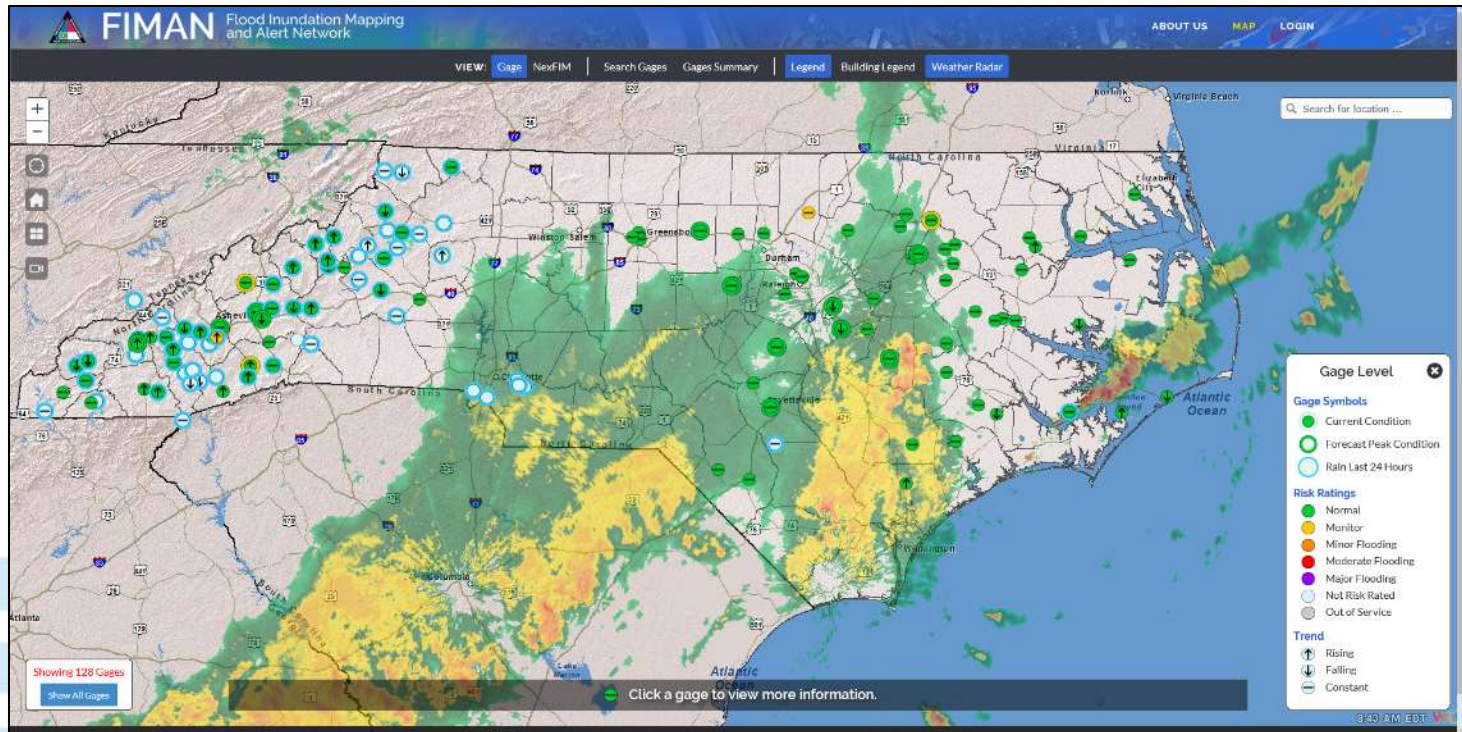


FIMAN

Beyond Floodplain Mapping to Real-time and Forecasted Event Based Flood Inundation Mapping



North Carolina Society of Surveyors
Wilmington, NC

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NC Department of Public Safety
Division of Emergency Management
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March 18, 2017

Outline

- The Past: How we got here
- The Present: FIMAN Basics – What it is and how it works
- The Future: Where are we going?
- How good is it? FIMAN in Action
- Closing and Q&A

THE PAST:

How we got here.



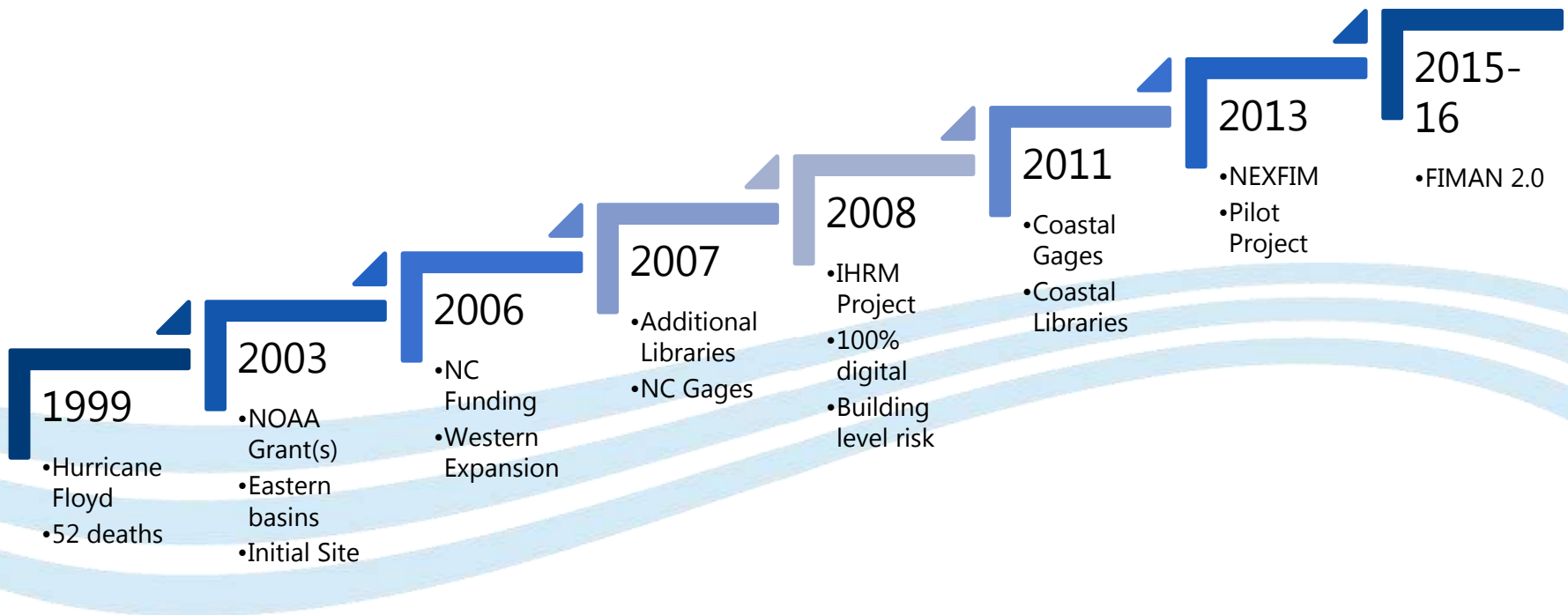
The Genesis 1999...Hurricane Dennis followed by Floyd



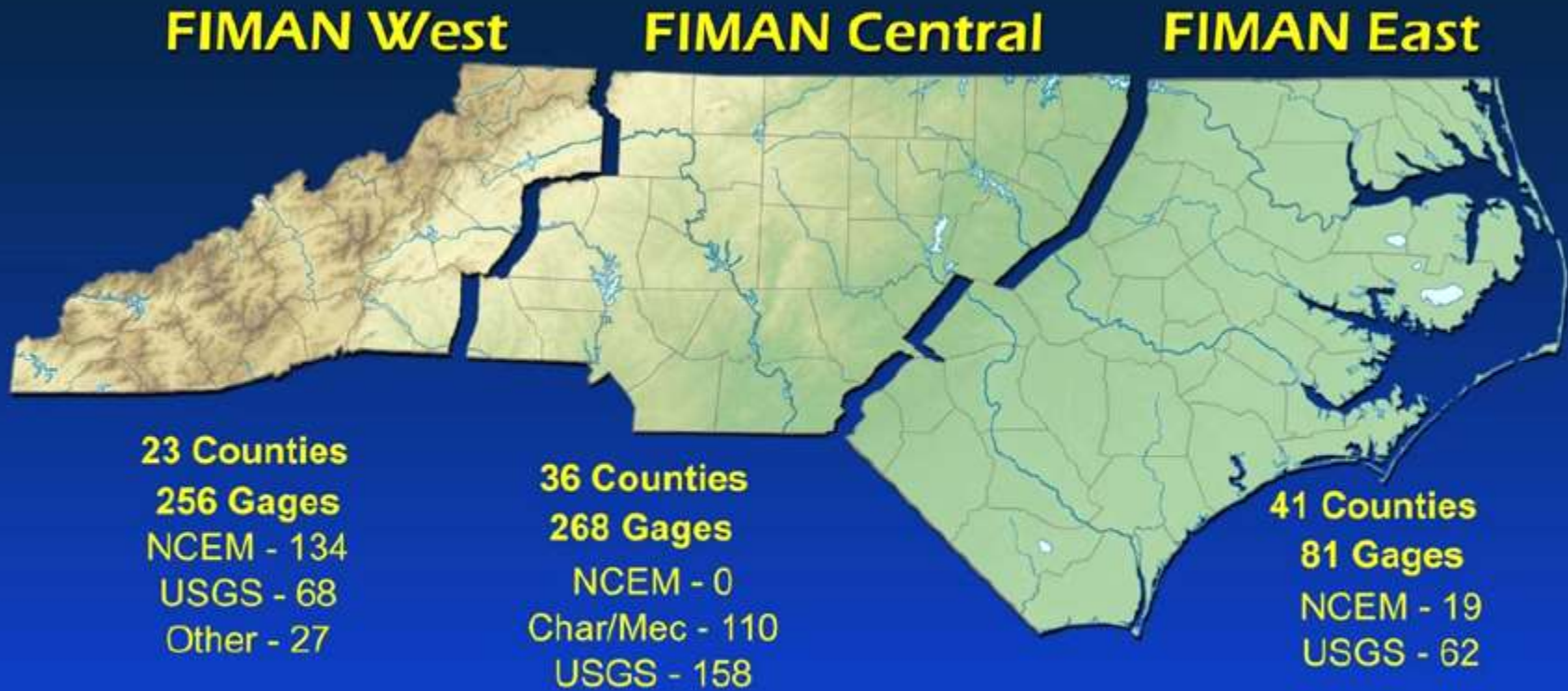
N.C. Flood Warning Program Goals

- Real-time flood inundation mapping (current and forecast)
- Alerts
- Leverage vast investment in data
- Assist in risk-based decisions during and before disaster
- Prevent and reduce the loss of lives and property

NC Flood Warning Program Timeline



FIMAN Data Sources

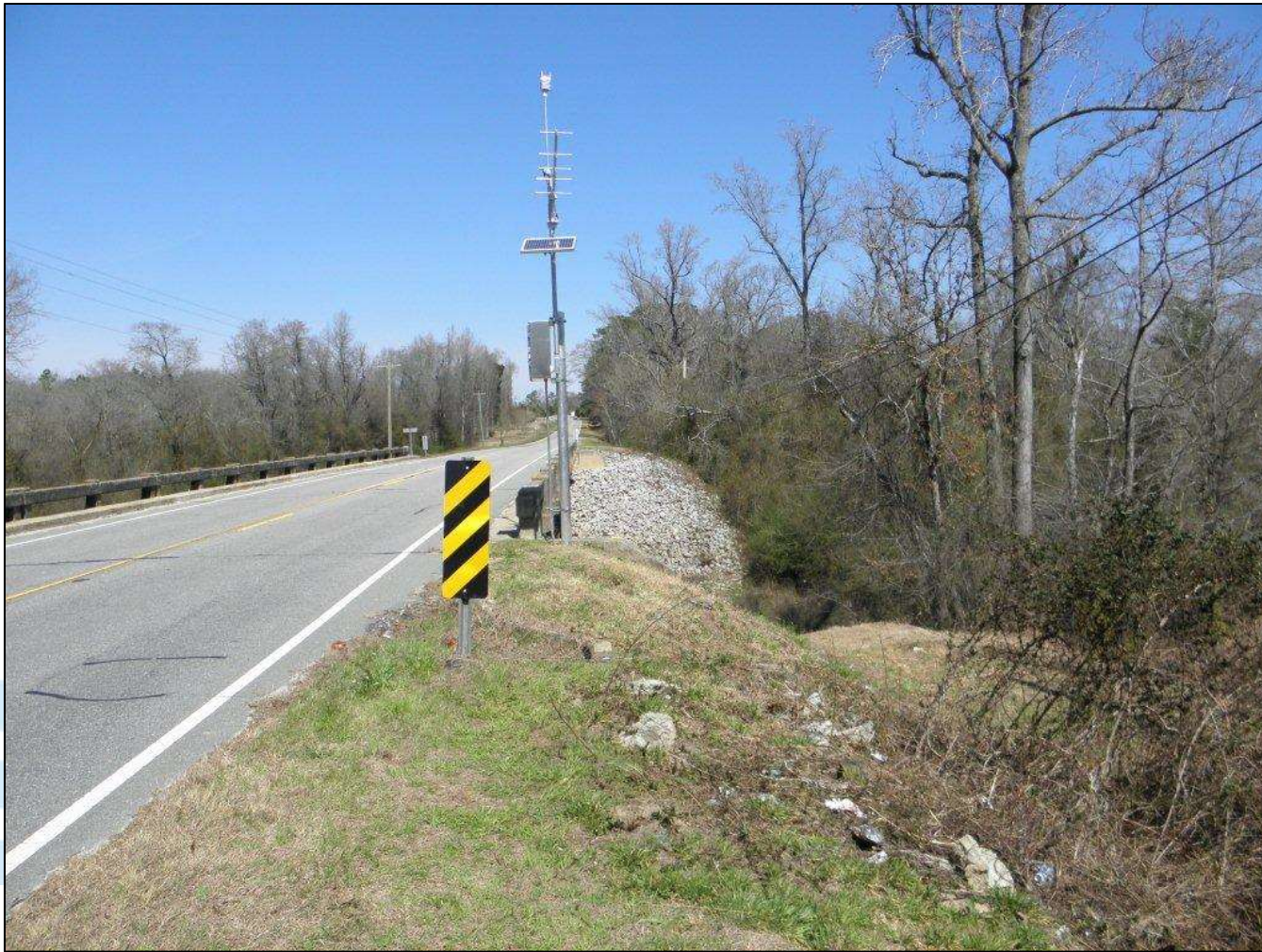


Example NC Gage Station Installations



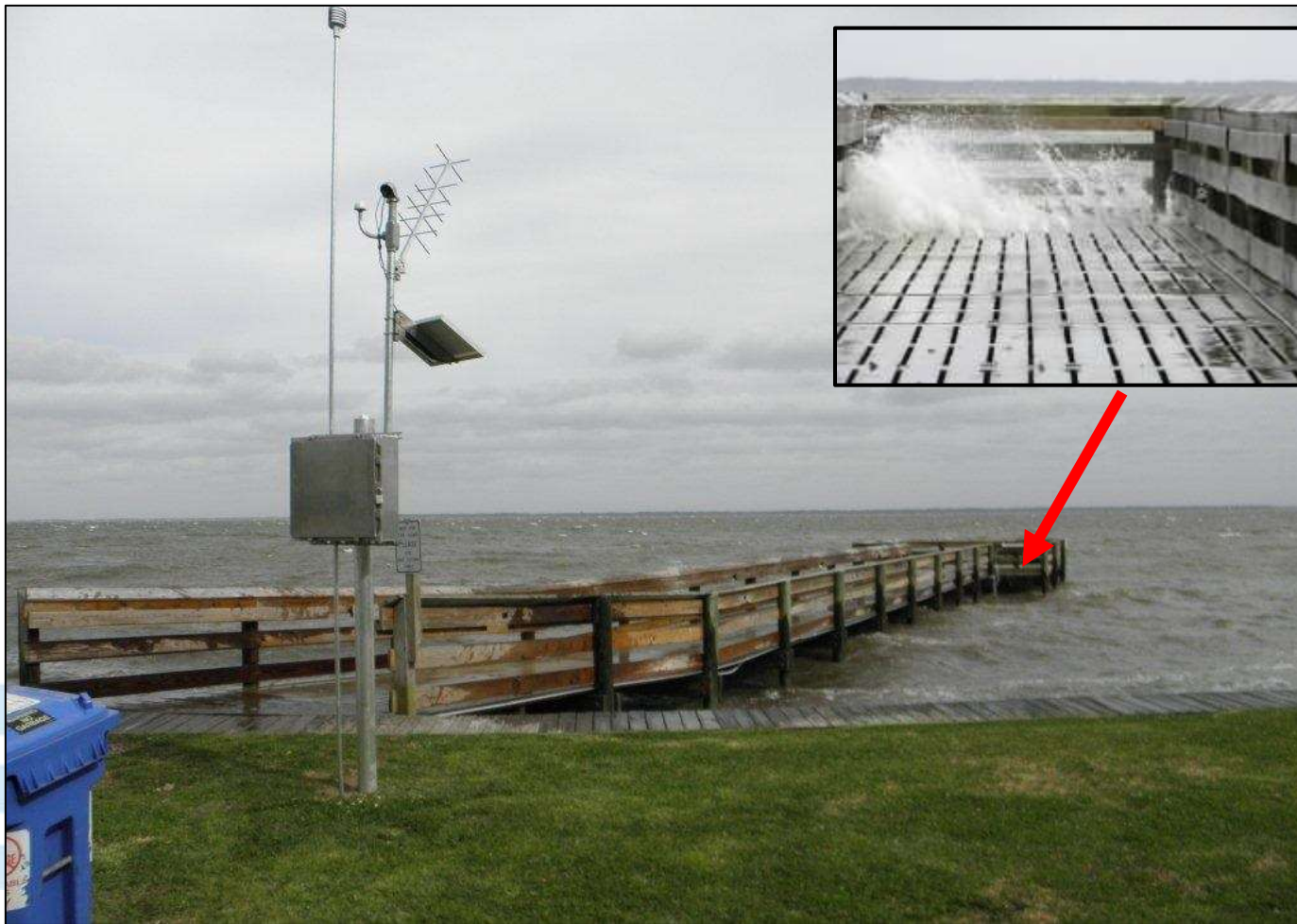
North Fork Catawba River at US 221

Example NC Gage Station Installations



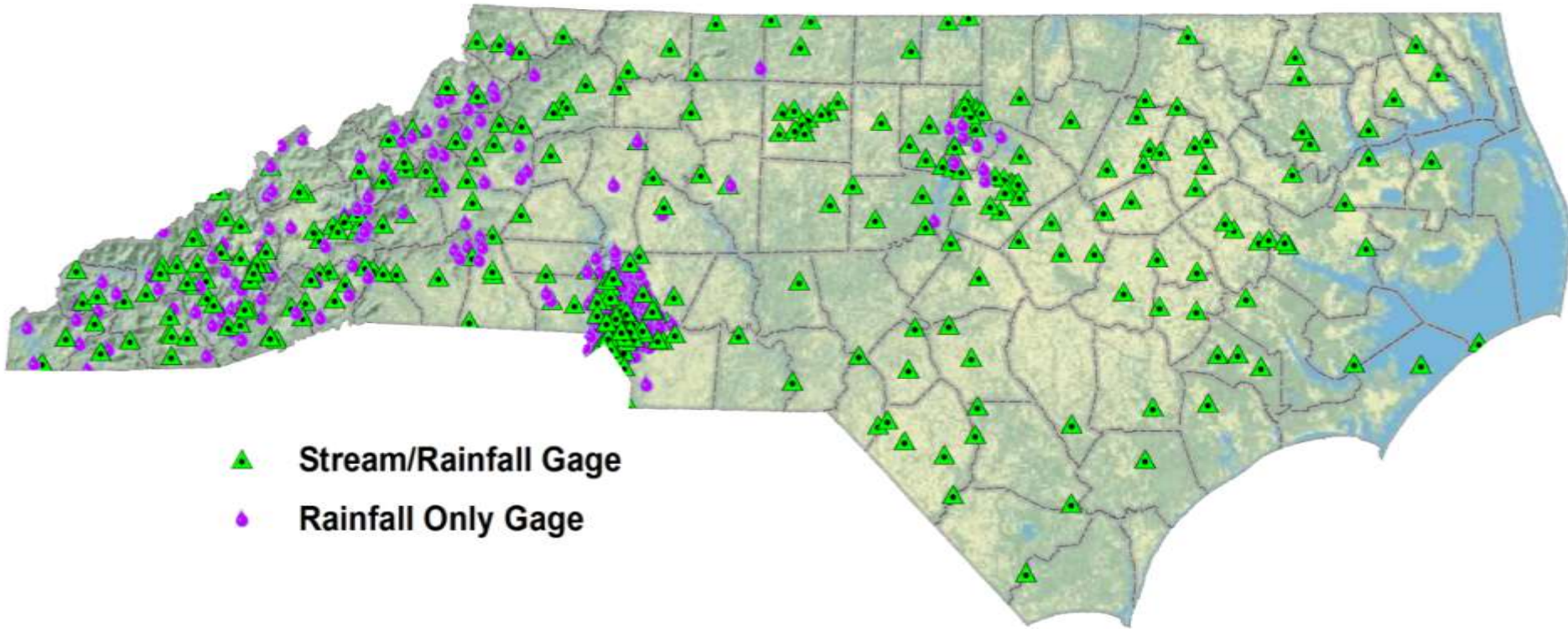
Town Creek at US 258 (Pitt County)

Example NC Gage Station Installations

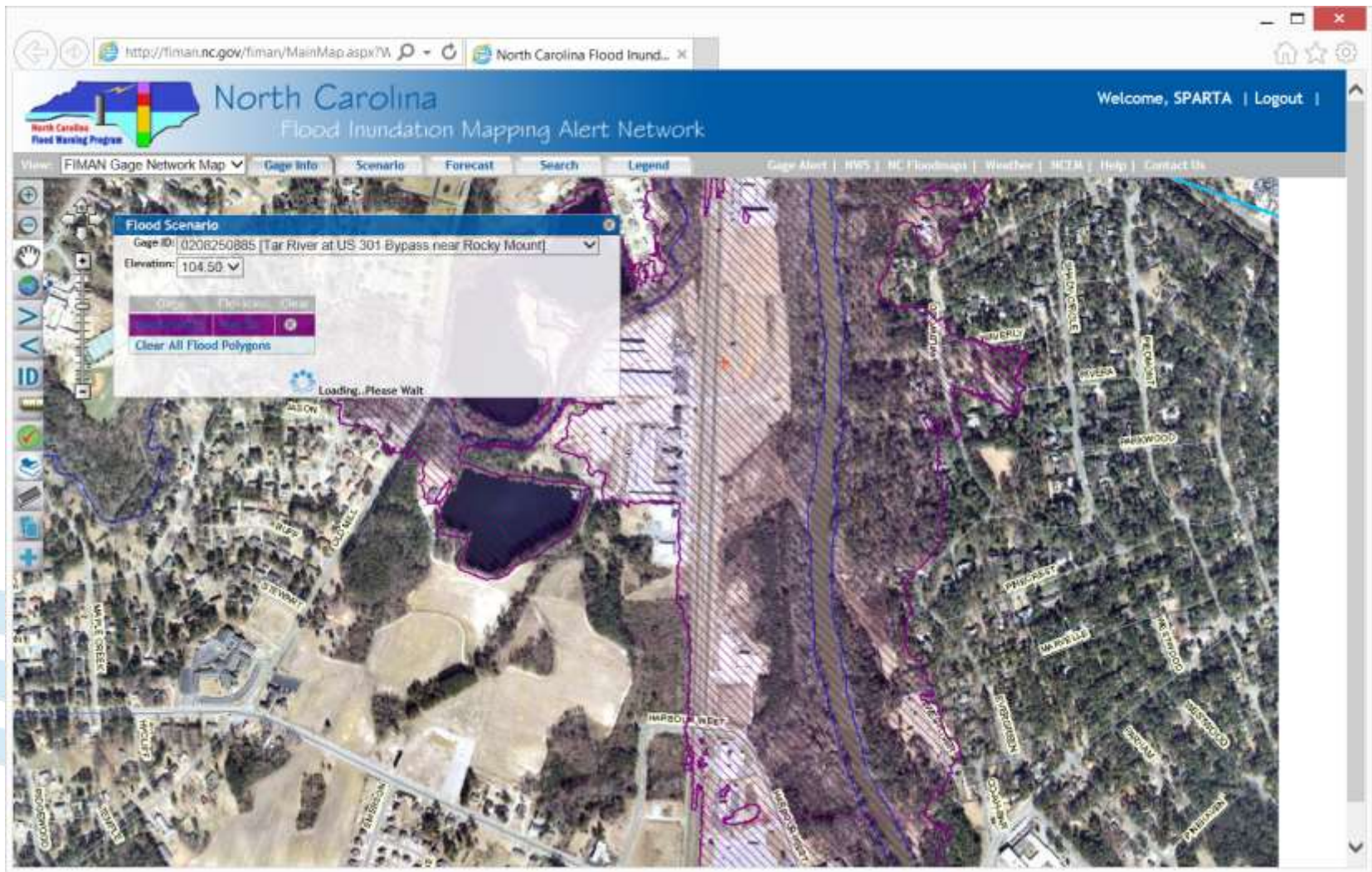


Neuse River at Oriental Town Pier

FIMAN Data Sources



Library Use (existing site)



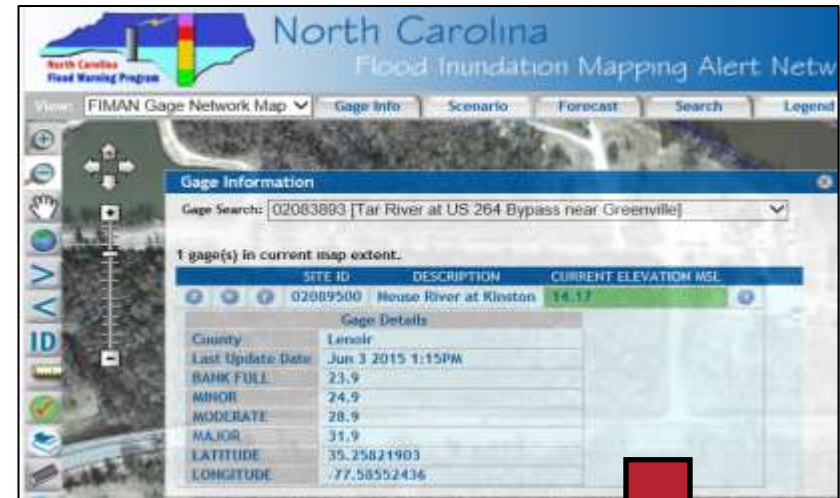
2015: Two Problems to Solve

1

- Current System was Dated
- Slow GIS Performance
- Only Showed Hazard (no risk)
- Responsive Design
- Open to Public / Alerts

2

- Solve the “postage stamp” problem with the library mapping approach
- Not ideal for assisting at EOC for Situational Intelligence



What is an Inundation Library?

“Library” of flood inundation mapping near gaging stations

- + Gaging Stations
- + Telemetry
- + Pre-made inundation libraries
- + Web tool to efficiently communicate

Real-time flood mapping solution



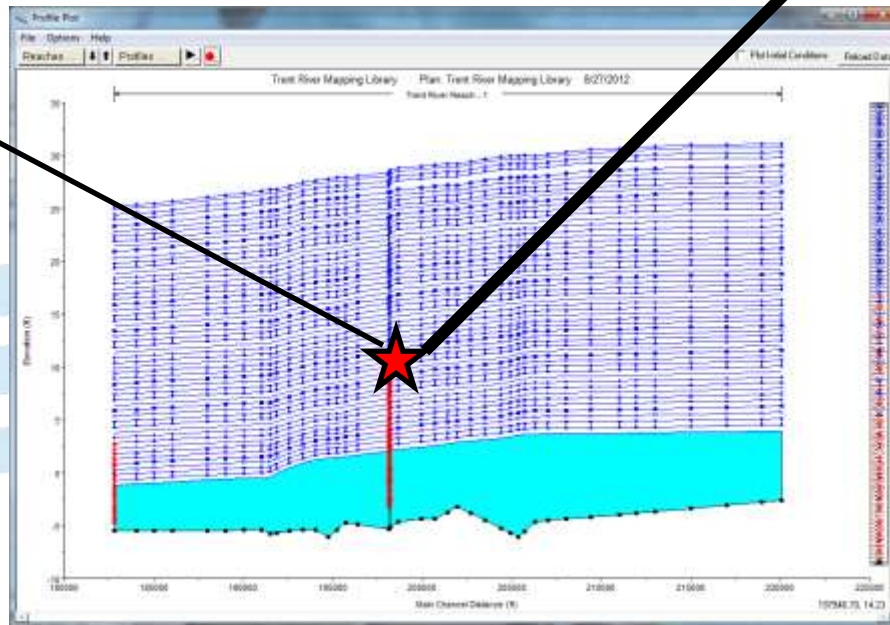
N. Fork Catawba River @ HWY 221

How do you make one?

- Start with effective FIS model
- Add survey if needed
- Iterative Modeling for all "Stage Targets"

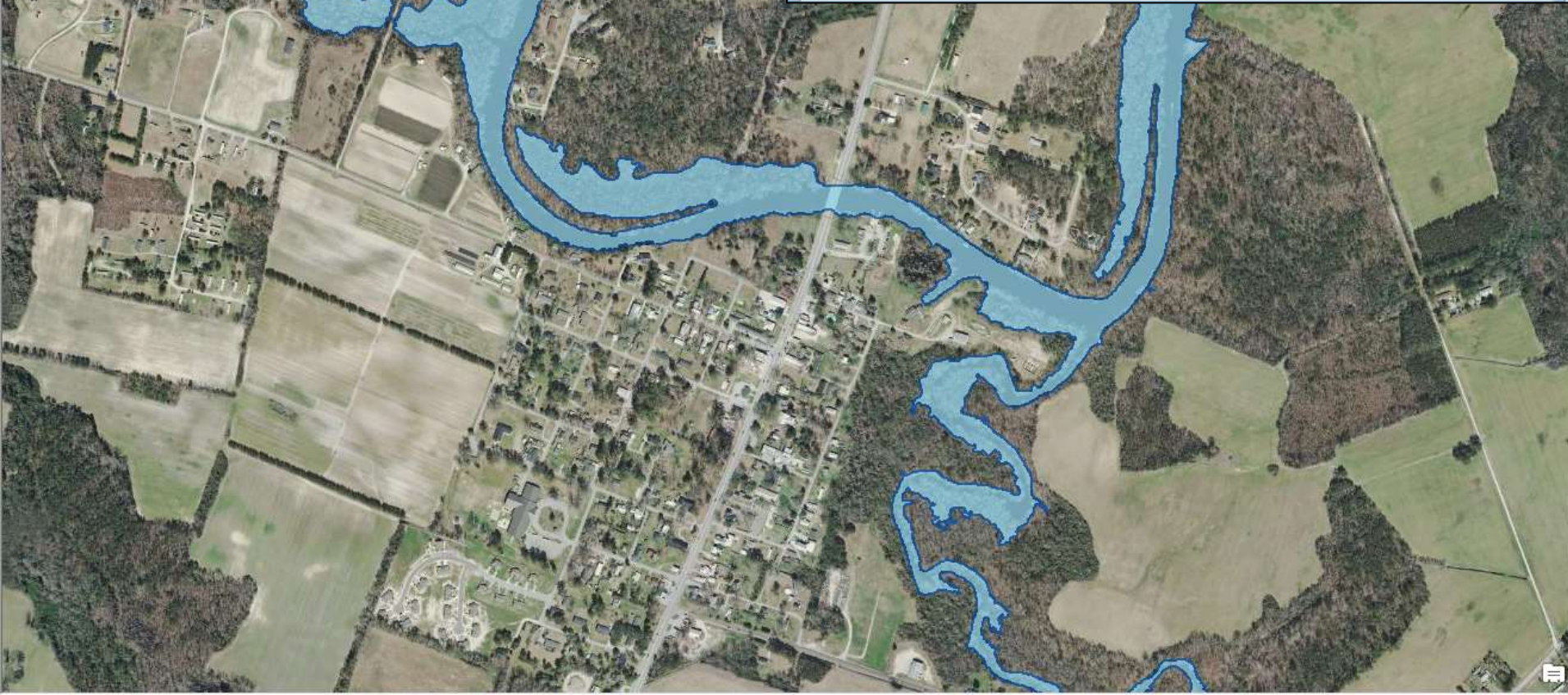
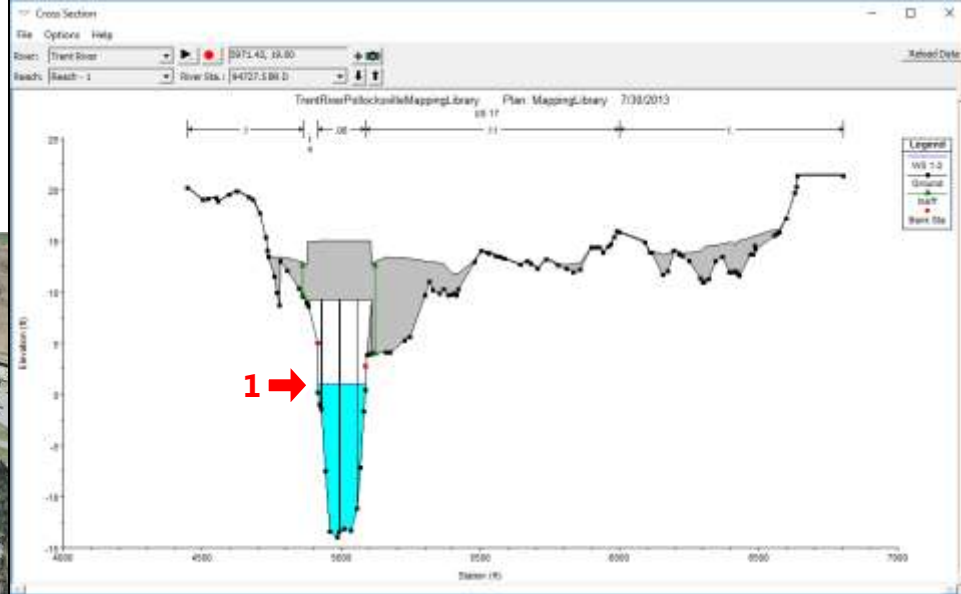
"Stage" target
in each model.

*This is
station
location*

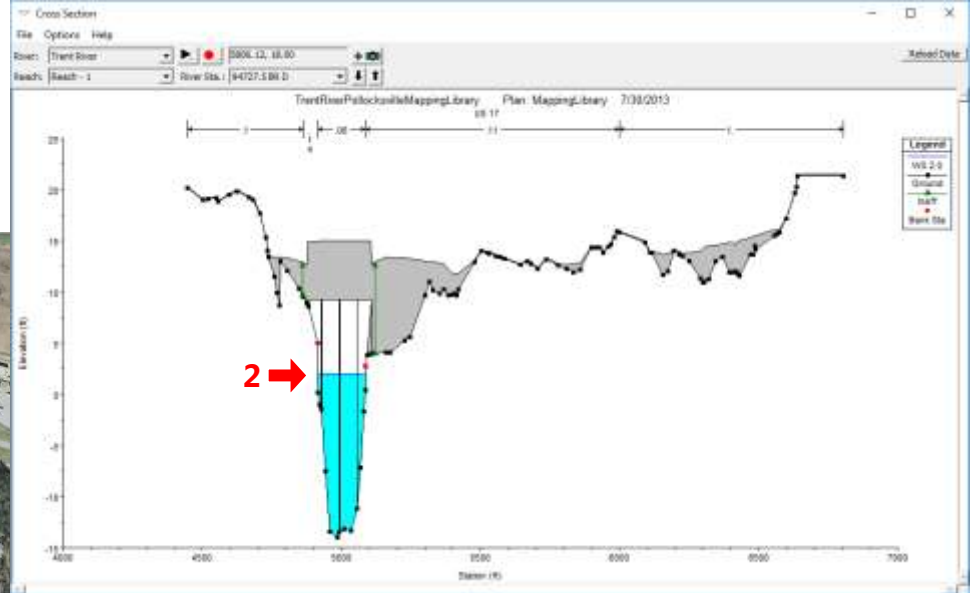


Profile Output Table - Drawdowns				
HEC-RAS Plan: 1				
Reach	River Station	Profile	W.S. Elev (ft)	Q Total (cfs)
Reach - 1	198164.3BR D	7.5	7.50	1435.00
Reach - 1	198164.3BR D	8	8.00	1563.00
Reach - 1	198164.3BR D	8.5	8.50	1698.00
Reach - 1	198164.3BR D	9	9.00	1838.00
Reach - 1	198164.3BR D	9.5	9.50	1980.00
Reach - 1	198164.3BR D	10	10.00	2130.00
Reach - 1	198164.3BR D	10.5	10.50	2285.00
Reach - 1	198164.3BR D	11	11.00	2450.00
Reach - 1	198164.3BR D	11.5	11.50	2625.00
Reach - 1	198164.3BR D	12	12.00	2805.00
Reach - 1	198164.3BR D	12.5	12.50	2995.00
Reach - 1	198164.3BR D	13	13.00	3195.00
Reach - 1	198164.3BR D	13.5	13.50	3395.00
Reach - 1	198164.3BR D	14	14.00	3615.00
Reach - 1	198164.3BR D	14.5	14.50	3842.00
Reach - 1	198164.3BR D	15	15.00	4080.00
Reach - 1	198164.3BR D	15.5	15.50	4330.00
Reach - 1	198164.3BR D	16	16.00	4595.00
Reach - 1	198164.3BR D	16.5	16.50	4875.00
Reach - 1	198164.3BR D	17	17.00	5160.00
Reach - 1	198164.3BR D	17.5	17.50	5460.00
Reach - 1	198164.3BR D	18	18.00	5775.00
Reach - 1	198164.3BR D	18.5	18.50	6105.00
Reach - 1	198164.3BR D	19	19.00	6450.00
Reach - 1	198164.3BR D	19.5	19.50	6815.00
Reach - 1	198164.3BR D	20	20.00	7230.00
Reach - 1	198164.3BR D	20.5	20.50	7660.00
Reach - 1	198164.3BR D	21	21.00	8075.00
Reach - 1	198164.3BR D	21.5	21.50	8590.00
Reach - 1	198164.3BR D	22	22.00	9140.00
Reach - 1	198164.3BR D	22.5	22.50	9715.00
Reach - 1	198164.3BR D	23	23.00	10300.00
Reach - 1	198164.3BR D	23.5	23.50	10920.00
Reach - 1	198164.3BR D	24	24.00	11500.00
Reach - 1	198164.3BR D	24.5	24.50	12190.00
Reach - 1	198164.3BR D	25	25.00	12830.00
Reach - 1	198164.3BR D	25.5	25.50	13550.00
Reach - 1	198164.3BR D	26	26.00	14270.00
Reach - 1	198164.3BR D	26.5	26.50	15040.00
Reach - 1	198164.3BR D	27	27.00	16005.00

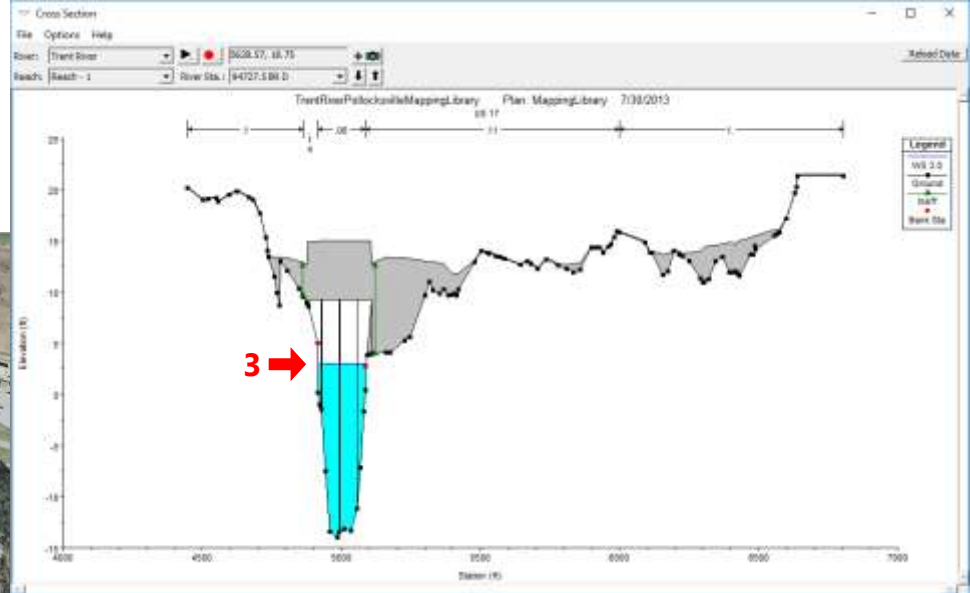
Library Creation



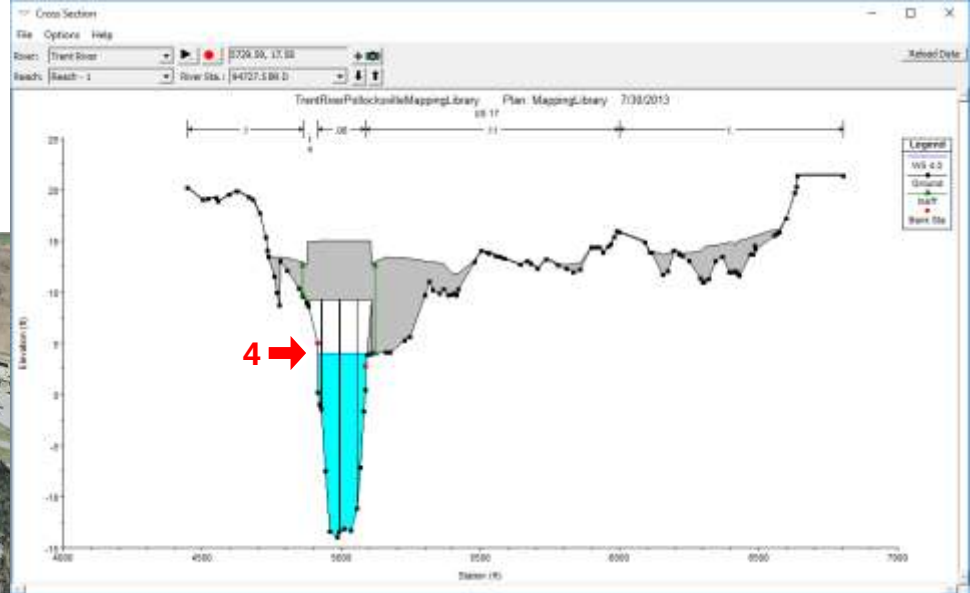
Library Creation



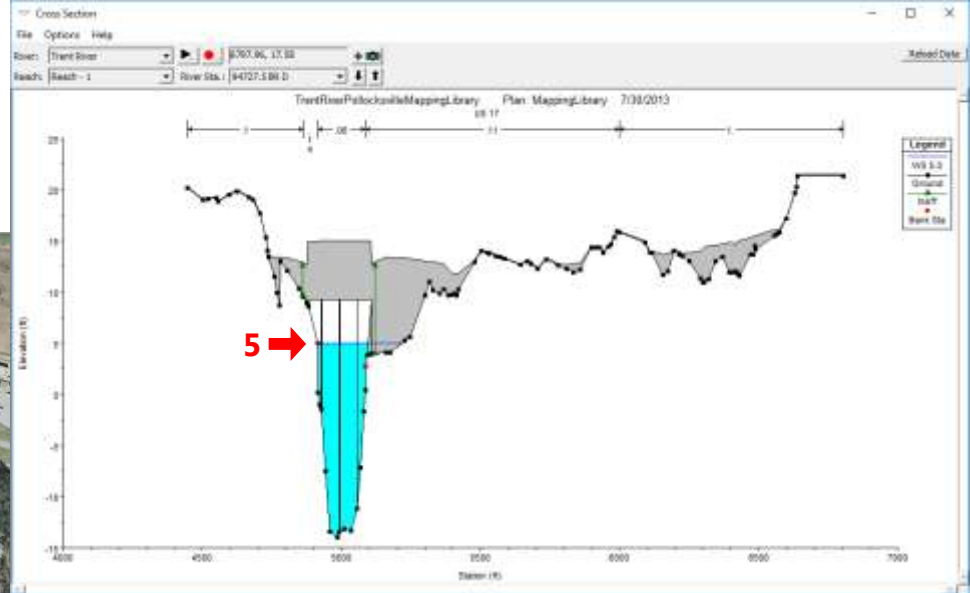
Library Creation



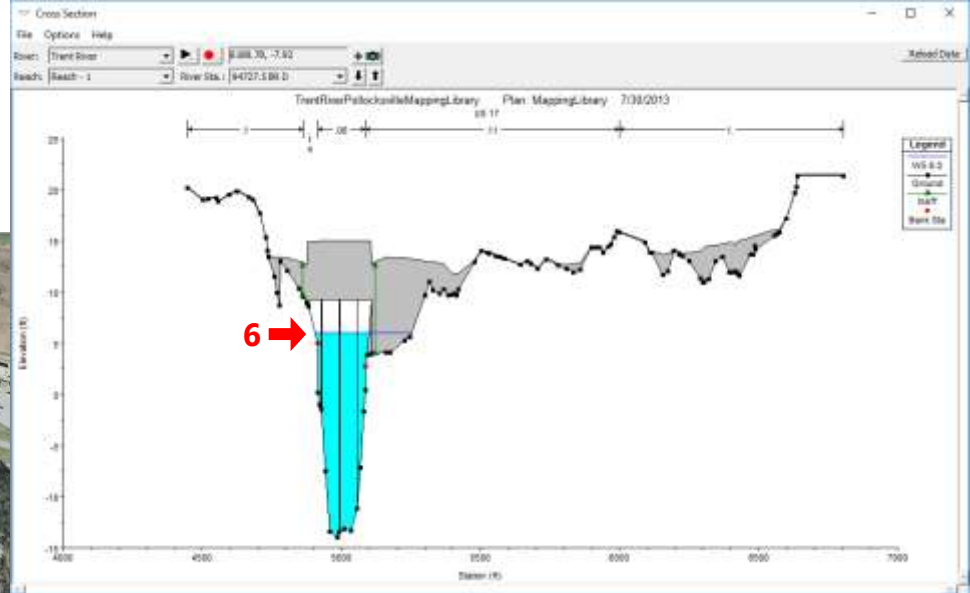
Library Creation



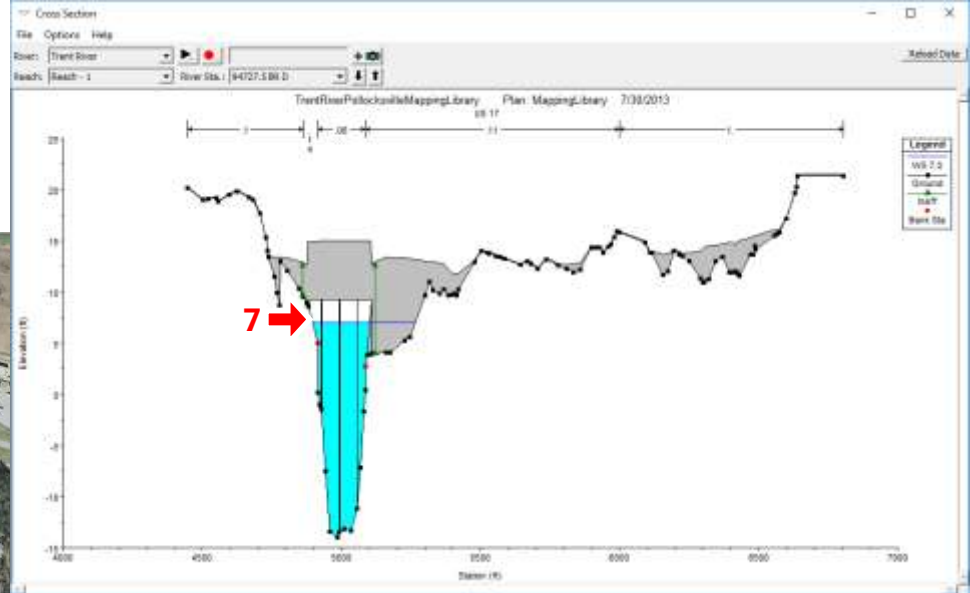
Library Creation



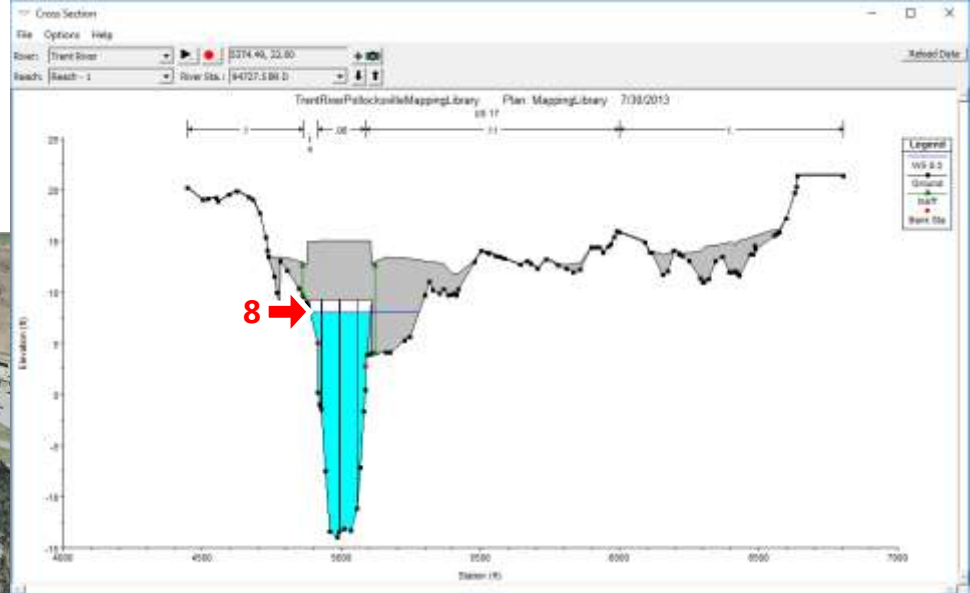
Library Creation



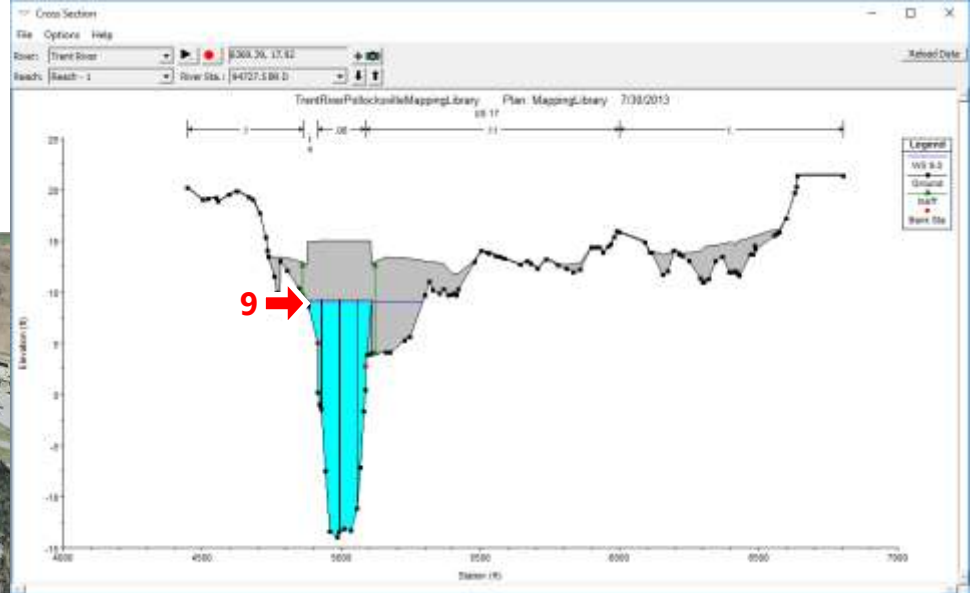
Library Creation



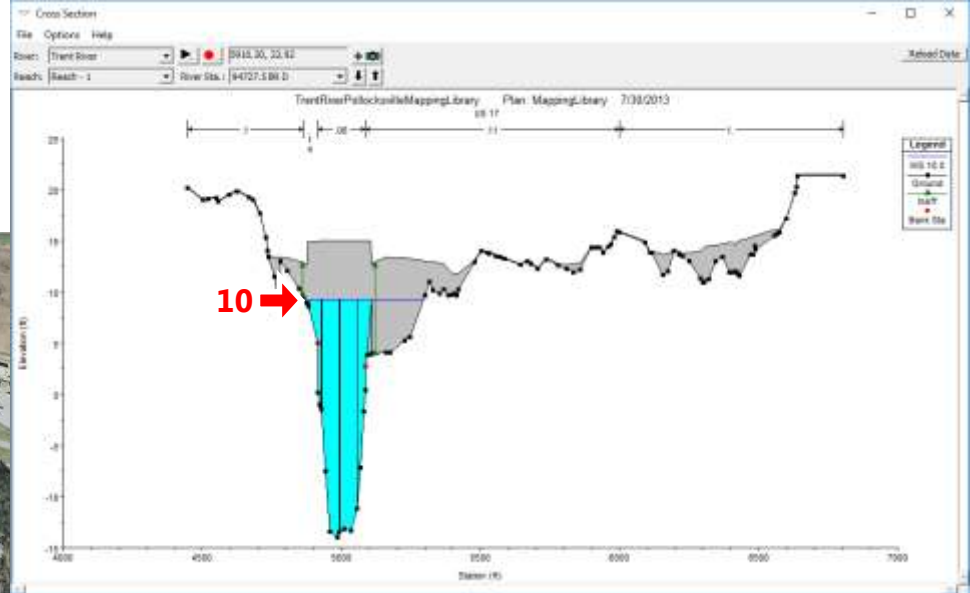
Library Creation



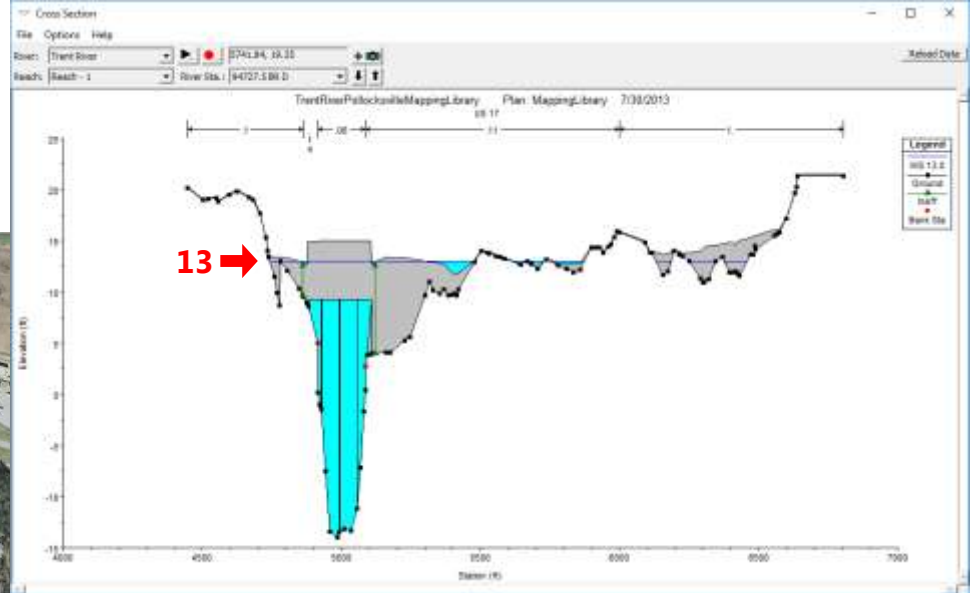
Library Creation



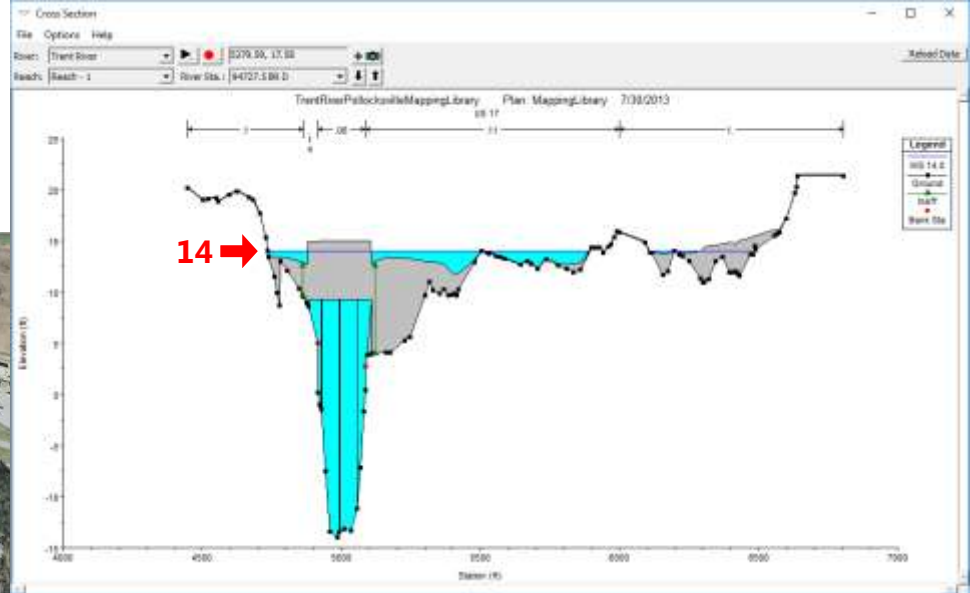
Library Creation



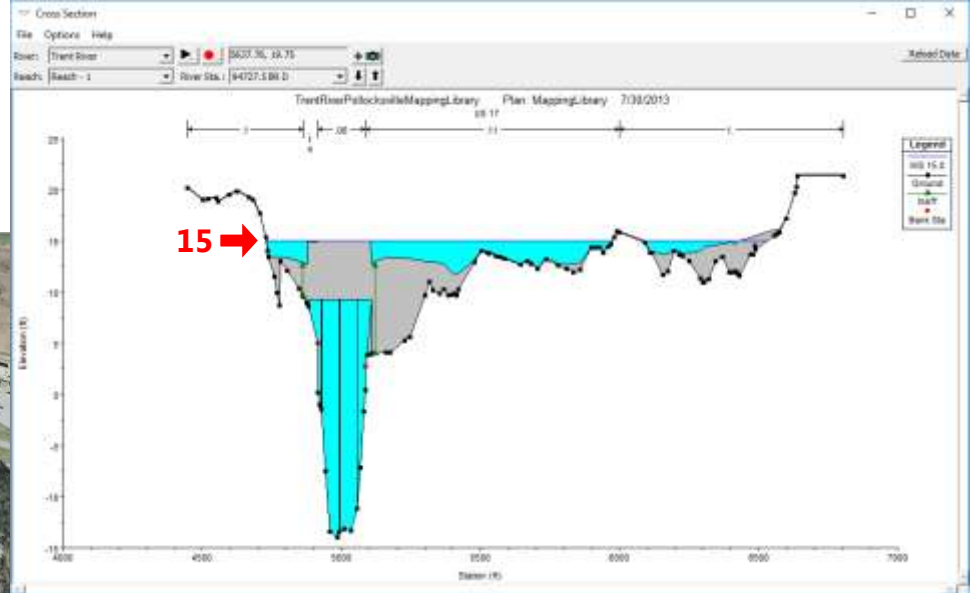
Library Creation



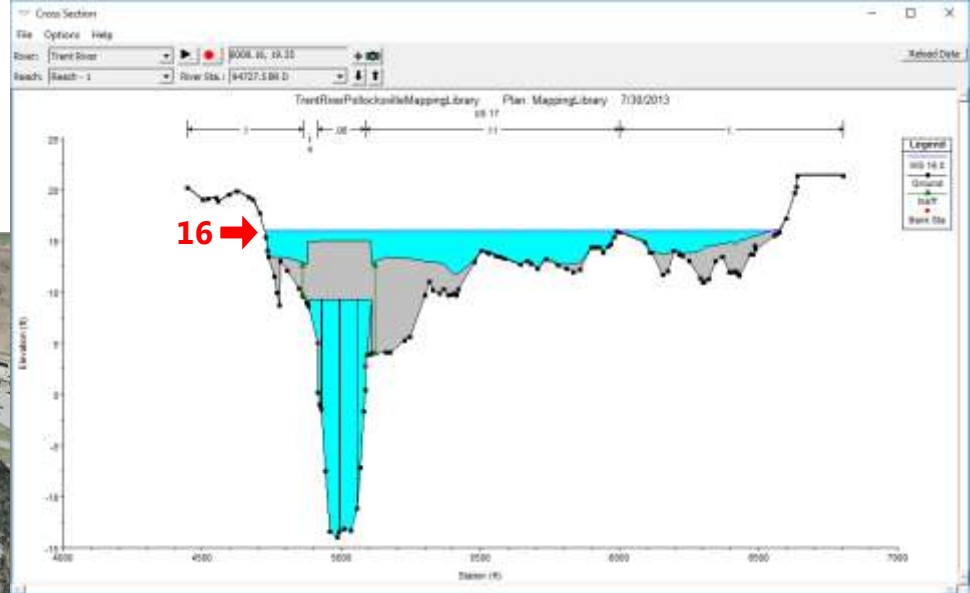
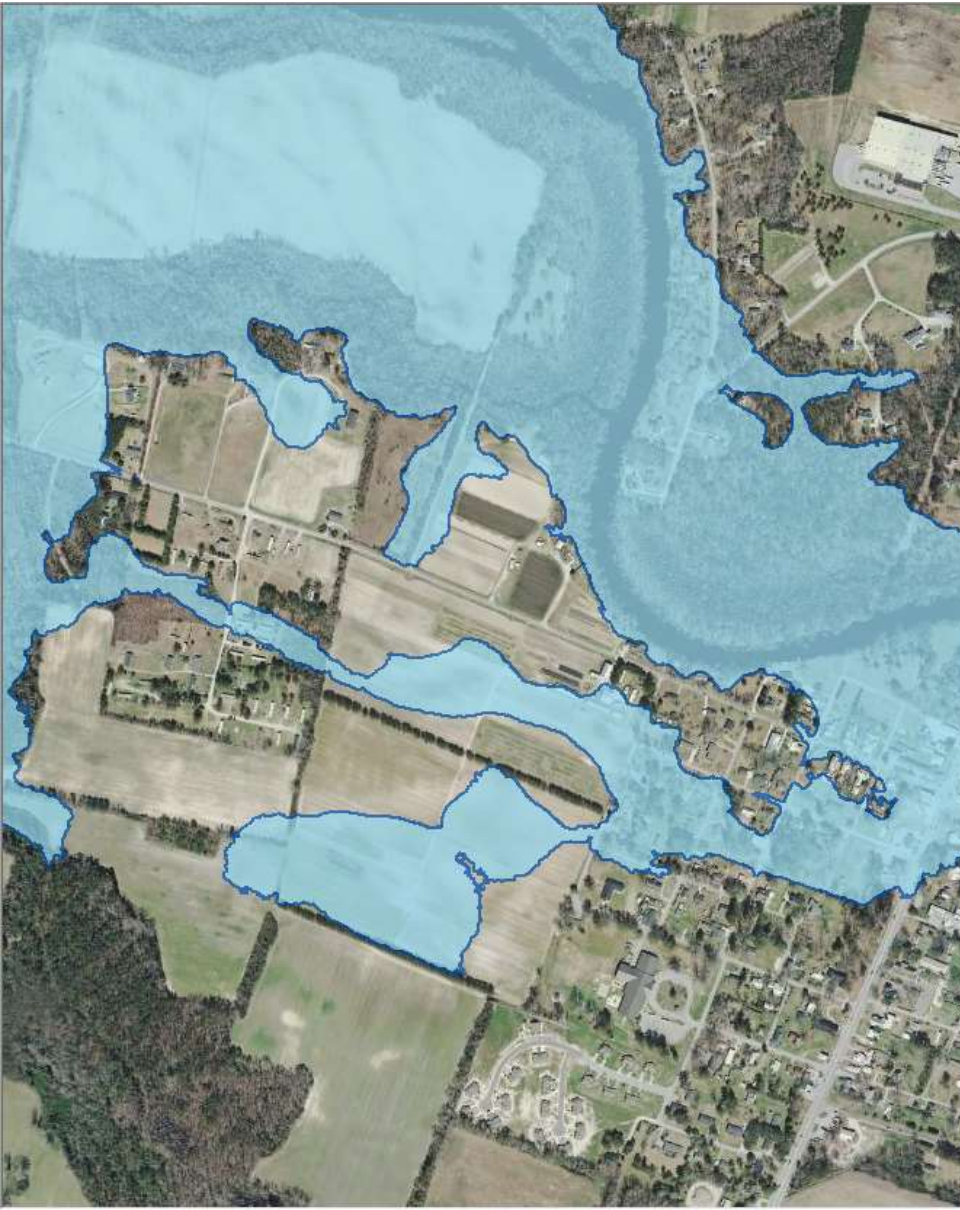
Library Creation



Library Creation



Library Creation



Assign Site "Severity Levels"

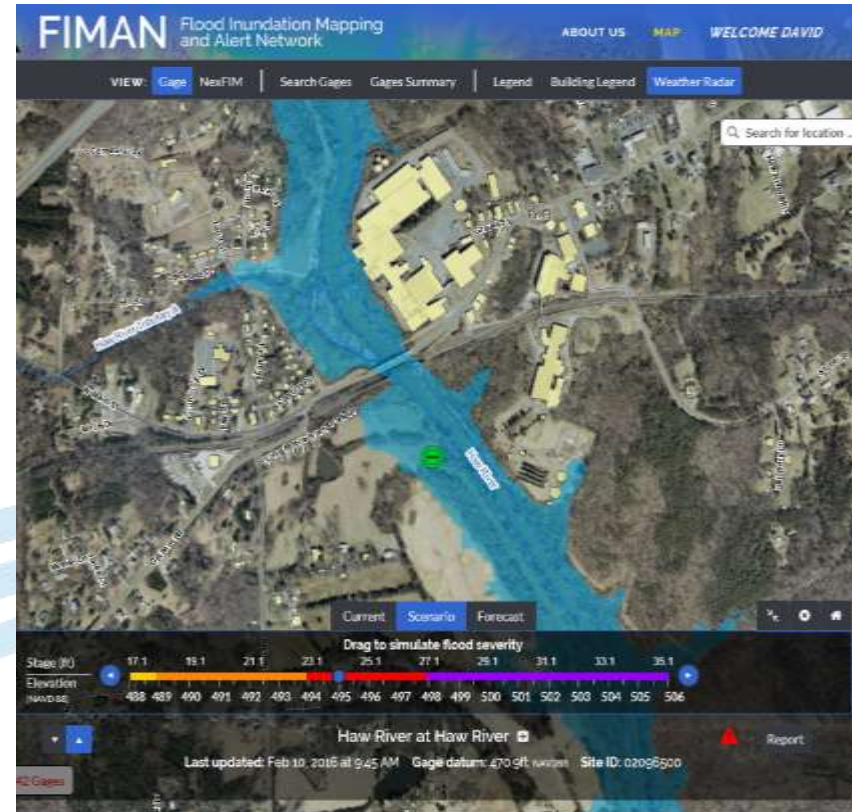
Preliminary Flood Severity Levels			
These flood severity levels should be used for guidance purposes only as they are subject to change			
Henderson County			
Cane Creek at Fletcher			
Elev.	Severity	Description	
2090.00	MAJOR FLOODING		
2089.50			
2089.00			
2088.50			
2088.00			
2087.50			
2087.00			-Water reaches buildings south of Parrish Municipal Dr -Large building south of water treatment plant cut off by rising water
2086.50	MODERATE FLOODING		
2086.00			
2085.50			
2085.00	-Water treatment facility east of US25 and south of creek cut off by rising water		
2084.50	MINOR FLOODING		
2084.00			
2083.50			
2083.00			
2082.50			
2082.00			
2081.50			-Water reaches parking lot of large building on Mills Gap rd between Cane Creek and LA White Rd
2081.00	-Water begins to cover Howard Gap Rd between US25 and Jackson Rd		
2080.50	MINOR ALERT LEVEL		
2080.00			
2079.50			
2079.00			-Water approaches ball fields east of Howard Gap Rd
2078.50			
2078.00			
2077.50			
2077.00			Bankfull
2076.50	WITHIN BANKS		
2076.00			
2075.50			
2075.00			
2074.50			
2074.00			

Flood Stage 2081.00'

- Major Flooding
- Moderate Flooding
- Minor Flooding
- Out of banks but below flood stage
- Within banks

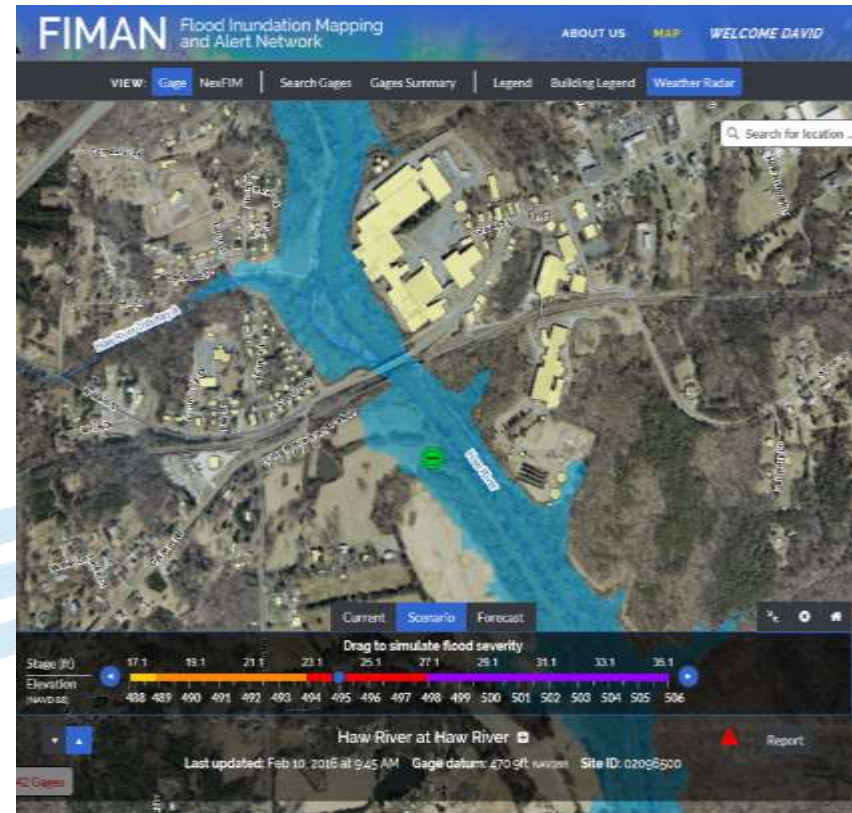
Library Pros

1. Inexpensive to develop.
2. Accurate with measured stages and elevations.
3. Easily communicated to stakeholders
4. Rapid web mapping deployment
5. Impacts can be pre-computed

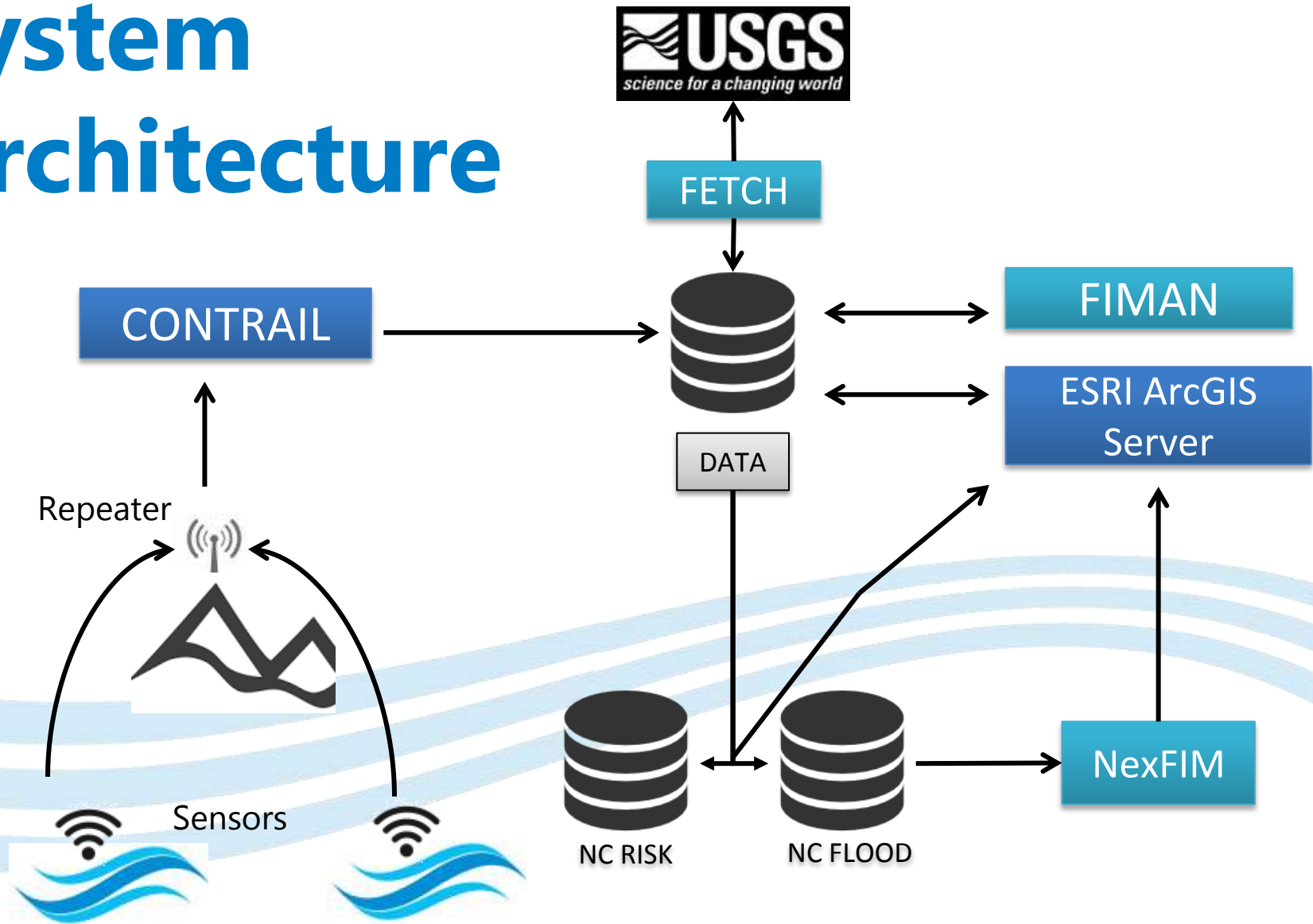


Library Limitations

1. Models do not account for flow variability
2. Limited to gage vicinity – based on watershed
3. Confluences can be a problem
4. Applicable range is around a mile U/S and D/S



System Architecture



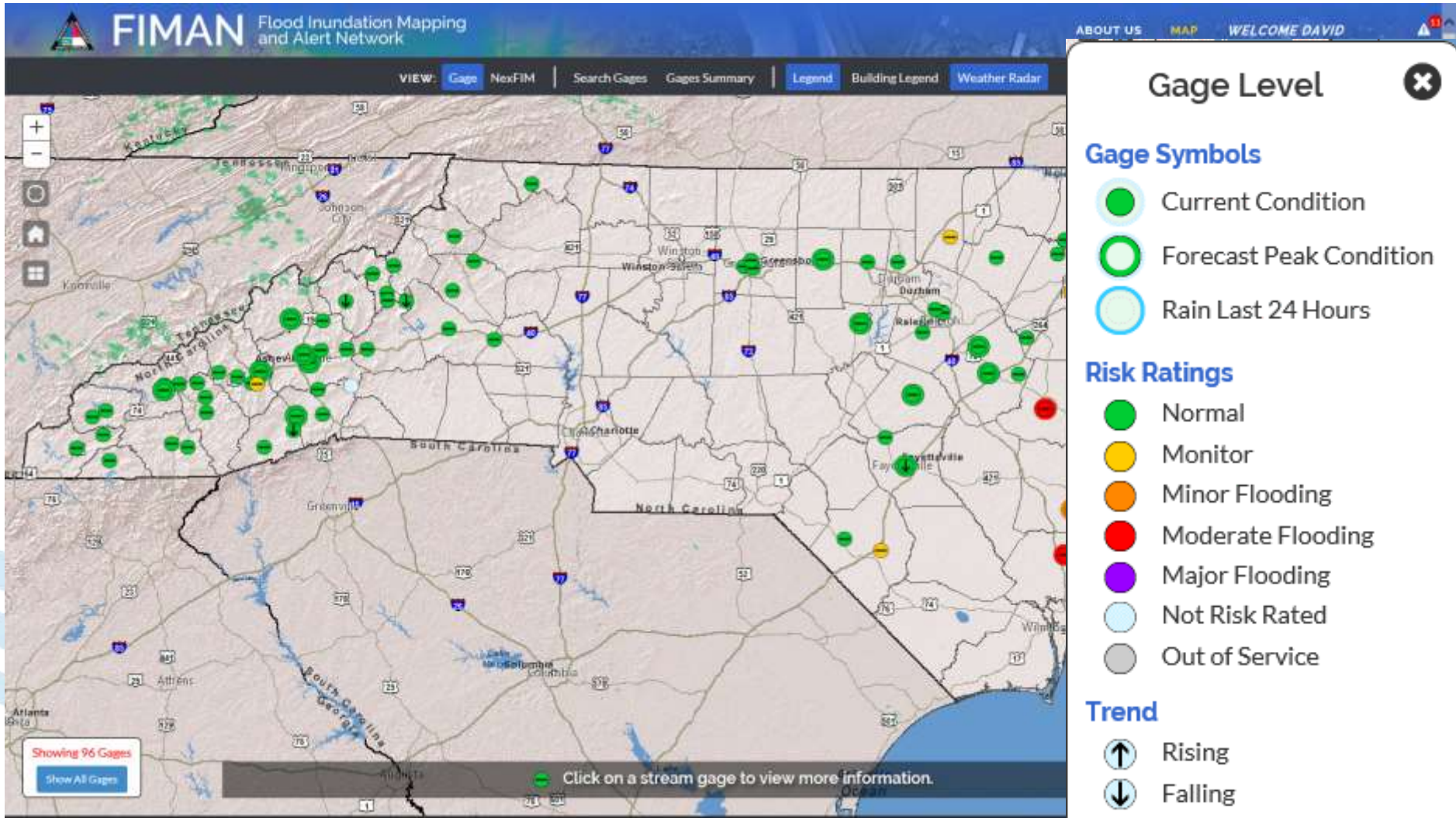
Site Login, Welcome Video

The screenshot displays the FIMAN (Flood Inundation Mapping and Alert Network) website interface. A central video player overlay titled "WELCOME TO NC FIMAN" is playing a "Welcome Video" featuring a man in a suit speaking in front of American and North Carolina flags. The video progress bar shows 0:06 / 1:38. Below the video is a "DONE" button with a right-pointing arrow and the text "Continue to FIMAN Log In." The background shows a map of North Carolina with numerous green circular markers representing gages. A legend on the right side of the map, titled "Gage Level", defines the symbols and colors used for gage data:

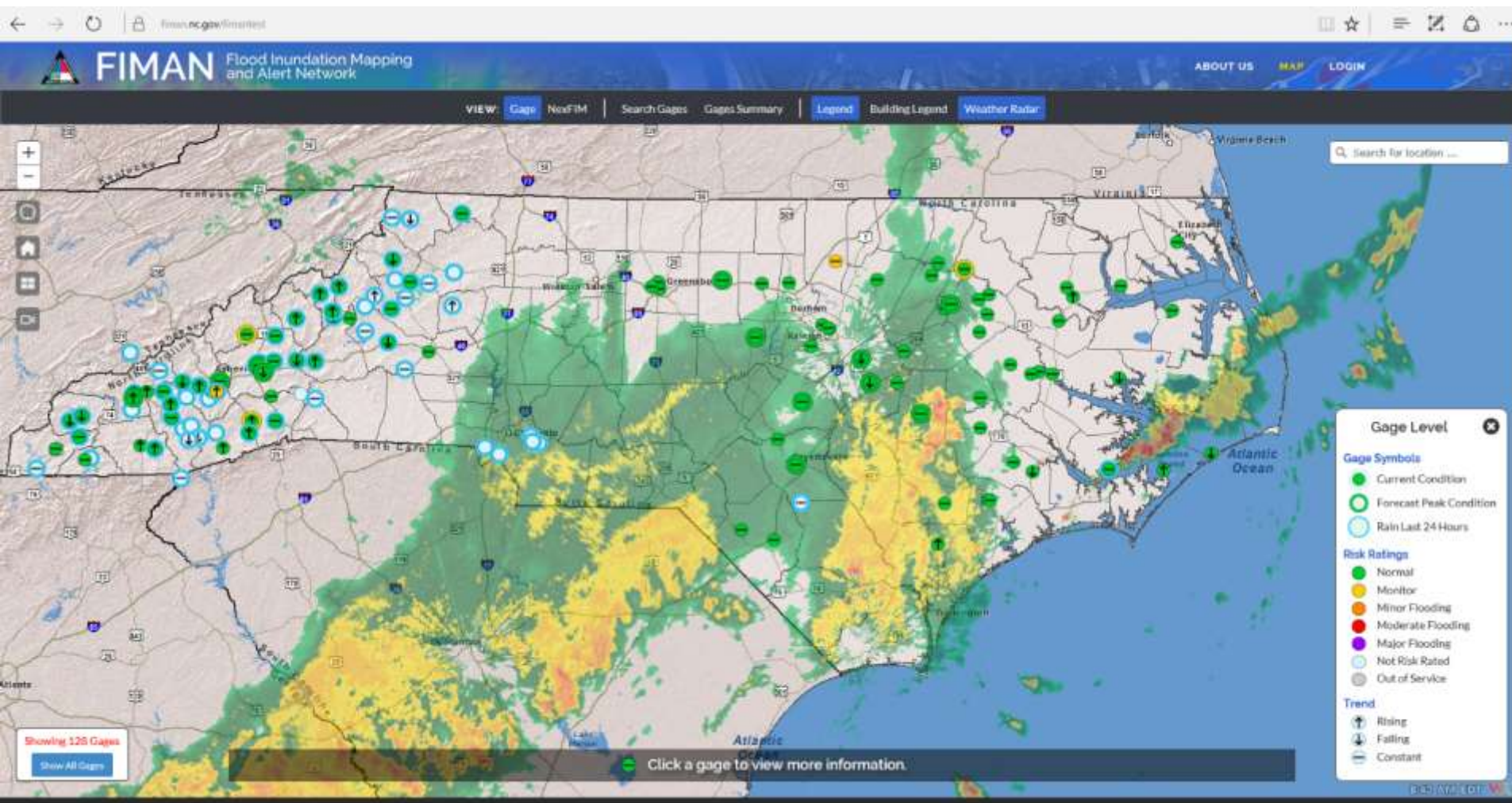
- Gage Symbols**
 - Green circle: Current Condition
 - Light green circle: Forecast Peak Condition
 - Light blue circle: Rain Last 24 Hours
- Risk Ratings**
 - Green circle: Normal
 - Yellow circle: Monitor
 - Orange circle: Minor Flooding
 - Red circle: Moderate Flooding
 - Purple circle: Major Flooding
 - Light blue circle: Not Risk Rated
 - Grey circle: Out of Service
- Trend**
 - Upward arrow: Rising
 - Downward arrow: Falling
 - Horizontal line: Constant

At the bottom of the map, a text prompt reads: "Click a gage to view more information." The top navigation bar includes "ABOUT US", "MAP", and "LOGIN". The top left corner features the FIMAN logo and the text "Flood Inundation Mapping and Alert Network".

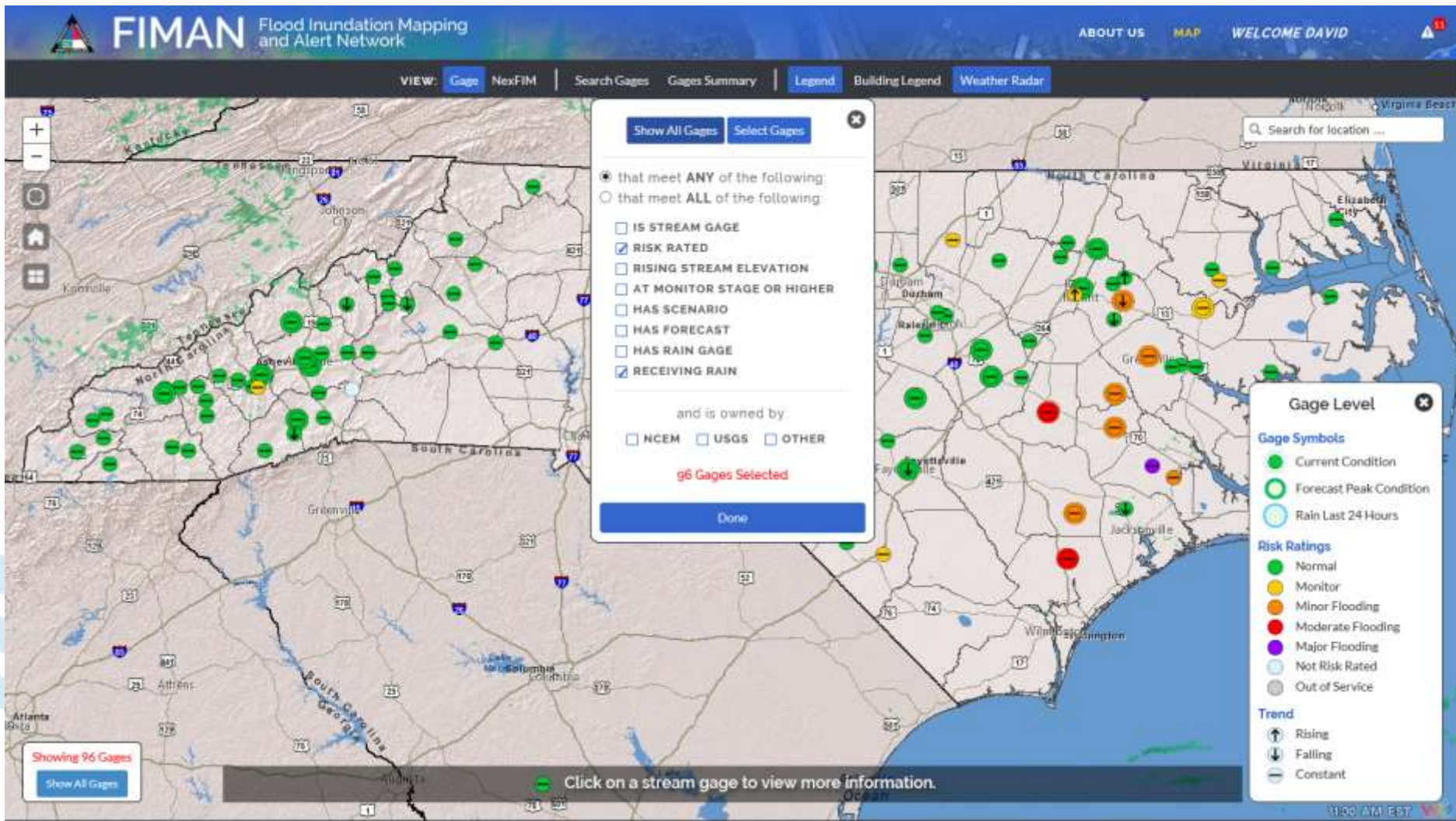
Home Screen / Current Severity



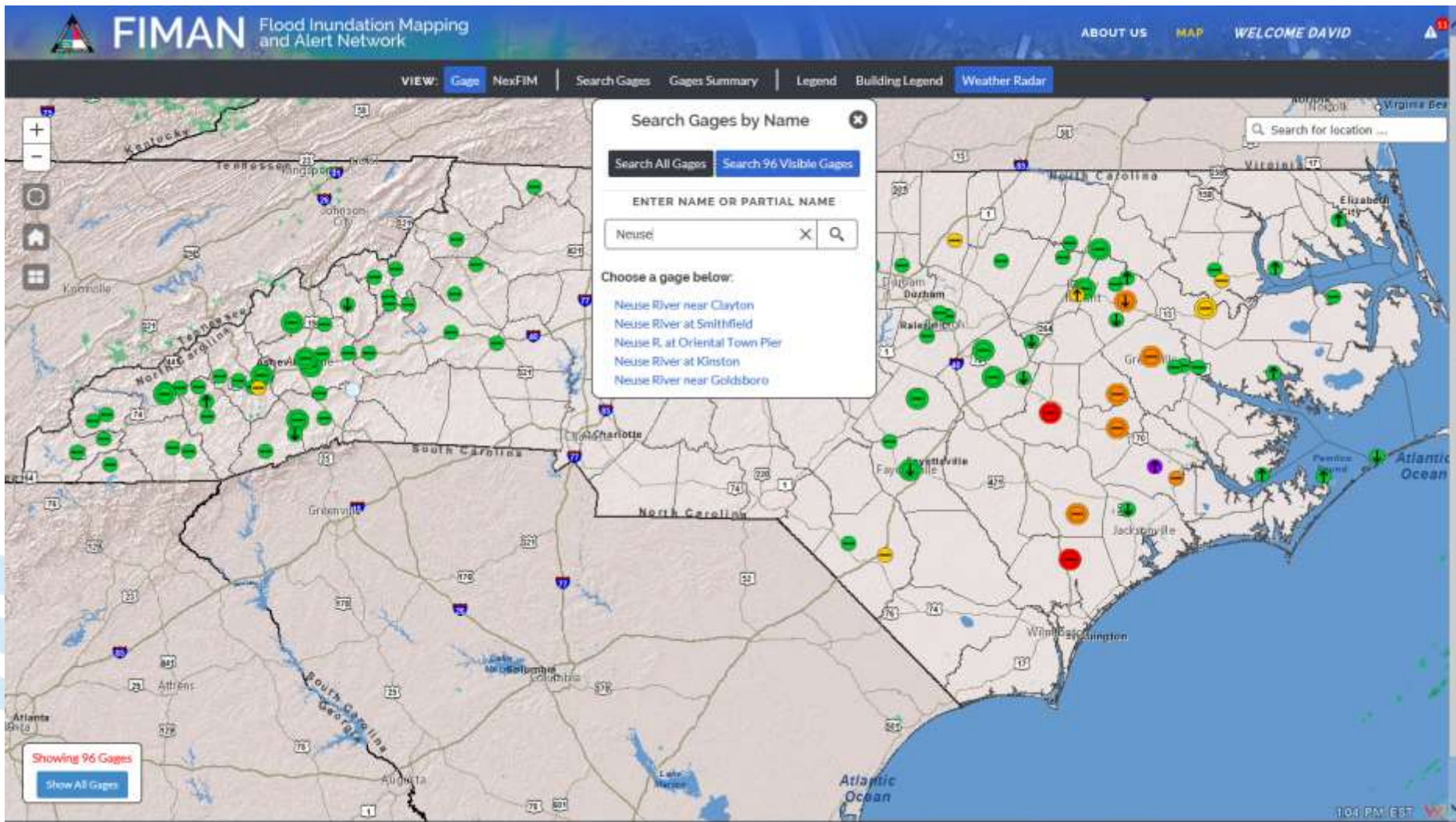
Weather Radar Loop



Search by Type, Owner, Etc



Search by Name, Keyword



Search Using Your Location

The screenshot displays the FIMAN web application interface. At the top left is the FIMAN logo and the text "Flood Inundation Mapping and Alert Network". Navigation links include "ABOUT US", "MAP", and "WELCOME DAVID". A menu bar contains "VIEW: Gage NexFIM Search Gages Gages Summary Legend Building Legend Weather Radar". The main area is a map of North Carolina with various gages marked by colored circles. A search panel on the right is titled "Gages Near Me" and includes a search radius slider set to 45 miles, resulting in 22 gages. A list of gages is shown below the slider, each with a colored circle icon and a red triangle icon.

FIMAN Flood Inundation Mapping and Alert Network

ABOUT US MAP WELCOME DAVID

VIEW: Gage NexFIM Search Gages Gages Summary Legend Building Legend Weather Radar

Showing 96 Gages
Show All Gages

Click on a stream gage to view more information.

Gages Near Me

Search All Gages Search 96 Visible Gages

Search Radius

5 25 45 65 85
Search radius = 45 miles.

Search Location

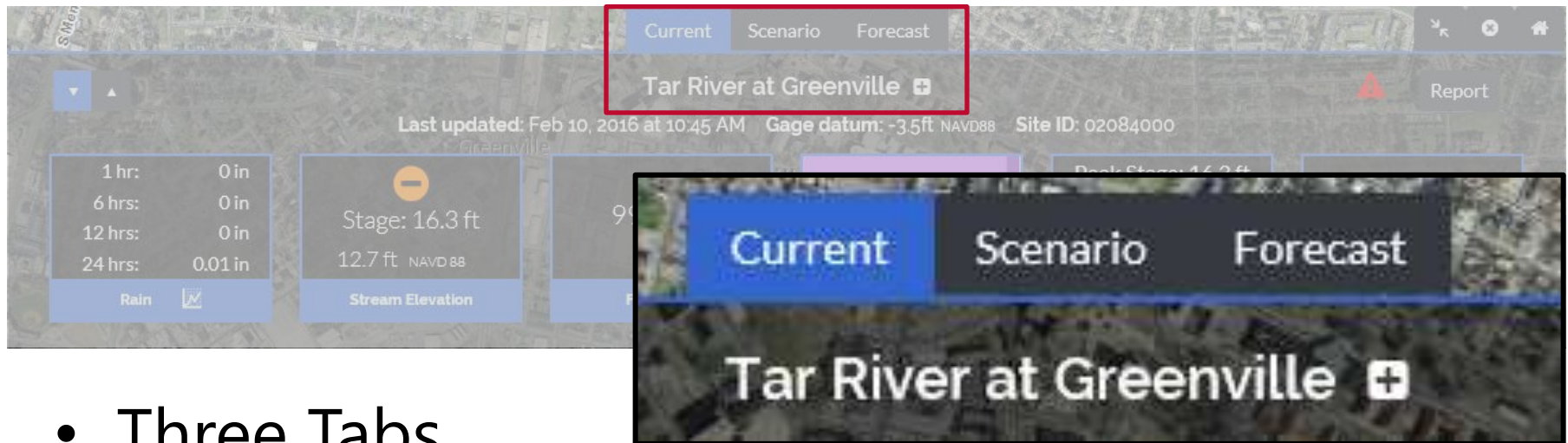
Results: 22 Gages within 45 miles.

- Neuse River near Goldsboro
- Neuse River at Kinston
- Contentnea Creek at Hookerton
- Tar River at Greenville
- Tar River at Tarboro
- Roanoke River at Williamston
- Tar River at Us 301 Bypass at Rocky Mount

Two Options for Real Time Data

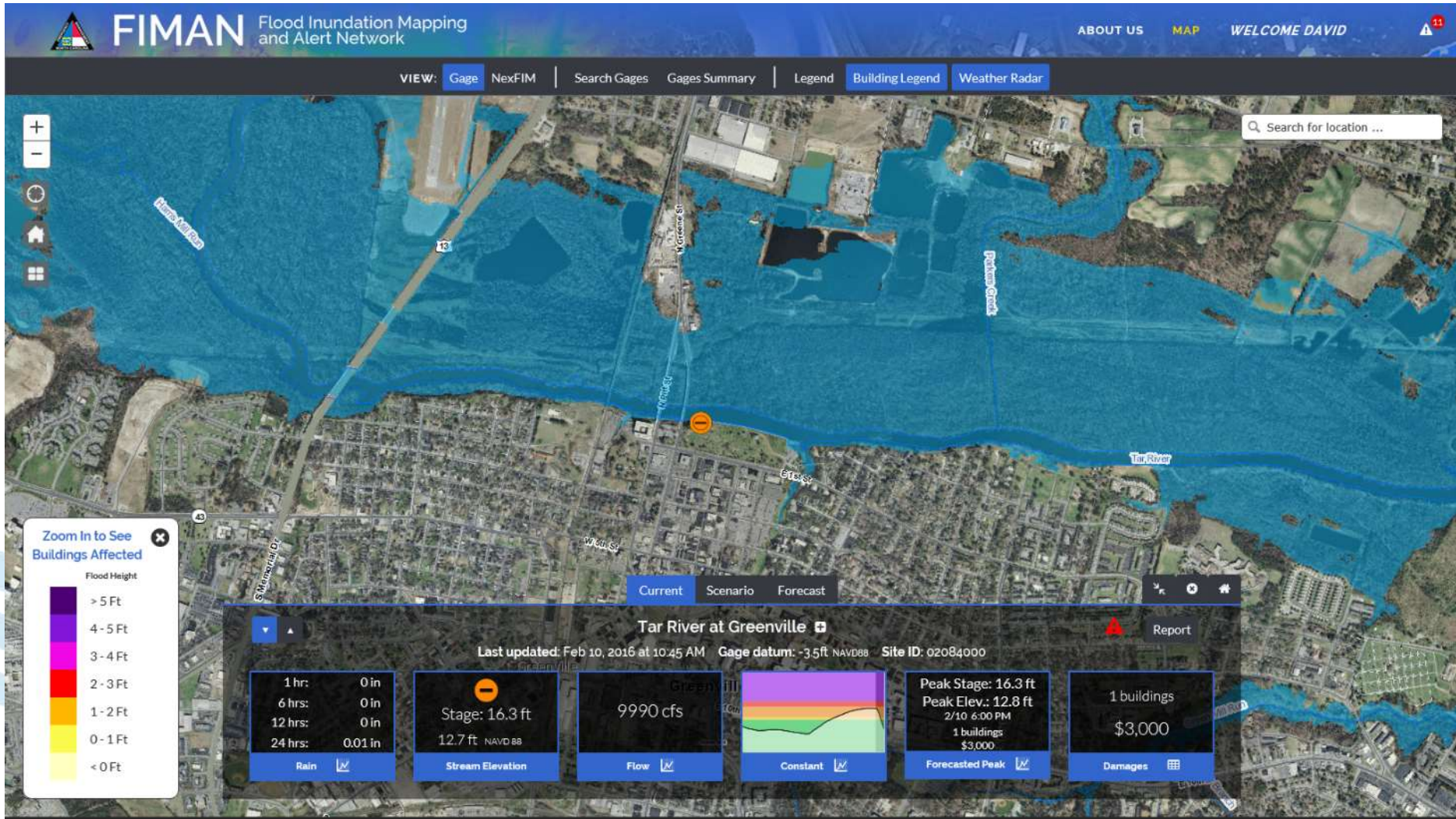
The screenshot displays the FIMAN web application interface. At the top left, the logo and name "FIMAN Flood Inundation Mapping and Alert Network" are visible, with a red box highlighting the text. The top navigation bar includes links for "ABOUT US", "MAP", and "WELCOME DAVID". Below this, a secondary navigation bar shows "VIEW: Gage NexFIM | Search Gages Gages Summary | Legend Building Legend Weather Radar". The main content area features a map of North Carolina with various gages marked by colored circles. A large blue overlay box in the center of the map contains the text "Flood Inundation Mapping and Alert Network" and "VIEW: Gage NexFIM | Search Gages". On the right side, a "Gages Near Me" panel includes search filters and a radius slider. A legend at the bottom right identifies specific gages: "Roanoke River at Williamston" (yellow circle) and "Tar River at Us 301 Bypass at Rocky Mount" (yellow circle). A bottom banner reads "Click on a stream gage to view more information." The bottom left corner shows "Showing 96 Gages" and a "Show All Gages" button.

Gage View - Dashboard Concept

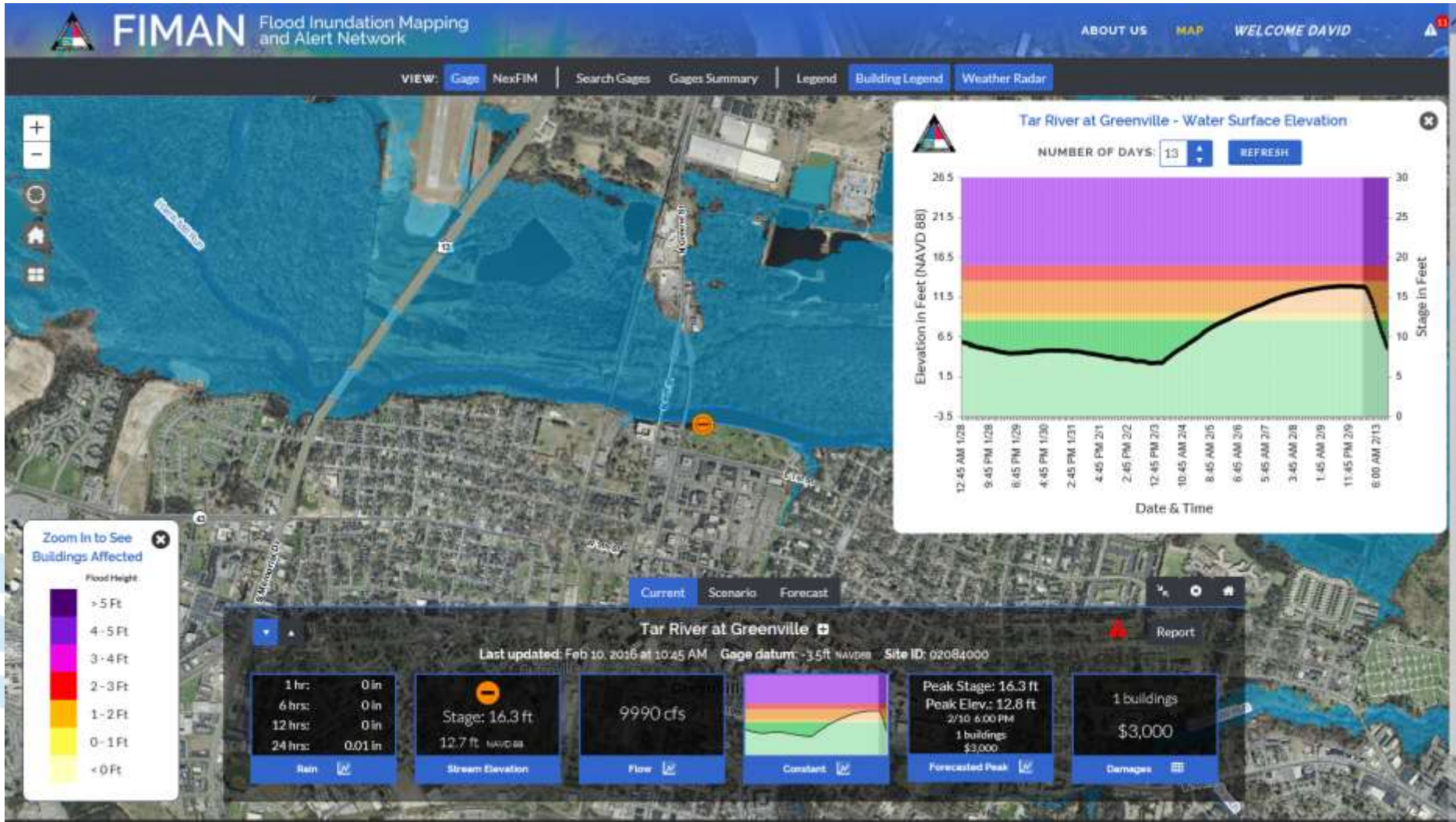


- Three Tabs
 - **Current:** Provides most recent inundation extent
 - **Scenario:** Planning tool for visualization and impact
 - **Forecast:** Shows timeline using NWS forecast data
- Info Widgets
 - Interactive for rainfall, stage, flow, forecast, impacts

Current Inundation Level and Map



Gage Stage Charts + Forecast



Real Time Flood Impacts

FIMAN Flood Inundation Mapping and Alert Network

ABOUT US | MAP | WELCOME DAVID KEY

VIEW: Gages | NexFIM | Search Gages | Choose River | Scenarios | Building Damages | Building Legend | Hot Spots | Report | Legend | Weather Radar

Neuse River near Goldsboro Buildings in Inundation Extent

Current Elevation: 65 Ft

Current Flood Depth	Total		Residential		Commercial		Public	
	Count	Est. Damag...	Count	Est. Damag...	Count	Est. Damag...	Count	Est. Damag...
Sub Structure	18	\$16,000	16	\$14,000	2	\$2,000	0	\$0
0 - 1 ft	2	\$5,000	2	\$5,000	0	\$0	0	\$0
1 - 2 ft	1	\$75,000	0	\$0	1	\$75,000	0	\$0
2 - 3 ft	2	\$24,000	1	\$15,000	1	\$9,000	0	\$0
3 - 4 ft	0	\$0	0	\$0	0	\$0	0	\$0
4 - 5 ft	0	\$0	0	\$0	0	\$0	0	\$0
> 5 ft	0	\$0	0	\$0	0	\$0	0	\$0
TOTAL	23	\$120,000	19	\$34,000	4	\$86,000	0	\$0

*Additional buildings may be impacted outside of the inundation extent.

Stage: 20.2 ft
62.2 ft NAVD 88

Stream Elevation | Flow | Rising | Forecasted Peak | Damages | Impact

Phone: 919-715-5711
Fax: 919-715-0408

SIGN UP FOR GAGE ALERTS

FIMAN Flood Inundation Mapping and Alert Network

NC Floodplain Mapping Program
4105 Reedy Creek Drive
Raleigh, NC 27607

Mailing Address
4218 Mail Services Center
Raleigh, NC 27699-4218

Emergency Op. Center Reports



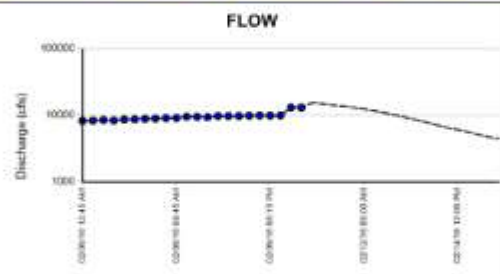
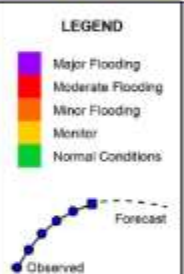
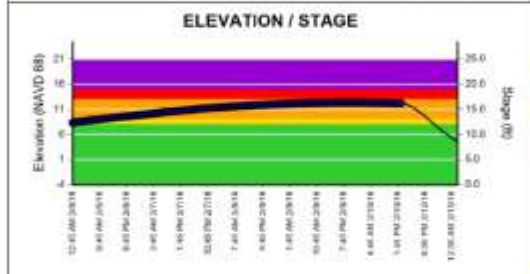
FIMAN Current Flood Impacts Report

Minor Flooding
Trend: Constant

Tar River at Greenville
Site ID: 02084000

Last Updated:
2/10/16 2:45 PM

<p>16.2 ft 12.7 ft (NAVD 88)</p> <p>Current Stage / Elevation</p>	<p>13100 cfs</p> <p>Current Flow</p>	<p>1 Buildings \$3,000</p> <p>Impacted Structures / Damages</p>	<p>12.7 ft 2/11/16 12:00 AM 1 Buildings Est. Damages: \$3,000</p> <p>Forecasted Peak / Impacts</p>
--	---	---	--



Estimated Damages based on Current Flood Elevation of 13 ft (NAVD 88).

Estimated Building Damages

DEPTH	Total		Residential		Public		Commercial	
	Damages	Total Count	Damages	Count	Damages	Count	Damages	Count
Sub-Structure	\$3,000	1	\$3,000	1	\$0	0	\$0	0
0 - 1 ft	\$0	0	\$0	0	\$0	0	\$0	0
1 - 2 ft	\$0	0	\$0	0	\$0	0	\$0	0
2 - 3 ft	\$0	0	\$0	0	\$0	0	\$0	0
3 - 4 ft	\$0	0	\$0	0	\$0	0	\$0	0
4 - 5 ft	\$0	0	\$0	0	\$0	0	\$0	0
> 5 ft	\$0	0	\$0	0	\$0	0	\$0	0
TOTAL	\$3,000	1	\$3,000	1	\$0	0	\$0	0

Impact Summary

Road Impact: None reported at this time
 Building Impact: 1 buildings impacted, \$3,000 estimated damages.
 Utilities Impact: None reported at this time
 Other Impact: Some farmland flooded. Water overflow lowlands adjacent to river.
 Note: Additional buildings may be impacted outside of flood inundation extent. Damages do not include content and inventory.

Search for location ...

Gage Level

Gage Symbols

- Current Condition
- Forecast Peak Condition
- Rain Last 24 Hours

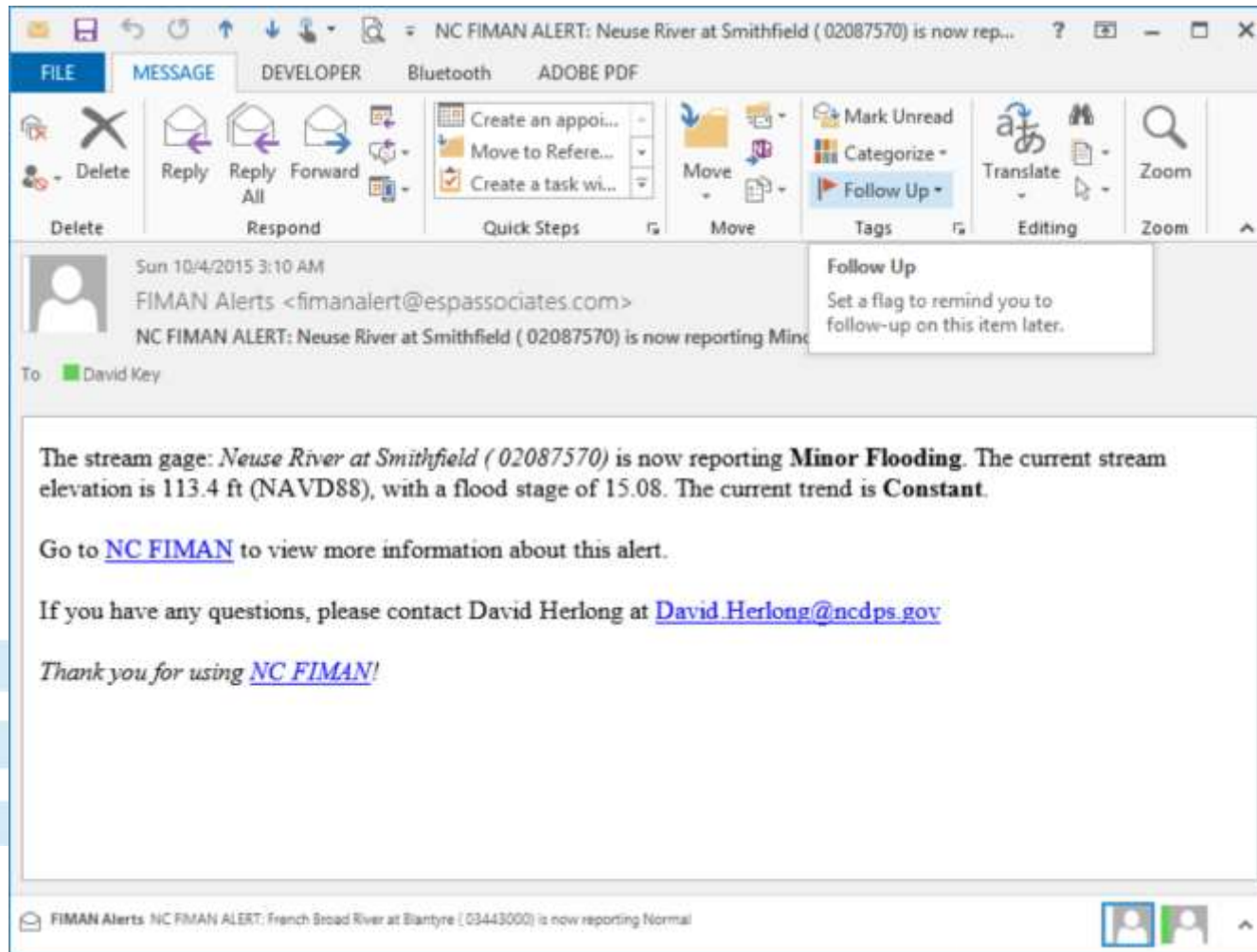
Risk Ratings

- Normal
- Monitor
- Minor Flooding
- Moderate Flooding
- Major Flooding
- Not Risk Rated
- Out of Service

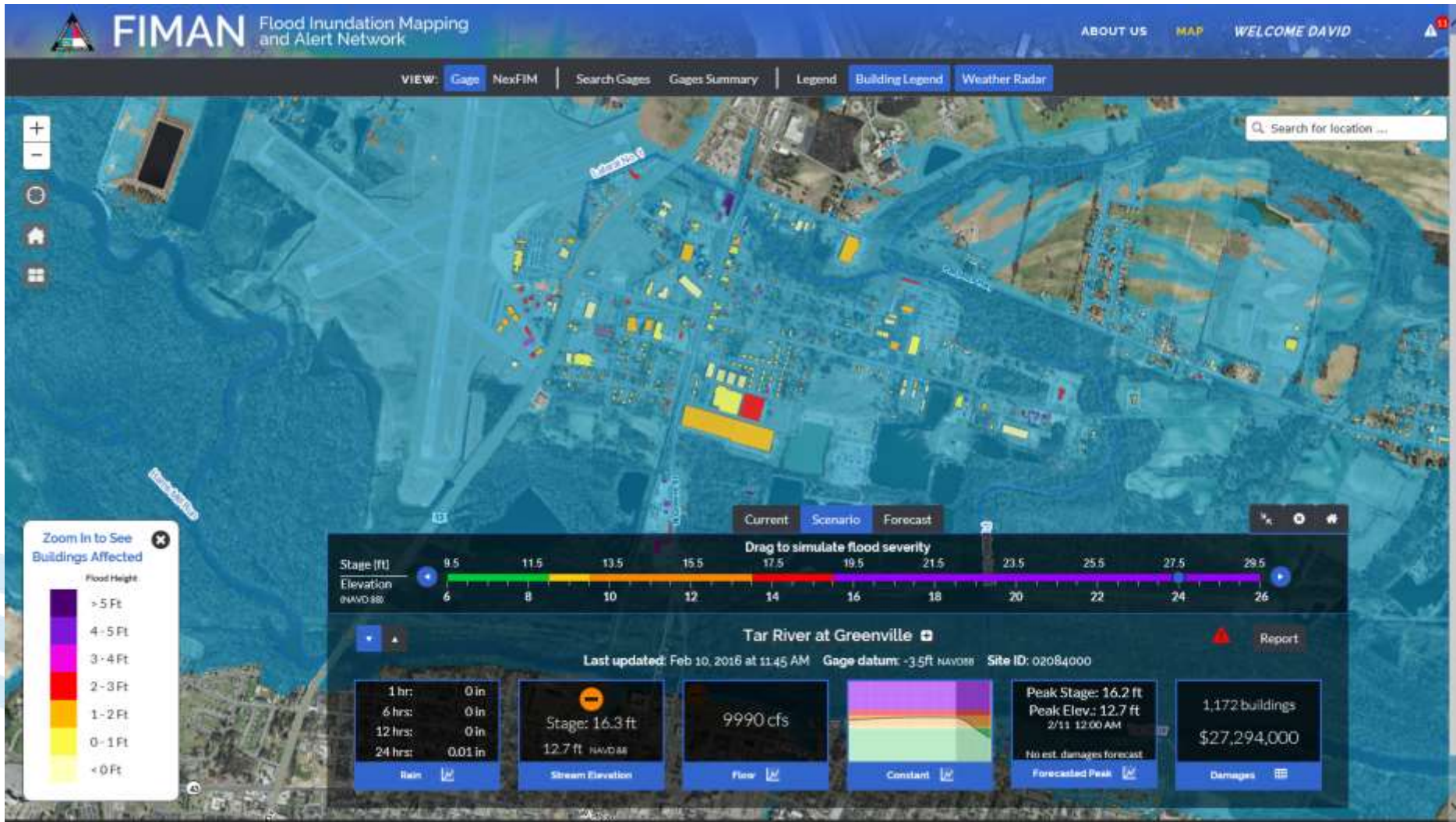
Trend

- Rising
- Falling
- Constant

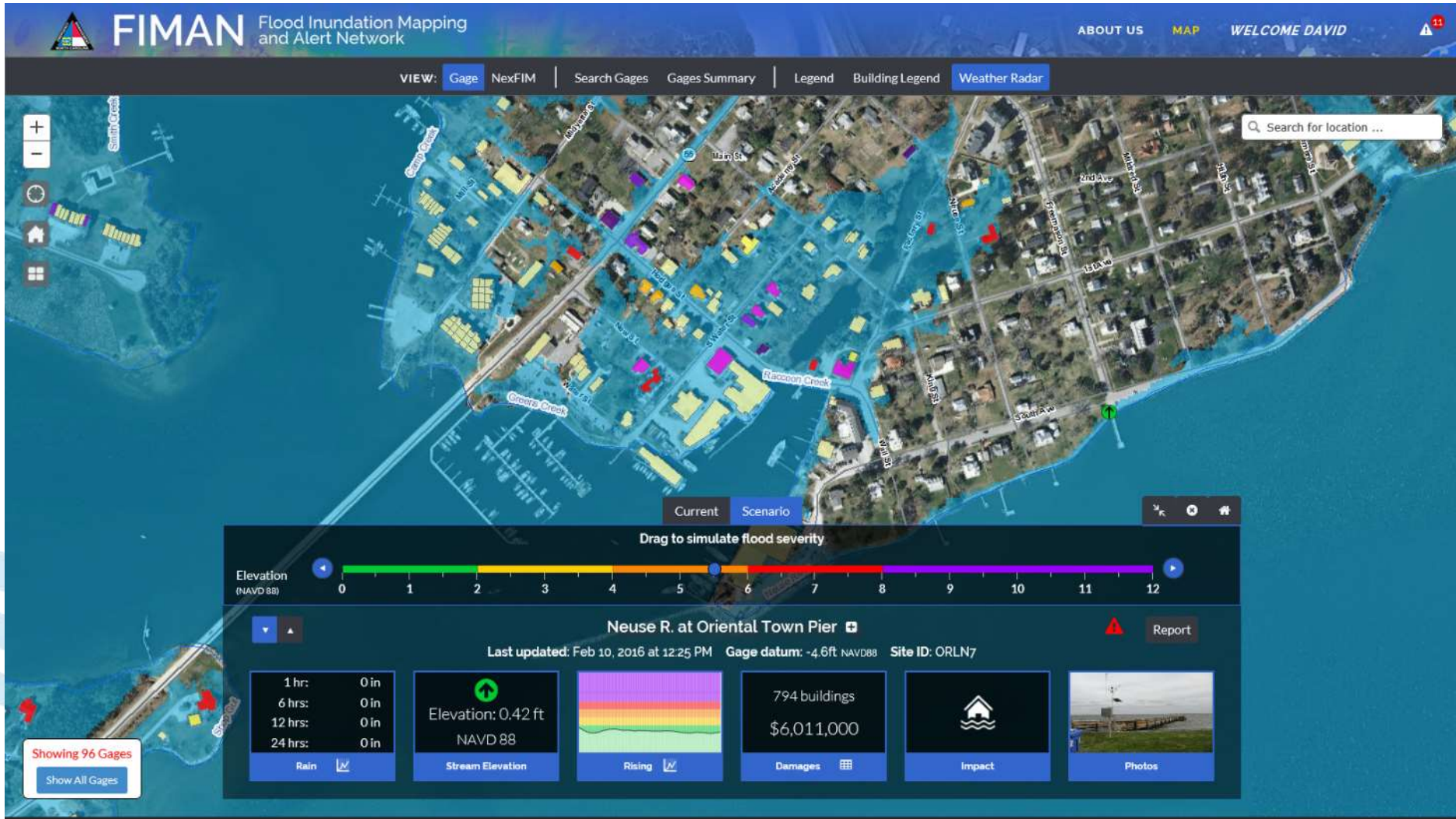
Real Time Email Alerts



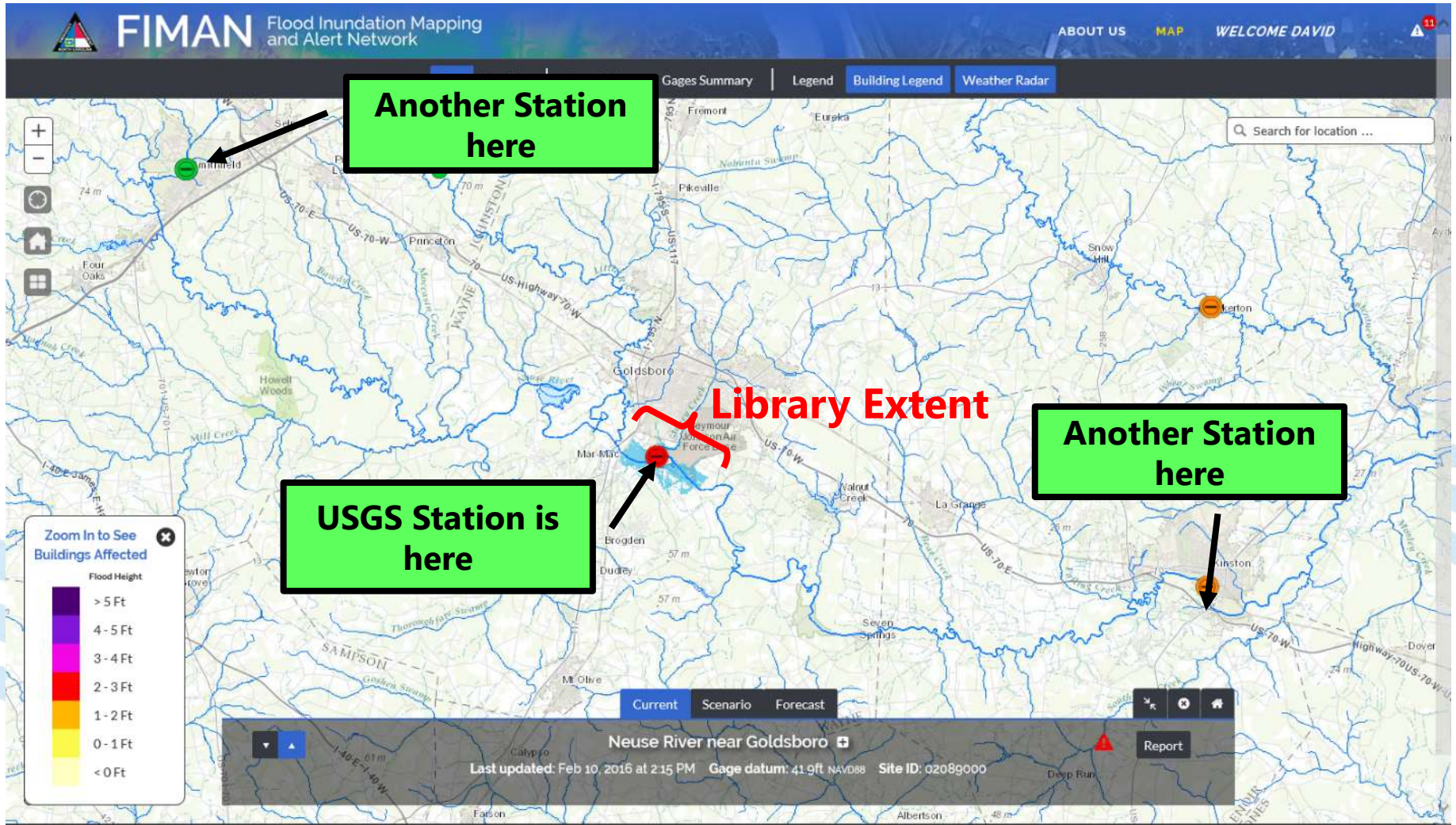
Flood Scenario Mode



Coastal Libraries

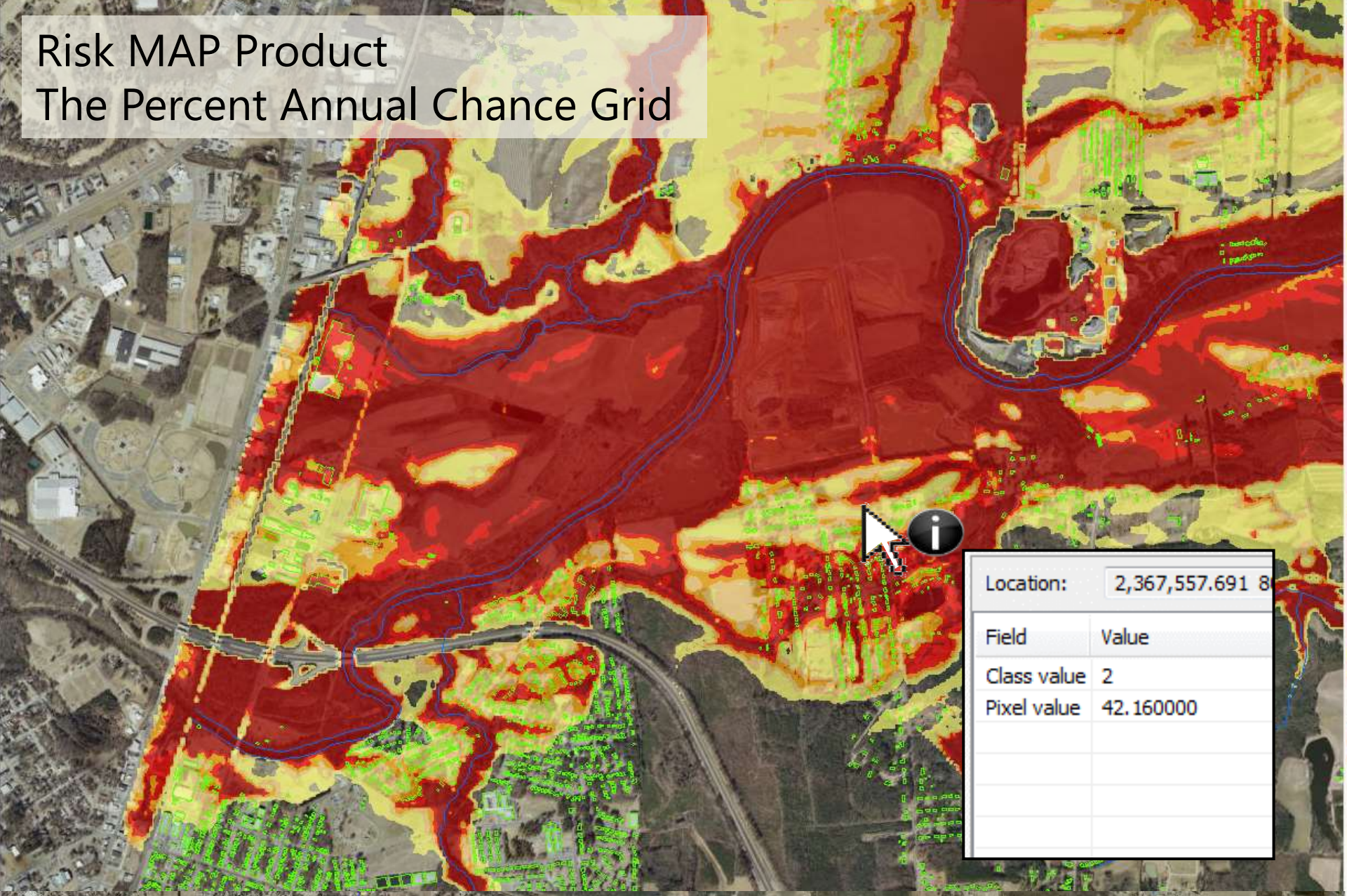


Where Libraries Come up Short



Risk MAP Product

The Percent Annual Chance Grid

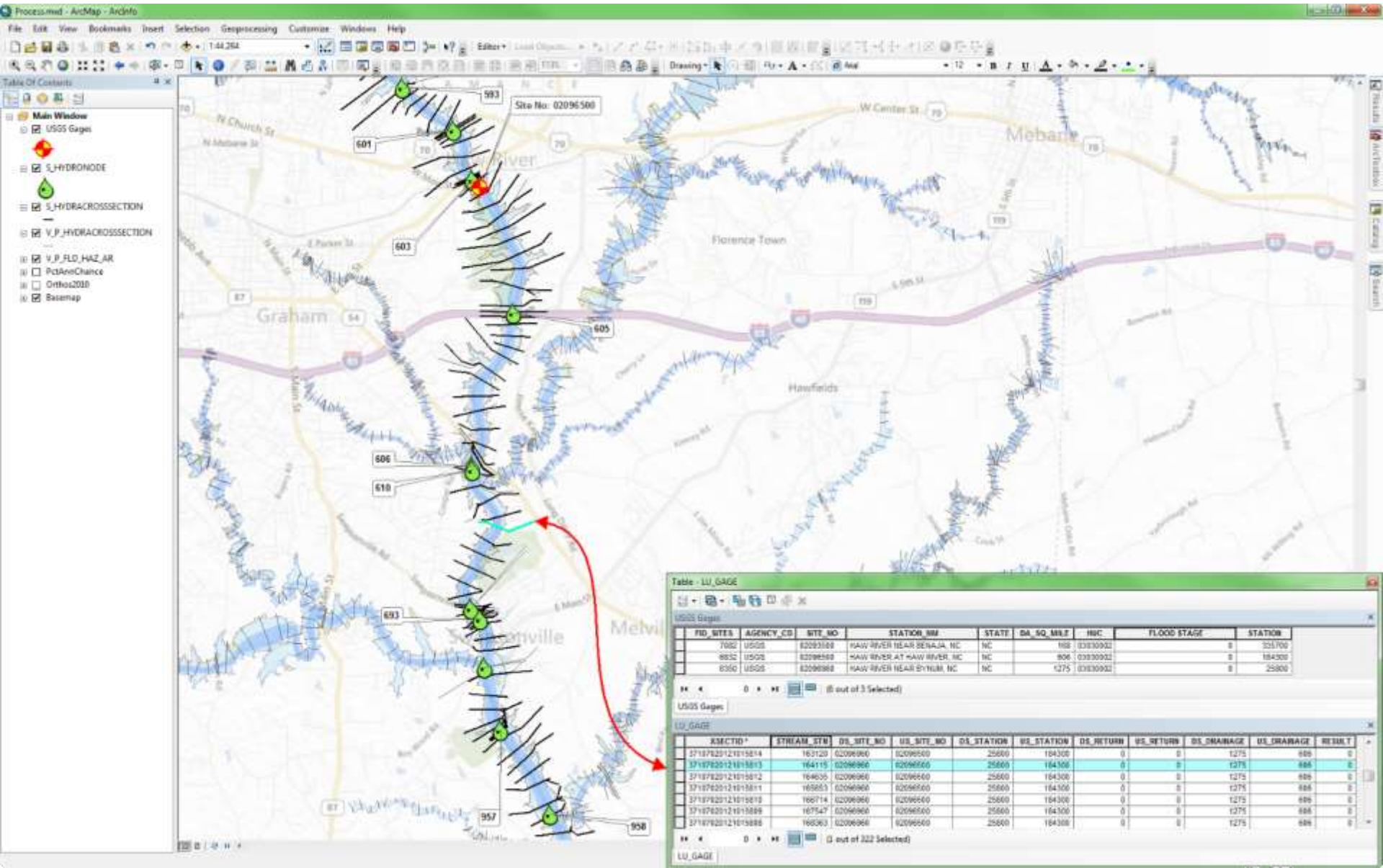


The Solution

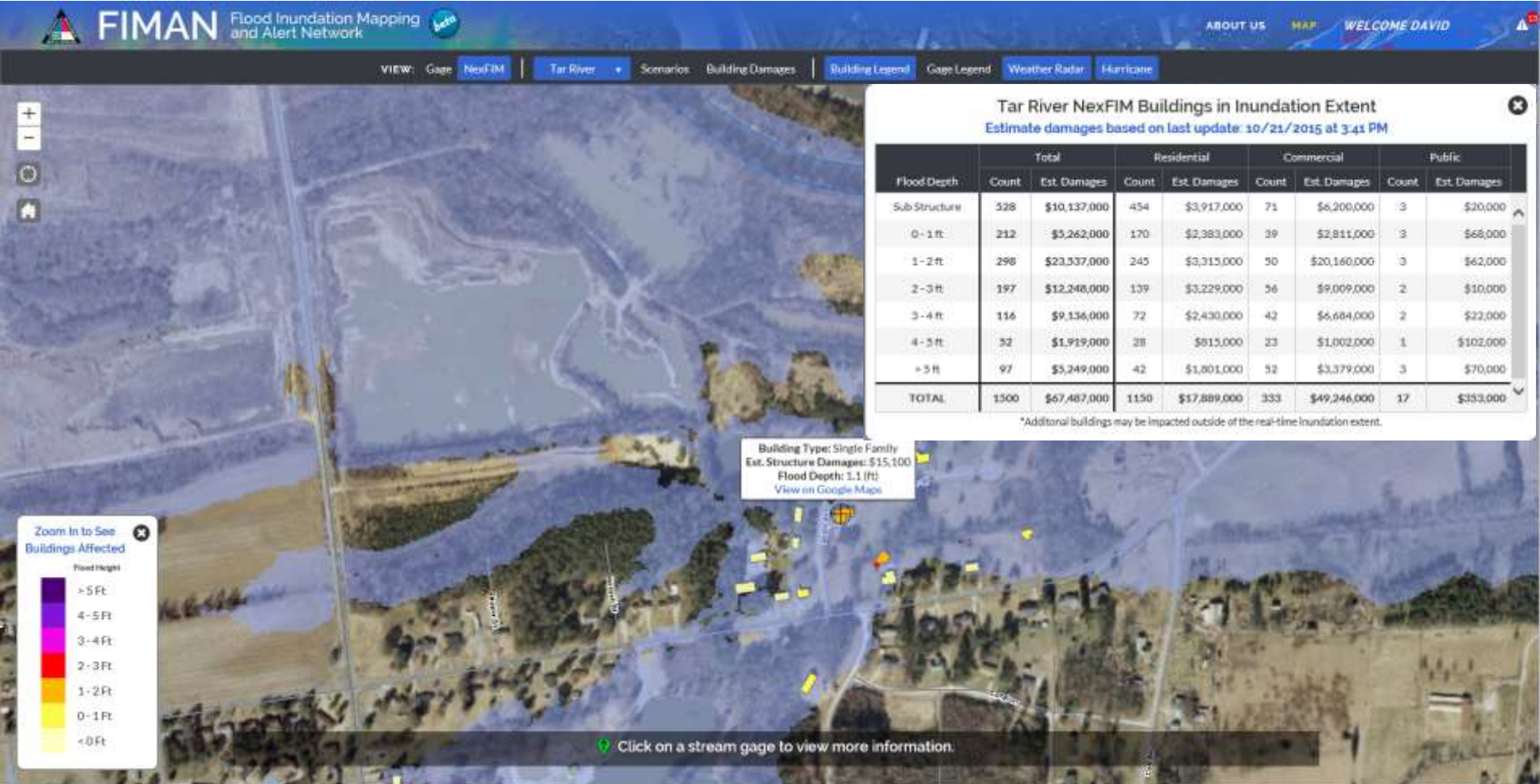
- For a given “river system” (main stem and tribs)
- The P.A.C. raster data set, **coupled** with:
 - Real time stage information at each gage
 - Stage/Return period look up tables
 - Stream distance (database)
 - Drainage area (database)
 - Model cross sections – critical (database)
 - Built Environment (buildings, roads, bridges)
- Reach based – Seamless Mapping Connecting USGS Stations
 - Pre-processed datasets
 - On the fly processing

Datasets Used

Exclusive use of the USGS Gages, FLOOD Geodatabase, and Percent Annual Chance Rasters

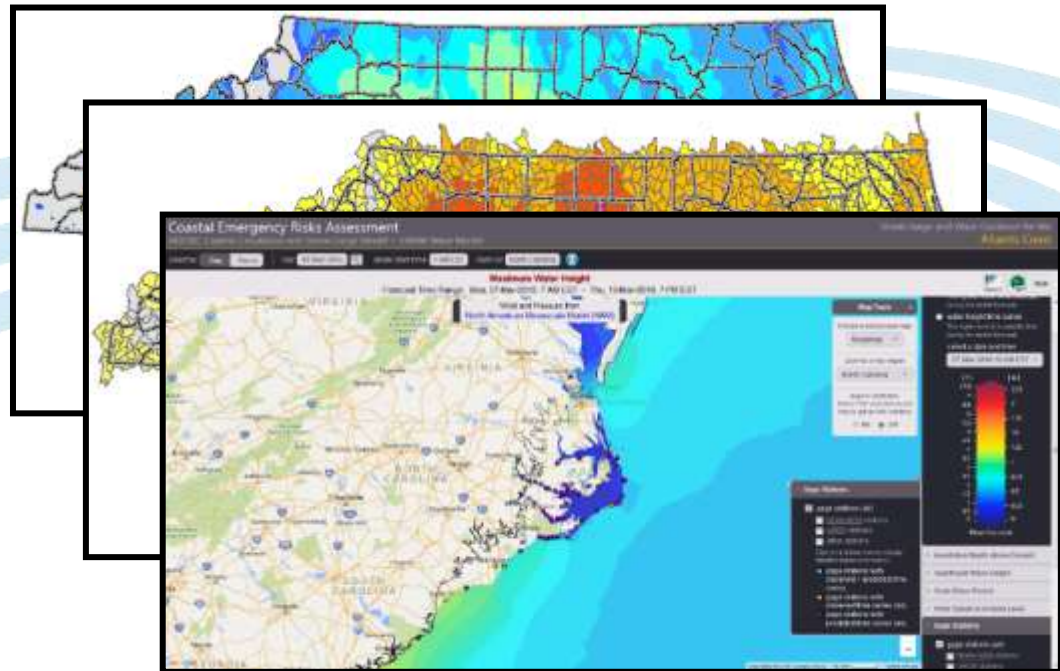


NexFIM Inundation Mapping



INVESTING IN THE FUTURE OF FIMAN:

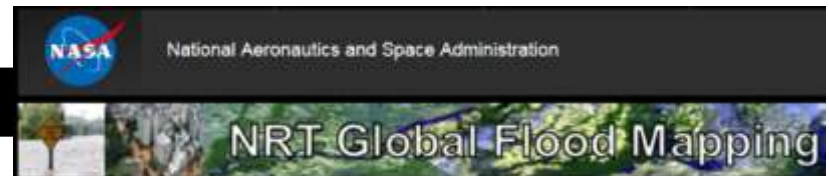
Where we are going!



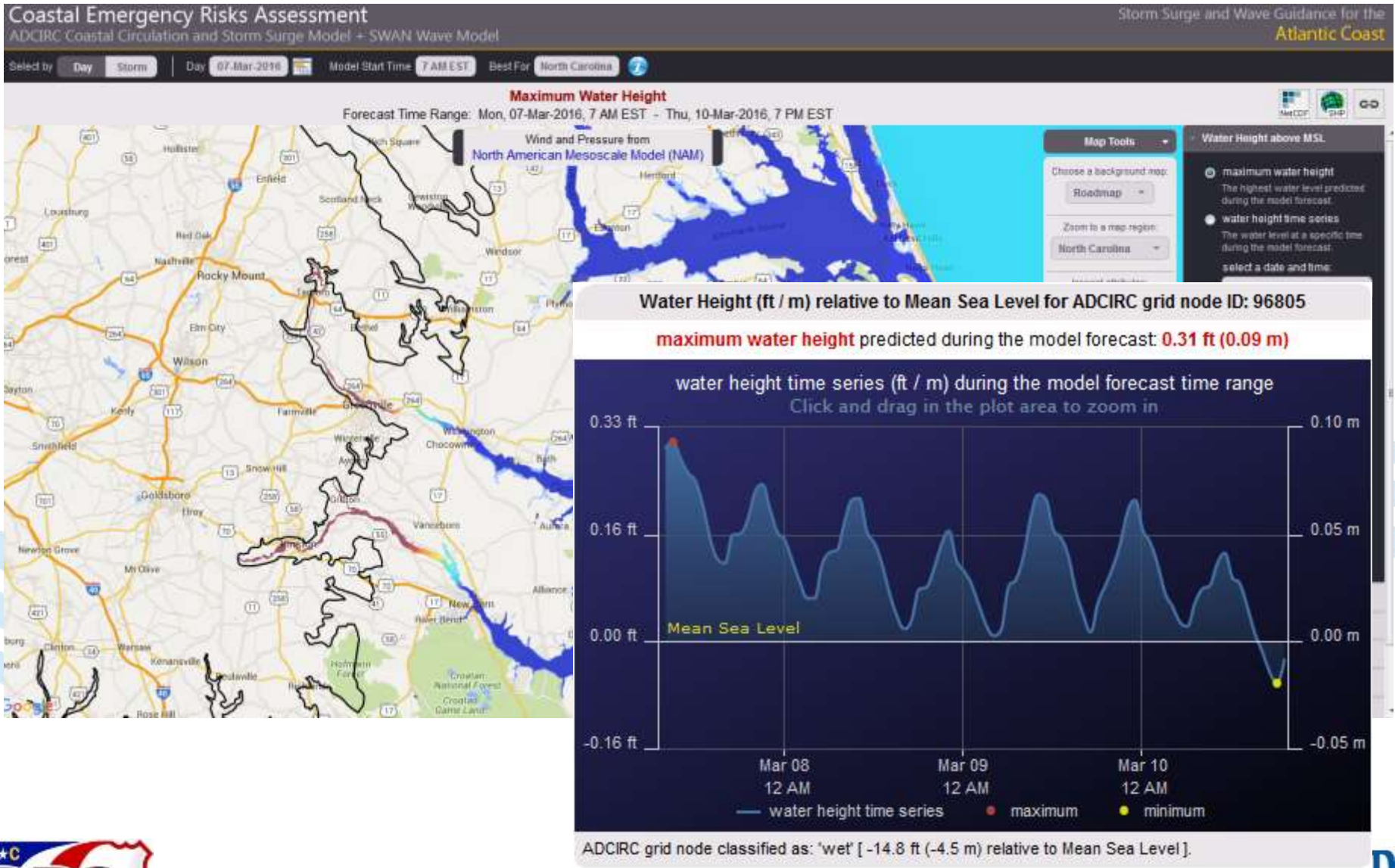
Leverage Existing Data Sources

Coastal Emergency Risks Assessment

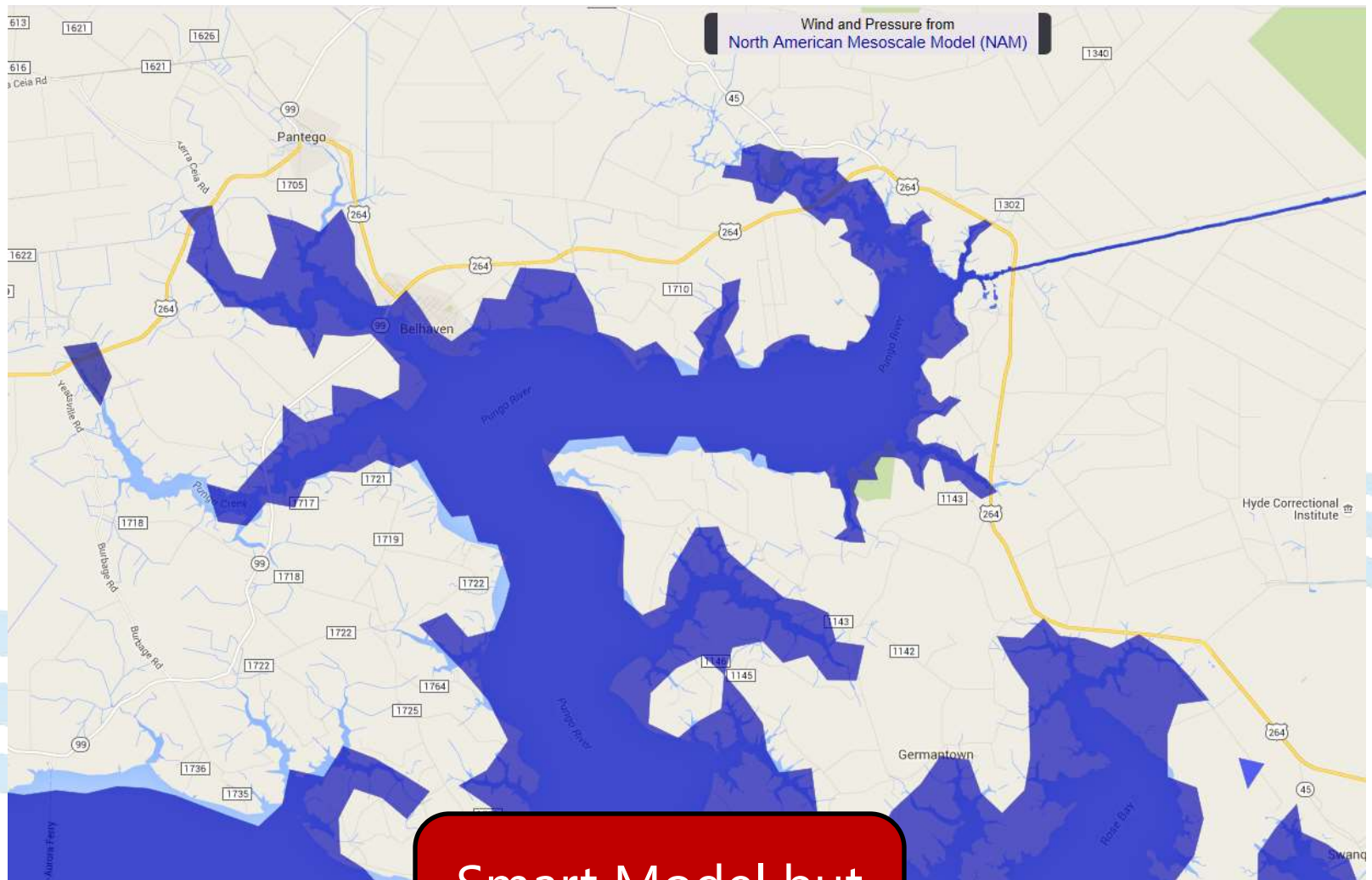
ADCIRC Coastal Circulation and Storm Surge Model + SWAN Wave Model



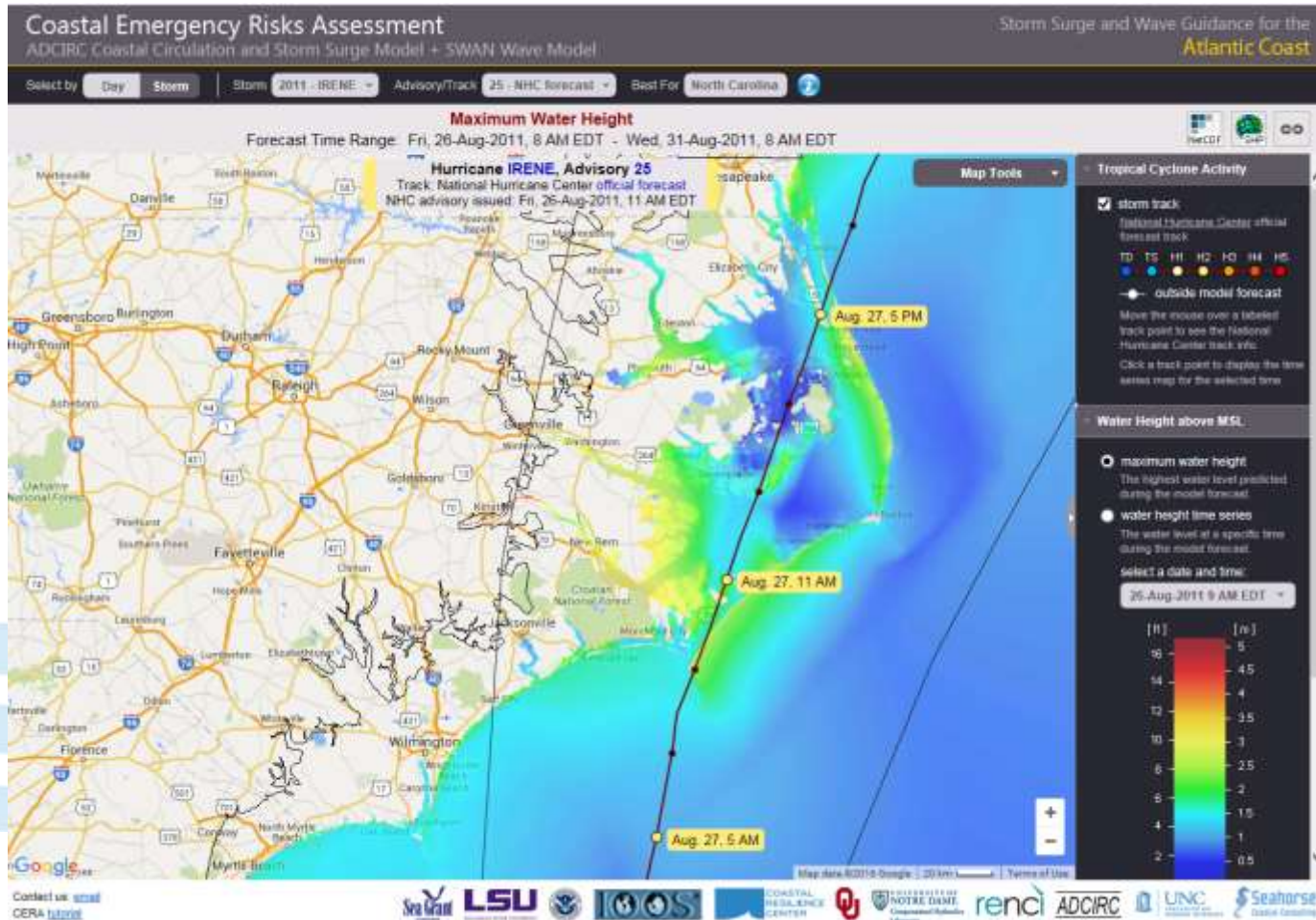
Seamless Realtime Coastal Inundation



Real Time Surge + Map Refinement

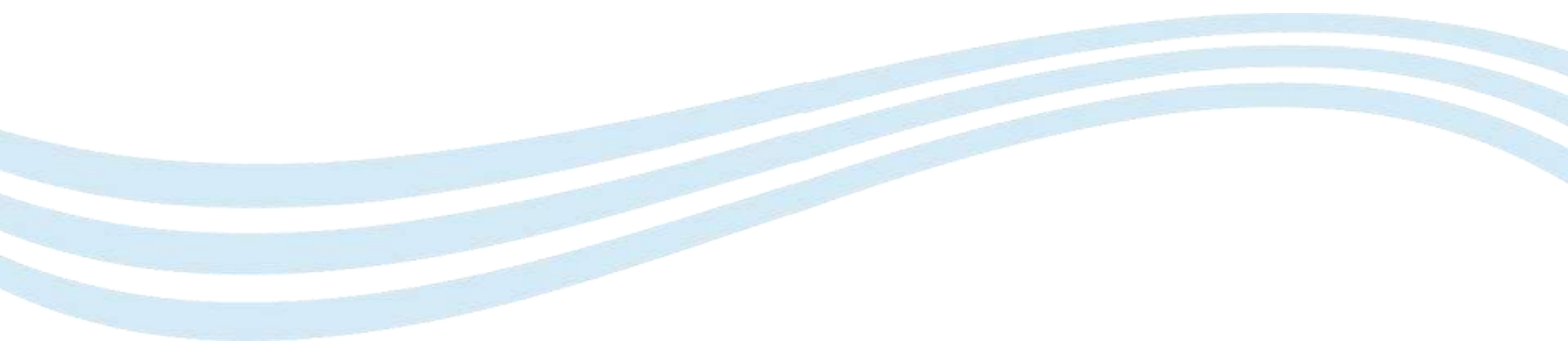


Coastal Emergency Risks Assessment (CERA)-2011 Irene

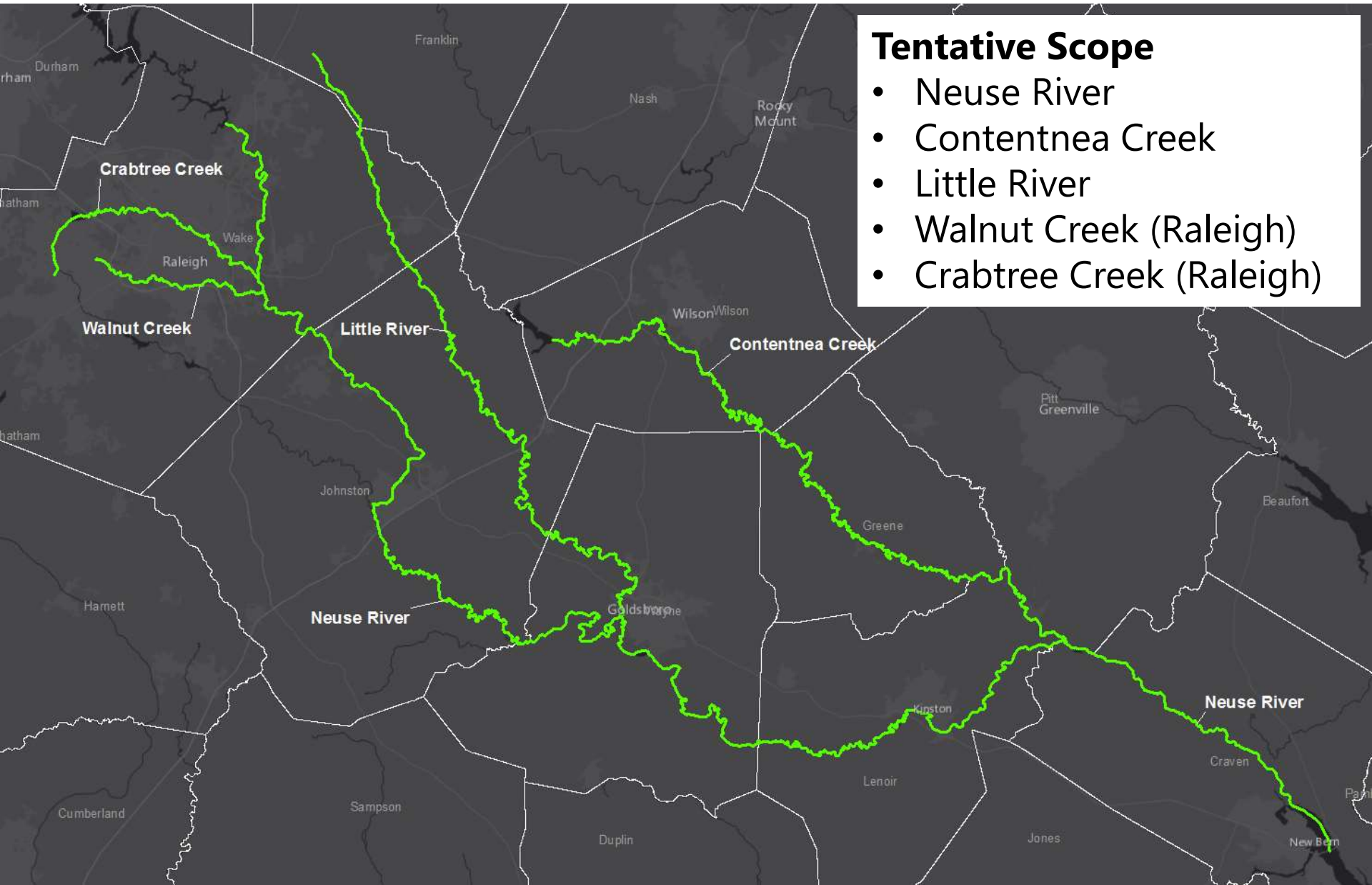


NexFIM Enhancements and River Basins

- Integration for more frequent events (2-yr and up)
- Neuse River System
- Cape Fear River System



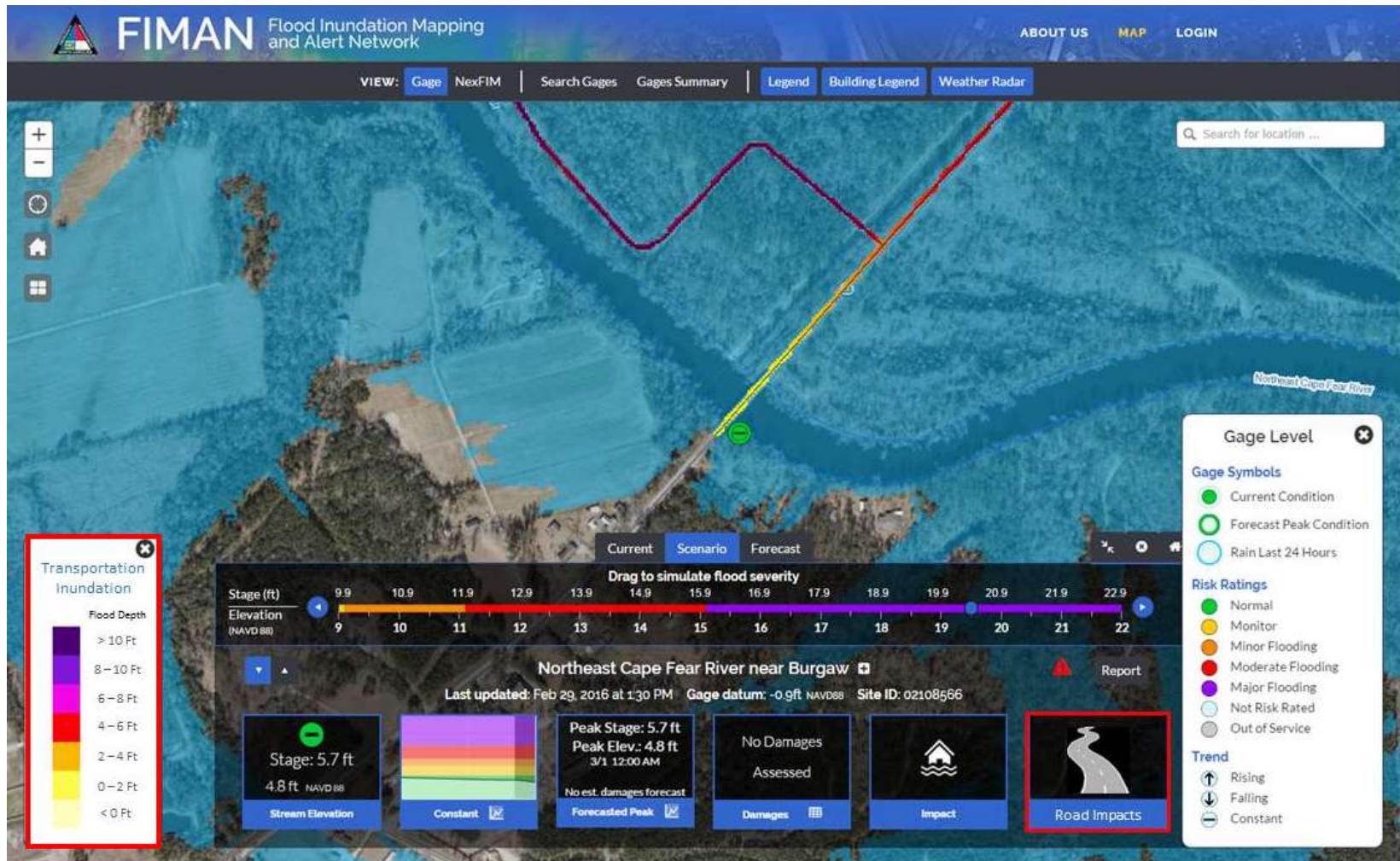
Additional NEXFIM System: Neuse



Tentative Scope

- Neuse River
- Contentnea Creek
- Little River
- Walnut Creek (Raleigh)
- Crabtree Creek (Raleigh)

Roadway Infrastructure Impacts



County	Gage ID	Road Name	Flooding WSEL	Max Inundation	Length of Road Overtopped
Pender	2108566	NC-53	20 ft	6.7 feet	0.5 miles
Pender	2108566	Cape Fear Dr	20ft	7.5 feet	0.8 miles
Pender	2108566	River Bend Dr	20ft	12.1 feet	1.4 miles



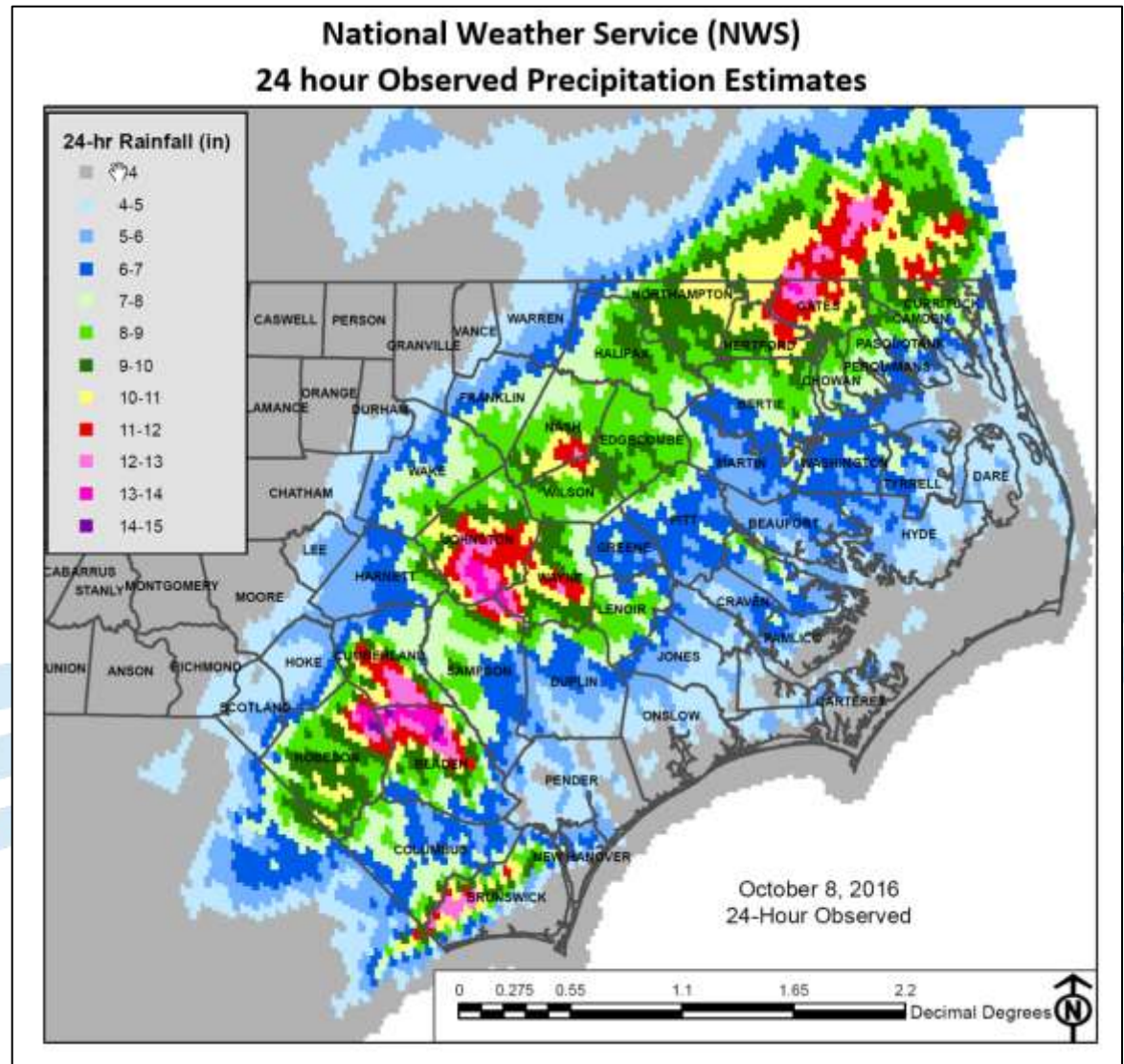
Hurricane Matthew

Flooding Impact on North Carolina



Matthew - Rainfall Totals

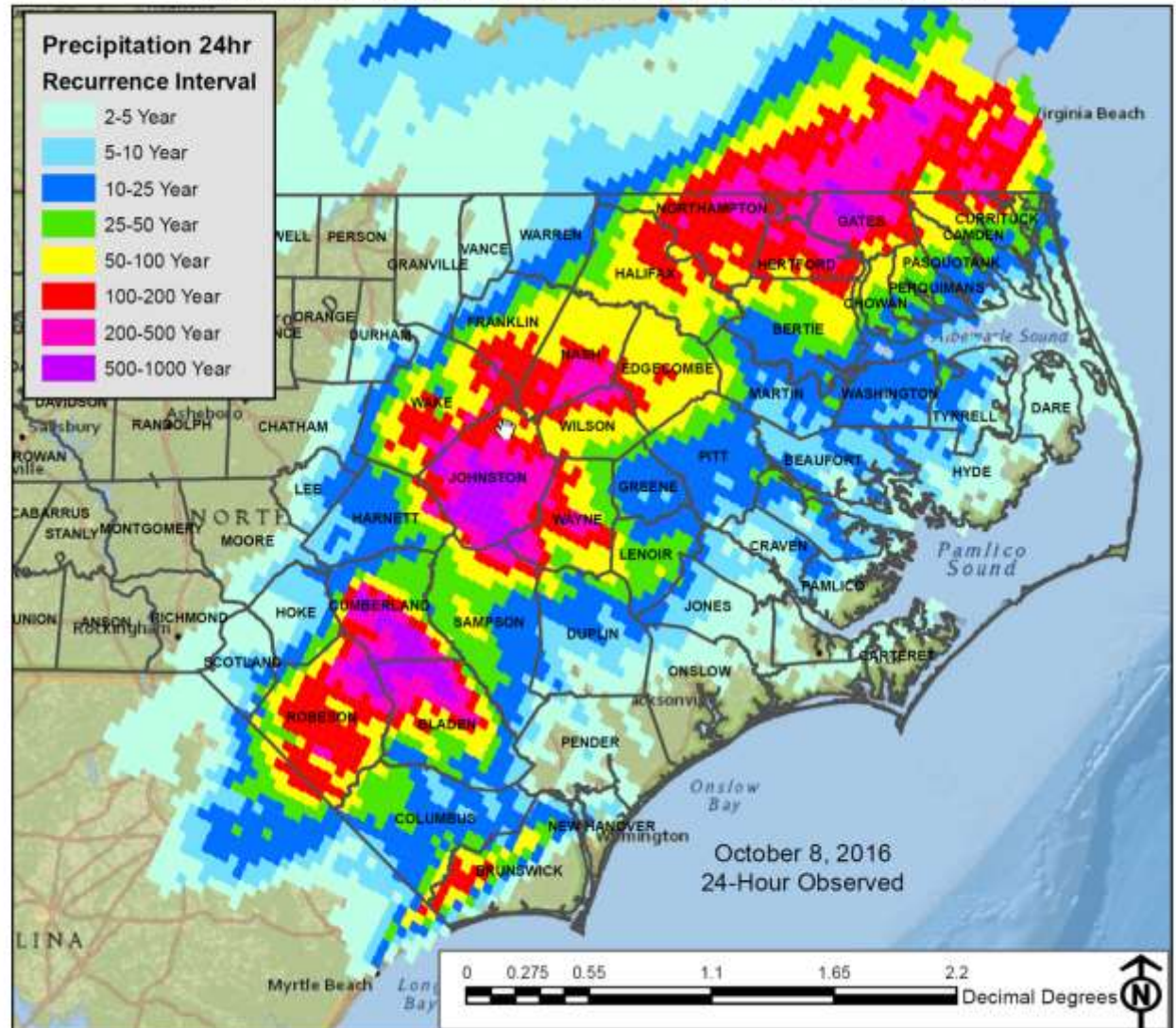
- Precipitation totals associated with Hurricane Matthew ranged from 4 to 15 inches in the central and eastern counties of North Carolina.
- Thirteen (13) counties (Bladen, Brunswick, Cumberland, Currituck, Gates, Hertford, Johnston, Nash, Northampton, Robeson, Sampson, Wayne, Wilson) experience 24-hour observed rainfall greater than 10 inches.



Matthew - Rainfall Recurrence Intervals

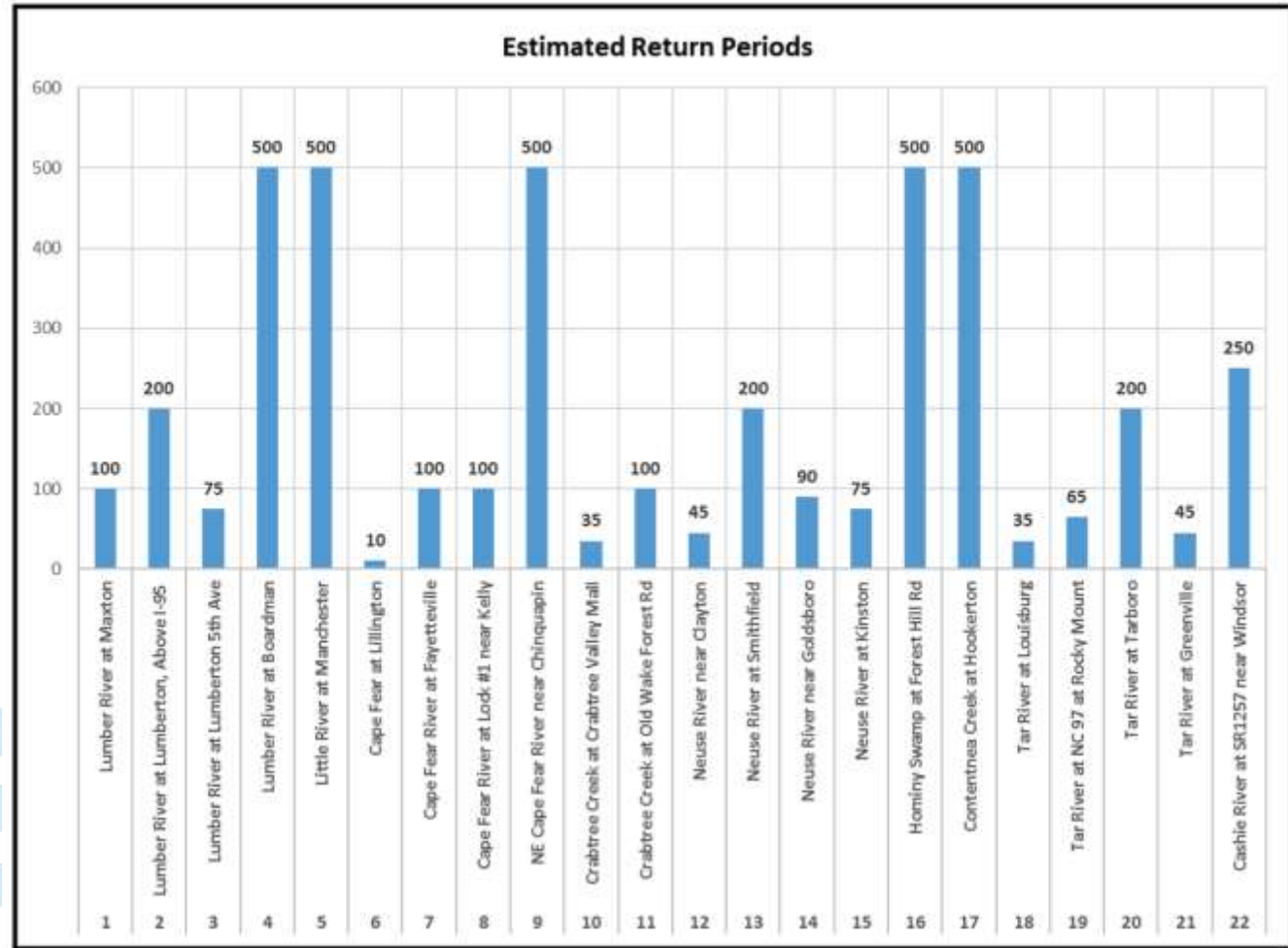
(NOAA Atlas 14 & NWS 24 hour Observed Precipitation)

- Precipitation totals associated with Hurricane Matthew equated to recurrence intervals of 2 to 1,000 year.
- Seven (7) counties (Bladen, Cumberland, Gates, Johnston, Robeson, Sampson, and Wayne) experience 24-hour observed rainfall equating to a 1 in 1,000 year chance rainfall.



Matthew – Gage / Flood Recurrence Intervals

- Gage observed elevations ranged from 10 year to 500 year flood recurrence interval.
- 13 gages observed 100 plus flood recurrence intervals.
- Eight (8) gages exceeded the previous flood of record.



GROUND TRUTH TESTING

September 22, 2016 in Windsor



Windsor – Sept 2016

Windsor Flooding 9/22/16 - Morning



Windsor – Sept 2016

Windsor Flooding 9/22/16 - Morning

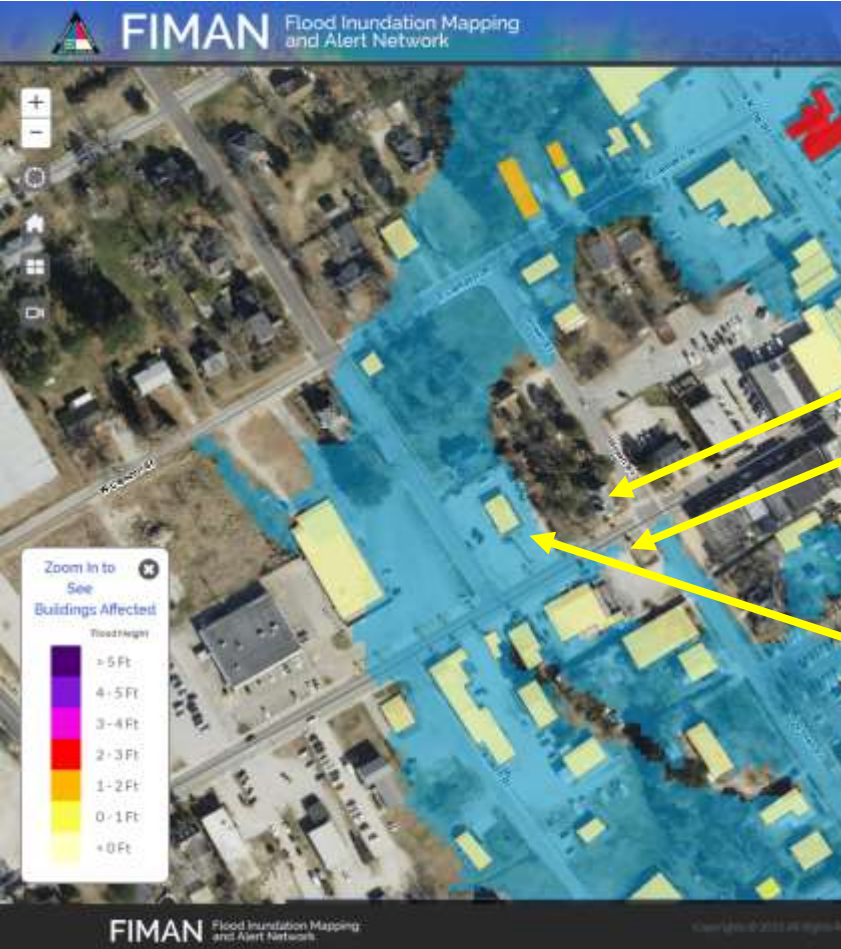


Note Flooding is on THIS side of tennis courts

Windsor – Sept 2016

Windsor Flooding

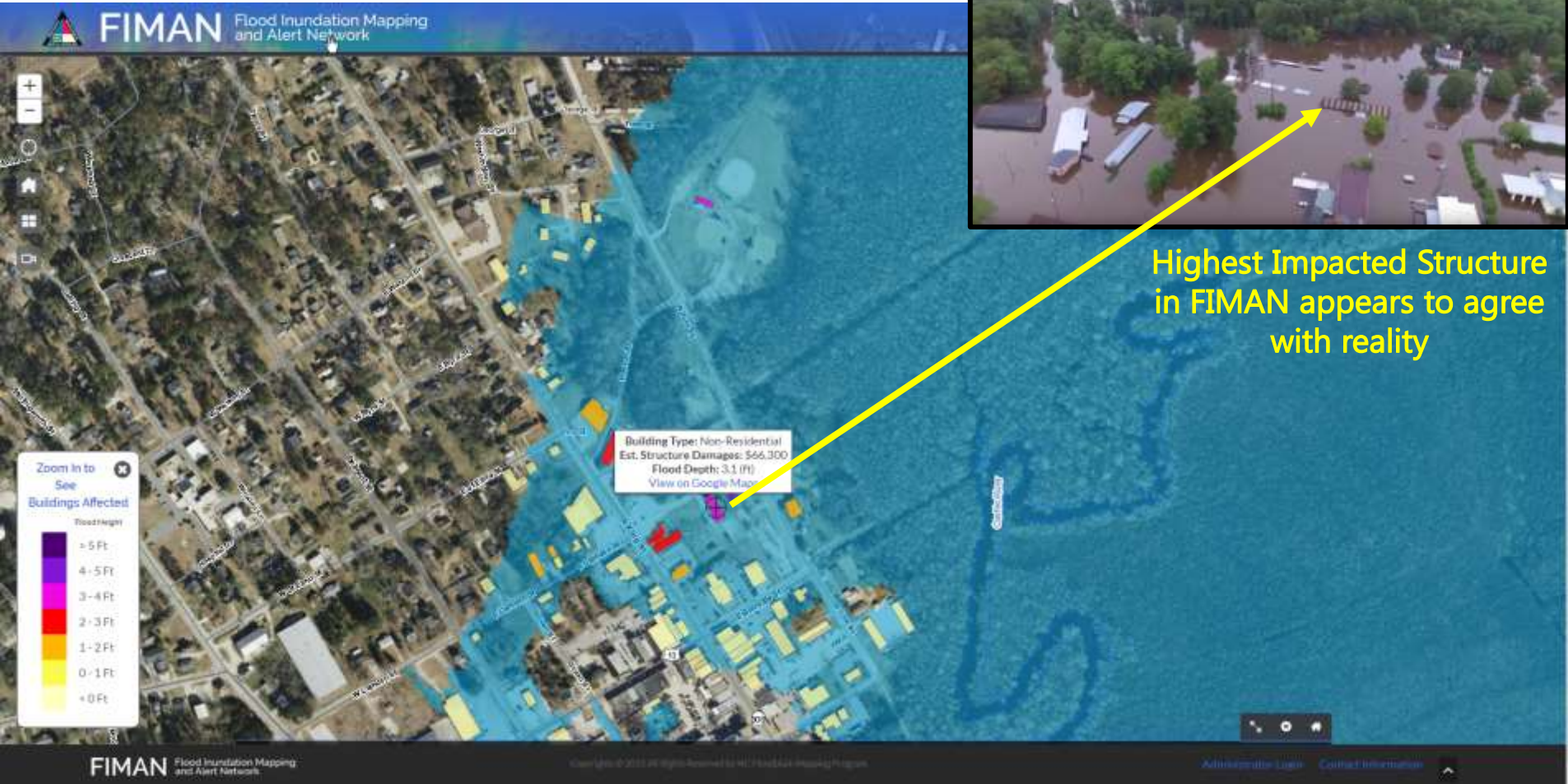
9/22/16 - Morning



Windsor – Sept 2016

Windsor Flooding

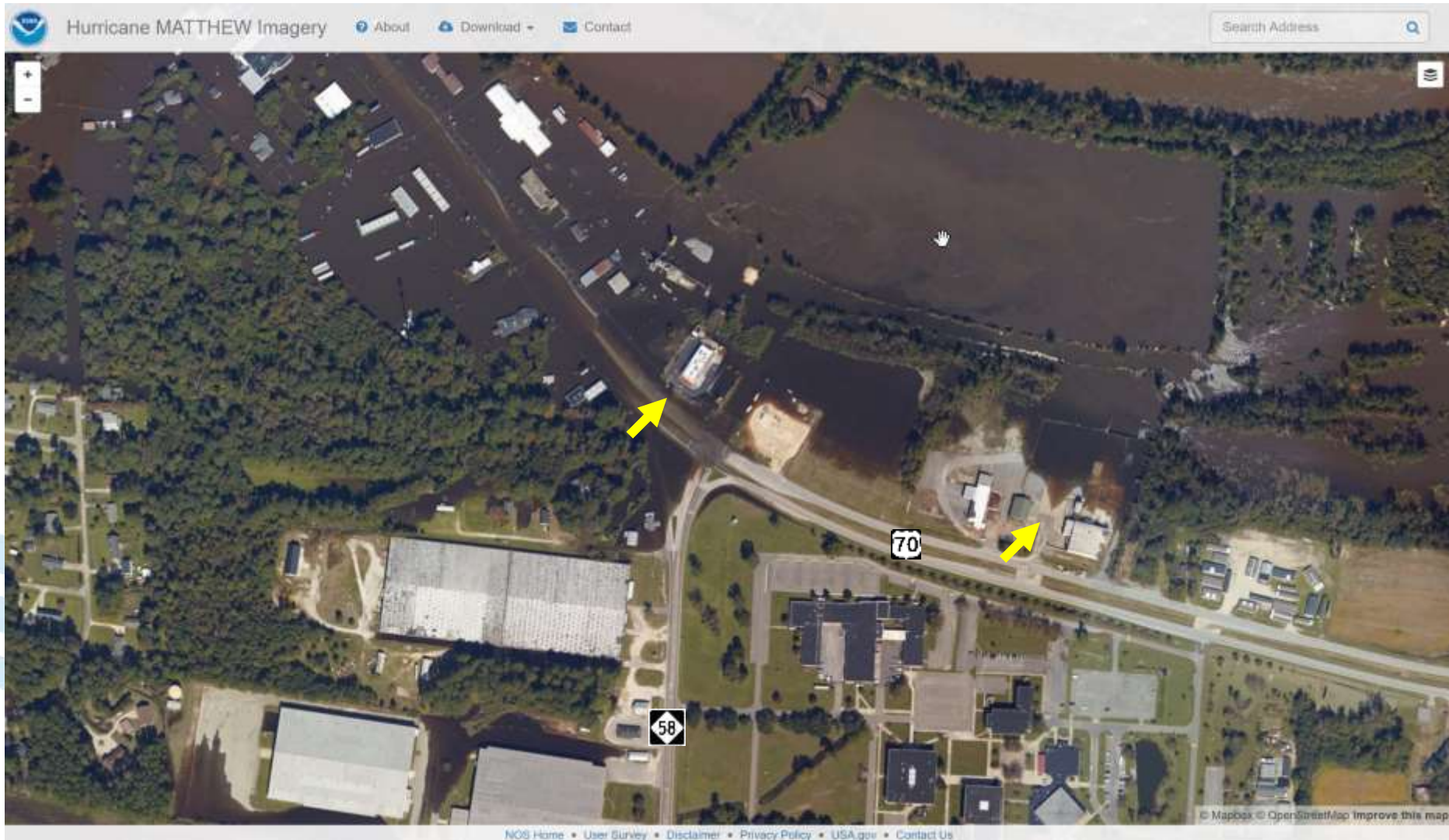
9/22/16 - Morning



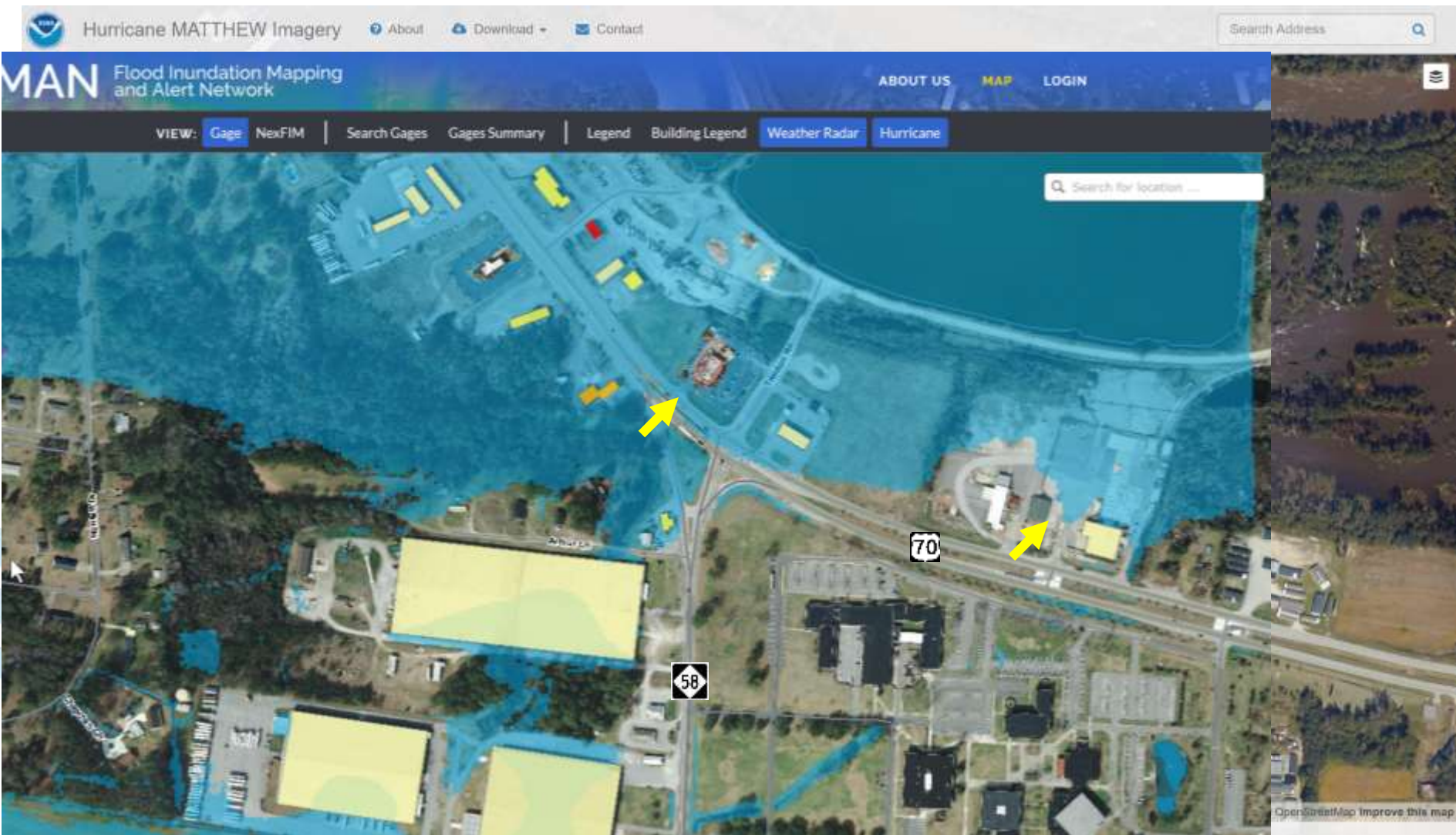
Greenville – October 11, 2016



Kinston



Kinston



Windsor





11.2

11.3

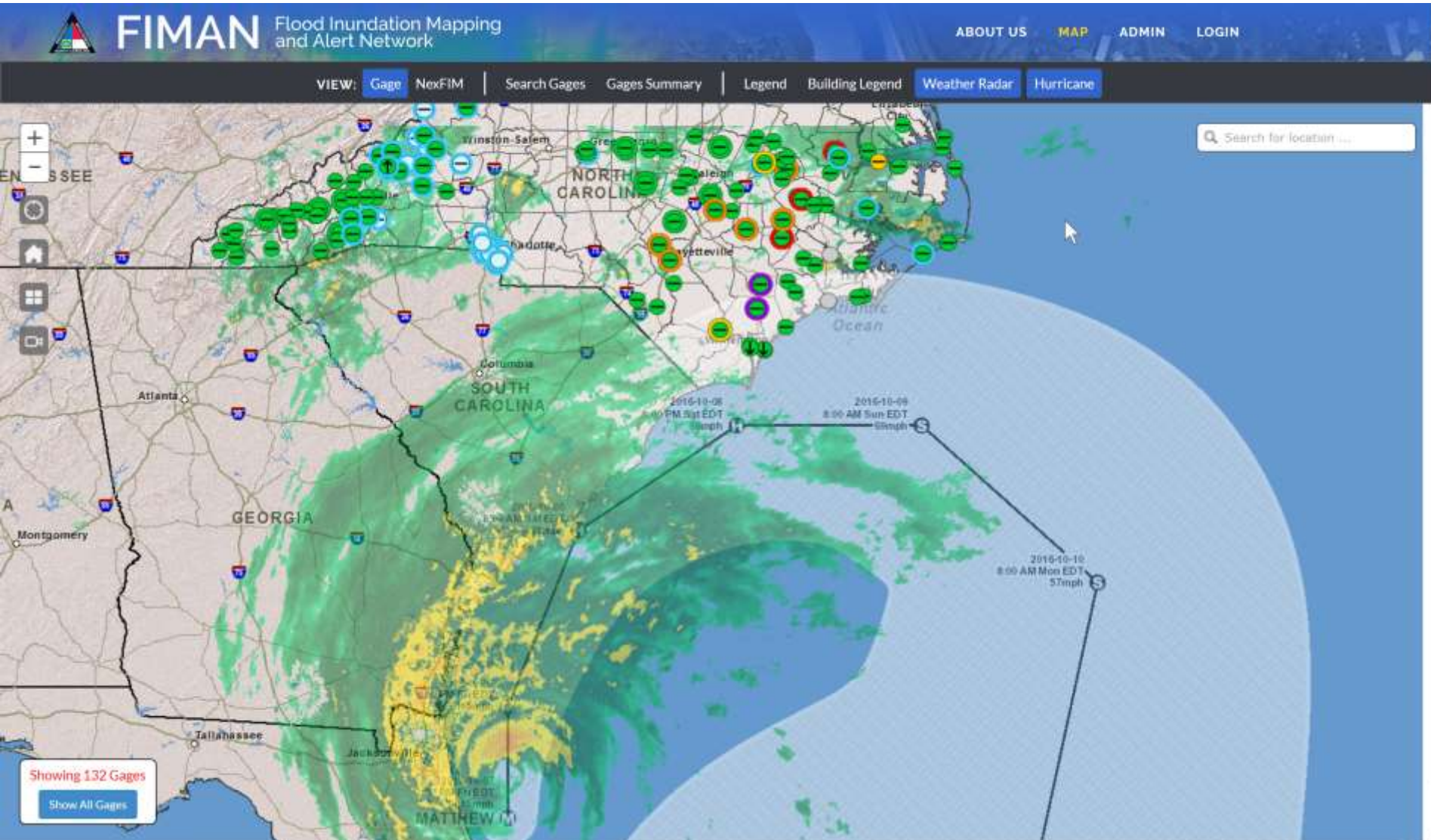
BERTIE

11.1

Windsor



Hurricane Matthew



Mayor Allen Thomas of Greenville, NC

FIMAN inundation used on Facebook to warn citizens of pending floods

Forecast peak: 20.2 ft

The screenshot shows a Facebook post from the profile of Mayor Allen Thomas of Greenville, NC. The profile picture is a police badge with 'PATROLMAN POLICE' and 'OF BATON RO' visible. The post text reads: '#HurricaneMatthew is projected to bring flooding within 10 feet of what what Hurricane Floyd brought in 1999. Expecting significant flooding in some areas along the Tar River, Green Mill Run and other tributaries and are advising residents in those areas to make the appropriate preparations. The Tar River is currently projected to reach a peak stage of 20.2 feet on Sunday, the highest since Hurricane Floyd, when it peaked about about 30 feet. At 20 feet, numerous areas along... Continue Reading'. Below the text is a large satellite-style map showing a flooded area in blue. To the left of the map are two smaller images: one of two men in uniform talking, and another of a flooded area with a '+4' overlay. At the bottom of the post, it shows '5' likes and buttons for 'Like', 'Comment', and 'Share'.

Hurricane Matthew



NC National Guard @NCNationalGuard · 3h

Our [#AlwaysReady](#) team is working closely with our State Emergency Response partners coordinating support efforts for Hurricane [#MatthewNC](#)

👤 NC Emergency Managem, NC Public Safety and NC Governor's Office

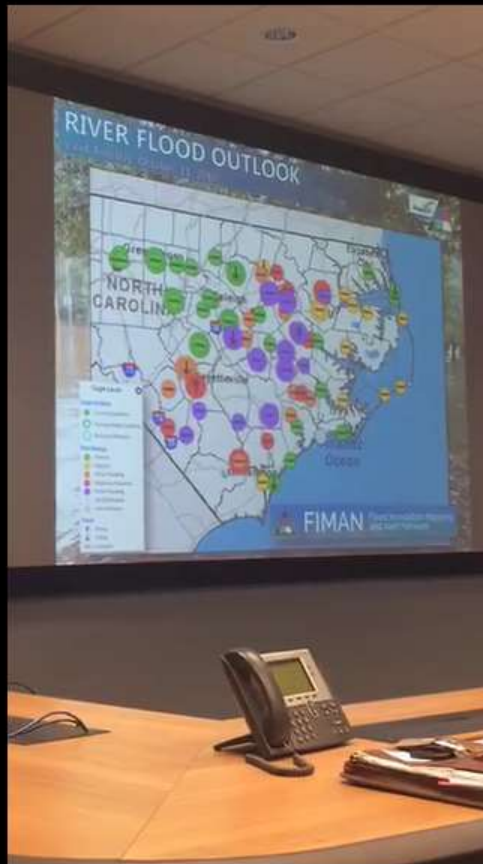


↻ 10

❤️ 8



Hurricane Matthew



 **NC Emergency Management** was live.
 Page Liked · 2 hrs · 

7PM Weather Outlook #MatthewNC

1,086 Views

 Like  Comment  Share

   35 Realtime Comments ▾

18 shares 8 Comments

 **Debbie Armstrong Cobb** · 1:19 Thank you
 Like · 2 hrs

 **Lori Gail Ennis** · 1:08 Thank you for keeping us updated
 Like ·  1 · 2 hrs

 **Rhonda Fields** · 0:52 Listening
 Like ·  3 · 2 hrs

 **Jonathan Anschutz** · 0:17 Thanks for the live stream - great situational awareness!
 Like ·  1 · 2 hrs

 **Laura Jane Richardson Price** · 0:03 McCory
 Like · 2 hrs

 **Laura Jane Richardson Price** · 0:03 Don't agree
 with mccory
 Like · 2 hrs

 **Laura Jane Richardson Price** · 0:03 Roy cooper !
 Like · 2 hrs

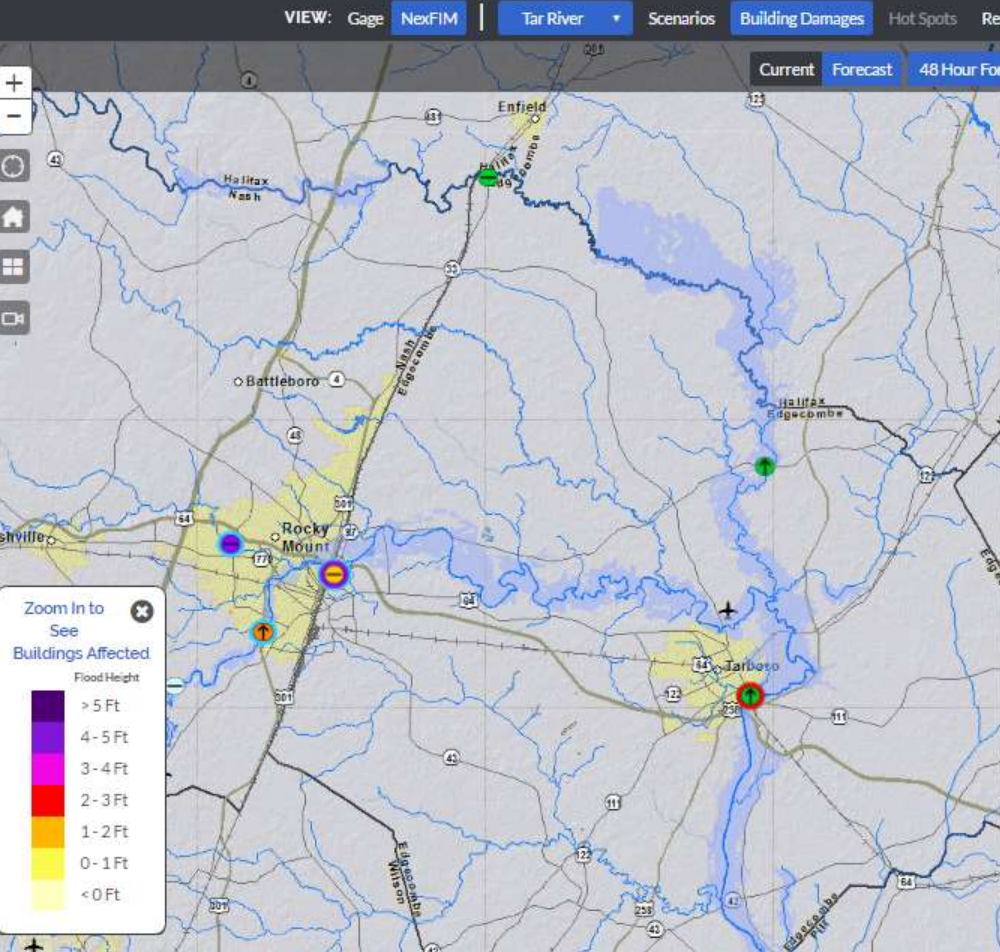
 **NC Emergency Management** · 0:00 Listening and watching debate
 Like · 2 hrs

 Write a comment... 

Suggested Pages See All

 **Skate For Derby**
 Megan and 4 other friends like this.
  Like

Hurricane Matthew



Tar River NexFIM Buildings in Inundation Extent
48 Hour Forecast estimated damages based on last update: 10/8/2016 at 6:48 PM

Flood Depth	Total		Residential		Commercial		Public	
	Count	Est. Damages	Count	Est. Damages	Count	Est. Damages	Count	Est. Damages
Sub Structure	323	\$591,000	306	\$555,000	14	\$32,000	3	\$4,000
0-1 ft	14	\$117,000	8	\$107,000	6	\$11,000	0	\$0
1-2 ft	10	\$215,000	4	\$73,000	5	\$105,000	1	\$38,000
2-3 ft	5	\$122,000	4	\$116,000	0	\$0	1	\$7,000
3-4 ft	8	\$114,000	0	\$0	7	\$103,000	1	\$11,000
4-5 ft	0	\$0	0	\$0	0	\$0	0	\$0
> 5 ft	2	\$36,000	0	\$0	2	\$36,000	0	\$0
TOTAL	362	\$1,197,000	322	\$850,000	34	\$287,000	6	\$59,000
Sub Structure	5,318	\$18,158,000	5,118	\$14,164,000	191	\$3,982,000	9	\$12,000
0-1 ft	524	\$9,174,000	335	\$4,195,000	186	\$4,973,000	3	\$5,000
1-2 ft	352	\$11,396,000	166	\$2,696,000	179	\$8,588,000	7	\$112,000
2-3 ft	302	\$55,387,000	166	\$4,140,000	129	\$51,112,000	7	\$125,000
3-4 ft	134	\$12,581,000	66	\$3,049,000	61	\$9,455,000	7	\$76,000
4-5 ft	102	\$5,203,000	48	\$3,999,000	48	\$1,020,000	6	\$184,000
> 5 ft	107	\$5,528,000	33	\$1,869,000	65	\$3,313,000	9	\$347,000
TOTAL	6,839	\$117,427,000	5,932	\$34,114,000	859	\$82,442,000	48	\$870,000
Sub Structure	3,653	\$12,302,000	3,514	\$9,628,000	132	\$2,665,000	7	\$9,000
0-1 ft	354	\$6,155,000	226	\$2,833,000	126	\$3,319,000	2	\$3,000
1-2 ft	238	\$7,669,000	112	\$1,822,000	121	\$5,760,000	5	\$87,000
2-3 ft	203	\$36,966,000	112	\$2,799,000	86	\$34,075,000	5	\$92,000
3-4 ft	92	\$8,425,000	44	\$2,032,000	43	\$6,338,000	5	\$55,000
4-5 ft	68	\$3,469,000	32	\$2,666,000	32	\$680,000	4	\$123,000
> 5 ft	72	\$3,697,000	22	\$1,246,000	44	\$2,220,000	6	\$231,000
TOTAL	4,680	\$78,684,000	4,062	\$23,026,000	584	\$55,057,000	34	\$600,000

*Additional buildings may be impacted outside of the real-time inundation extent.

Hurricane Matthew

NC Flood Inundation Mapping and Alert Network

VIEW: Gage NexFIM Search Gages Gages Summary Legend Building Legend Weather Radar Hurricane

ABOUT US MAP WELCOME LAURA

Search for location ...

Zoom In to See Buildings Affected

Flood Height

- > 5 Ft
- 4-5 Ft
- 3-4 Ft
- 2-3 Ft
- 1-2 Ft
- 0-1 Ft
- <0 Ft

Crabtree Cr at Old Wake Forest Rd Rah

Last updated: Oct 8, 2016 at 6:30 PM Gage datum: 485.7ft NAVD88 Site ID: 02087322

1 hr: 0 in		52 buildings	Report		
6 hrs: 3.33 in				\$1,603,000	
12 hrs: 6.96 in					Damages
24 hrs: 7.57 in					
Rain <input checked="" type="checkbox"/>	Constant <input checked="" type="checkbox"/>				

Windows taskbar: Ask me anything, 7:12 PM 10/8/2016, ISP Associates, P.A.

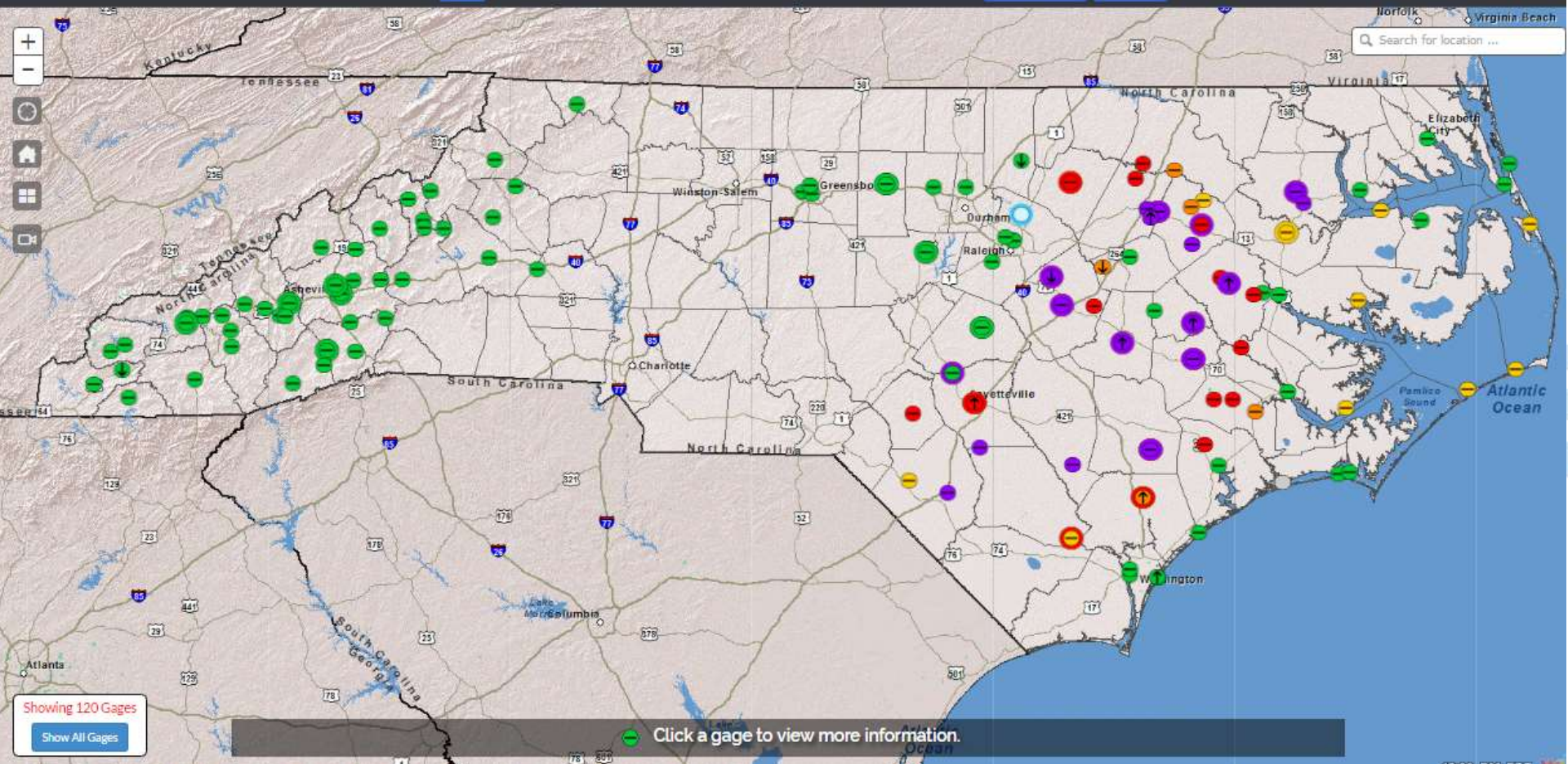
Hurricane Matthew



FIMAN Flood Inundation Mapping and Alert Network

ABOUT US MAP WELCOME LAURA

VIEW: Gage NexFIM Search Gages Gages Summary Legend Building Legend Weather Radar Hurricane



Showing 120 Gages
Show All Gages

Click a gage to view more information.



Hurricane Matthew



FIMAN Flood Inundation Mapping and Alert Network

ABOUT US

MAP

WELCOME LAURA



VIEW: **Gage** NexFIM

| Search Gages

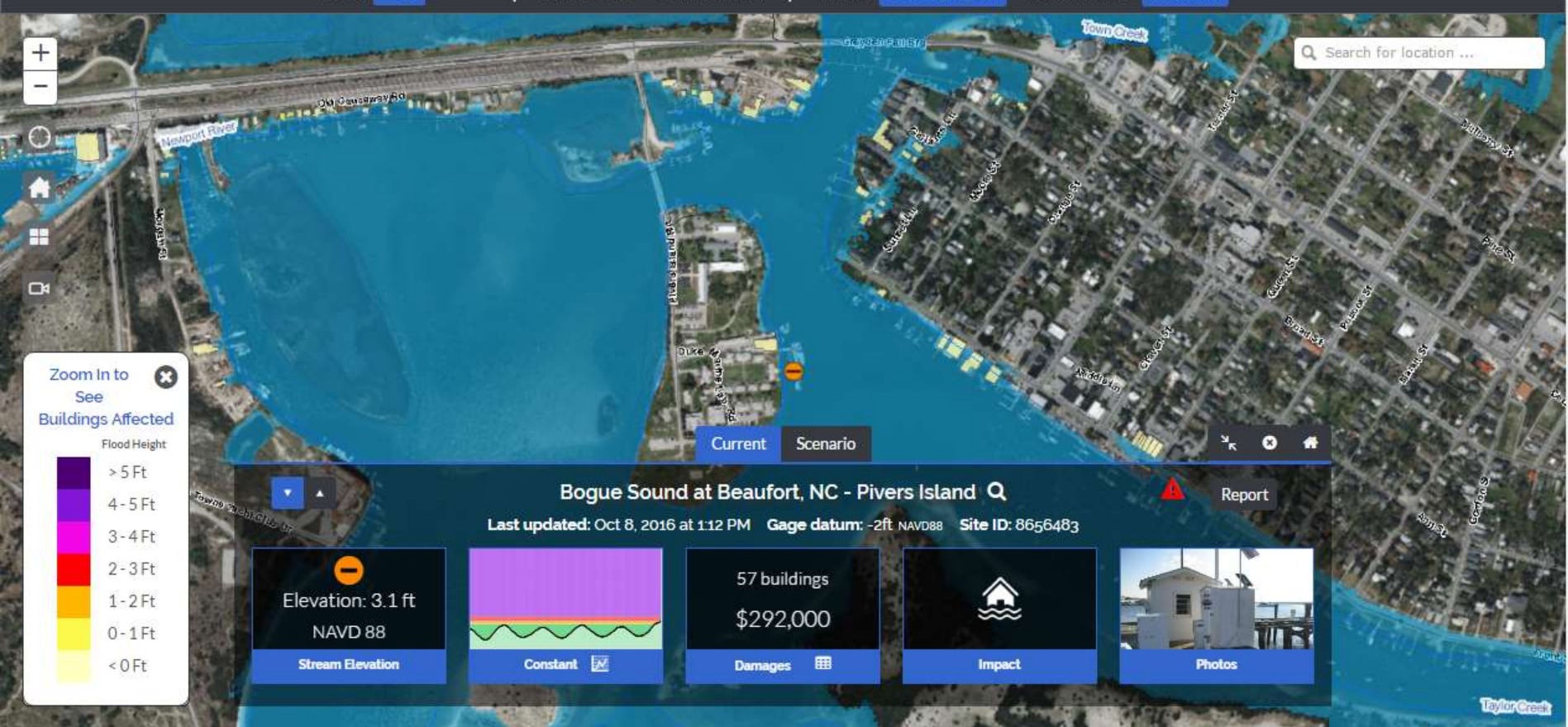
Gages Summary

| Legend

Building Legend

Weather Radar

Hurricane



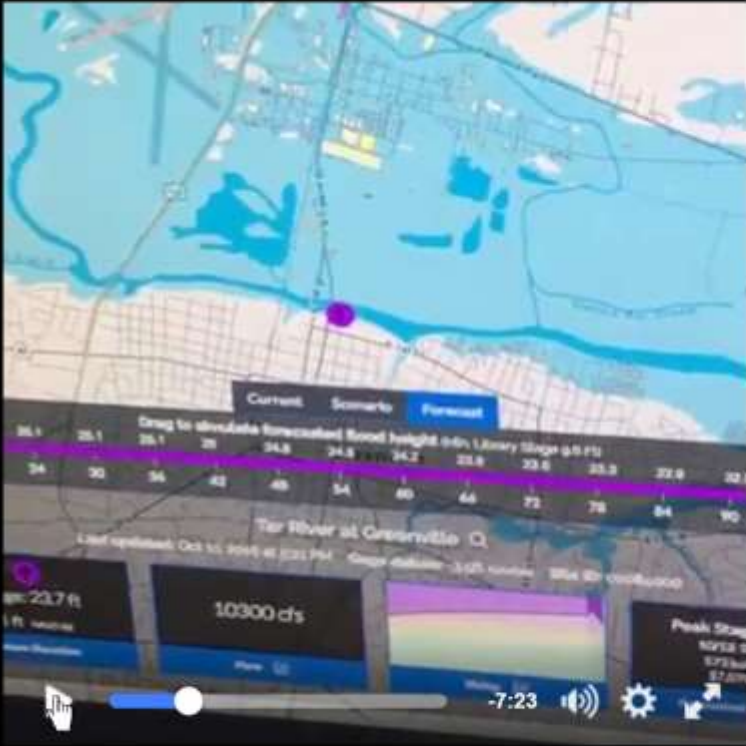
Media and Social Media

Rising Tar River water levels threaten Tarboro, Princeville



N+C
D The rising water levels in the Tar River are threatening to flood Tarboro and Princeville.
5:34 a.m. yesterday

Media and Social Media



Current Scenario Forecast

Drag to simulate forecasted flood height with Library Stage at 8.71

26.1	25.1	25.1	25	24.8	24.8	24.7	23.8	23.5	23.3	22.9	22.1
34	30	34	42	49	54	60	66	72	78	84	90

Tar River at Greenville

Leaflet | OpenStreetMap contributors, Imagery © Mapbox

Peak Stage
NWSR 5
10750
17.87

10300 cfs

23.7 ft

1 ft

-7:23

Options | Share | Send | Like

5 WRAL TV was live.
Page Liked · October 12 · 🌐

WRAL Nate Johnson takes a look at crest levels across the state.

7,676 Views

👍 Like 💬 Comment ➦ Share

👤 🗣️ 146 Realtime Comments *

53 shares 24 Comments

Raisy Rae · 2:11 Praying
Like · 1 · October 12 at 2:45pm

Rachael Currin Skipper · 2:06 News on lower Cape Fear?
Like · 1 · October 12 at 2:33pm

Monamovingforward Marie · 2:00 264 Wilson/rocky mount?
Like · October 12 at 4:46pm

Robin Steward · 1:57 That is right
Like · October 12 at 3:59pm

Write a comment...

Media and Social Media



SECTIONS



TRAFFIC



WATCH



82° Raleigh, NC
M/Cloudy EDIT

and Alert Network as of 11:00 a.m., Tuesday, October 11, 2016. (NC FIMAN)

The Lumber River in the Lumberton area is currently running at record levels but is down from yesterday with a reading of 20.7'. The old record was 20' with flood stage at 13'. According to the NC Flood Inundation Mapping and Alert Network, 882 buildings are flooded with an estimated damage cost of \$23.9 million.

VIEW: Gage NexFIM Search Gages Gages Summary Legend Hu

Current Scenario Forecast

Drag to simulate flood severity

Stage (ft) 16.2 17.2 18.2 19.2 20.2 21.2 22.2

Elevation (NAVD 88)

Neuse R

Last updated: Oct 20, 2016 at 12:30 PM

BUILD YOUR MORNING ANY WAY YOU WANT

ALL ORIGINAL GREEN PEPPER ALL ORIGINAL ALL ORIGINAL

FIND A RESTAURANT

SUBWAY

At participating locations.

TOP STORIES



Driver accused of slapping special needs child
Updated 50 mins ago



Woman shot in the face at Raleigh apartment complex
Updated 58 mins ago



Southbound I-95 still detoured after 3 crashes
Updated 36 mins ago



Trump says he'll honor election results - if he wins
Updated 39 mins ago

3rd person charged in murder of Fayetteville landlord

People line up for early voting in North Carolina
Updated 51 mins ago

Experts say we're in for a warmer, drier winter
Updated 1 hr 32 mins ago

Clinton, Trump don't shake hands, fling barbs instead

McCrory outlines plans for NC's hurricane

TOP VIDEO



People line up for early voting in North Carolina
Updated 51 mins ago



Trooper comes to rescue of bald eagle



Snake slithers out of car



Brazen burglary caught on camera

MORE VIDEO ▶

Media and Social Media



Mike Moss

22h



Lots of areas continue to face river flooding - this is one example in the Goldsboro area, showing locations west and southwest of Seymour Johnson AFB where the Tar River is or will extend to as it reaches a...

[Read More](#)



Share



Nate Johnson

13h



This is a look at the areas expected to flood if the Tar River crests as forecast in Greenville NC later this week. This is from the new NC FIMAN system at <http://fiman.nc.gov/fiman/> — if you live in an area...

[Read More](#)



Share



Nate Johnson

13h



Good news for Fayetteville. Assuming no dams fail and there is no additional rain (and certainly none is in the forecast), the Cape Fear will dip below flood

Hurricane Matthew



Summary and Q&A

