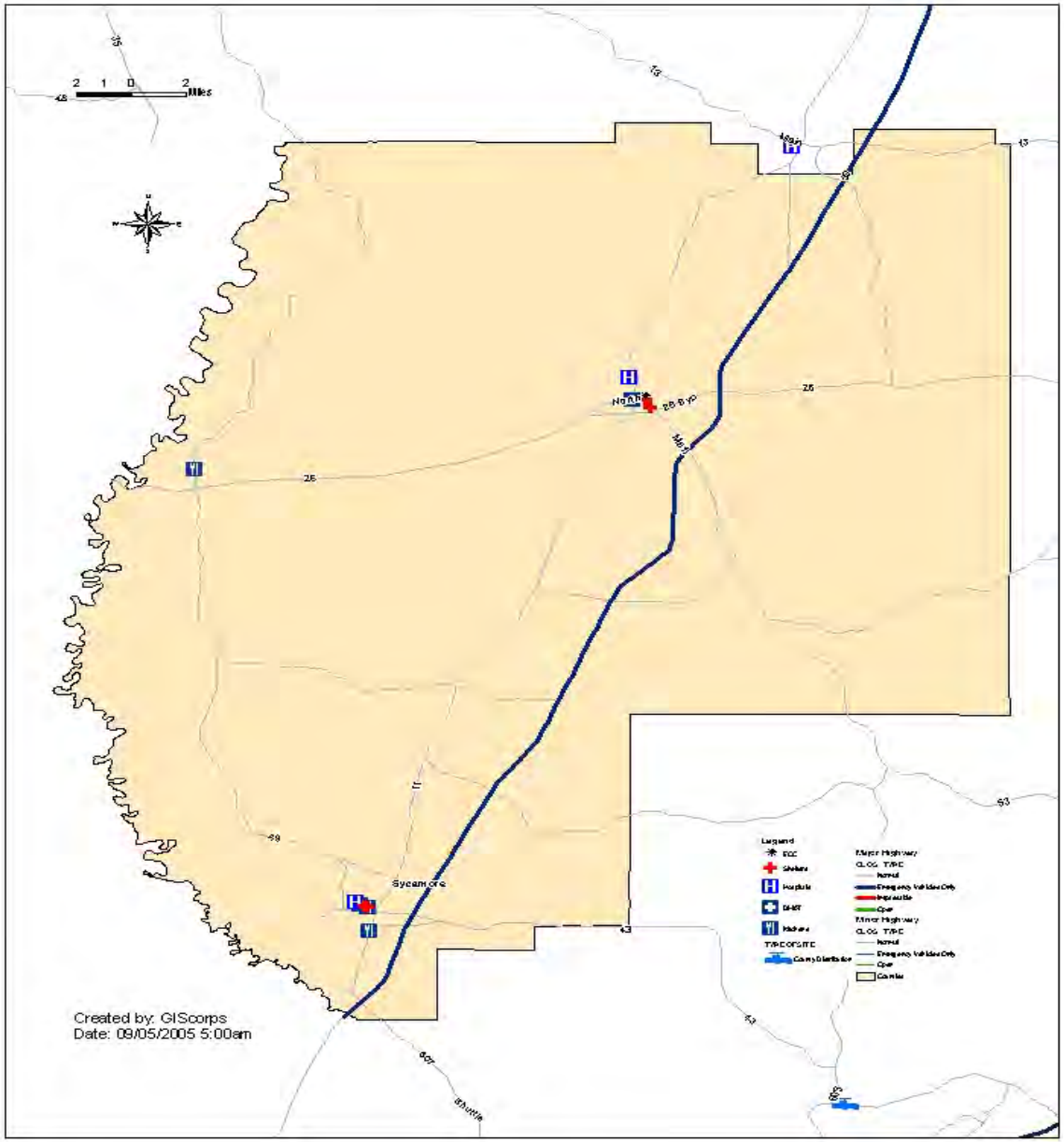
NATIONAL GUARD MAP - 05 SEP 05



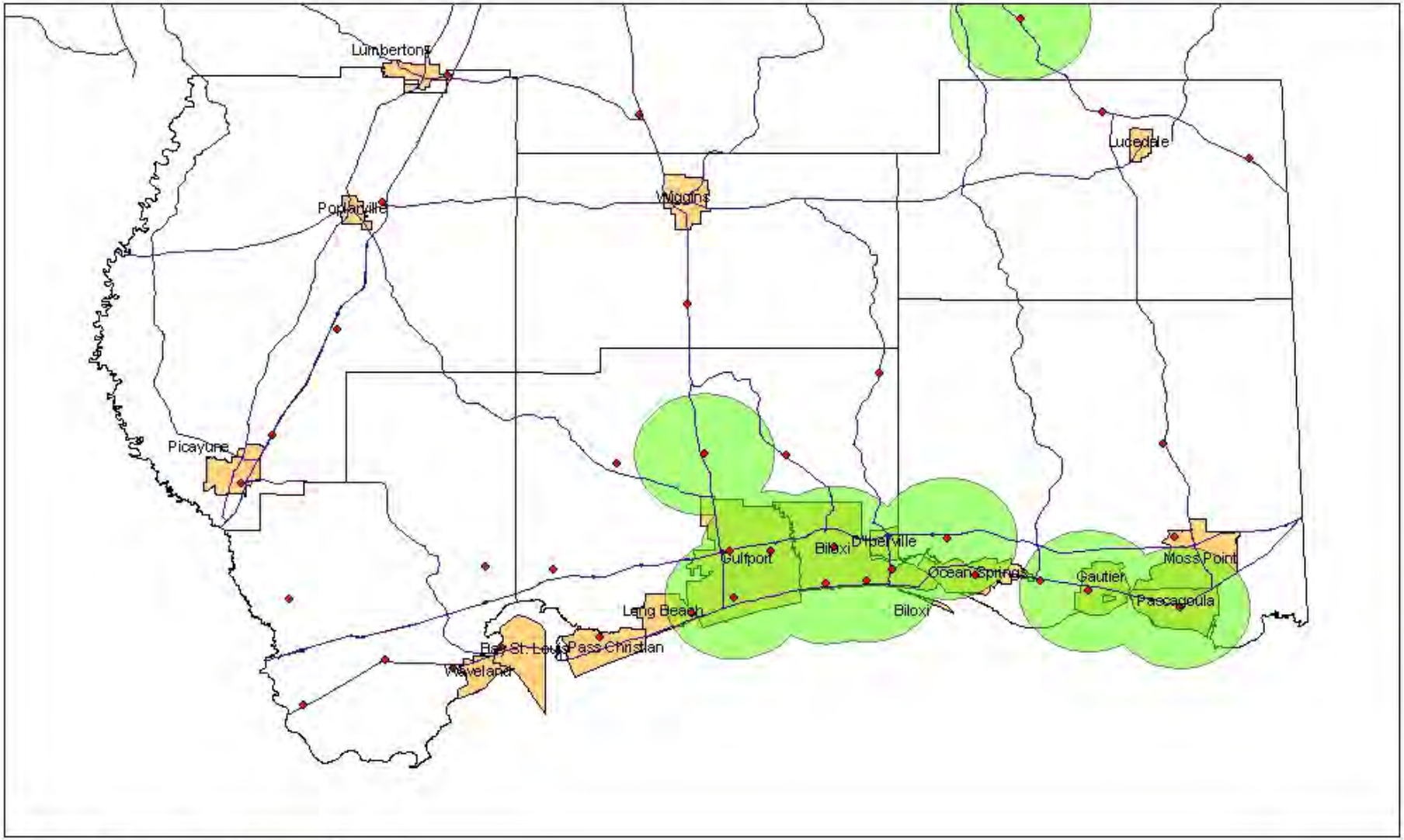
Aid and Comfort Stations



Pearl River County
GPS Resource Maps



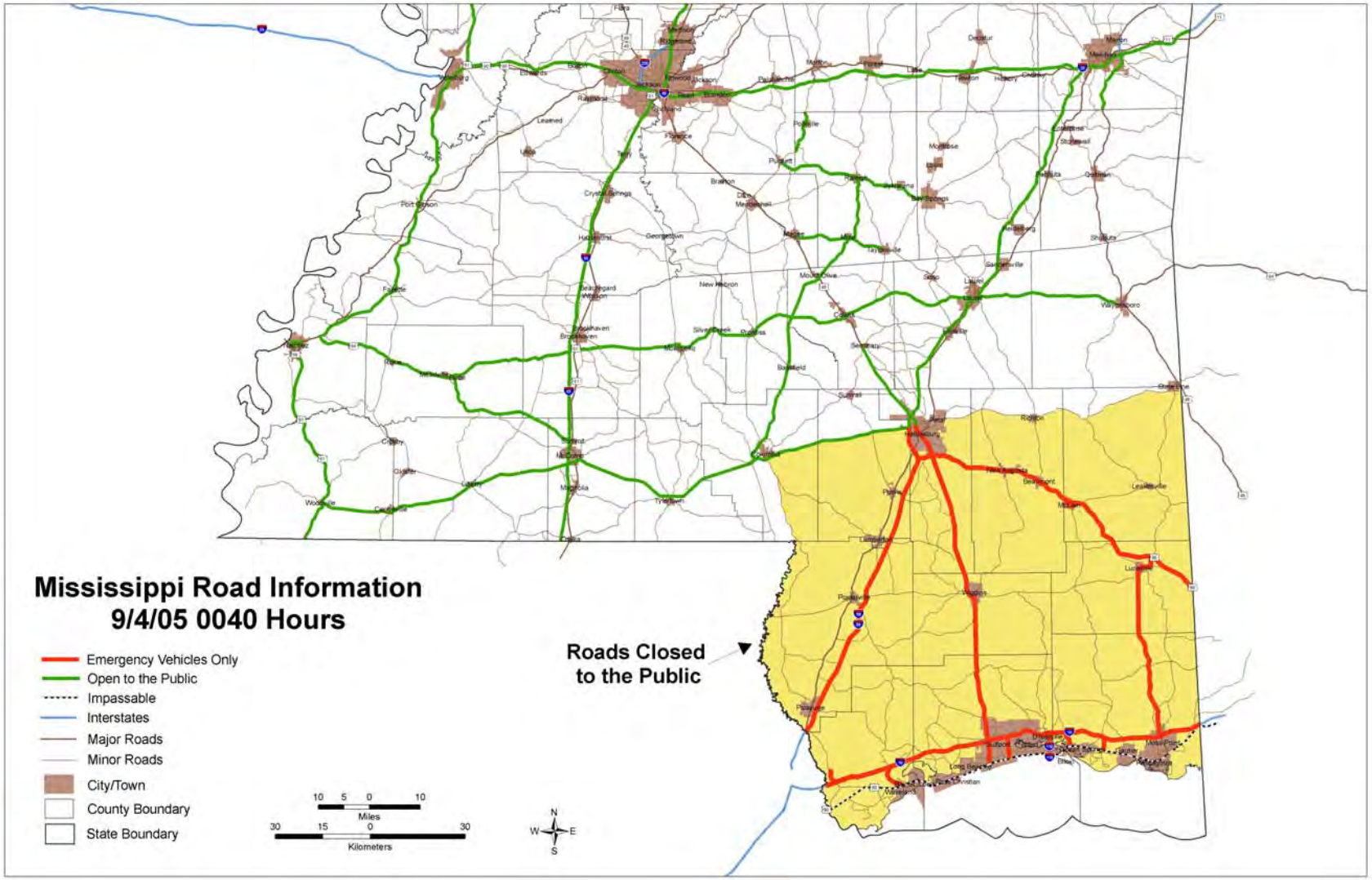
Coastal Cellular Covereage



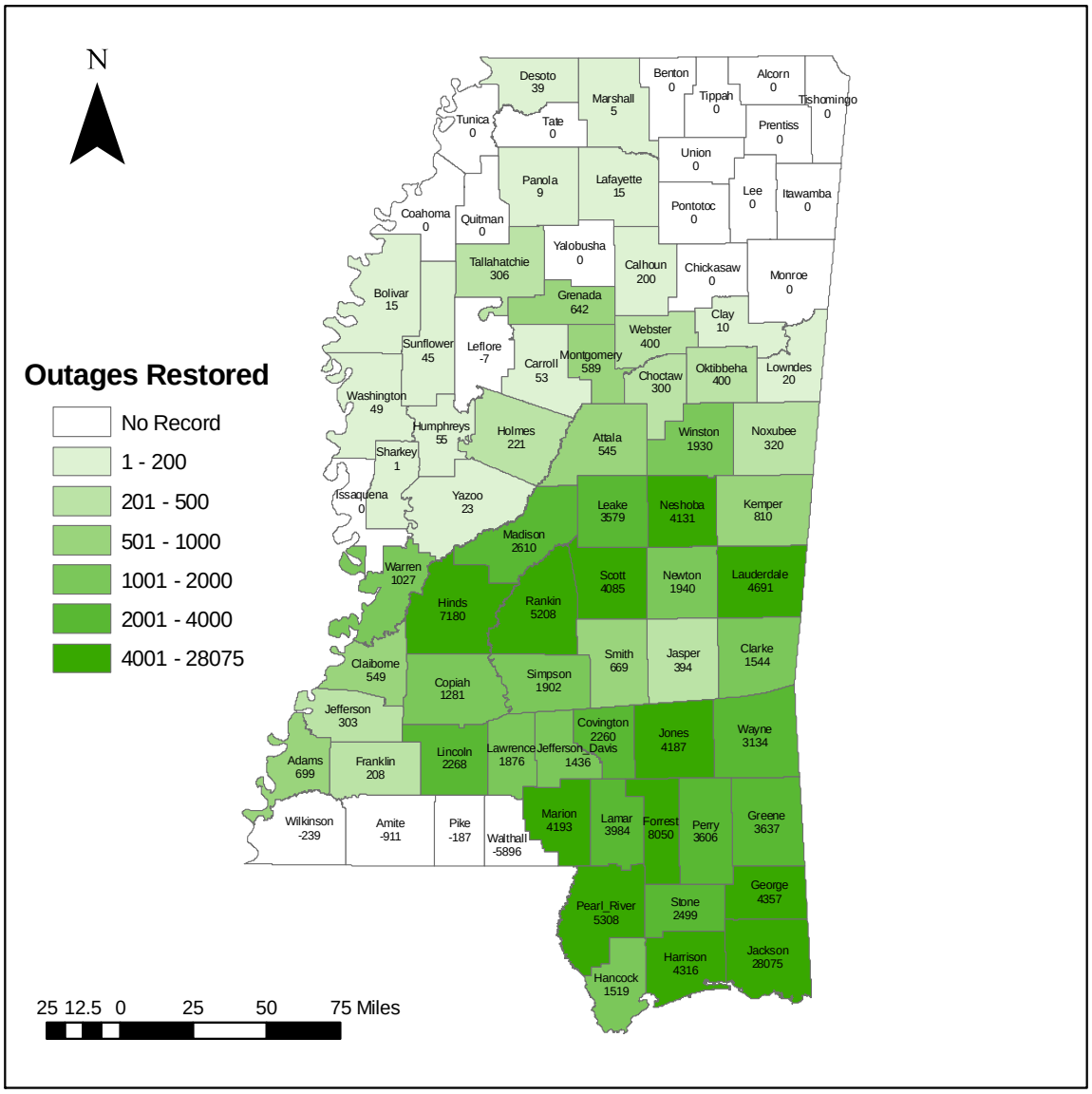
Cellular Coverage Legend

- Cellular Towers
- Major Highways
- Cellular Coverage
- Cities and Towns
- Counties

Map Creation Date
September 3, 2005
1:30 A.M.

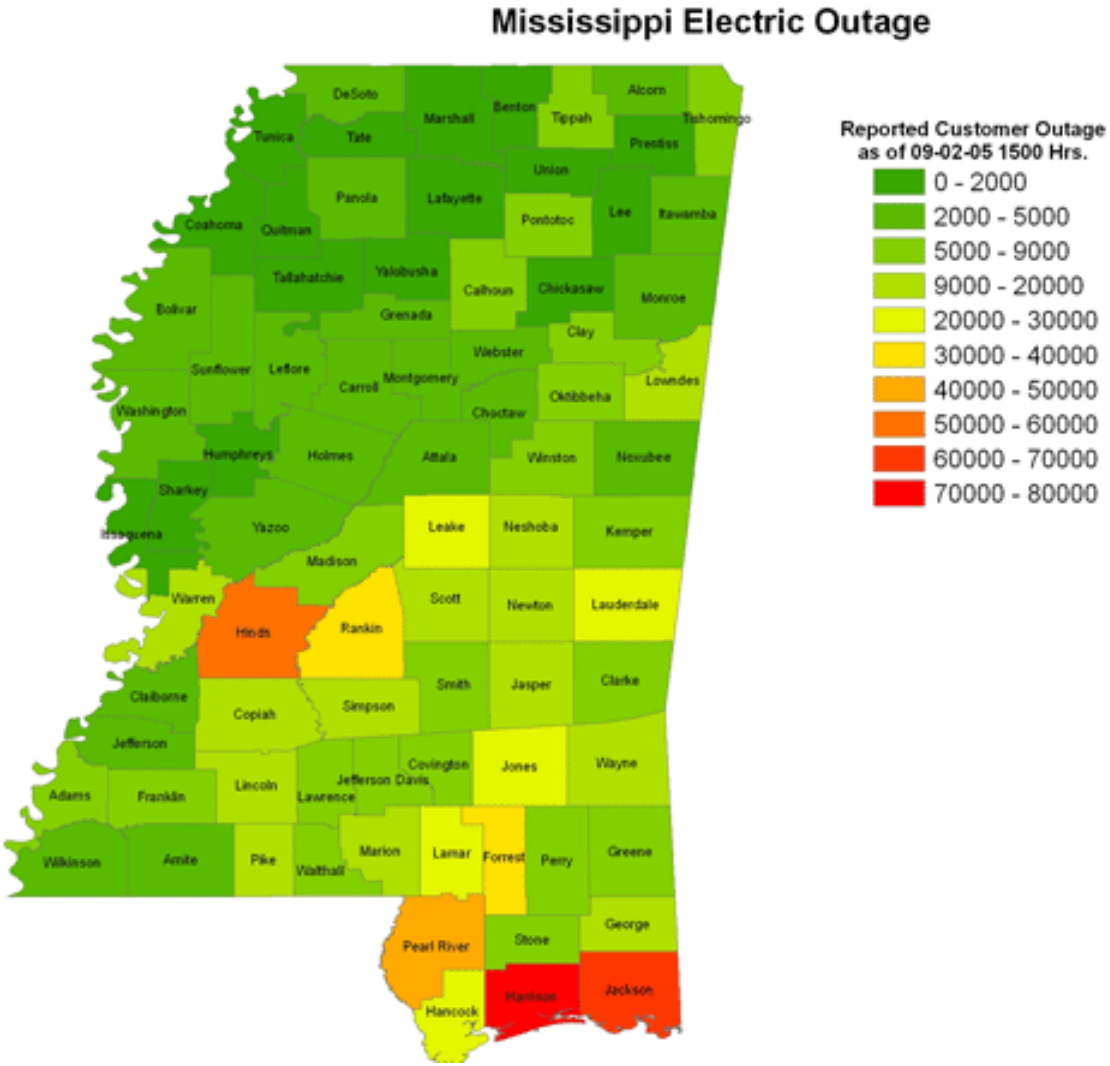

Mississippi Road Information
9/4/05 0040 Hours
Emergency Vehicles Only
Open to the Public
Impassable
Interstates
Major Roads
Minor Roads
City/Town
County Boundary
State Boundary
10 5 0 10
Miles
30 15 0 30
Kilometers
N
W E
S
Roads Closed
to the Public

Power Outages Restored September 4, 2005
Data from EPAs, ENTERGY, MSPCO, TVA



Map Created by GISCorps 0010 Hours, Sept. 5, 2005

Sept. 2nd, 2005

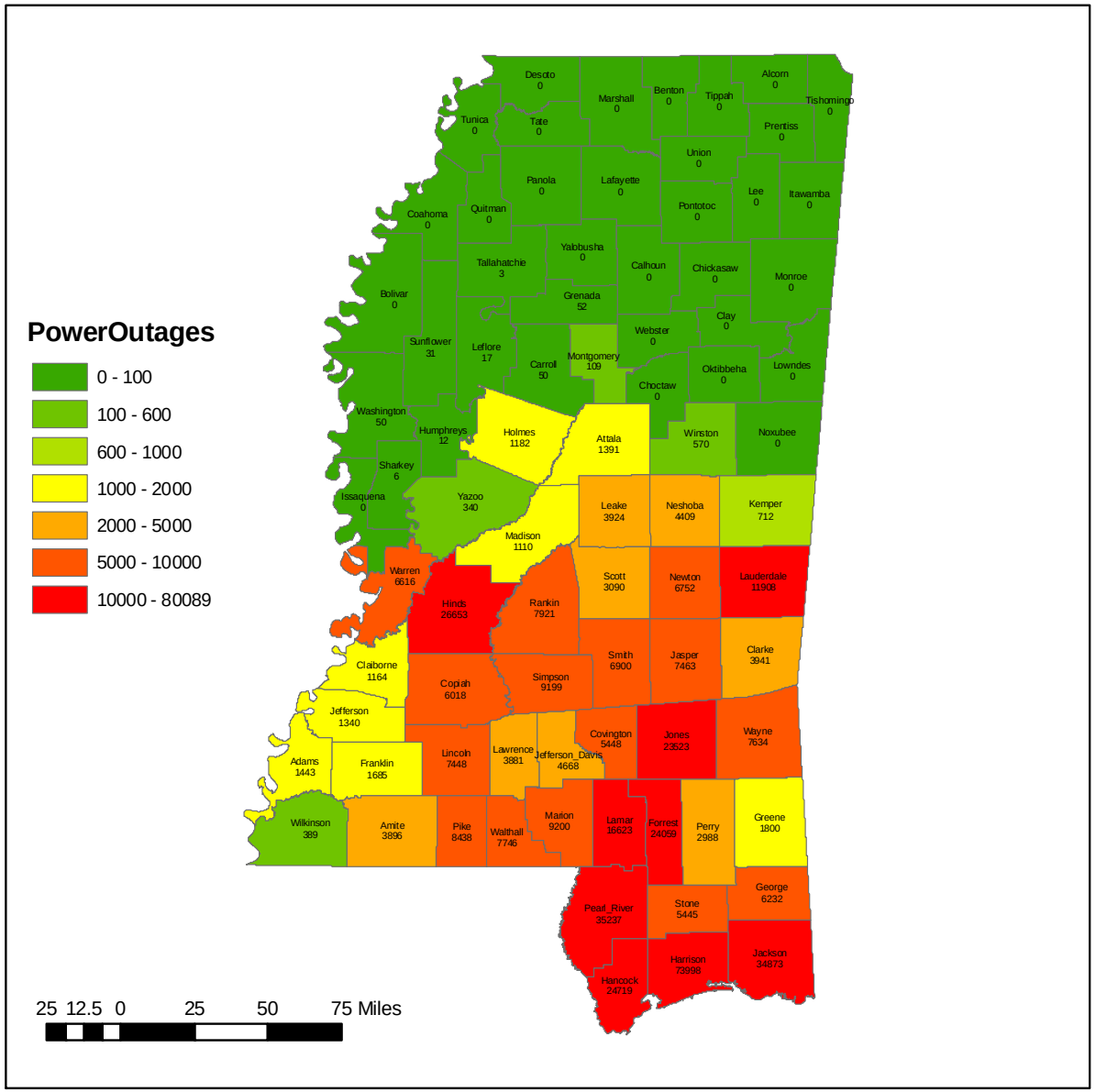


Note the big increase in reported outages vs. Sept. 4th

No customer info yet.

Power Outages September 4, 2005
Data from EPAs, ENTERGY, MSPCO, TVA

Sept. 4th, 2005



Note huge increase in reported outages vs. Sept. 2nd

Customer info is in now!

Hurricane hit Aug. 29th

Map Created by GISCorps at 2230 Hours, Sept. 4, 2005

Shelters, Kitchens, and Water and Ice Distribution

Legend

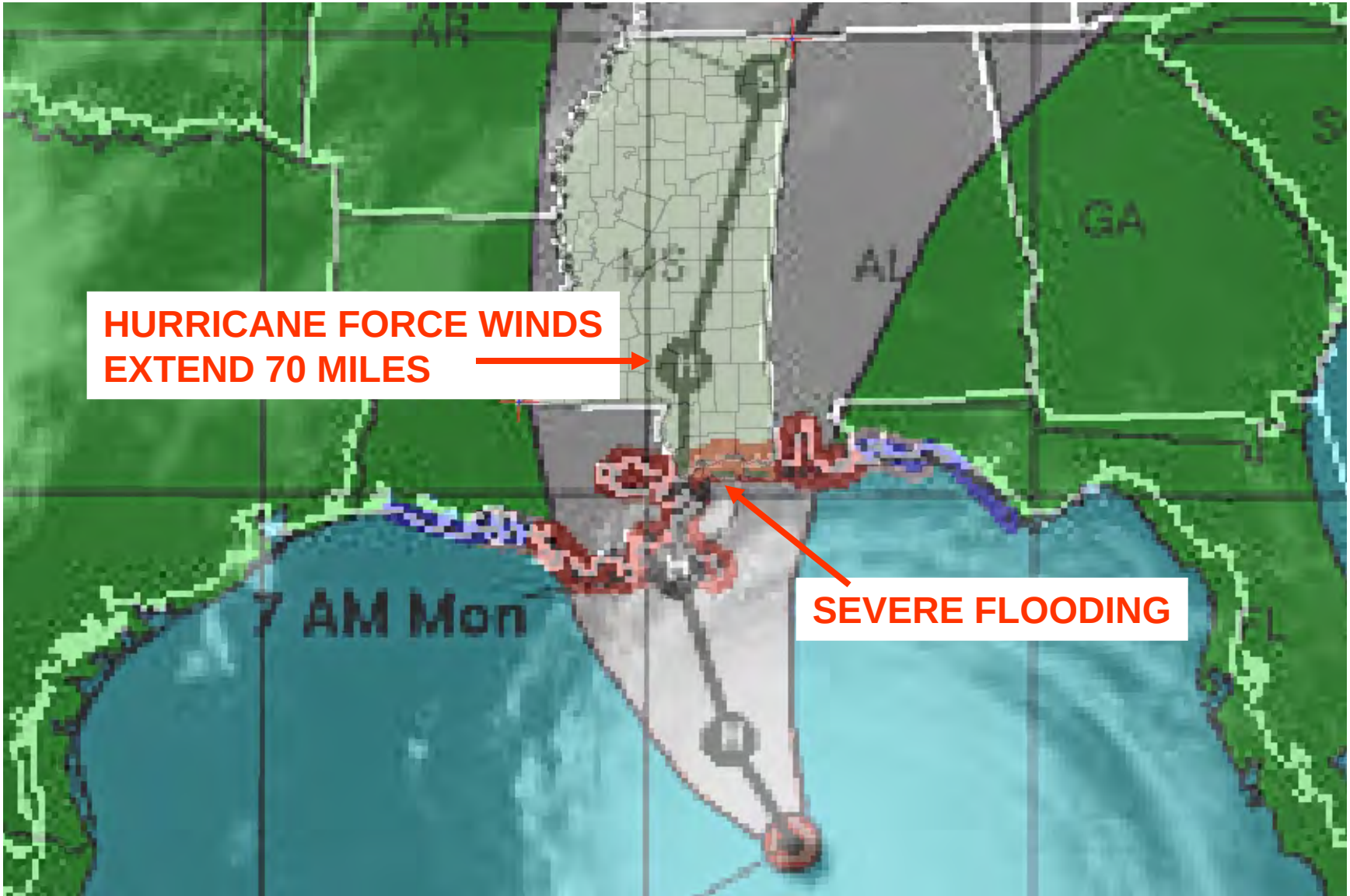
Counties
- New Water Area from Costal Counties
- Counties
- Shelters

Primary Roads
- Interstates
- US Highways
- State highways
- Other Highways
- Kitchens
- DMAT
- Cities_and_Towns

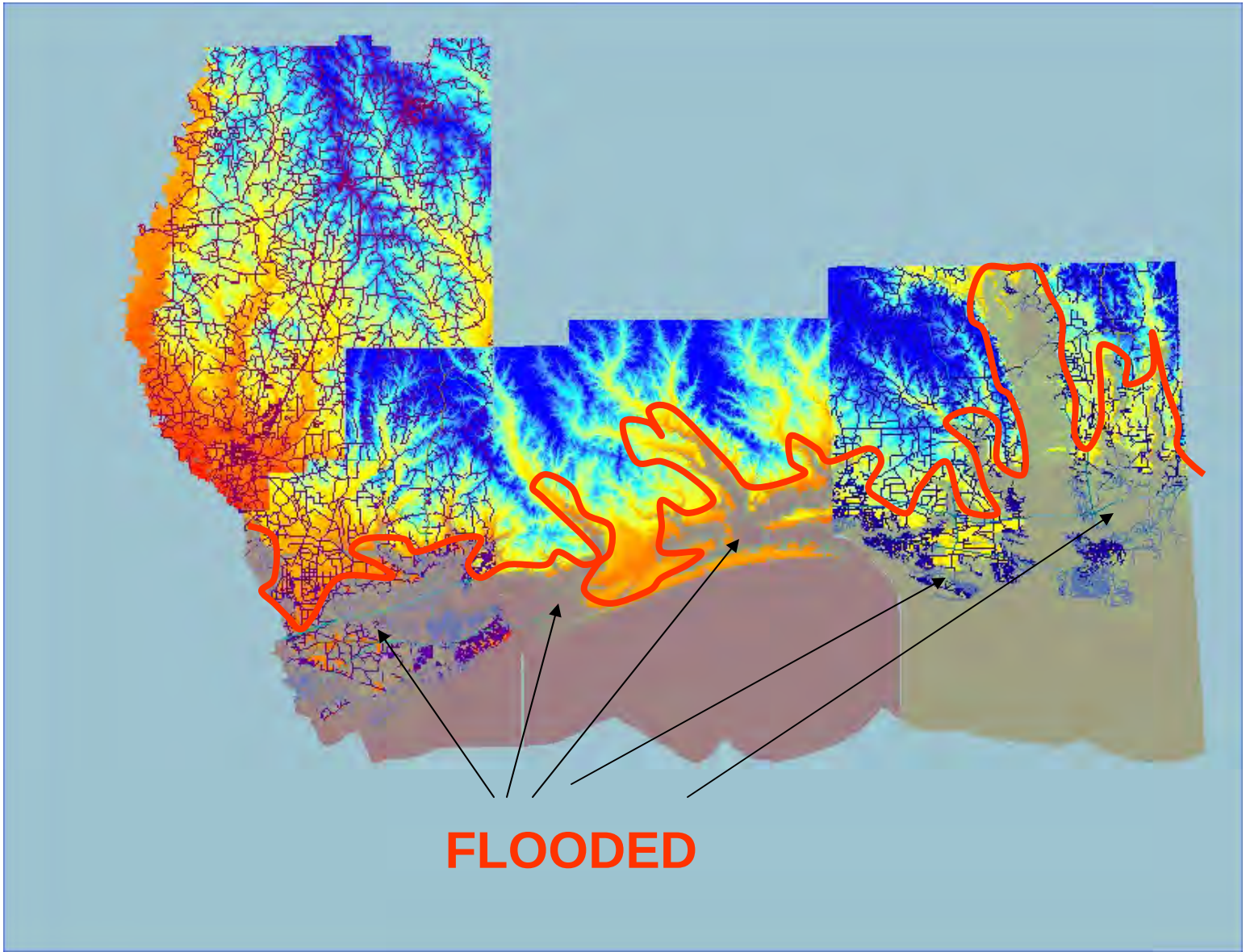
N
W E
S

Relief Support Services
Gulf Coast
9-4-2005 0700 Hours

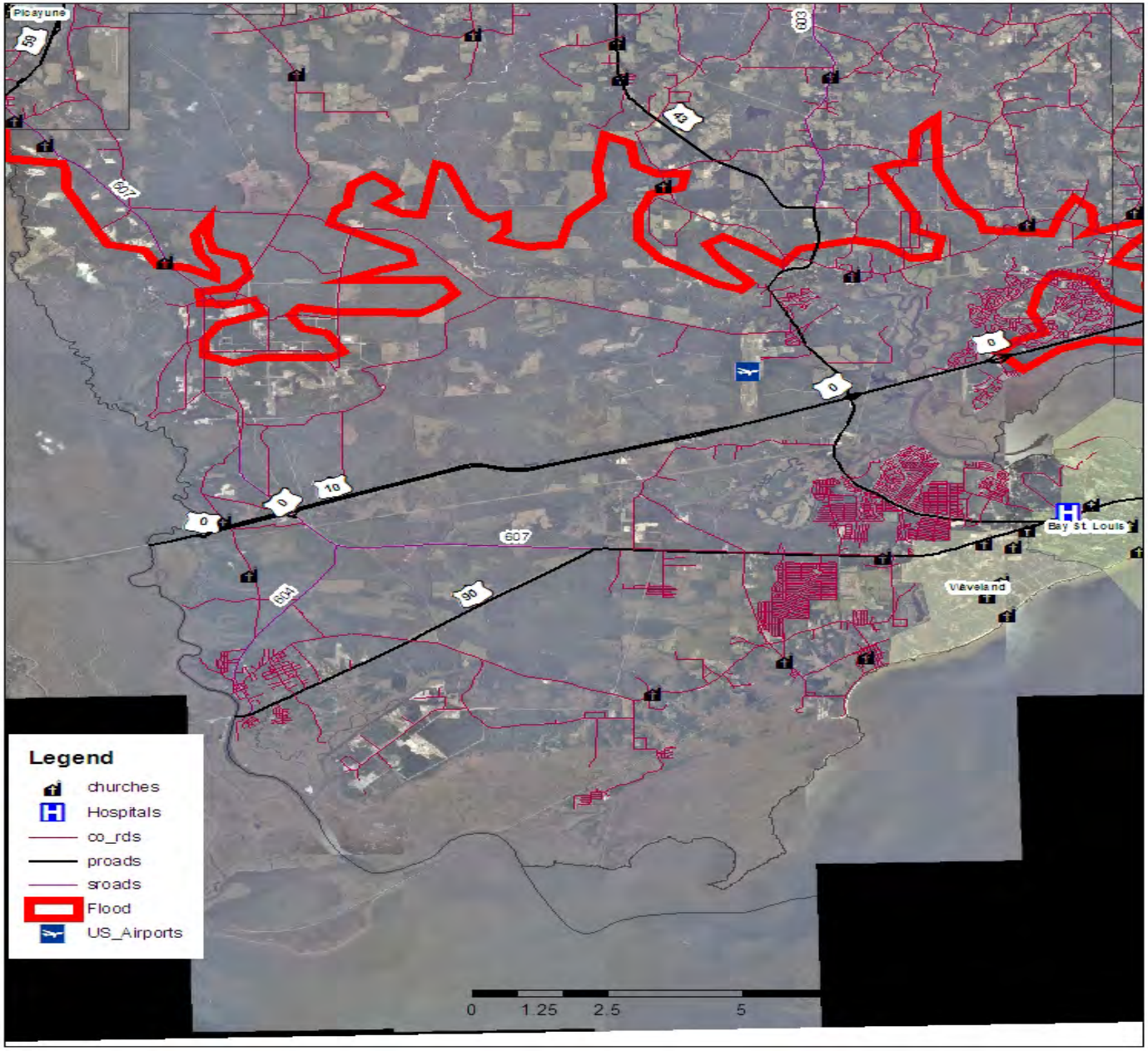
Katrina Storm Track as of 11am CDT



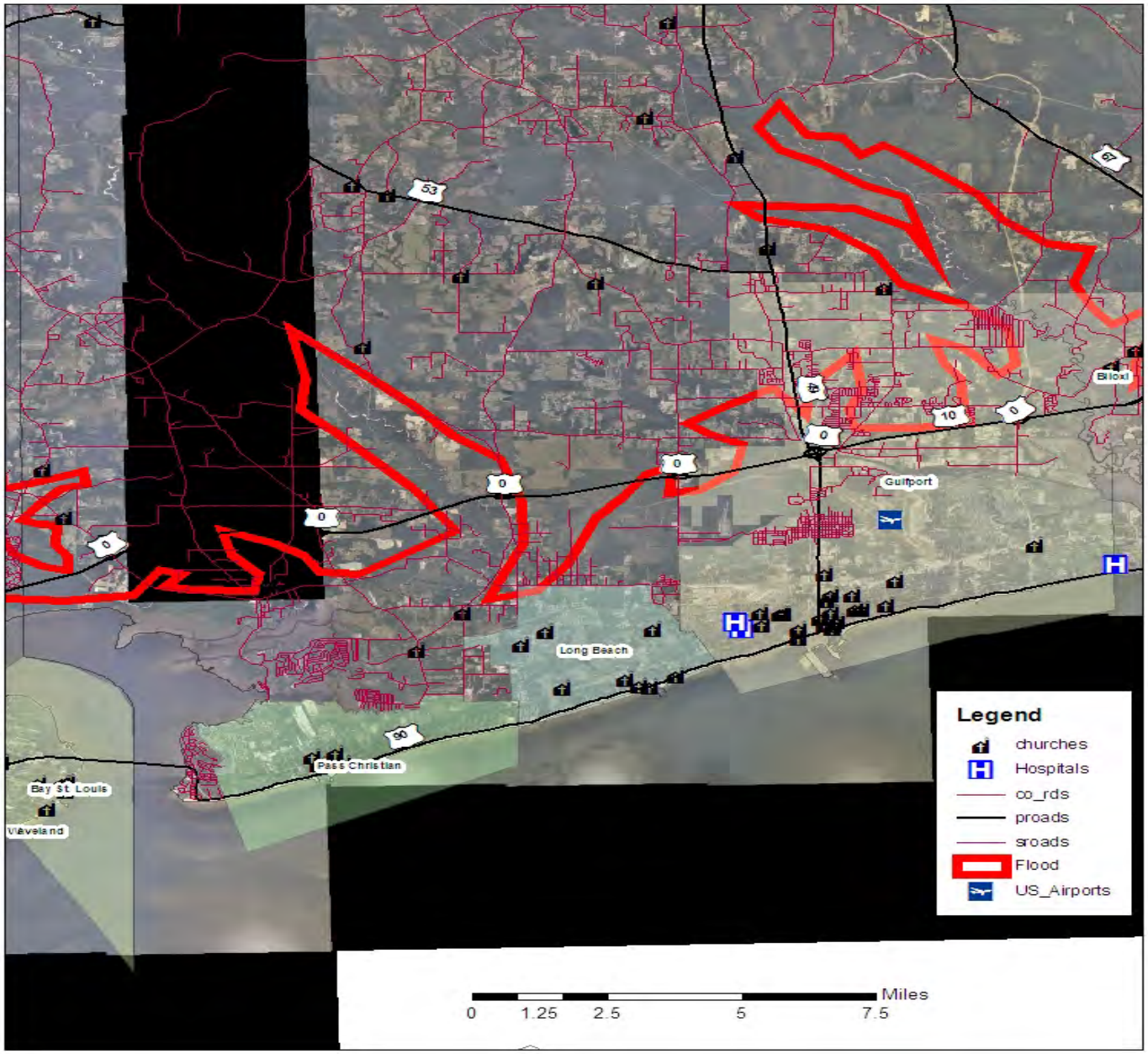
16 foot storm surge
Grayish areas under water



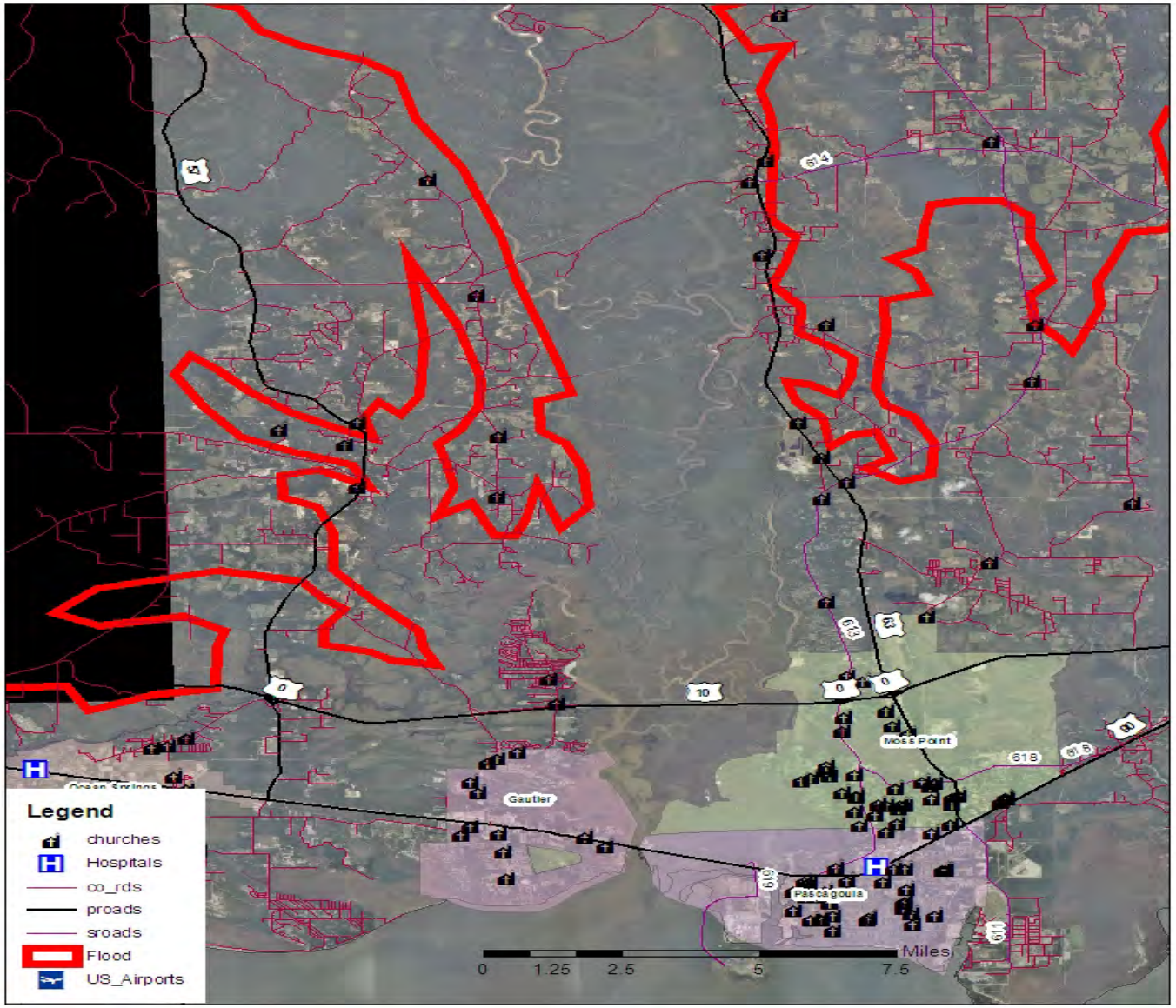
Hancock County Projected Flooded Areas



Harrison County Projected Flooded Areas



Jackson County Projected Flooded Areas



Initial Update

Gulfport - Mississippi

This is an initial look at some of the damage in Gulfport, Mississippi. This Damage Assessment was created using Open Source Intelligence (OSINT) Sites.

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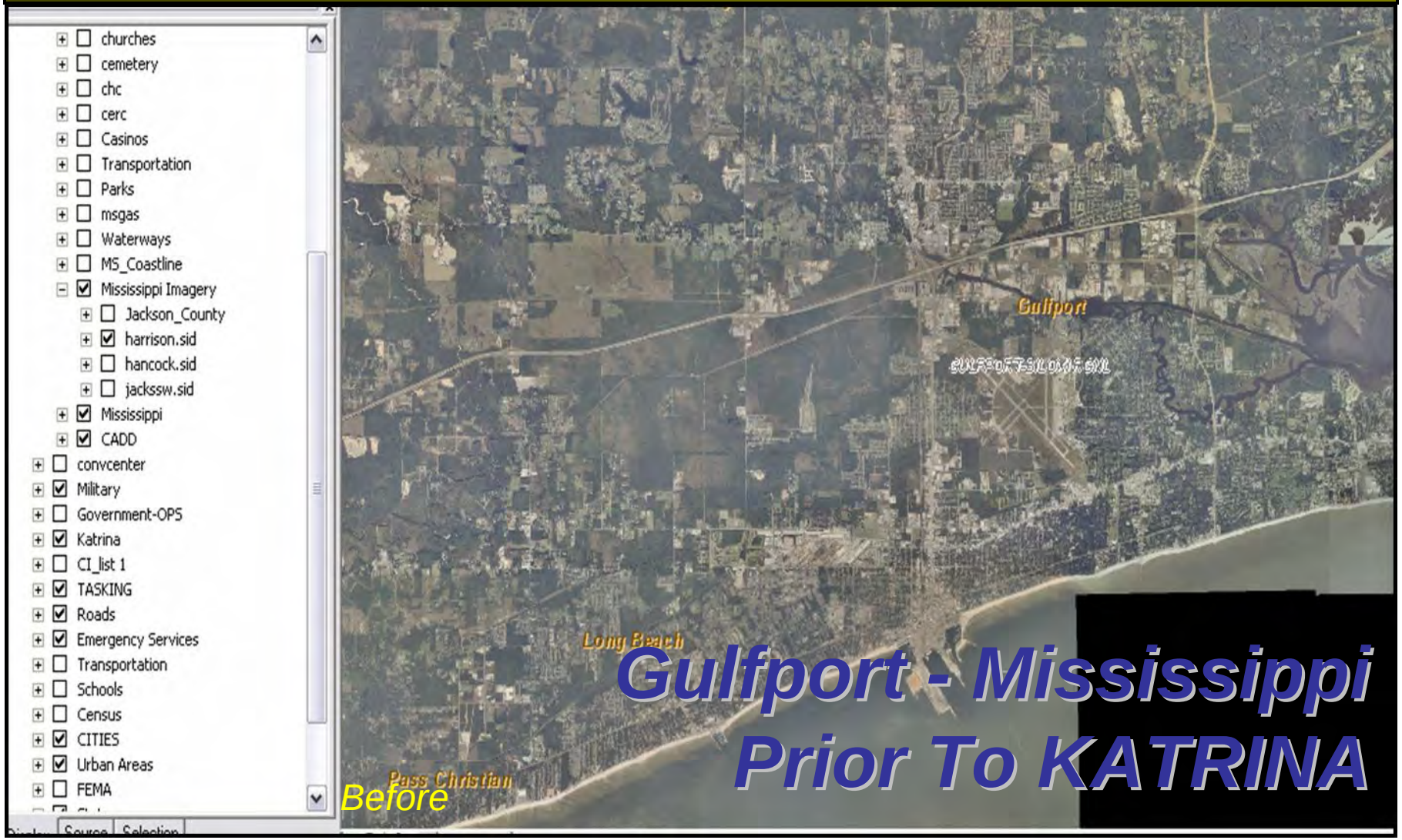
Gulfport - Mississippi

Area Of Interest (AOI)

Gulfport Mississippi

Initial Damage Assessment



Post Katrina

Image Analysis Areas

Image Area – I
Footprint

Areas Selected

Image Area – I

Image Area I
DA-1

Image Area I
DA-2

Image Area I
DA-3

Image Area – II
Footprint

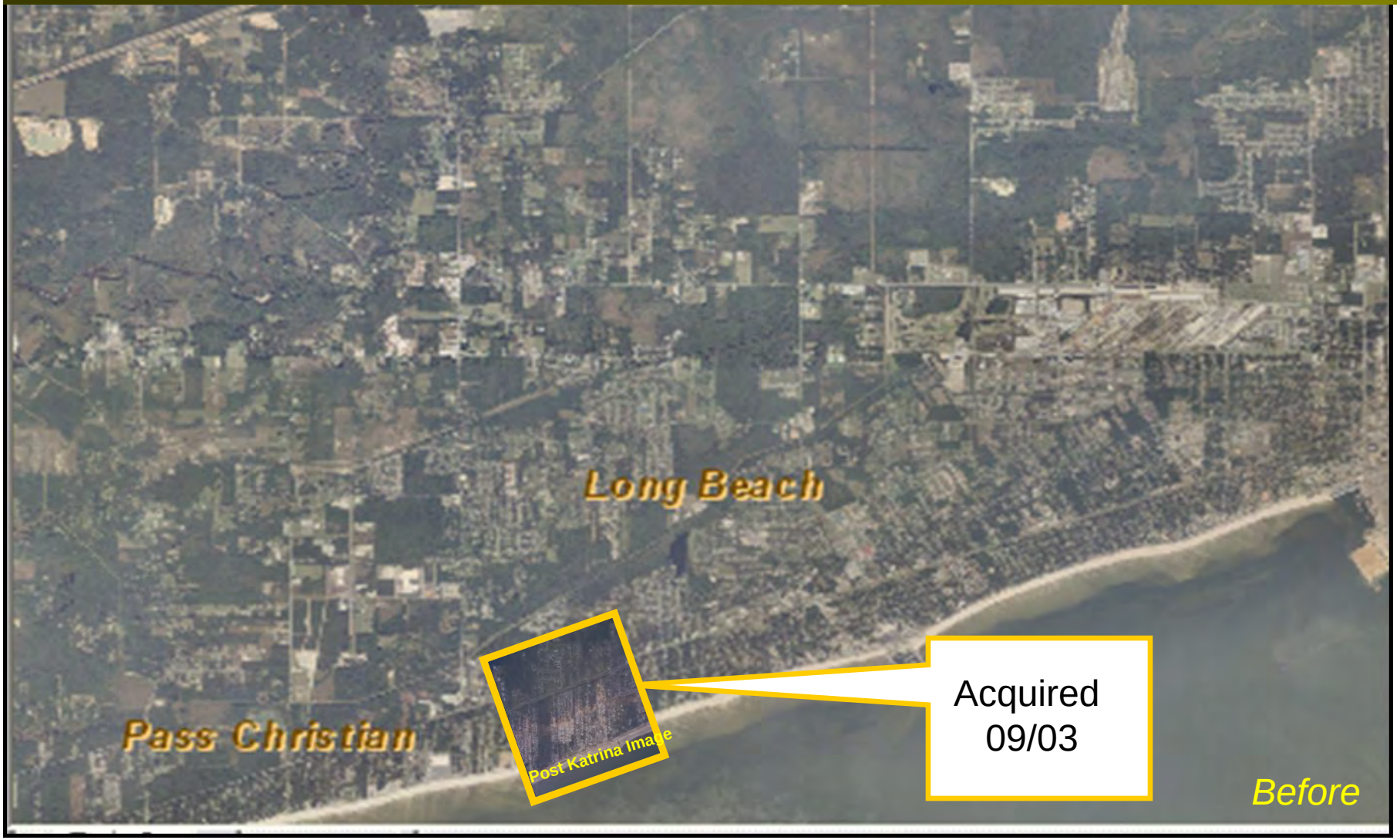


Image Area II
DA-1

Image Area II
DA-1 (zoom 1)

Image Area II
DA-1 (zoom 2)