NORTH CAROLINA
Department of Transportation

Storm Operations: BridgeWatch and FIMAN-T

METTS West

April 7th, 2022

Matt Lauffer - Hydraulics

BridgeWatch

FIMAN-T

AGENDA:

1. BridgeWatch
2. FIMAN and FIMAN-T
3. Flood Warning Tool Team Site
4. Lessons Learned From TD Fred
5. Tools Under Development

Flood Awareness Products Will Be Available in the Future for Direct Use by Division Personnel

1) BridgeWatch

2) FIMAN-T

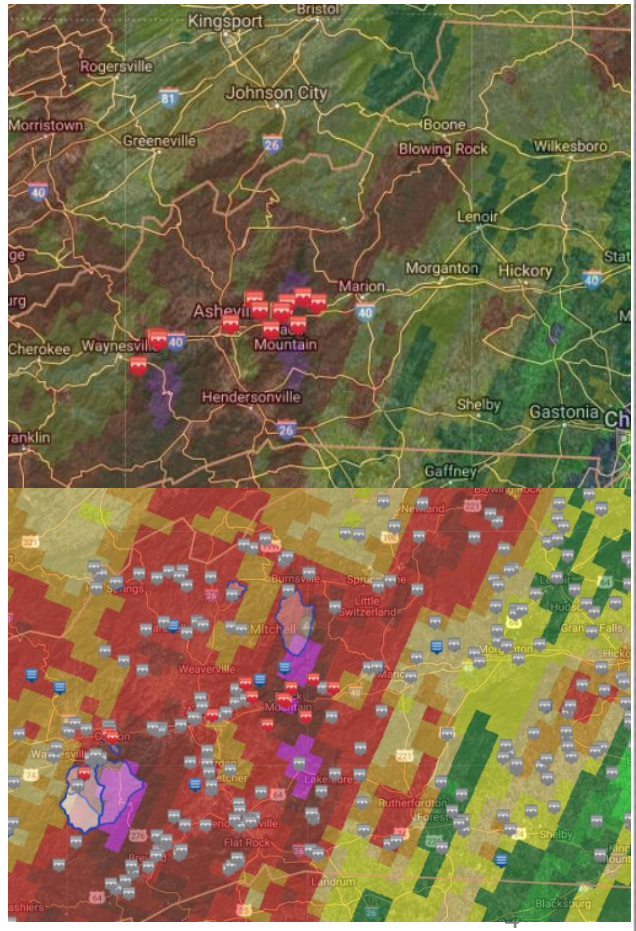
NCDOT BridgeWatch

What is BridgeWatch?

Real-time monitoring for structures over water.

Alerted immediately when levels exceed set threshold

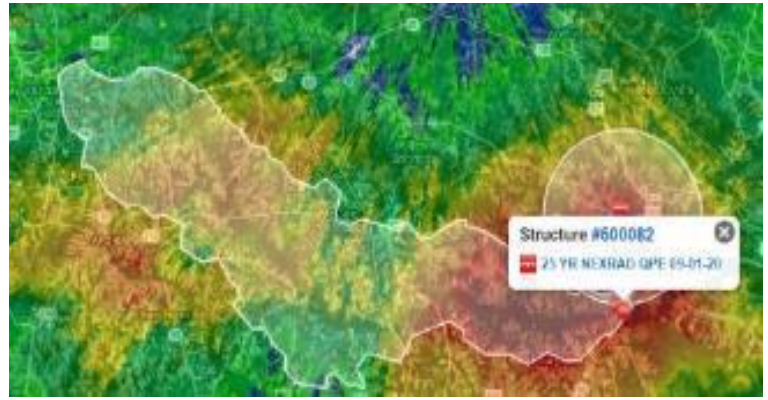
Alerts help identify flooded roadways and scour critical structures impacted by heavy rainfall



How BridgeWatch Works to Send Alerts

- 395 Gauged Bridges with Pre-Set Elevations Triggering:
  - Overtopping Alerts
  - Low Chord Alerts (Bottom of Girder)
  - Freeboard Alerts (2ft Below Girder)

- 15,700 Rainfall Alerts (25-year Storm and Greater) from Weather Radar



BridgeWatch Metrics

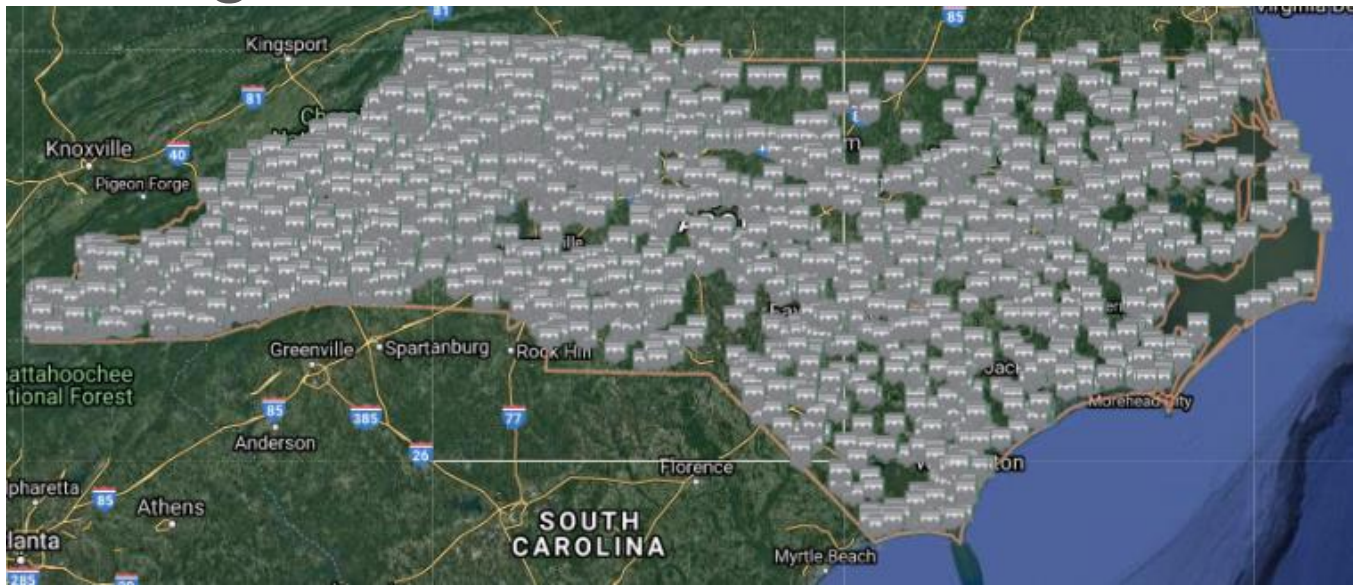
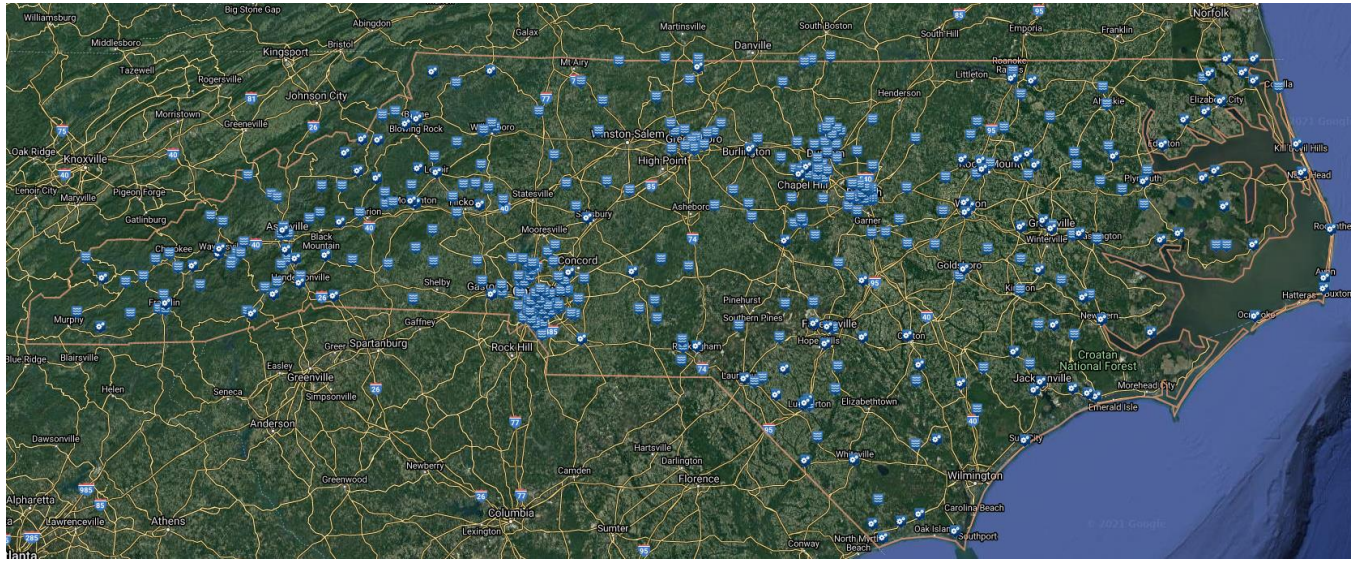


Figure of all gage locations

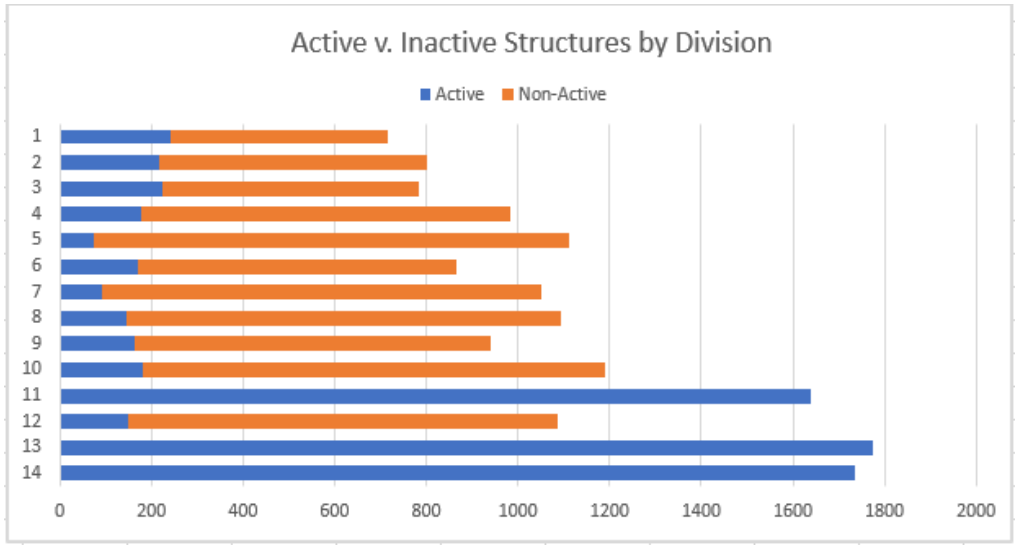


Structures

6978 Actively monitored

15767 Total in BridgeWatch

- 743 Active Evacuation Route Structures
- 5 Priority Structures Monitored (post-Fred)



Gages

395 Gages Actively Monitored

USGS gages: 281

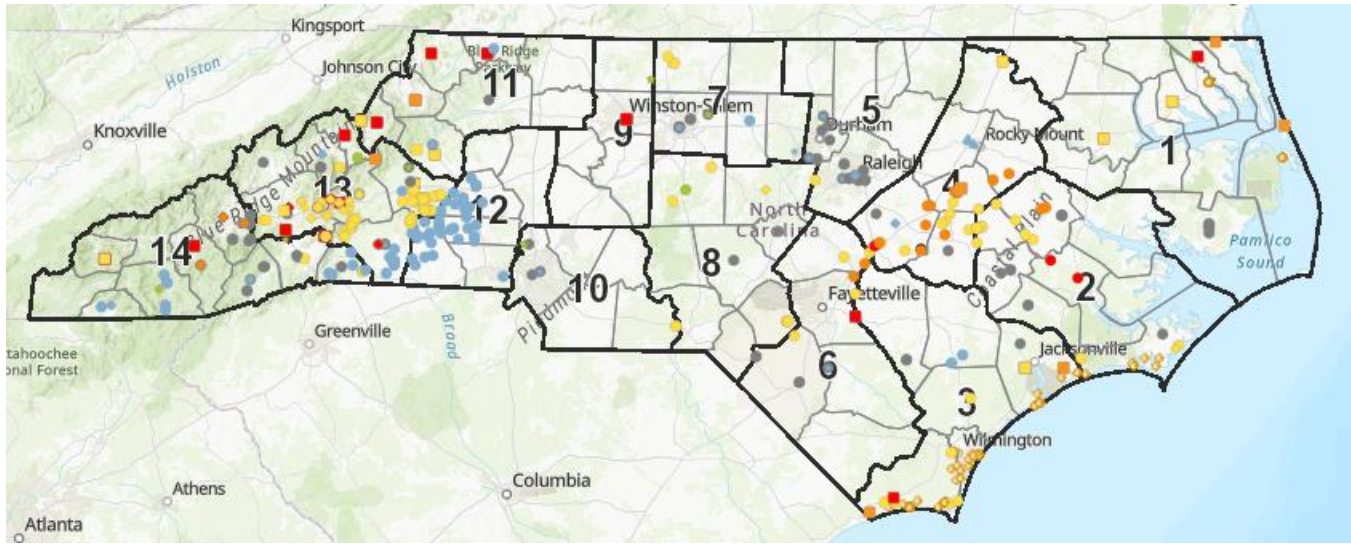
NCEM gages: 114/129

BridgeWatch Output

1) Flood Alerts Direct to Text or Email

2) Flood Alerts Displayed on Online Map

3) Summary of Alerts in Excel Format



[External] BridgeWatch - Device Alert

N NCBridgeWatch@ncdot.bridgewatch.us
To Smith, Charles R

You forwarded this message on 2/24/2022 7:14 AM.
If there are problems with how this message is displayed, click h

CAUTION: External email. Do not click links or open attachments

Structure Overtopping bridges: 780045 (In Rockingham)

NCEM Structure Overtopping
Bridge: 780045
County: Rockingham
Road: SR2282
Stream: DAN RIVER
Lat\Long: 36.485,-79.763
Gage: 30020
Time: 2022-02-24 06:16:01 UTC
Event Value: 49.02
Threshold Exceeded: 45.4
Confirmation:Yes

(USGS Alert) USGS Structure Overtopping Br 990040 (Yancey)@ NC197 & CANE RIVER Lat\long: 35.830,-82.318 Time: 2021-12-03 15:30:00.0 17.77 > 17.06

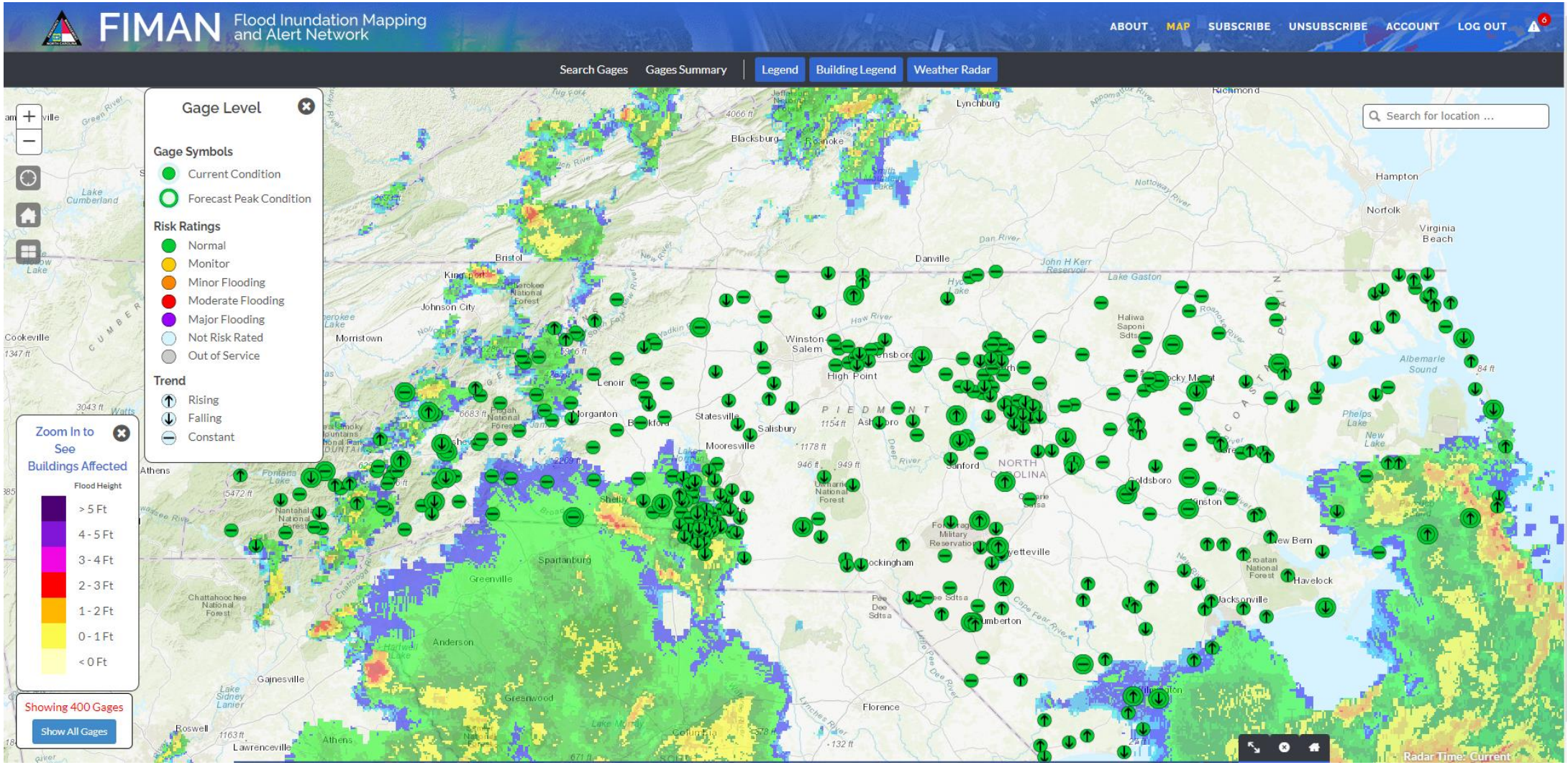
FIMAN-T and FIMAN

Flood Inundation Mapping and Alert Network for Transportation

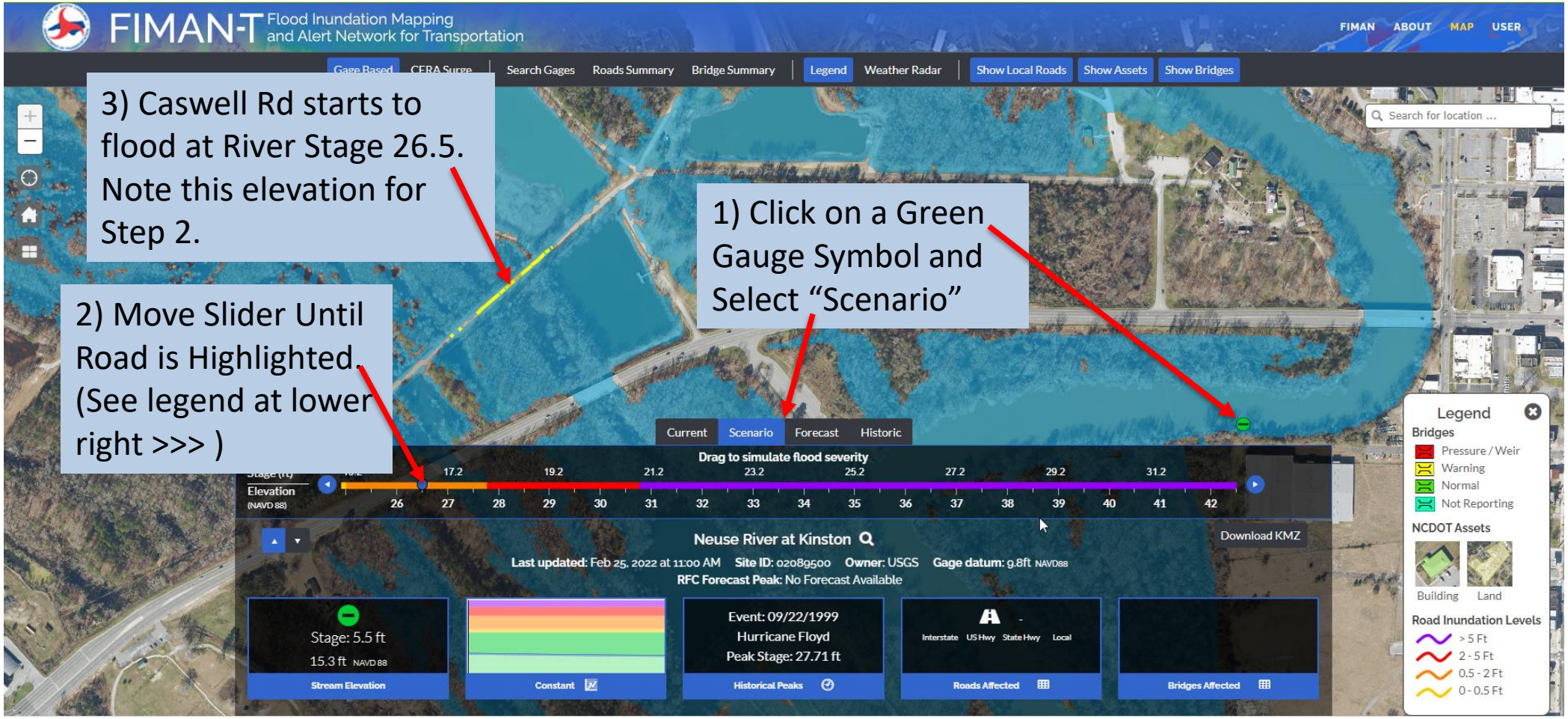
Gauges and River Water Surface Models Are Used To Show Current and Forecasted Flooding from Rivers and Coastal Areas

Users will Investigate Roads of Interest, then Sign Up for Pre-Set and Custom Flooding Alerts by Text and Email, Using a Two-Step Process

(Also note that an Excel-based FIMAN-T summary is in development)


FIMAN
Flood Inundation Mapping and Alert Network
ABOUT
MAP
SUBSCRIBE
UNSUBSCRIBE
ACCOUNT
LOG OUT
Search Gages
Gages Summary
Legend
Building Legend
Weather Radar
Gage Level
Gage Symbols
Current Condition
Forecast Peak Condition
Risk Ratings
Normal
Monitor
Minor Flooding
Moderate Flooding
Major Flooding
Not Risk Rated
Out of Service
Trend
Rising
Falling
Constant
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
Showing 400 Gages
Show All Gages
Search for location ...
Radar Time: Current

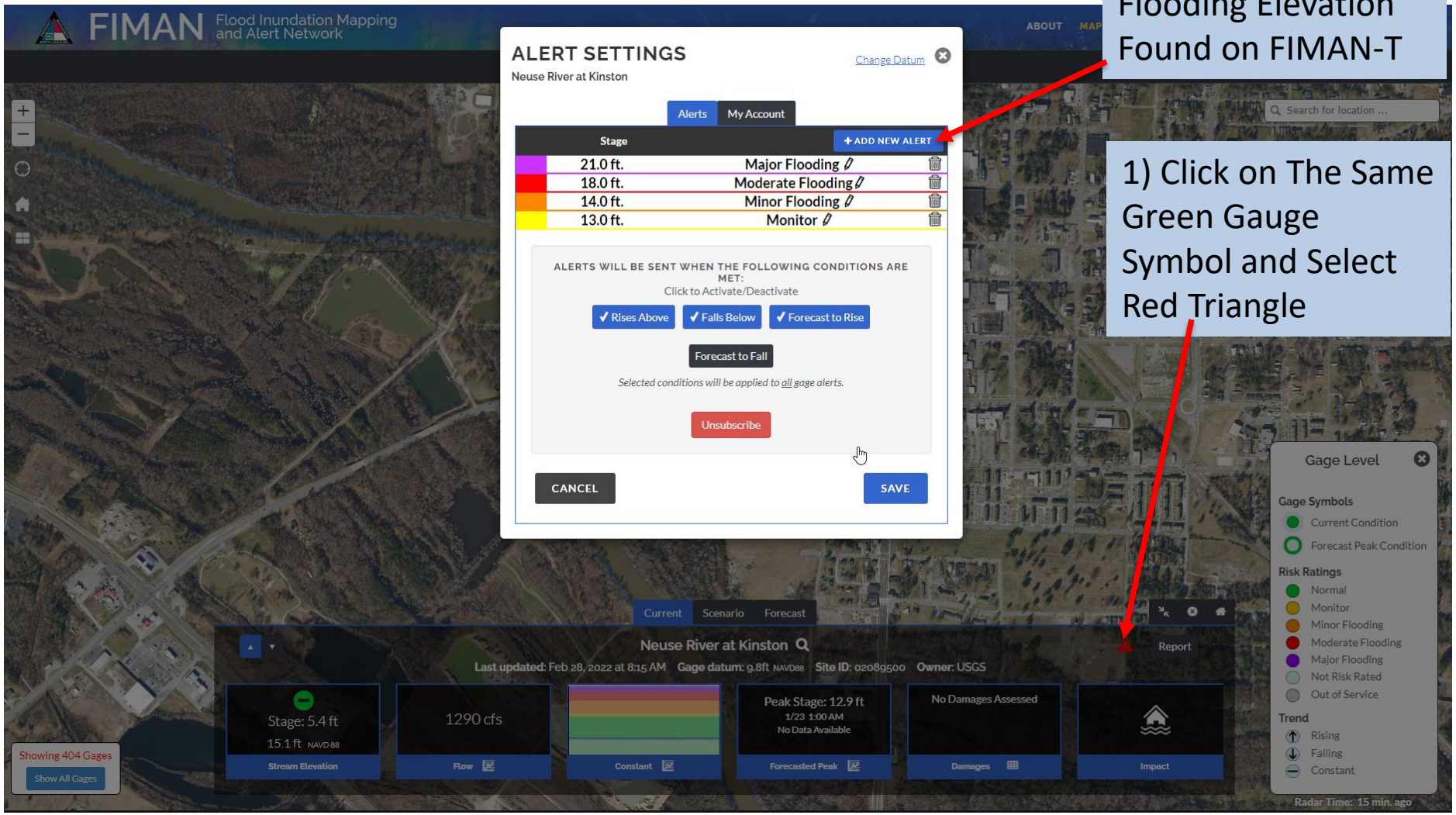
Subscribing to FIMAN Alerts
Step 1 - Start on FIMAN-T Website



Subscribing to FIMAN Alerts
Step 2 – Set Alerts on FIMAN Website

2) Set a Custom Alert at the Road Flooding Elevation Found on FIMAN-T

1) Click on The Same Green Gauge Symbol and Select Red Triangle



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NCDOT - Hydraulics Flood Warning Tools

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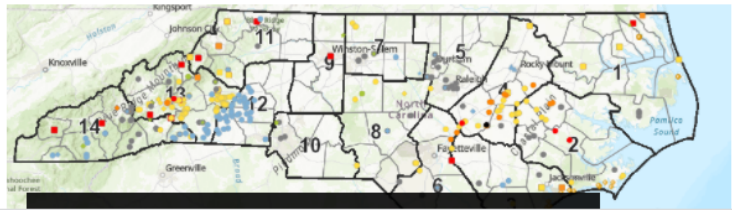
BETA SITE UNDER DEVELOPMENT

BridgeWatch | FIMAN-T & FIMAN | FIMAN-T SURGE

BridgeWatch

Bridgewatch is a real-time bridge flooding warning system that relies on stream gauges and weather radar to indicate when bridges and culverts are near flooding, actively flooding, or weather conditions are favorable for flooding. Users can subscribe to text and/or email alerts, or view flooding statuses on a GIS map. Uses for Bridgewatch include: Closing and Reopening flooded roadways, compiling inspection list for flooded bridges, relief and resupply route finding.

Users wanting to monitor gauges of interest that are not currently triggering alerts should use FIMAN.



BridgeWatch Alert Descriptions

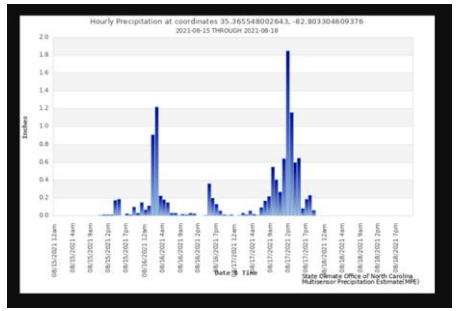
NON-GAUGE ALERTS: SLOSH, NEXRAD, & QPF

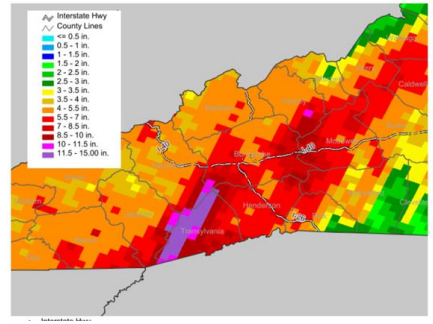
Forecast Coastal Storm Surge SLOSH (Watch-Yellow)

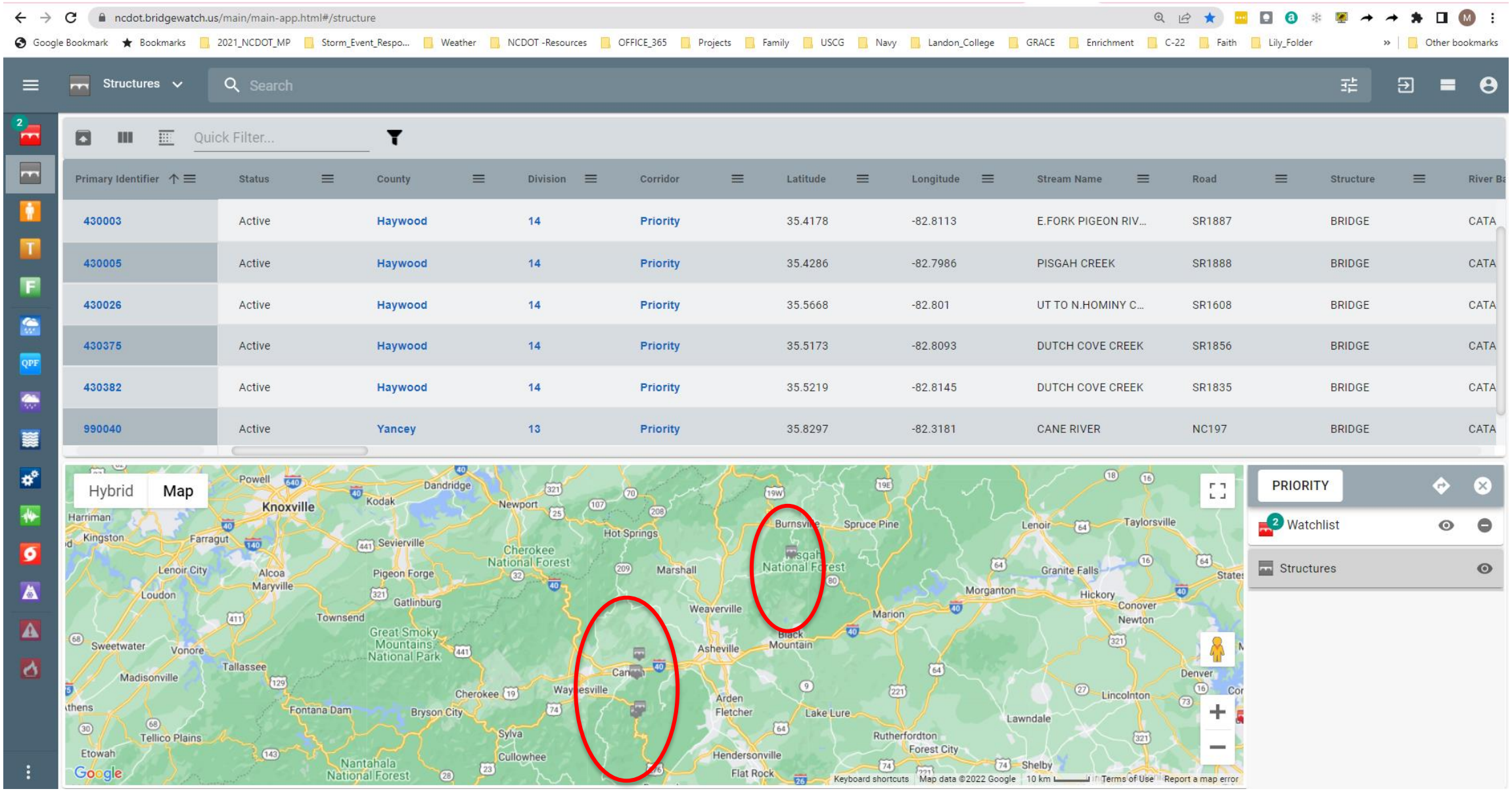
SLOSH ALERT IS ISSUED WHEN HURRICANE STORM SURGE HAS A 10% CHANCE OF EXCEEDING BRIDGE LOW CHORD ELEVATIONS. SLOSH ALERTS INDICATE FAVORABLE CONDITIONS FOR FLOODING - NOT THAT FLOODING IS IMMINENT OR OCCURING.

Lessons from TD Fred

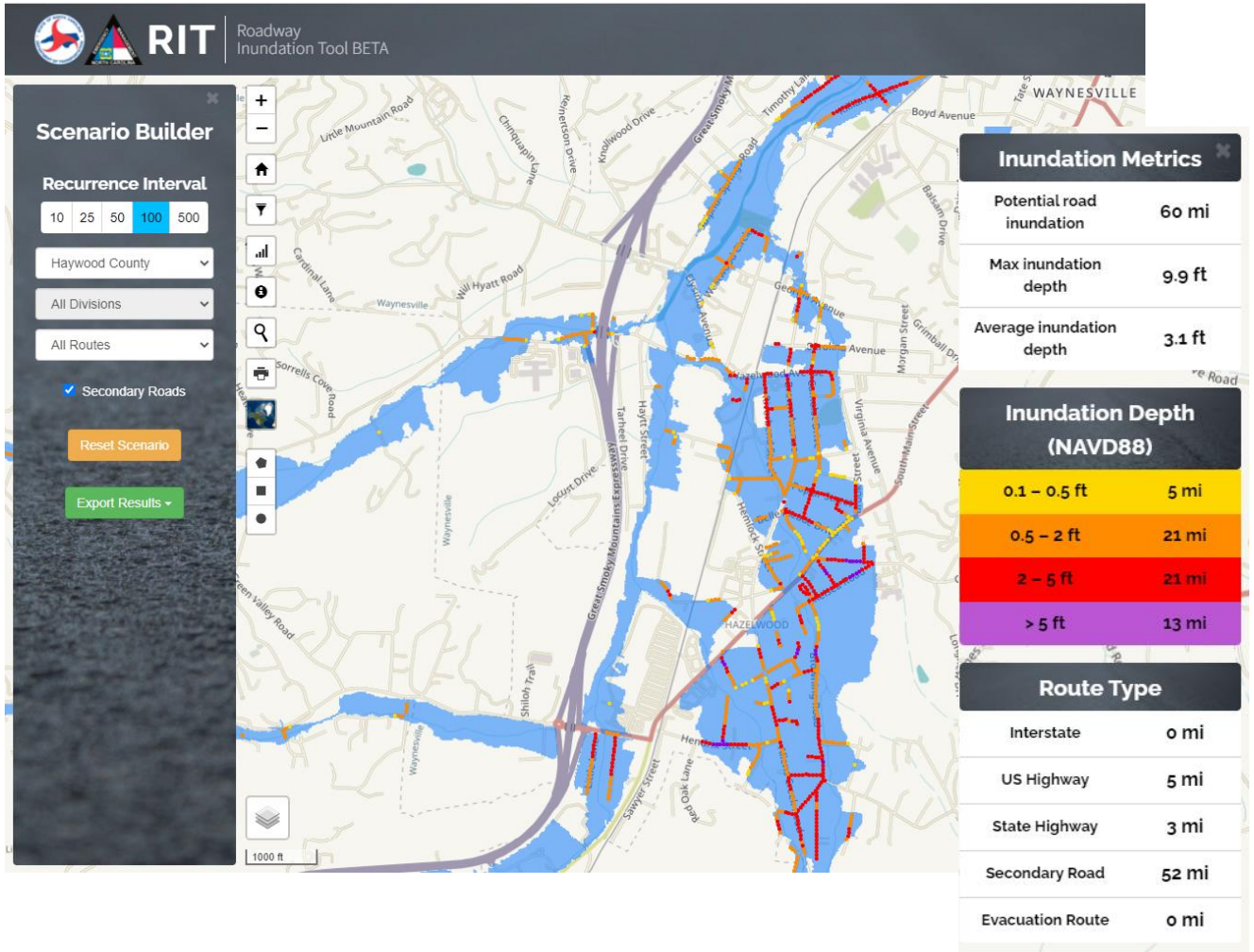
- Use BridgeWatch to monitor temporary structures. Five in Division 14 and One in Division 13. Help provide more situational awareness in remote locations.
- Hydraulic coordinated with USGS to have a Rapid Deployment Gage placed on NC 197 at Bridge 990040 to provide Division 13 with real-time data on stream levels that will be provided through BridgeWatch. Installation completed on 8/31/21.
- All bridges for Divisions 11, 13 and 14 were activated in BridgeWatch for Tropical Depression IDA.
- Countywide rainfall awareness
- Land slide awareness






ncdot.bridgewatch.us/main/main-app.html#/structure
Structures
Search
Quick Filter...
Primary Identifier
Status
County
Division
Corridor
Latitude
Longitude
Stream Name
Road
Structure
River Ba
430003 Active Haywood 14 Priority 35.4178 -82.8113 E.FORK PIGEON RIV... SR1887 BRIDGE CATA
430005 Active Haywood 14 Priority 35.4286 -82.7986 PISGAH CREEK SR1888 BRIDGE CATA
430026 Active Haywood 14 Priority 35.5668 -82.801 UT TO N.HOMINY C... SR1608 BRIDGE CATA
430375 Active Haywood 14 Priority 35.5173 -82.8093 DUTCH COVE CREEK SR1856 BRIDGE CATA
430382 Active Haywood 14 Priority 35.5219 -82.8145 DUTCH COVE CREEK SR1835 BRIDGE CATA
990040 Active Yancey 13 Priority 35.8297 -82.3181 CANE RIVER NC197 BRIDGE CATA
Hybrid
Map
Knoxville
Asheville
Cherokee National Forest
Great Smoky Mountains National Park
Pisgah National Forest
Black Mountain
PRIORITY
Watchlist
Structures
Google
Keyboard shortcuts
Map data ©2022 Google
10 km
Terms of Use
Report a map error

Roadway Inundation Tool (RIT)



- Based on multi-frequency riverine flood studies
  - 10-, 25-, 50-, 100- and 500-year recurrence intervals
- Statewide coverage
- Primary and secondary roads

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crsmith1@ncdot.gov

https://ncconnect.sharepoint.com/sites/HydroFloodWarningTools

Additional training planned for June