

GIS for Hurricane Response

The Hurricanes and GIS in 2004 - 2005

The GIS Tools proven most effective for Storm Response

Mobile Damage Assessment System

Rob Hofmann - ESRI



Who is *ESRI* ?

Founded in 1969

World Leader in GIS

The Standard for GIS software

300,000+ Client Locations Worldwide

3,000+ Employees

10 US Regional, 13 International Offices

Zero Debt and 20% Annual Growth

The GIS company





How/Why Does *ESRI* get involved in Hurricane Preparation and Response?

Because we can help and our customers ask for that help

Examples include:

Preparedness programs like 'HAZUS' from
ESRI/FEMA

Web site assistance,

Data Access and Data Models,

Special Application Development,

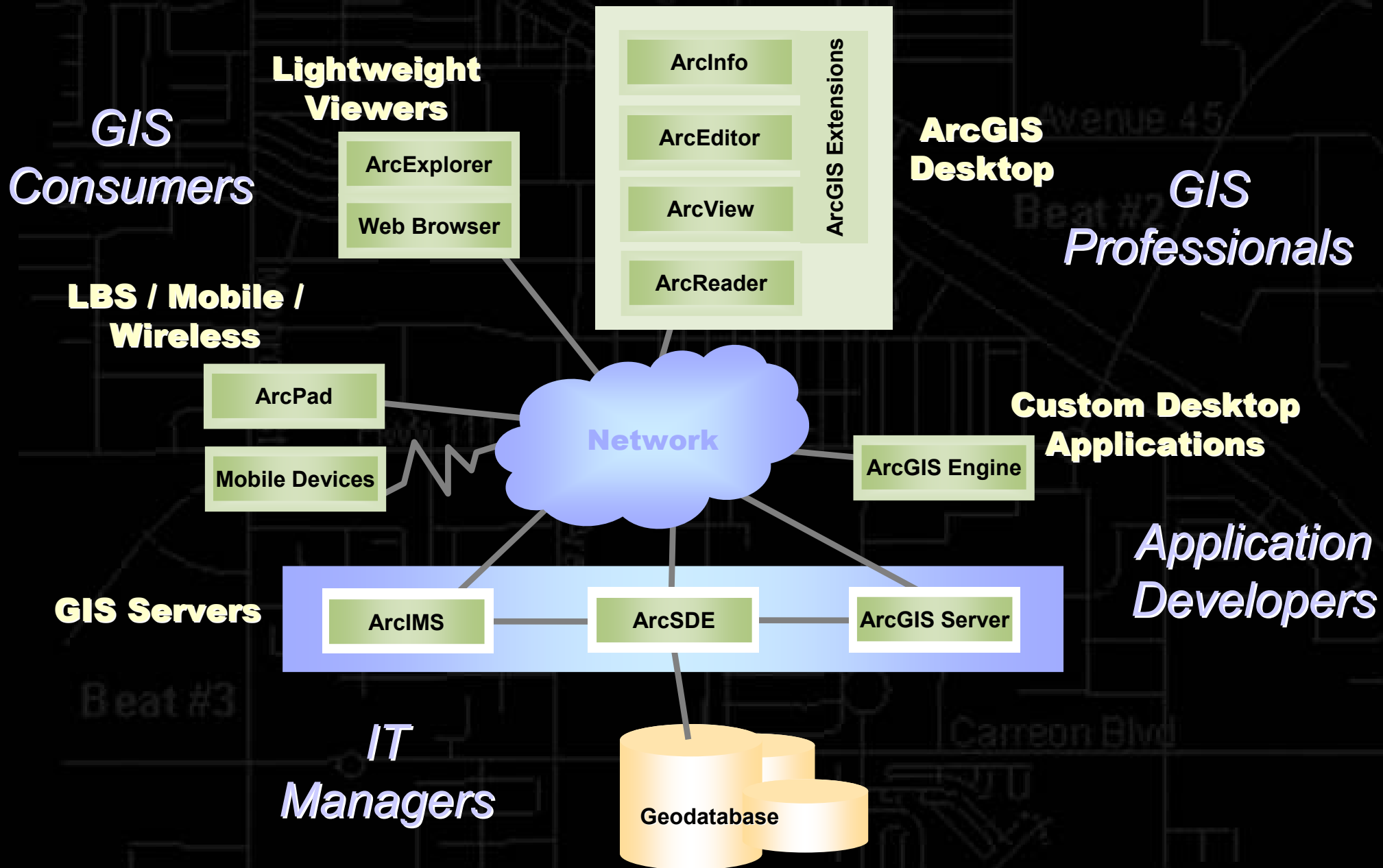
Temporary Licenses,

GISCorps coordination.

OnSite setup support.

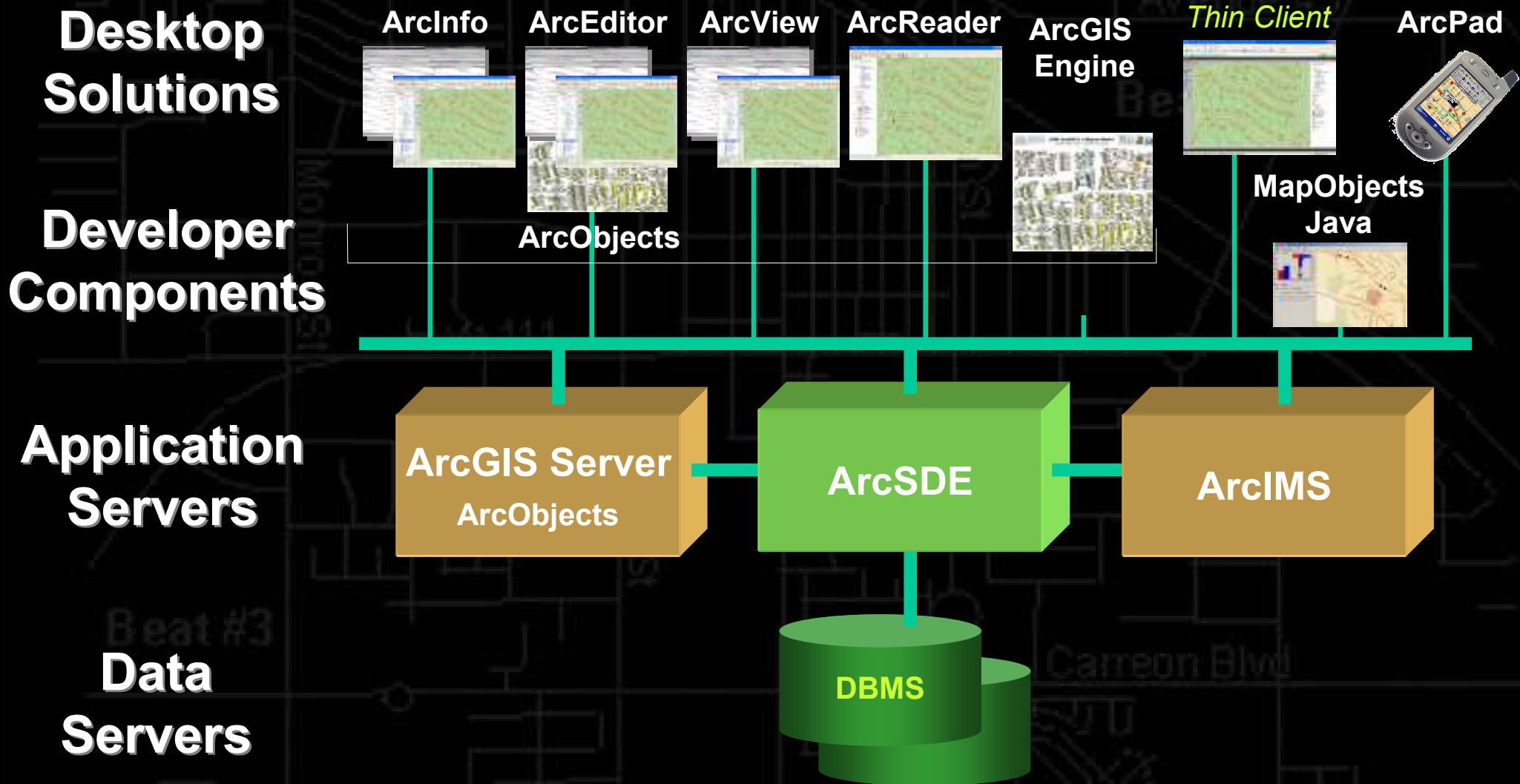


ArcGIS 9 System



ArcGIS

System Architecture

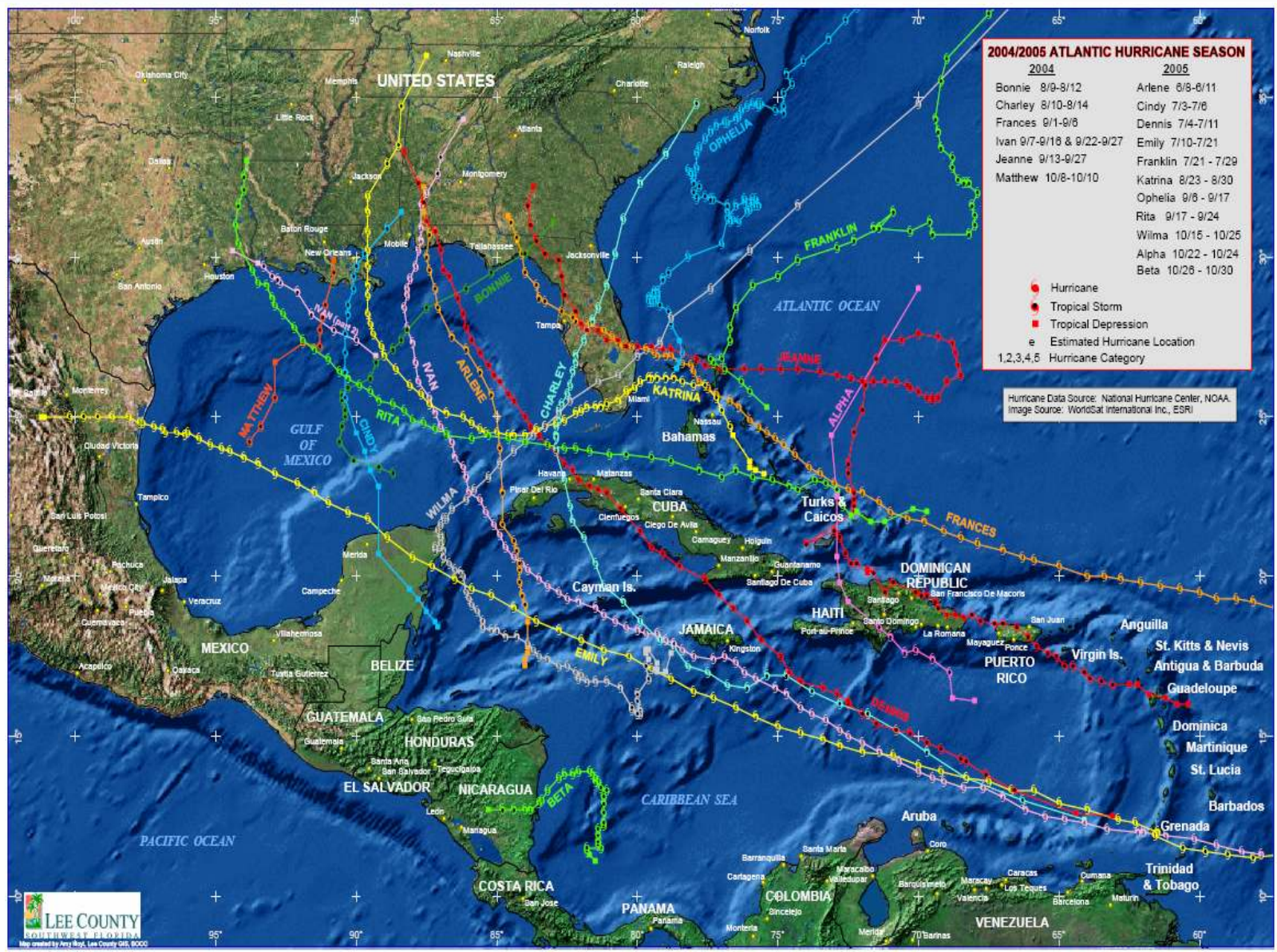


The Hurricanes of 04 & 05:

First-Status Maps and communication thru GIS



Storm Tracking: Graphics, preparation and Summaries



Hurricane Charley

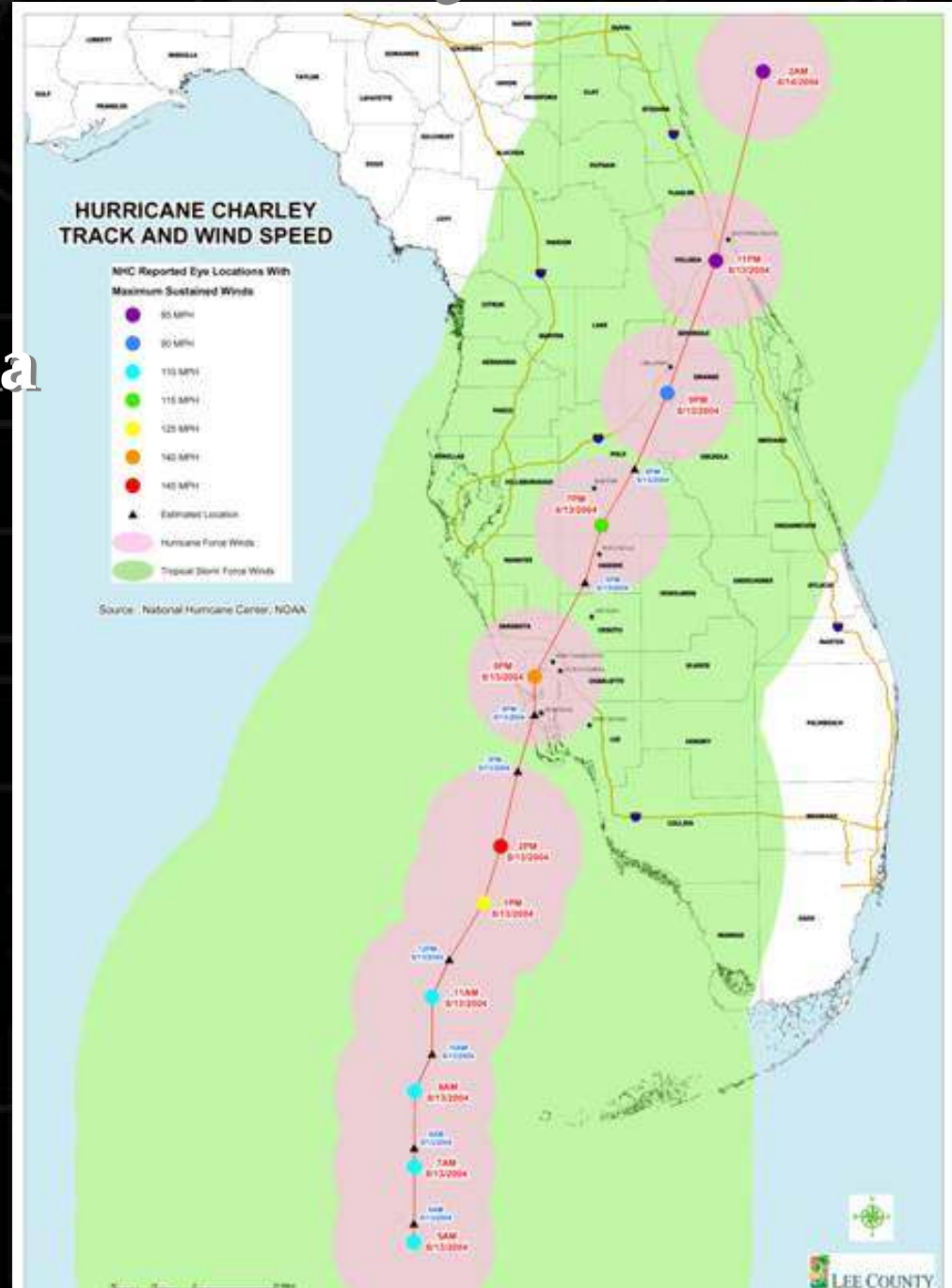
Friday, August the 13th

The Category 4

Slammed into Punta Gorda
and Port Charlotte and
continued to wreck towns
up the Peace River

GIS used extensively by
Charlotte Co.

ESRI setup and ran a GIS
for DeSoto County after
the storm passed.



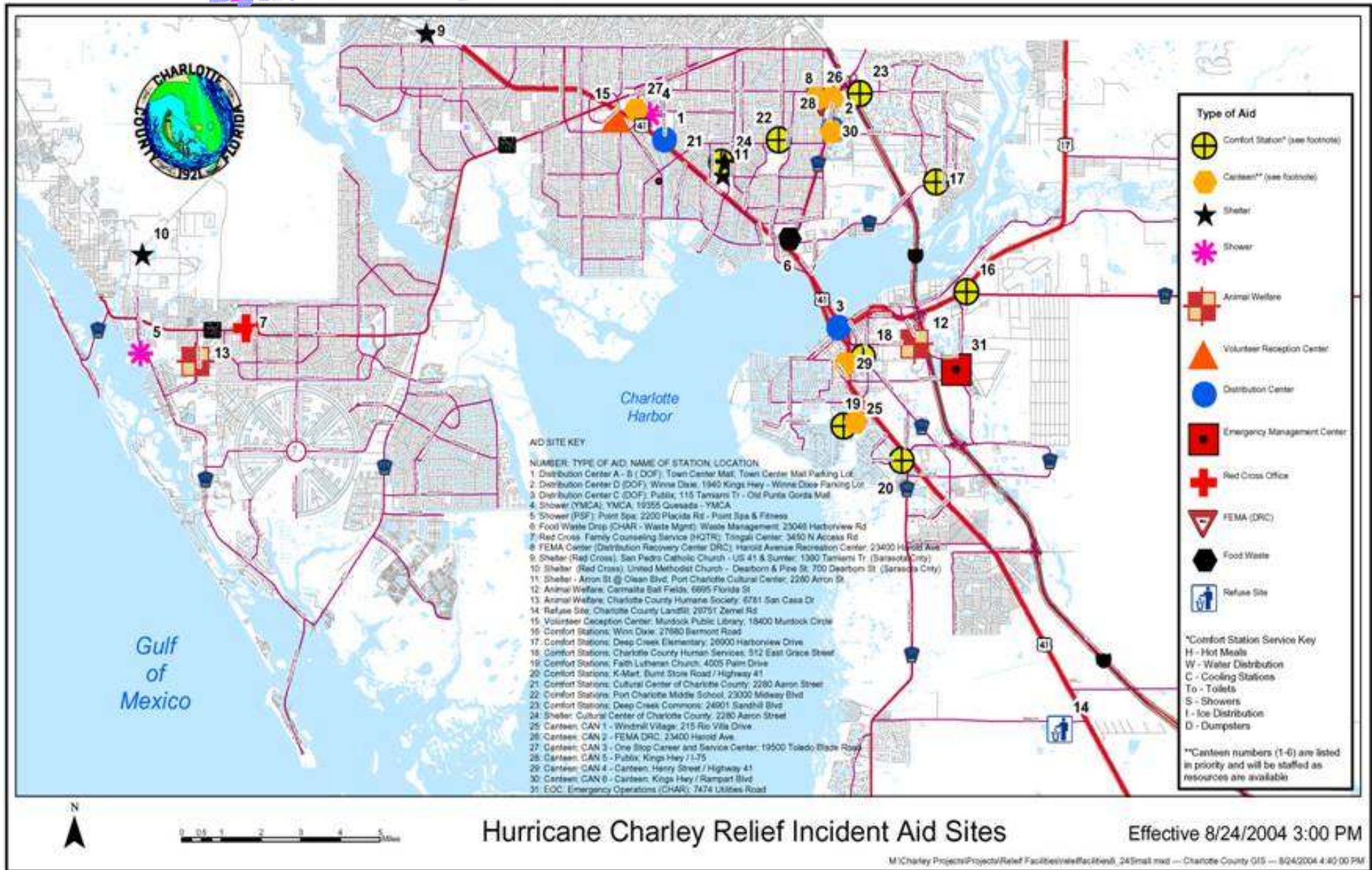
Charlotte County, Florida

Beat #1



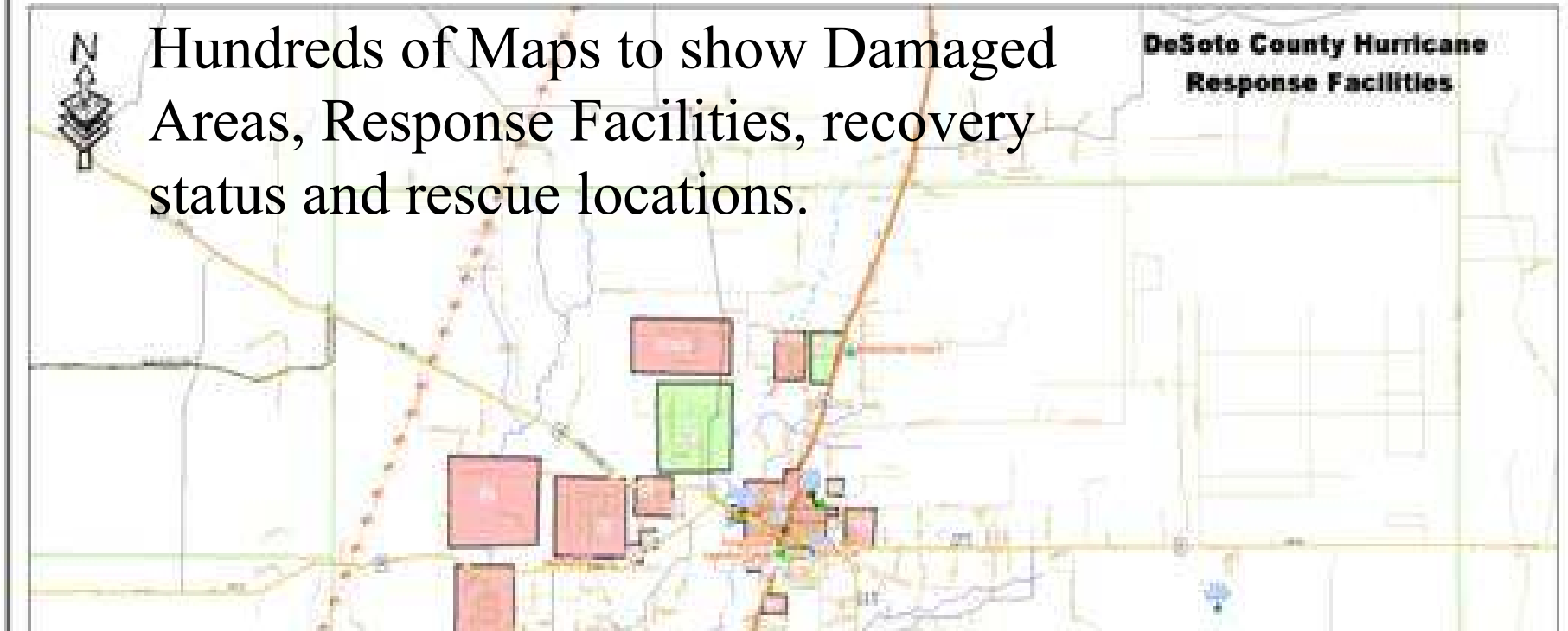
Carreon Blvd

Dynamic Maps showing current situations!



Hundreds of Maps to show Damaged Areas, Response Facilities, recovery status and rescue locations.

DeSoto County Hurricane Response Facilities



- #### Legend
- Damaged Areas**
 - Moderate (Green square)
 - Heavy (Red square)
 - Staging Sites**
 - Staging (Green square)
 - Control (Red square)
 - Distribution (Blue square)
 - Critical Facilities**
 - Other (Blue square)
 - Fire (Red triangle)
 - Government (Green square)
 - Shelter (Yellow square)
 - Hazardous Waste (Yellow square)

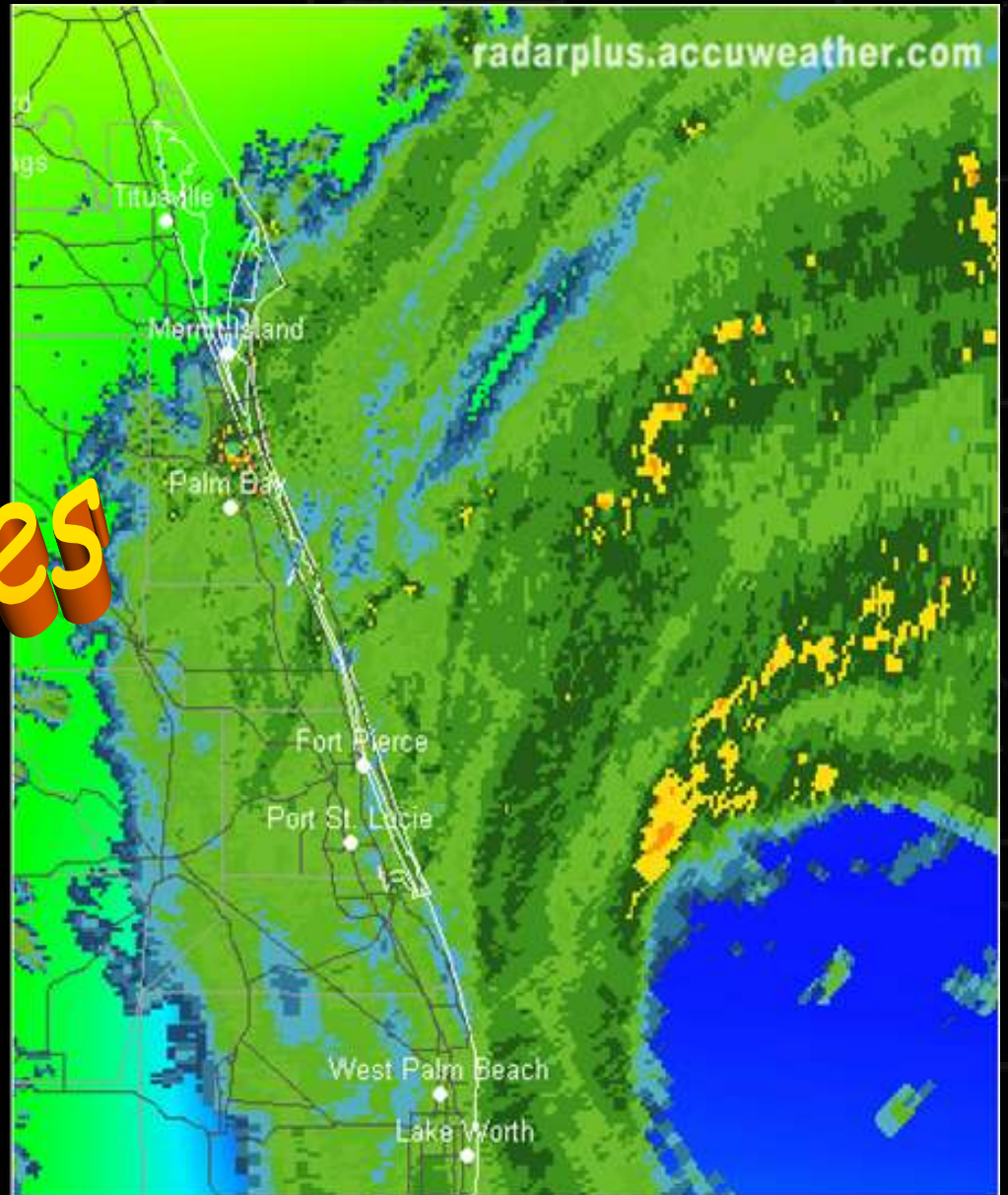
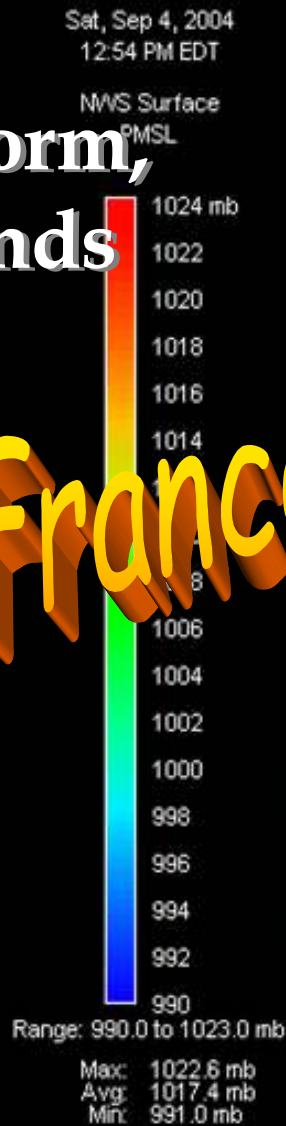
April 2004 Team
August 27, 2004
Source: ESRI Data & Map CD
Created in ArcGIS
Compassion - Map 104
8:01 - 1:13 PM



Wide Spread, Variable Damage from Pompano Beach to Daytona Beach

**A Huge,
Slow moving Storm,
with Cat 1-2 winds**

Hurricane Frances



Frances was here ...

Fort Pierce



Palm Beach



Boynton Beach



GIS at work in StLucie County

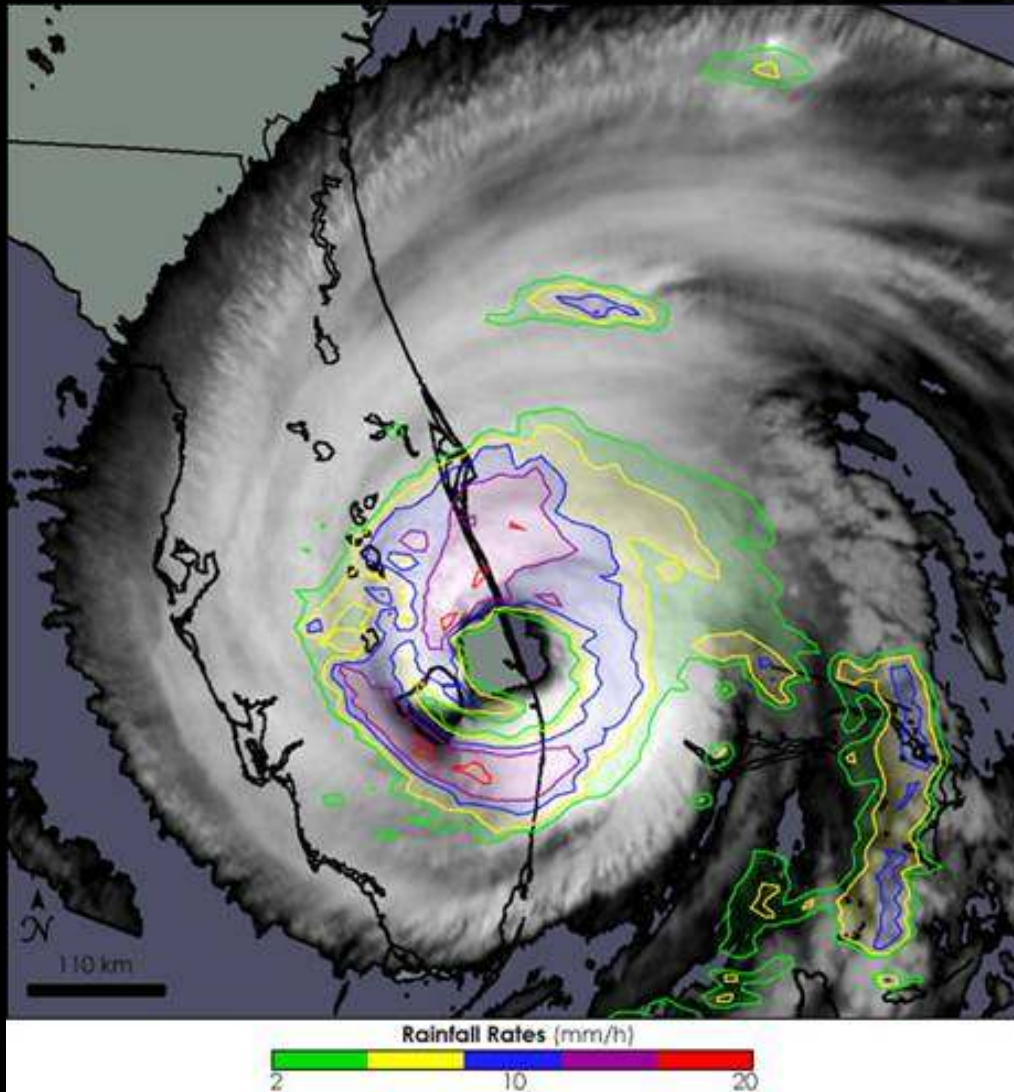


Hurricane IVAN



The Storm Surge effect

Hurricane Jeanne ...



Not Again! ...



GIS Helps Again...

after Hurricane Jeanne...



Response:

Damage Assessment

Mobile GIS field Units were Used to do Damage Assessment, Map the perimeters of floods and site various Locations.

The screenshot displays the ArcPad interface for a 'Damage Assessment' application. The main window shows a satellite map of a residential area with green outlines delineating property boundaries. Several red diamond markers are placed on the map to indicate specific locations of interest. An 'Edit Housing Damage' dialog box is overlaid on the map, providing a form to enter details for a specific site. The form includes tabs for 'Site', 'Damage', 'Incident', and 'Comments'. The 'Site' tab is active, showing the following information:

- Occupant: SUROVEK JOHN H
- Address: 3518 N FLAGLER DR
- Type: SF MF MH Other
- Status: Own Rent Unknown
- Home: Primary Secondary Unknown
- Ref No.: []

Buttons for 'OK' and 'Cancel' are located at the bottom of the dialog box. The Windows taskbar at the bottom of the screen shows various open applications, including 'Send Items', 'PWI: Excel Po...', 'Yahoo! Mail', 'Pvt_email', 'Windows', 'Damage_Ass...', and 'untitled - Paint'. The system tray displays the date and time as '11:25 AM'.

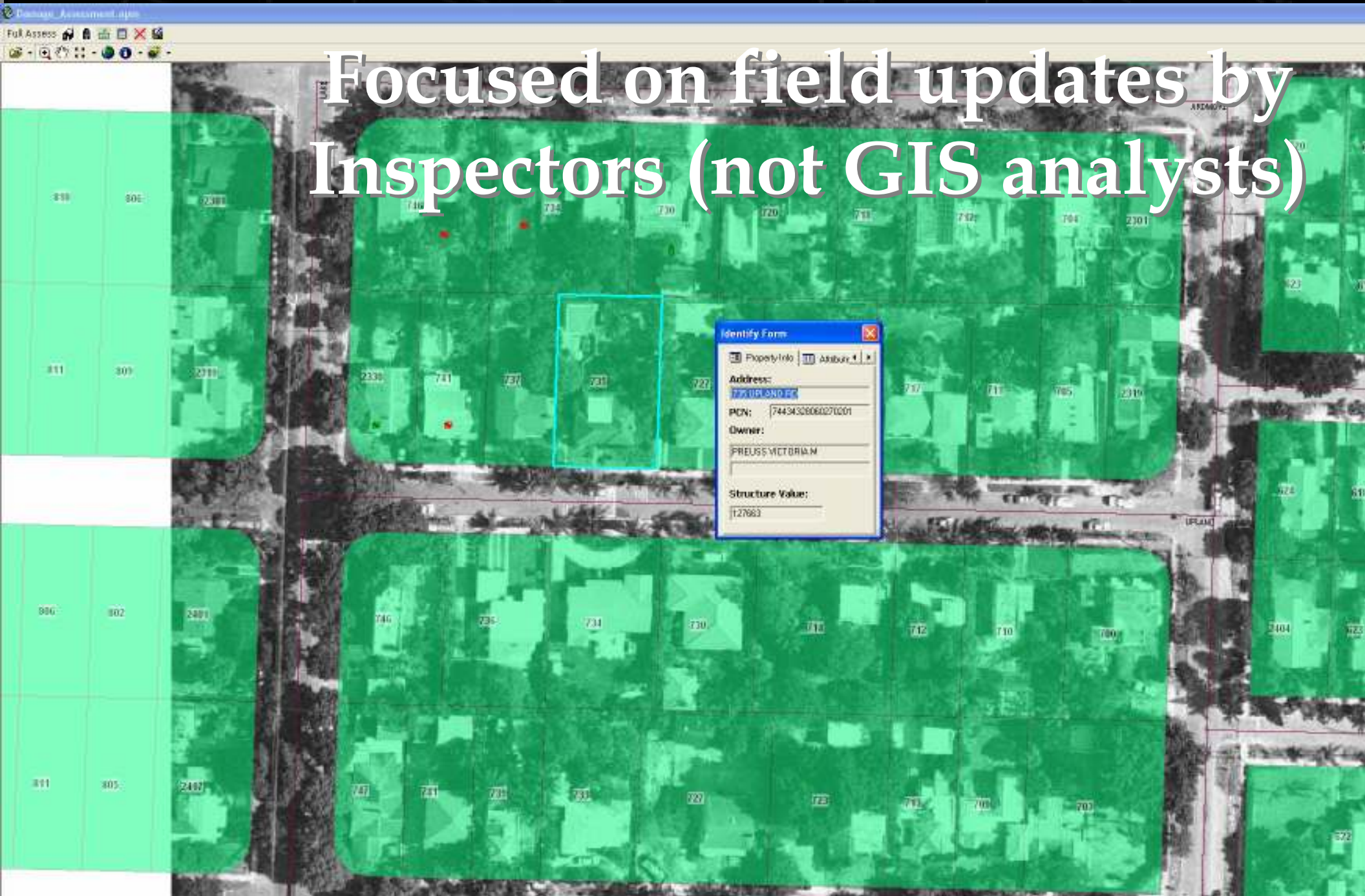
Field Damage Assessment Tool

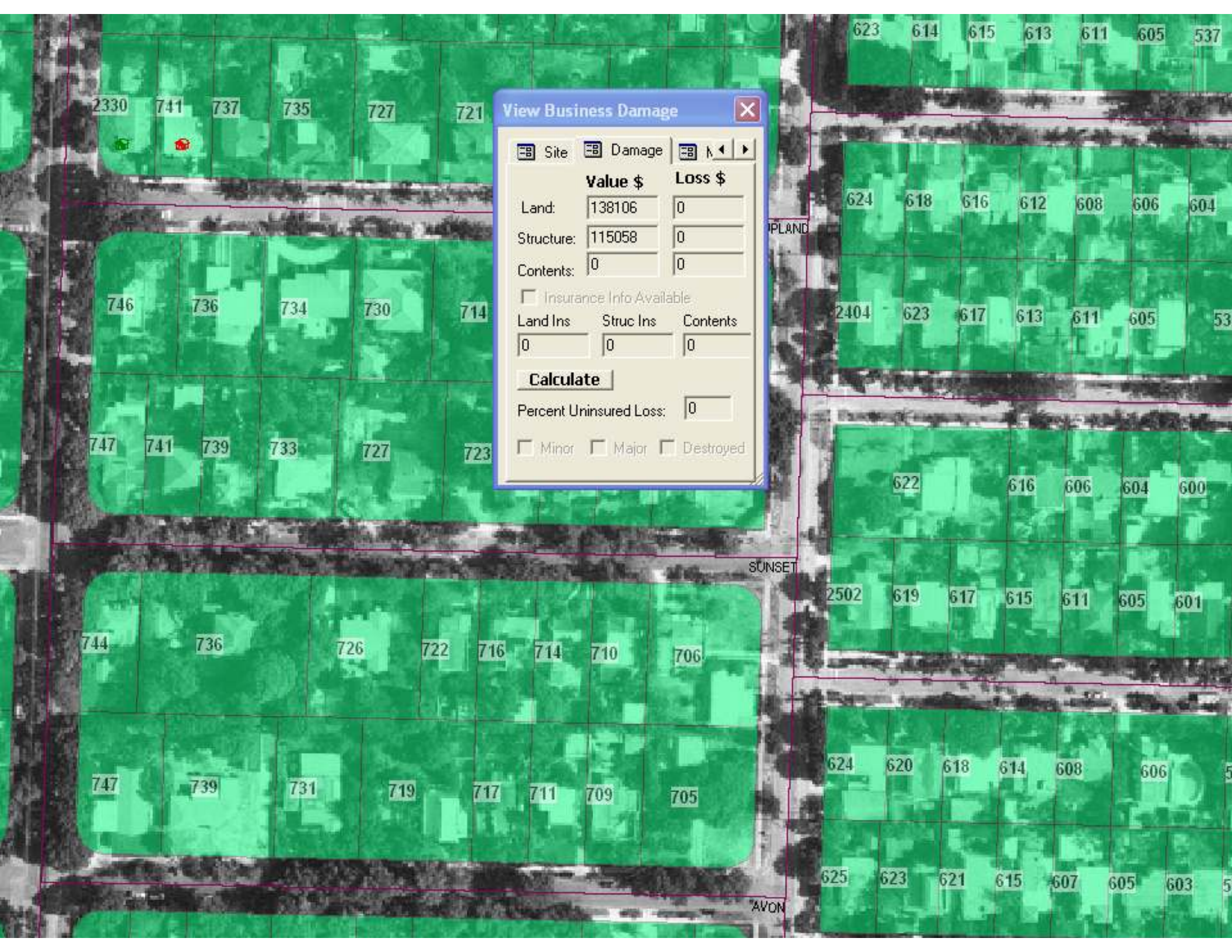
- > Easy to use with focused form based data entry and provides some error checks and validation
- > Over 30,000 sites surveyed and captured in the system !
- > Also adopted and Deployed at City of Palm Beach Gardens , County of St.Lucie and being adapted for County of Palm Beach and City of Wellington.
- > Results uploaded and available via ArcIMS same day!
Built on ArcPad, available for Free.



Beat #1

Focused on field updates by Inspectors (not GIS analysts)





View Business Damage

Site
 Damage
 Home
 Map

| | Value \$ | Loss \$ |
|------------|----------|---------|
| Land: | 138106 | 0 |
| Structure: | 115058 | 0 |
| Contents: | 0 | 0 |

Insurance Info Available

| Land Ins | Struc Ins | Contents |
|----------|-----------|----------|
| 0 | 0 | 0 |

Calculate

Percent Uninsured Loss:

Minor
 Major
 Destroyed

2330 741 737 735 727 721

746 736 734 730 714

747 741 739 733 727 723

744 736 726 722 716 714 710 706

747 739 731 719 717 711 709 705

623 614 615 613 611 605 537

624 618 616 612 608 606 604

2404 623 617 613 611 605 53

622 616 606 604 600

2502 619 617 615 611 605 601

624 620 618 614 608 606 5

625 623 621 615 607 605 603 5

PLAND

SUNSET

AVON

What is ArcPad?

Mobile GIS and field mapping

Field-based GIS tasks

Query

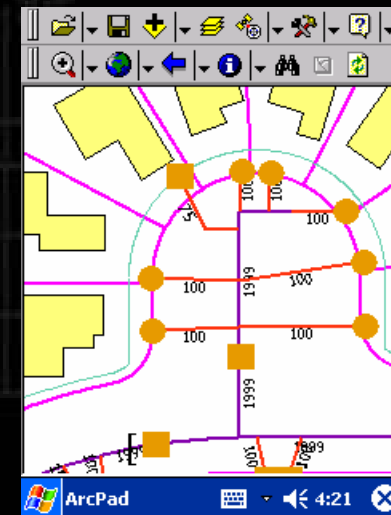
Data capture
(with/without GPS)

Editing and updating

For handheld &
mobile systems

Part of Enterprise
ArcGIS solution

Data goes direct from Field to GIS!



GIS for Katrina Response



**Hits Louisiana and Mississippi as Cat 3
with Huge Storm Surge on East Side**

The Storm Surge Area



The Project Site



GIS for FLA Emergency Operations

During Katrina Support in Mississippi ...

How did we Support Main Functional areas:

Risk Assessment & Planning :

Flood and surge maps - (Since we came in after storm this was minimal)

Response :

**Fire/Rescue area maps, Coordinates of Specific areas for crews with GPS,
Damage assessment maps, Staging Site maps, driving direction maps
GPS data input from crews for Damage Assessment maps.**

Recovery :

**More Status maps, find locations for Cell Towers, More maps of Staging and
Recovery Sites, Bring in and coordinate new volunteers to replace us, clean up
DBs...**

Web Sites built for State of Louisiana and FEMA and Red Cross

Mapofflooding_water_NOleams.jpg - Windows Picture and Fax Viewer

katrina.mxd - ArcMap - ArcInfo

File Edit View Insert Selection Tools Window Help

1:67,864 TerraServer Spatial Analyst Layer: 1 meter above sea level

Layers

- rail100k
- urban
- airports
- roads
- Central New Orleans Id
- Major waterways
- Estimated depth
 - If water surface is at sea level
 - 0 - 1 meter
 - 1 - 2 meters
 - 2 - 3 meters
 - 3 - 4 meters
 - 4 - 4.2 meters
- Digital Globe image RGB
 - Red: Band_1
 - Green: Band_2
 - Blue: Band_3
- TerraServerimage -32m RGB
 - Red: Band_1
 - Green: Band_2
 - Blue: Band_3
- Estimated depth
- Estimated depth- Aug 31st
- Calculation
- Original elevation
- 1 meter above sea level
- meter_depth
- no_hshd
- TerraServer (UrbanArea - Scale500
- dtl_st



On-Site Planning and Preparation Ideas:

Secure primary machines well and make lots of Data backups (CDs, USB devices, emails, servers) of data and documents

Have a good list of who can help you and how/when to call them?
Establish support contracts ahead of time if possible
(and dbl check their schedule and availability)

Make sure you have good, usable background data including streets and key facilities prepped and ready for GeoCoding/address matching and quick asset look up functions

Good grid/tile systems and index maps, build map books and make accessible to others. (see Broward for web based ideas here)

Need Ability to make LOTS of simple street maps with basic special text and relief locations fast, build tools for this.

'Pre-Make' lots of basic maps of area and facilities maps ahead of time and make them available in hard copy and digital formats (PDF or jpeg) , put them where people can get to them

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-  [ArcGIS 9.1 Service Pack 1](#)
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http://campus.esri.com/campus/community/index.cfm?CFID=1743370&CFTOKEN=77429702

Internet

GIS for Hurricane Response

Demos and Trial copies available

Thanks !

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