

# Using Mobile Devices for Enhanced Storm Damage Surveys

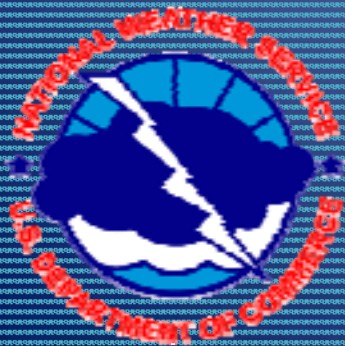
**Parks Camp**  
National Weather Service  
Tallahassee, Florida

**Keith Stellman**  
National Weather Service  
Shreveport, Louisiana

**Kris Lander**  
National Weather Service  
Kansas City, Missouri

**Paul Kirkwood**  
National Weather Service  
Forth Worth, Texas

**2010 ESRLUC**  
San Diego, CA



# Post-Storm Damage Assessment (PSDA)

- **National Weather Service Responsibility**
  - ...acquisition and assembly of highly perishable data necessary for accurate post-event analysis. It requires the rapid deployment of trained teams following the event to gather damage evidence, e.g., storm debris damage patterns, that can be used to accurately identify and describe the event. In cases of prolonged events, it may be appropriate to collect data during the event.”
  - Tornadoes, Floods, Hurricanes, etc.
- **Users**
  - Media/Public
  - Emergency Management
  - Research Community



# Explosion of Technology



- **Moving away from paper maps**
  - Digital Photography
  - GPS
  - Mobile Communications (e.g. smartphones)
  - GIS
  - Web Technologies (e.g. Web 2.0)
- **Non-Uniform Adoption of these technologies**
  - Hundreds of Thousands of images sit on hard drives across the NWS
  - No central repository for high-density datasets



# Goal

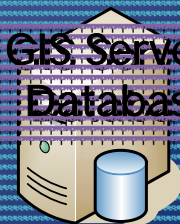
- **Streamline and Standardize Storm Survey Data Collection**
  - Simple, intuitive process
  - Standardized set of attributes
  - Flexibility
  - Central Repository
  - Quick Turnaround

# Damage Survey Process

- Collect data in field with mobile device (Laptop, BlackBerry,)
- Transmit data back to GIS server
- Edit data from web interface
- Extract data for partners or distribution on web site



GIS Server/  
Database



Web



# Mobile Data Collection

- **Laptop PC-based Application**

- ArcGIS Mobile\*
- GPS “puck”



- **BlackBerry® Smartphones\***

- Freance Mobile\*
- Data + Photographs

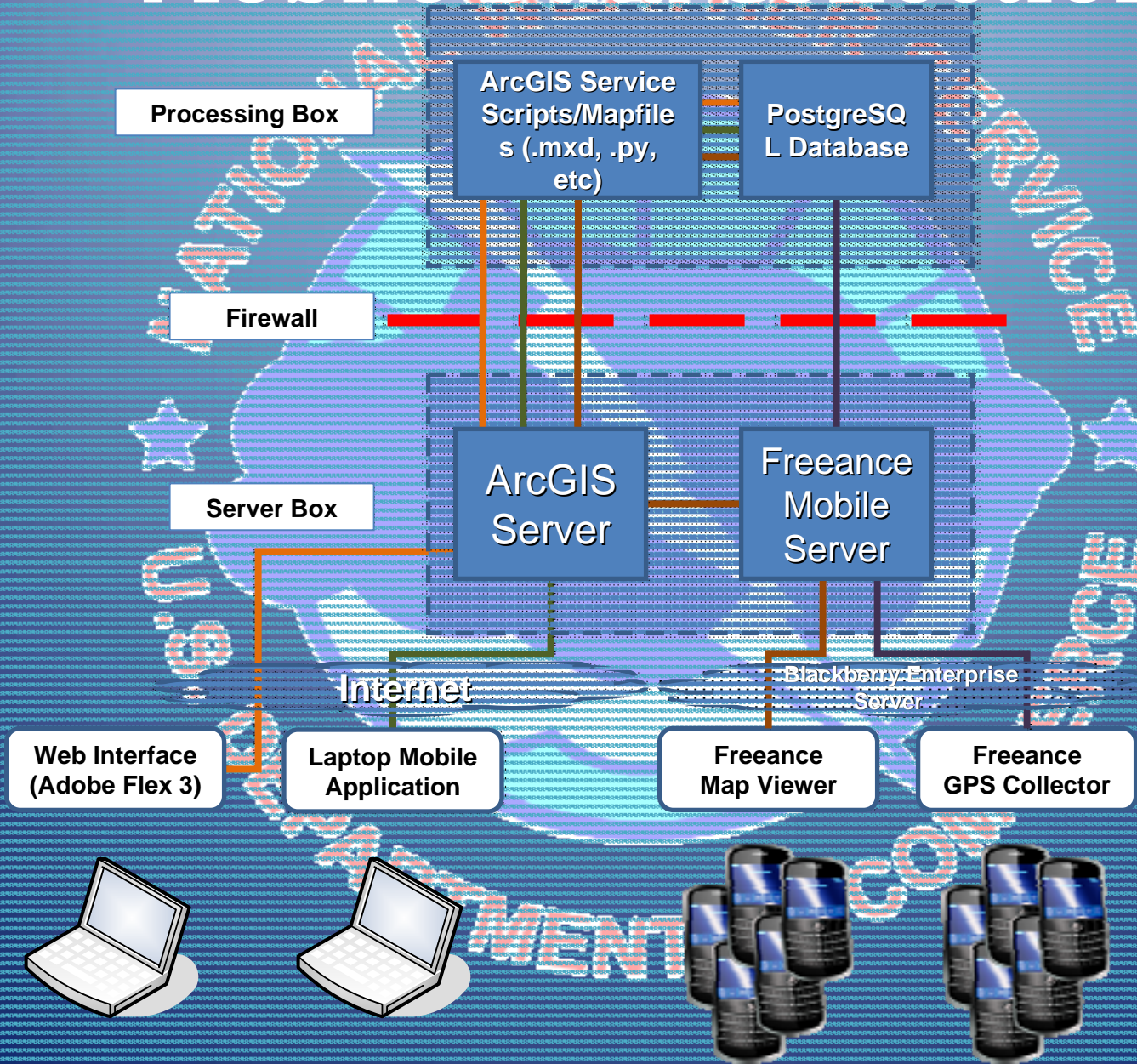


- **ESRI ArcGIS® Server\***

- PostgreSQL/ArcSDE GeoDatabase
- Adobe® Flex®\* (Flash-based) web interface
- ESRI Flex® API

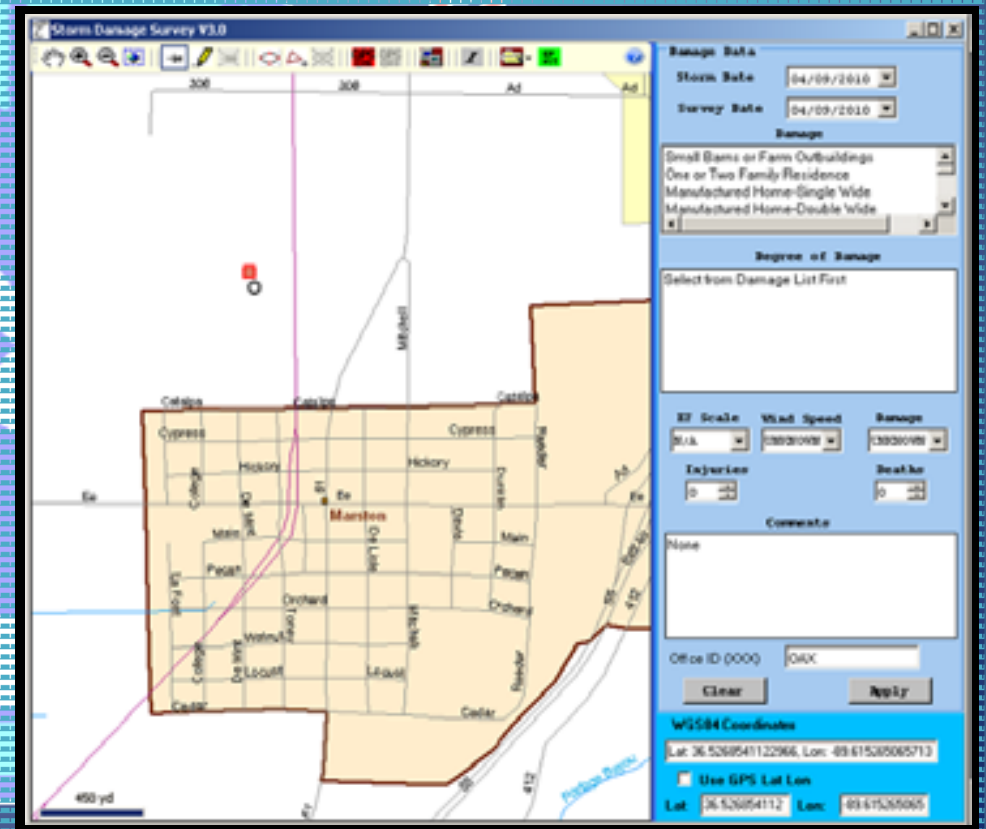
\*NOTE: Mention or display of a trademark, proprietary product, or firm in text or figures does not constitute an endorsement by the National Weather Service, NOAA or the Department of Commerce, and does not imply approval to the exclusion of other suitable products or firms.

# Mobile Data Collection



# Data Collection and Transmission

- **Laptop Application**
  - ArcGIS Mobile and C#
  - Background maps cached locally so no requirement for internet connection
  - Position data through attached (internal or external) GPS
  - Data can be synched to central server from the field (wireless)

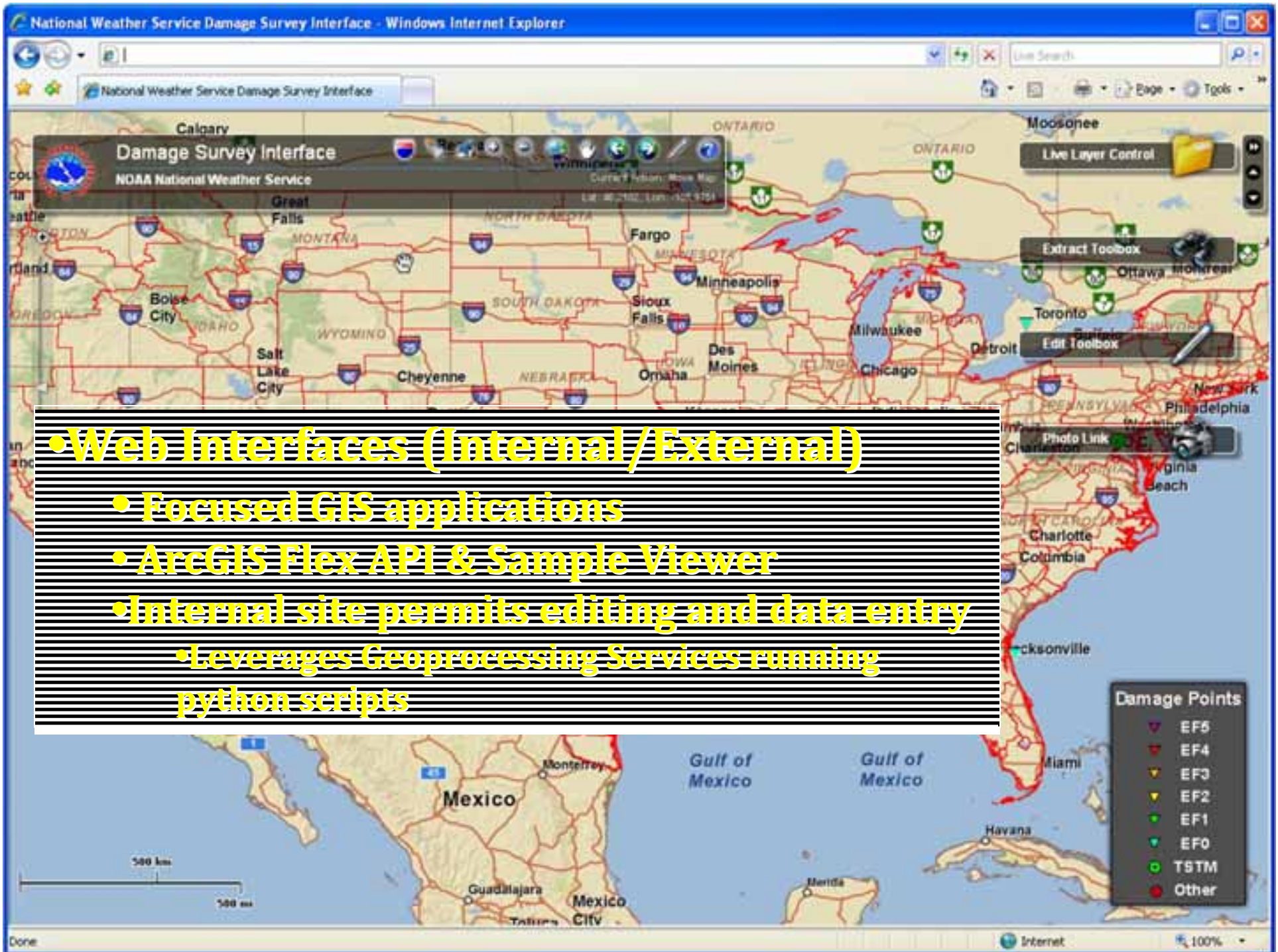




# Data Collection and Transmission

- **BlackBerry® Application**
  - **Freeance Mobile Software**
  - **Incorporate EF-Scale criteria**
  - **Custom Forms**
    - **Drop down menus to minimize typing**
  - **Allows for standardized but detailed data to be gathered**
  - **Geo-tagged photos transmitted along with data**
  - **Can be deployed via BlackBerry Enterprise Server**





National Weather Service Damage Survey Interface - Windows Internet Explorer

http://system.nws.noaa.gov/StormDamage/DamageEditorTest/index.html

File Edit View Favorites Tools Help

National Weather Service Damage Survey Interface

Damage Survey Interface  
NOAA National Weather Service - EXPERIMENTAL  
Current Action: Re-center Map  
Lat: 34.1237, Lon: -94.0992

- Quality Control
- Data Entry
- Add/Edit/Delete data
- Geotag photos using GPX files
- Add already geotagged photos to database

Lang Ho Creek Pond  
Live Layer Control

Extract Toolbox

Edit Toolbox

Edit Existing Damage Point

Office: [dropdown]  Quality Controlled

Storm Date: 4/30/2010 [calendar icon] H:MM:SS AM/PM

Survey Date: 5/2/2010 [calendar icon] 5:25:52 PM H:MM:SS AM/PM

Damage Indicator: Small Retail Building [Fast Food Restaurants] (SRB)

Degree of Damage: Split or collapse of entire roof structure

Wind Speed: 0 88

EF Rating: [dropdown] Damage Direction: [dropdown]

Injuries: 0 Fatalities: 0

Comments: west wall of a laundrymat

Other

Damage Direction: NE45  
Comments: west wall of a laundrymat collapsed on

Wind speed: 400 ft  
1000 ft

Internet 100%

National Weather Service Damage Survey Interface - Windows Internet Explorer

Damage Survey Interface  
NOAA National Weather Service

Little  
Pine Bluff  
Nashville

Live Layer Control

Extract Toolbox

Use Date Range  
Begin [ ] End [ ]  
KML Shapefile

Status:  
To extract a KML file: Select date range first (if desired), then click on the polygon above. Click on the map at each desired vertex. Double-click for your last vertex. A link to your kml file will appear above.

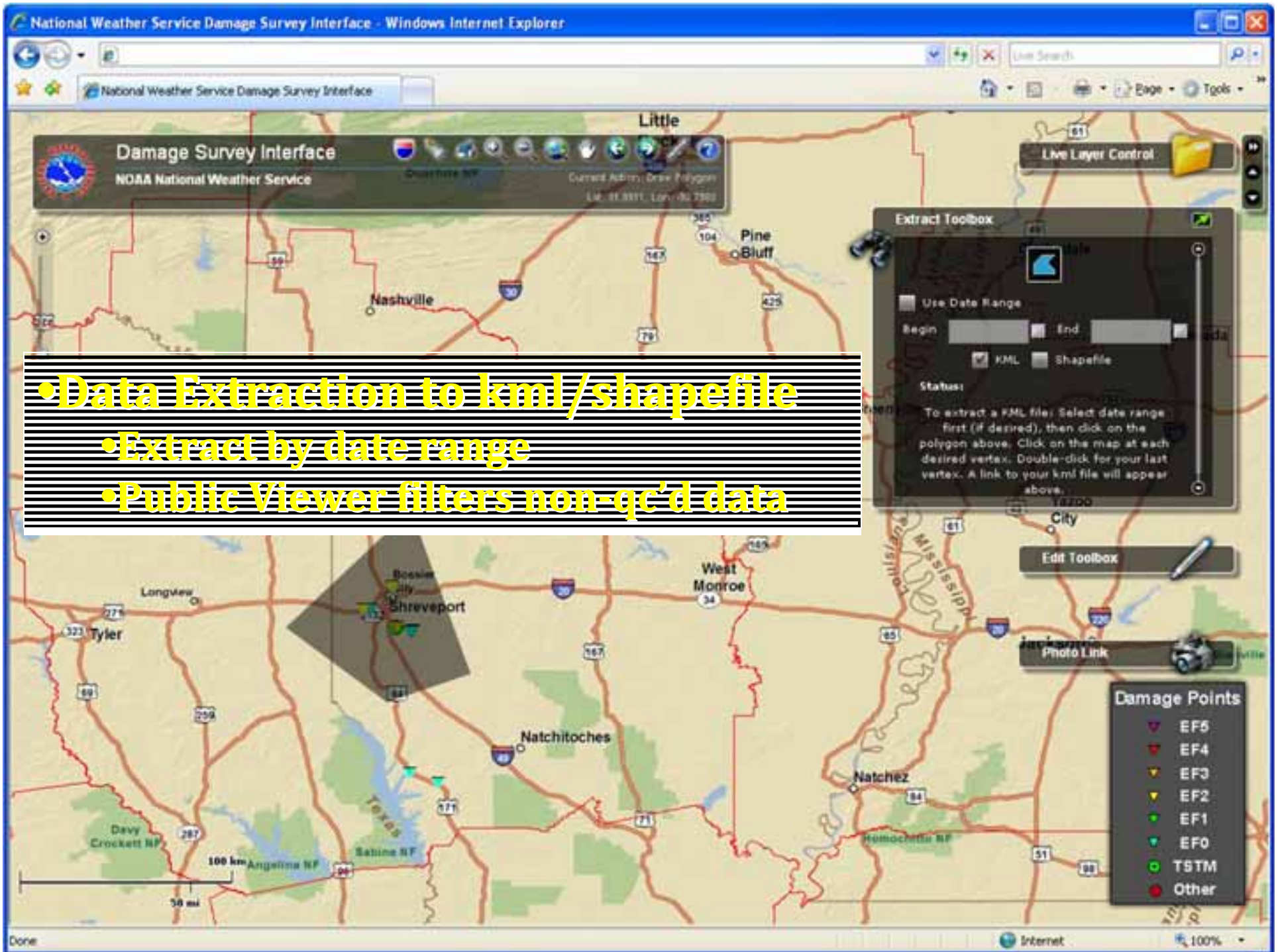
Edit Toolbox

Photo Link

Damage Points

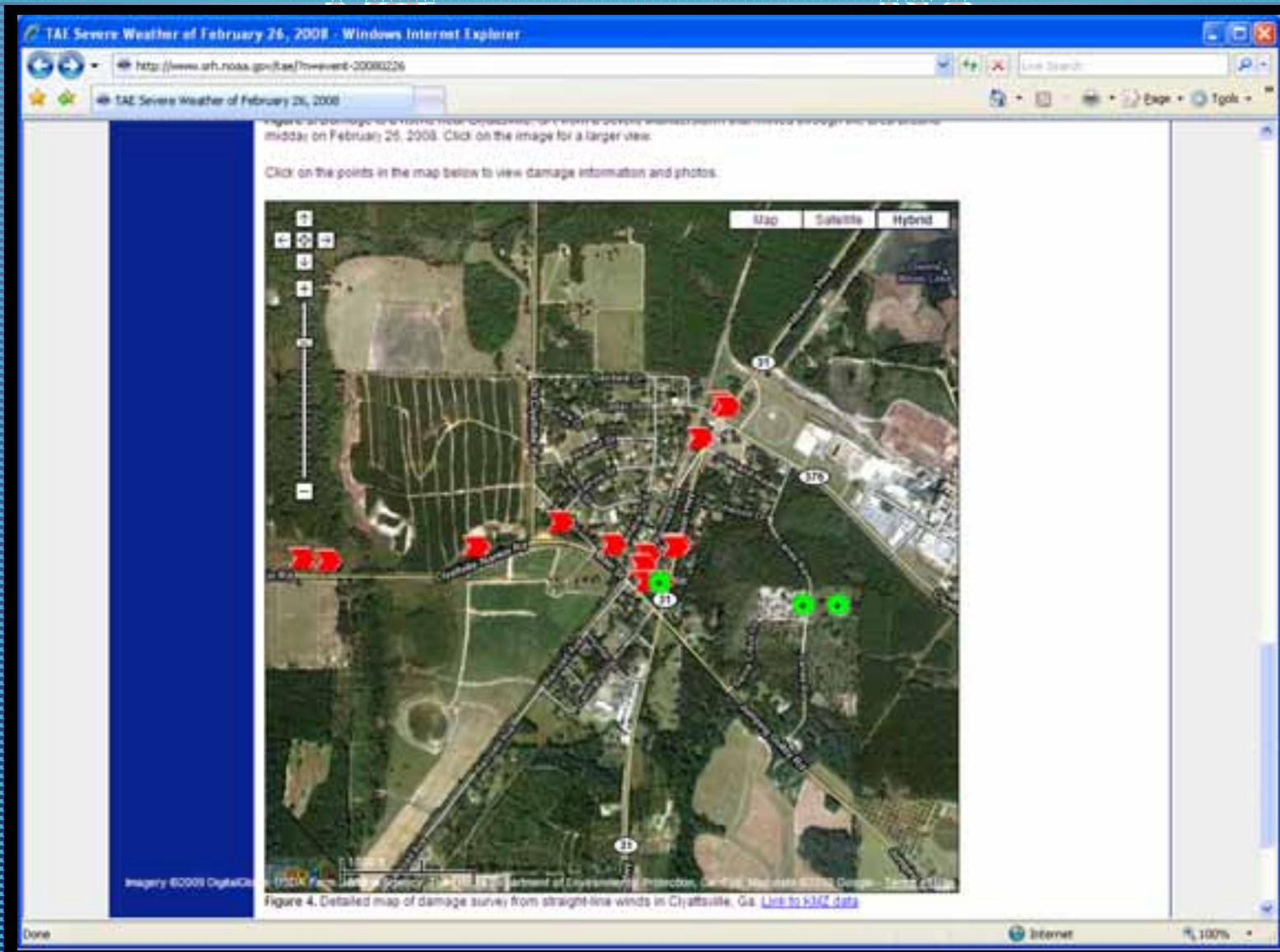
- EF5
- EF4
- EF3
- EF2
- EF1
- EF0
- TSTM
- Other

Done Internet 100%



- Data Extraction to kml/shapefile
- Extract by date range
- Public Viewer filters non-qc'd data

# Interactive Survey Map



# Interactive Survey Map

The screenshot shows a web browser window titled "TAE Severe Weather of February 26, 2008 - Windows Internet Explorer". The address bar shows the URL "http://www.srh.noaa.gov/tae/tsever08-20080226". The page content includes a map of Claytonville, GA, with a data table and a photo of the damage.

Click on the points in the map below to view damage information and photos.

N/A	
Date of Damage	2/26/2008
Date of Survey	2/26/2008 5:04:30 PM
EF Rating	N/A
Estimated Wind Speed	34
Estimated Wind Direction	E-90
Damage Indicator	27
Damage (text)	Trees: Hardwood (TH)
Degree of Damage	Trees uprooted
Injuries	0
Fatalities	0
Latitude	30.692195501
Longitude	-83.317032522
Comments	Large hardwood tree uprooted
Surveying Office	None

Figure 4. Detailed map of damage survey from straight-line winds in Claytonville, GA. <http://www.srh.noaa.gov/tae>

# Future

- **Integration with NOAA BlackBerry® Enterprise Server**
- **Field testing during 2010 Severe Weather Season**
- **Integration with Storm Data**
- **Beyond Severe Thunderstorms**
  - **Floods, Hurricanes, etc.**

# Questions???

- [parks.camp@noaa.gov](mailto:parks.camp@noaa.gov)
- [keith.stellman@noaa.gov](mailto:keith.stellman@noaa.gov)

