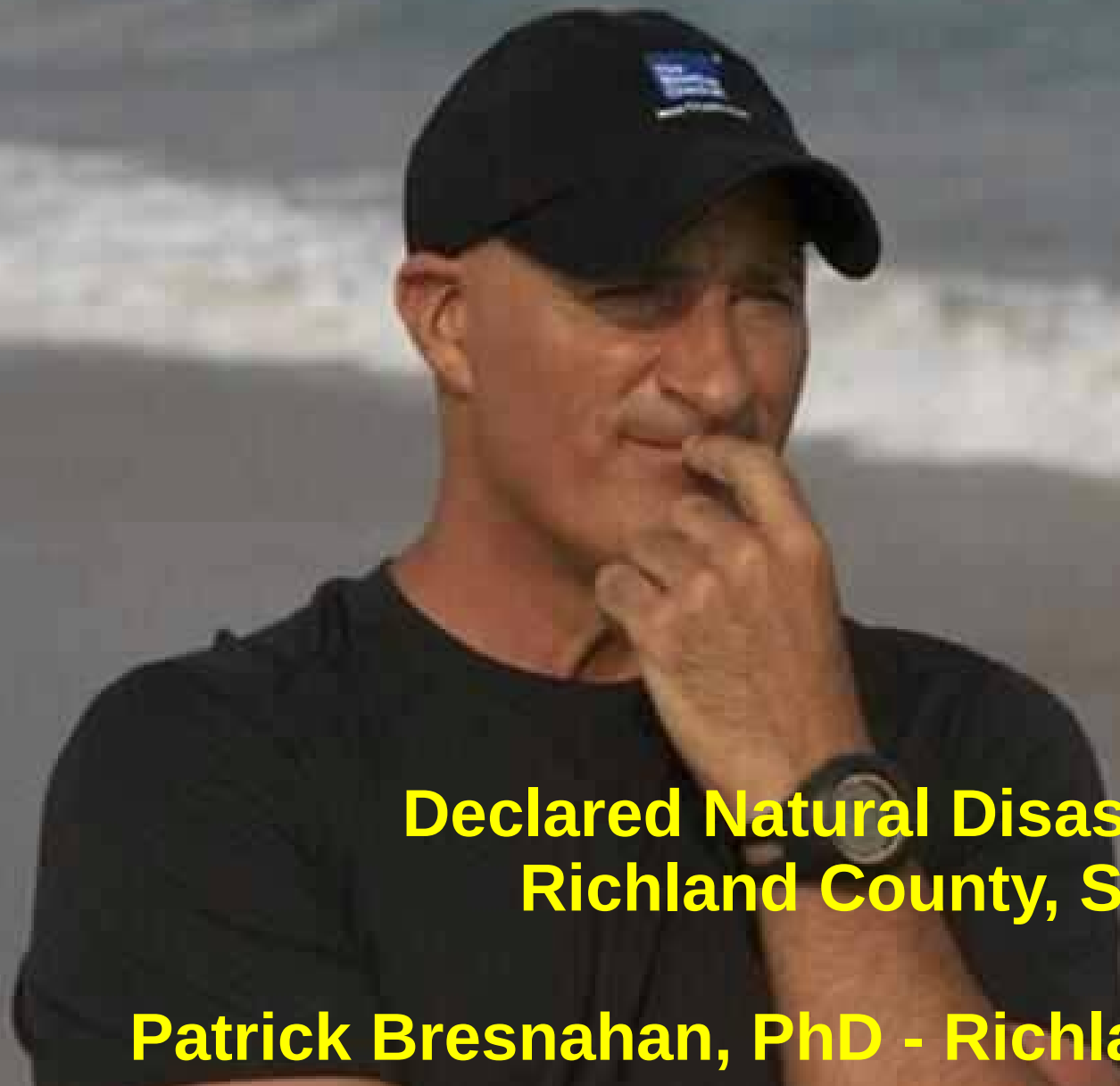


Oh, you know it's gonna suck
when I come to town!



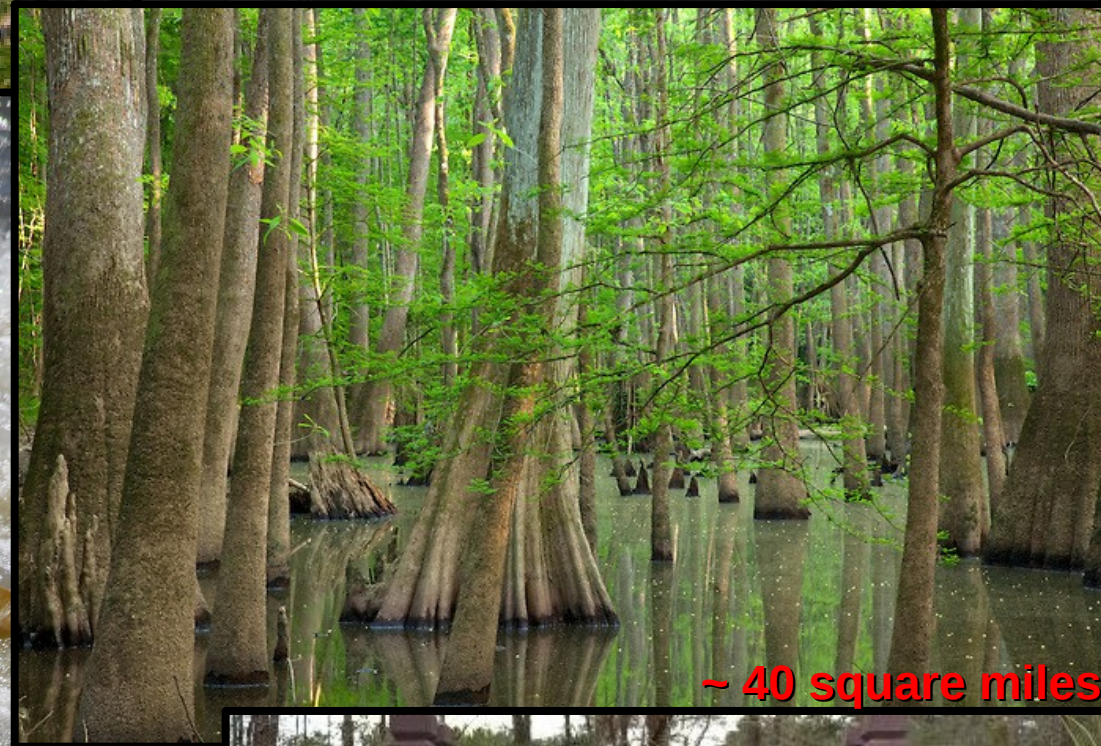
**Declared Natural Disaster Flood Event
Richland County, SC October 2015**

Patrick Bresnahan, PhD - Richland County GIO

We already have plenty of water!

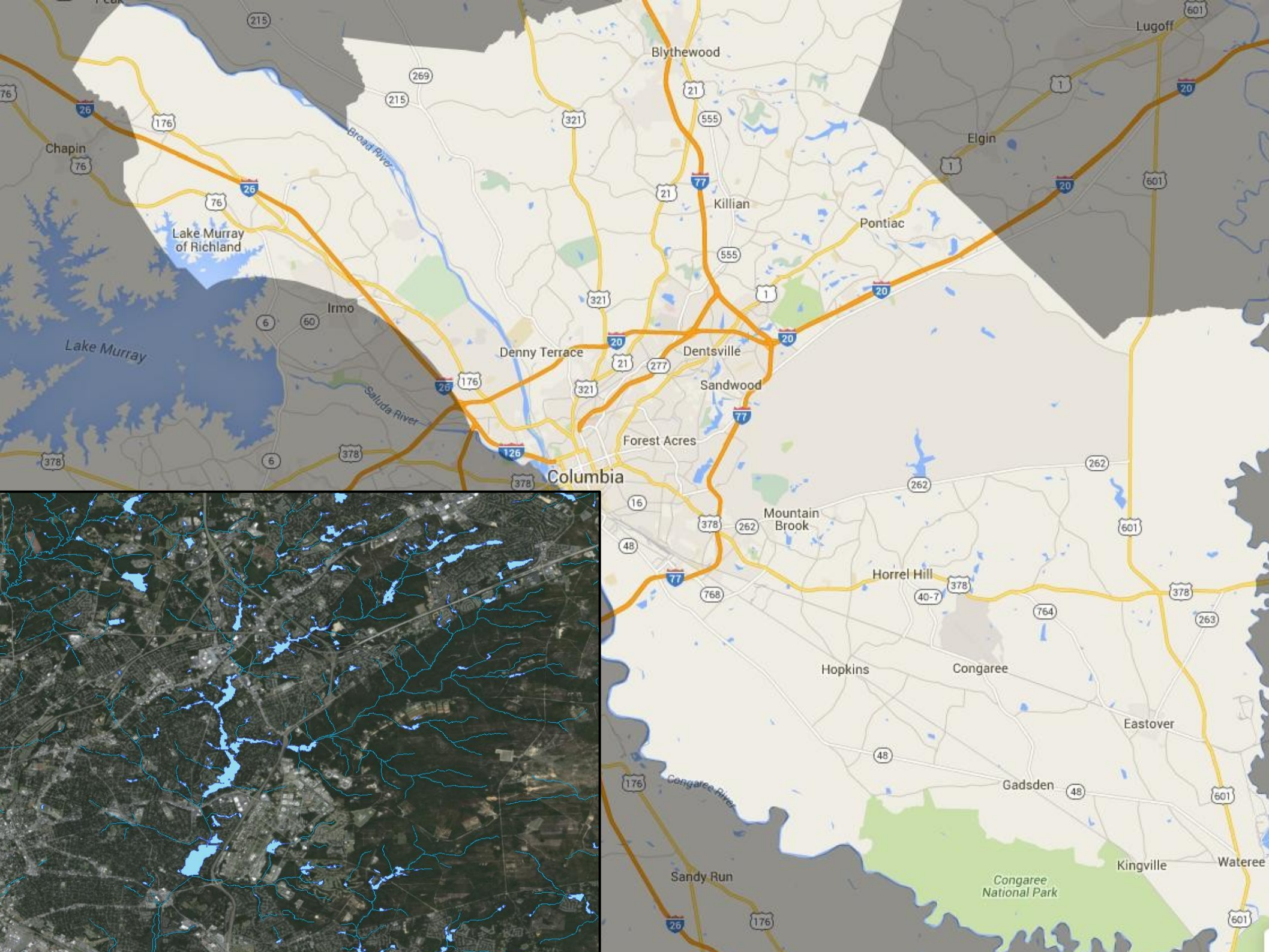


78 sq. miles w/650 miles shoreline

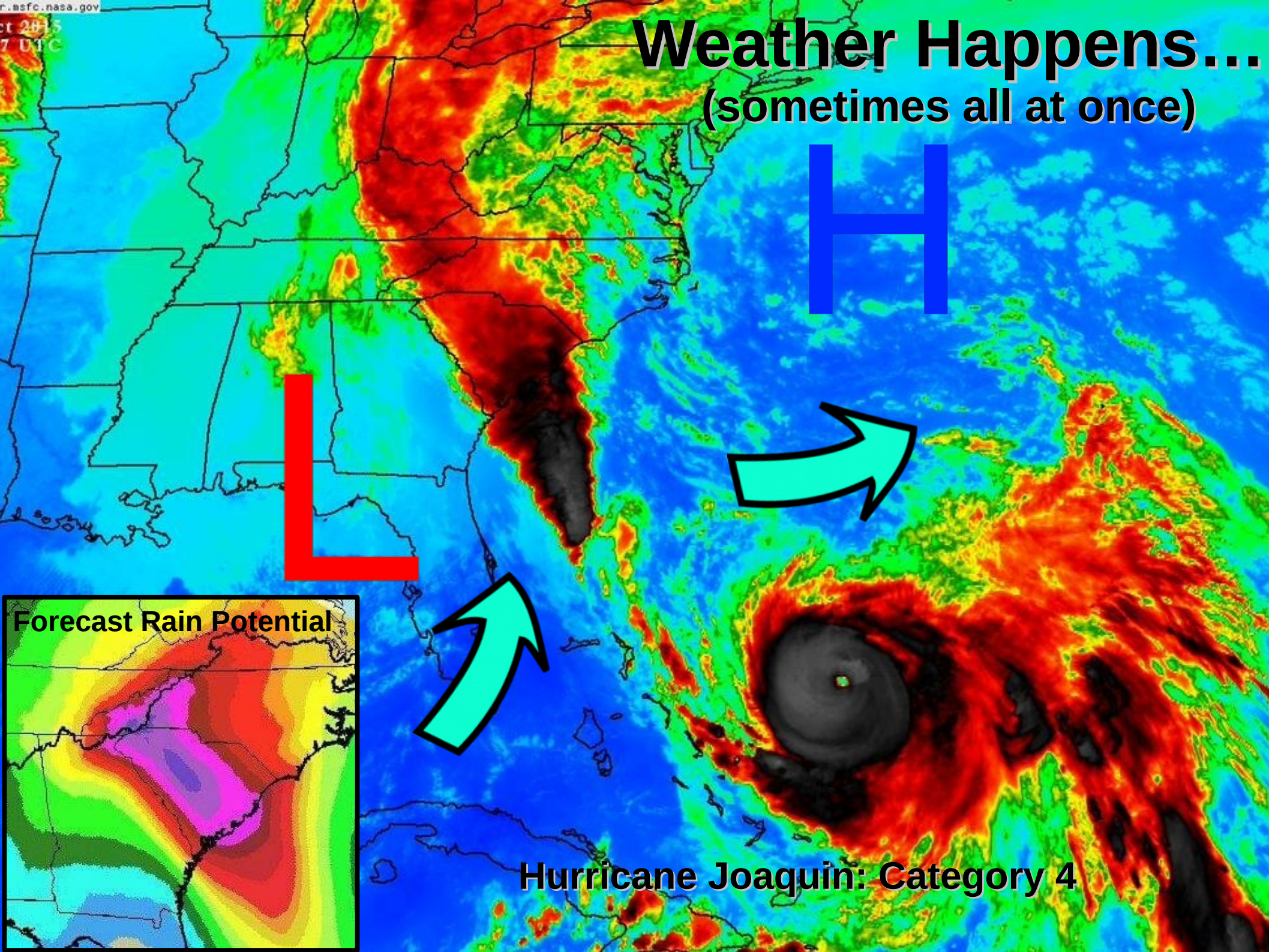


~ 40 square miles





Weather Happens... (sometimes all at once)



Hurricane Joaquin: Category 4

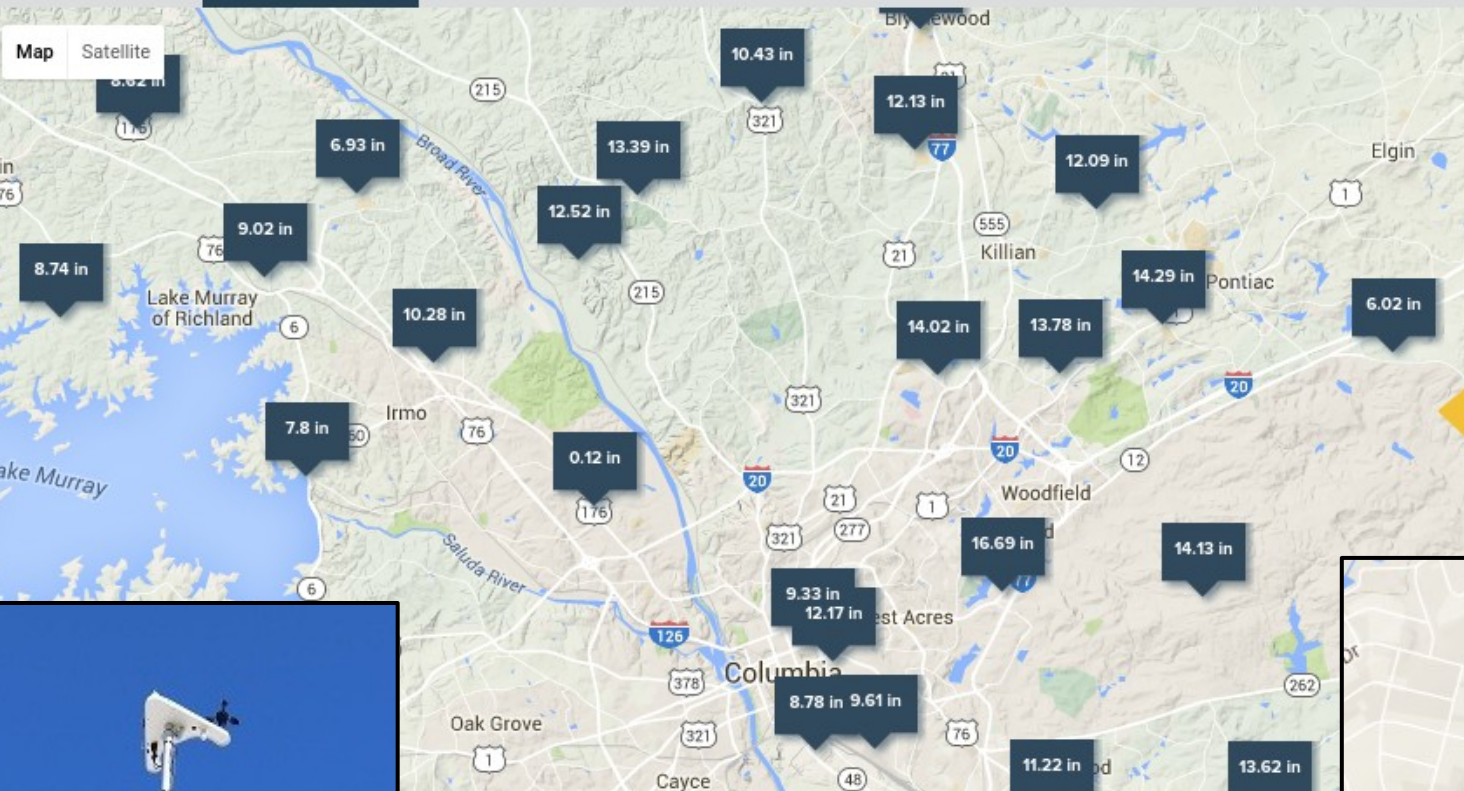


Forecast data provided by the National Weather Service

OVERVIEW

WEATHER DATA

ABOUT RC WINDS



Temperature



Humidity

Wind Speed



Barometric Pressure

Today's Rainfall



Ken Aucoin, RC Meteorologist

- 63 unit network
- 36 units operational



Gills Creek

Rainfall

TODAY'S RAINFALL	15.71 in
YESTERDAY'S RAINFALL	3.23 in
MONTHLY RAINFALL	19.33 in
ANNUAL RAINFALL	68.9 in

[Click to View Details](#)

15.71 in

12

In the Bullseye...How Much Water?

Hourly rainfall rates at the Forest Acres
Richland County Emergency Services
Gills Creek automated gauge (Forest Drive)
recorded:

1.76 inches from 2-3:00 a.m.

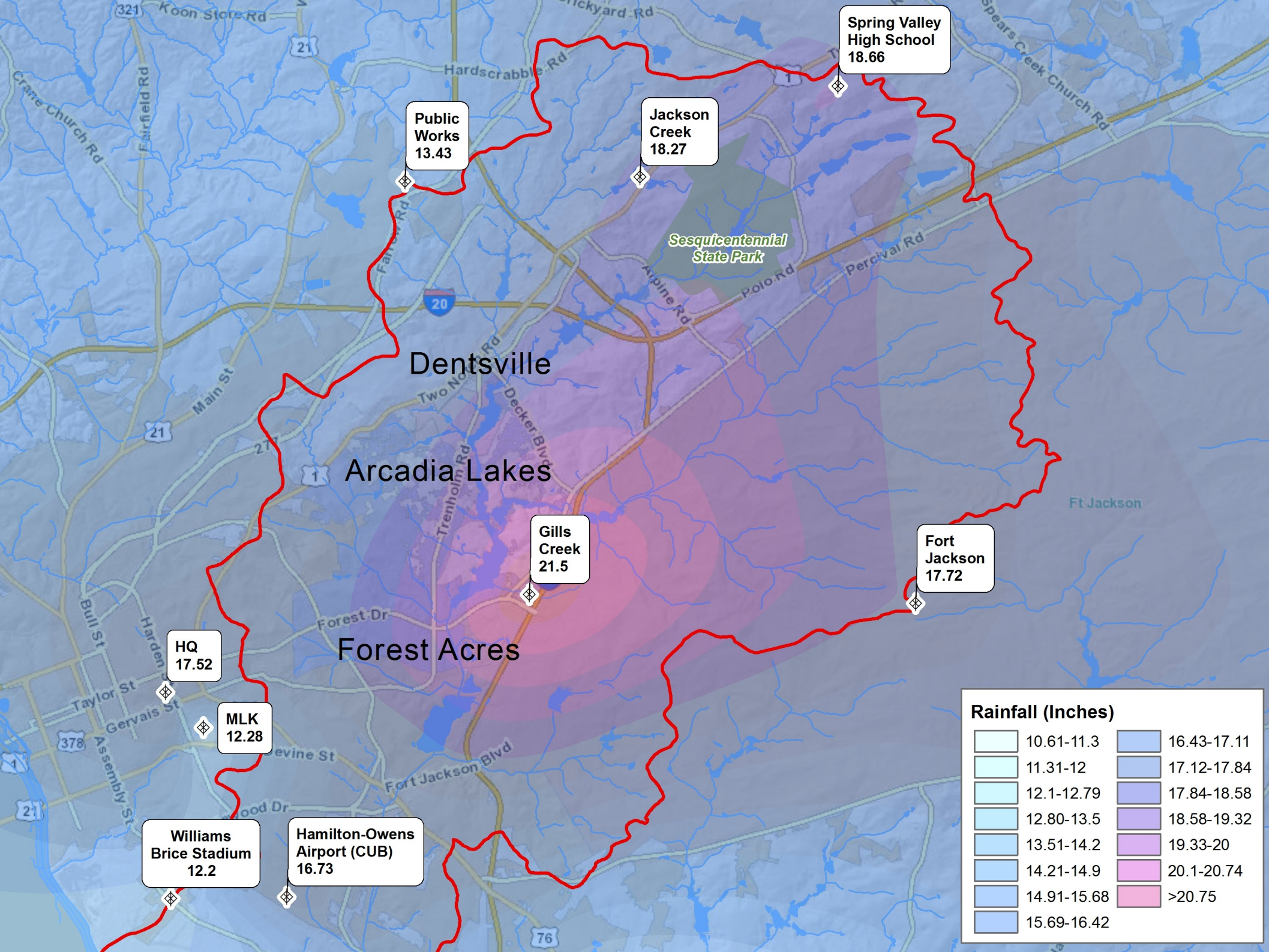
3.76 inches from 3-4:00 a.m.

3.00 inches from 4-5:00 a.m.

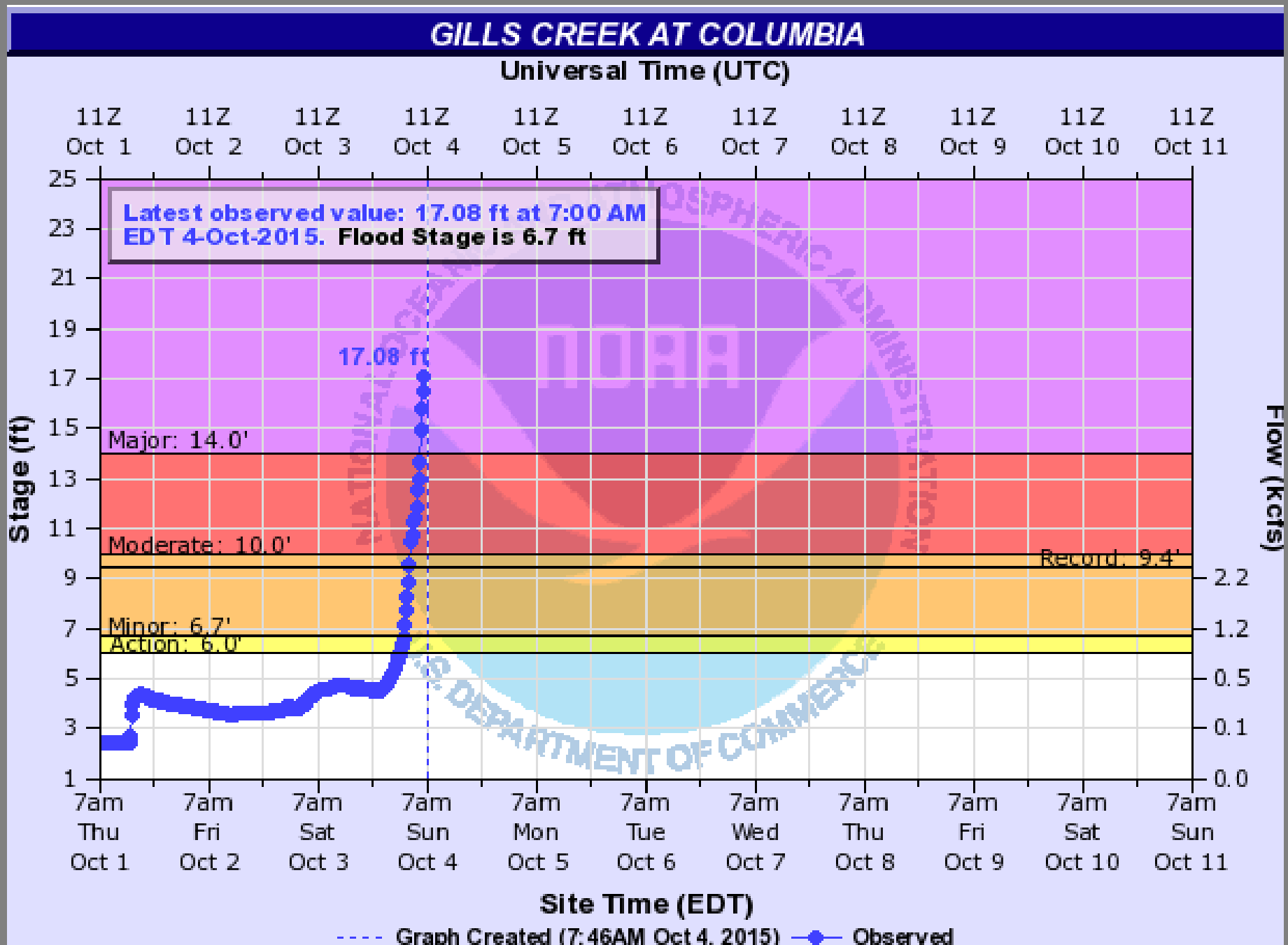
2.12 inches from 5-6:00 a.m.

...yielding an unprecedented **10.64 inches over four hours**. At 7:00 a.m., the Gill's Creek site had accumulated 12.68 inches of rain since midnight. Spillways and dams along the Arcadia Lakes watershed were overwhelmed. As dawn arrived, so did a succession of dam failures...





River Gauge on Gills Creek doubles record: Peaked at 19.6 feet - Previous Record: 9.4 feet



A Few Numbers

- **19 Storm-related Deaths**
- **17 dams failed in Richland County**
- **561 Road segments/bridges closed during the event in Richland County**
- **459 roads closed on Oct 13**
- **2800 National Guard Soldiers and Airmen deployed**
- **Cost? Billions\$ Still counting...**







BREAKING

MIDLANDS SEES HISTORIC RAINFALL

LIVE

66°

1:19

wltx.com

Atlanta
3:45 PM ET

CNN WEATHER CENTER



BREAKING NEWS

S.C. DAM BREACHES; MANDATORY EVACUATIONS



12:45 PM PT

NEWSROOM



Like Comment



WLTX News19

EVACUATION MAP: If you're in Columbia within this highlighted area...get out! A mandatory evacuation was issued because a dam broke. **DETAILS:**

<http://on.wltx.com/1OTz8N3>

Album: Timeline Photos

Shared with: Public







Richland County
Hamilton-Owens Airport





Dams, bridges, roads...

Overcreek Rd.





**Drive through
standing water...**



...you die!



**(extended saturating rains
+ historic rain event) +
wind = danger/match
sticks!**





**Roads, rail, canal,
quarries...**

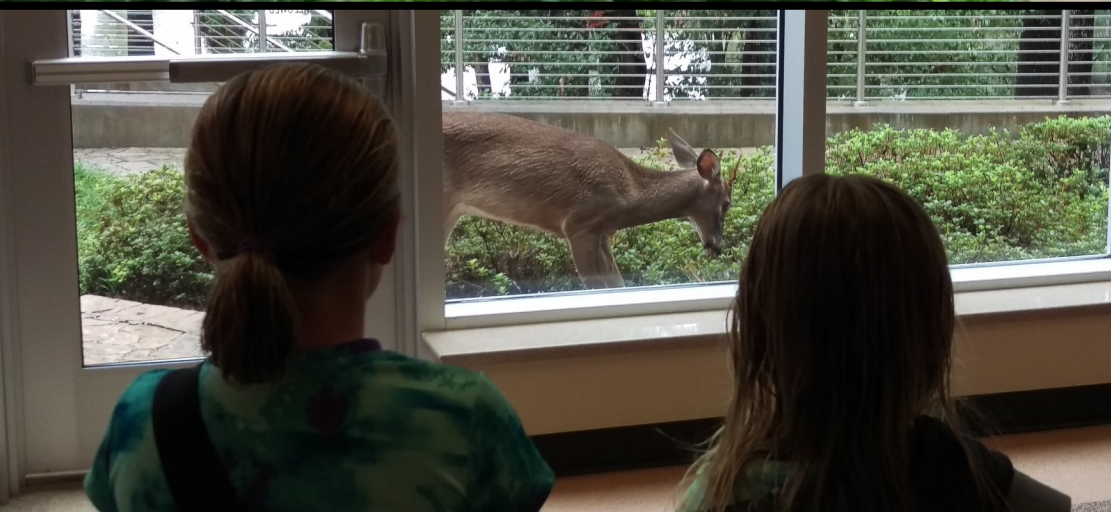
...nothing spared!





Animal populations hit hard...

Hunting suspended (except for gator, coyote, hogs, and doves)







Progression of Rescue/Recovery Reliance

- Yourself/family
- Neighbors (immediate and distant)
- Local Government and NG* (public safety/public works)
- Utilities and State government
- Community
 - Local businesses
 - Local religious groups
 - Local charities
- Private sector
- Religious and charity organizations
- Federal government

* NG – our citizen soldiers (local people, state and federal org)





Neighbors and Charities



Private Sector Response

EOC -> Geo EOC



GIS - Focus on NEED!

- **Road Status ***
 - Destroyed, passable, closed, open
- **Dam status**
 - Holding, monitor, failed
- **Bridge status ***
 - Open/secure, monitor, failed
- **Property/population impact (max water)**
 - Inundated, potential evac., safe
- **Ad Hoc requests**
 - EOC, Inspections, appraisers, public works, public safety, National Guard, admin., PIO, etc.
- **Solid Waste – Debris removal**

*** for 911**

Foundation Is Open Source



Real Property Comparative Sales Analysis Ver 0.001

1. Buffering/Area Criteria

☐ Address/TMS ☐ NBHD Code ☐ Custom

Address:

Radius:

2. Property Type

Type of Property:

Property Use: ☐ Improved ☐ Vacant

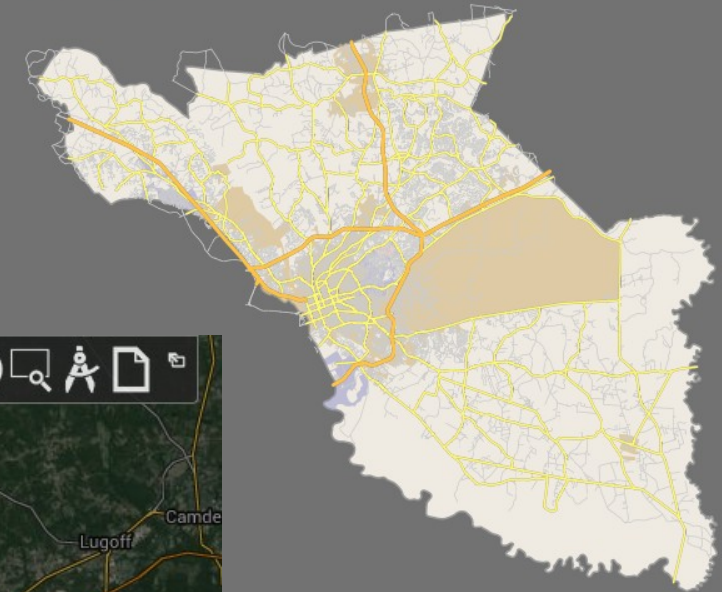
Qualified Sales: ☒

3. Search Parameters

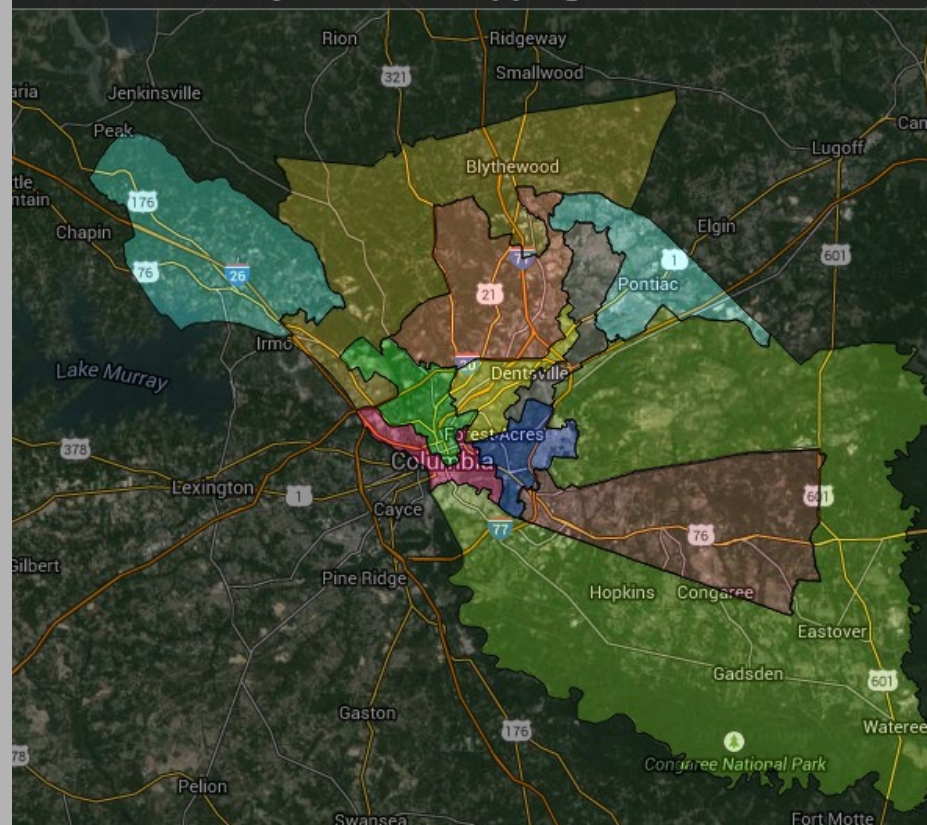
Min Max

Start Date: End Date:

Map/Drawing Tools



Richland County Internet Mapping 7.2



Sqft Beds Baths NbhdCode Zoning Zillow

- Elastic
- Immediate
- Remote
- Agnostic

Woolpert – Thank You!

[private sector responds quickly as corporate citizens]



South Carolina Flood Imagery

October 6, 2015 1ft GSD



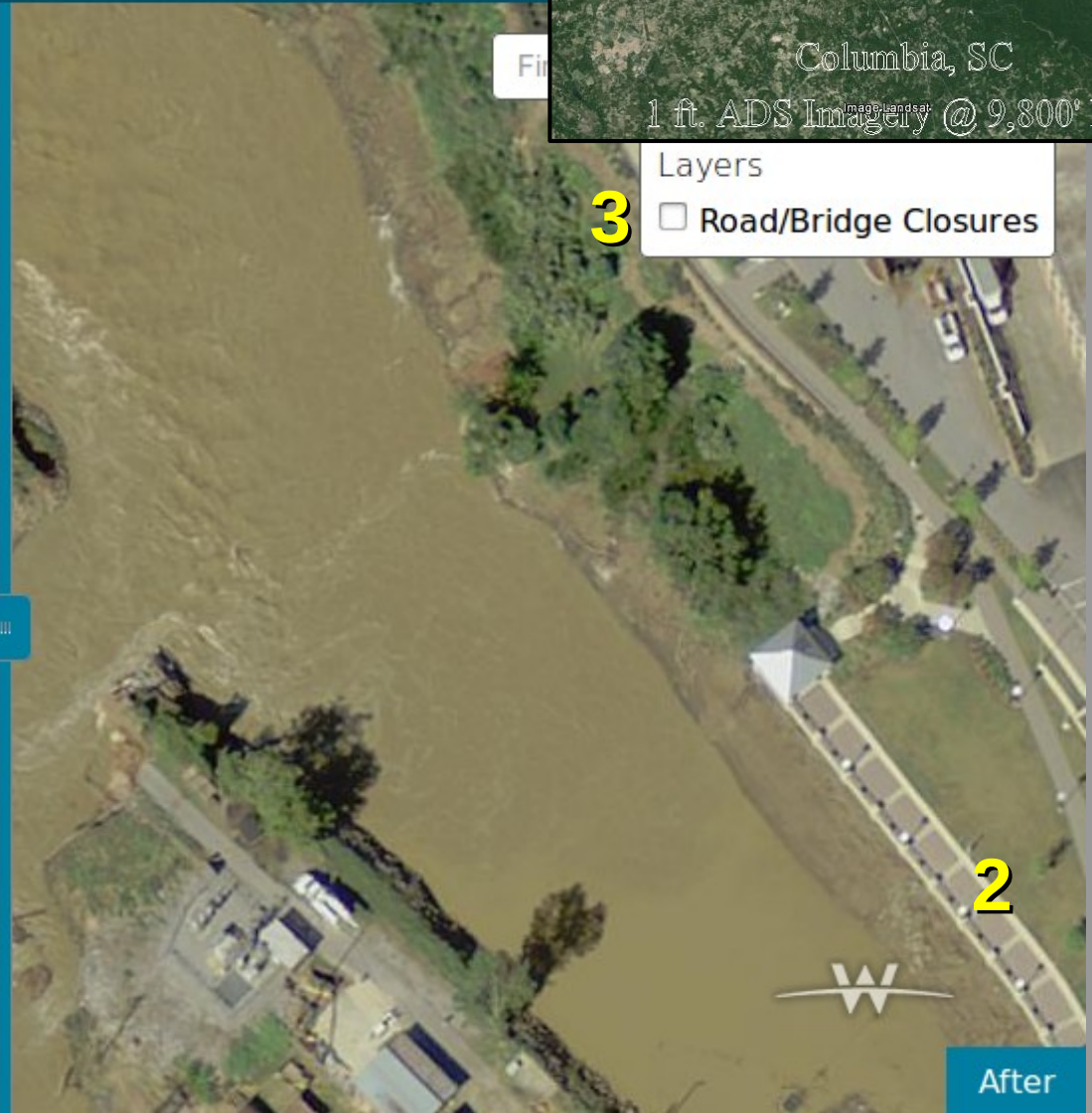
2014 Imagery Courtesy of:



richlandmaps.com

1

Before (2014)



Fit

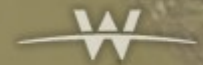
Columbia, SC

1 ft. ADS Imagery @ 9,800' MSL

Layers

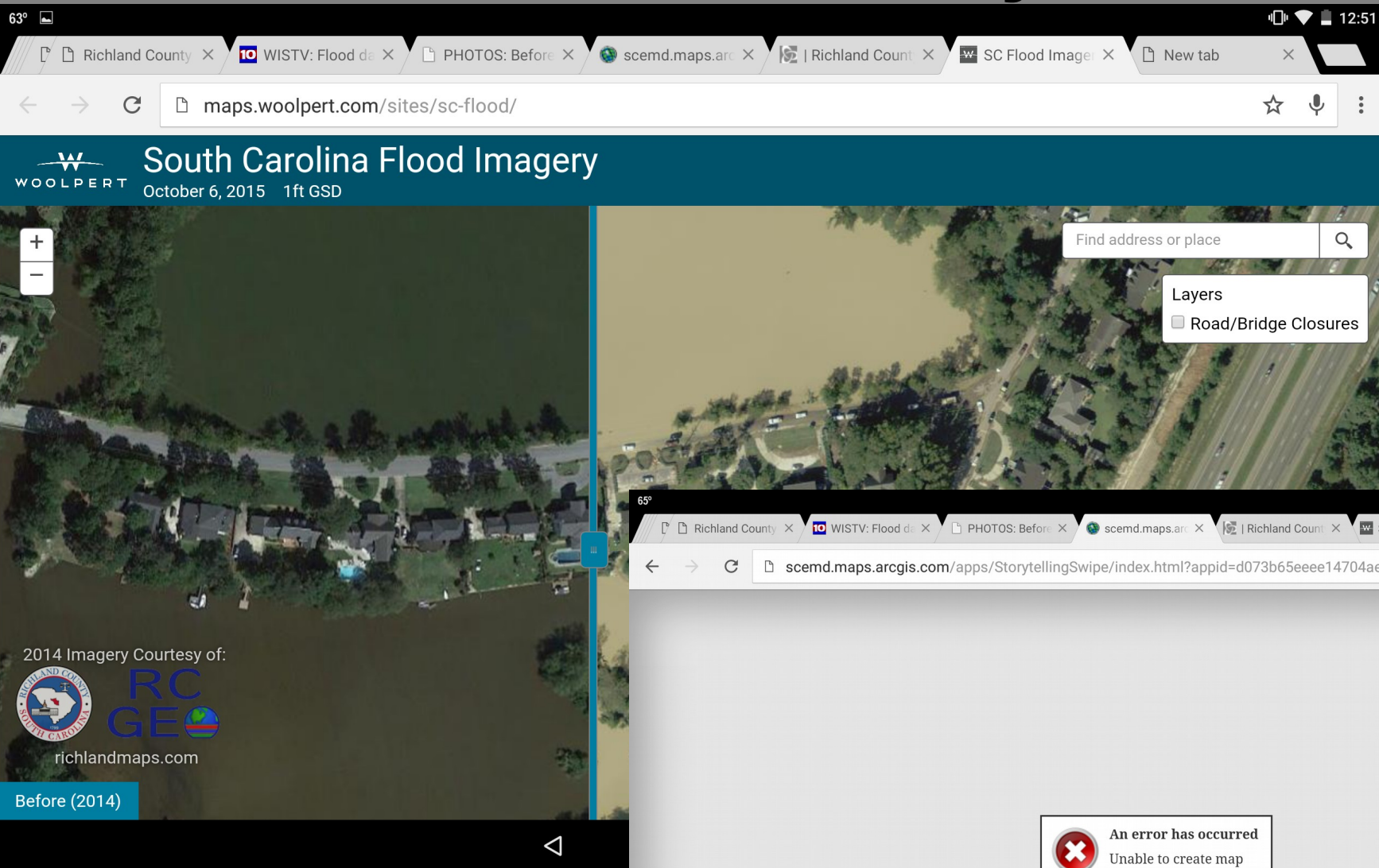
☐ Road/Bridge Closures

2

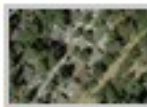


After

If it is not mobile ready...



...Don't do it!



Lake Katherine - Before
SCEMD



North Lake Dam after the flood.
(Source: SCEMD)

COLUMBIA, SC (WIS) - Aerial photos taken Tuesday illustrate the extent of the damage done by flooding in and around Columbia.

The images, released by the South Carolina Emergency Management Division, allow users to compare before and after images after torrential rains dropped over 11 inches of rain in Columbia from Oct. 1-5.

[Click here to use the comparison tool for yourself.](#)

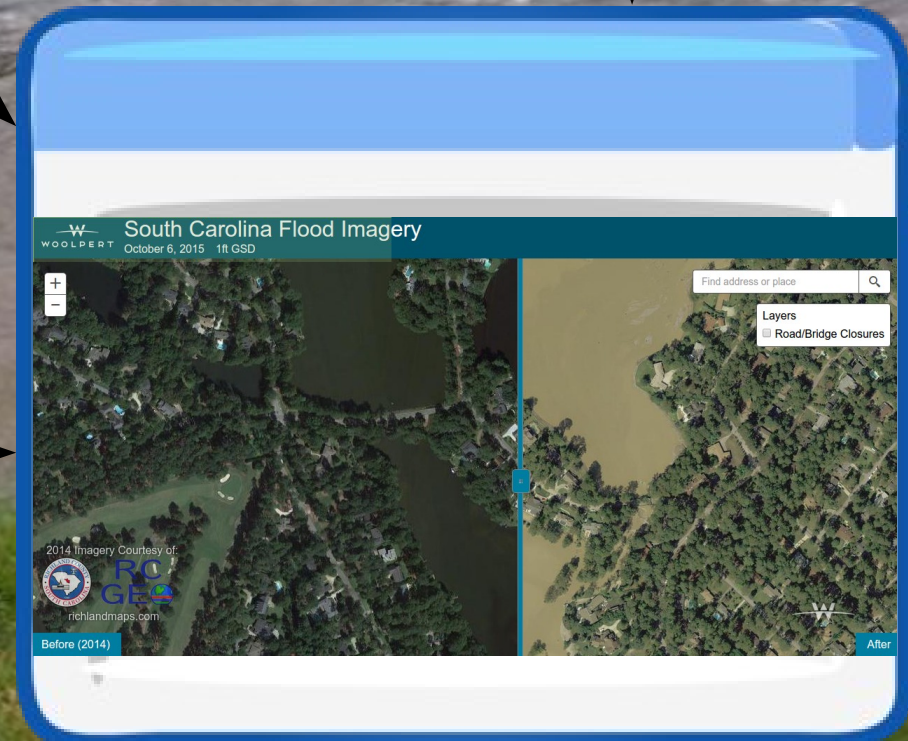
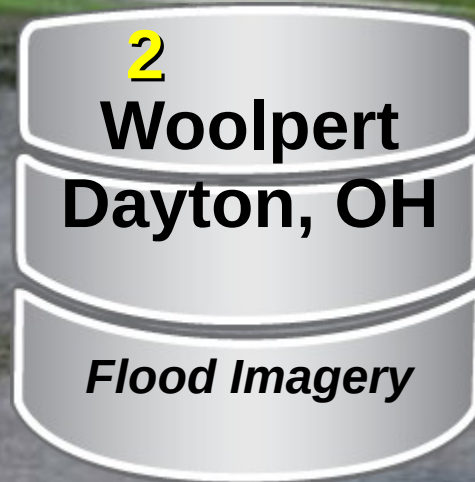
President Obama signed a disaster declaration Monday ordering federal aid to help recovery efforts in South Carolina. Federal funding [is available to people in 16 counties.](#)

[On a mobile device? Tap here to see a slideshow of before and after photos.](#)

Copyright 2015 WIS. All rights reserved.

RECOMMENDED STORIES

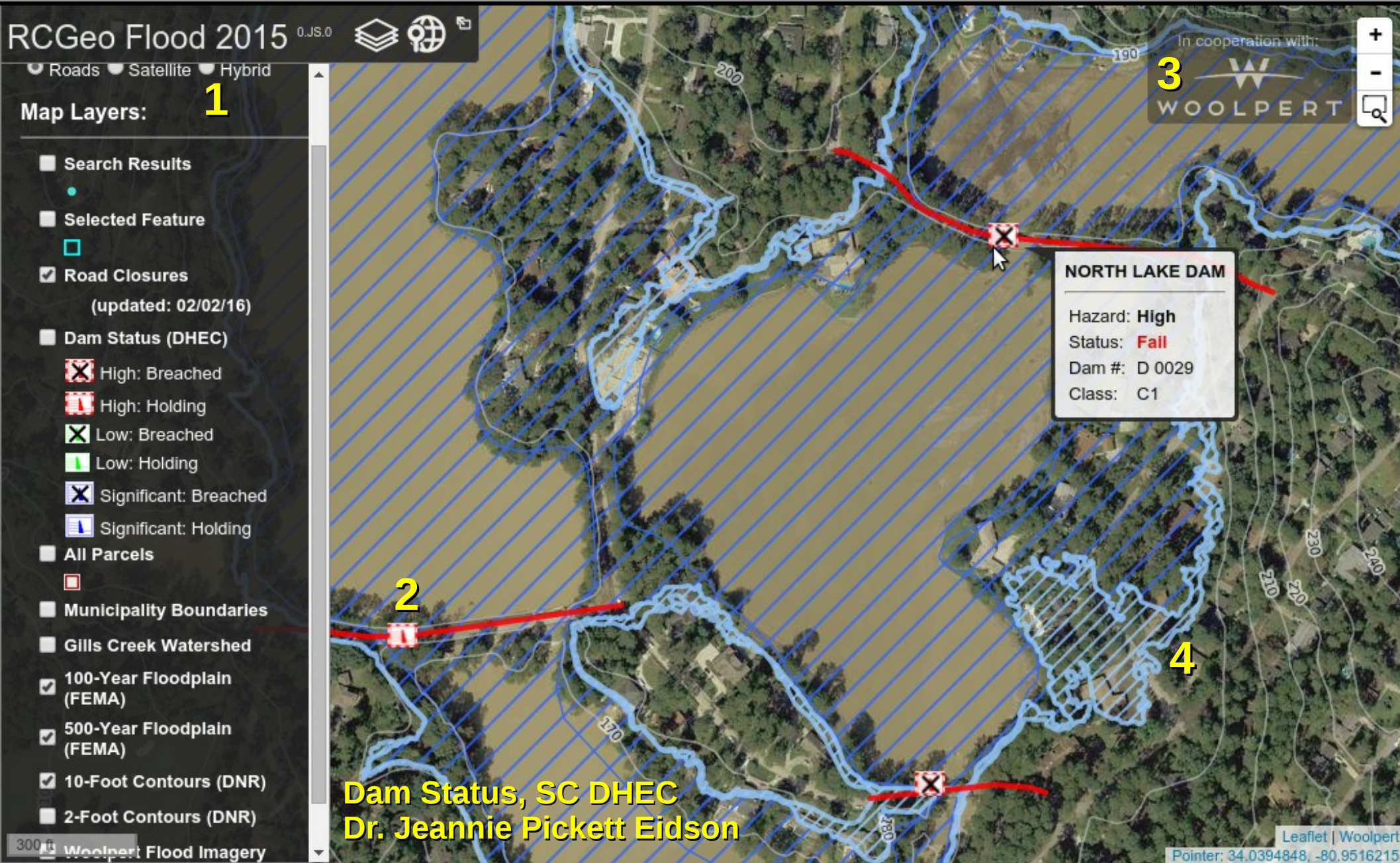
All Data Offsite



“The Cloud(s)” :-)

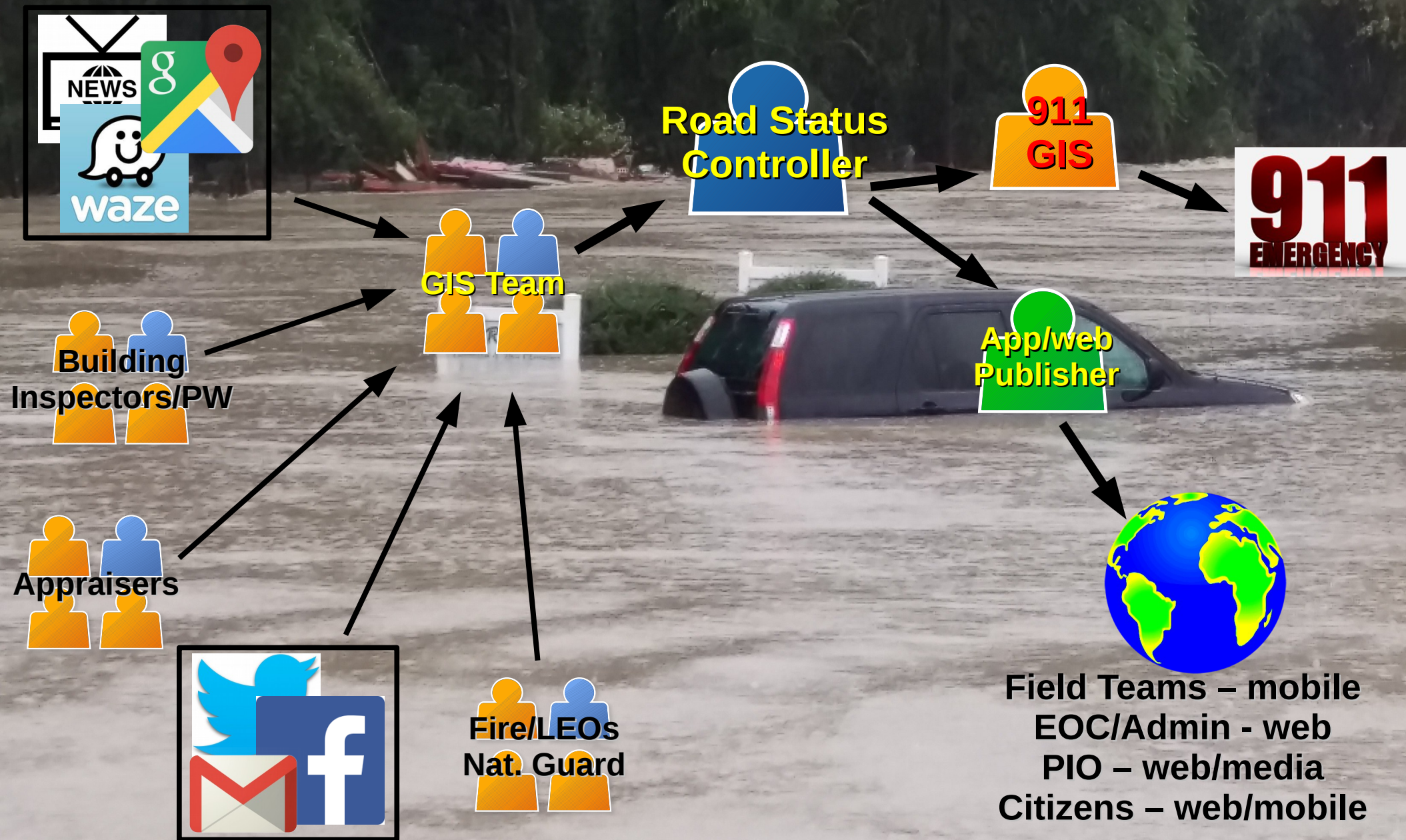
Web Services Are Essential!

Authoritative, Updated, Accurate



Maelstrom of Live Updates

Process + Coordination + Control = Situational Awareness





SCDOT

21 hrs · Edited ·

SC 215/Monticello Road is open to two-way traffic - 3 lanes are operational. Repairs will continue through the first part of the week to return it to full service.

Nice note of support from the community.



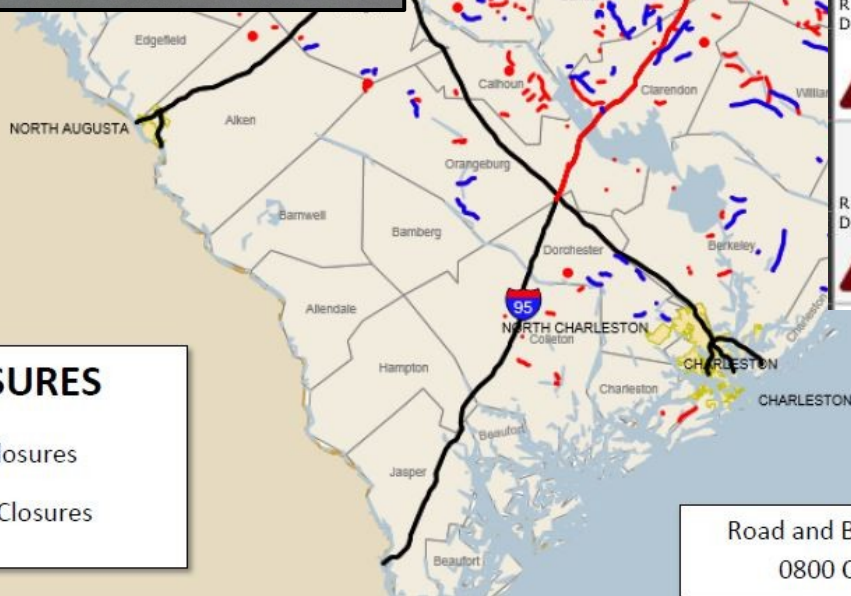
All Info...All Day...All Night

Of Limited Use

Printed Document

414 CLOSURES

- 271 Road Closures
- 143 Bridge Closures

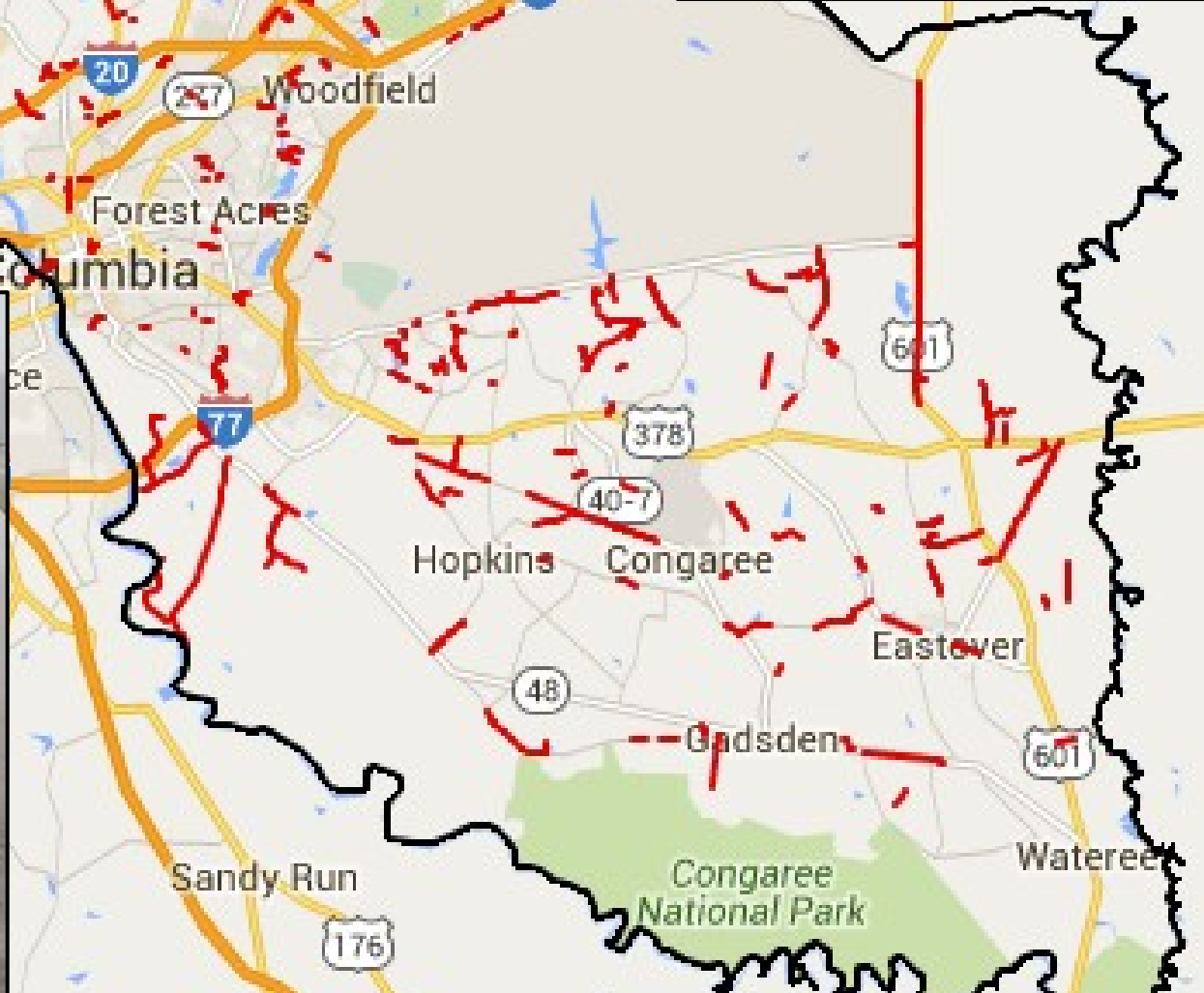
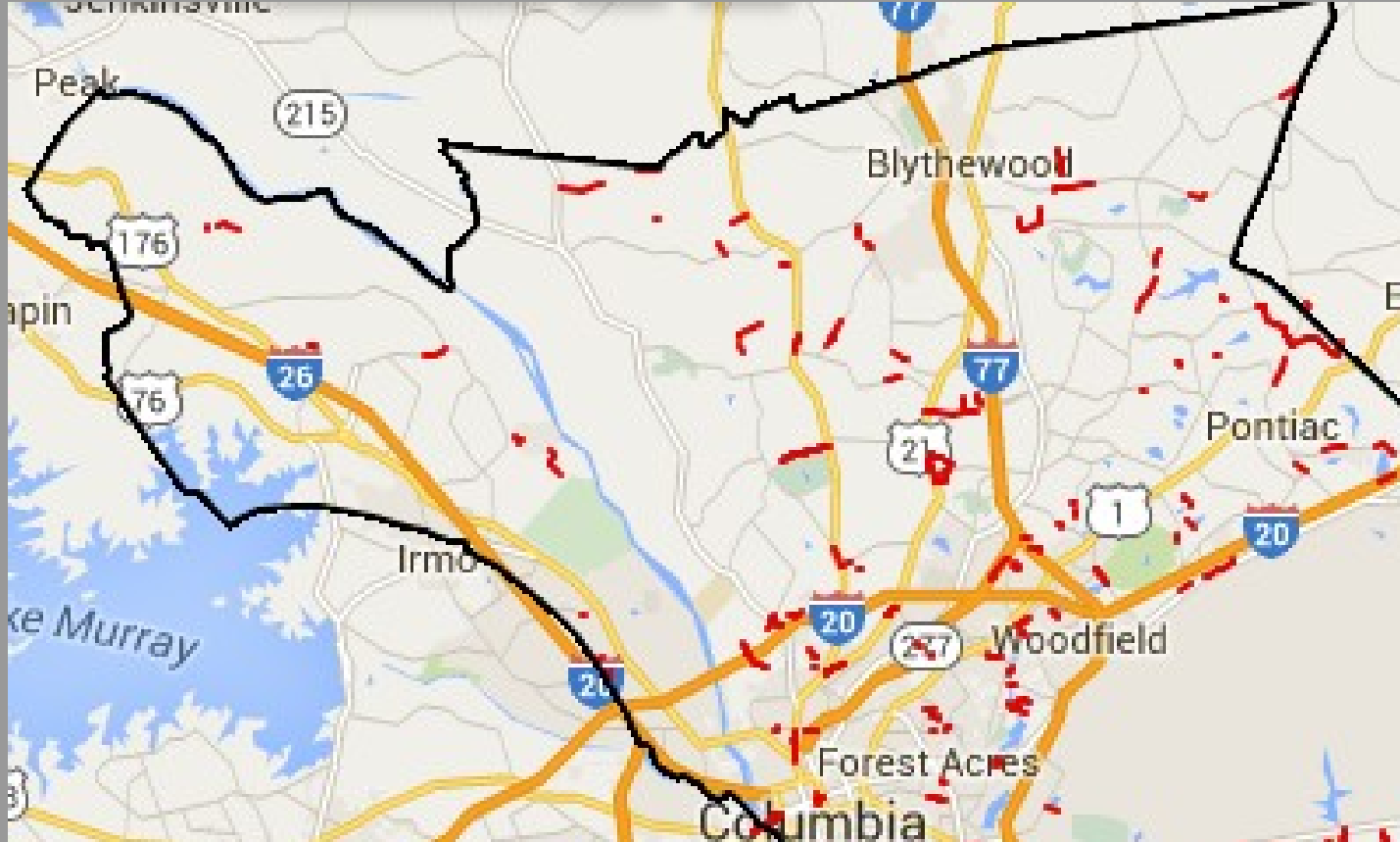


Road and Bridge Closures as of
0800 October 7, 2015

County	Route	From	To	Route Direction	Road Name	Start Date/End Date	Description
RICHLAND	S-436	S-33 Trenholm Road MP 0	End of Academy Road MP 0.36	BOTH	ACADEMY WAY	10/04/15 - 10/11/15	All Lanes Blocked CLOSED DUE TO FLOODING.
RICHLAND	S-223	Old Hopkins Rd (S-222) MP 0.00	Lower Richland Rd (S-37) MP 1.60	BOTH	AIR BASE ROAD	10/05/15 - 10/11/15	All Lanes Blocked CLOSED DUE TO FLOODING.
RICHLAND	S-233	MP 0	at Lower Richland Blvd. MP 0.12	BOTH	AIRBASE RD.	10/05/15 - 10/07/15	All Lanes Blocked CLOSED DUE TO FLOODING.
RICHLAND	S-63	Tell Dr. MP 0.76	Windsor Lake Blvd. MP 1.68	BOTH	ALPINE RD.	10/05/15 - 10/07/15	All Lanes Blocked CLOSED DUE TO FLOODING.
RICHLAND	S-1575	North Trenholm Rd (S-33) MP 0	Sandwood Drive (S-2348) MP 0.45	BOTH	ARCADIA LAKES DRIVE EAST	10/04/15 - 10/11/15	All Lanes Blocked CLOSED DUE TO FLOODING.
RICHLAND	S-1198	Mt. Elon Rd. MP 0	Garners Ferry Rd. MP 1.33	BOTH	ARNOLD RD.	10/05/15 - 10/07/15	All Lanes Blocked CLOSED DUE TO FLOODING.

Spreadsheet

Low-res PDF



Mobile/ Immediate

Richland County Flood 2015

Map Status Viewer as of 1/22/2016

saved in Drive

er + Share

uncil_Districts

Closures

dividual styles

ION

RTER

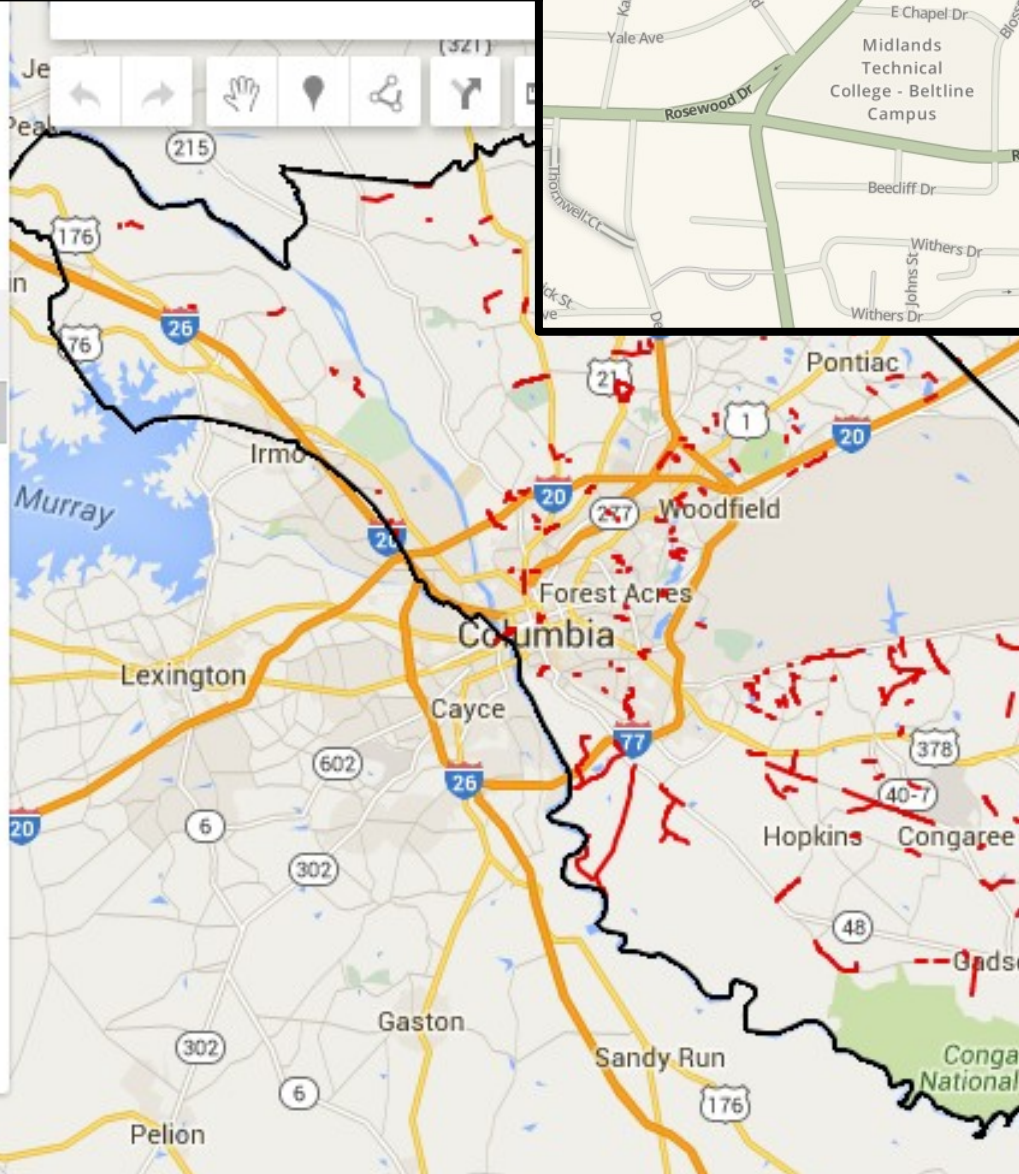
RICK

RICK

BERTS

AR CREEK

ERCREEK



waze

LIVE MAP

MAJOR EVENTS

SUPPORT

BLOG

ABOUT

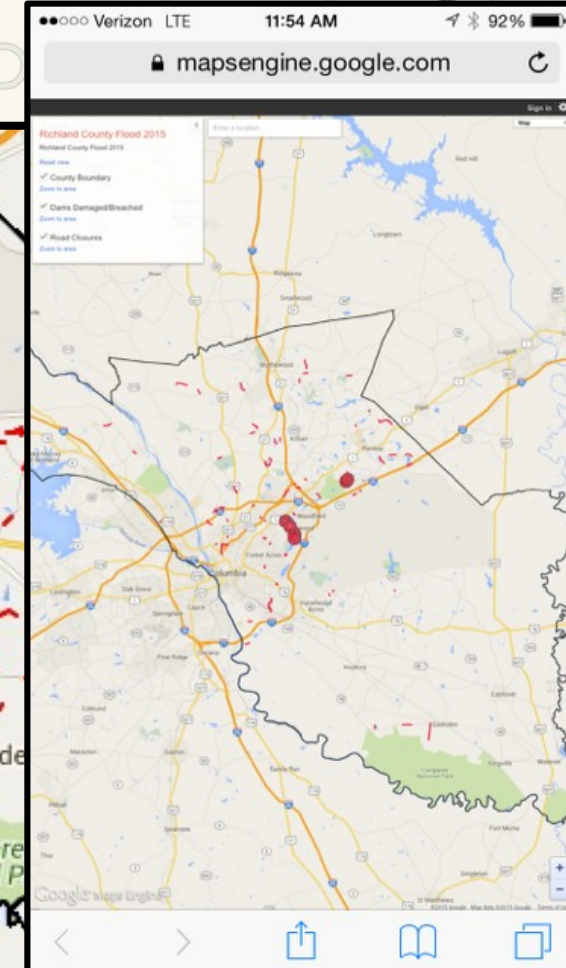
Search for an address or place

Road closure

On Devine St in Columbia, SC
Average speed: 0 mph
about 8 hours ago

Devine St

Columbia, SC



Road Closures with Columbia Area Detours

Legend

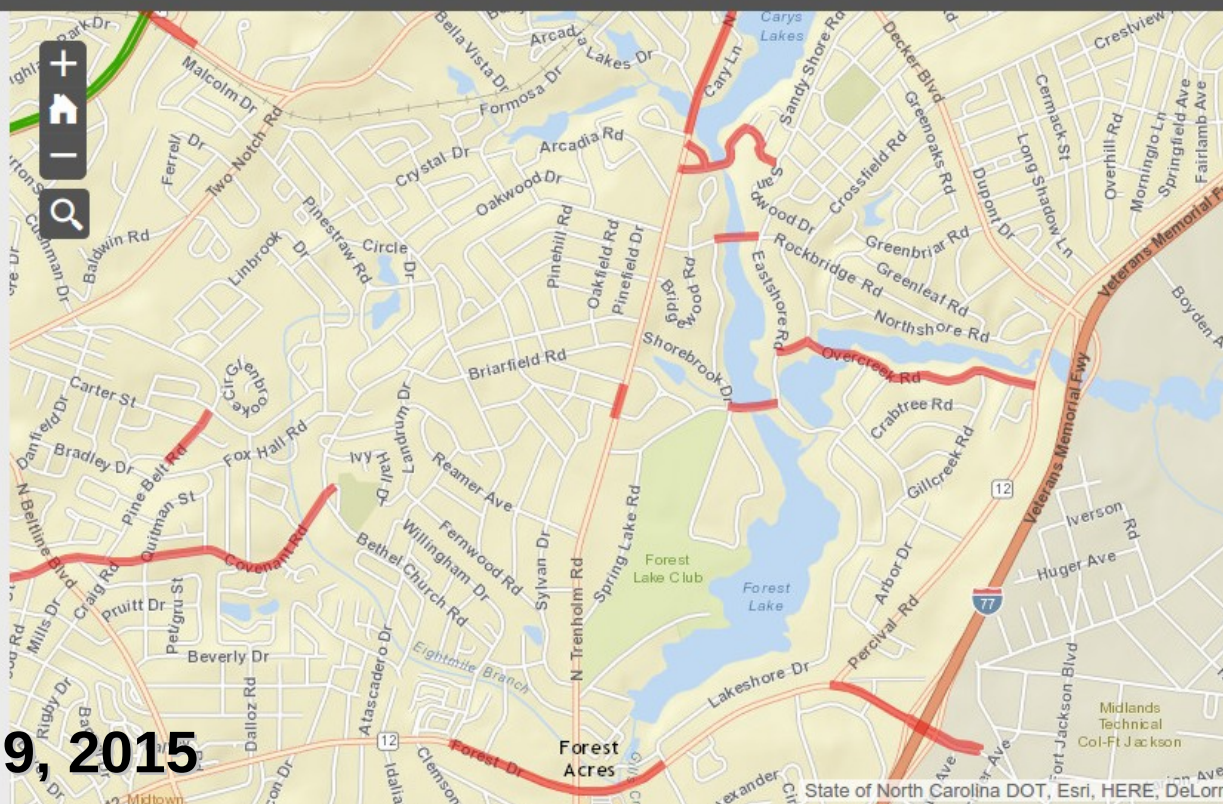
SCDOT Road Closures

SCDOT Road Closures

I-95 open to Local Traffic Only

Columbia Area Detours

Counties

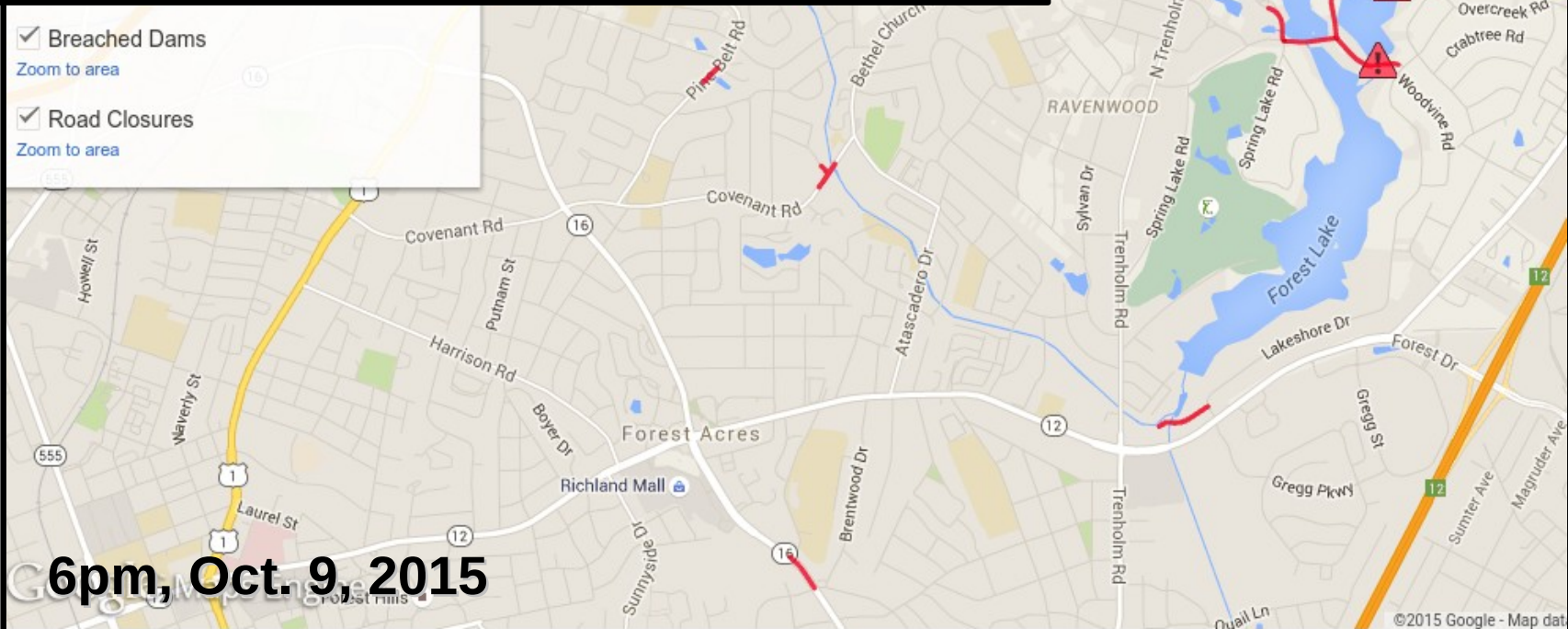


6pm, Oct. 9, 2015

**Must Be
Accurate!**

**For 911,
Field Crews,
and Citizens**

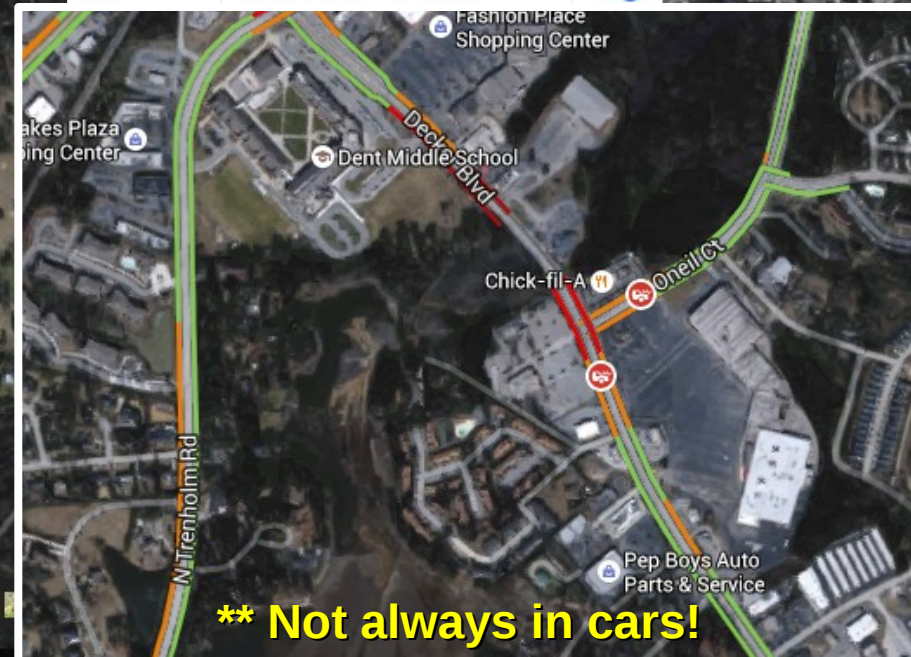
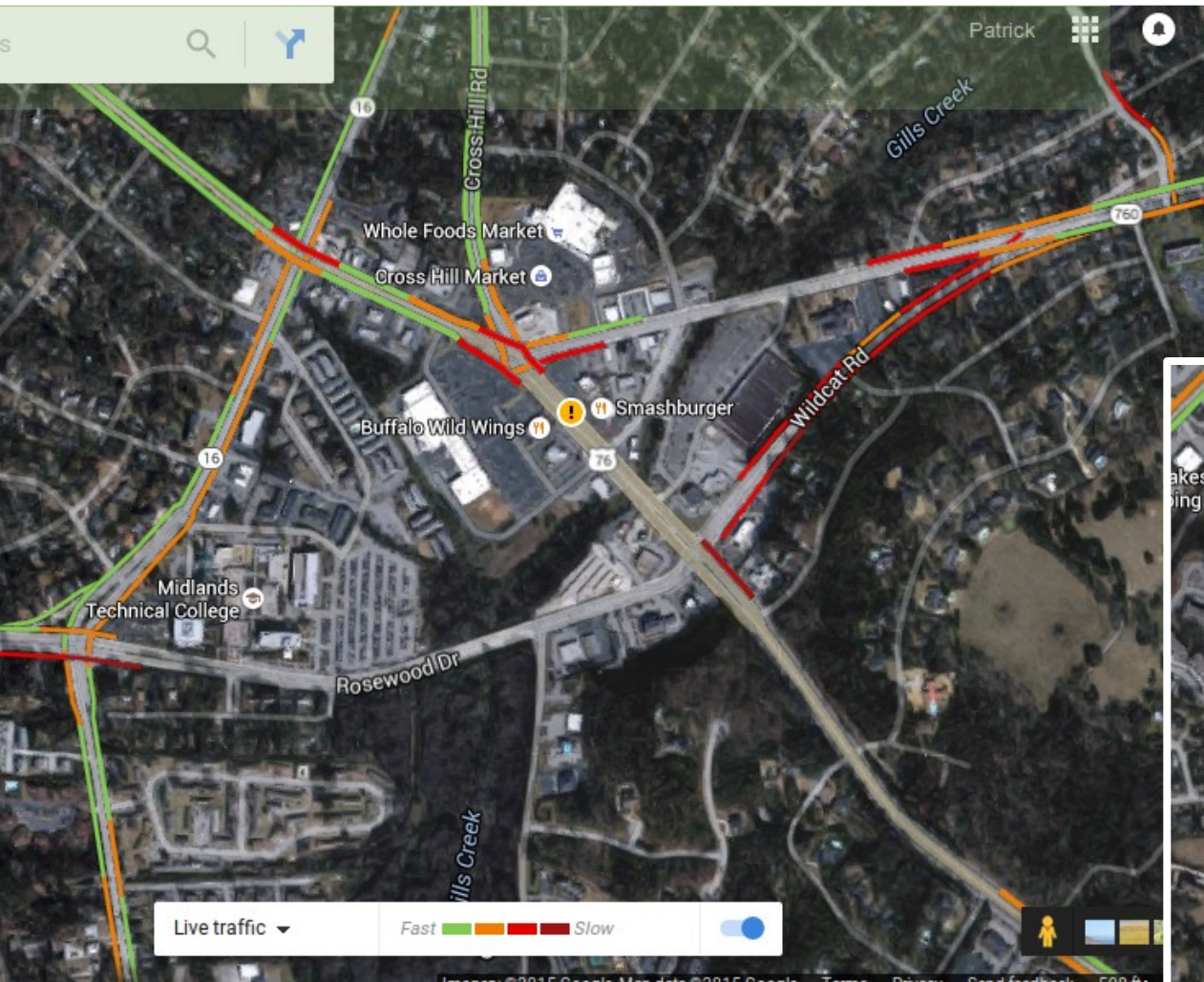
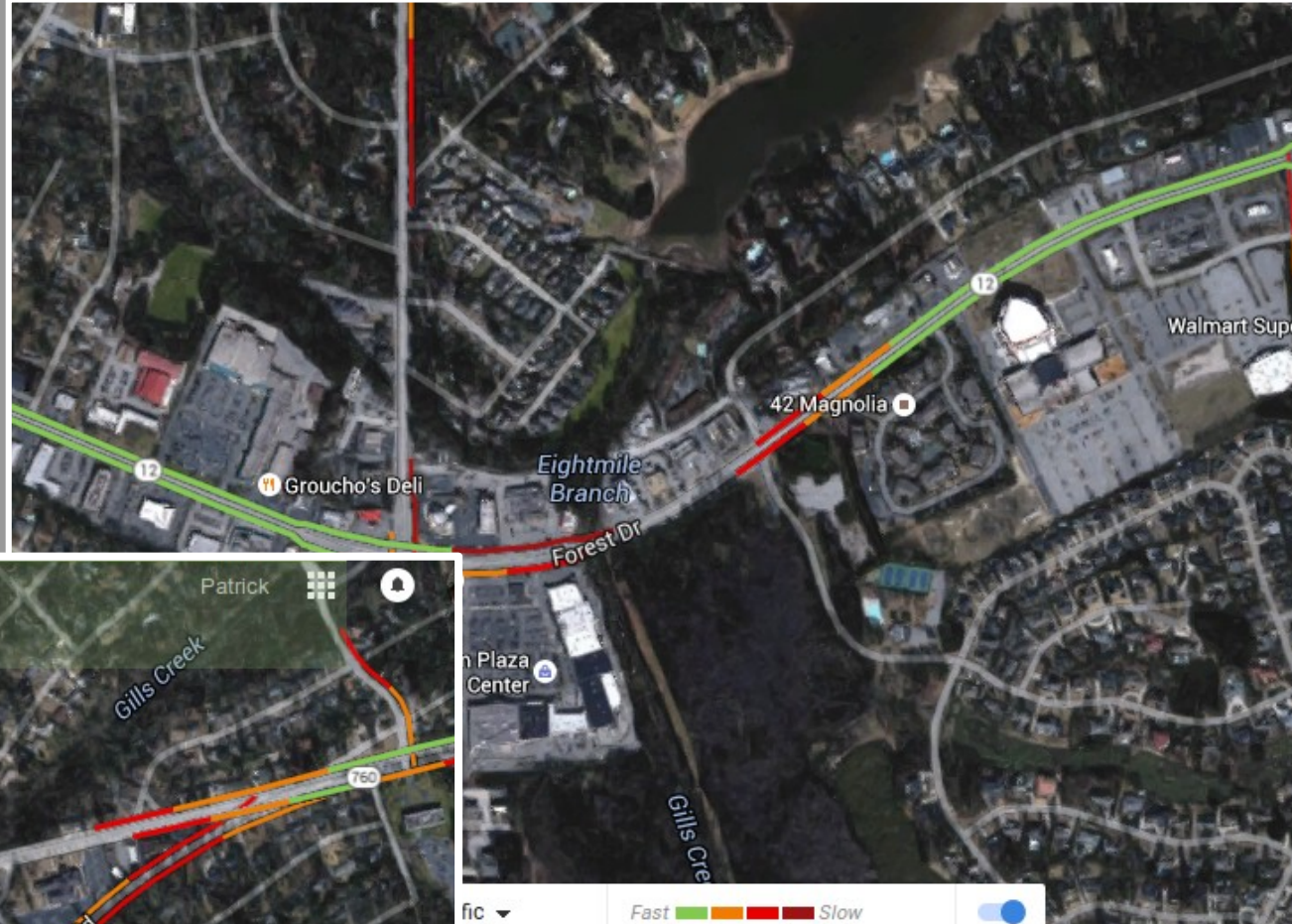
- ☒ Breached Dams
[Zoom to area](#)
- ☒ Road Closures
[Zoom to area](#)



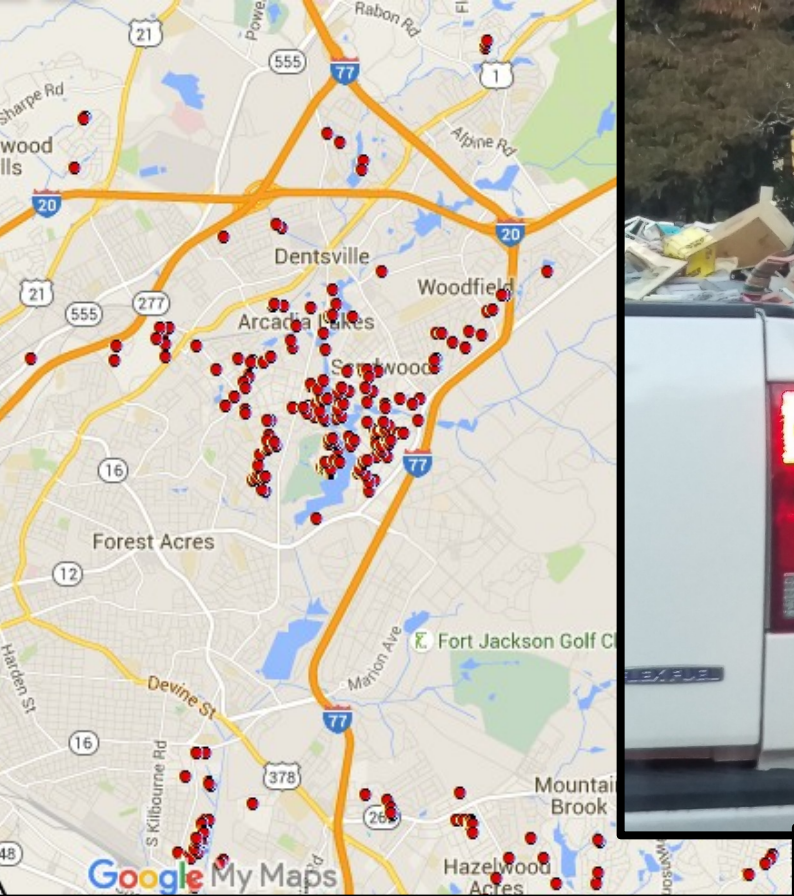
6pm, Oct. 9, 2015

Citizen Sensors

Google Traffic



**** Not always in cars!**



As we recover, we record what we learn...

- No paper
- Each event is unique – mobile was key in this one (cell towers intact)
- Web services!
- Platform agnostic technology and mobile ready
- Contact/cooperation
- Use all contacts
- Firemen rock!
- Efficient/effective/roi/just because you can doesn't mean you should!
- Geo in response plan