



## Hurricane Harvey 8.31.17 Analysis

Risk Services Division

31 August 2017

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## Hurricane Harvey (Post Tropical Storm) August 31, 2017 9AM ET

### Summary

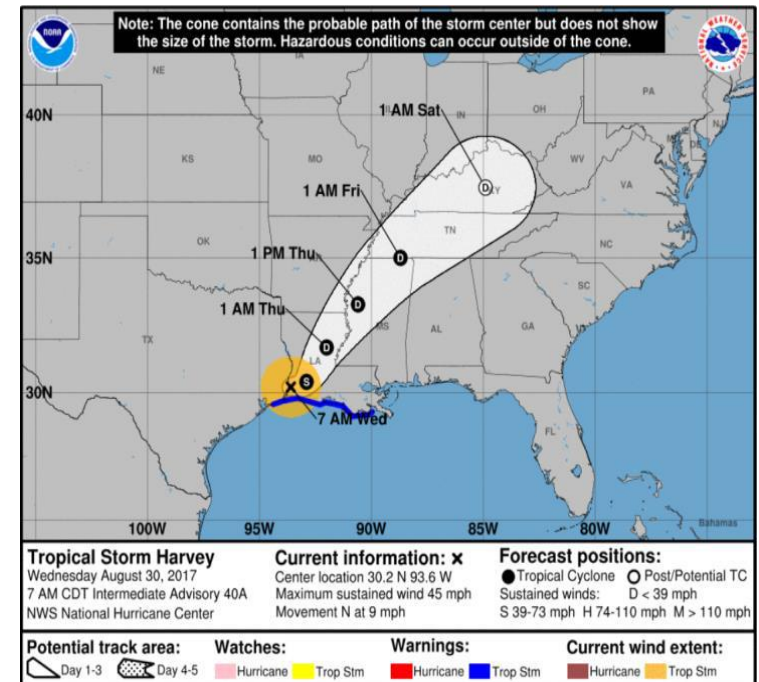
Harvey is now a tropical depression. Additional heavy rainfall is expected mainly over far southeastern Texas and southwest Louisiana into Friday. Flash Flood Warnings and Watches will remain in effect for much of the region over the next couple of days. Harvey's immediate impact is not expected to be as severe as when it hit Texas as a Category 4 hurricane last week.

### Analysis of Impacts

- Evacuations:
  - TX –mandatory evacuations for 780k; voluntary evacuations 980k people
  - LA –mandatory evacuations for 6.8k; voluntary evacuations for 133k people
- Shelters/occupants: 142 / 22k in TX and 1 / 20 in LA
- Nearly 99.5k residential homes may be affected (up from previous estimate of 62k) out of 2.2 million across 19 counties
- Power outages: 277k customers without power in TX; 11k customers without power in LA
- Drinking and waste water systems continue to be evaluated for operational status
- Drinking water systems: 4,421 systems; 4,194 no status; 18 not operational; 18 operational
- Waste water treatment plants: 2,466 plants: 2,293 no status available; 14 on generator or bypass pumps; 11 not operational; 4 are partially operational
- If Northeast Water Purification Plant in Houston drops to below 20 percent capacity, the city may have to issue a boil water notice
- All water boil notices lifted for Corpus Christi, TX; all Corpus Christi wastewater plants operational

### Texas

- EOC at Full Activation
- Governor declared a State of Disaster for 50 counties
- Mandatory/voluntary evacuations in effect for 8 counties and several independent communities
- National Guard (12K members) activated
- EMAC request for housing 3,400 evacuees
- City of Houston imposed a curfew effect immediately
- Hospitals and nursing homes remain closed
- Port Arthur refinery is shutting down
- Airports: George Bush IAP and William P Hobby are closed but accepting limited relief flights



## Louisiana

- EOC at Full Activation with ESFs 1, 3, 6, 7, 8, and DoD
- Governor declared a State of Emergency for all parishes
- Mandatory and voluntary evacuations remain in affect
- Governor mobilized 210 National Guard members with additional 230 full-time Guardsmen supporting
- 24 parish schools closed until further notice

## Water Systems Impact

Flood modeling and geospatial analysis identified 500 drinking water treatment plants expected to experience at least 4 feet of flooding. Of these, 18 water treatment plants, all but one in Texas, also belong to systems serving at least 40,000 people. In general, flooding simulation indicates reduced flooding on the western side of the domain and increased flooding in Houston and north of Houston.

The updated projection includes a 1-day hindcast using precipitation observations obtained from the NWS. In addition, a 5-Day quantitative precipitation forecast from NOAA was simulated, assuming that the majority of the precipitation will occur over the first 2 days of the simulated period.

As of 28 August 2017, all four drinking water purification plants in Houston are operational, despite continued severe flooding. One plant, the Northeast Water Purification Plant, is experiencing flooding. If the plant drops to below 20 percent capacity, the city might be forced to issue a notice to residents to boil their water. Flooding will make it difficult for workers to get equipment to the site and to do any adjustments and maintenance.

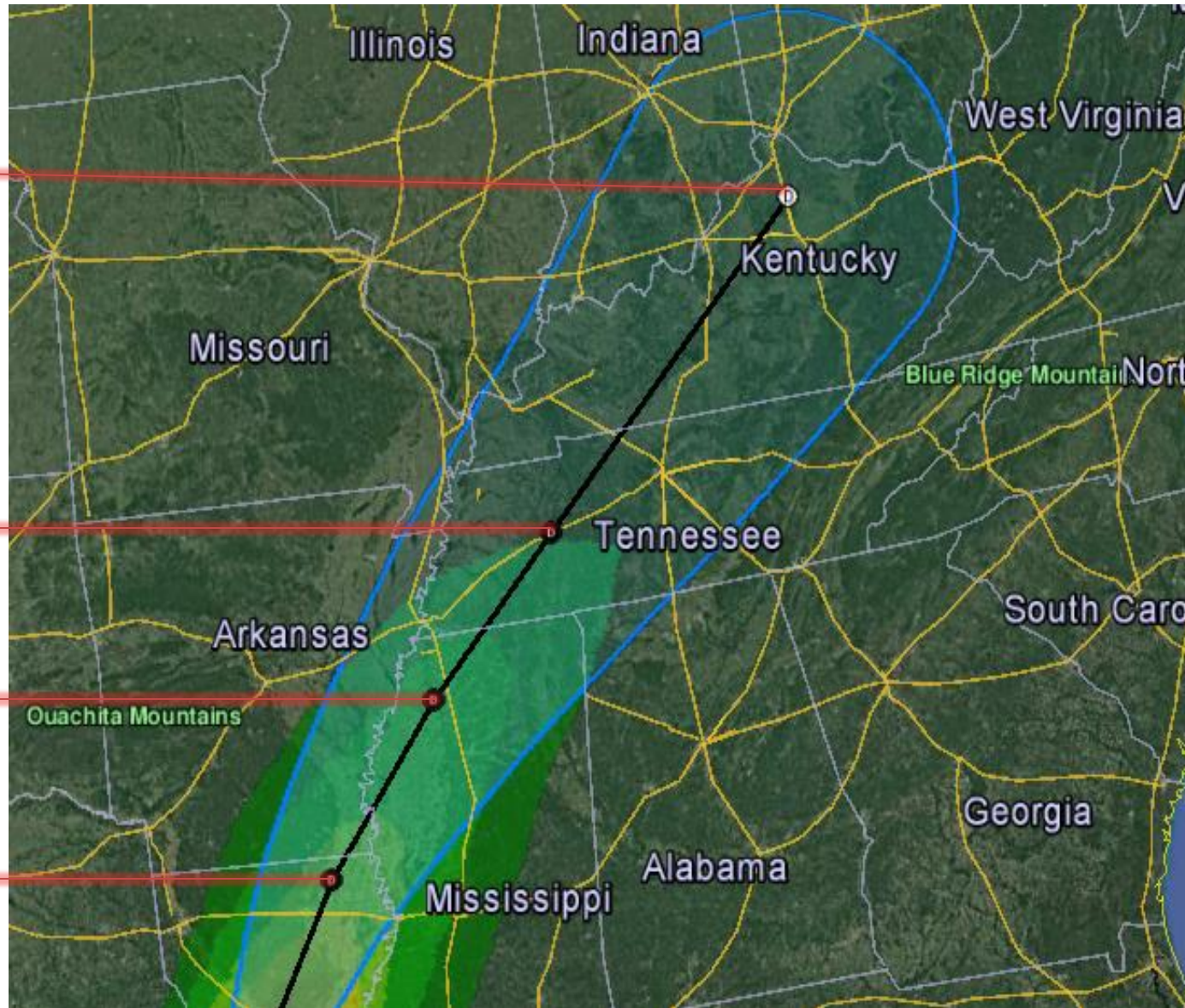
All water boil notices have been lifted for Corpus Christi, TX and all Corpus Christi wastewater plants are operational. Boil water notices and voluntary conservation measures are expected to remain in effect for Victoria, TX for another week. For more information, see [TS Harvey Impacts to Drinking Water Systems](#) and [Precipitation Forecast with Drinking Water Facilities](#).

## Communications Systems Impact

Tropical Storm Harvey will continue to have moderate regional impacts and low national impacts on the Communications Sector because of power loss, flooding, and wind damage. Impacts to communications assets are mostly attributable to lack of electric power and flooded transportation networks, which can interrupt and postpone generator fuel resupply efforts. Competing higher priority assets such as hospitals may also have a bearing on fuel resupply patterns. Disrupted communications can hinder emergency response and disaster recovery efforts in the near term, and prolonged service outages may result from flooded telecommunication facilities and systems. Wired communications will be low to moderately impacted across the disaster area. There are at least 189,487 subscribers (cable and wireline) out of service in the affected area, but the impacts are not clear, as consumer occupancy is unknown because of evacuations.

The overall impact to wireless systems across the affected region will remain low, but moderate to high in localized areas. As of 29 August 2017, cellular site outages are at 4.7 percent across the affected area. Of the 27 counties reporting disruptions, three have a higher than 40 percent outage, Aransas at 84 percent, Refugio at 75 percent, and Calhoun at 46 percent. Providers may mitigate outages with deployable, mobile communications systems. For example, AT&T deployed Cell on Light Trucks, however, impassible roads can complicate the deployment of these systems. Historically, Categories 1, 2, and 3 storms affecting the United States have resulted in cellular service outages of 20 to 44 percent within the impacted area primarily due to loss of electric power.

Predicted Path



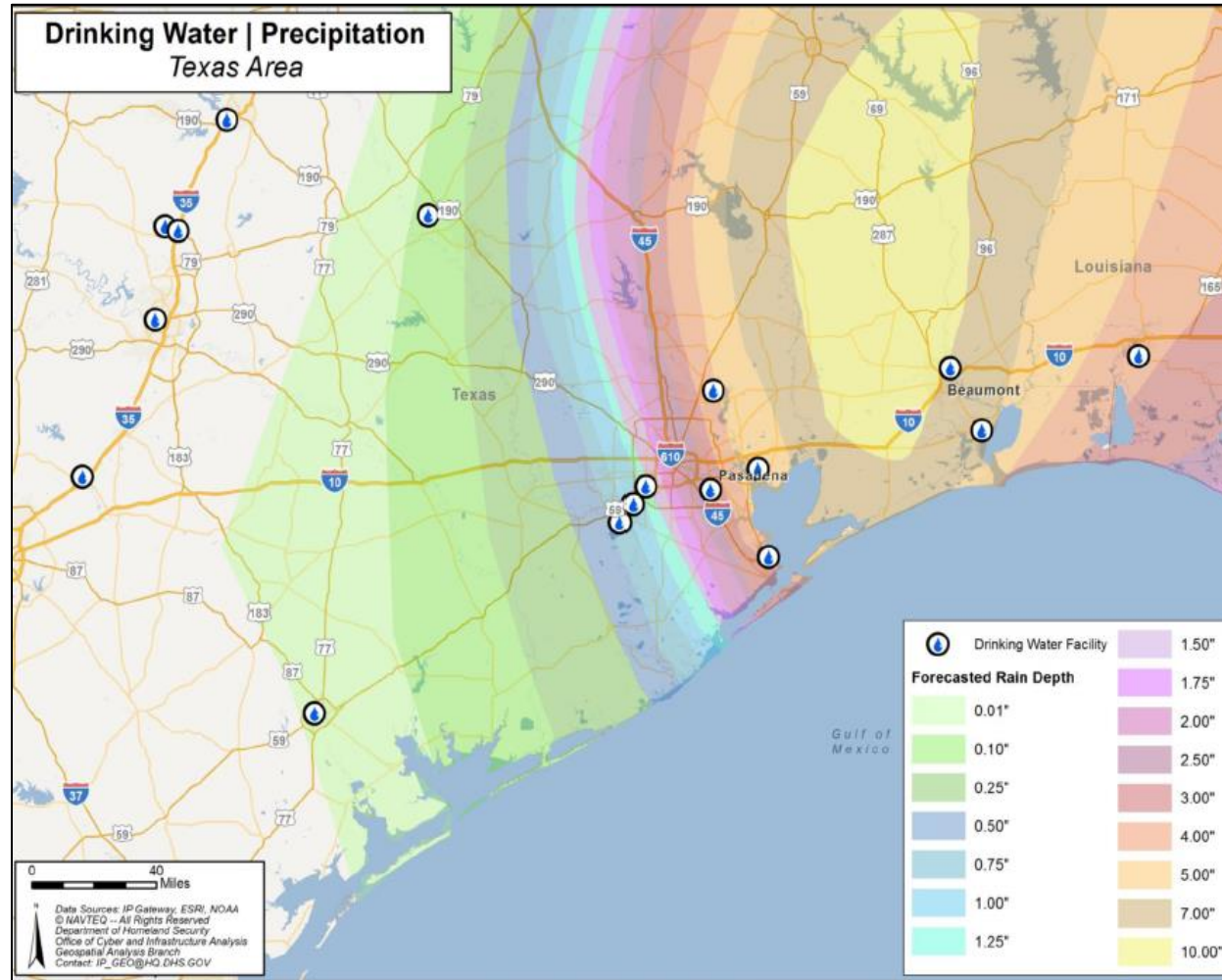
**TS Harvey Impacts to Drinking Water Systems**

- Drinking water treatment plants expected to receive at least 4 feet of flooding and belonging to systems serving more than 4,000 people.

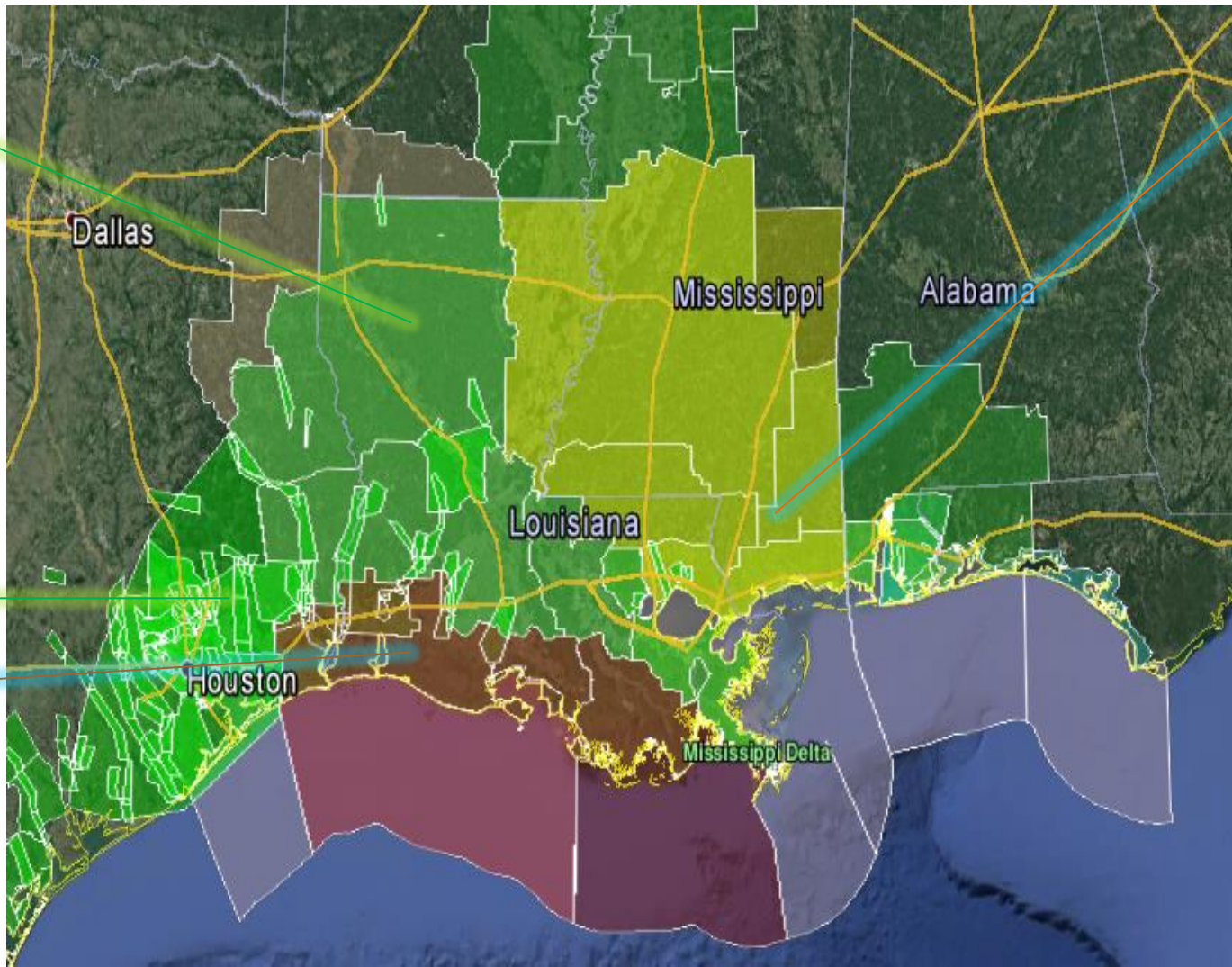
Facility Name	Location	Expected Flood Depth (Feet)
Baytown Park St. Well Baytown, TX	Baytown, TX	15
Houston Kingwood 2 / 4	Houston, TX	15
Lawson Crossing Beaumont	Beaumont, TX	15
Leon River Intake Temple	Temple, TX	12
Victoria Raw Water Purification	Victoria, TX	12
Lake Georgetown Pumps 1-9	Roundrock, TX	12
Old San Antonio Rd. NOF Well	College Station, TX	8
Riverstone 7	Sugarland, TX	8
Davis Stormwater Treatment Plant	Austin, TX	8
San Gabriel Park	Georgetown, TX	8
San Antonio Mission 2	San Antonio, TX	6
New Braunfels Raw Water Treatment Plant	Braunfels, TX	6
Fort Bend County 5	Katy, TX	6
8-Goddard 2	Texas City, TX	6
Braeswood 1	Houston, TX	6
Port Arthur C1-C4 Texaco Refinery	Port Arthur, TX	6
Lake Charles Well 3	McNeese Lake Charles, LA	4
Pasadena 5	Pasadena, TX	4

### Precipitation Forecast with Drinking Water Facilities

- Rainfall runoff flooding due to TS Harvey will have a moderate to high impact over the next 4 days.



Current Watches and Warnings



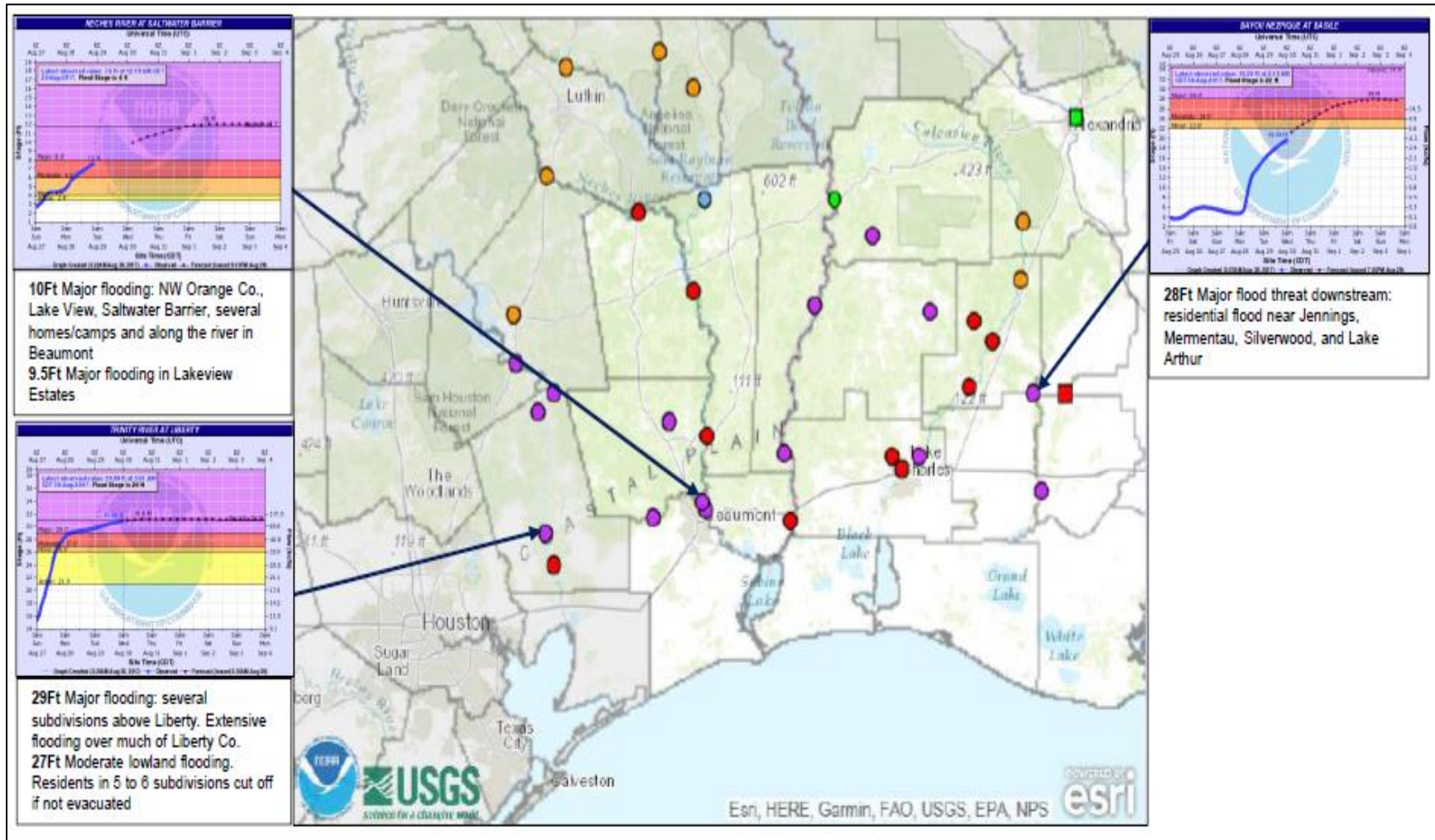
Flash Flood Watch

Tornado Watch

Aerial Flood Warning

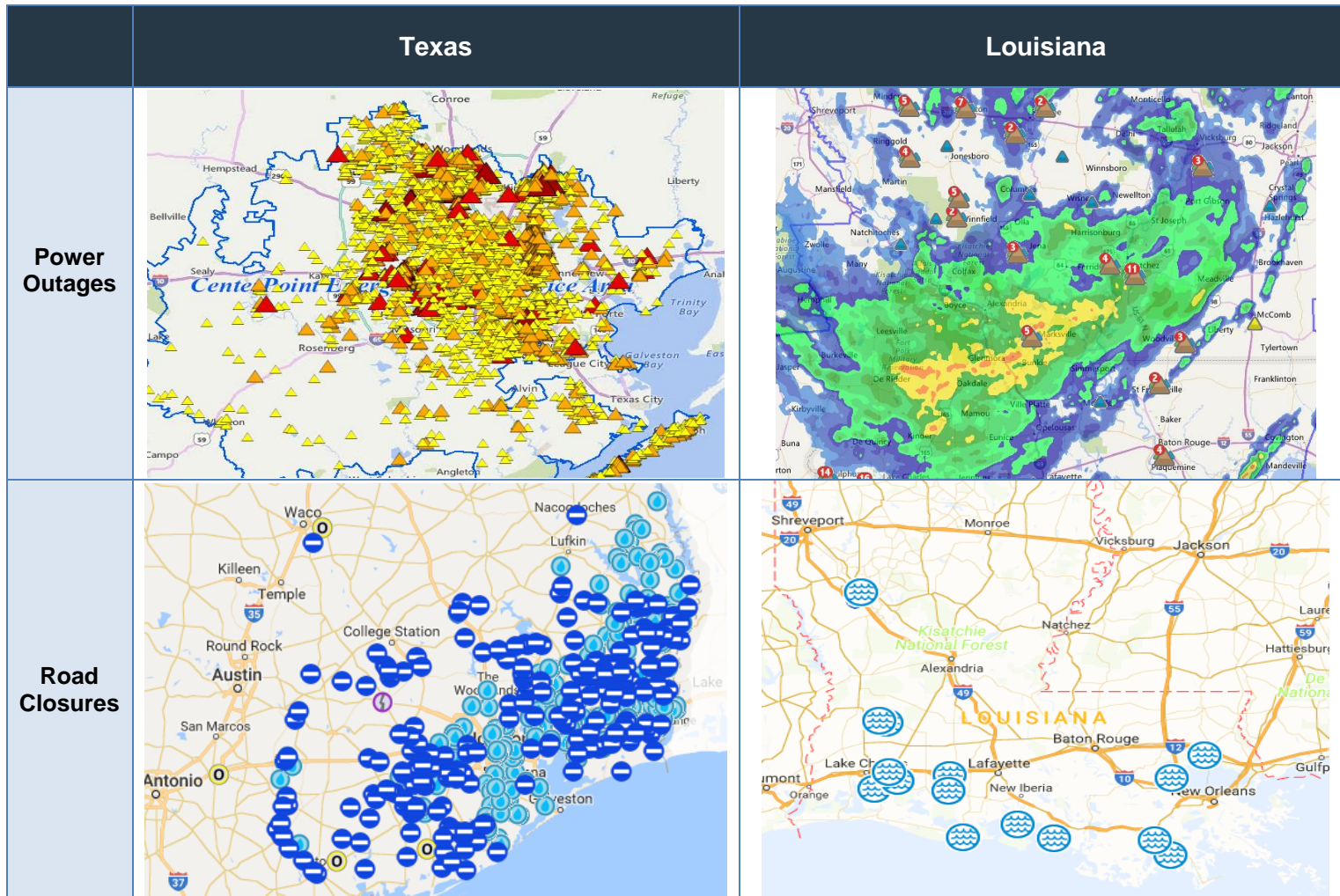
Tropical Storm Warning

**Major to Record River Flooding**



### Road Closures and Power Outage Maps

- There remain over 400 Texas roadways experiencing flooding.
- 1-10 West before the LA/TX state line closed due to flooding.
- 96% of Centerpoint customers have power in Houston (51,538 still without power).



**For Additional Information:**

American Red Cross  
<http://www.redcross.org/>

Texas Department of Transportation  
<https://drivetexas.org/#/7/32.340/-99.500?future=false>

Texas Hotels and Lodging  
[https://texaslodging.com/uploads/files/general/Hotel\\_Brands\\_Toll\\_Free\\_Numbers.pdf](https://texaslodging.com/uploads/files/general/Hotel_Brands_Toll_Free_Numbers.pdf)

Texas Department of Insurance  
<http://www.tdi.texas.gov/consumer/storms/helpafterharvey.html>

US Coast Guard Storm Center  
<https://www.uscg.mil/news/stormcenter/>

US National Hurricane Center  
[www.nhc.noaa.gov](http://www.nhc.noaa.gov)

US Federal Emergency Management Agency  
<http://www.ready.gov/hurricanes>

Governor's Office of Homeland Security and Emergency Preparedness - Louisiana  
<http://gohsep.la.gov/RESPOND/ALERTS>

Emergency Management – Louisiana  
<http://emergency.la.gov/>

National Hurricane Center  
<http://www.nhc.noaa.gov/>

FBI Internet Crime Complaint Center  
<https://www.ic3.gov/default.aspx>