Making FIMs Work for Multiple Users: Understanding the Value and Function of Flood Inundation Mapping to Support Decision Support

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Researchers at the Nurture Nature Center (NNC) study the communication, utility, and design of National Weather Service forecast products. Our goal is to understand and improve the information you need to protect yourself when severe weather is possible. To do this, we need the help of volunteers who are willing to take part in research.

This material is based upon work supported by the National Oceanic and Atmospheric Administration FY2023 Weather Program Office Research Programs under grant number NA23OAR4590359.
Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of NOAA.

Agenda

- Consent form
- Pre-session Survey
- Scenario
- Post-session Survey

Hurricane Harvey: SE Texas Impacts

10 AM CDT Update
Saturday, August 26, 2017

Prepared by:
Katie Landry-Guyton

Situation Overview

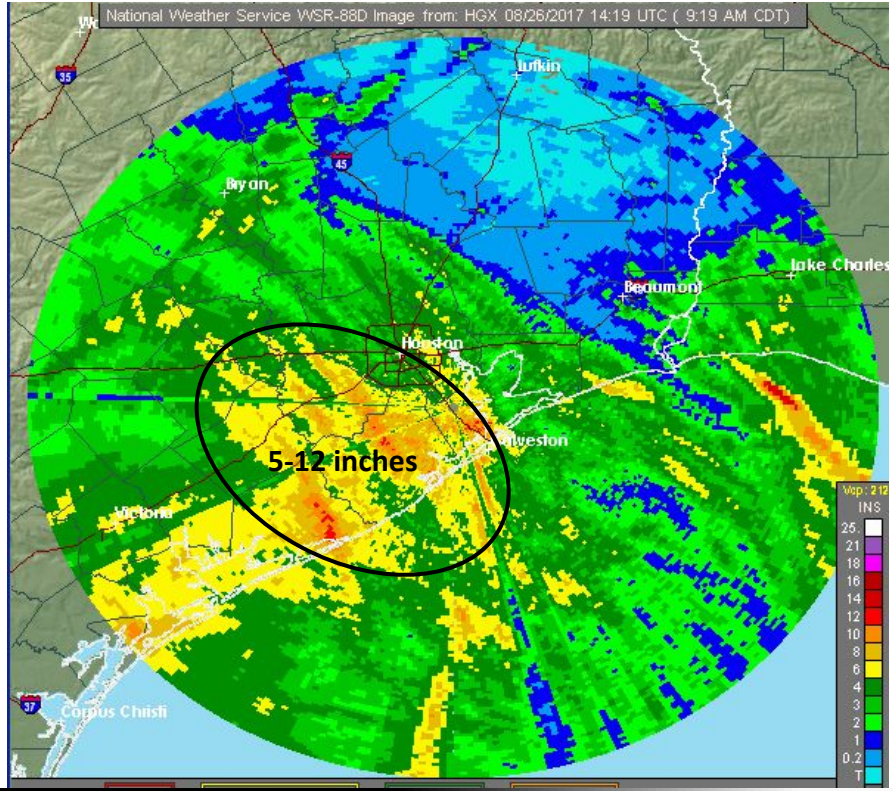
National Weather Service Houston/Galveston

- Hurricane Harvey made landfall Friday evening near Rockport.
- Harvey is gradually weakening and continues to move slowly northwest early this morning.
- The track forecast and forecast models continue to show a very slow movement for the next 5 days.
- ***Catastrophic flooding is expected*** from rainfall this weekend and into next week. Flash Flood warnings are currently in effect for portions of southeast Texas.
- ***Storm Surge*** inundation continues early this morning: Port O'Connor to Sargent...6 to 9 ft…Sargent to Jamaica Beach...4 to 6 ft…Jamaica Beach to High Island...2 to 4 ft. Water levels have peaked at some locations and are remaining steady at others. Will be slow to recede today.
- ***Tornado threat continues*** with rainbands coming onshore and moving inland today.

Observed Rainfall

National Weather Service Houston/Galveston

Radar Estimated Rainfall through 9 AM



Some area totals through 2-3 AM:

...Jackson County...

Edna	12.06 in
La Ward	7.06 in

...Matagorda County...

2 W Bay City	8.17in
Palacios Airport	5.73
9 W Markham	4.96 in
1 WNW Bay City	5.40 in

...Wharton County...

East Bernard	8.08
8 WSW Boling-iago	7.92 in
1 NW El Campo	3.64 in
Wharton	6.99 in

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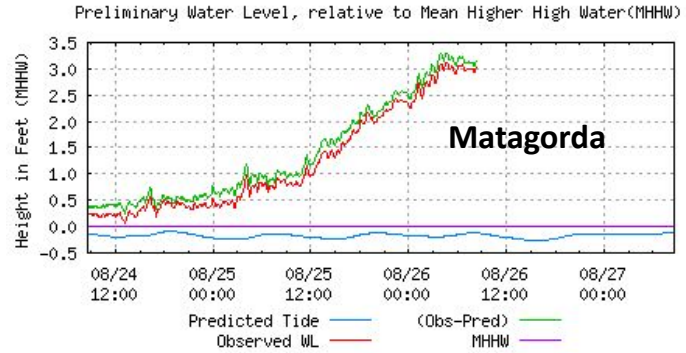
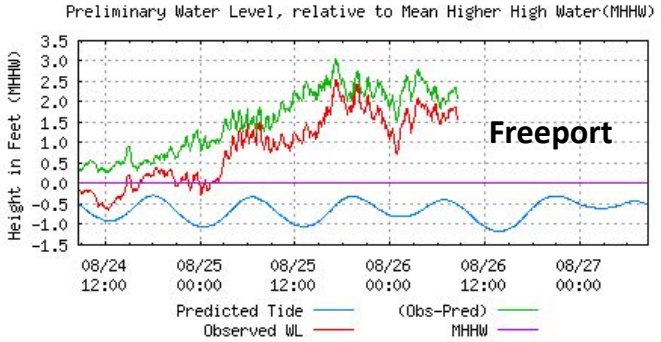
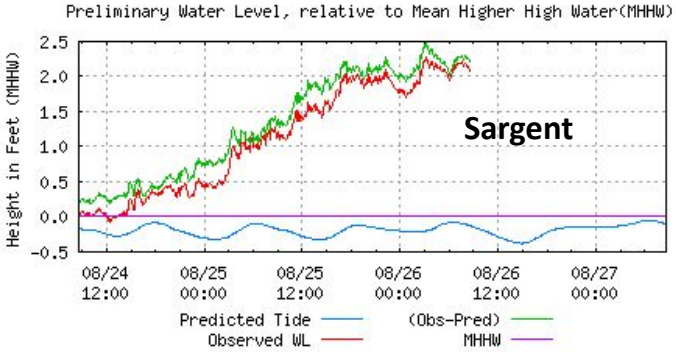
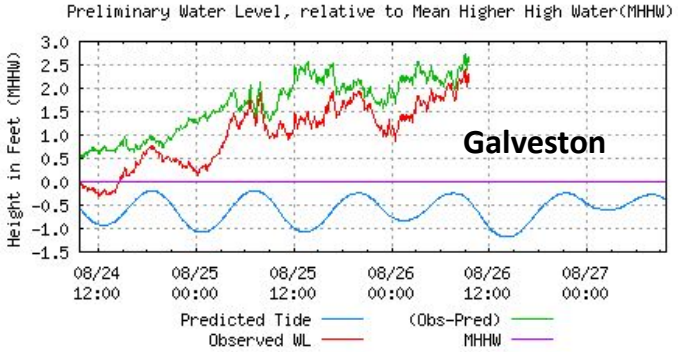
Tides

National Weather Service Houston/Galveston







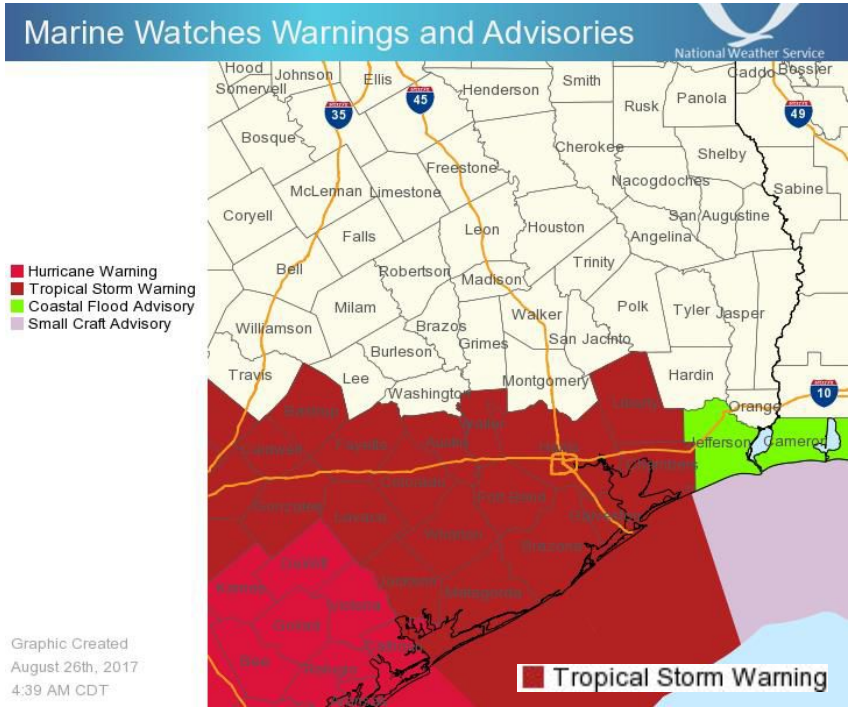


Storm Surge generally 2 to 4 feet most places

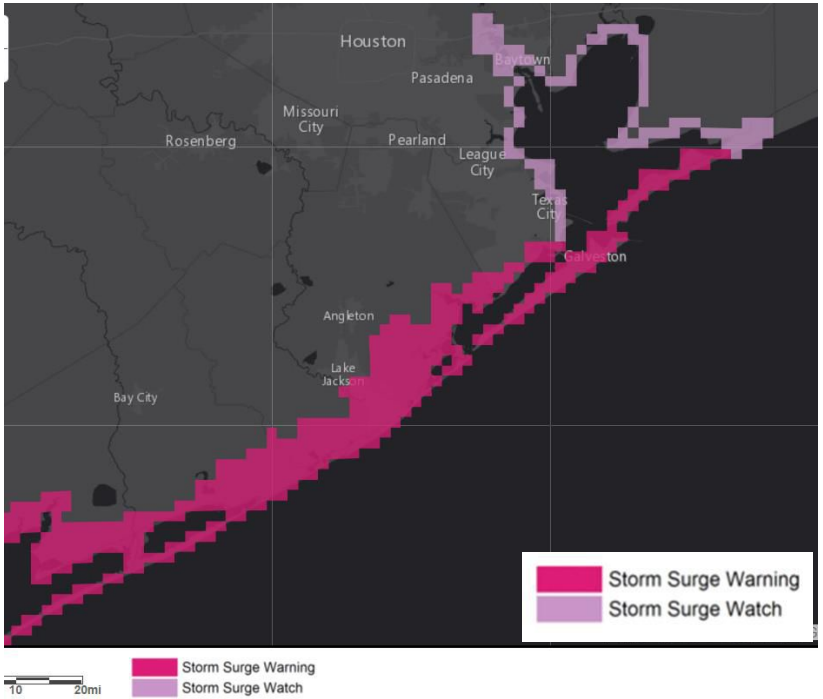
Watches and Warnings

National Weather Service Houston/Galveston

Tropical Storm Warning in effect from O'Connor to High Island.



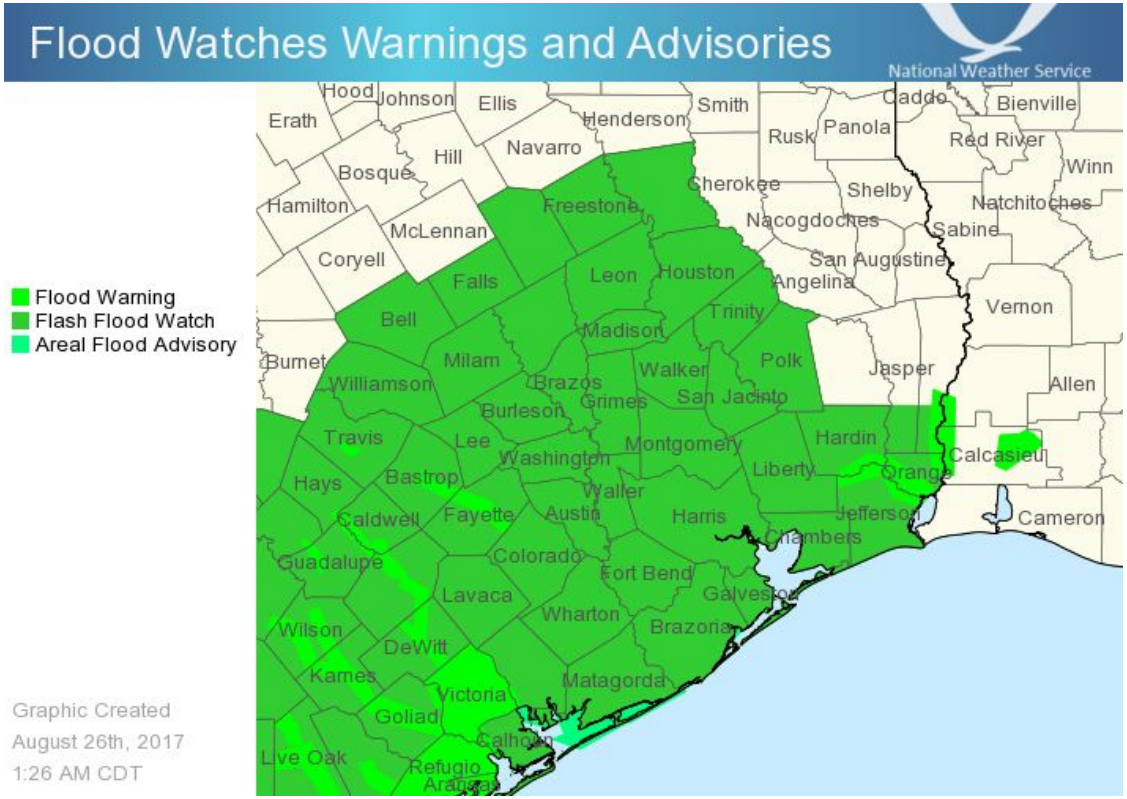
Storm Surge Warning remains in effect this morning.



Watches and Warnings (continued)

National Weather Service Houston/Galveston

- **Flash Flood Watch** is in effect for all of our forecast area
- Flash flood threat in effect until further notice, possibly into the middle of next week
- Watch means potential for life threatening flooding; stay alert for any later warnings

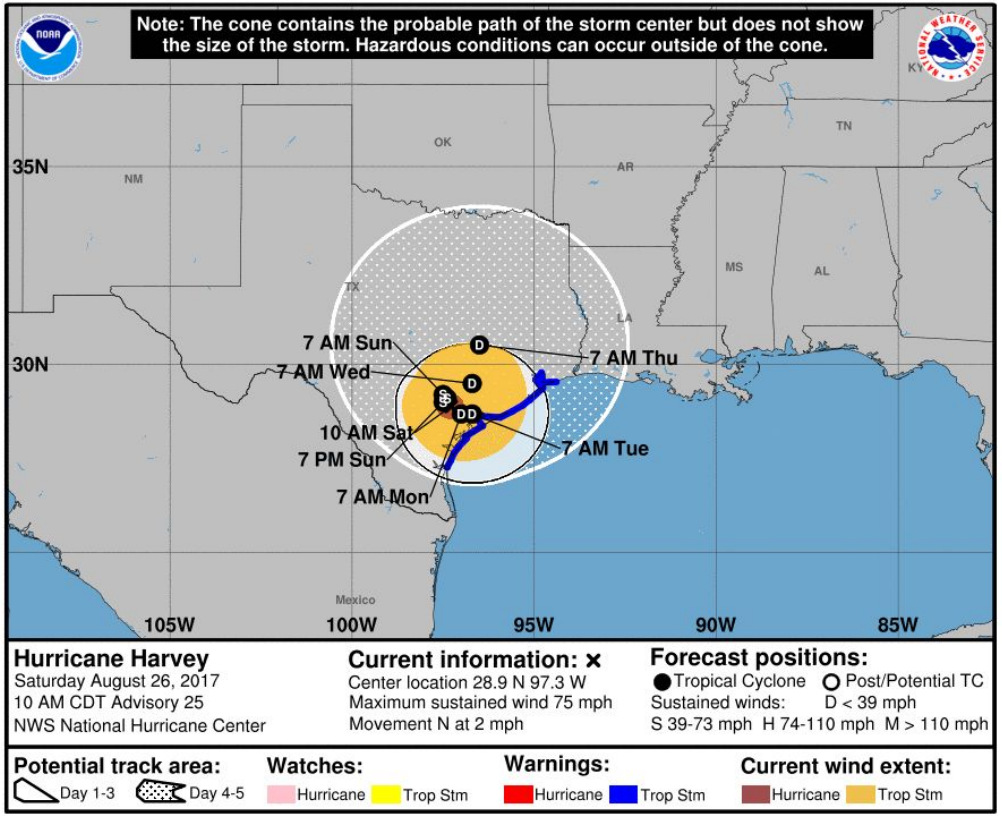


Forecast Track into Thu Morning

National Weather Service Houston/Galveston

- Forecast to stall later today and weaken to a tropical storm then drift back to the southeast near Matagorda Bay and slowly move north (inland) through the next 5 days.

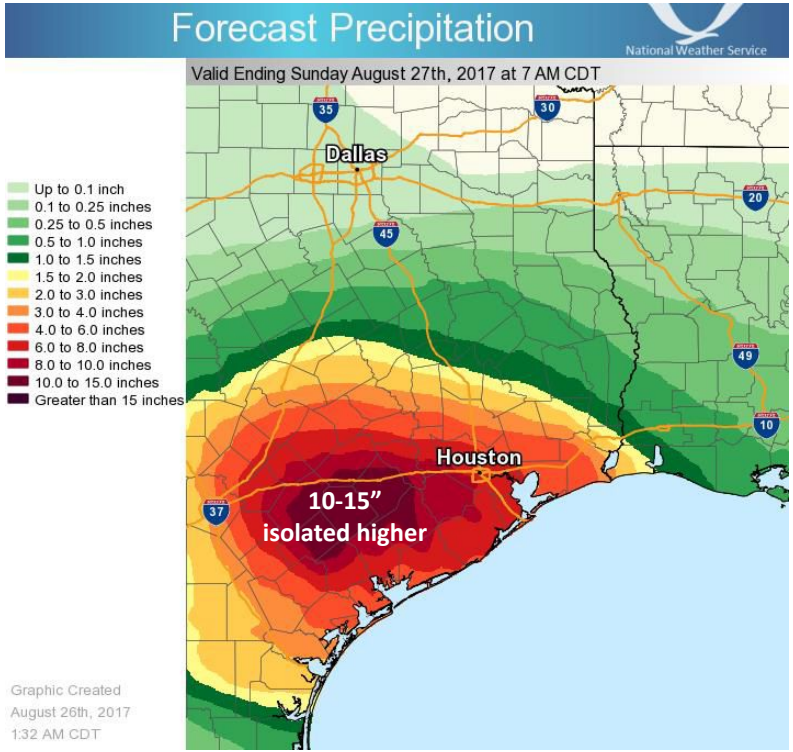
Track shape



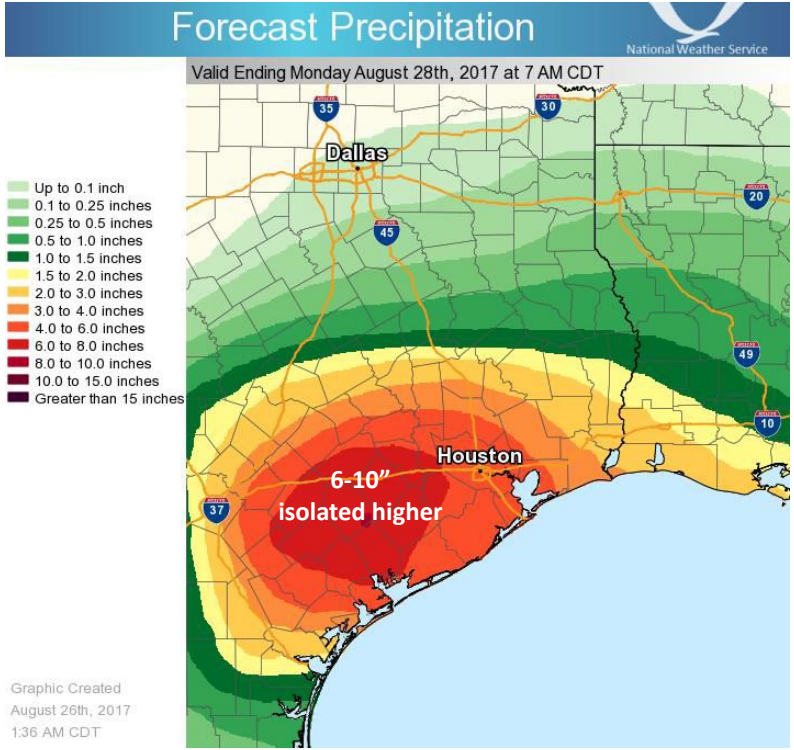
Forecast Rainfall

National Weather Service Houston/Galveston

Today and Tonight



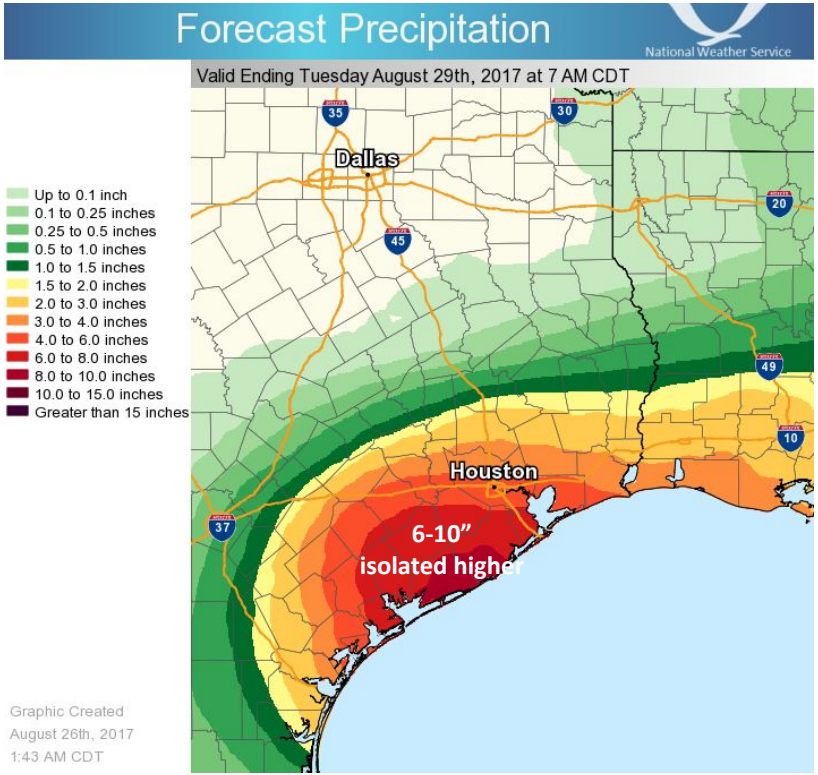
Sunday and Sunday night



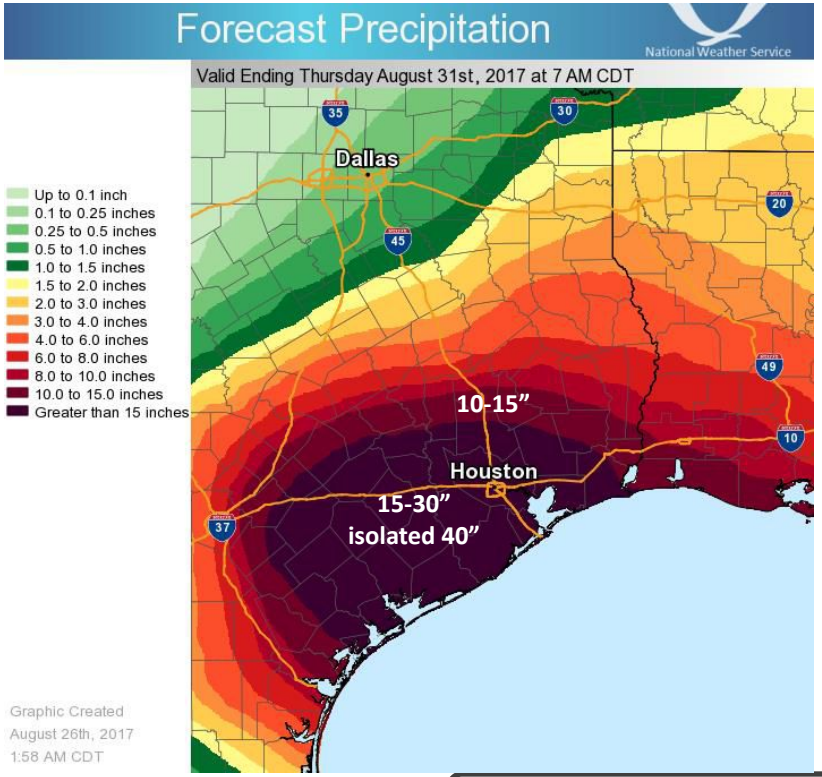
Forecast Rainfall

National Weather Service Houston/Galveston

Monday and Monday Night



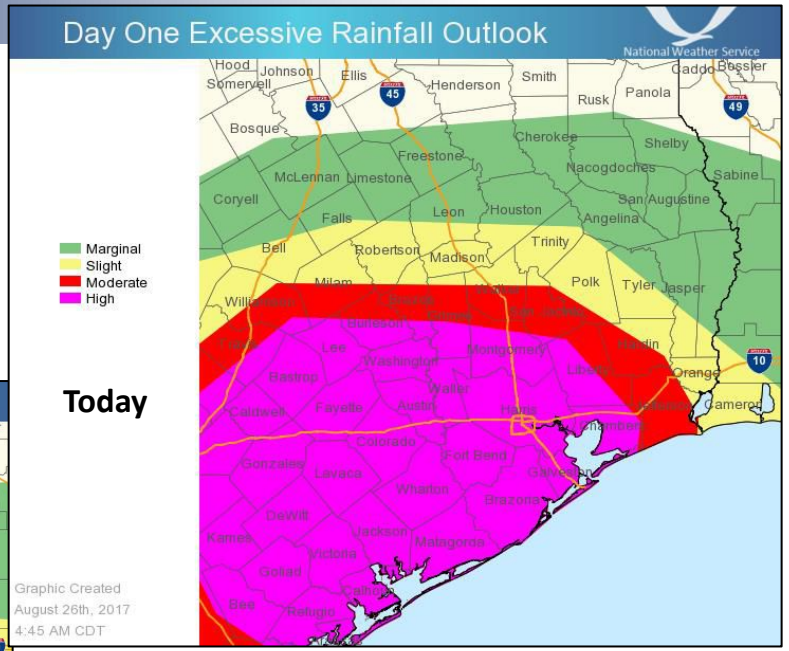
5 Day Total (Saturday PM through Thursday AM)

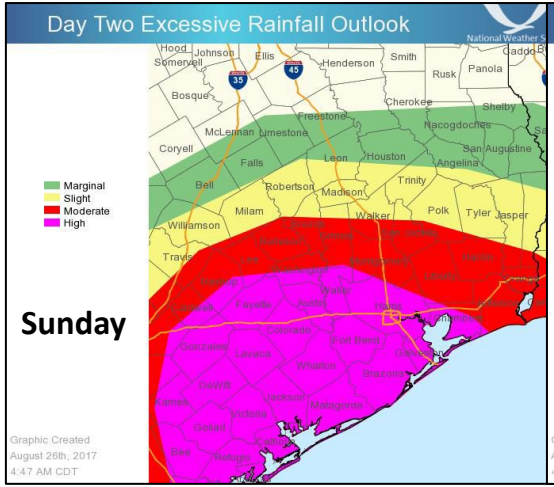


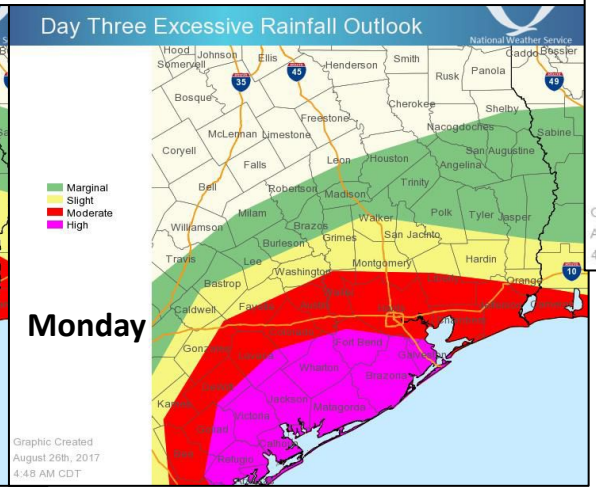
Devastating Flood Threat

National Weather Service Houston/Galveston

- A slow track over the area will mean **periods of heavy rain** from today into **at least Wednesday**.
- Impacts: **Widespread flooding** with numerous road closures as rainfall amounts grow through the weekend. Major bayou and river flooding is expected. Some structure flooding is likely.







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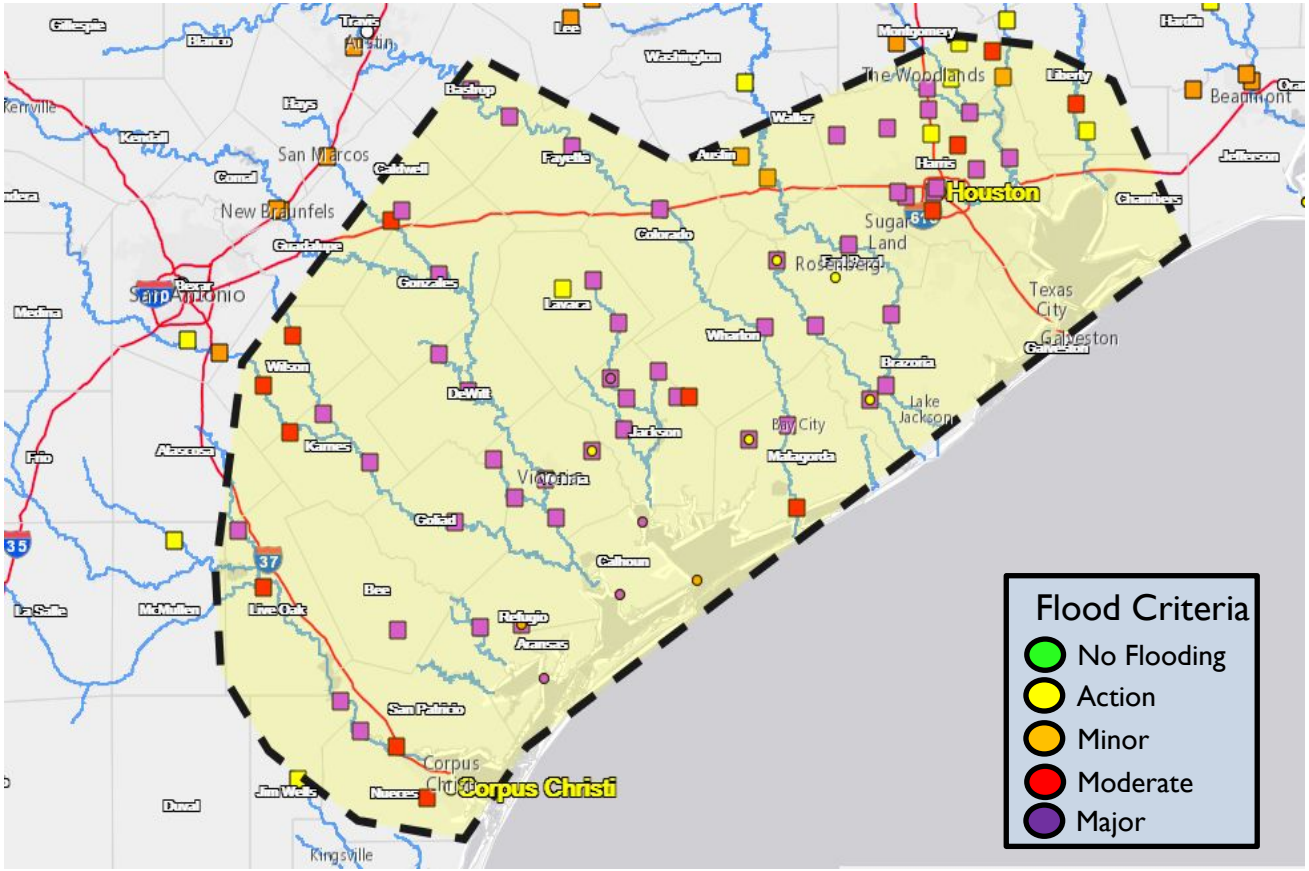
River Flooding Forecast

Hurricane Harvey

West Gulf
RIVER FORECAST CENTER



- **Purple squares** represent points that are forecast to reach MAJOR or RECORD flooding
- Record flooding means that the impacts are *unknown* and beyond anything experienced
- **Devastating flooding potential with this storm**

Forecasts

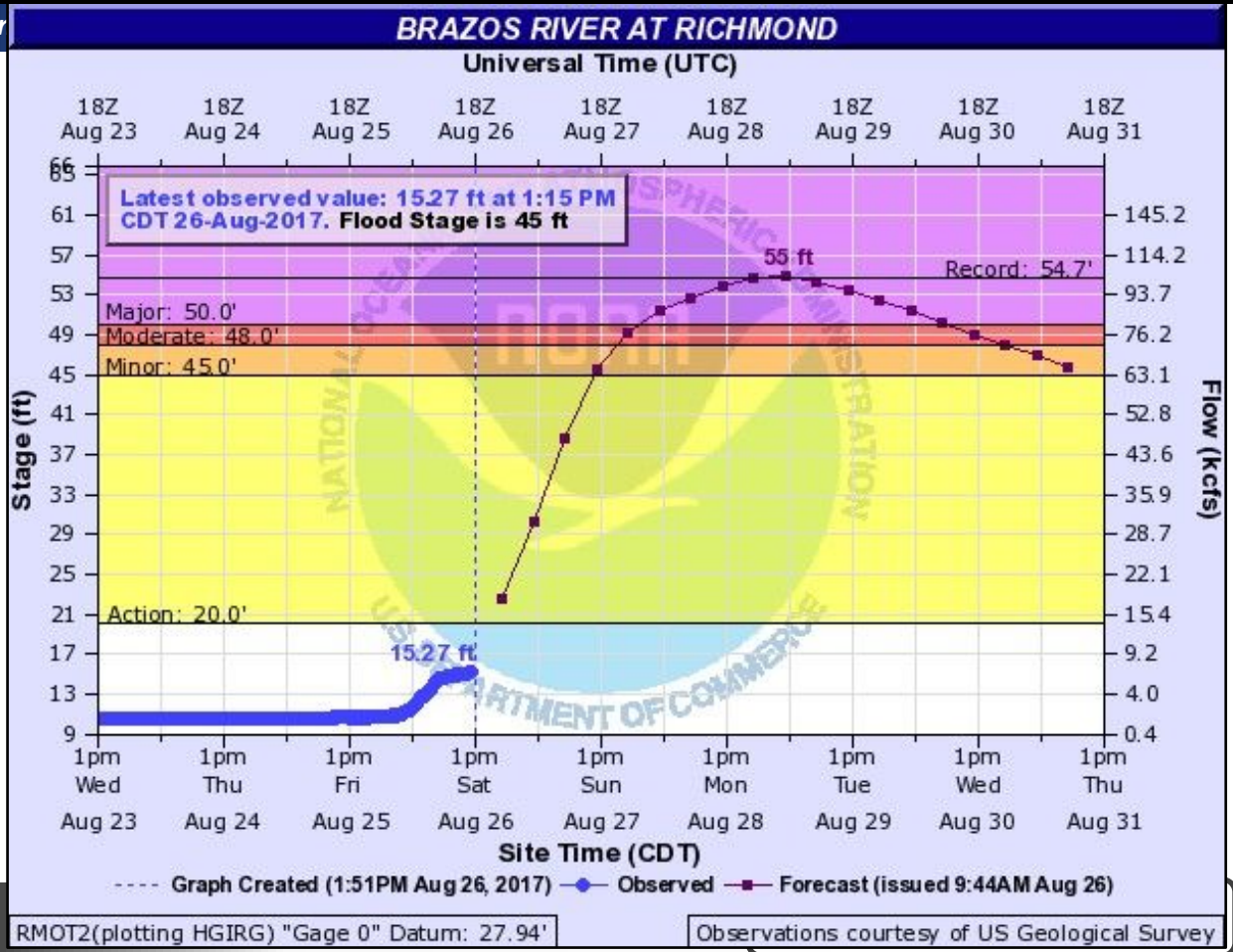
National Weather Service Houston/Galveston

- **Lavaca-Navidad**: Widespread Major river flooding likely and Record flooding possible
- **Colorado**: Major river flooding likely from Colorado River at LaGrange downstream
- **Tres Palacios**: Moderate flooding now and Major forecast
- **San Bernard**: Major with Record river flooding likely for entire area
- **Brazos**: Minor flooding upstream of Hempstead and Major river flooding likely in Brazoria and Fort Bend County
- **Houston Bayous**: Moderate to Major flooding (will depend on intensity and rainfall amounts)
- **San Jacinto River**: Moderate to Major flooding, changes possible with Lake Conroe releases
- **Trinity:** Minor and Moderate flooding possible downstream of Lake Livingston

Brazos River at Richmond

National Weather Service Houstor

Brazos: Minor flooding upstream of Hempstead and Major river flooding likely in Brazoria and Fort Bend County



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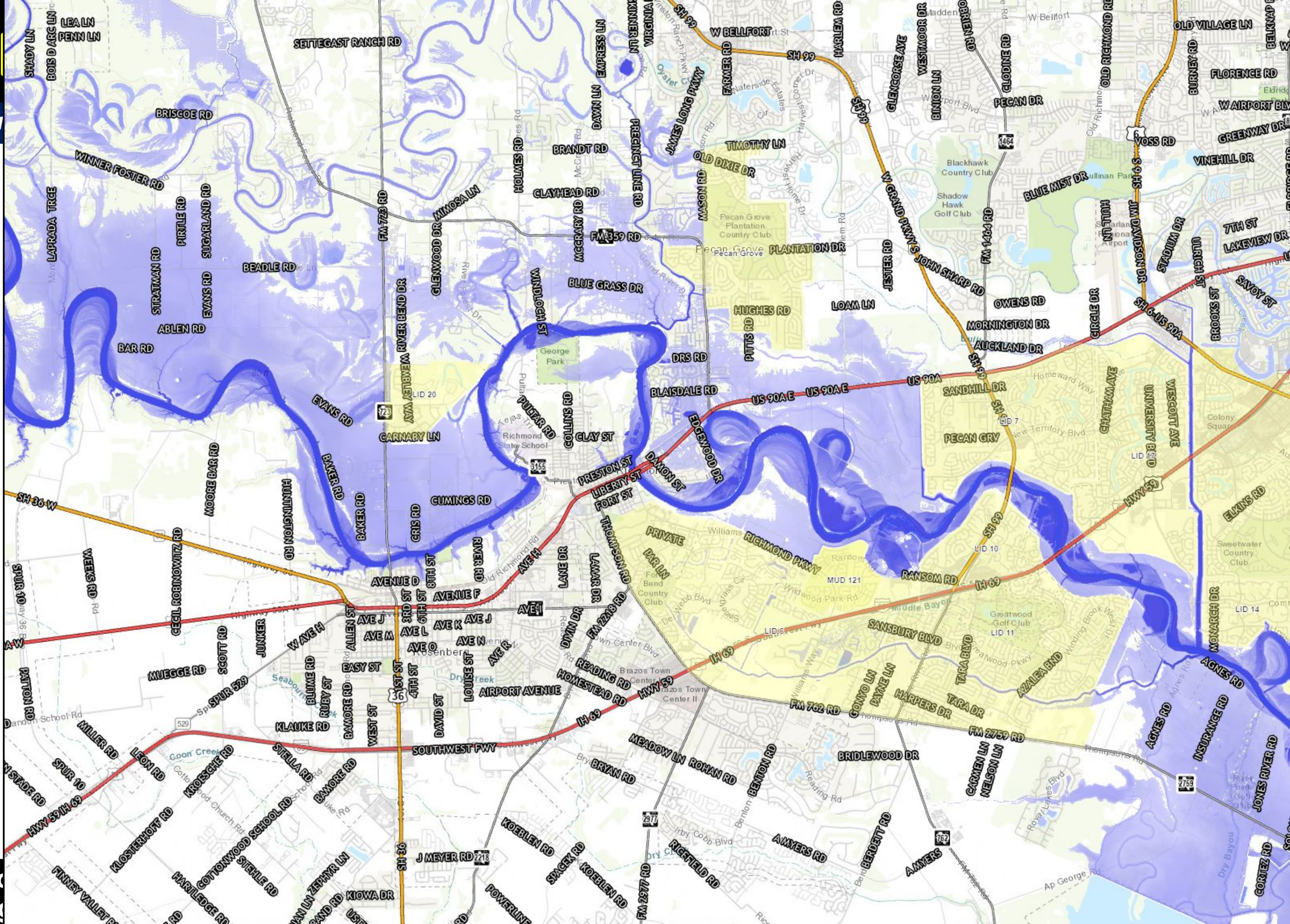
Fort Bend County Drainage District Flood Inundation Map at 55ft



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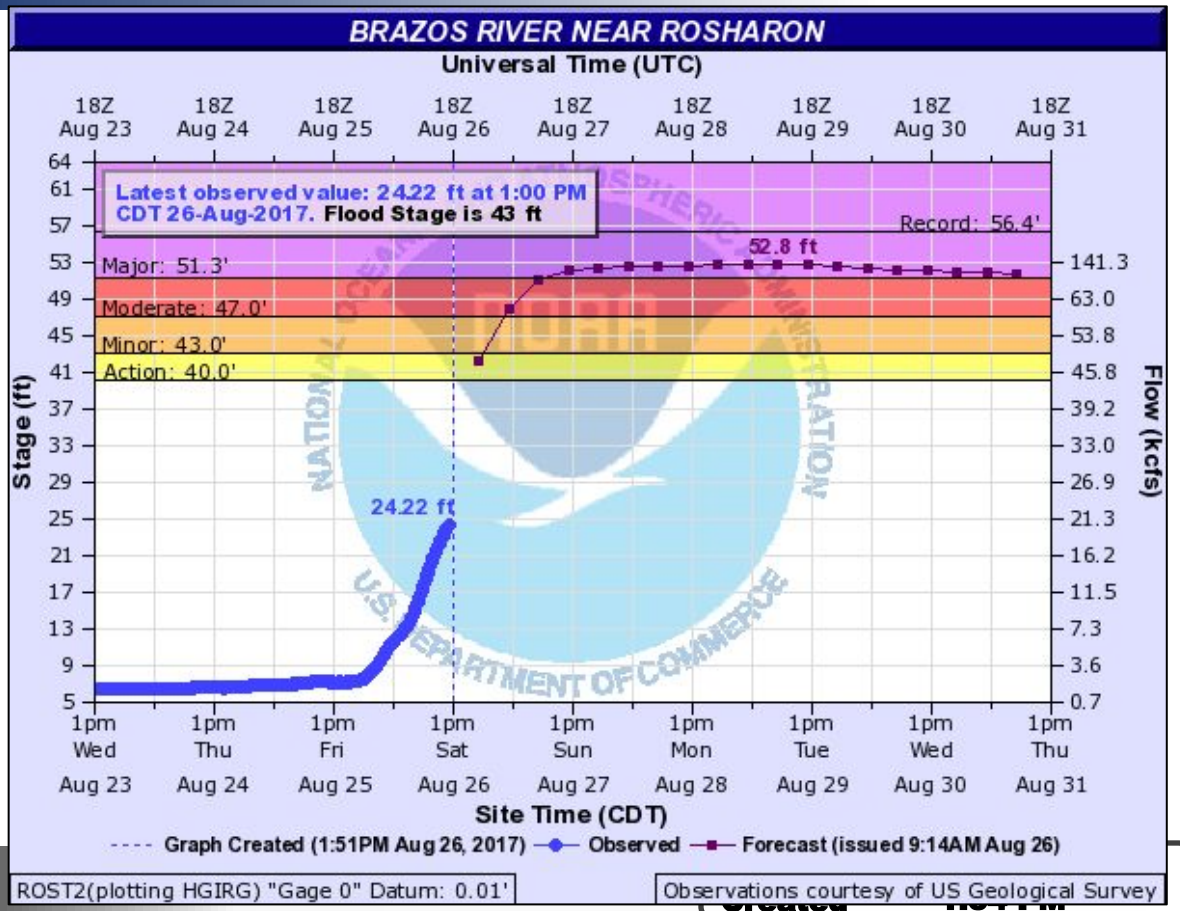
Brazos River at Rosharon

National Weather Service Houston/Galveston

Brazos: Minor flooding upstream of Hempstead and Major river flooding likely in Brazoria and Fort Bend County



NWS Categorical Flood Inundation Map

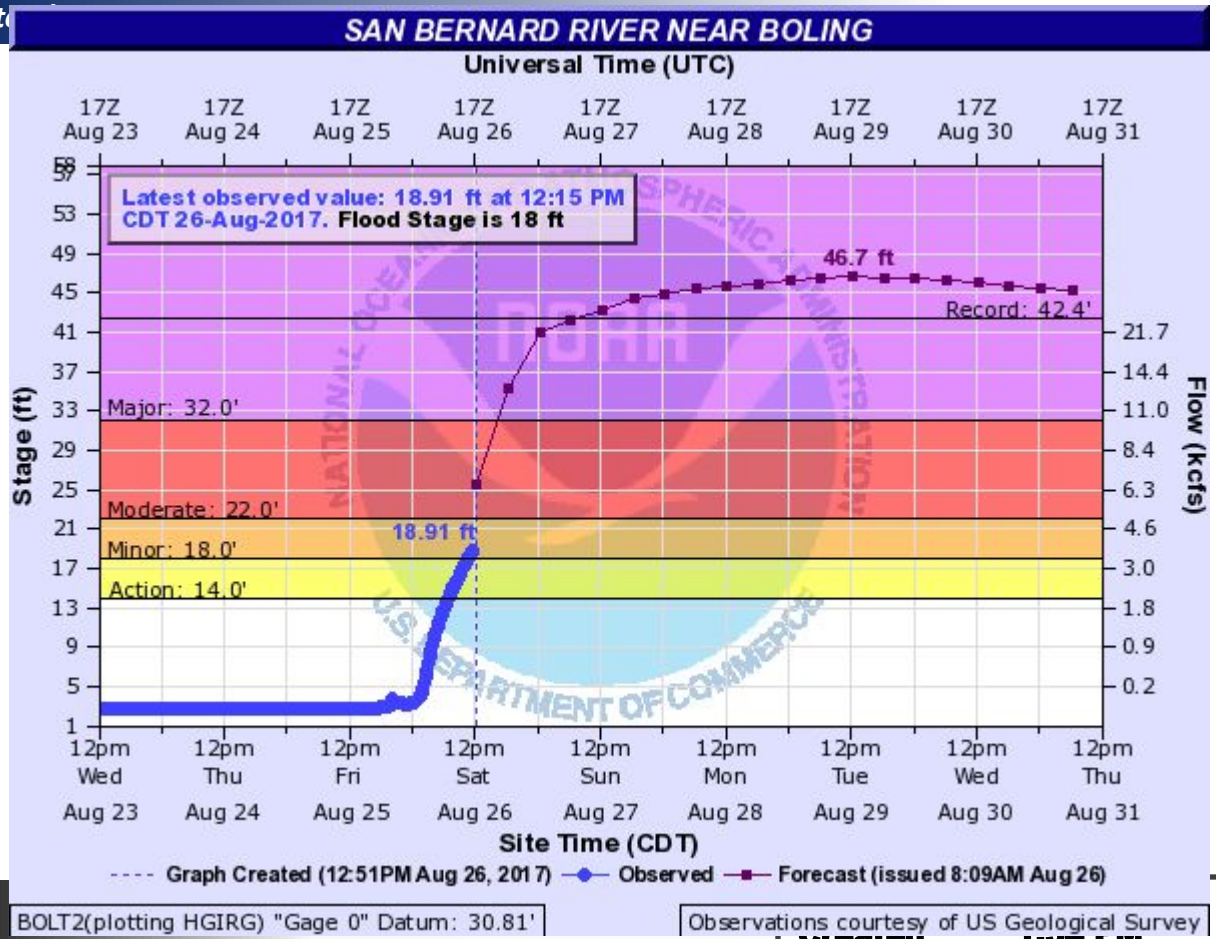
National Weather Service Houston/Galveston

Major river flood extent (51.3ft) on the Brazos River at Rosharon

San Bernard River near Boling

National Weather Service Houst

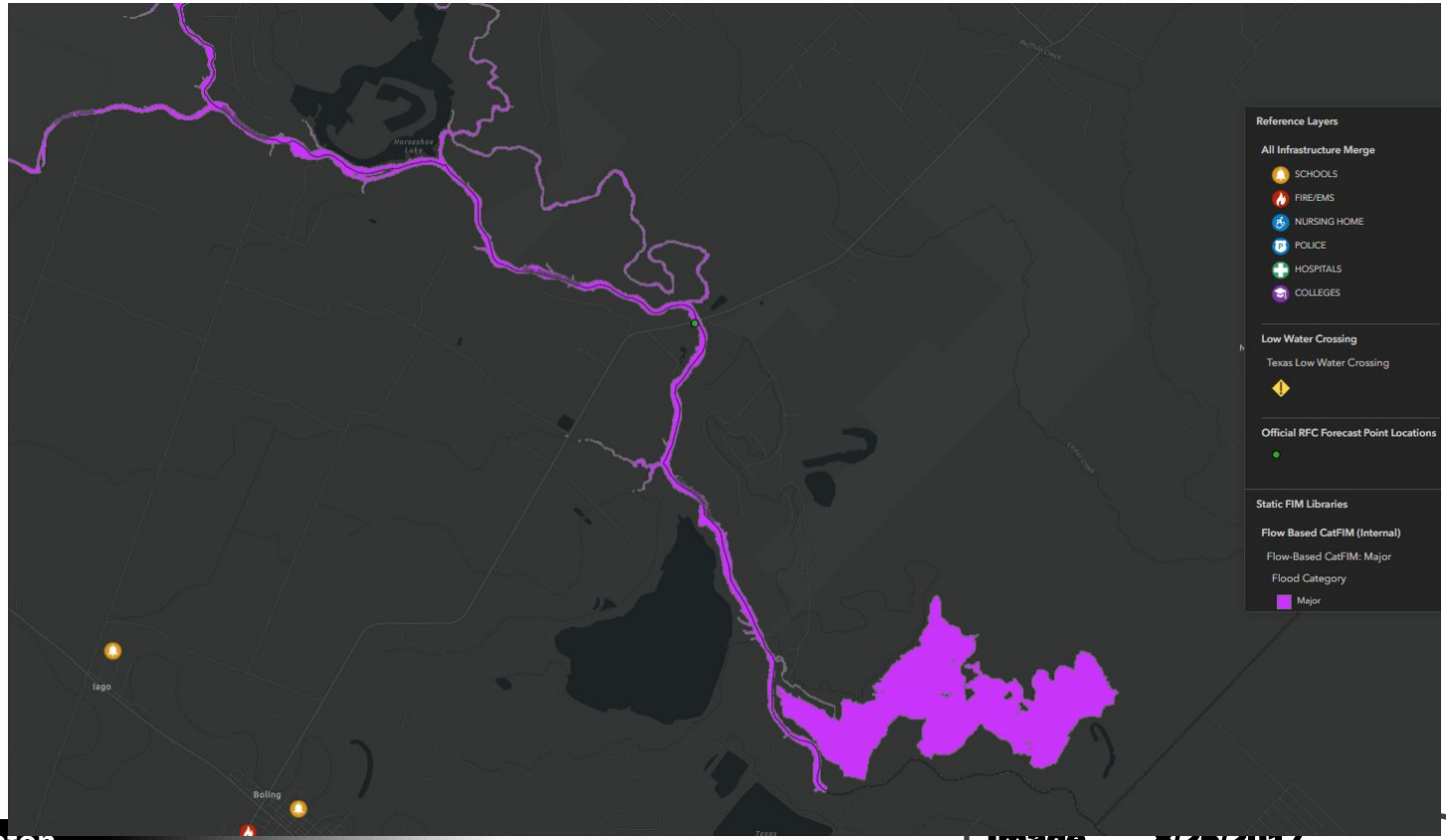
San Bernard: Major with Record river flooding likely for entire area



San Bernard River near Boling

National Weather Service Houston/Galveston

FIM only shows 32ft. We are expected Record river flooding. Impacts are forecast to be worse than this.



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Impacts

National Weather Service Houston/Galveston

- Dangerous flooding situation
- Inundation of roads and structures are expected
- Use impact statements on NWS webpage
- Report any reports of flooding to NWS

Questions?

National Weather Service Houston/Galveston

- Questions?
- Email: Katie.landry@noaa.gov
- Weather.gov/houston
- @NWSHouston

- Please relay any storm reports to NWS at SR-HGX.NWS@noaa.gov
  - Storm damage, funnel cloud sightings, flooded roads (closures), water in structures, etc.

Tropical Storm Harvey: SE Texas Impacts

10 AM CDT Update
Sunday, August 27, 2017

Prepared by:
Katie Landry-Guyton

Situation Overview

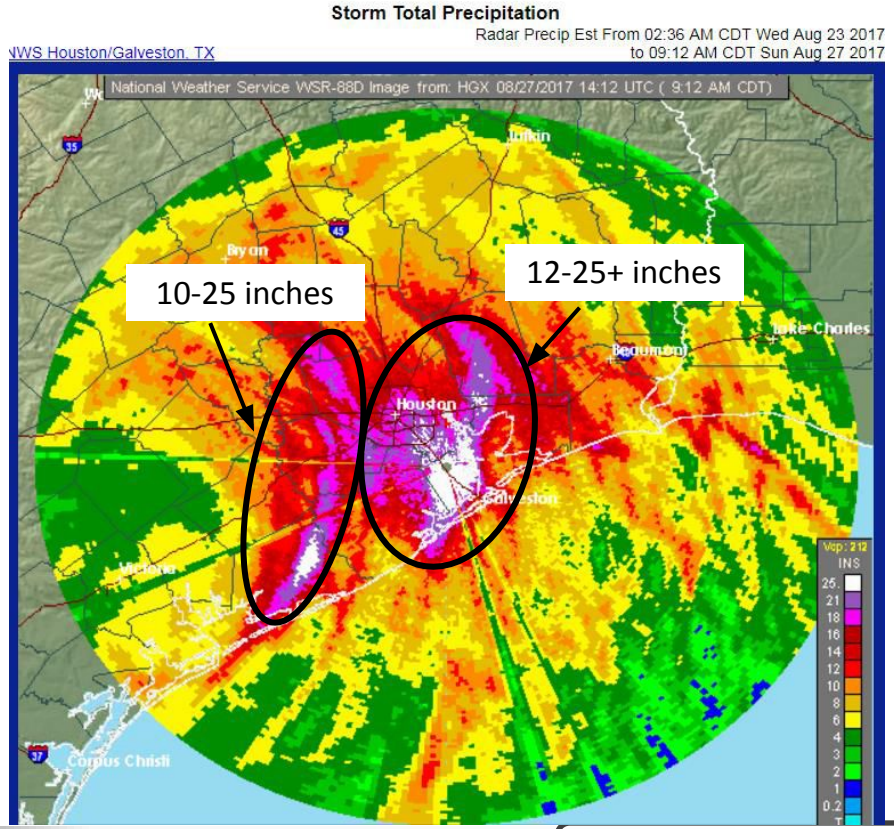
National Weather Service Houston/Galveston

- ***Catastrophic flooding is ongoing with flash flood emergencies remaining in effect.*** The threat for continued ***additional catastrophic, unprecedented, and life threatening flooding continues*** today and into next week with periods of heavy rain from bands coming off the Gulf. Flash Flood Watches and Warnings are currently in effect for all of southeast Texas.
- TS Harvey is drifting southeast towards Matagorda Bay, then is expected to turn and slowly move north through SE TX.
- ***Minor coastal flooding*** is possible around times of high tide today. Water levels are holding steady or slowly receding given continued onshore winds.
- ***Tornado threat continues*** with rain bands coming onshore and moving inland. Have had multiple tornadoes reported with damage.
- ***High wind threat has diminished*** with gusts mainly in the 25 to 45 mph range near the coast and near thunderstorms and rain bands

24 Hour Radar Est Rainfall and Obs

National Weather Service Houston/Galveston

...Brazoria County...	
Dixie Farm Road	26.76 in
3 SW Alvin	22.97 in
...Fort Bend County...	
4 WSW First Colony	23.84 in
1 NNW Pecan Grove	22.99 in
...Galveston County...	
Santa Fe	24.50 in
Bacliff	23.78 in
Marys Creek At Melodywood	21.56 in
La Marque 1.8 E	21.43 in
1 NNW Hitchcock	21.38 in
1 SE Friendswood	20.54 in
...Harris County...	
3 NNE Pearland	24.27 in
Berry B Forest Oaks	22.80 in
White Oak Bay Heights Blvd	22.44 in
2 NNE Friendswood	22.18 in
1 NNE South Houston	21.97 in
Bay Area Blvd At Horsepen Cr	21.88 in
Turkey Ck At Fm 1959	21.56 in
Ih-10 @ Normandy	20.32 in
Mount Houston	20.12 in
...Liberty County…	
Dayton	27.45 in



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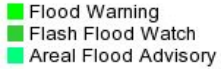
Watches and Warnings (continued)

National Weather Service Houston/Galveston

- **Flash Flood Watch** is in effect for all of our forecast area.
- Flash flood threat in effect until further notice, possibly into the middle of next week.
- Watch means potential for continued life threatening flooding; stay alert for warnings/emergencies.



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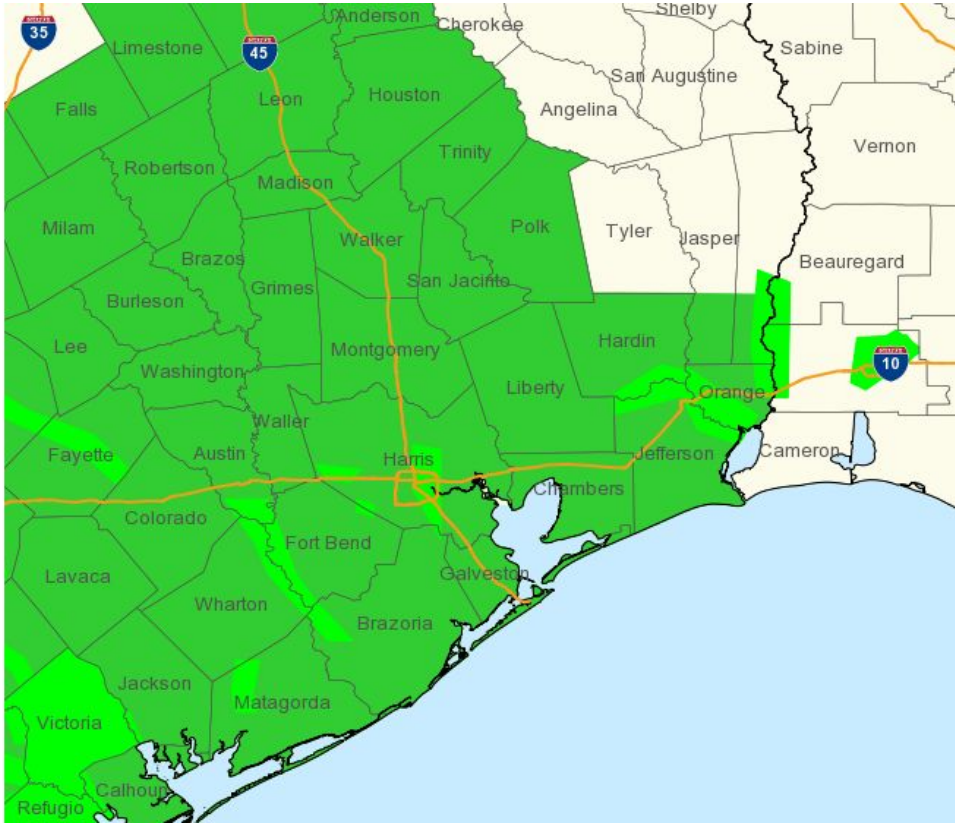
1:04 PM CDT



Forecast Track into Fri Morning

National Weather Service Houston/Galveston

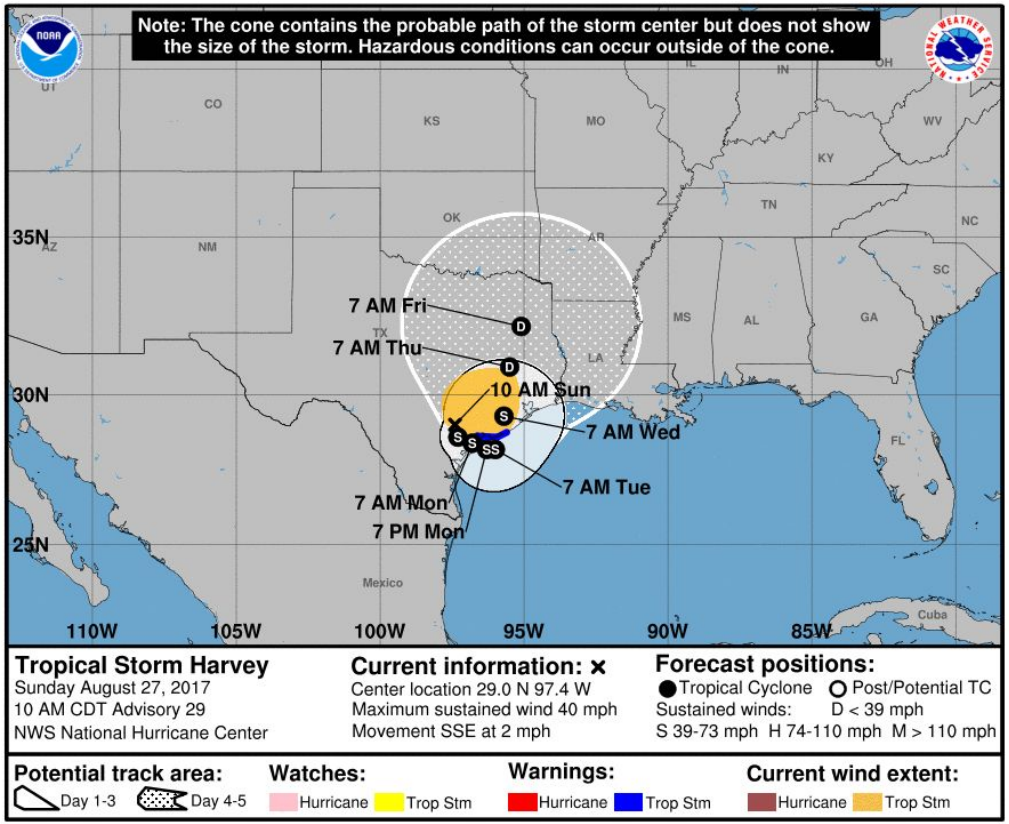


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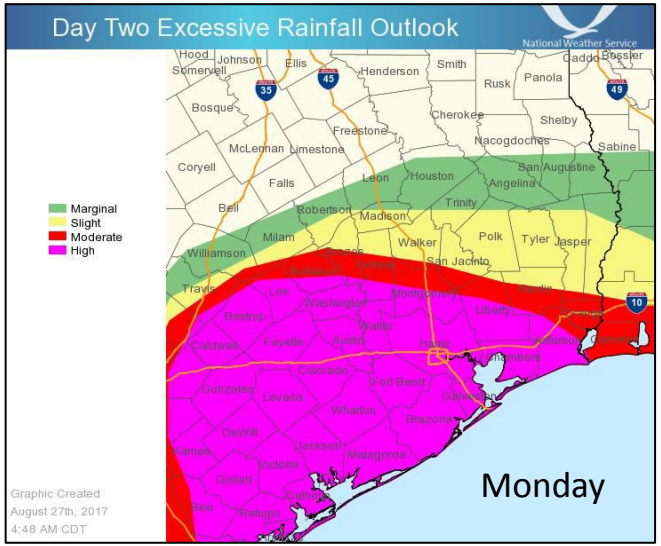
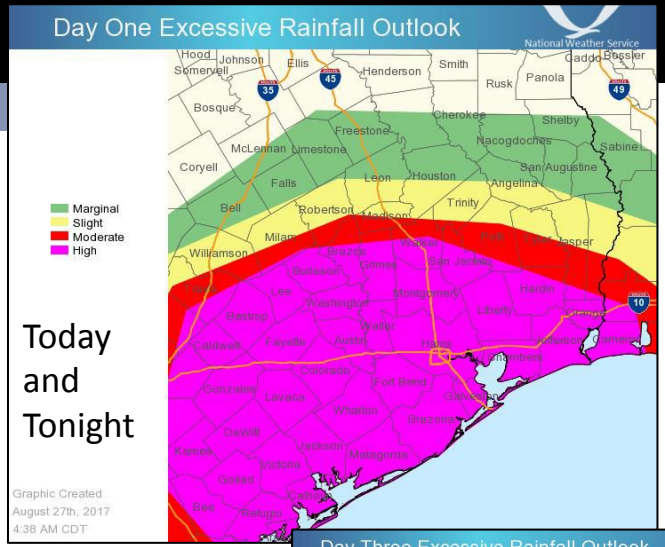
Image	8/27/2017
Created	9:30 AM

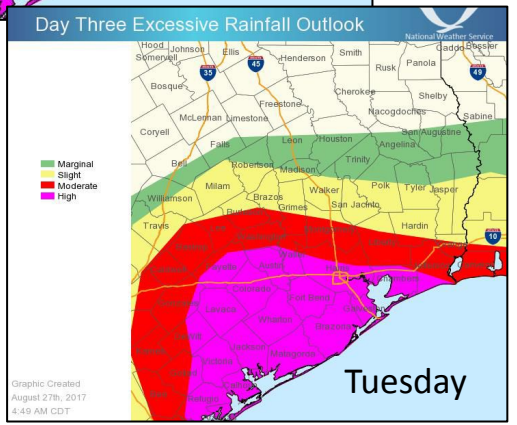
Devastating Flood Threat

National Weather Service Houston/Galveston

- A slow track over the area will mean **periods of heavy rain through Wednesday.**
- Impacts: **Unprecedented flooding for Southeast Texas in High area.** Major/Record bayou and river flooding. Continued structure flooding. **Life threatening situation.**







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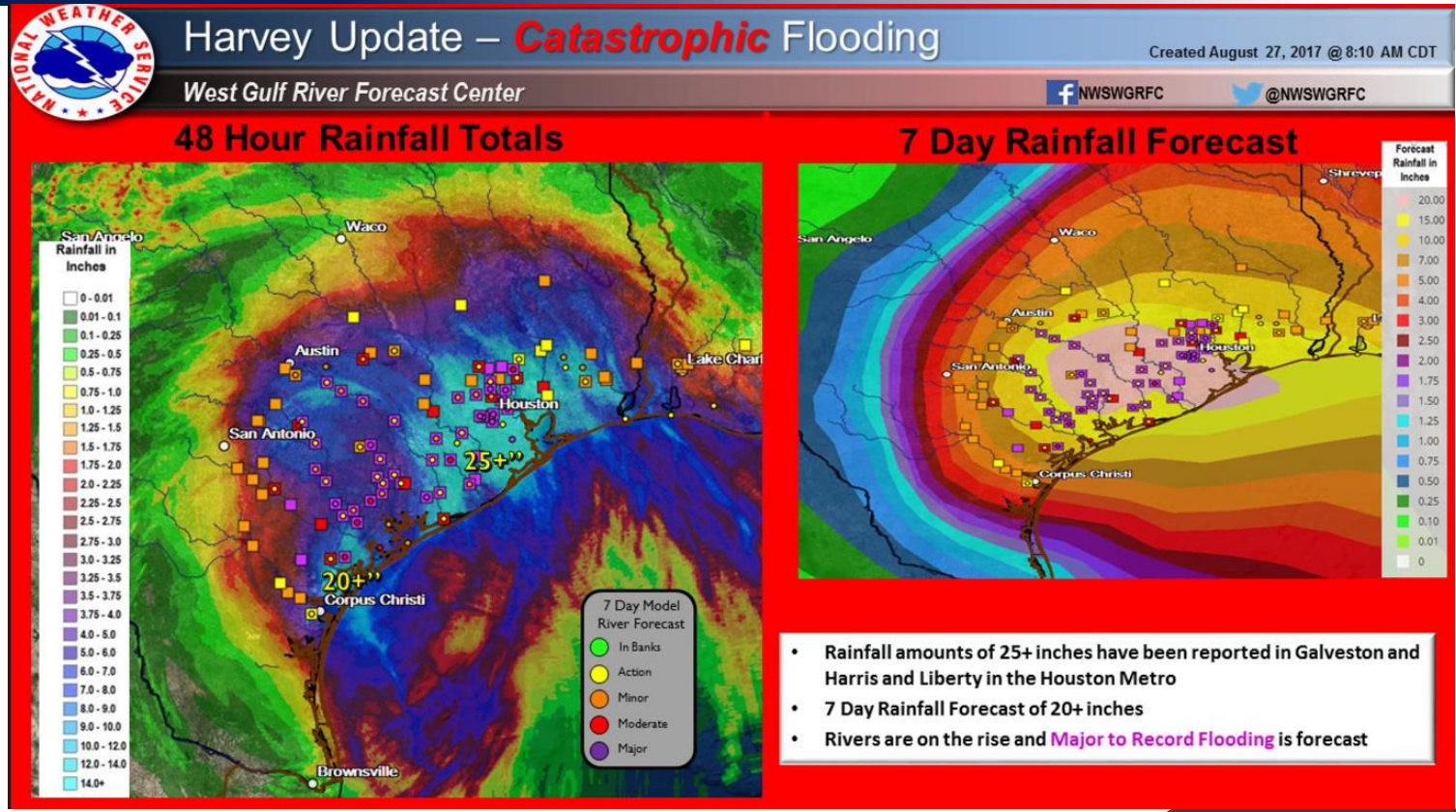
River Flooding

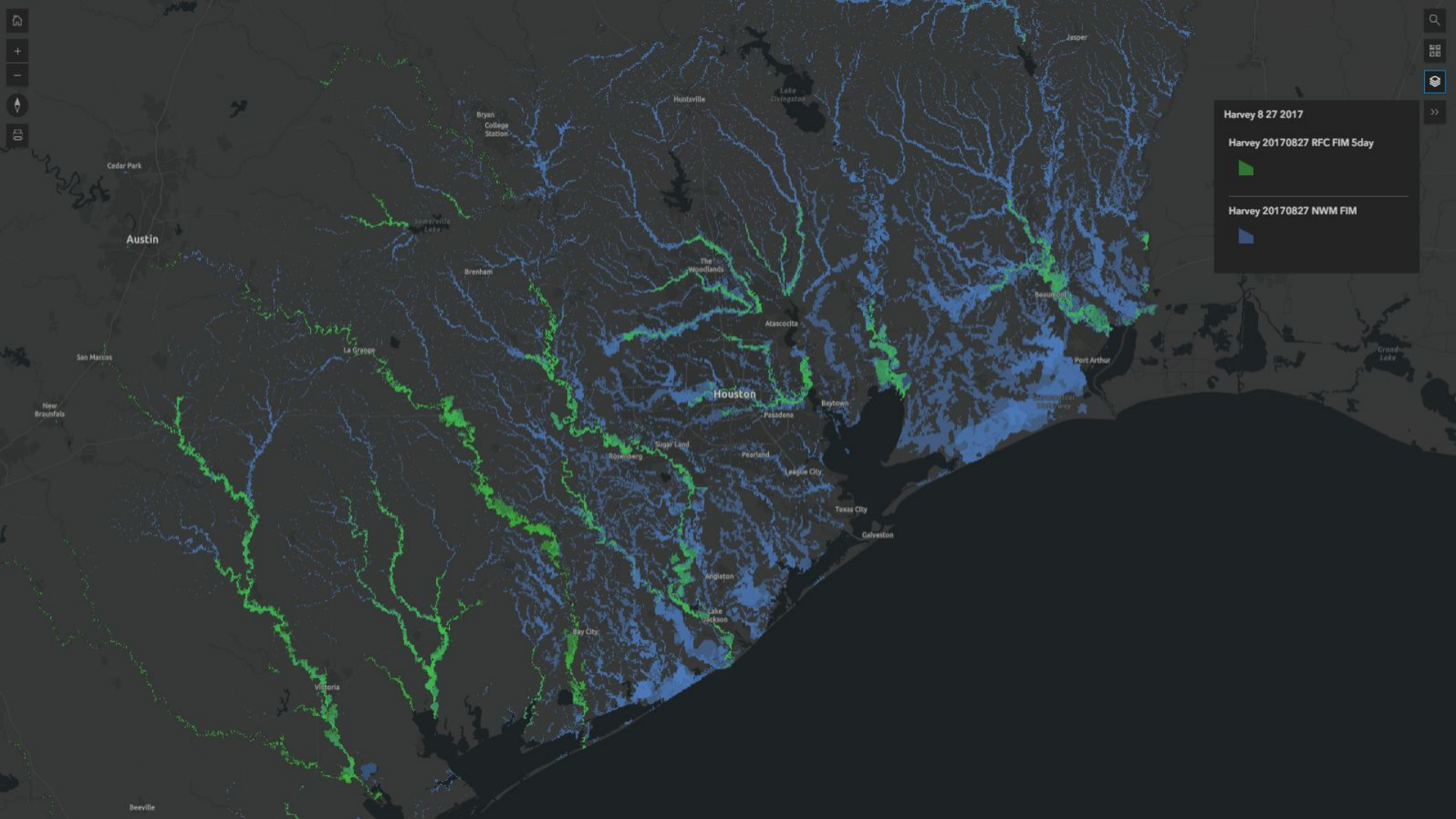
National Weather Service Houston/Galveston



Forecasts

National Weather Service Houston/Galveston

- **Lavaca- Navidad**: Minor to Major flooding occurring with widespread Major forecast (Record likely)
- **Colorado**: Moderate to Major flooding occurring with Major forecast from Colorado River at LaGrange downstream
- **Tres Palacios**: Major flooding occurring and forecast
- **San Bernard**: Minor to Major flooding occurring with Major forecast (Record likely)
- **Brazos**: Minor flooding occurring on tributaries, Moderate forecast for Hempstead and Major forecast from San Felipe downstream
- **Houston Bayous**: Widespread Major flooding occurring with Records already set in many locations, Major forecast (will continue to depend on intensity and rainfall amounts)
- **San Jacinto River**: Minor to Major flooding occurring with widespread Major forecast, taking into account Lake Conroe releases
- **Trinity:** Minor flooding occurring with Moderate and Major forecast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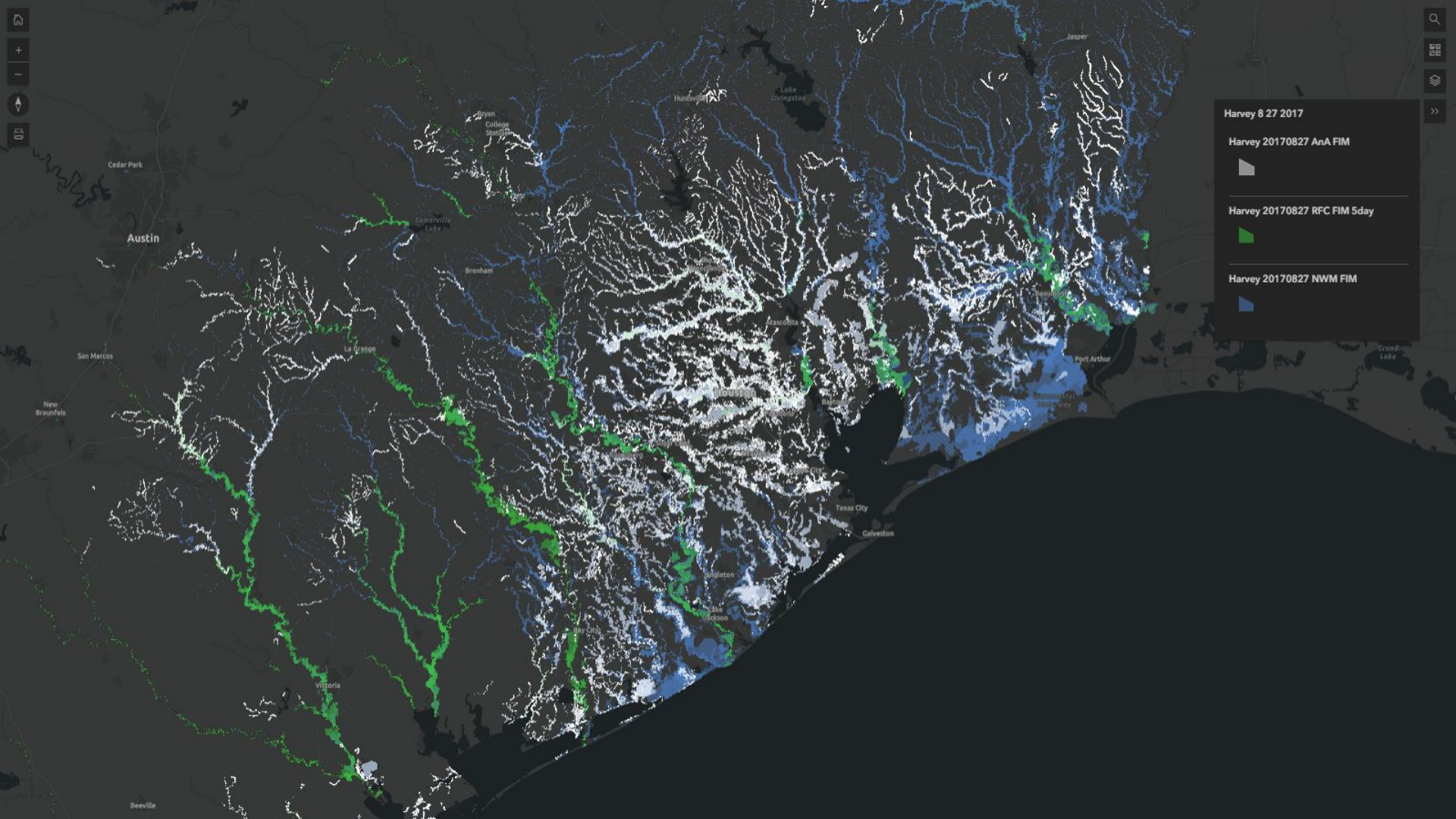
Harvey 20170827 NWM FIM
Jasper
Huntsville
Lake Livingston
Bryan
College Station
Cedar Park
Austin
Somerville Lake
Brenham
The Woodlands
Beaumont
Atascocita
San Marcos
La Grange
Port Arthur
Houston
Baytown
Pasadena
New Braunfels
Sugar Land
Rosenberg
Pearland
League City
Texas City
Galveston
Angleton
Lake Jackson
Bay City
Victoria
Beeville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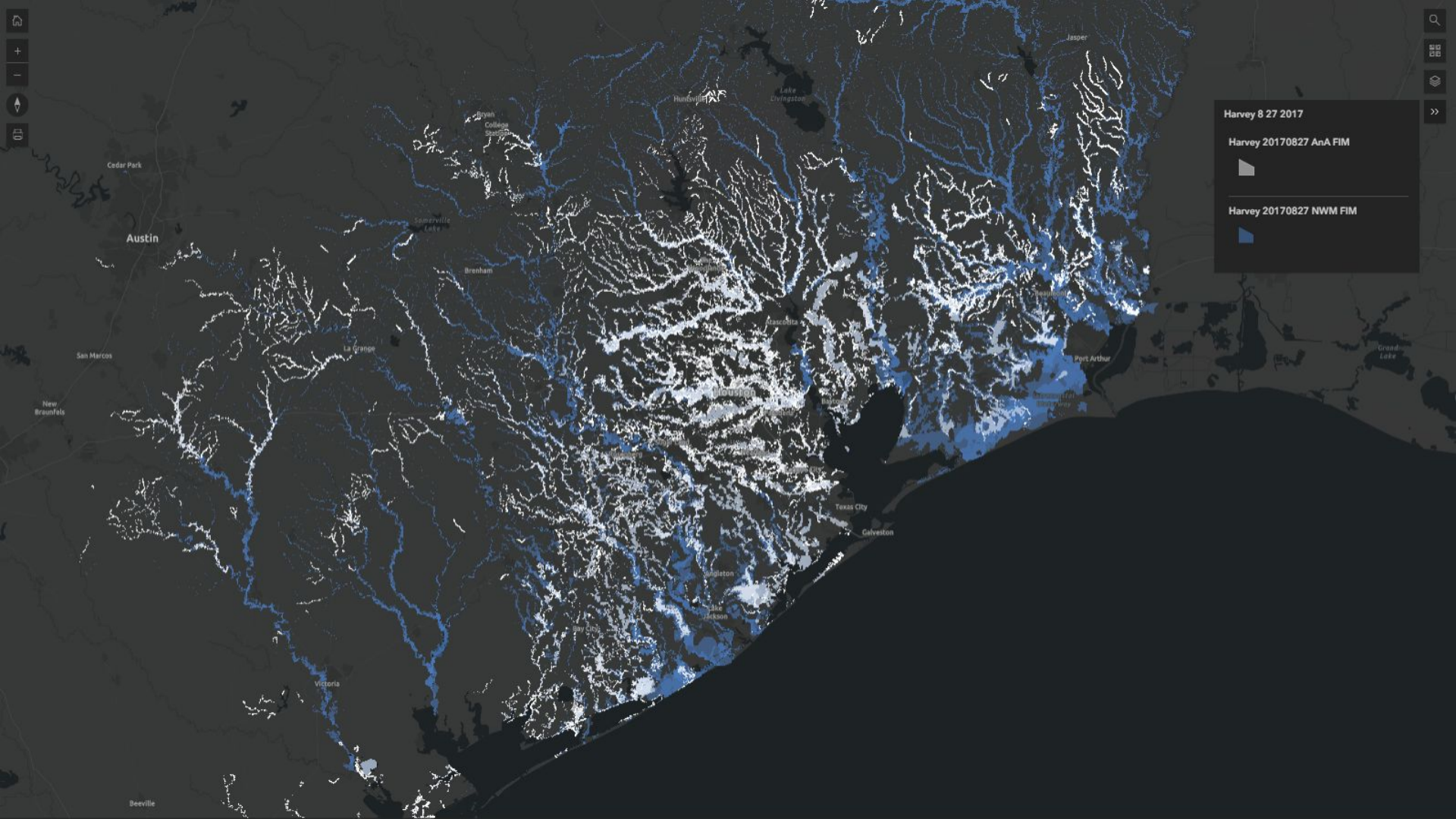
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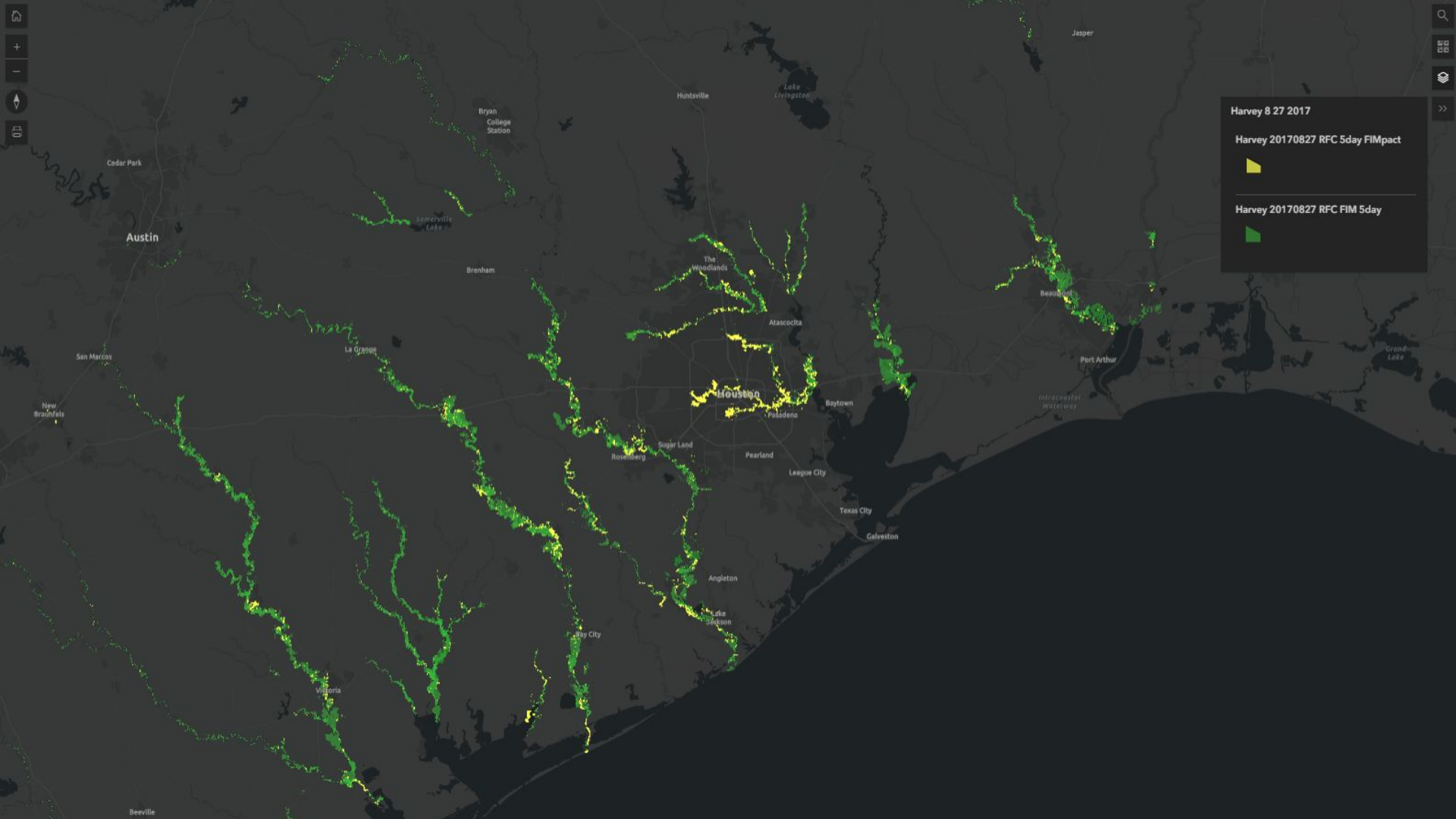
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San Marcos
La Grange
Port Arthur
Houston
Baytown
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Sugar Land
Rosenberg
Pearland
League City
Texas City
Galveston
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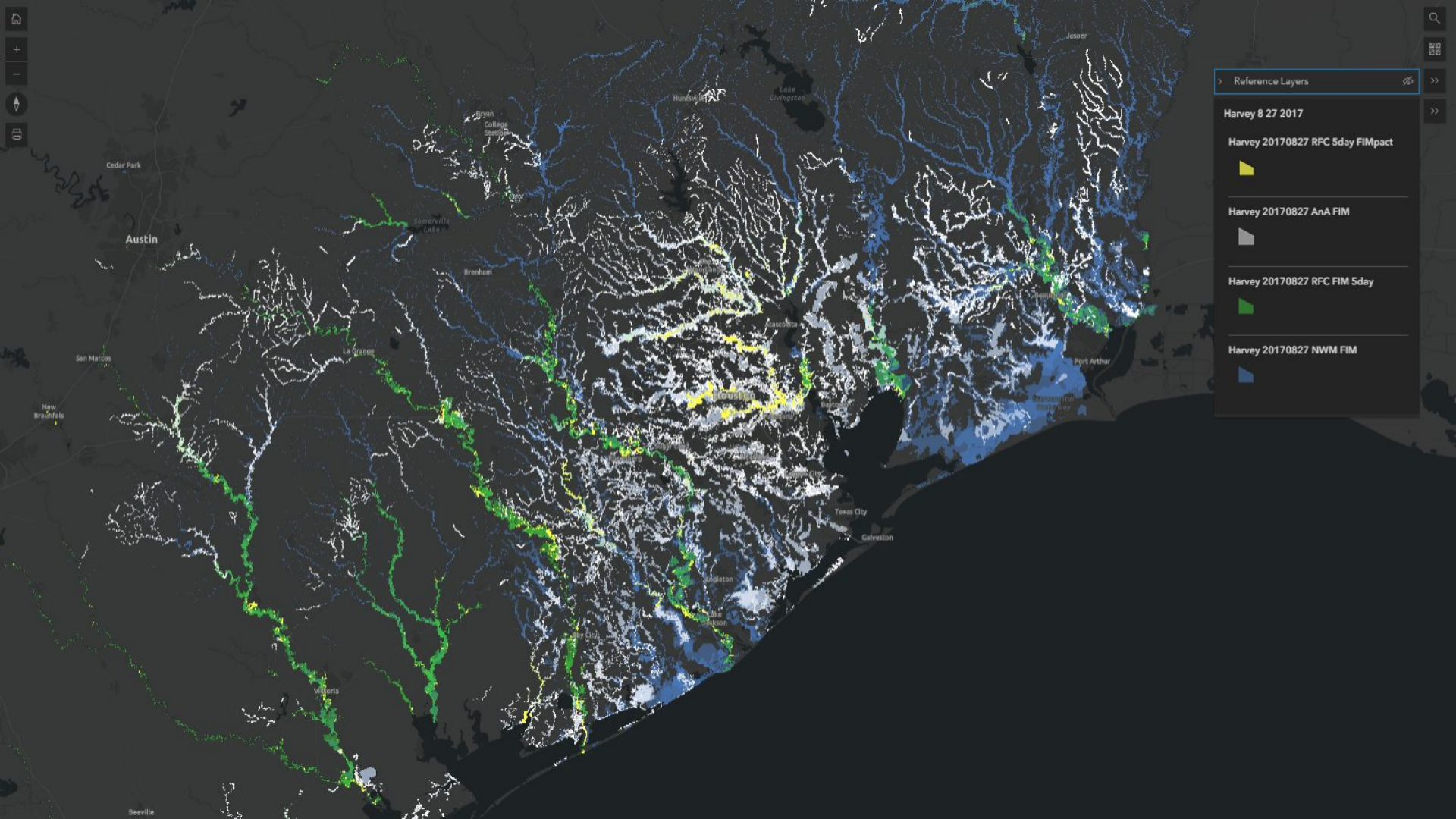
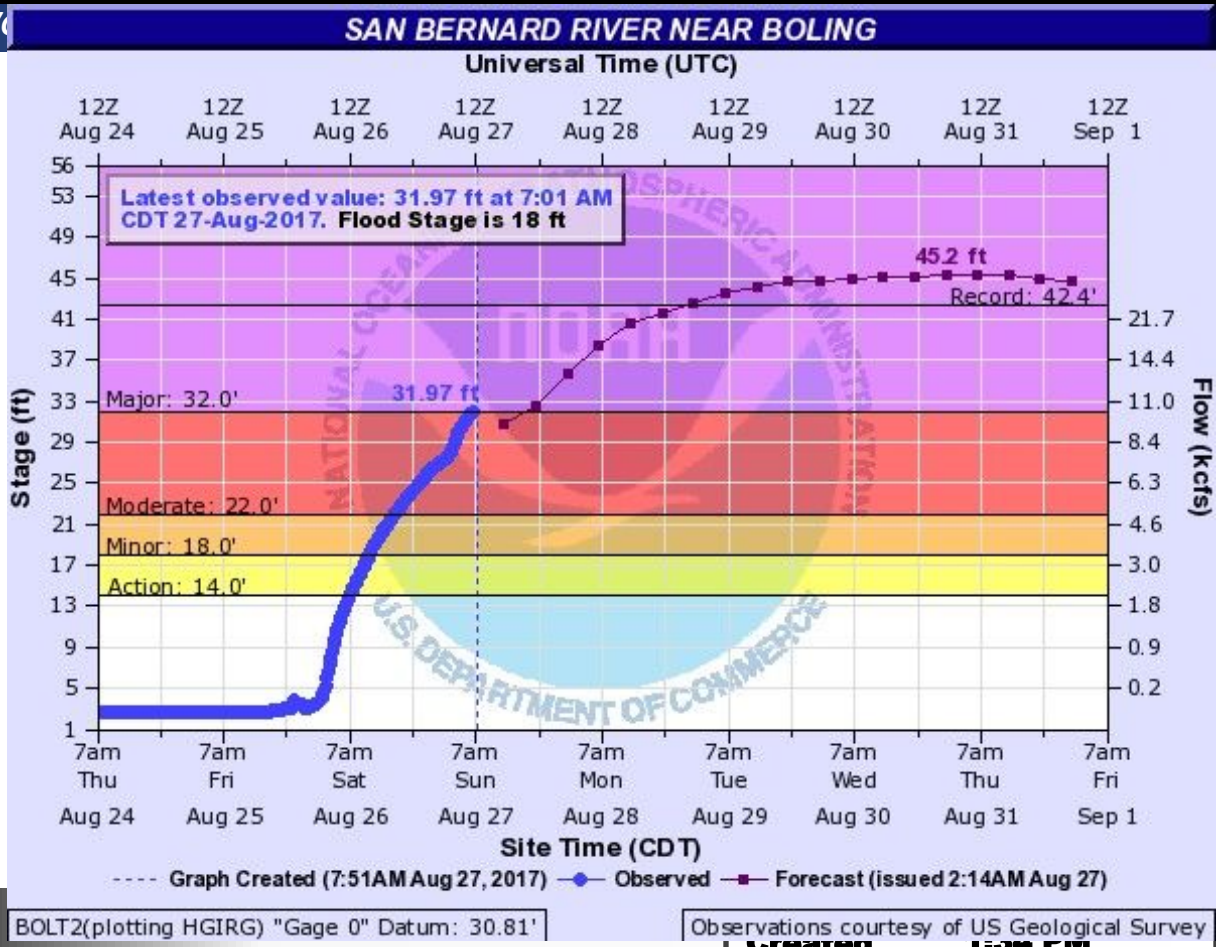

Reference Layers
Harvey 8 27 2017
Harvey 20170827 RFC 5day FIMpact
Harvey 20170827 AnA FIM
Harvey 20170827 RFC FIM 5day
Harvey 20170827 NWM FIM
Austin
Cedar Park
San Marcos
New Braunfels
Brenham
La Grange
Victoria
Beeville
Huntsville
Lake Livingston
Jasper
Port Arthur
Texas City
Galveston
Angleton

San Bernard River at Boling

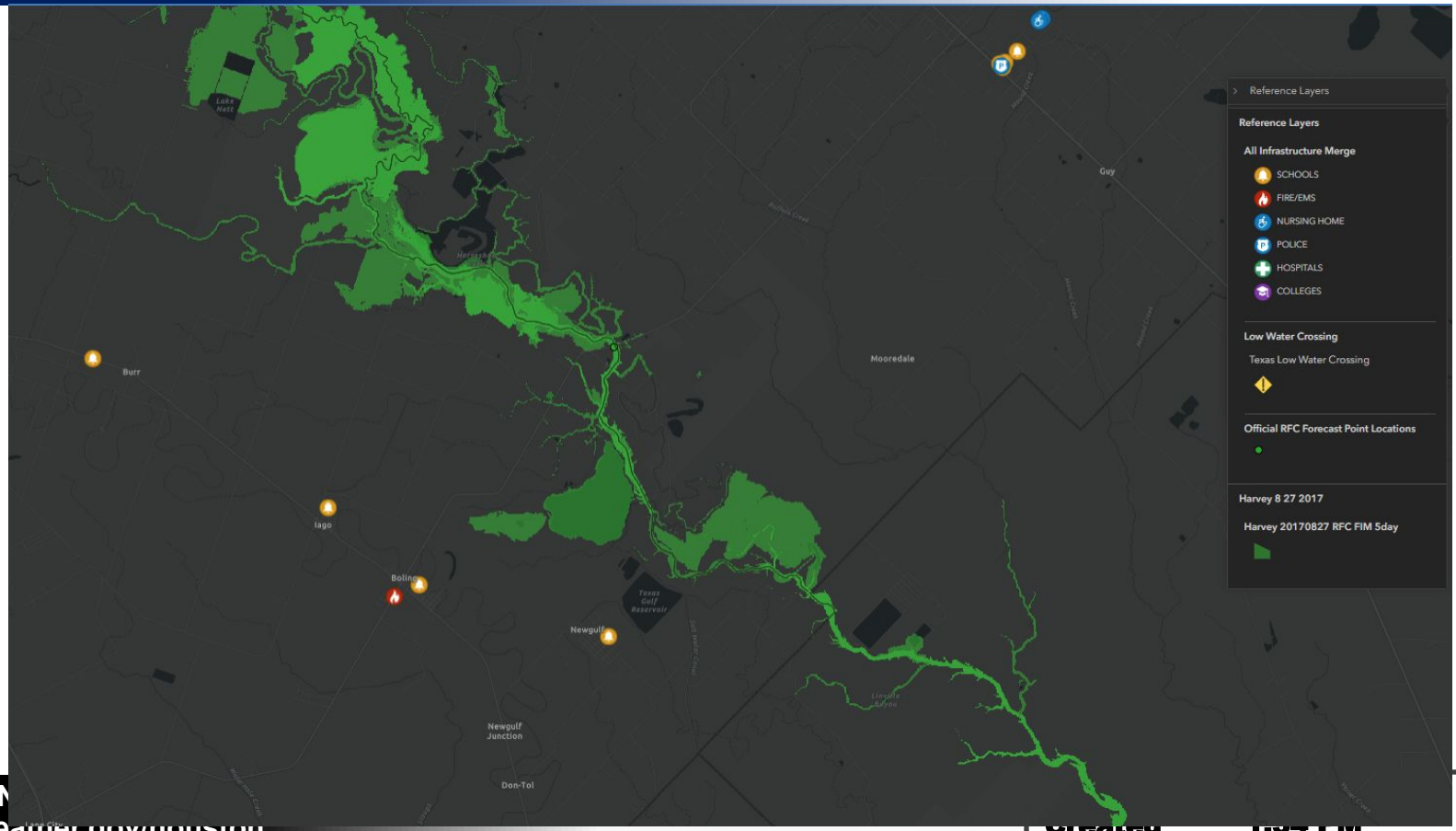
National Weather Service Houston/(

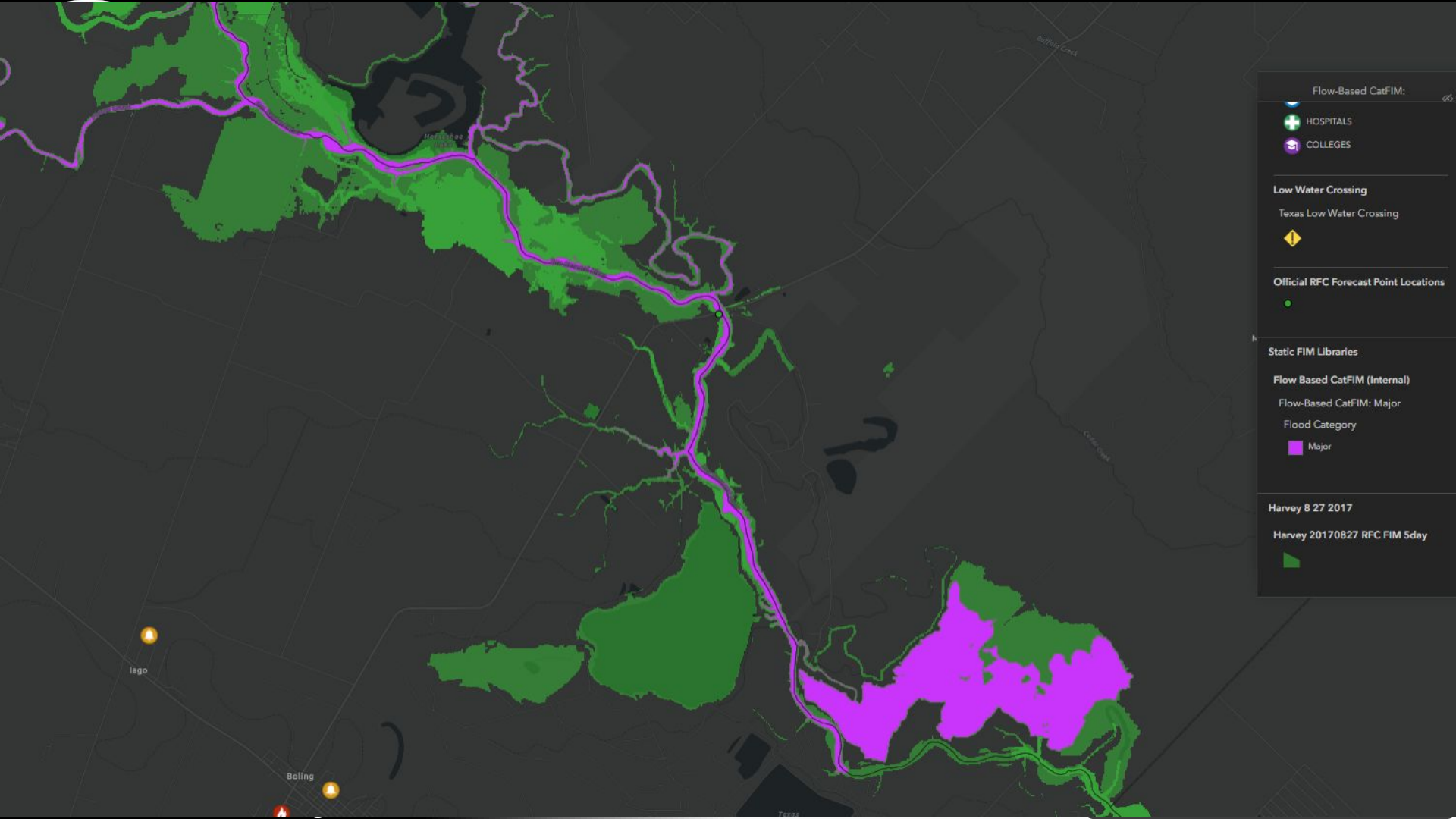
San Bernard: Minor to Major flooding occurring with Major forecast (Record likely)

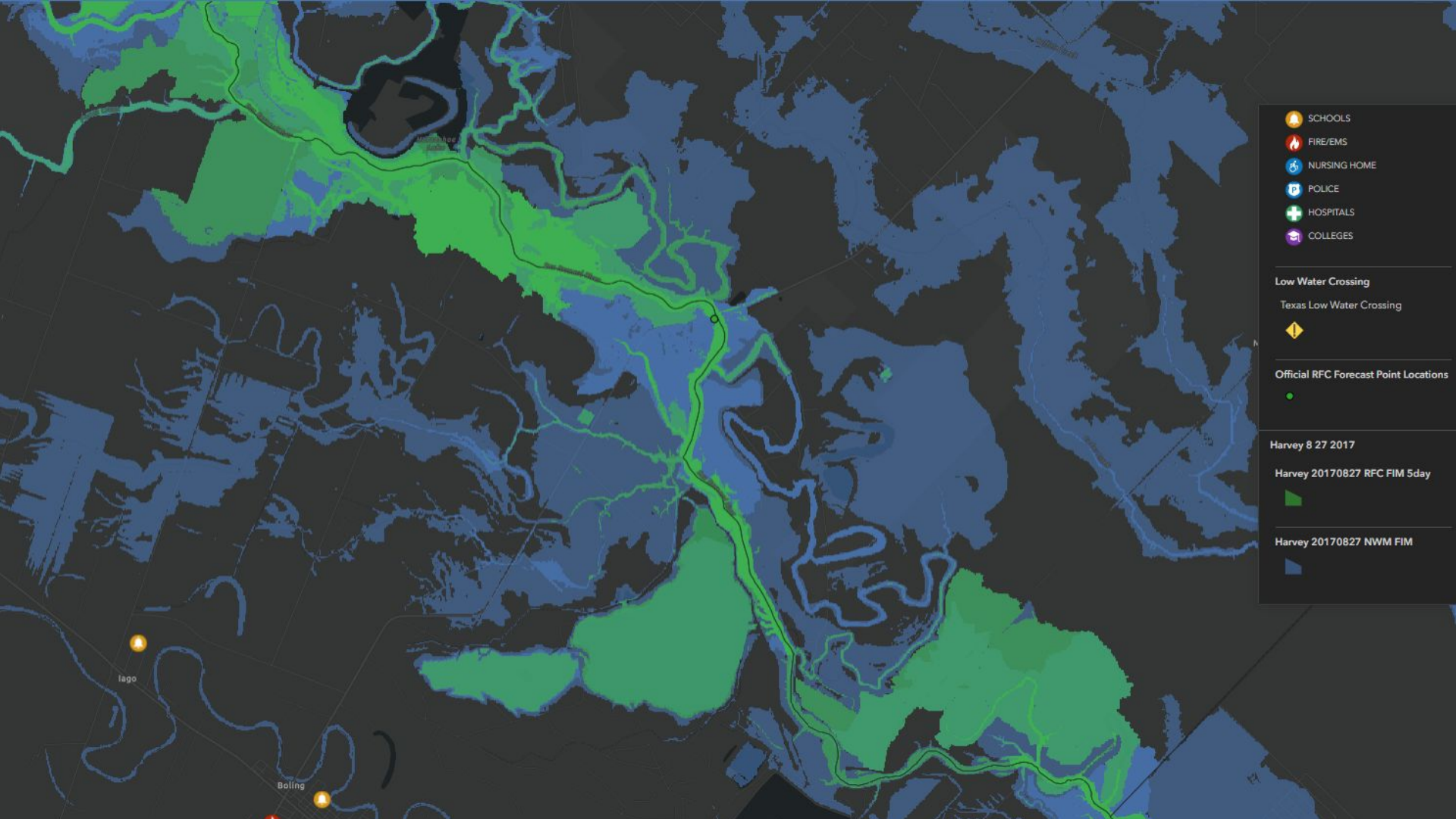


San Bernard River at Boling

National Weather Service Houston/Galveston




Flow-Based CatFIM:
HOSPITALS
COLLEGES
Low Water Crossing
Texas Low Water Crossing
Official RFC Forecast Point Locations
Static FIM Libraries
Flow Based CatFIM (Internal)
Flow-Based CatFIM: Major
Flood Category
Major
Harvey 8 27 2017
Harvey 20170827 RFC FIM 5day
Iago
Boling


SCHOOLS
FIRE/EMS
NURSING HOME
POLICE
HOSPITALS
COLLEGES
Low Water Crossing
Texas Low Water Crossing
Official RFC Forecast Point Locations
Harvey 8 27 2017
Harvey 20170827 RFC FIM 5day
Harvey 20170827 NWM FIM
Iago
Boling

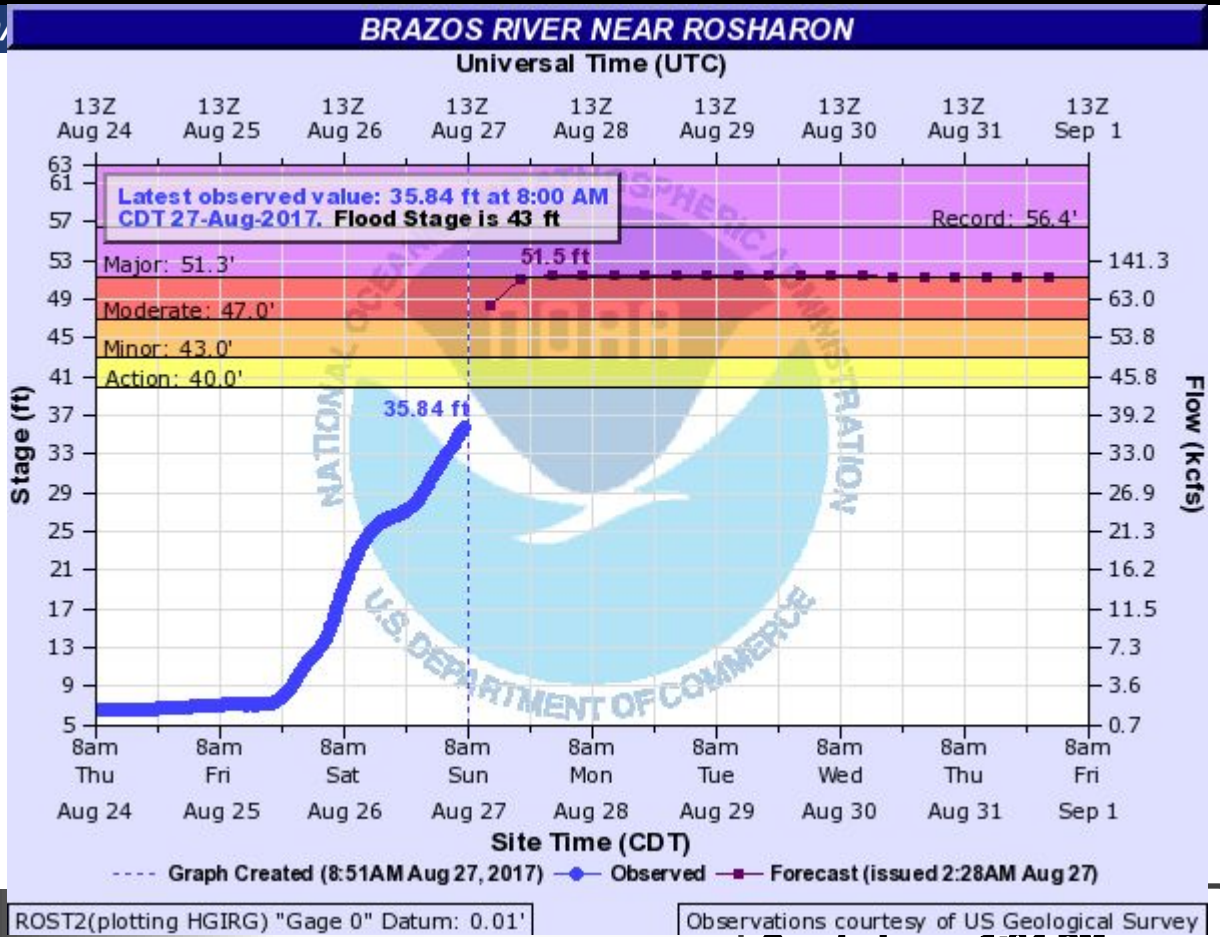
Brazos River at Richmond

National Weather Service Houston/Galveston

Forecast has not changed. Previous FIM is still valid.

Brazos River at Rosharon

National Weather Service Houston



Brazos River at Rosharon

National Weather Service H

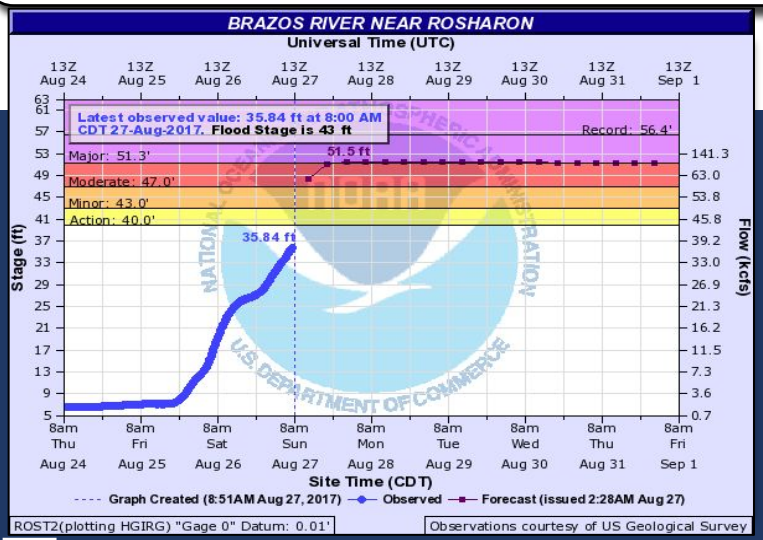
@NWSHouston
weather.gov/houston

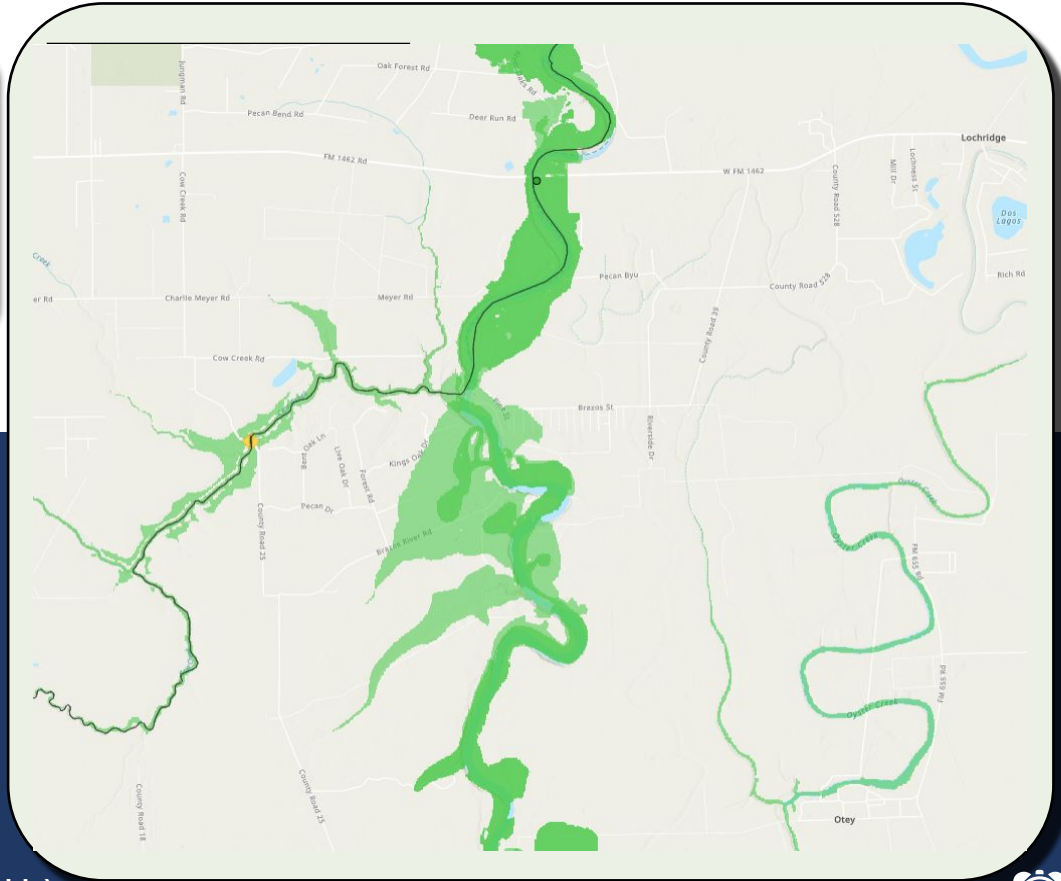
NWS Flood Inundation Mapping Services

Disclaimer: This map shows the flood extent based on a river crest of 51.5 feet. This is an approximate-based FIM which should be used more conservatively.

Brazos River at Rosharon, TX (ROST2)

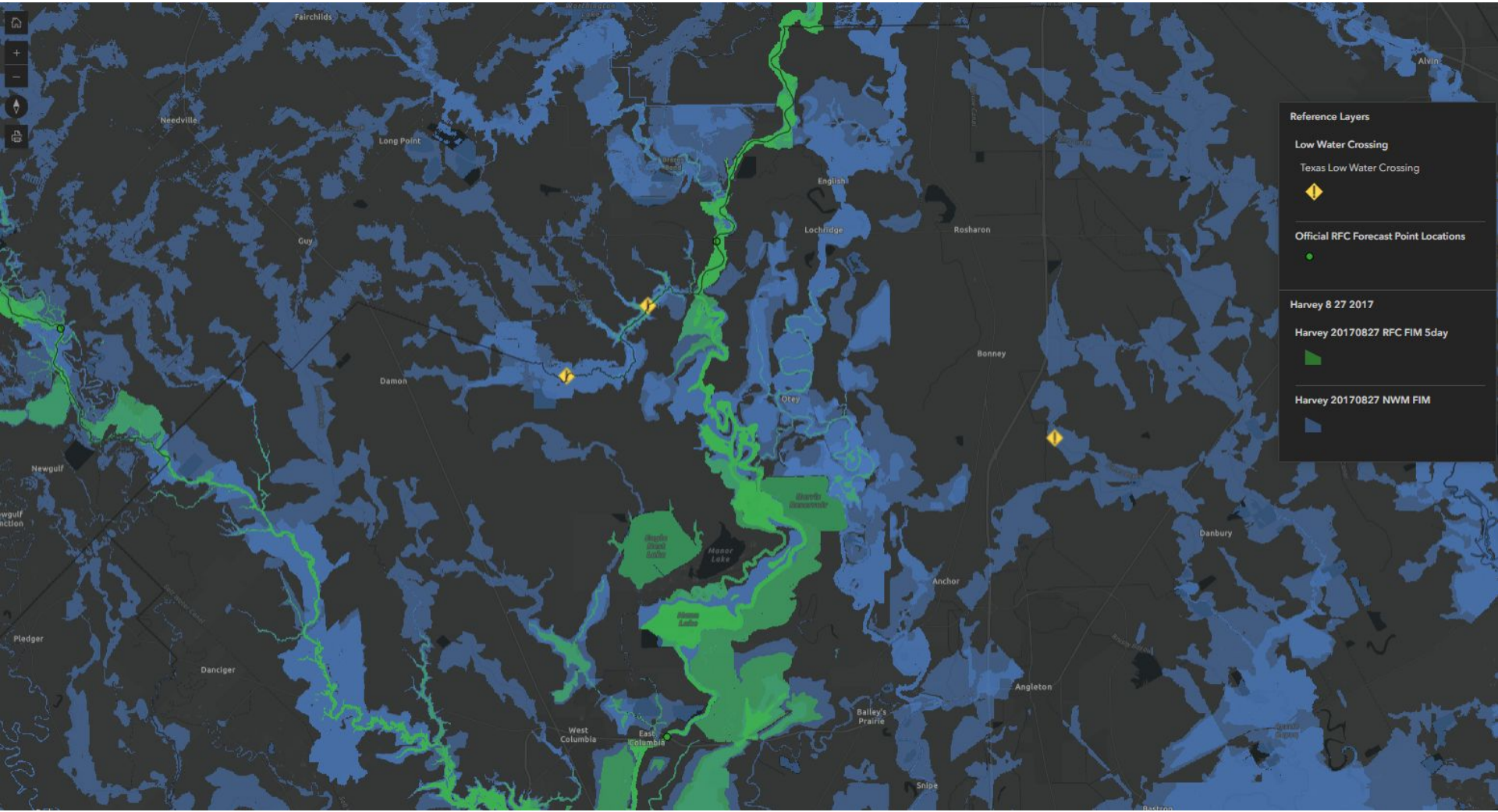
Forecast Crest Height: **51.5 Feet**
Map Height Shown: **51.5 Feet**
FIM Source: **RFC 5-Day Inundation Extent**
FIM Type: **Dynamic (Depth NOT Included)**
FIM Creation Time: **8/27/17 @ 10:00am**





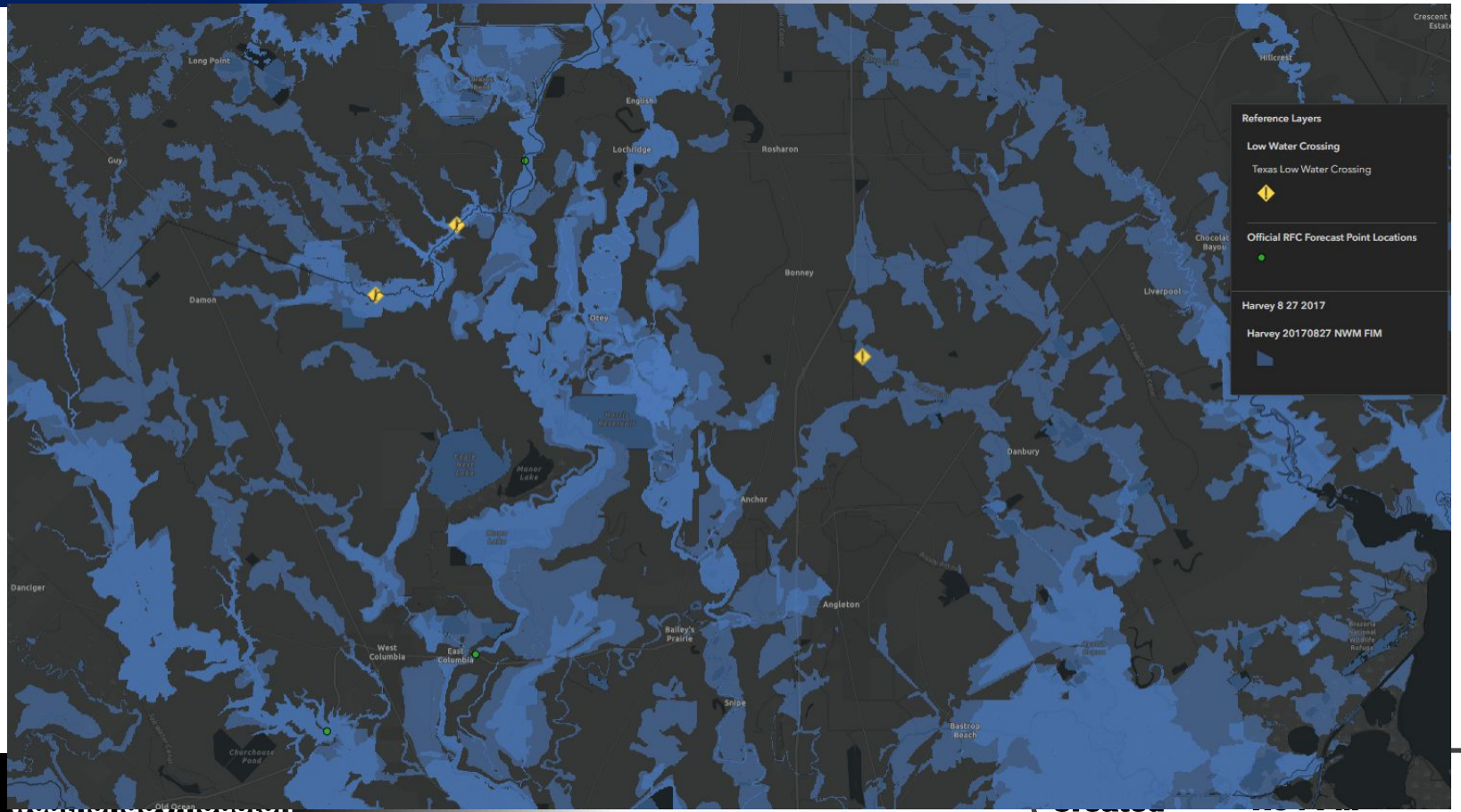
Link: National GIS Viewer (additional screen captures available)

8/27/17 @ 10:00am


Fairchilds
Needville
Long Point
Guy
Damon
English
Lochridge
Rosharon
Bonney
Otey
Alvin
Newgulf
Pledger
Danciger
Manor Lake
Anchor
Danbury
Angleton
West Columbia
East Columbia
Bailey's Prairie
Snipe
Reference Layers
Low Water Crossing
Texas Low Water Crossing
Official RFC Forecast Point Locations
Harvey 8 27 2017
Harvey 20170827 RFC FIM 5day
Harvey 20170827 NWM FIM

Oyster Creek

National Weather Service Houston/Galveston



Impacts

National Weather Service Houston/Galveston

- Dangerous flooding situation
- Inundation of roads and structures ongoing and expected to continue
- Use impact statements on NWS webpage
- Report any reports of flooding to NWS

Questions?

National Weather Service Houston/Galveston

- Questions?
- Email: Katie.landry@noaa.gov
- Weather.gov/houston
- @NWSHouston

- Please relay any storm reports to NWS at SR-HGX.NWS@noaa.gov
  - Storm damage, funnel cloud sightings, flooded roads (closures), water in structures, etc.