



FIRST: Flood Information & Response System

- Developed for the City of Houston by the SSPEED Center
- Operational for 5 years
- Tool for flood assessment and mapping
 - Monitors floodplain extent in developed areas
 - Monitors critical infrastructure in a watershed (hospitals, nursing homes, camps, shelters)
 - Provides lead-time alerts to officials and emergency managers for closures, evacuations, and rescues

FAS: Flood Alert System

- Inputs radar rainfall data from the National Weather Service (every 15 minutes) from four watersheds in Houston into computer models
 - Watersheds totaling 362 sq. mi.: Brays Bayou, Hunting Bayou, White Oak Bayou, and Sims Bayou
 - Radar is adjusted to measured rainfall
- Displays rainfall intensity in real time for all the sub-basins of the watersheds
 - Rain is color-coded on the map to indicate rainfall intensity/inches of rain:

0.10	0.25	0.50	0.75	1.00
1.25	1.50	1.75	2.50	3.00
3.50	4.00	4.75	5.50	6.00
6.00+				

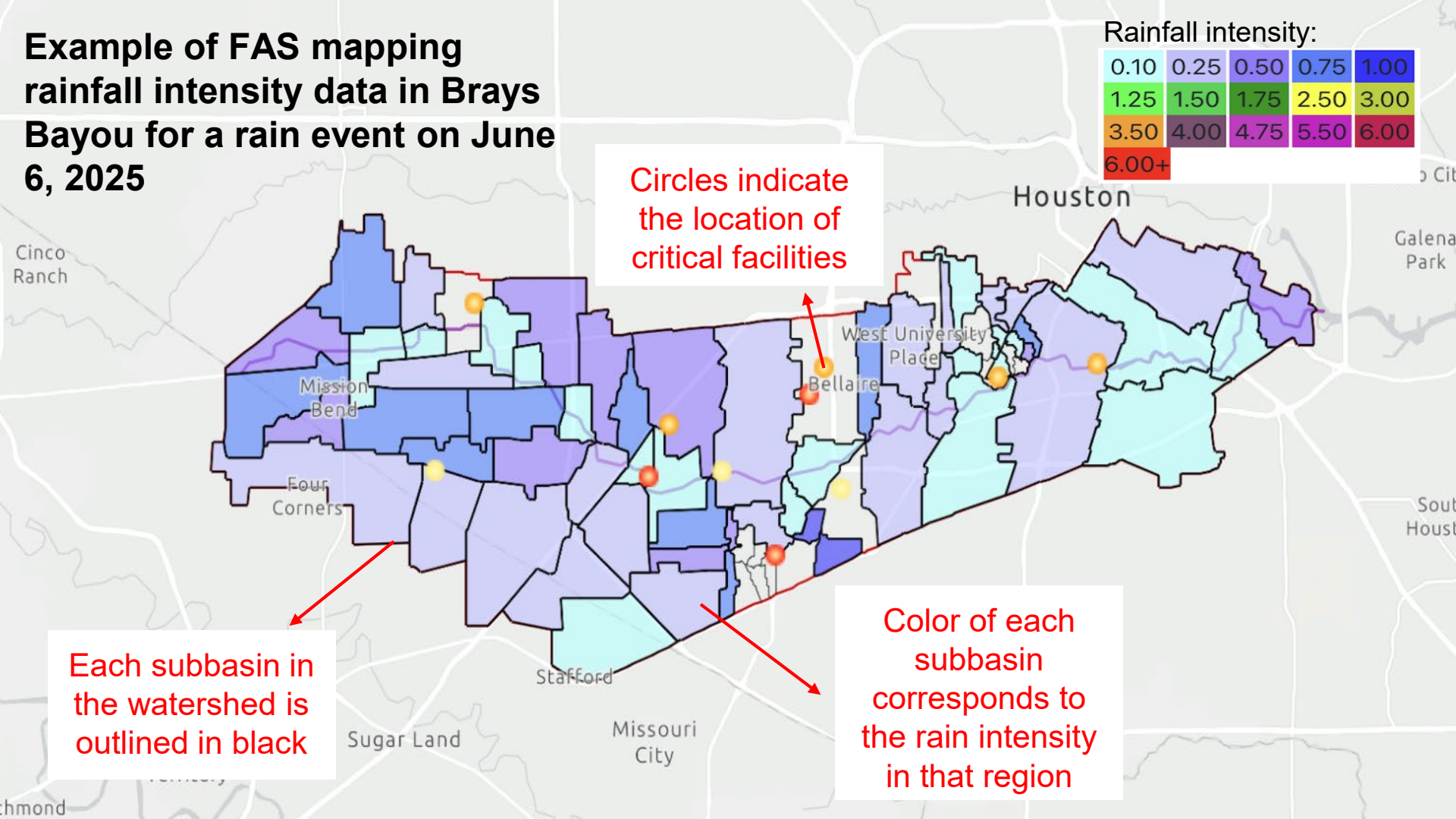
Example of FAS mapping rainfall intensity data in Brays Bayou for a rain event on June 6, 2025



Circles indicate the location of critical facilities

Each subbasin in the watershed is outlined in black

Color of each subbasin corresponds to the rain intensity in that region



How FIRST works: <https://firstcoh.org/>

FIRST methodology:

1. **Collect data:** rainfall (radar + gages), models from HCFCD, terrain/land use maps, critical infrastructure locations
2. **Analyze:**
 - a. Simulate floods – this shows travel time through the watershed – using HEC-HMS (hydrologic model) and HEC-RAS (hydraulic model)
 - b. Create flood maps for 100 different storm scenarios (5 in. - 18 in.)
3. **Supports decision:**
 - a. Radar data is used to select appropriate floodplain map to display
 - b. Live dashboard updates every 15 minutes
 - c. Data is available on the FIRST website (as a function of time)
 - d. **Floodplain map includes travel time (lead time) through the watershed**

FIRST flood inundation mapping in Brays Bayou

- Forecasts flood inundation maps in terms of water depth and elevation

5 in. of rainfall over 6 hours

11 in. of rainfall over 6 hours

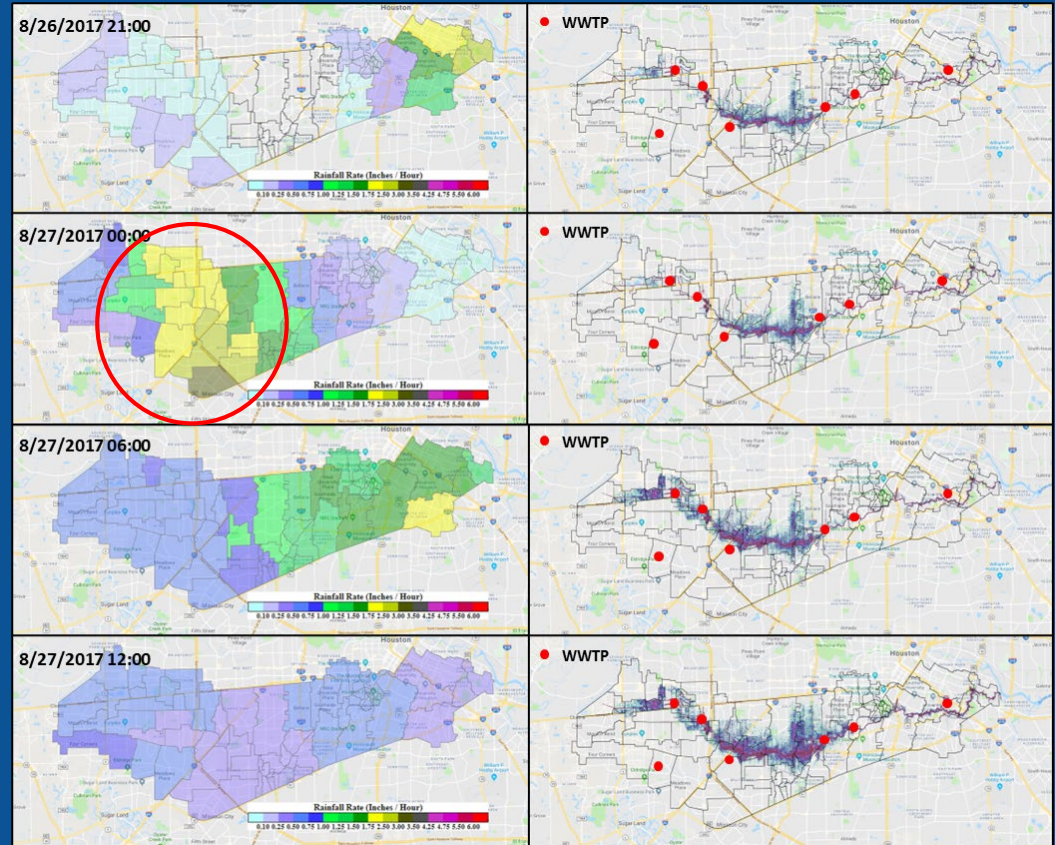
13 in. of rainfall over 6 hours

Water
Depth
(ft)



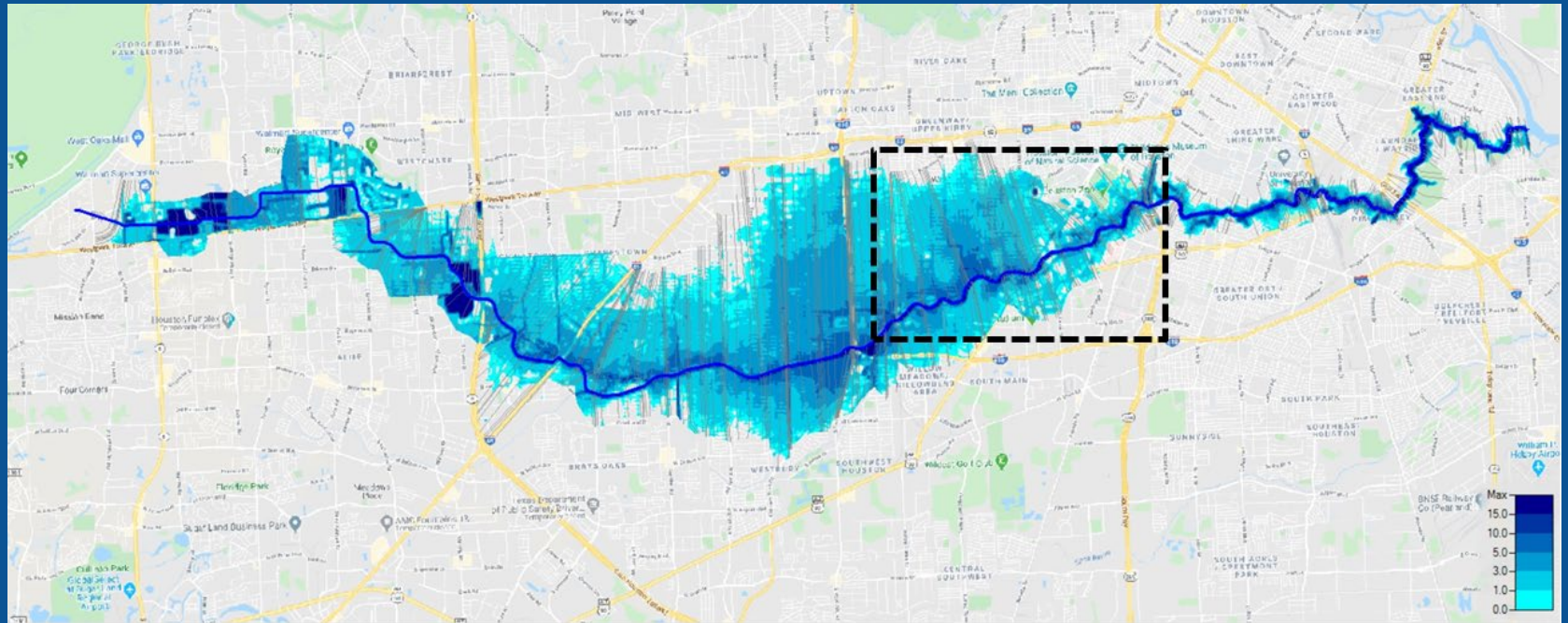
FAS/FIRST mapping during Hurricane Harvey (2017)

- FAS selects hazard map from FPML based on real-time rainfall data
- FIRST estimates flood depth and water surface elevation at each watchpoint
- Flood warning and hazard info can be provided at any number and type of critical facilities

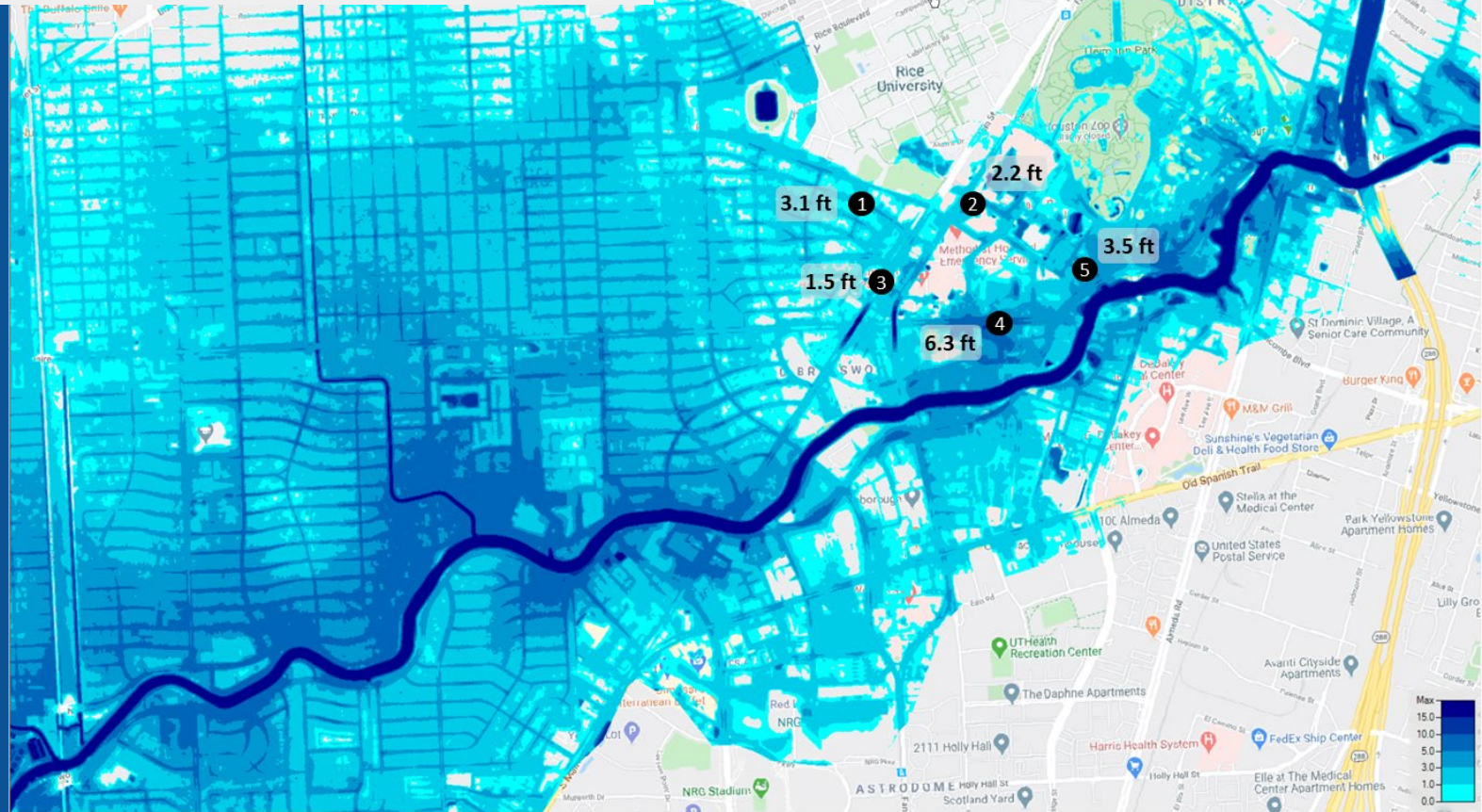


Brays Bayou (Modeled Flood Depth)

- Generates flood hazard maps (flood depth and flood elevation) by interpolating between cross-sections
- Estimated flood hazard at street level and designated watchpoints



Brays Bayou (Modeled Flood Depth at Critical Intersections)



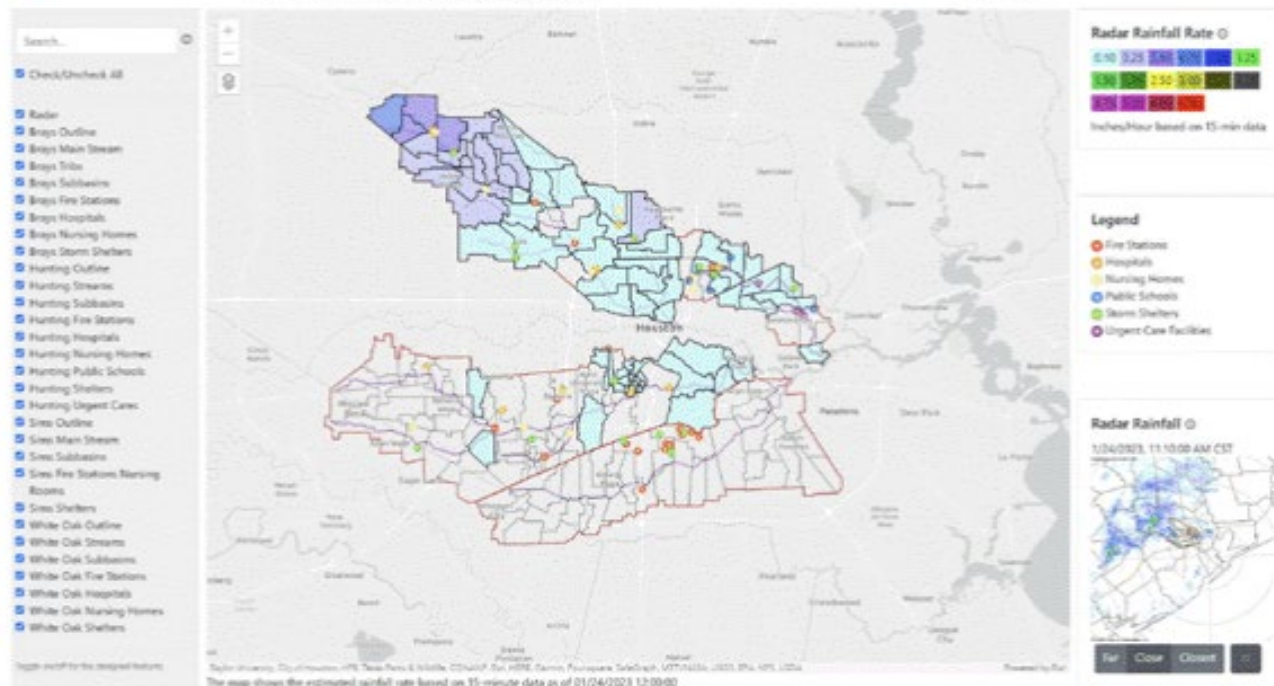
FIRST ARCHIVE: JANUARY 24, 2023 STORM

12:00 PM

FIRST

Flood Information and Response System for the City of Houston

HOME ABOUT



© 2009 - 2021. Developed by Fang Research Group. Contact info: Dr. Nick Fang, email: nickfang@utdallas.edu

This flood warning system is still under development. The data shown on the site can only be used if authorized by the admin.

Implementation for the Guadalupe River Basin

- Split the Upper Guadalupe River Basin into 3 monitorable sections along the borders of existing sub-basins
- Add in 20-25 gages & warning siren along vulnerable stretches of the river
- Use HEC-HMS and HEC-RAS with radar input

