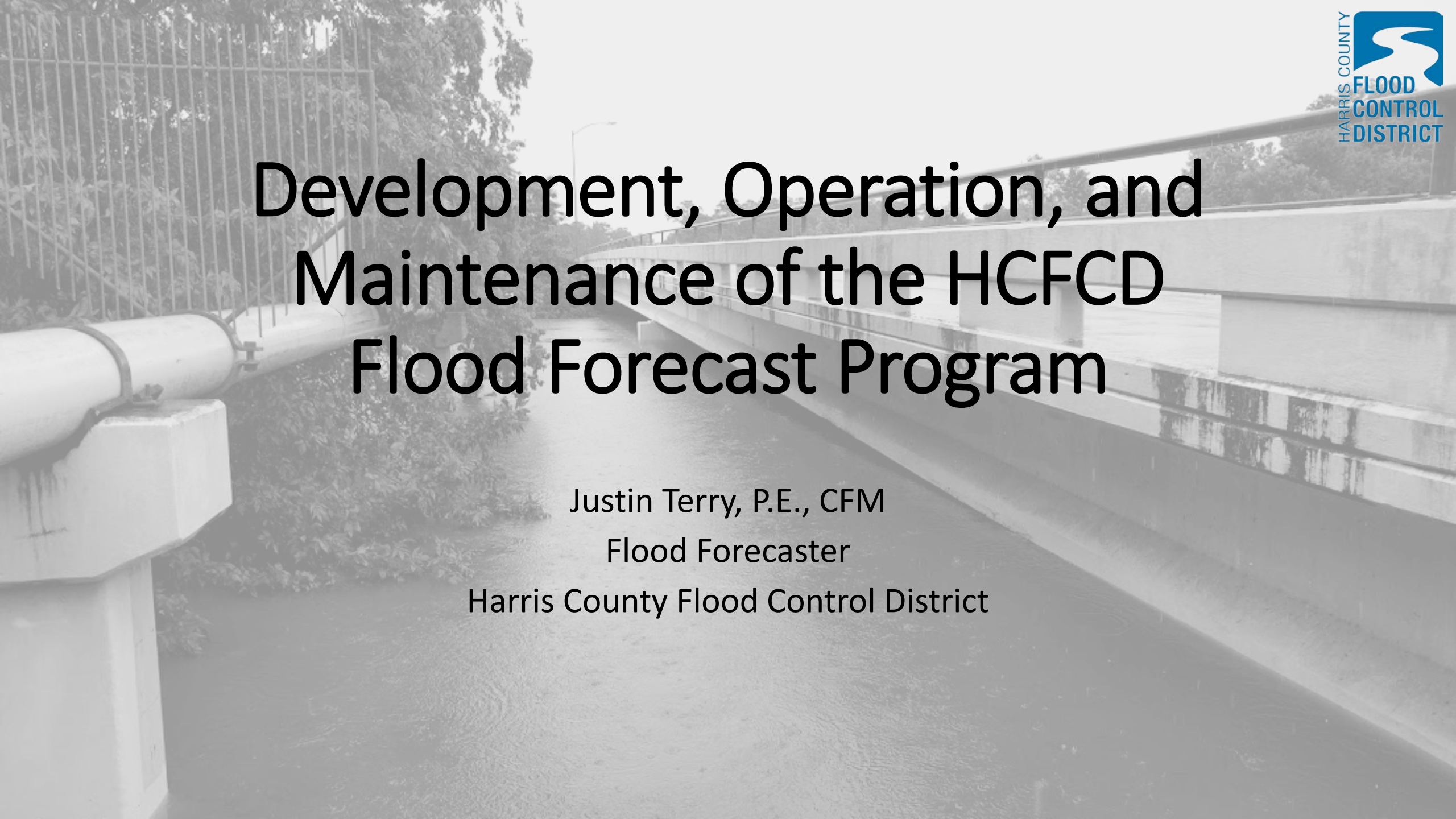


Development, Operation, and Maintenance of the HCFCD Flood Forecast Program

Justin Terry, P.E., CFM
Flood Forecaster
Harris County Flood Control District

Program Goal

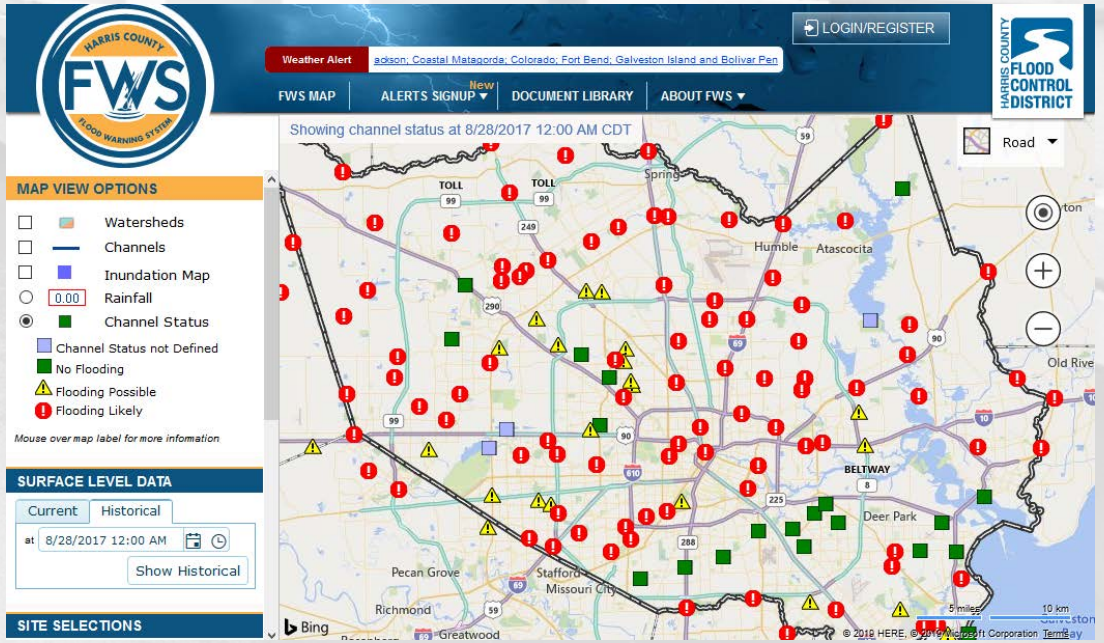
Produce accurate and timely forecasts of water levels and flood inundation in real-time for Harris County's 22 watersheds, and provide advance flood warning and guidance for emergency managers, first responders, public officials, and the public to reduce property damage and loss of life.

Achieving Our Goal

- Build on our existing capabilities by leverage staff knowledge and expertise
- Develop and maintain quality, representative models
- Maintain a high quality gauge network
- Establish reliable operational procedures
- Know our limitations
- Keep our goal in mind

Expanding Capabilities

- Flood Warning System
  - Comprehensive network of 250+ gauges including HCFCD owned and partners
  - Warning relies heavily on experience
  - By nature is more reactive
- Forecast System
  - Provides guidance on future outcome
  - Allows us to see between gauges
  - Allows for what-if scenarios to be evaluated
  - Supplements experience, but does not replace it

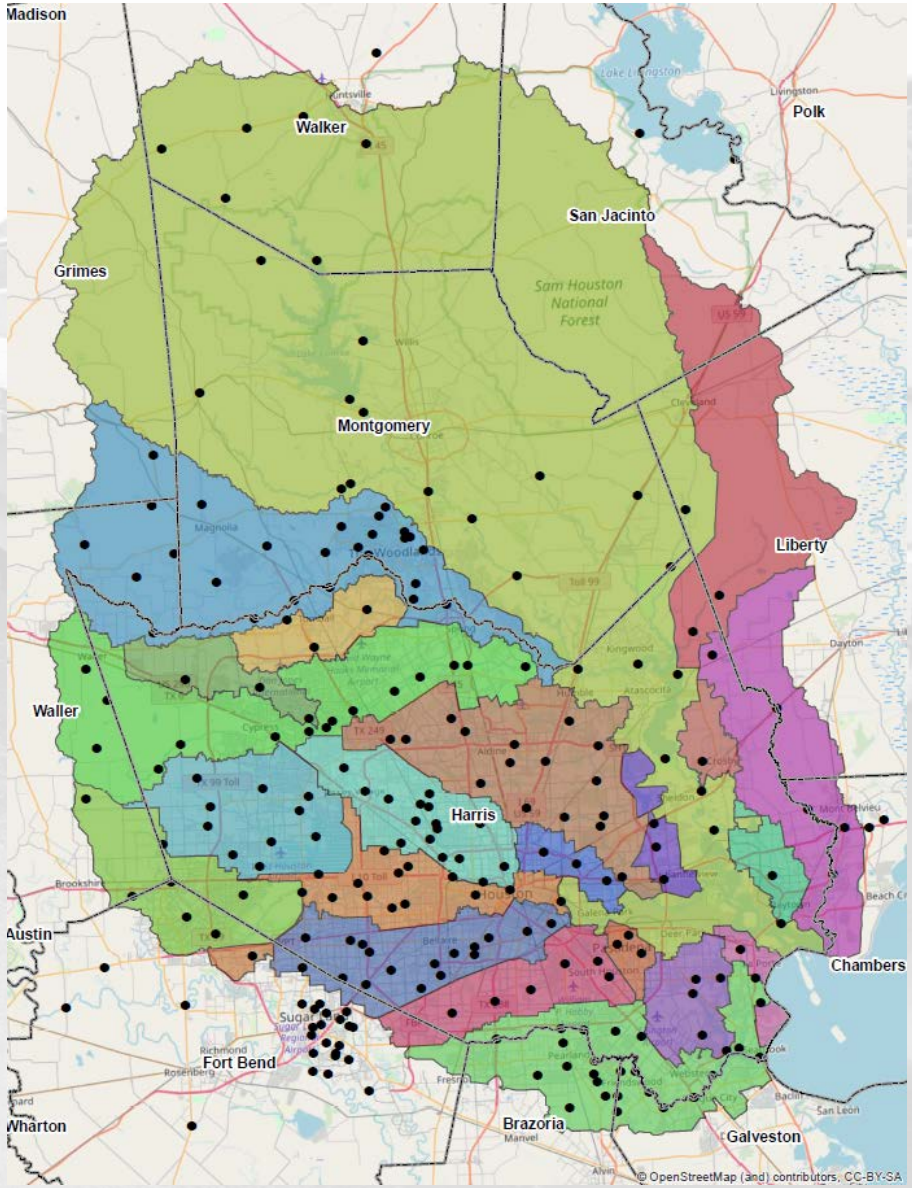


History of Forecasting at HCFCD

- Pilot Study (2006-2010)
  - HEC-HMS with HEC-RAS Unsteady (1D)
  - White Oak and Little White Oak Bayou
- Software Evaluation (2016-2017)
  - Identified HEC-RTS as forecast software
  - Recommended phased approach
- Pilot Study with RTS (2017-2018)
  - HEC-HMS with rating curves for Brays Bayou
- Countywide Development (2018-Present)

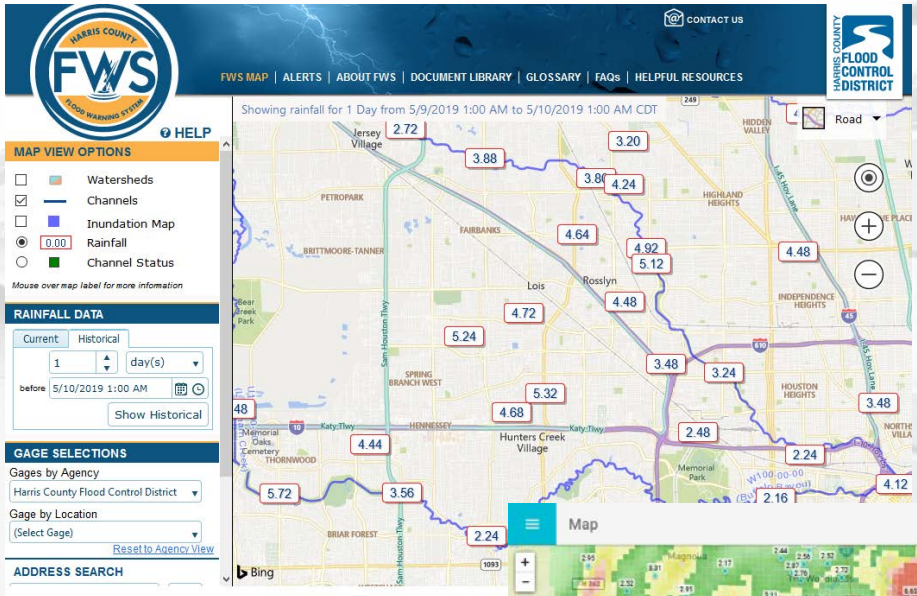
Forecast Models

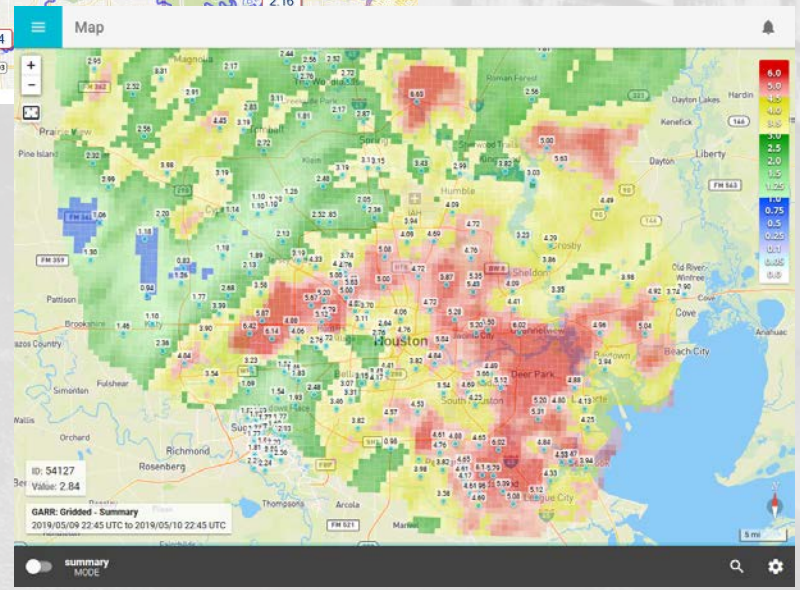
- HEC-HMS in HEC-RTS (CWMS)
- Based on current conditions
  - Channel improvements, regional detention, bridges, etc.
- Rating curves from discharge measurements and models
- Calibrated to flooding and non-flooding events



Forecast Inputs

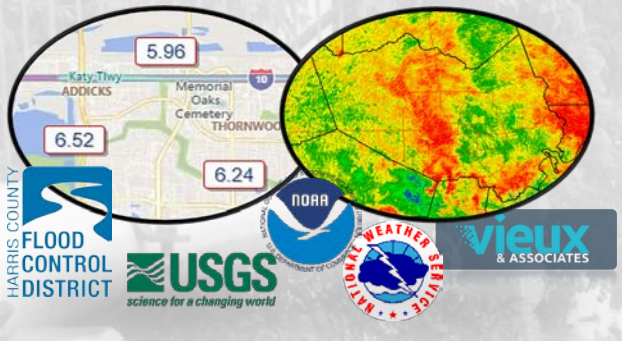
- Near-Real-Time Rainfall
  - FWS Gauges
  - NWS MRMS Radar (QPE)
  - Vieux GARR (QPE)
- Forecast Rainfall
  - NWS HRRR (QPF)
- Steam Data
  - HCFCD/Partner Gauges
    - USGS, SJRA, and others
  - WGRFC forecasts



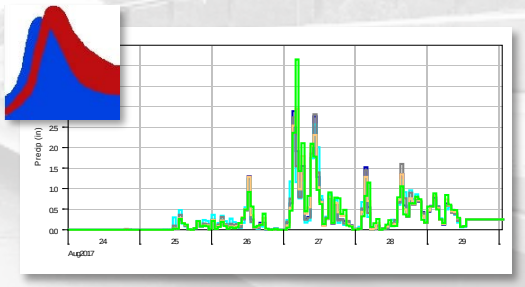


Forecast Approach

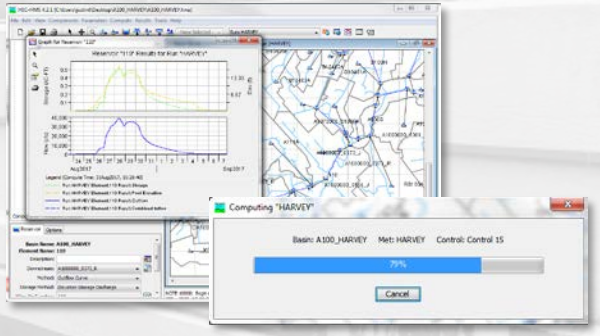
Data Acquisition



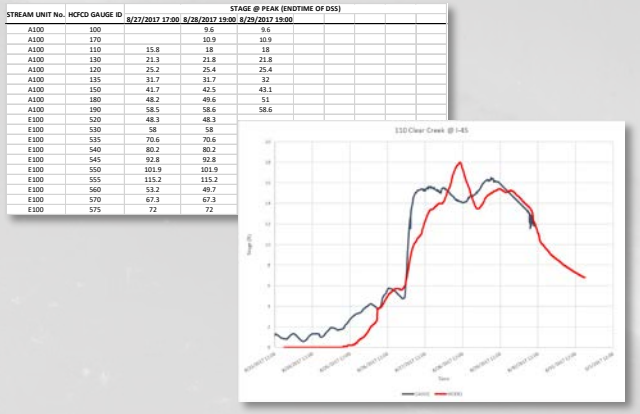
Data Pre-Processing



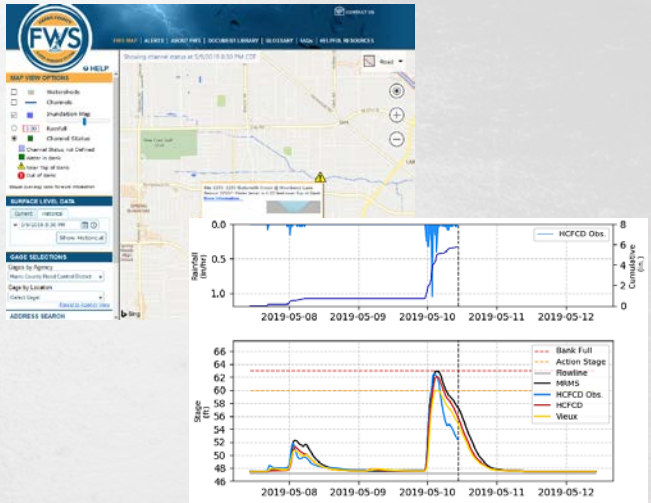
Run Forecast



Results Post-Processing



Review Results



OEM Partner Communication and Messaging

HARRIS COUNTY FLOOD CONTROL DISTRICT

NATIONAL WEATHER SERVICE

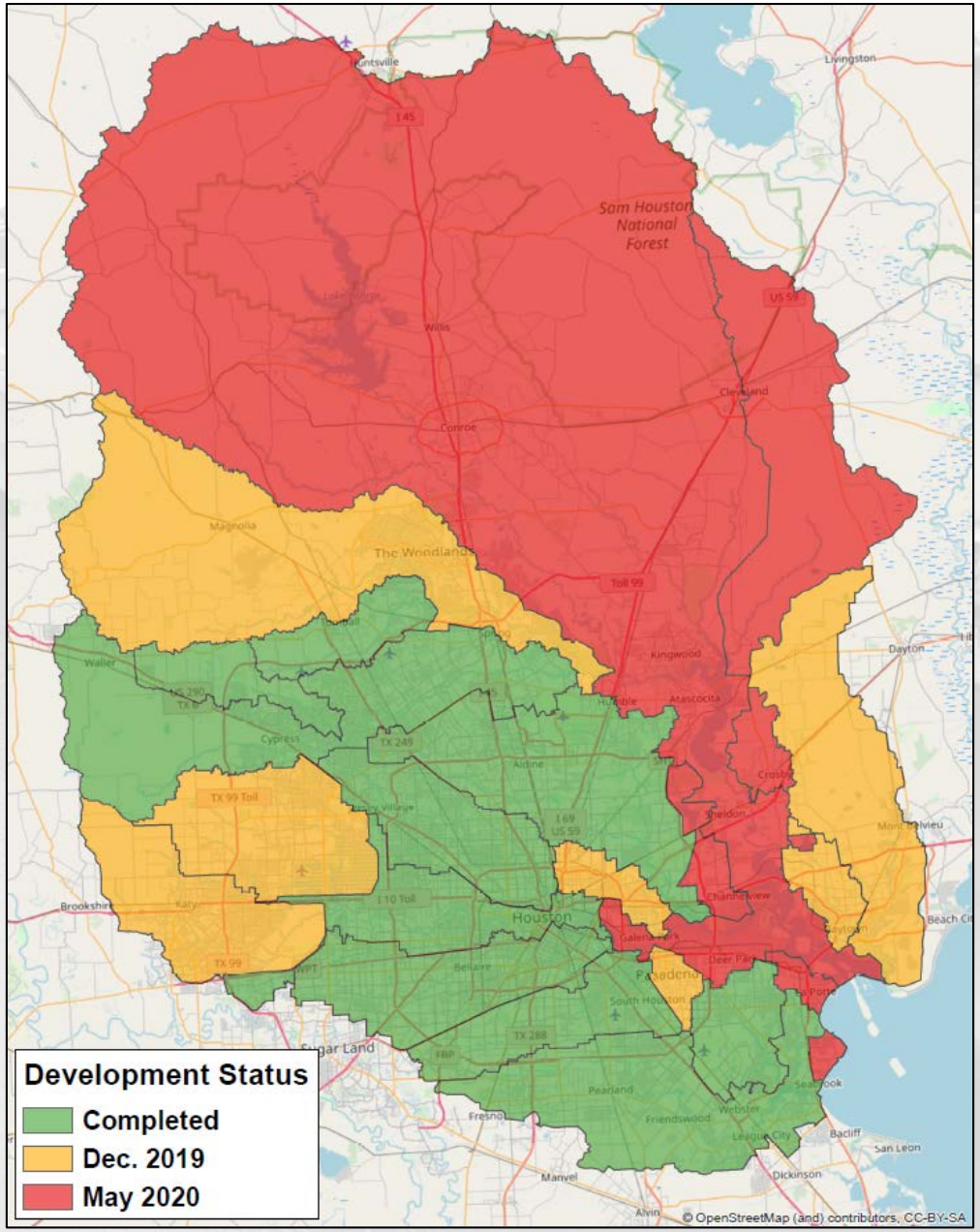
HARRIS COUNTY HOMELAND SECURITY & EMERGENCY MANAGEMENT TEXAS

Maintaining System Reliability

- Keep models current
- Incorporate new gauges
- Research and testing
- Calibration and validation of new events

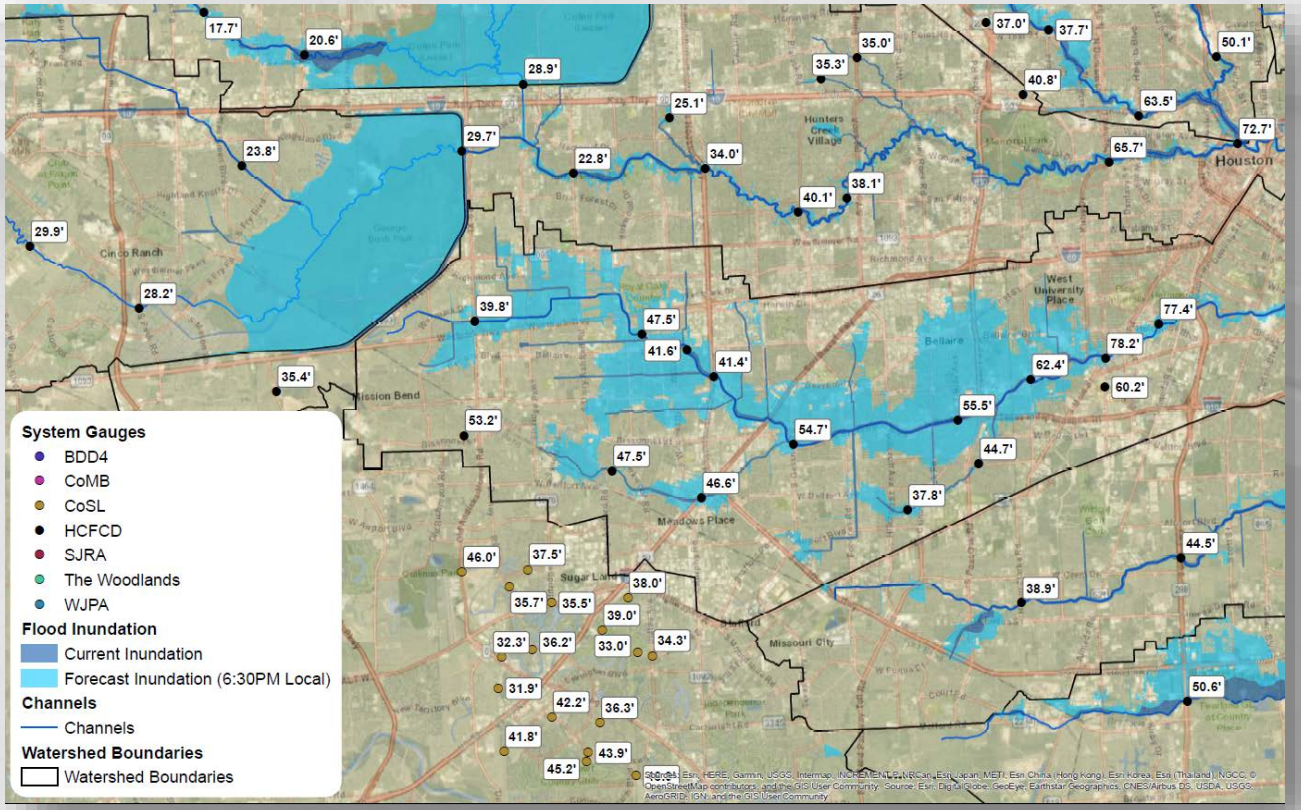
Development Progress

- Forecasting at 82 gauges
- Developing Watersheds
  - Completion May 2020
  - Expands forecasts to 177 gauges
- Forecast rainfall to improve short-term forecasting



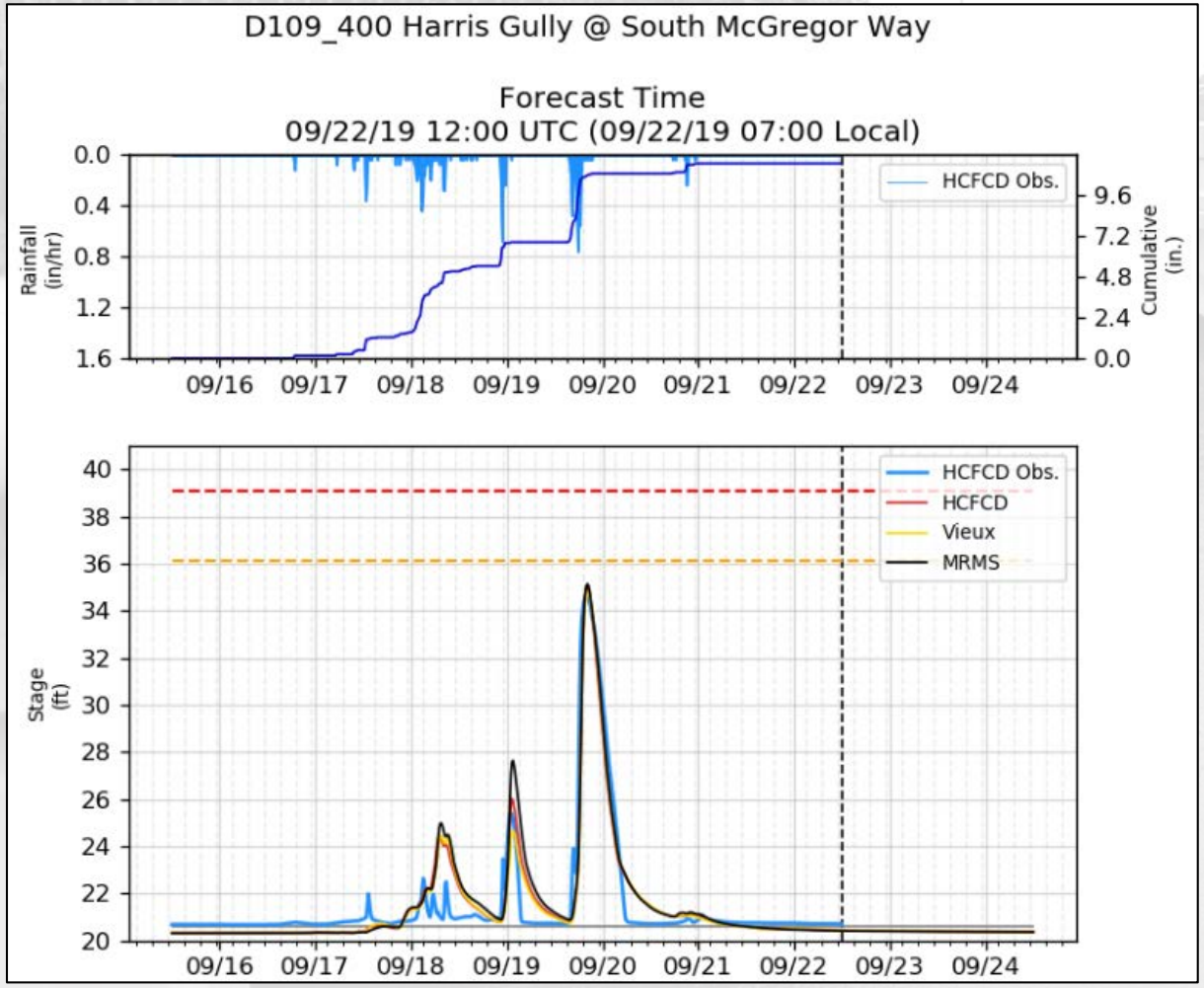
Future Additions

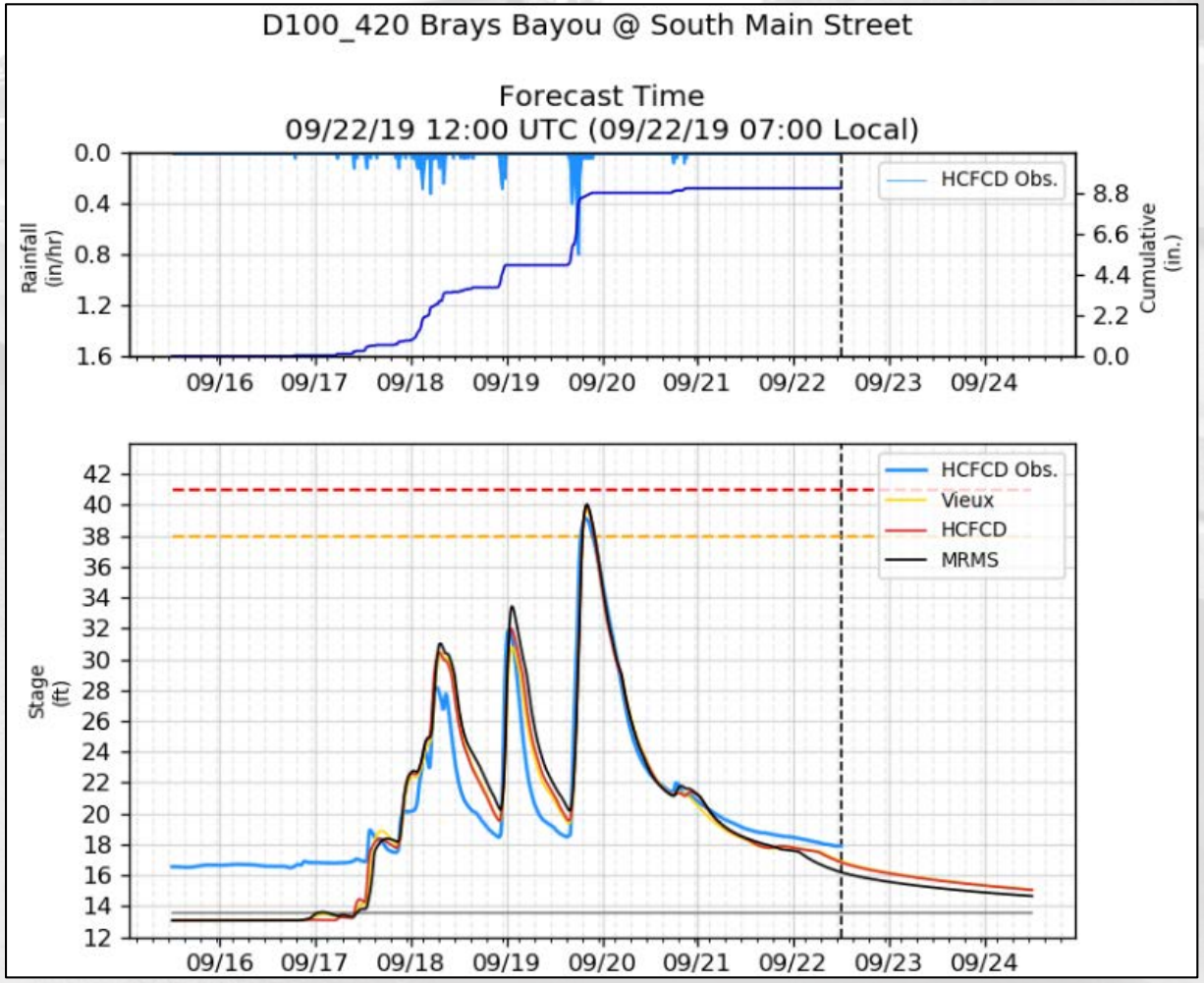
- Incorporate forecast rainfall products
- Forecast Dashboard
  - Support forecast operations and partner communication
- Forecast inundation mapping
- Integrate hydraulic models



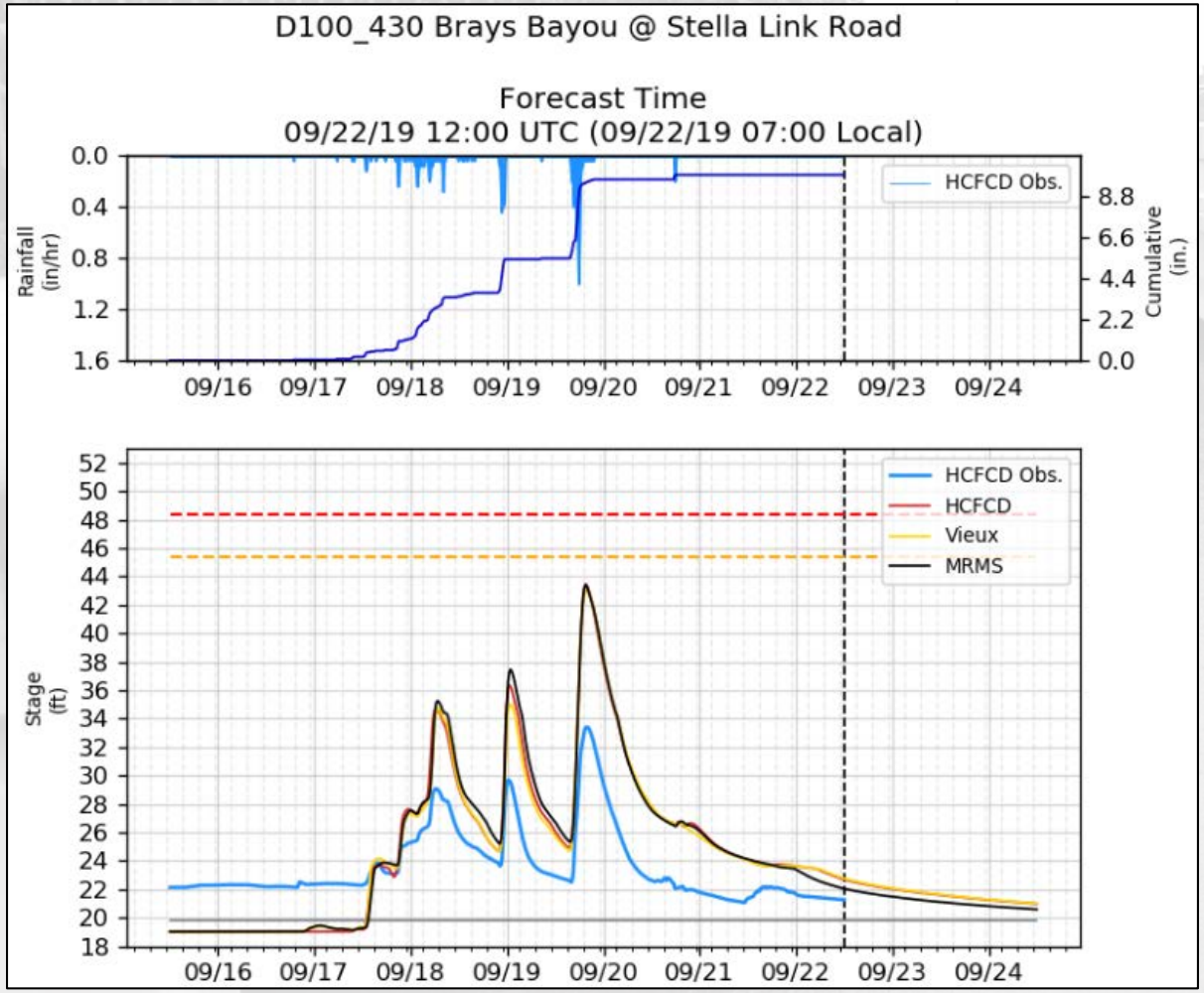
Tropical Storm Imelda

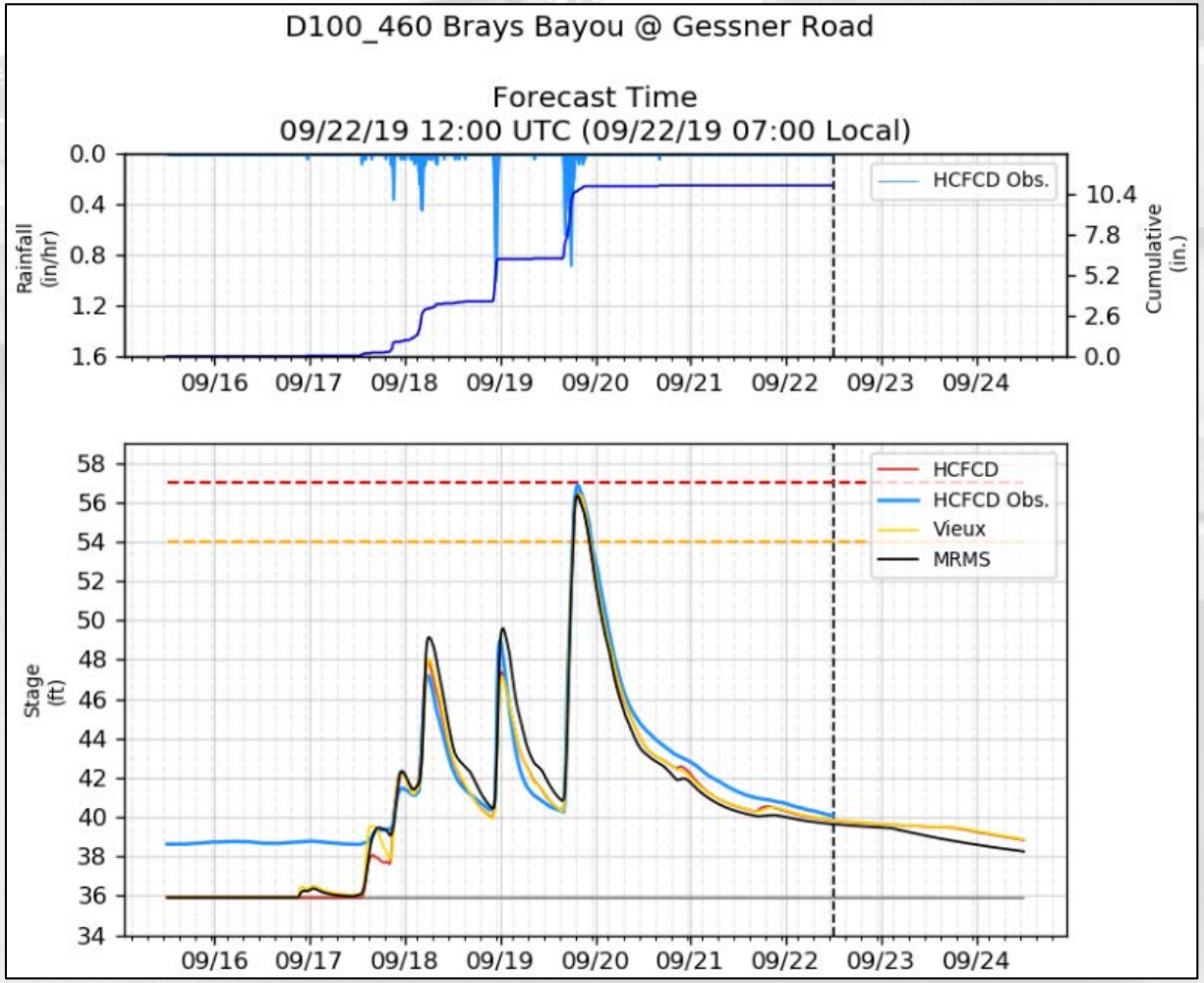
Brays Bayou – Harris Gully & South Main



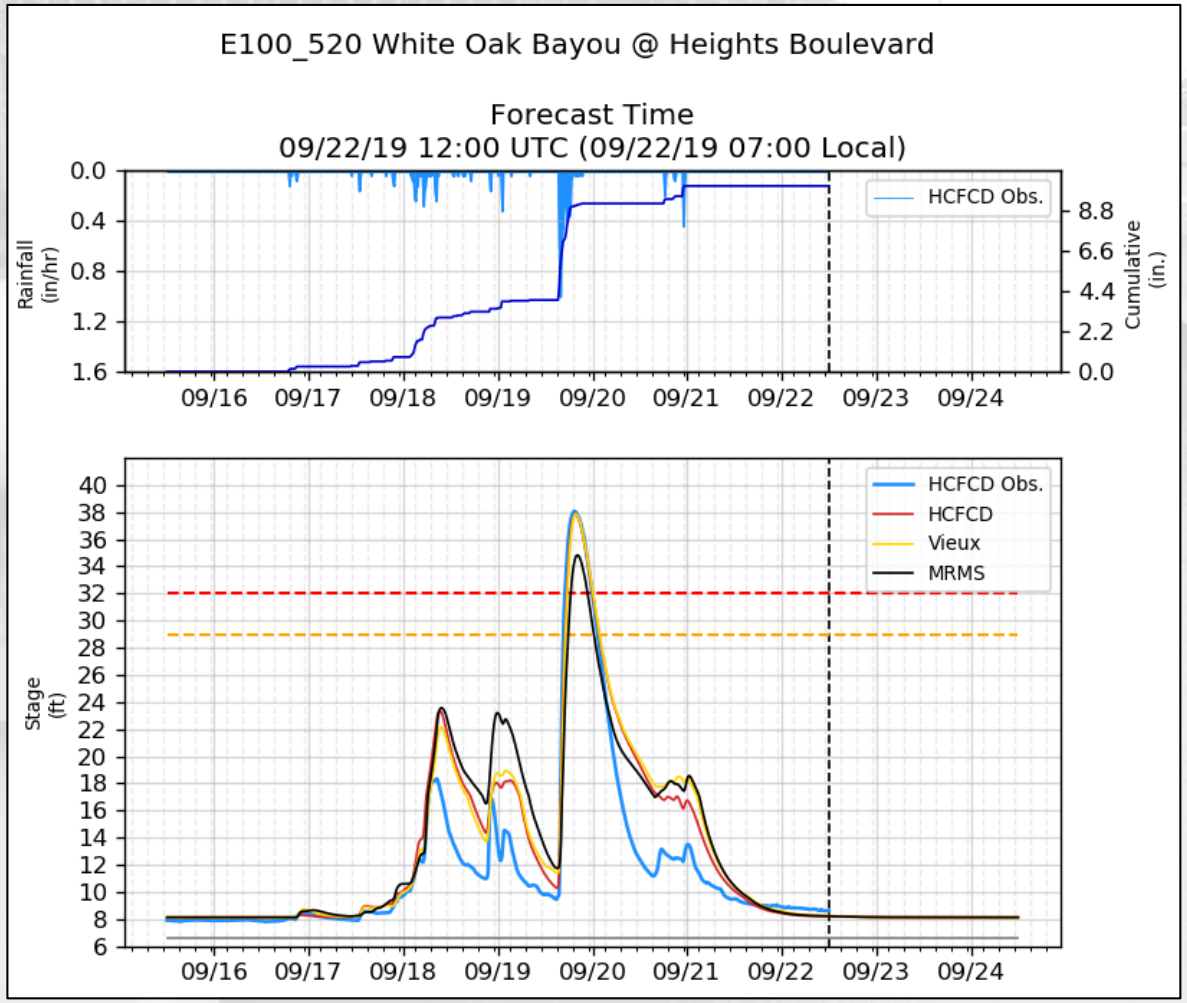


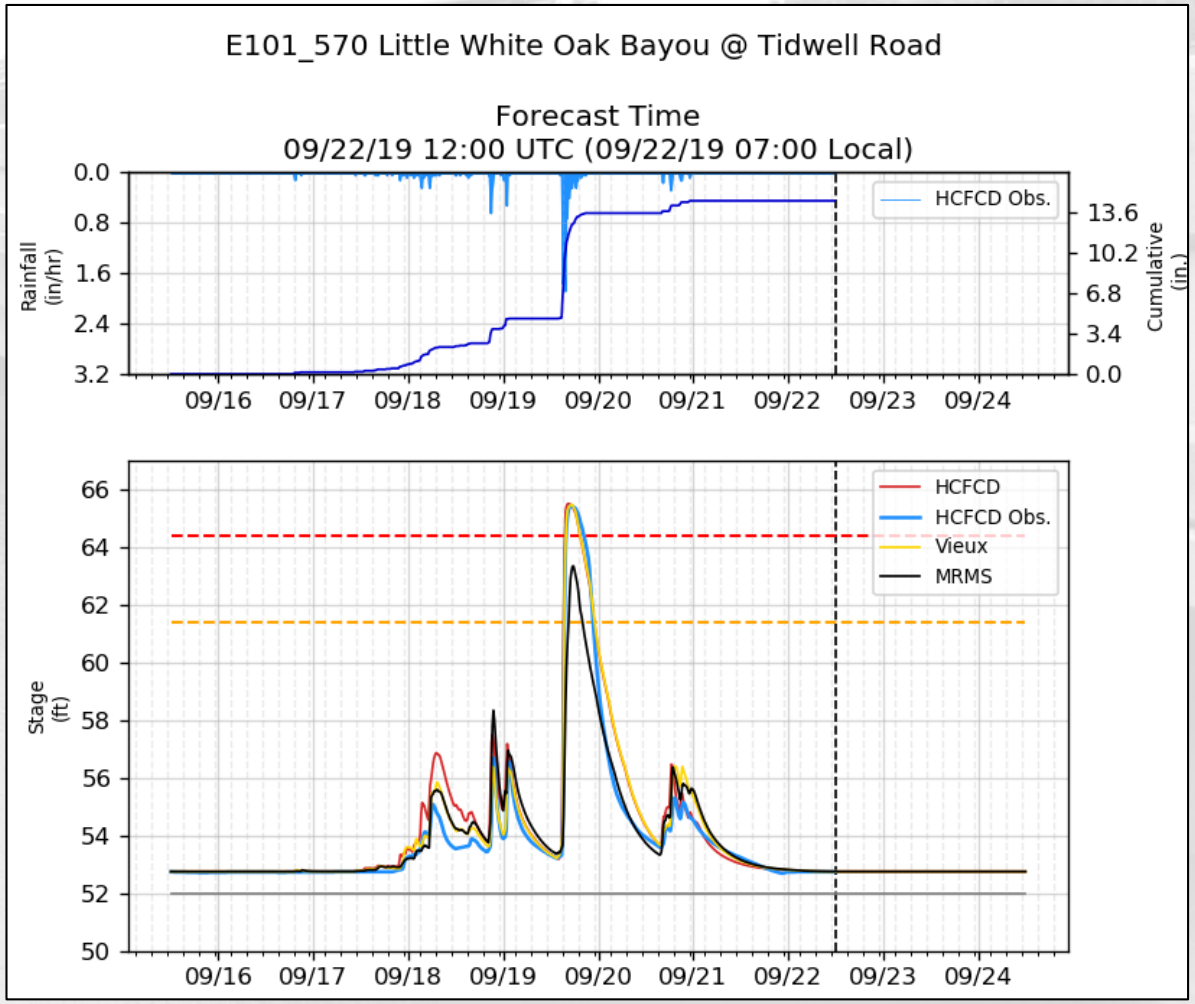
Brays Bayou – Stella Link & Gessner





White Oak Bayou - Heights & Tidwell






HARRIS COUNTY
FLOOD
CONTROL
DISTRICT
walter
p moore
NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE
NATIONAL WEATHER SERVICE
vieux
& ASSOCIATES
HDR
PAPE-DAWSON
ENGINEERS

Questions?

Justin Terry, PE, CFM
Flood Forecaster
Harris County Flood Control District
Justin.Terry@hcfcd.hctx.net
346-286-4060
Twitter: @justnlt

Jeff Lindner
Meteorologist
Director Hydrologic Operations Division
Harris County Flood Control District
Jeff.Lindner@hcfcd.hctx.net
Twitter: @JeffLindner1