

Hurricane Harvey

Jeff Lindner

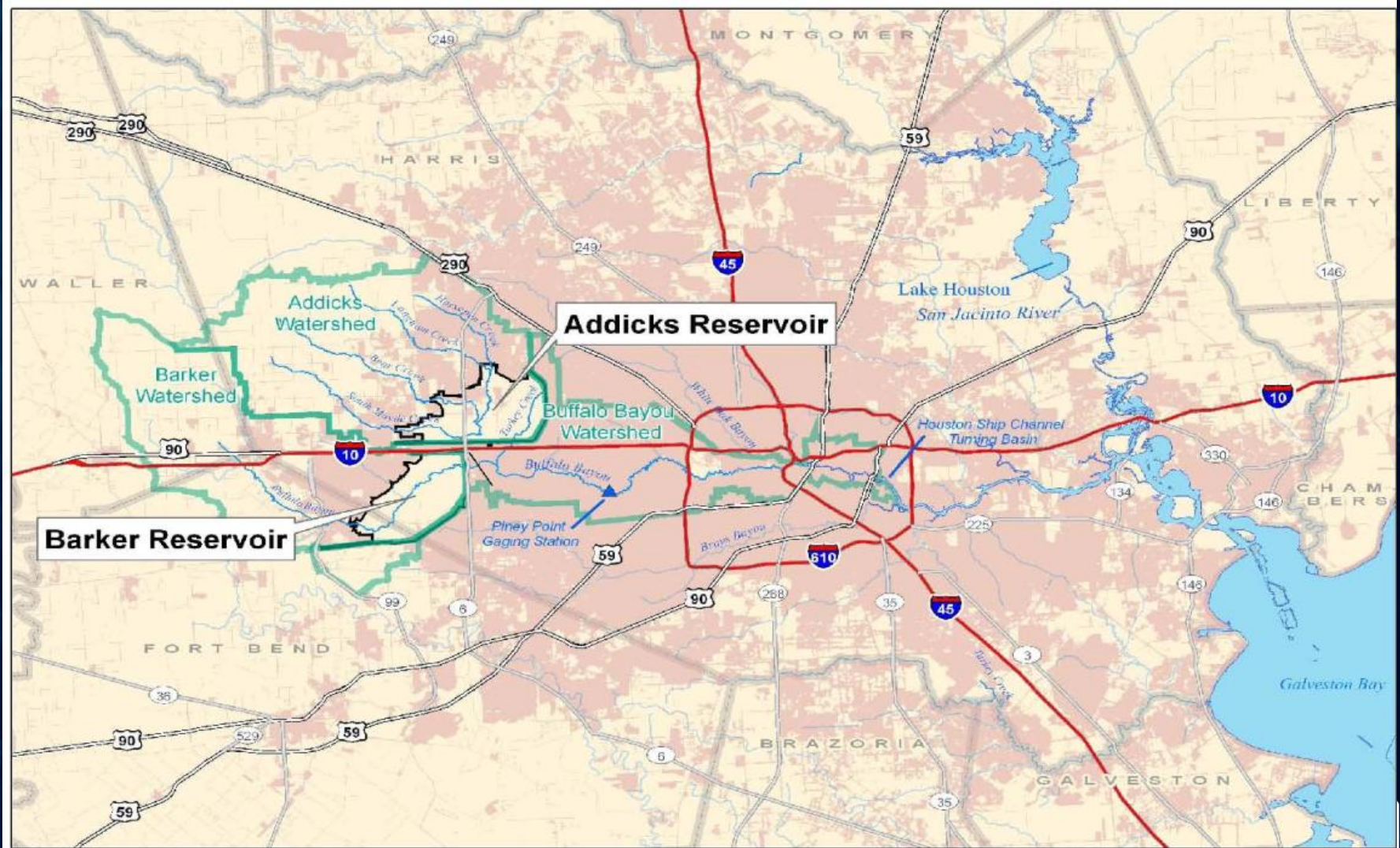
Meteorologist

Harris County Flood Control District

Harris County Watersheds



Addicks and Barker Watersheds



Hurricane Harvey Track



The Forecast

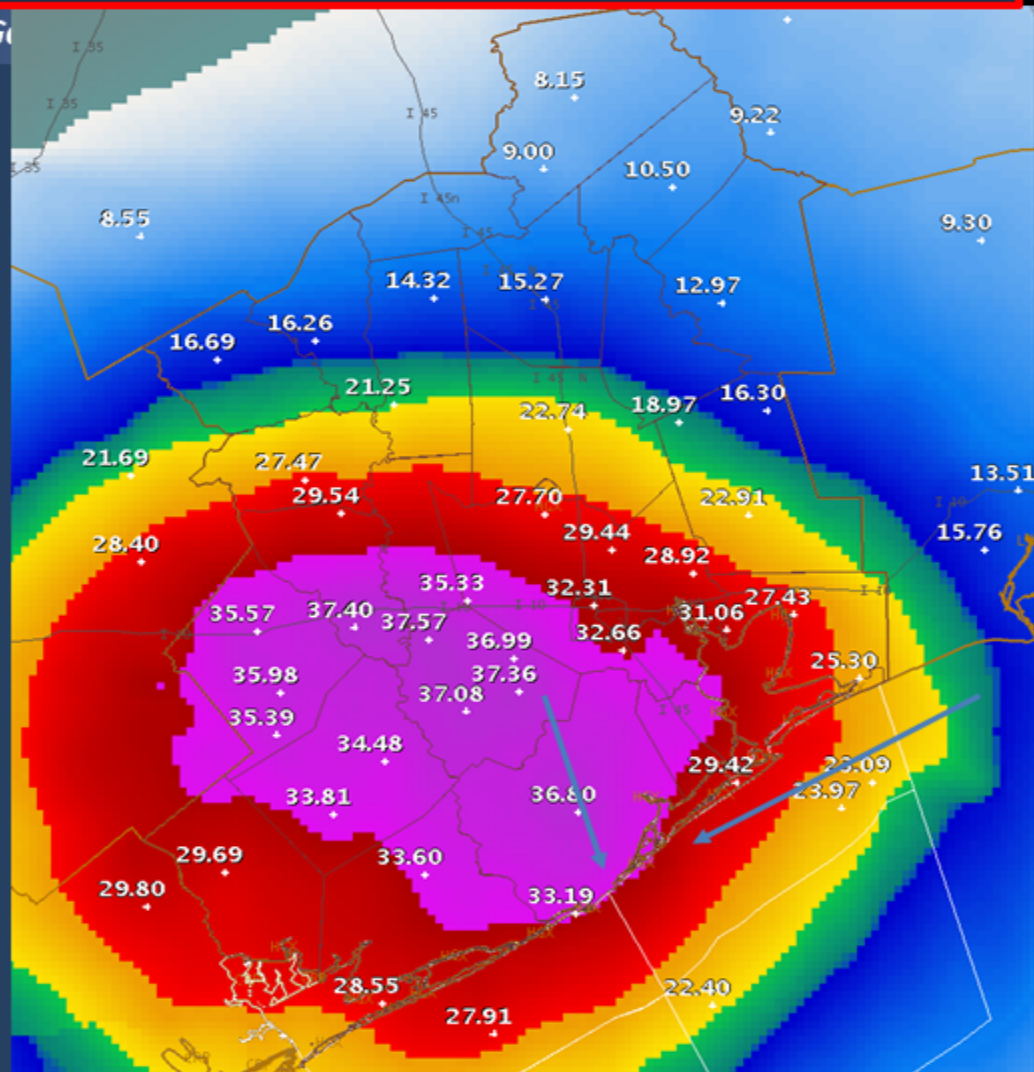


Catastrophic Flooding Expected

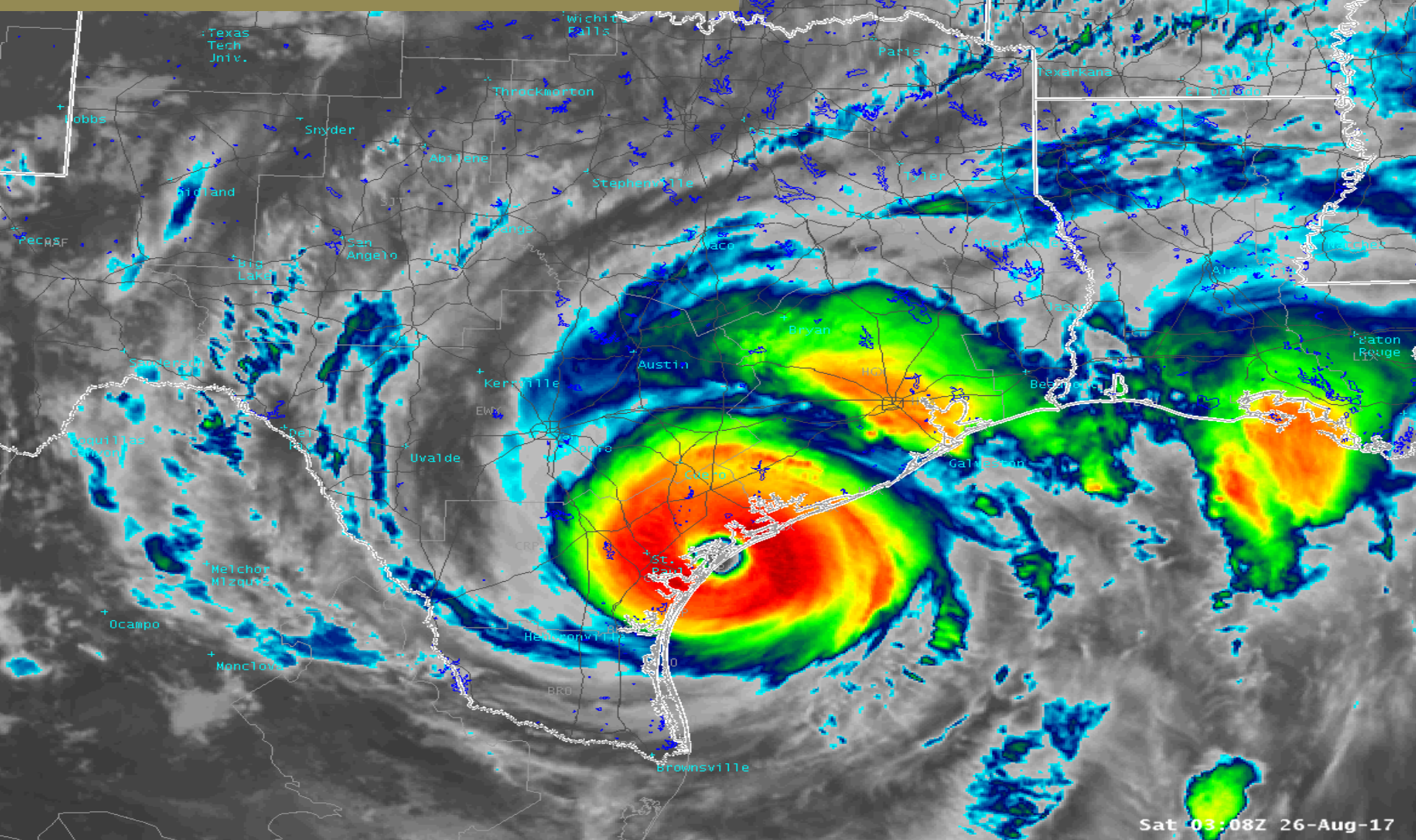
National Weather Service Houston/Galveston

Harvey is going to bring record setting rainfall to the region. Amounts of 10 to 20 inches will be common. Areas of 25 to 40 inches will cover portions of the area.

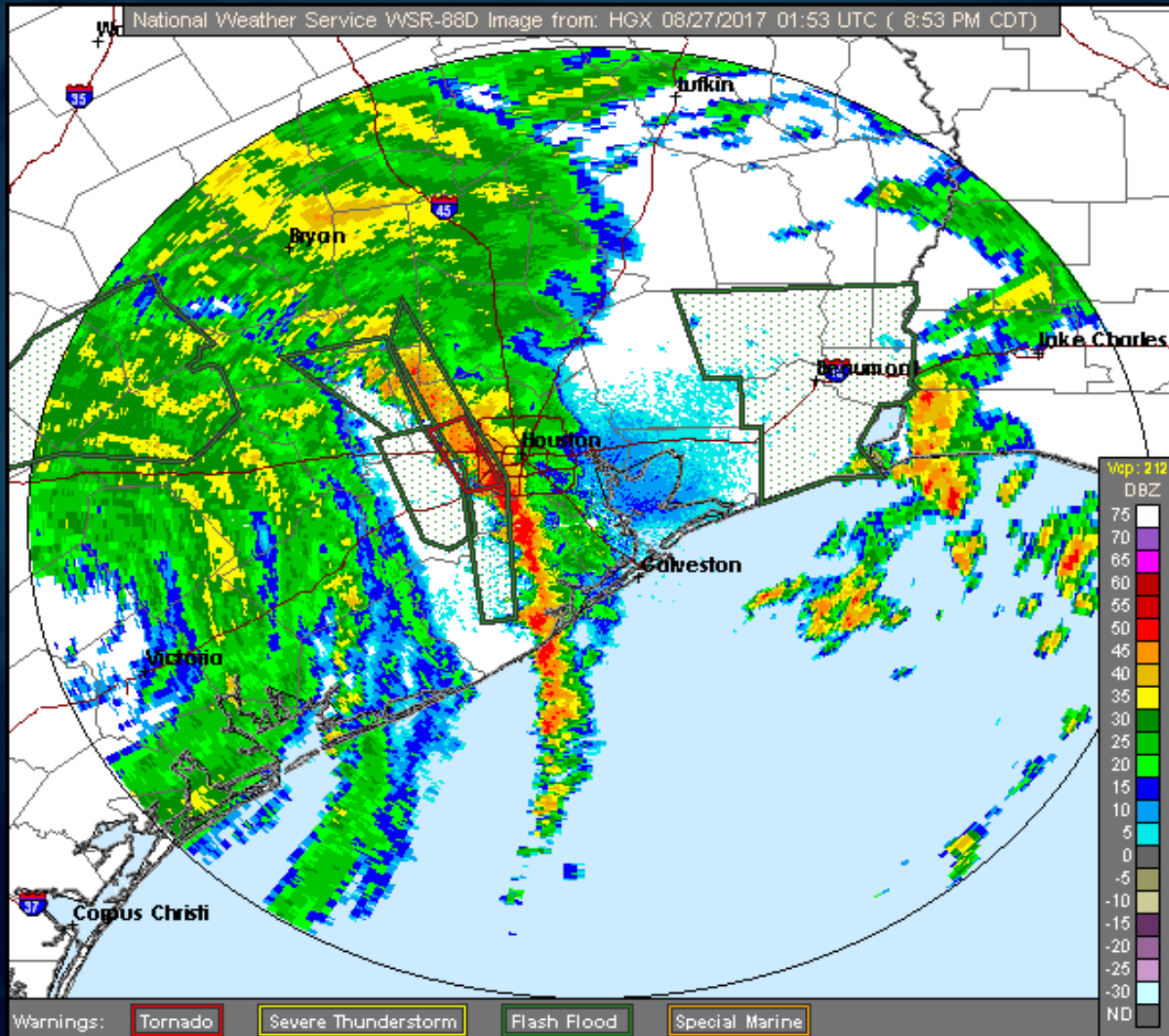
- This is storm total forecast
- Today through Wednesday.
- Torrential rainfall today through Monday with rain bands that anchor over areas.



Landfall near Port Aransas
10:00 p.m. August 25th
Category 4 (130mph)
First hurricane to strike TX since Ike (2008)



Intense Rainfall Begins (9:00pm) Sat



NWS/HCFCD/MEDIA: NWS Chat

[10:49:40]<water-jeff.d.lindner

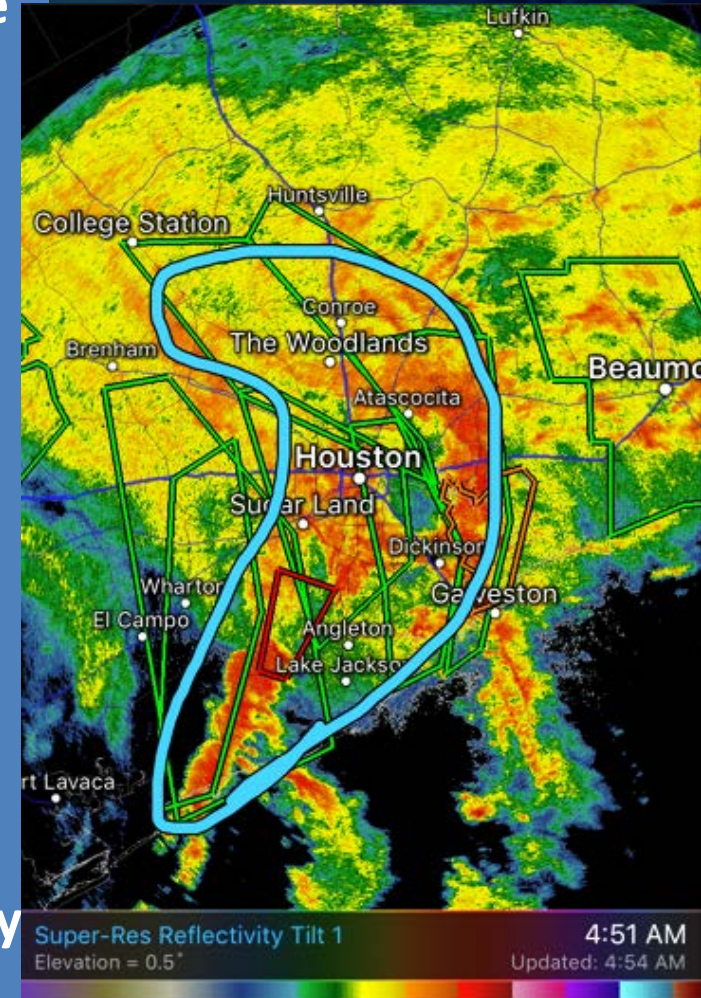
MEDIA/NWS: we need help getting this message out. Our message is for persons to not go into their attic, but instead get on the roof. Also if calling 911 stay on the line until it is answered

[10:53:21]<media-britta.merwin

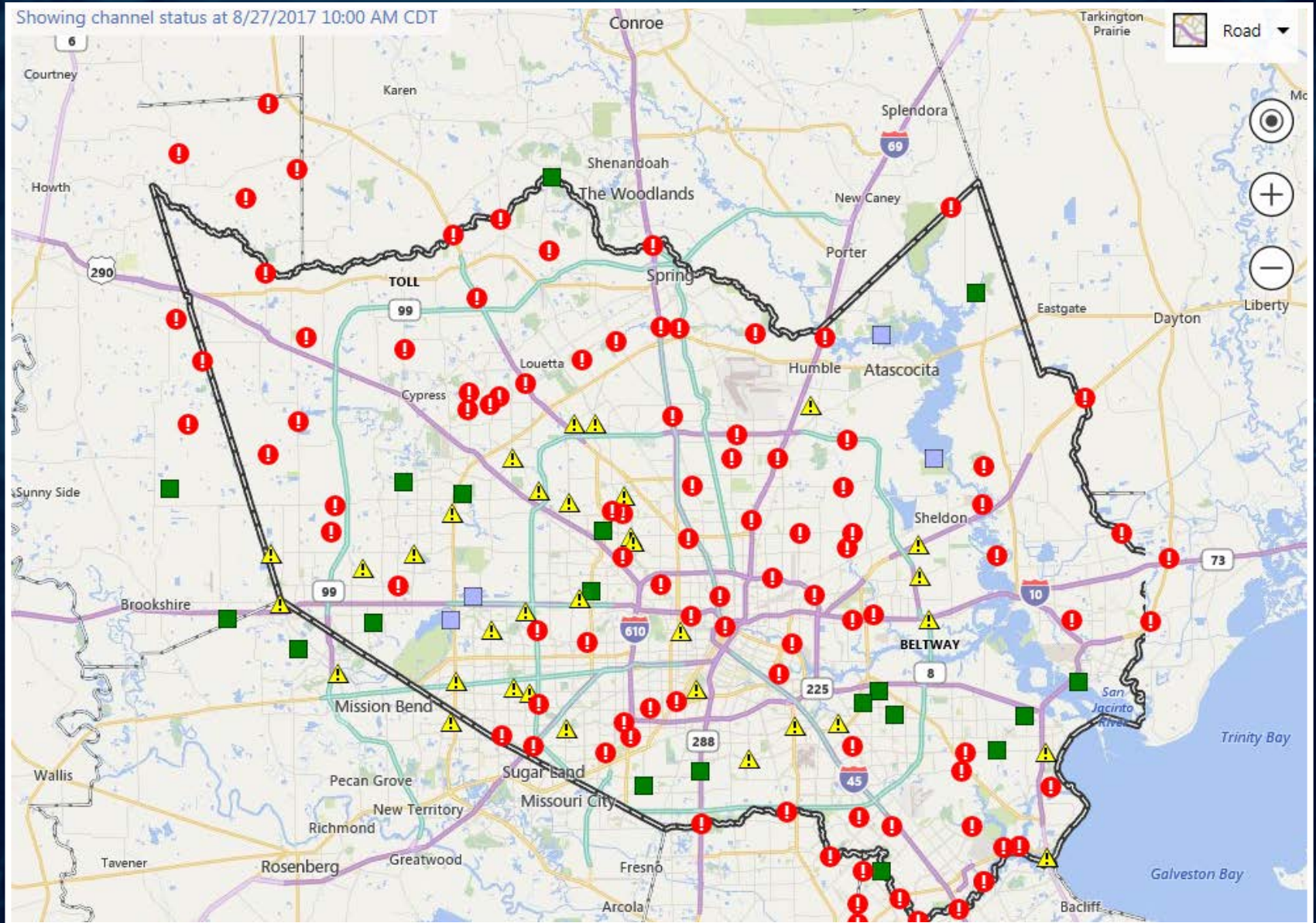
Thanks Jeff we just passed that along. To my knowledge there are 2 spots this is occurring/possible I-10 between the loop and beltway due to hunting bayou and then down along the gulf freeway

[10:53:55]<nws-molly.merrifield

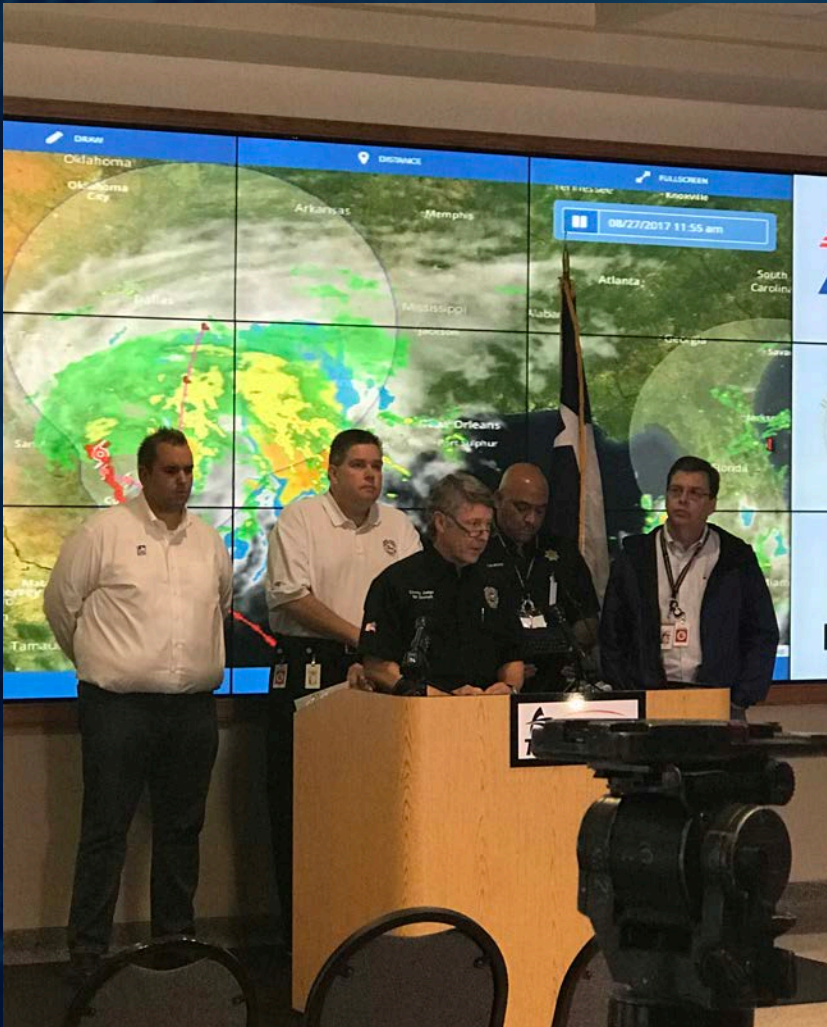
Britta- Also have reports of water in second story apartments in Dickinson



Widespread Catastrophic Flooding (1000am)



**I do not need to tell you how dire a situation we have
“every available rescue asset is deployed”**



**“If you have a boat,
we need your help”**
Harris County Judge Ed Emmett

**53,000 911 calls
in 15 hrs**

Adapt and Overcome



Hurricane Harvey - Rainfall

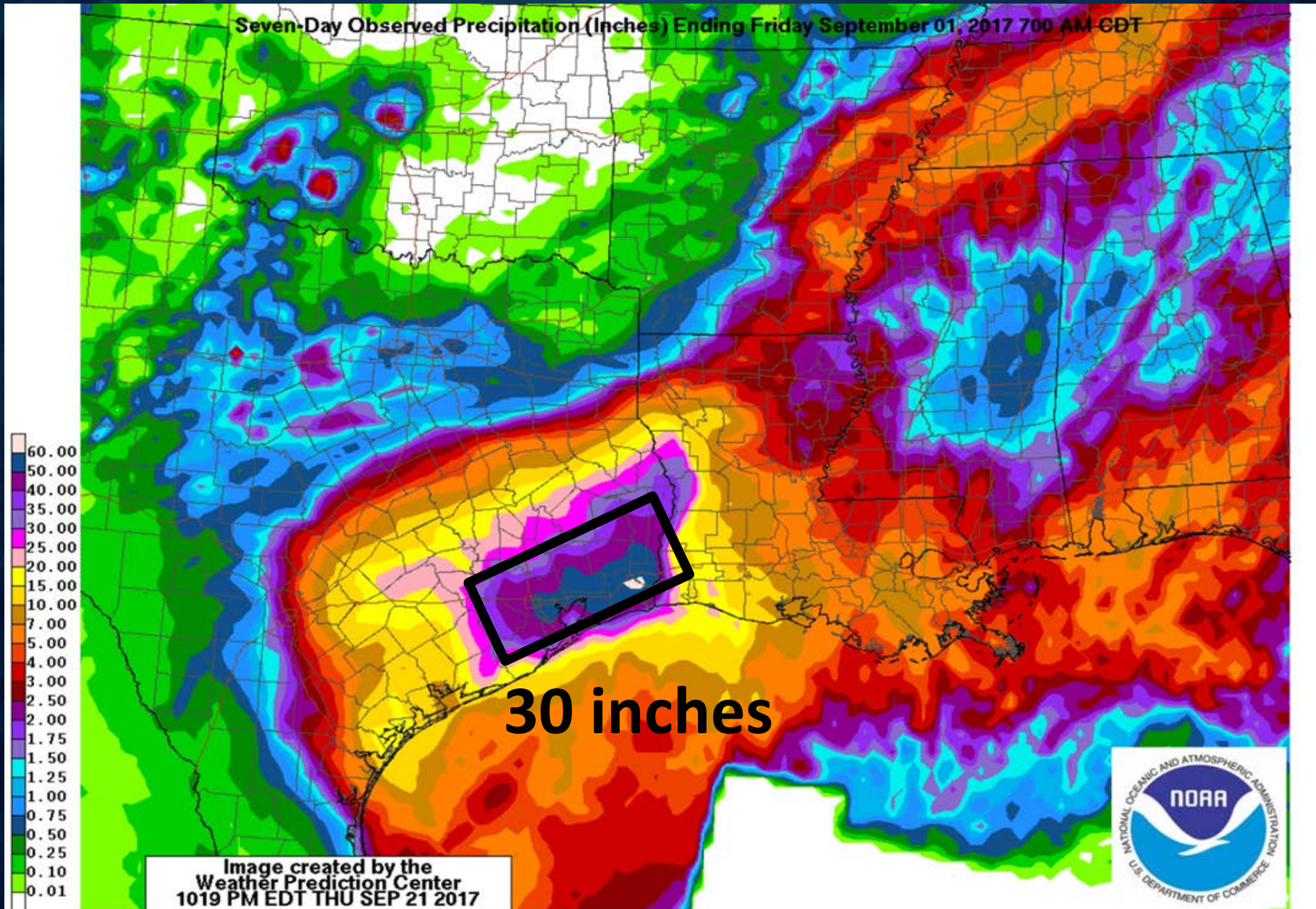
Duration	Max Rainfall	Duration	Max Rainfall
15-min	2.0	6-hr	18.9
30-min	3.6	12-hr	20.9
1-hr	6.8	24-hr	25.6
2-hr	11.9	2 day	34.6
3-hr	14.8	4 day	47.4

Location	Rainfall	Duration
Nederland (Jefferson Co)	60.58	5-day
N Groves (Jefferson Co)	60.54	5-day
Friendswood	56.00	5-day
Santa Fe	54.77	5-day
League City	52.87	5-day
Webster	52.30	5-day

Harvey Versus Other Major Floods

Duration	Harvey August 2017	Allison June 2001	Tax Day April 2016	October 1994
1-hr	6.8	5.7	4.7	3.7
2-hr	11.9	9.9	7.3	4.7
3-hr	14.8	13.5	8.3	5.3
6-hr	18.9	21.2	13.9	7.2
12-hr	20.9	28.3	16.7	12.0
24-hr	25.6	28.4	17.4	20.9
2 days	35.2	28.5	17.5	23.1
4 days	47.7	38.5	N/A	28.9

Harvey's Rainfall

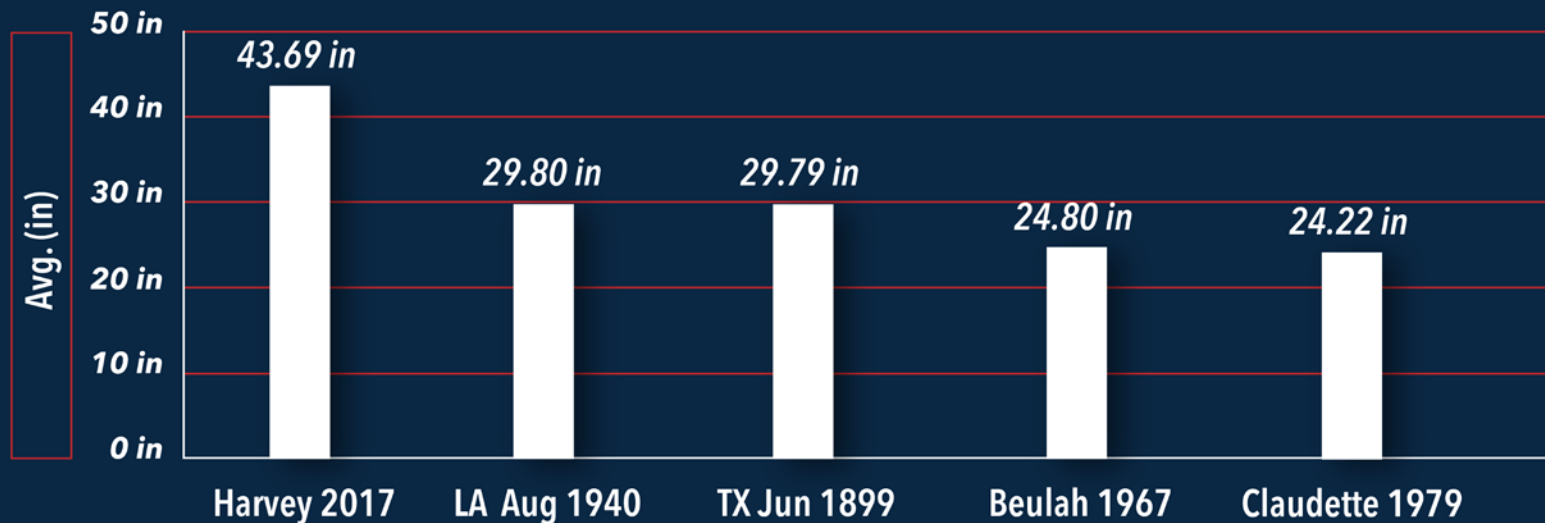


Max: 62.07 inches

Harvey Smashes US Rainfall Records

2,000
square miles

Duration: 120 h



TX State Climatologist

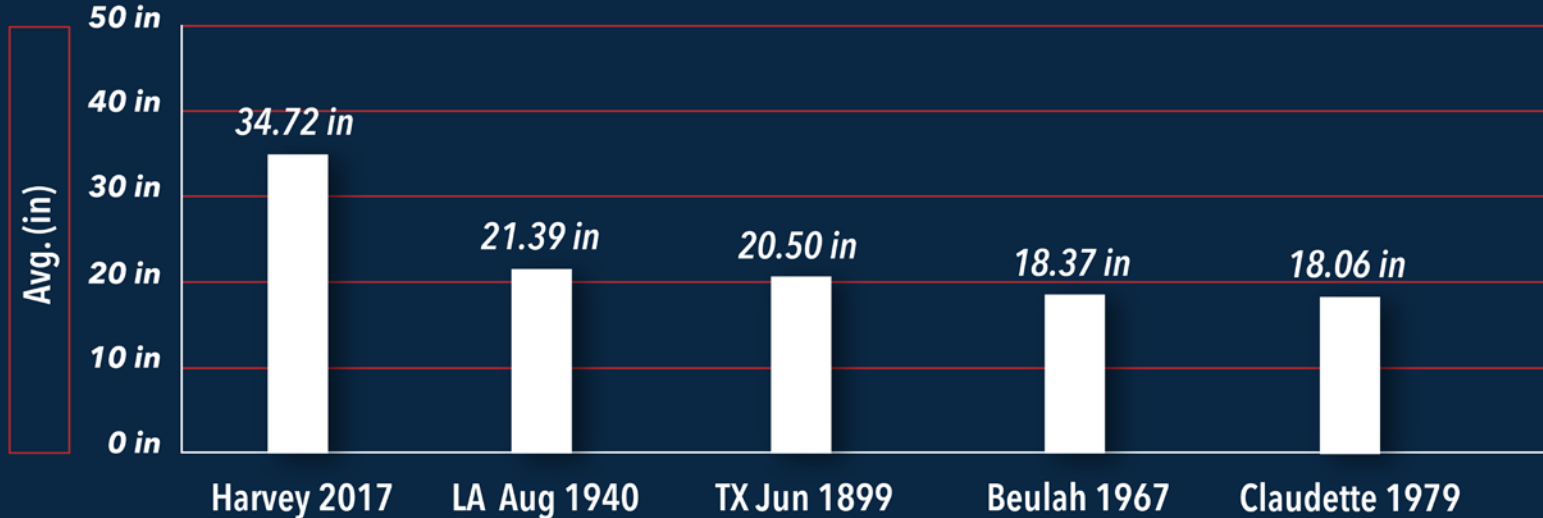
47% over previous record

- 1530 Billion gallons
- Fill Astrodome 4790 times
- Supply US water usage for 26 days

Harvey Smashes US Rainfall Records

10,000
square miles

Duration: 120 h



TX State Climatologist

62% over previous record

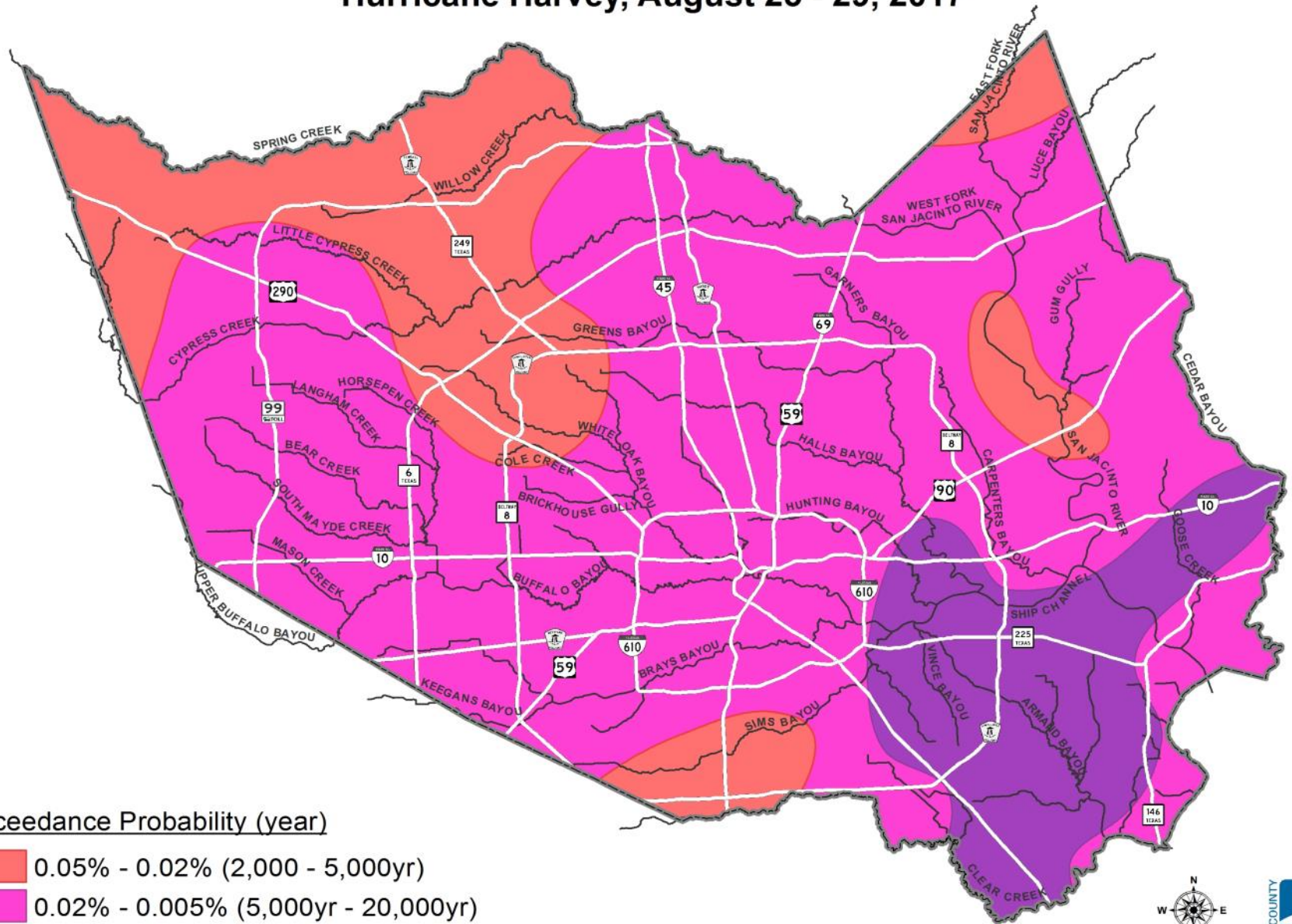
- 6 Trillion gallons of water
- Fill Lake Conroe 42 times
- Supply US water usage for 102 days

Harris County Rainfall Statistics

- **1 Trillion gallons of water over 4-days (1,777 sq mi)**
 - **Would run Niagara Falls for 15 days**
 - **Fill the Astrodome 3200 times**
- **33.7 inches average Harris County rainfall over 4 days**
 - **68% of Harris County yearly rainfall in 4 days**
 - **69% of PMP**
- **Max 4 day total: 47.40 in at Clear Creek at I-45**
 - **95% of PMP**

Four Day Peak Rainfall Frequency

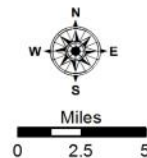
Hurricane Harvey, August 25 - 29, 2017



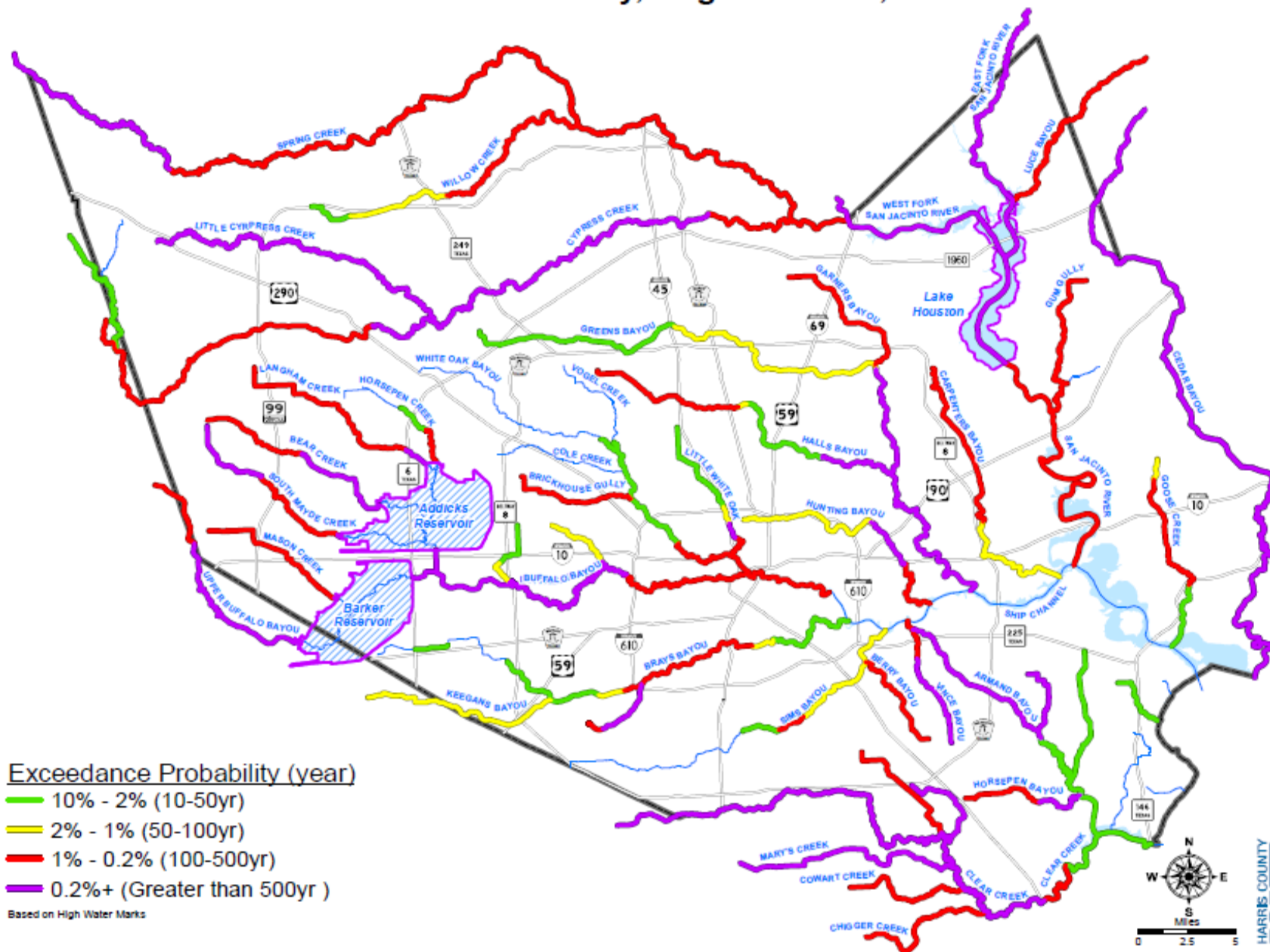
Exceedance Probability (year)

- 0.05% - 0.02% (2,000 - 5,000yr)
- 0.02% - 0.005% (5,000yr - 20,000yr)
- .005%+ (20,000yr+)

Based on HCFCF Rainfall Gages



Hurricane Harvey, August 25 - 29, 2017



Exceedance Probability (year)

10% - 2% (10-50yr)

== 2% - 1% (50-100yr)

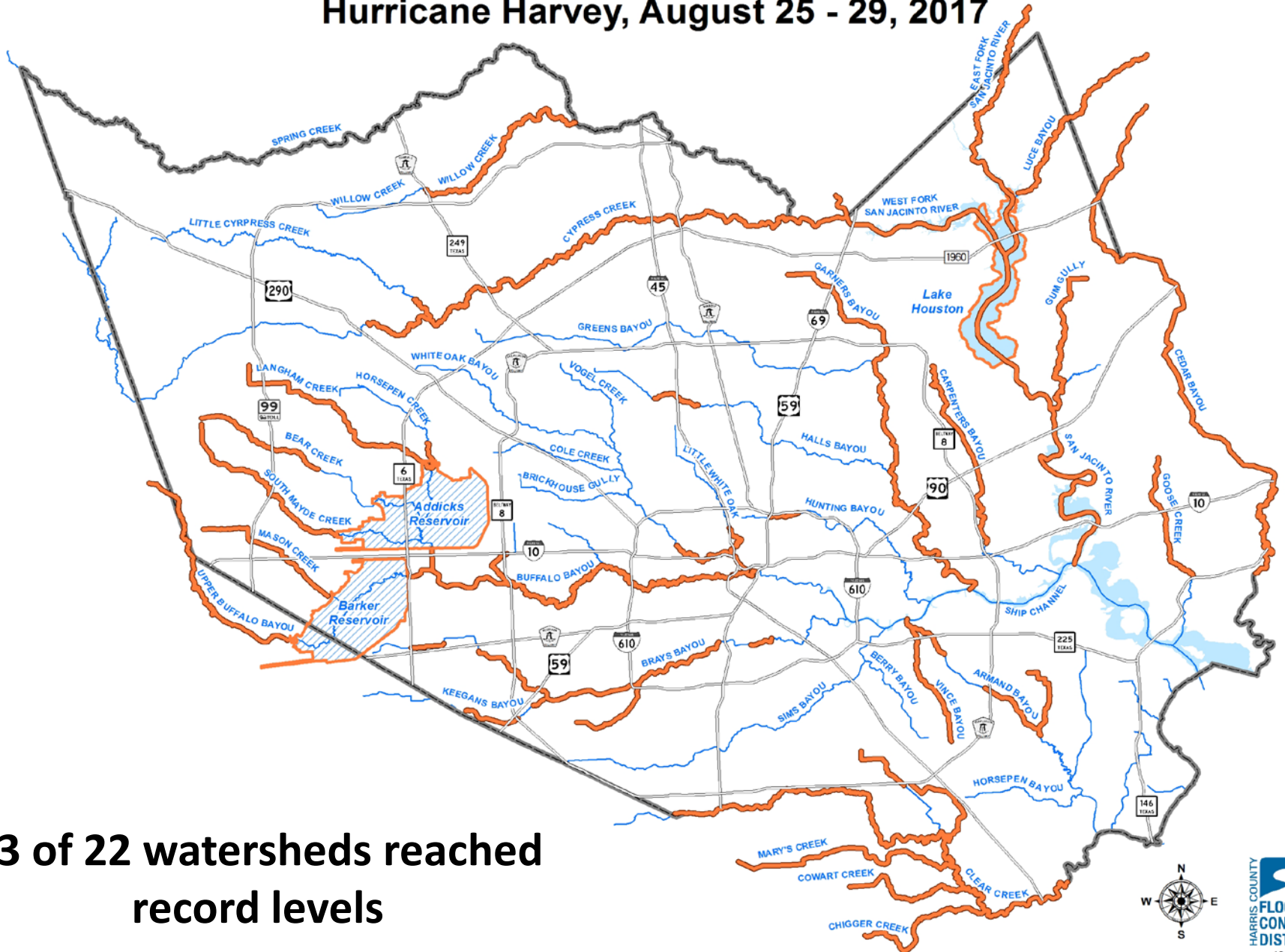
— 1% - 0.2% (100-500yr)

0.2%+ (Greater than 500yr)

Based on High Water Marks

Record Flood Levels

Hurricane Harvey, August 25 - 29, 2017



**13 of 22 watersheds reached
record levels**

Cypress Creek



Event Date	HWM
Harvey	97.0
Allison (01)	92.5
4/18/16	90.6
11/14/98	85.6
10/49	95.5



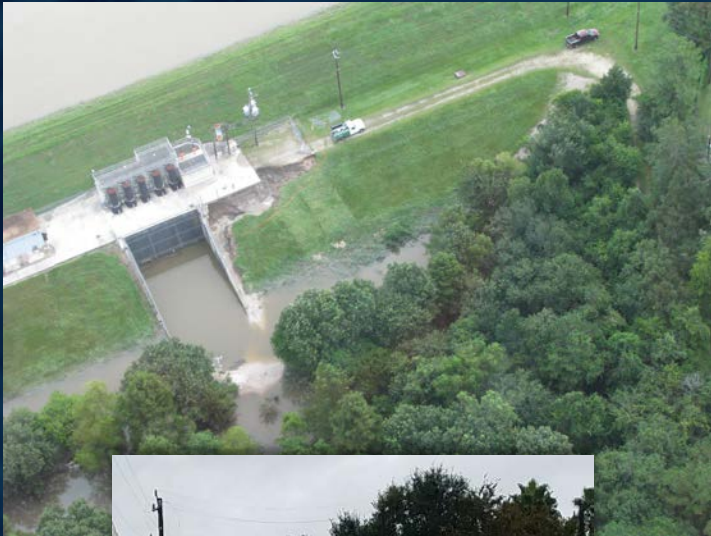
Inverness Forest Levee



Event Date	HWM
Harvey	92.1
Allison (01)	86.9
4/18/16	86.9
11/14/98	85.4
10/49	89.8



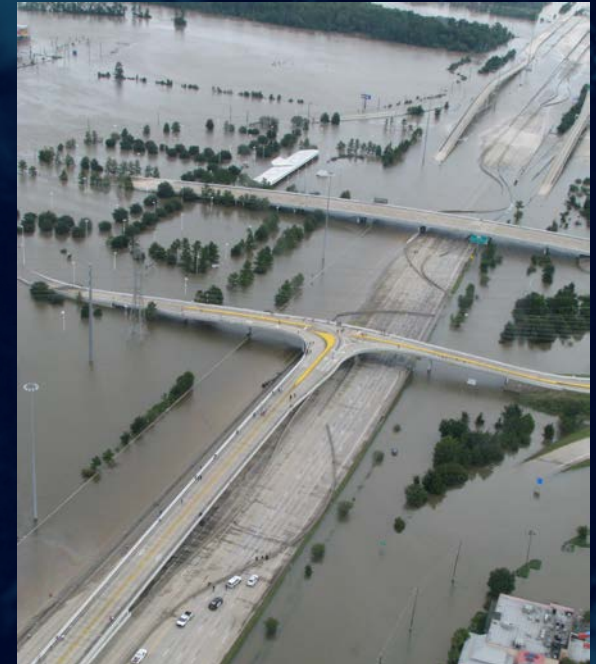
Inverness Forest Levee



W Fork San Jacinto River



Event Date	HWM
Harvey	69.6
5/27/16	61.9
4/18/16	57.5
Ike (08)	53.0
10/18/94	66.7



Clear Creek



Event Date	HWM
Harvey	16.6
Allison (01)	10.7
Ike (08)	11.0
Claudette (79)	16.9
4/18/09	9.5



Buffalo Bayou



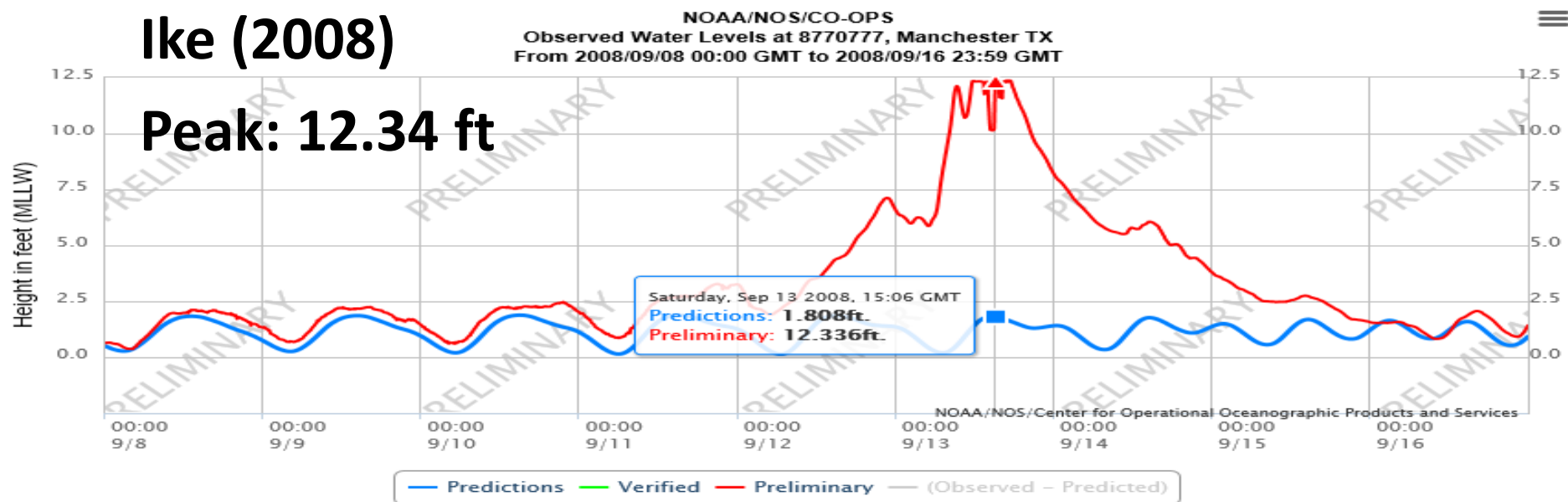
Event Date	HWM
Harvey	71.6
4/28/09	65.4
3/4/92	64.5
4/18/16	65.3
5/26/15	62.9



Houston Ship Channel

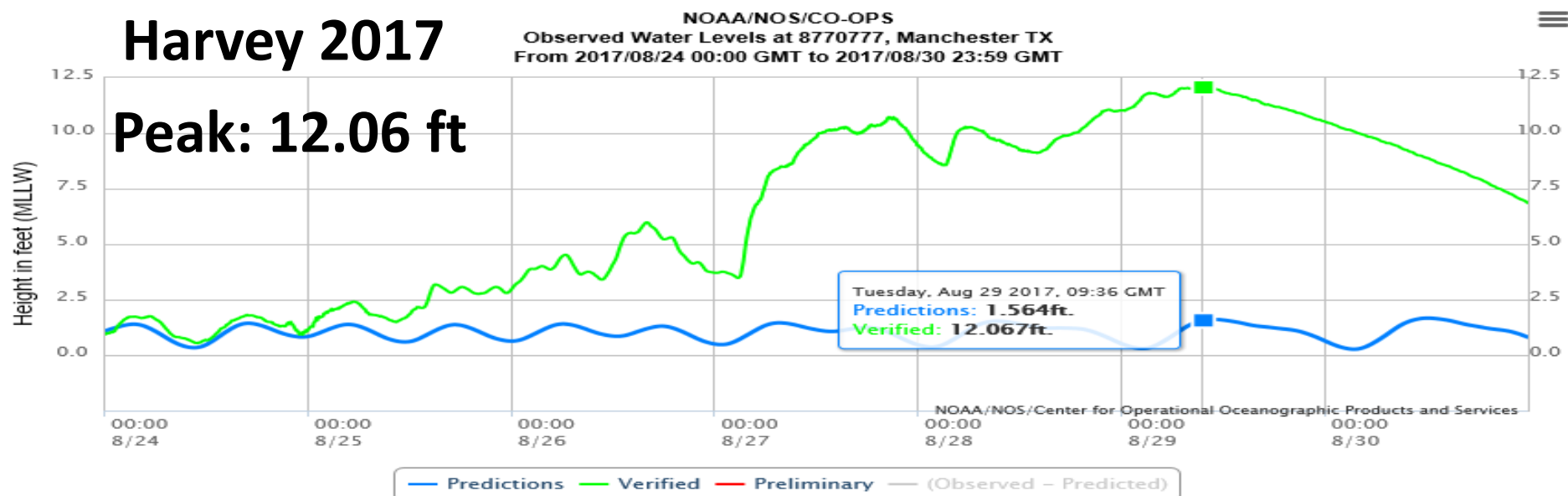
Ike (2008)

Peak: 12.34 ft



Harvey 2017

Peak: 12.06 ft



Addicks Reservoir

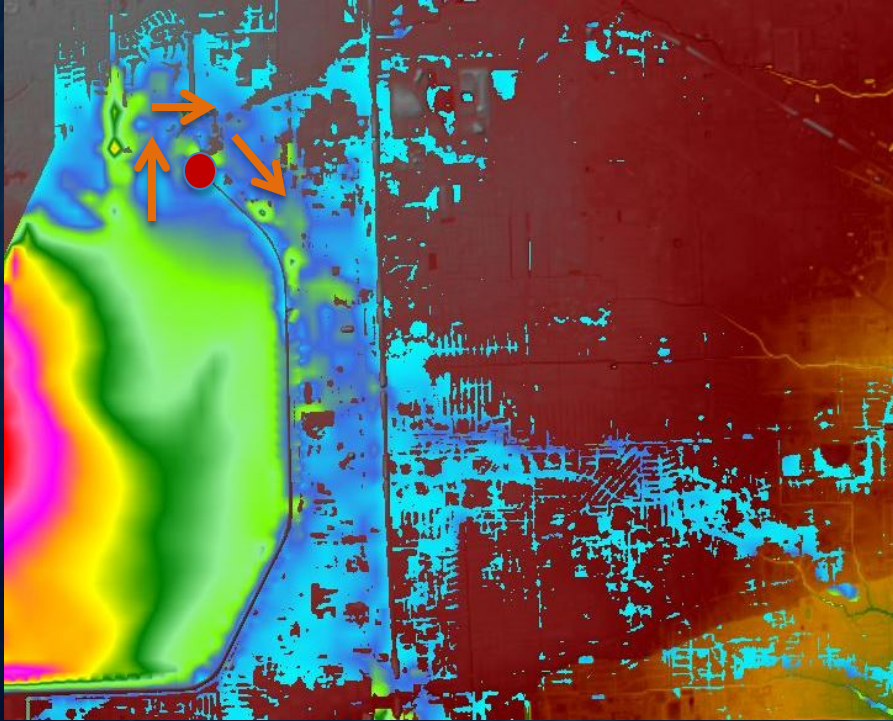


Top 5 Pools

Date	Elevation
Harvey	109.1
Apr 2016	102.65
Mar 1992	97.64
Apr 2009	97.08
Nov 2002	96.63



Addicks Reservoir N End Spillway



Barker Reservoir



Top 5 Pools

Date	Elevation
Harvey	101.6
Apr 2016	95.22
Mar 1992	93.60
Nov 2002	93.24
Nov 1998	92.31



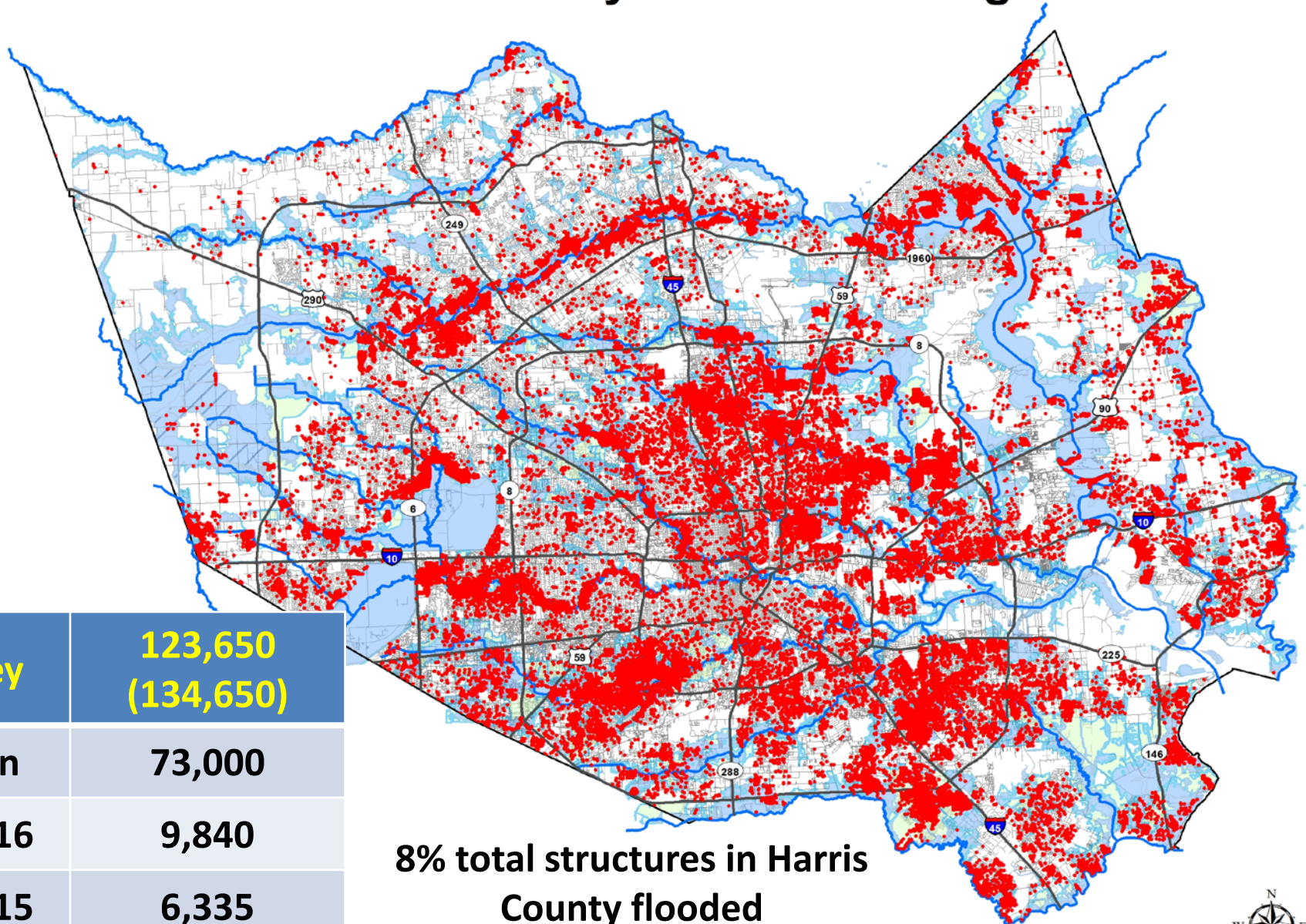
Damage



- 300,000 vehicles flooded (HC)
- Est. damages (125 B)
- 60,064+ persons rescued



Hurricane Harvey House Flooding



Harvey	123,650 (134,650)
Allison	73,000
4-18-16	9,840
5-25-15	6,335
6-19-06	3,370

8% total structures in Harris
County flooded
79,390 or 64% outside 1% floodplain



Jeff Lindner

713-684-4165

jeff.lindner@hcfcd.org
@jefflindner1