



2018 FloodWarn Training

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National Weather Service- Houston/Galveston, TX

Outline

Flooding Importance

Flooding Types and Causes

Flood Products

River Flooding

Partners

Flood Preparedness

Reporting Flooding

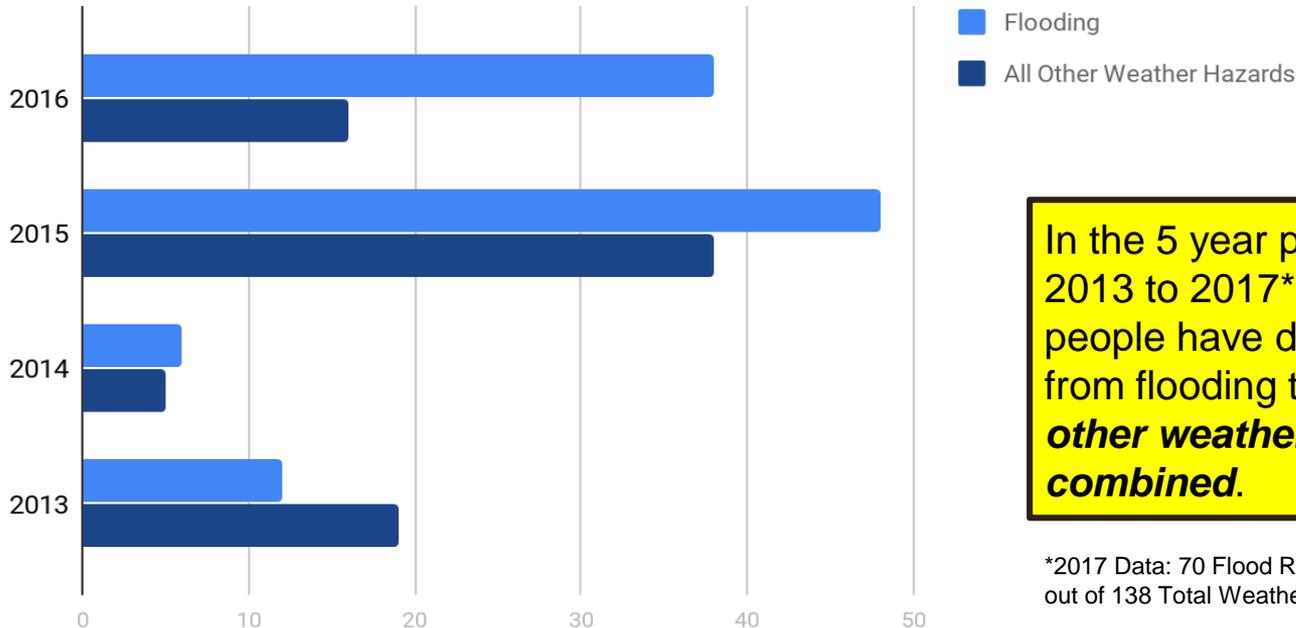




Flooding Importance

Flooding is Deadly!

Weather-Related Deaths in Texas

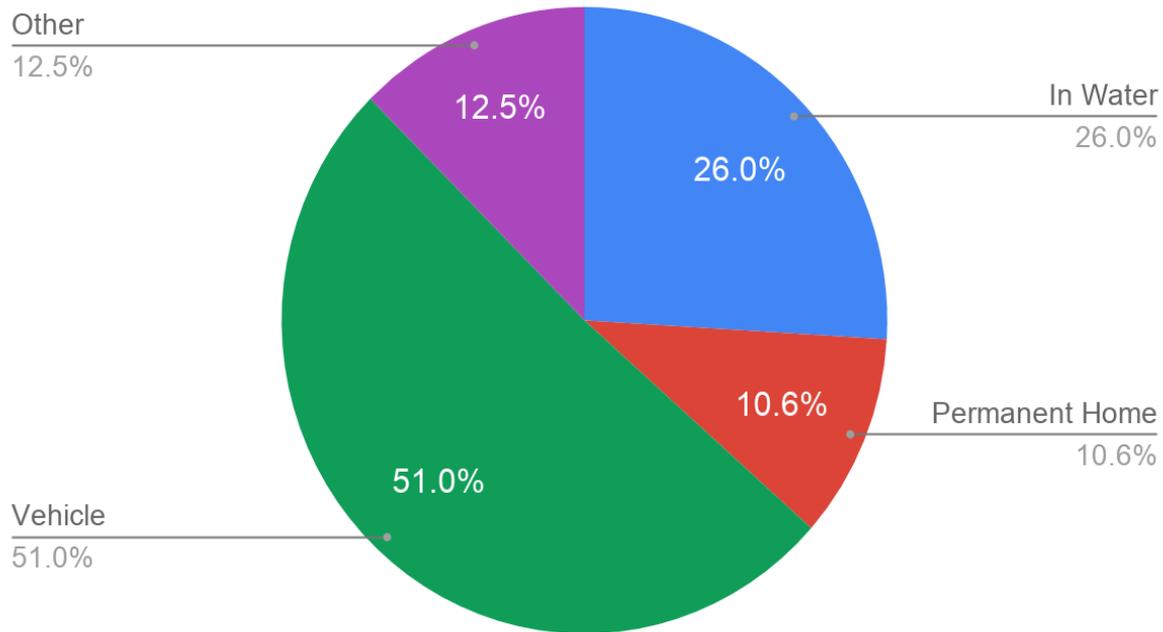


In the 5 year period from 2013 to 2017*, **more** people have died in Texas from flooding than ***all other weather hazards combined.***

*2017 Data: 70 Flood Related Deaths in TX out of 138 Total Weather-Related Fatalities

Flood Fatalities

Texas Flood Fatalities by Shelter from 2013-2016



Over half of the flood fatalities in Texas occurred while people were in their car.

Houston Floods: April 18, 2016



Recent Big Floods...

Memorial Day 2015

Tax Day 2016

Brenham 2016

Harvey 2017



Harvey 2017



Brenham 2016



Tax Day 2016

And other historic floods...

Tropical Storm Allison

1994 Flood

Tropical Storm Claudette



Flooding Types and Causes

What Causes Flooding?

- Intense rainfall
- Rain over several days
- Dam/levee failures
- High tides or storm surge
- Snowmelt
- Ice or debris jams



Types of Flooding

Ponding & Sheet Flow Flooding

Flooding that occurs gradually over time, usually 6 hours after the rain begins or longer (longer duration)

Flash Flooding

Flooding that develops quickly (typically 6 hours or less) either from heavy rainfall or dam/levee failure (shorter duration).

River Flooding

Flooding that occurs from water escaping river banks.

Coastal Flooding

Flooding along a coastline either from high tides or storm surge during a tropical storm or hurricane



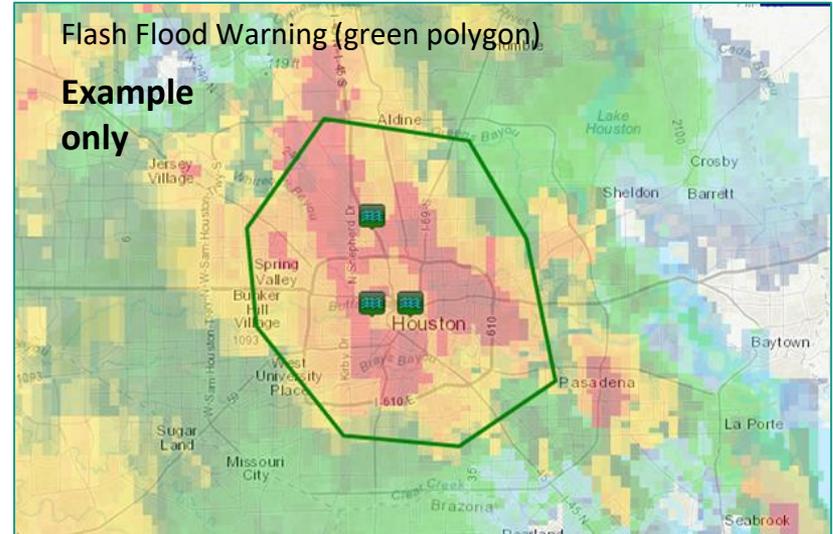
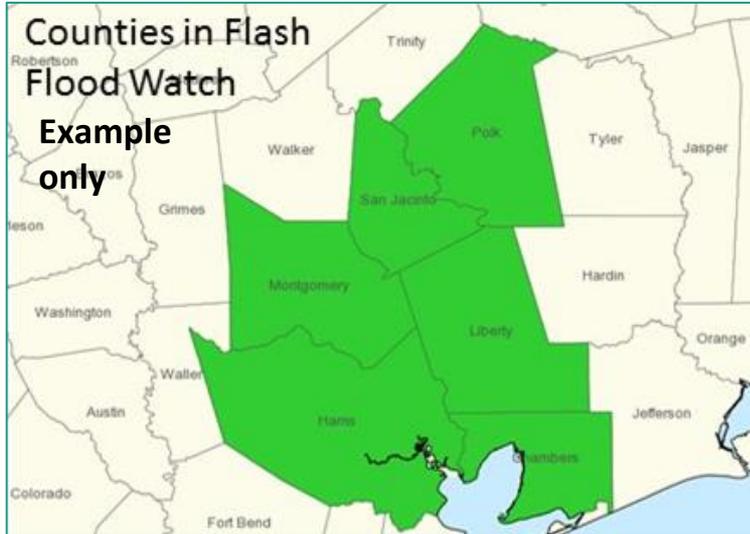


Flood Products

Watch vs Warning

A **Watch** is issued when conditions are favorable to occur.

A **Warning** is issued when the threat is *occurring or imminent*, threatening life or property.



Flood vs. Flash Flood

A **Flood** is an overflow of water onto normally dry land likely caused by rising water in a river/bayou or poor drainage. Flooding is a longer term event than flash flooding. It may last days or weeks.

A **Flash Flood** is a flood caused by heavy or excessive rainfall in a short period of time, typically 6 hours or less. Flash floods are defined as:

- ≥ 3 feet of standing water (less if threatening life or property), and/or

- ≥ 6 inches of fast flowing water across a road or bridge, or

- Water in a stream or bayou flowing rapidly out of its banks, or

- A dam break (even on a sunny day)

Understanding Flooding

Urban / Small Stream Advisory

WHAT IS IT?

Flooding of small streams, streets and low-lying areas.

WHAT TO DO?

Stay away from areas that are prone to flooding and stay clear of rapidly moving water

Flood Watch

WHAT IS IT?

Flooding is possible – typically within a 6 to 48 hours before rain is expected to reach the area.

WHAT TO DO?

Stay tuned to local river forecasts; prepare for areas near rivers to spread towards nearby roads and buildings

Flash Flood Watch

WHAT IS IT?

Flash flooding is possible – typically 6 to 48 hours before rain is expected to reach the area.

WHAT TO DO?

Have a way to receive local warnings, expect hazardous travel conditions and have alternate routes available

Flood Warning

WHAT IS IT?

Flooding impacts are occurring or imminent.

WHAT TO DO?

Stay *alert* for inundated roadways and follow all local signage! Additional impacts include homes and structures could become flooded and need to be evacuated

Flash Flood Warning

WHAT IS IT?

Flash flooding impacts are occurring or imminent.

WHAT TO DO?

Conditions will *rapidly* become hazardous! Do not cross flooded roadways or approach inundated areas as water may still be rising

Flash Flood Emergency

WHAT IS IT?

Flash flood situation that presents a clear threat to human life due to extremely dangerous flooding conditions

WHAT TO DO?
Immediately reach higher ground by any means possible

Urban /
Small
Stream
Flood
Advisory



This image depicts what conditions may look like during a flood advisory.

Flash
Flood
Warning



This image depicts what conditions may look like during a Flash Flood Warning.

Flash Flood Emergency

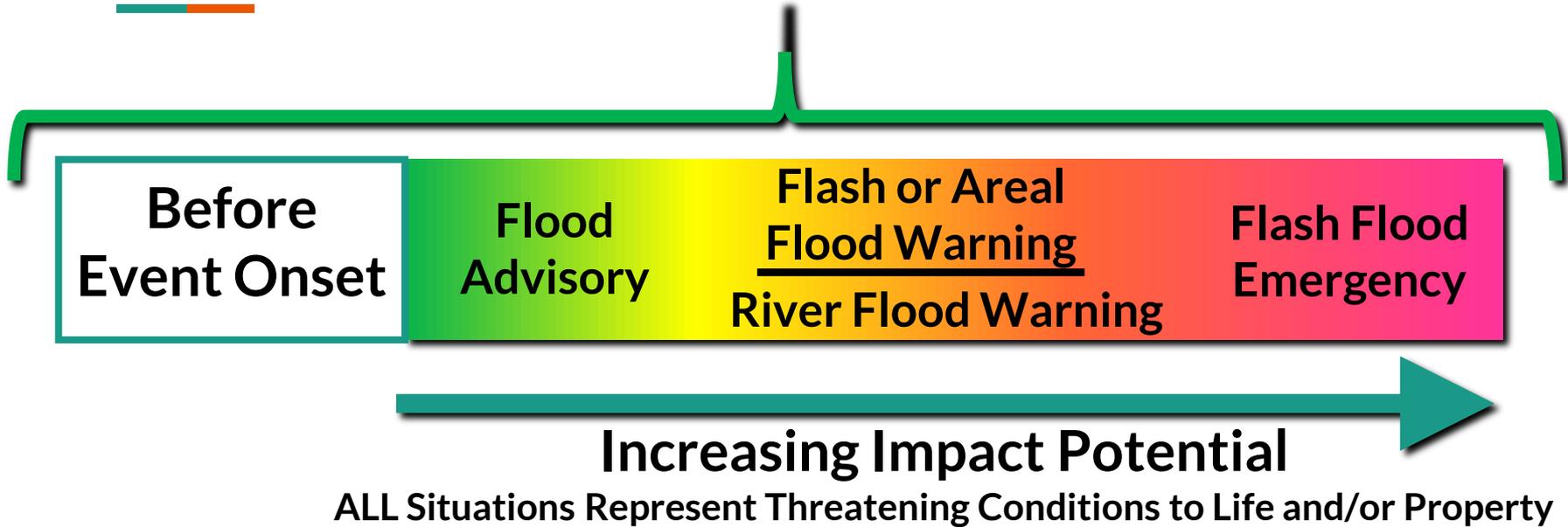


This image depicts what impacts may result from a Flash Flood Emergency. A rapidly moving flood wave resulted in this roadway being completely washed out.


**Flood
Warning
(Areal/
River/
Bayou)**



Flood Timeline



Note: Flooding can (and does) occur without a Flash Flood Watch!

Be sure to have multiple ways to receive warnings.

Ways to Receive a Warning

NOAA Weather Radio



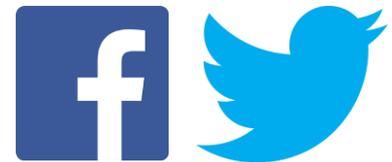
Wireless Emergency Alerts and Weather Apps



TV and Radio



Social Media



NWS Website: <https://www.weather.gov/hgx/>



River Flooding

Llano River Flooding



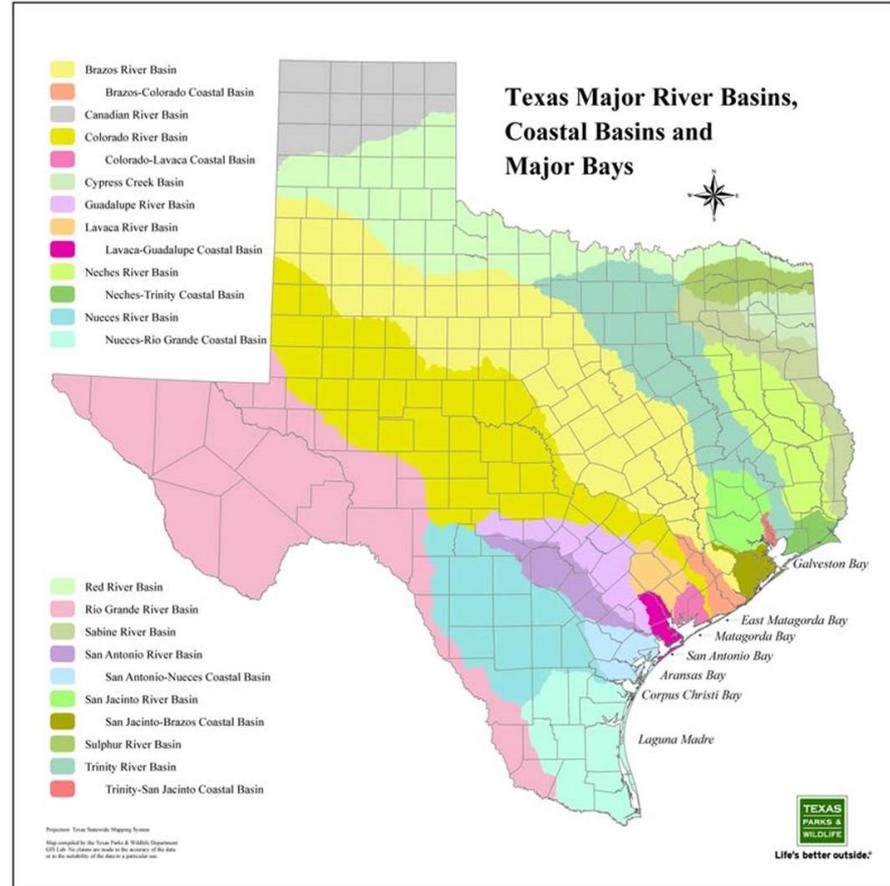
River Flooding



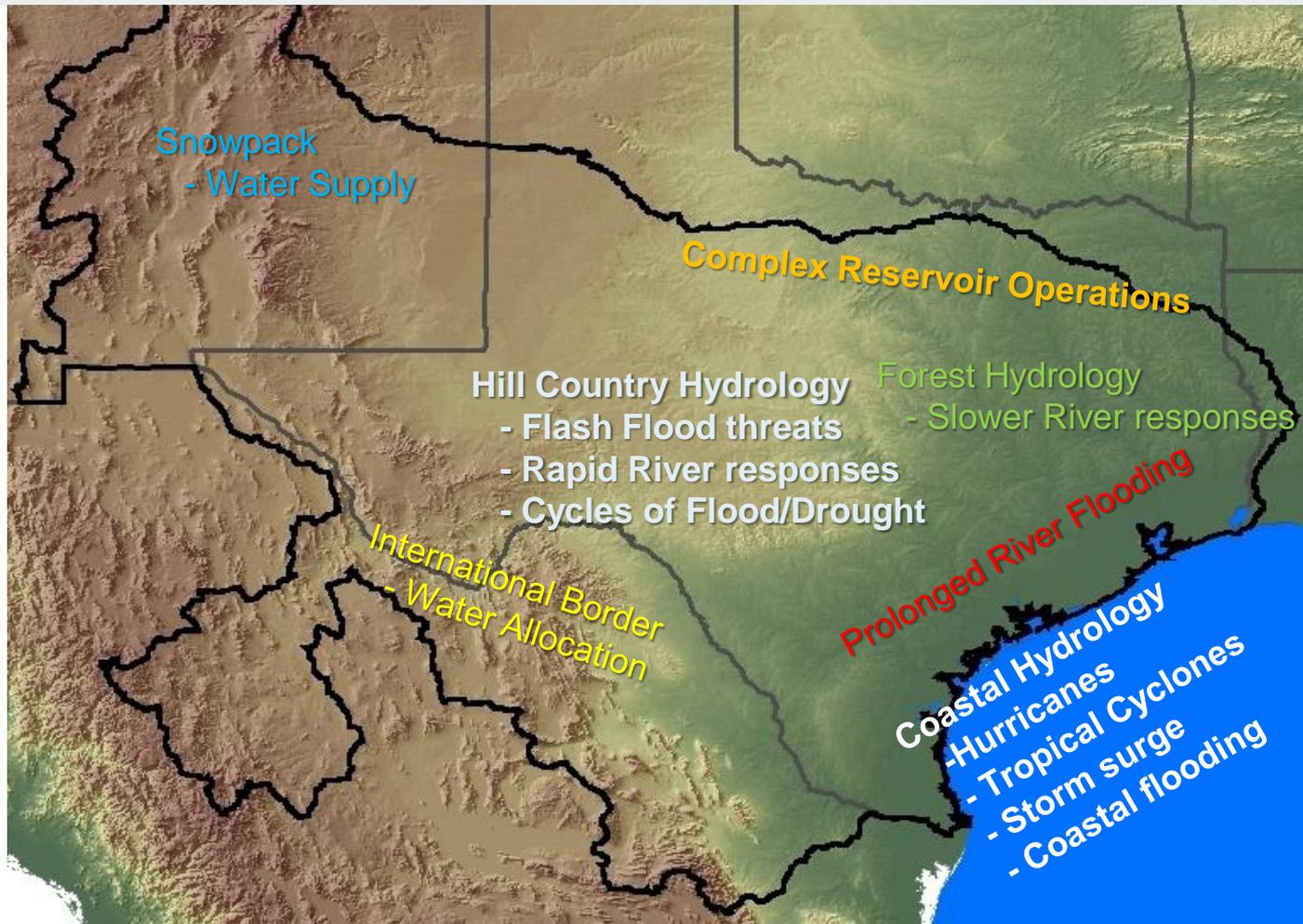
River flooding occurs when water escapes the river banks. There are different thresholds for river flooding: action, minor, moderate, major and record flooding. This image depicts what a river flooding looks like.

Watershed

- A watershed, or basin, is an area of land that drains runoff from rainfall (stormwater) to a body of water, either a river, bayou, creek, or lake.
- Topography plays a big role in how watershed boundaries are defined.
- A watershed can flow into another watershed.
- Watersheds vary in shape and size which ultimately lead to unique challenges.

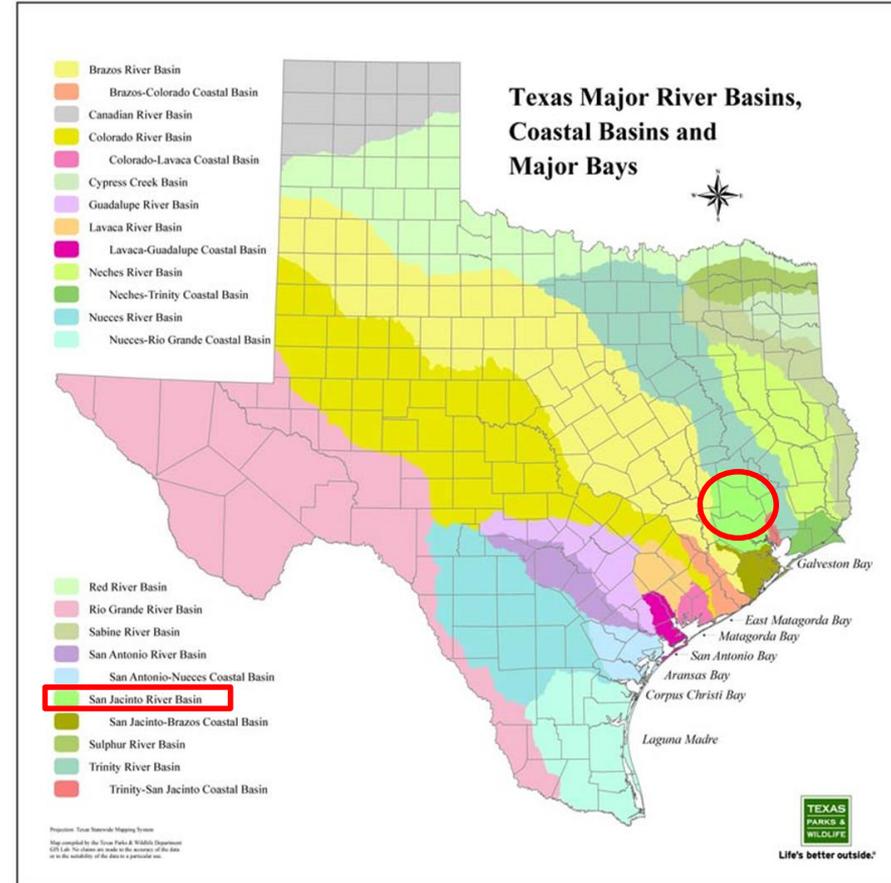


Diverse Watershed Characteristics in Texas



Watershed

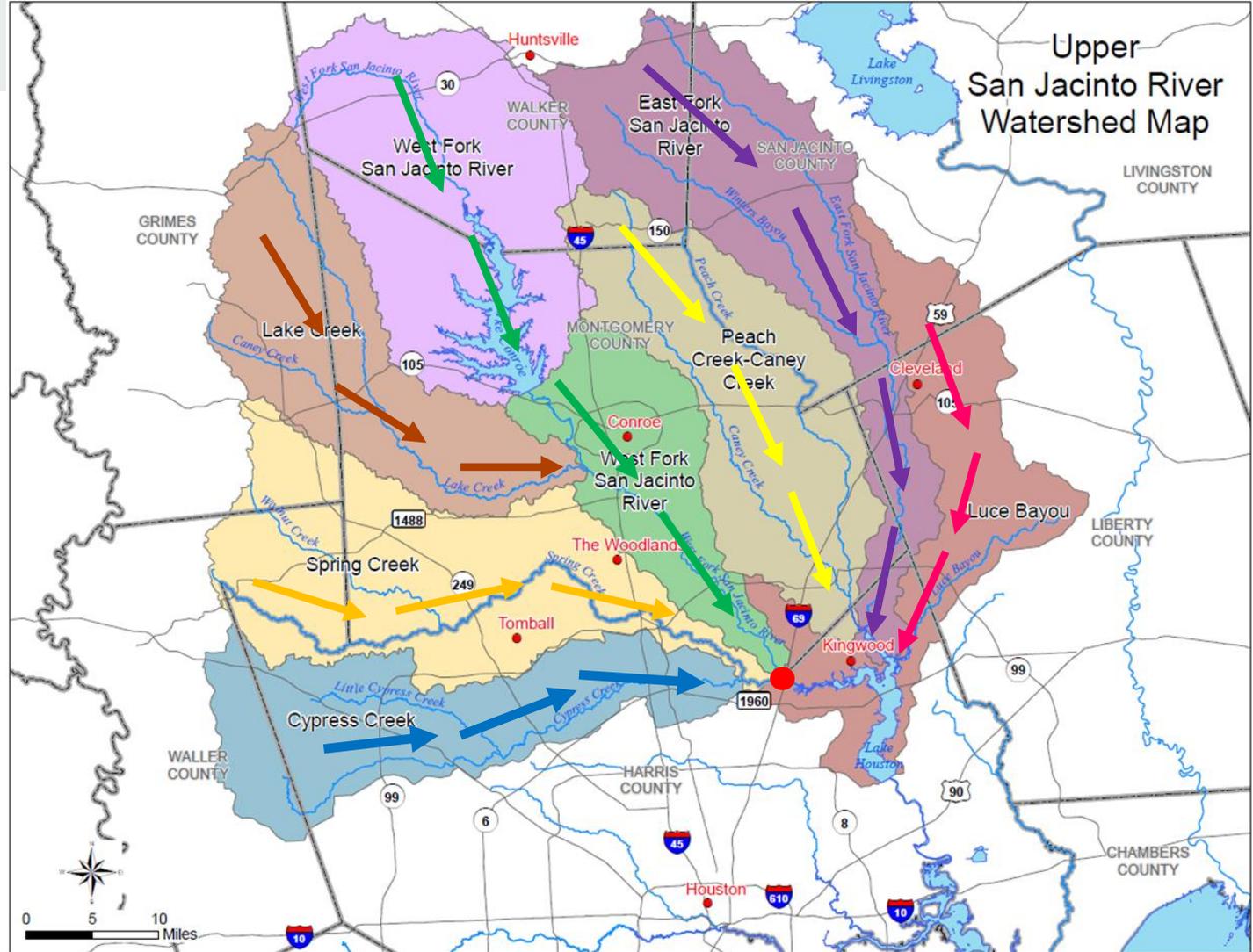
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- Montgomery County deals with 1 primary watershed: San Jacinto River



Upper San Jacinto River Watershed

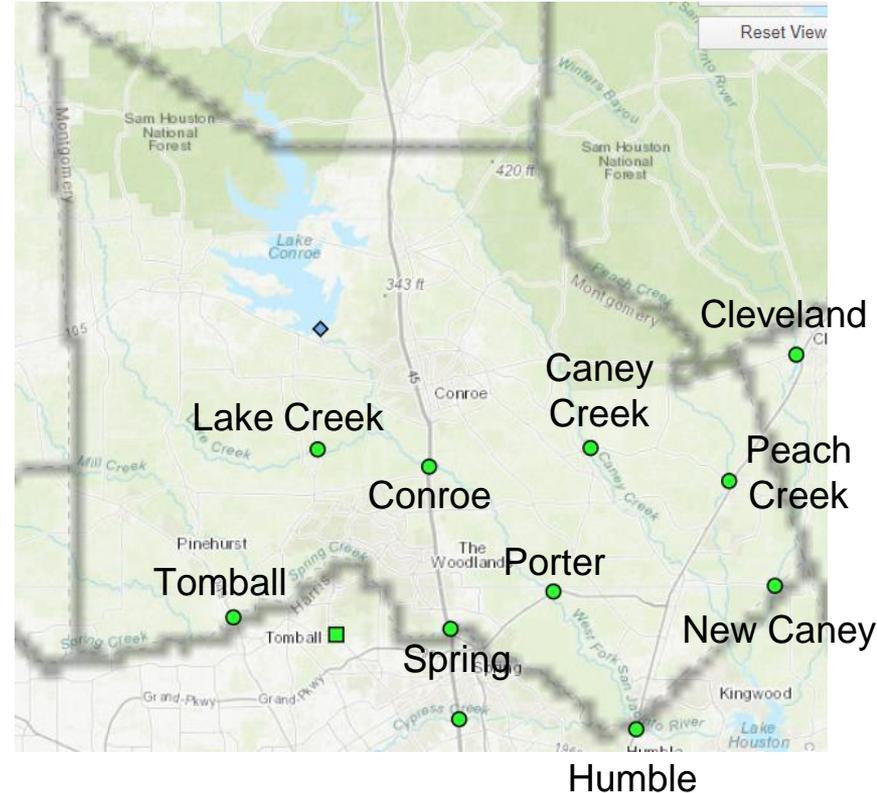


● West Fork San Jacinto River at Humble, TX



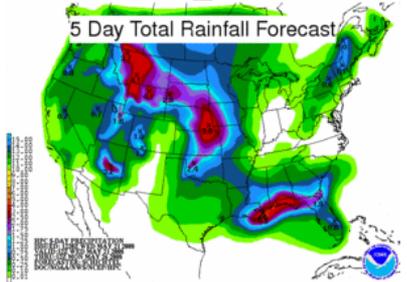
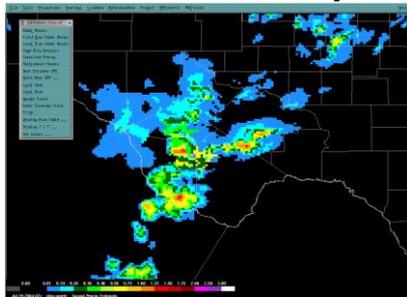
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- Watersheds vary in shape and size which ultimately lead to unique challenges.
- Montgomery County deals with 1 primary watershed: San Jacinto River
- NWS issues river forecasts for 10 sites in and around Montgomery County.



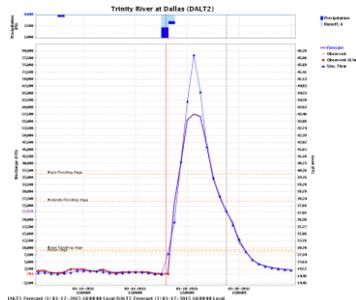
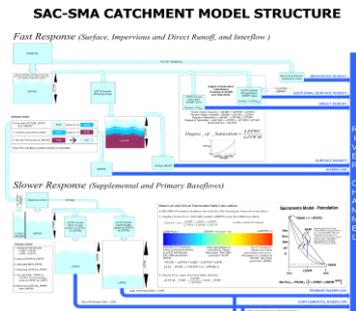
River Forecast Process

Rainfall Analysis



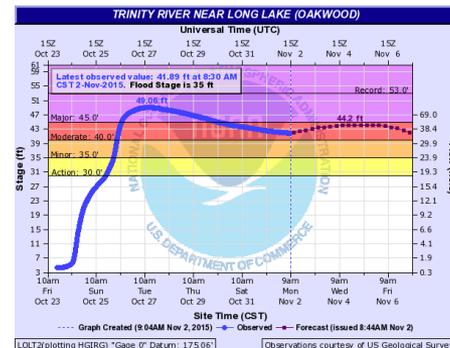
Rainfall estimates and forecasts merged into continuous dataset

Hydrologic Modeling



Rainfall ingested into hydrologic model. Forecasters adjust model parameters in real time

Forecast



Warning

FLOOD WARNING
 NATIONAL WEATHER SERVICE HOUSTON/GALVESTON, TX
 926 PM CDT THU MAY 26 2016

...The National Weather Service in Houston/Galveston has issued a flood warning for the following rivers...

Brazos River In Richmond affecting the following counties in Texas...Austin and Fort Bend

TXC015-039-157-473-271425-
 /O.NEU.KHGX.FL.W.0149.160529T0730Z-000000T0000Z/
 /R/MOT2.1.ER.160529T0730Z.160531T0600Z.000000T0000Z.N0/
 126 PM CDT THU MAY 26 2016

The National Weather Service in Houston/Galveston has issued a

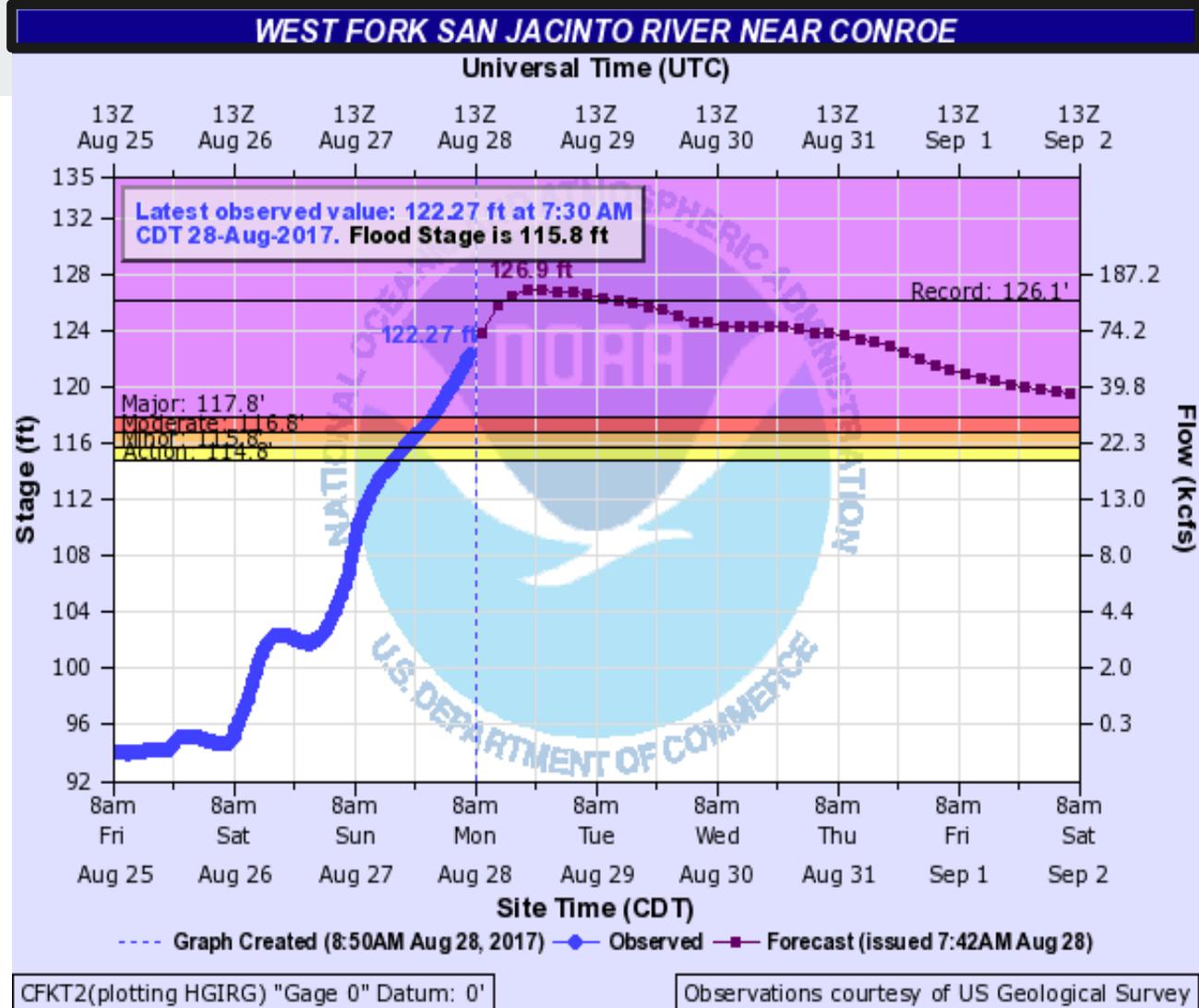
Flood Warning for
 The Brazos River In Richmond.
 from late Saturday night until further notice...or until the warning is canceled.

Hydrograph Basics



LOCATION:

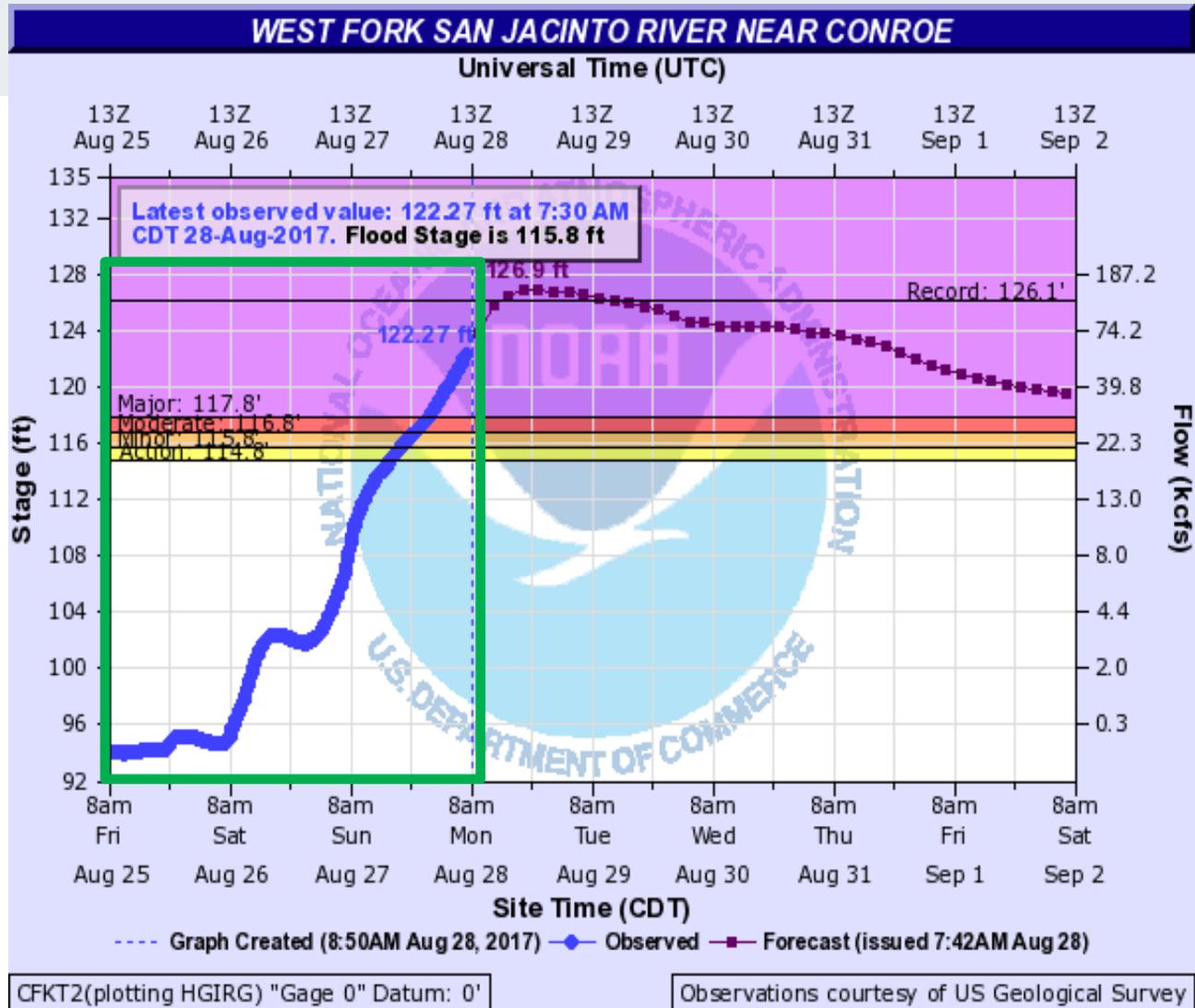
Of the gage the forecast is made, AT means the gage is in the limits of the town/city, NEAR or NR means that town/city has the closest post office



Hydrograph Basics



OBSERVATIONS:
Past river stages

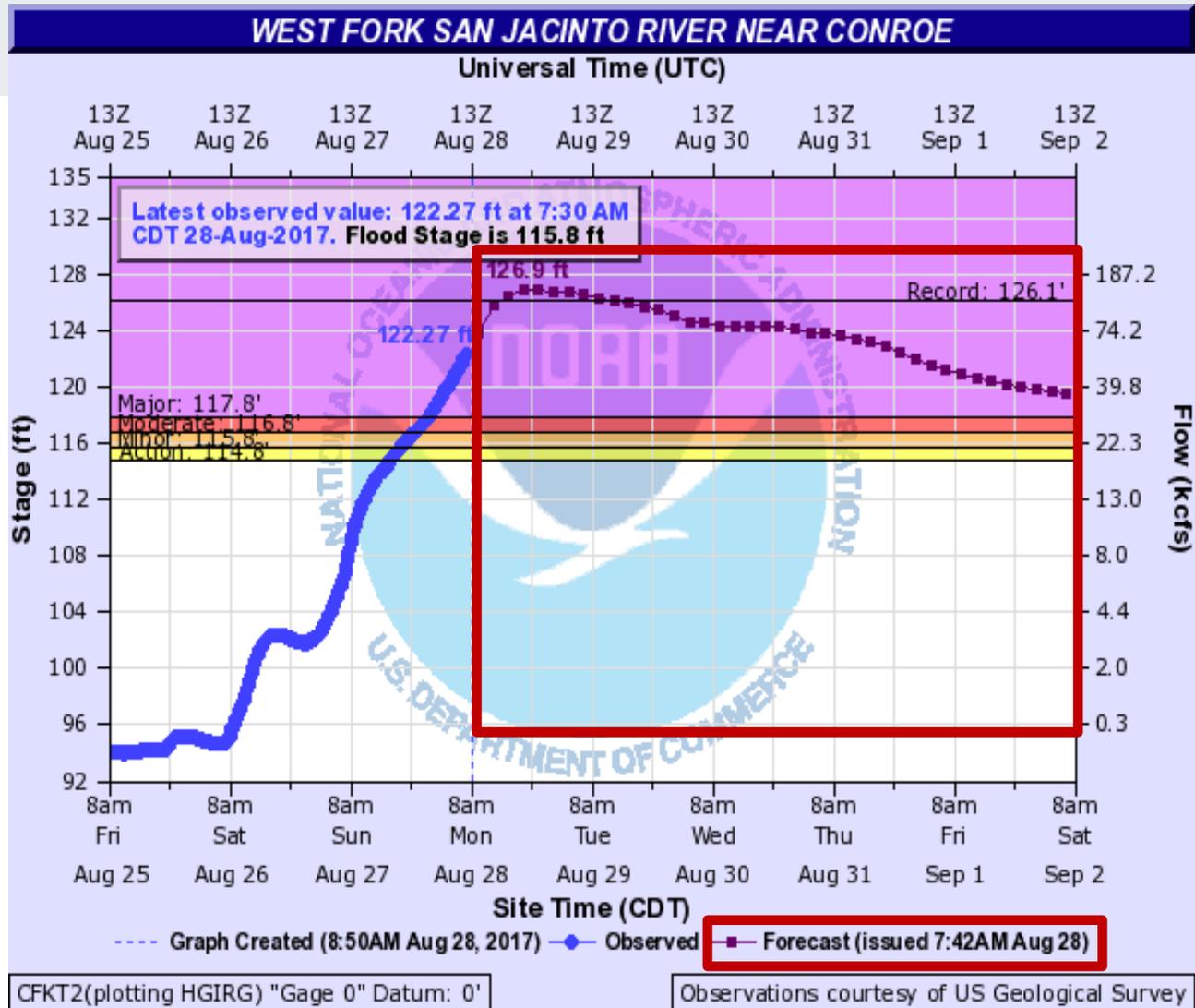


Hydrograph Basics



FORECAST:
Forecast River
Stages

CREST:
Peak Stage

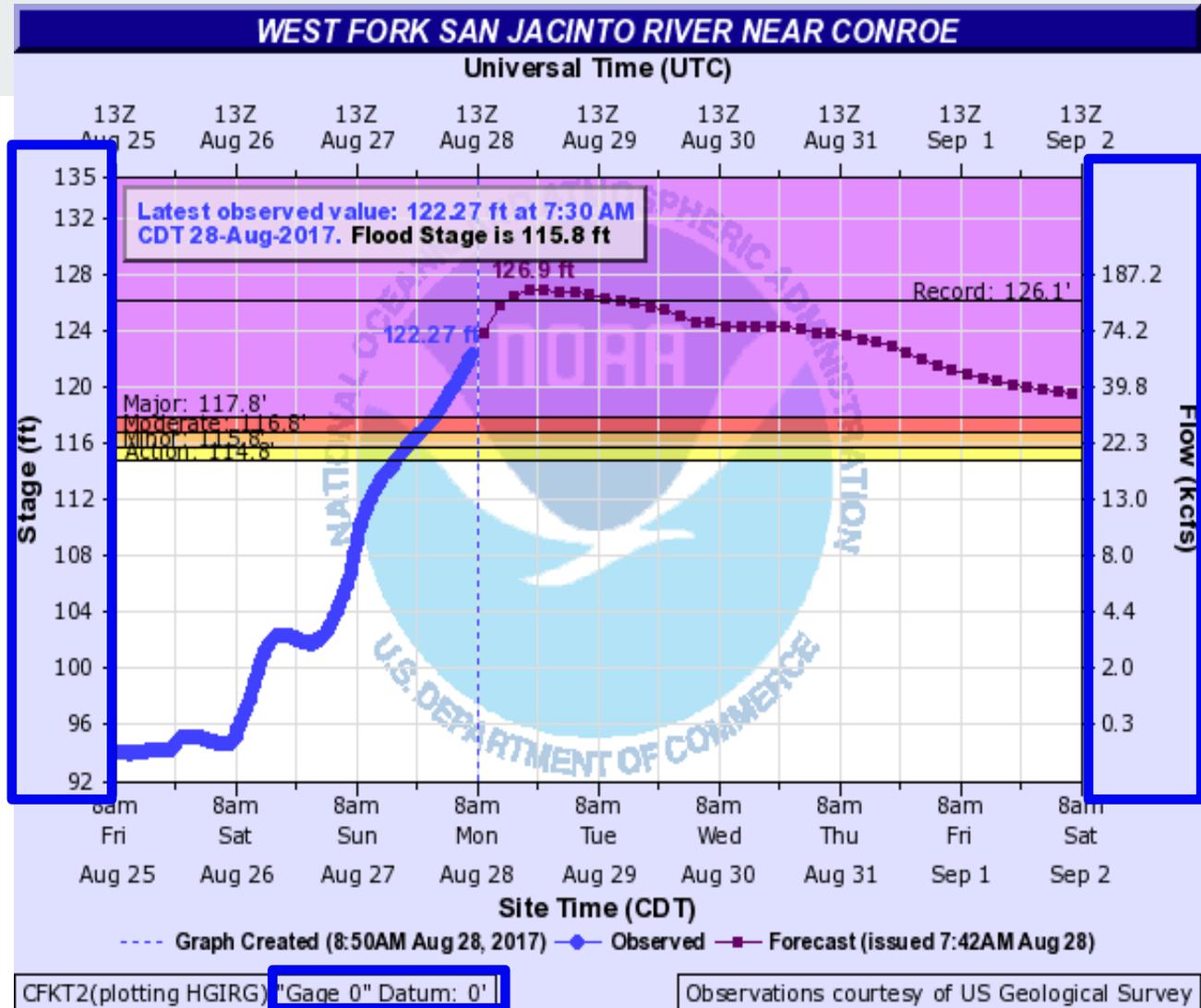


Hydrograph Basics

STAGE VS FLOW:

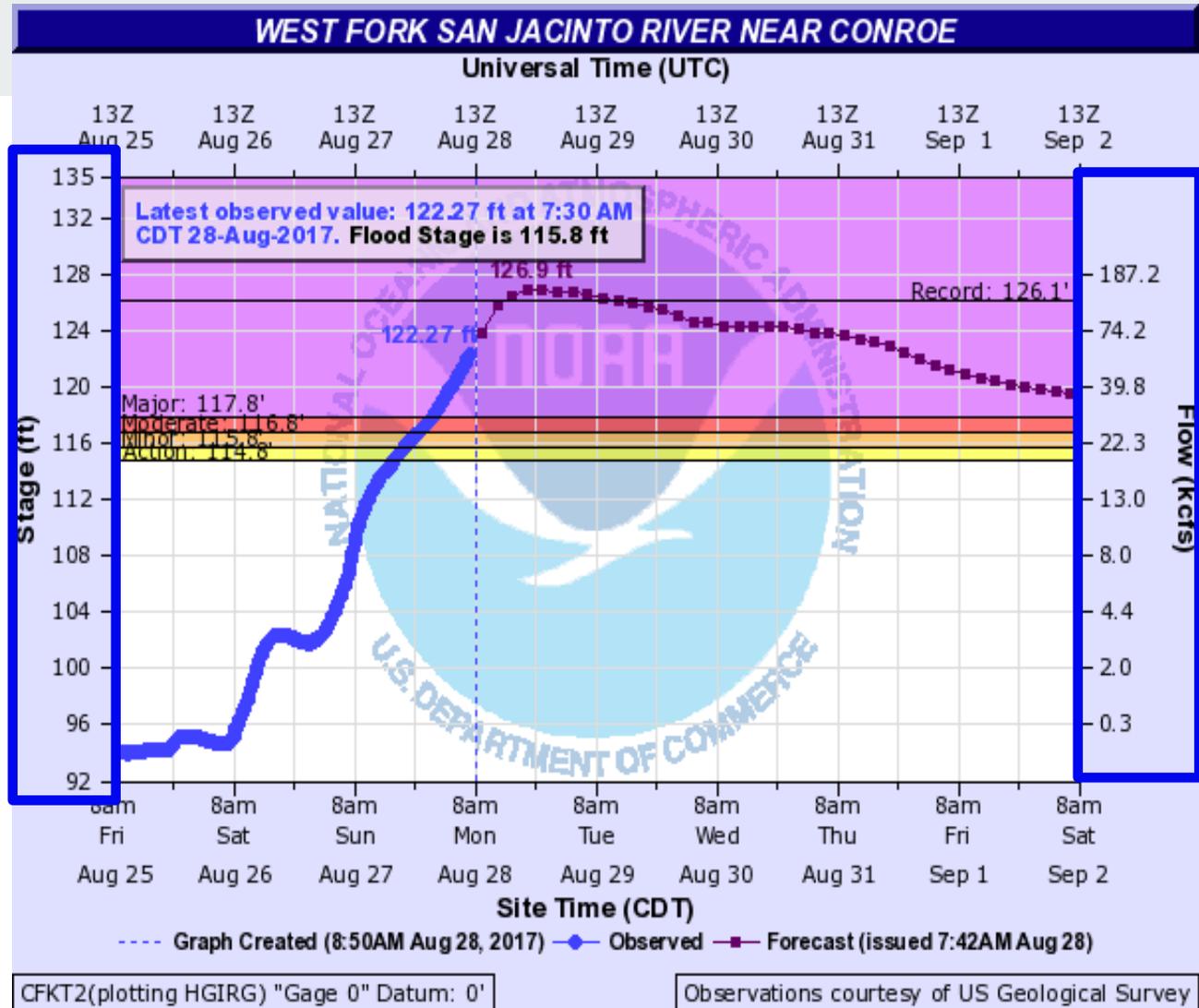
Hydrologists, models, reservoirs work in flow. Emergency managers, media, general public work in stage.

What is flow or a cubic foot per second?



Hydrograph Basics

A basketball is roughly a cubic foot, so 20,000cfs is 20,000 basketballs of water passing the gage every second.



Understanding River Criteria Levels



BELOW CRITERIA

Impact: Water is within the banks of the river with no impacts to the surrounding area. Flow speeds may still be high during rainfall or releases which could impact recreational activities

ACTION

Impact: Water is over the banks and into the flood plain, but not a threat to structures or roadways. Some action may be required such as moving farm equipment or increasing awareness

MINOR

Impact: Typically water is impacting areas inside of floodplain which can vary by location. Some low water crossings covered by water, agricultural flooding, water approaching public areas (parks, sidewalks etc.). Areas frequently flooded can expect to be impacted

MODERATE

Impact: Water now reaching areas only impacted by significant rain events. Structures can be inundated, several roads covered with water, water may cut off certain areas, widespread agricultural flooding.

MAJOR

Impact: Water is near the highest it's ever been representing rare flooding and significant widespread impacts. Most roads will be covered by water in the area cutting off if not completely flooding subdivisions, rivers can be several miles wide in areas. Homes and structures underwater, bridges inundated and in danger of being hit by debris. Impacts may be greater than ever experienced.

Advanced Hydrologic Prediction System

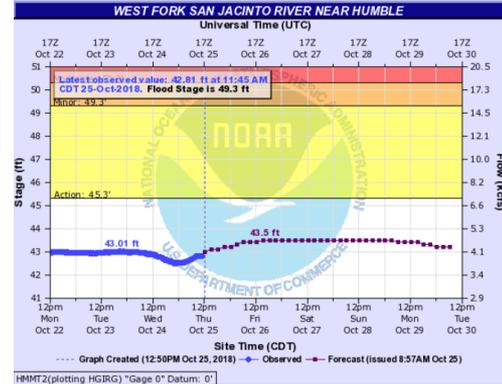
Flood Categories (in feet)

Major Flood Stage:	52.3
Moderate Flood Stage:	50.3
Flood Stage:	49.3
Action Stage:	45.3
Low Stage (in feet):	0

Historic Crests

- 69.18 ft on 08/29/2017
- 67.30 ft on 10/18/1994
- 63.23 ft on 05/31/1929
- 63.23 ft on 11/26/1940
- 62.80 ft on 09/14/2008

[Show More Historic Crests](#)



River Observations | River Forecasts | Experimental Long-Range Flood Risk | Precipitation | Download

Auto Refresh: Off | Print this map | Permalink | BOOKMARK

132 total gauges | 3 gauges in flood

Map showing river observations and forecasts for the Houston area. A red circle highlights a gauge near The Woodlands. The map includes a legend for forecast availability, probability, and flood stages (Major, Moderate, Minor, Near Flood, No Flooding). It also shows a list of gauges with their current stages and last update times.

- 55.2 Major lowland flooding continues with up to 6 inches of water is over the 800 block Hamblen Road adjacent to the Kingwood Cove Country Club Golf Course with many homes in the Bellau Woods and Treasure Cove subdivision are flooded.
- 54.4 Major lowland flooding continues with homes along Riverview Drive in River Ridge subdivision upstream of the gauge begin to flood.
- 53.3 Major lowland flooding continues with water is in homes on Lake Lane West and Southshore Drive in the Belleau Woods subdivision and Homes in the Treasure Cove subdivision and along Aqua Vista Drive begin flooding.
- 52.3 Major lowland flooding begins as homes on Lake Lane West and Southshore Drive in the Belleau Woods subdivision begin flooding. Roads into the Treasure Cove subdivision are inundated and homes along Aqua Vista Drive threatened. Water is in many homes on Lake Point Drive in the Northshore subdivision.
- 51.5 Moderate lowland flooding continues with up to one foot of water is over the road at the intersection of Bellau Wodd and Riviera and many homes in the Northshore subdivision are flooded.
- 50.3 Moderate lowland flooding begins as homes on Lake Point Drive in the Northshore subdivision begin flooding and roads in the Belleau Woods subdivision are inundated.
- 49.3 49.5 feet MSL...Minor lowland flooding begins in the vicinity of the gauge. North side turnaround at US 59 begins to flood. Low points on Thelma Road, Aqua Vista Drive, and Riverview Drive begin to flood.

<http://water.weather.gov/ahps2/index.php?wfo=hgx>

USGS Water Alerts

- Set alerts when a gauge reaches certain water surface elevations.
- Identify the gauge nearest you
- Click on the gauge

USGS Water Alerts:

<https://maps.waterdata.usgs.gov/mapper/wateralert/>

USGS Water Alerts

- Set alerts when a gauge reaches certain water surface elevations.
- Identify the gauge nearest you
- Click on the gauge and select "Subscribe to WaterAlert"

USGS
science for a changing world

WaterAlert

Sites Map

Select Location

News updated September 30, 2013

Search by Street
Enter Street Address

Search by Place Name
Enter Place Name

Search by Site Number
Enter Site Number

Search by State
Select an Area

Search by Watershed
Select a Region

Select Data Type

About WaterAlert

How To Use WaterAlert

Related Information

Site Information

Site Number: 08069500
Site Name: W Fk San Jacinto Rv nr Humble, TX
Site Type: Stream
Agency: USGS
[Access Data](#)

Streamflow: 7260 ft³/sec
on 2018-04-02 at 22:15 CDT (TSID 229383)

Stage: 42.78 ft
on 2018-05-07 at 06:45 CDT (TSID 140334)

Subscribe to WaterAlert

USGS Water Alerts:

<https://maps.waterdata.usgs.gov/mapper/wateralert/>



USGS Water Alerts

- Set alerts when a gauge reaches certain water surface elevations.
- Identify the gauge nearest you
- Click on the gauge and select "Subscribe to WaterAlert"
- Define how you want to receive the information:
 - Email or phone
 - Frequency
 - Stage or Discharge
 - Stream Elevation(s)
- Note: Use Internet Explorer

Subscription Form

The U.S. Geological Survey WaterAlert service sends e-mail or text (SMS) messages when [certain parameters](#), as measured by a USGS real-time data-collection station, exceed user-definable thresholds. The development and maintenance of the WaterAlert system is supported by the USGS and its partners, including numerous federal, state, and local agencies.

Real-time data from USGS gages are transmitted via satellite or other telemetry to USGS offices at various intervals; in most cases, 1 to 4 times per hour. Emergency transmissions, such as during floods, may be more frequent. *Notifications will be based on the data received at these site-dependent intervals.*

Site Info:		
Number:	08069500	
Name:	W Fk San Jacinto Rv nr Humble, TX	
Agency:	USGS	
Transaction ID:	stsCN	
Send Notification To:	about this...	
<input type="radio"/> My mobile phone		
<input type="radio"/> My email address		
Notification Frequency:	about this...	
Hourly	<input type="radio"/>	
Daily	<input checked="" type="radio"/>	
Streamflow Parameter(s):	about this...	Recent value:
Discharge, in ft ³ /s	<input checked="" type="radio"/>	7260 [peak chart]
Gage height, in ft	<input type="radio"/>	42.78 [peak chart]
Alert Threshold Condition:	about this...	
<input checked="" type="radio"/> Greater than (>)		
<input type="radio"/> Less than (<)		
<input type="radio"/> Outside a range (< or >)		
<input type="radio"/> Inside a range (> and <)		
	Real-time value is greater than:	<input type="text"/> ft ³ /s
<input type="checkbox"/> I have read and acknowledge the Provisional Data Statement and Disclaimer .		

Submit Reset Cancel



USGS Water Alerts:

<https://maps.waterdata.usgs.gov/mapper/wateralert/>



Partners

Partners

Roles of Primary River Forecast Partners



**US Army Corps
of Engineers®**

- Operate Flood Control Reservoirs
- Manage Other WR Projects



**US Army Corps
of Engineers®**

- Assist w/Gage Maintenance
- Assist w/Stream Measurements
- Assist w/Funding Data Networks



- U.S. Stream Gage Network
- Water Science Studies



- Gage Maintenance
- Stream Measurements
- Focus Stream Gage Network



- Issue Weather & Water
Forecasts, Watches, Warnings &
Data



- Cooperative Data Network
- NOAA/NWS Satellite Transmission
- Forecasts/Data for Operations

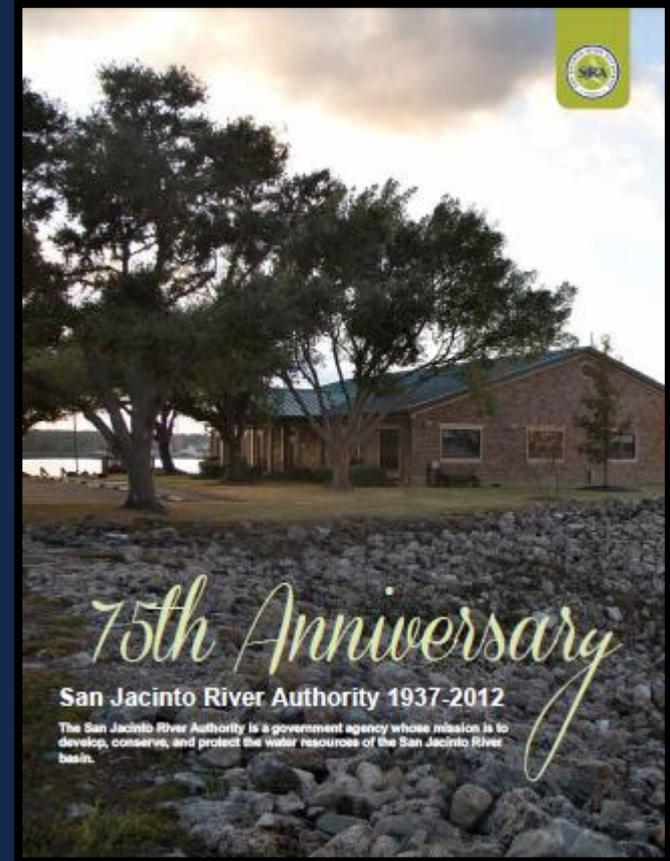


SJRA Update: From Flood Operations to Flood Management

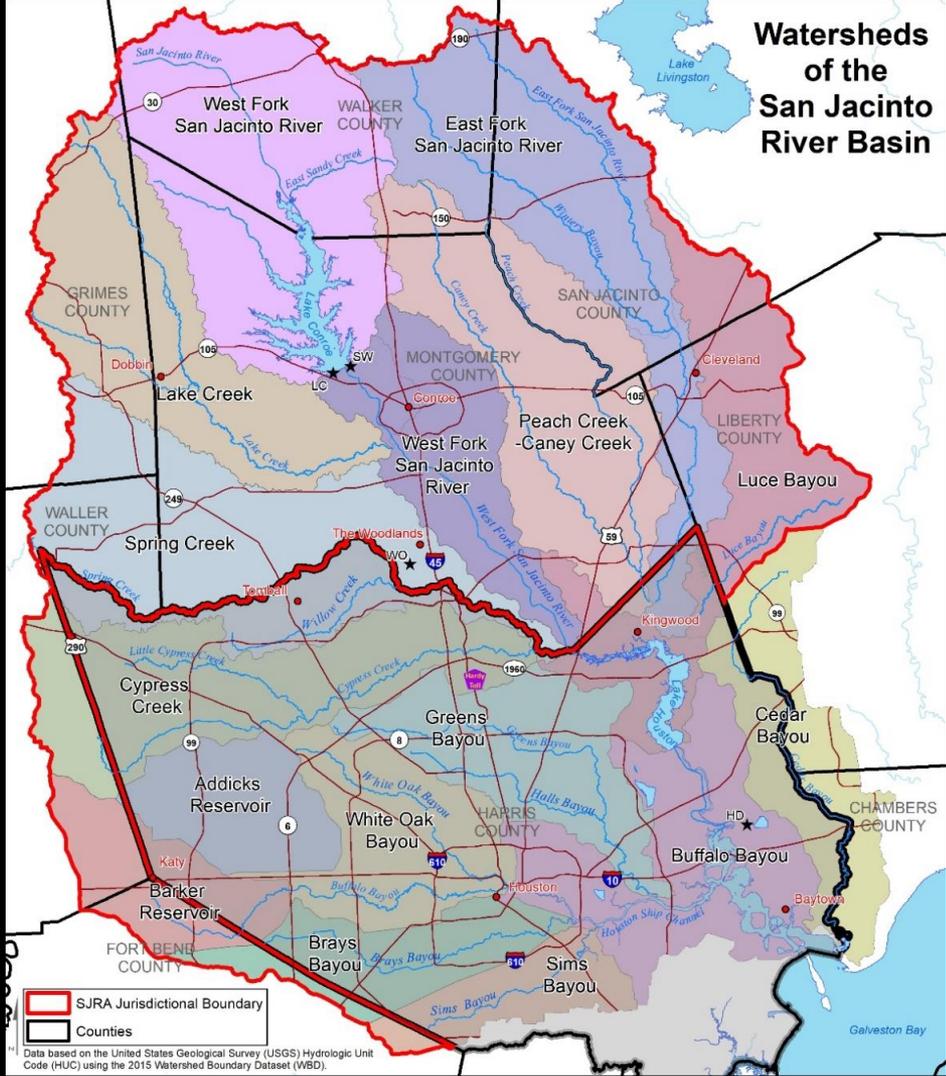
October 25, 2018

San Jacinto River Authority

- Created in 1937
- Statutory purpose – Long-term, regional water resource planning and development
- One of about two dozen river authorities in Texas
- Five operating divisions – Highlands, Woodlands, Lake Conroe, GRP, and Flood Management

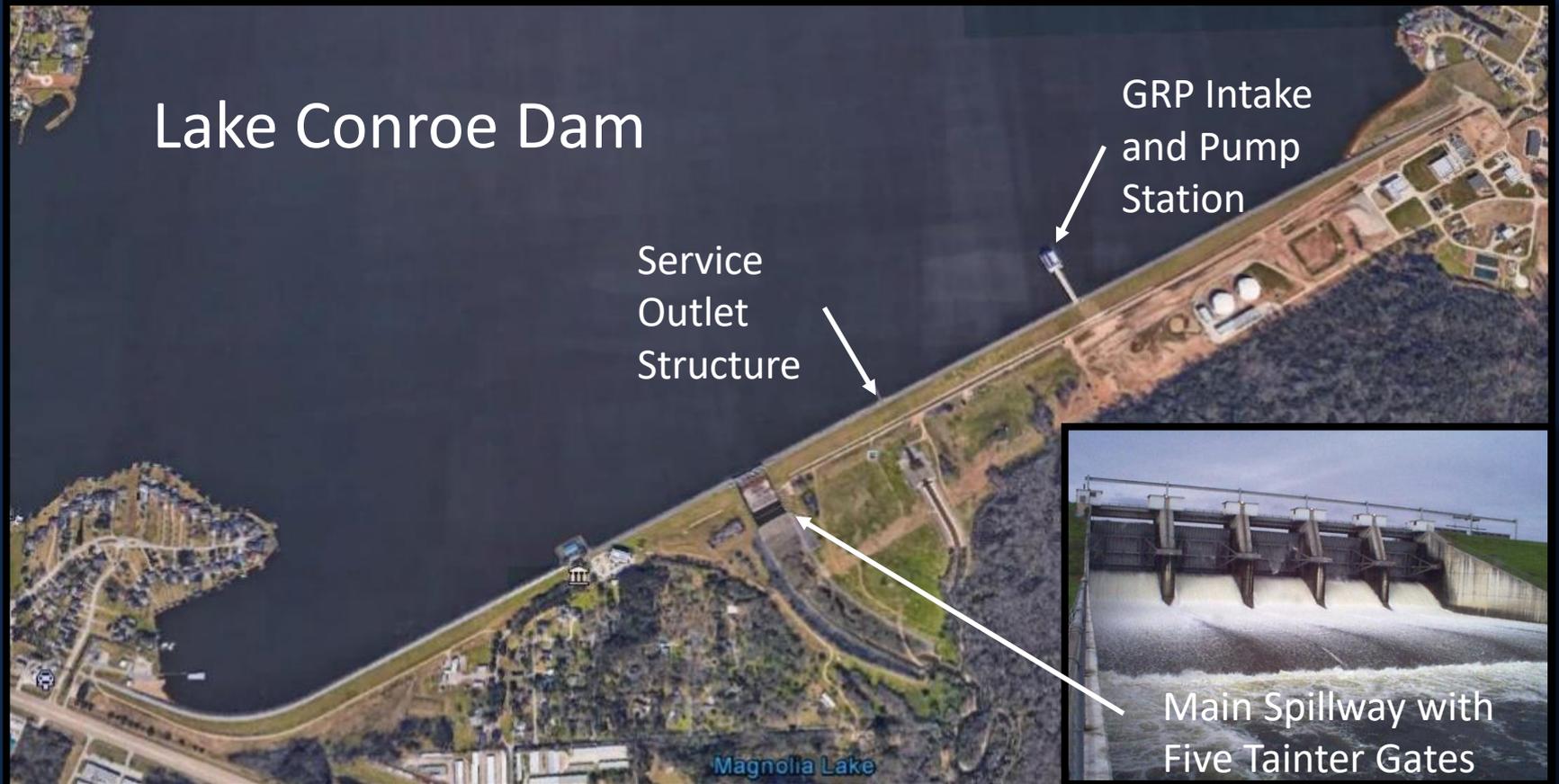


Watersheds of the San Jacinto River Basin



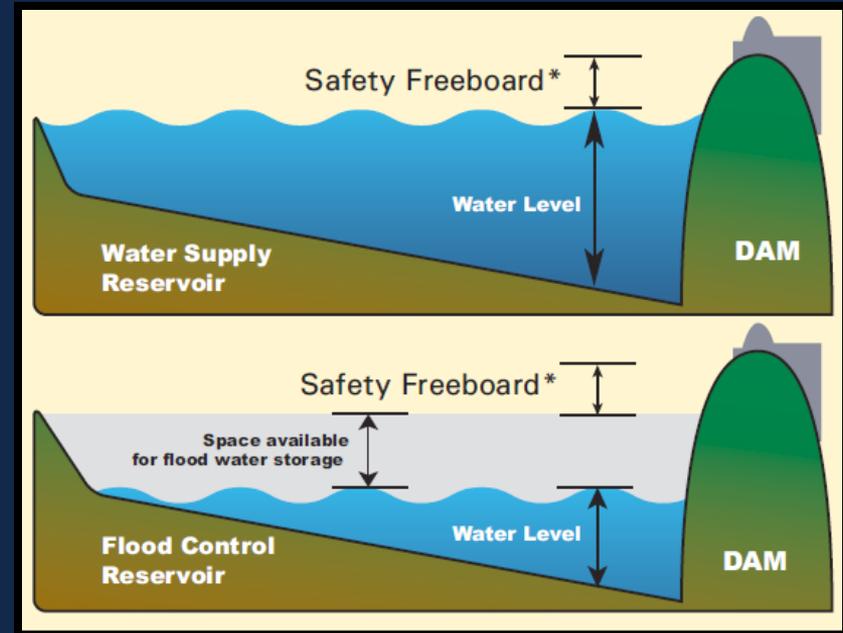
Data based on the United States Geological Survey (USGS) Hydrologic Unit Code (HUC) using the 2015 Watershed Boundary Dataset (WBD).

Key Points Regarding Lake Conroe Operations



Water supply reservoirs are designed to stay full

- Lake Houston and Lake Conroe are both water supply reservoirs
- Very limited capacity to capture storm inflows
- Designed to pass inflows from storms (with some reduction in peak flow)
- Structurally, the gates must open gradually as lake rises

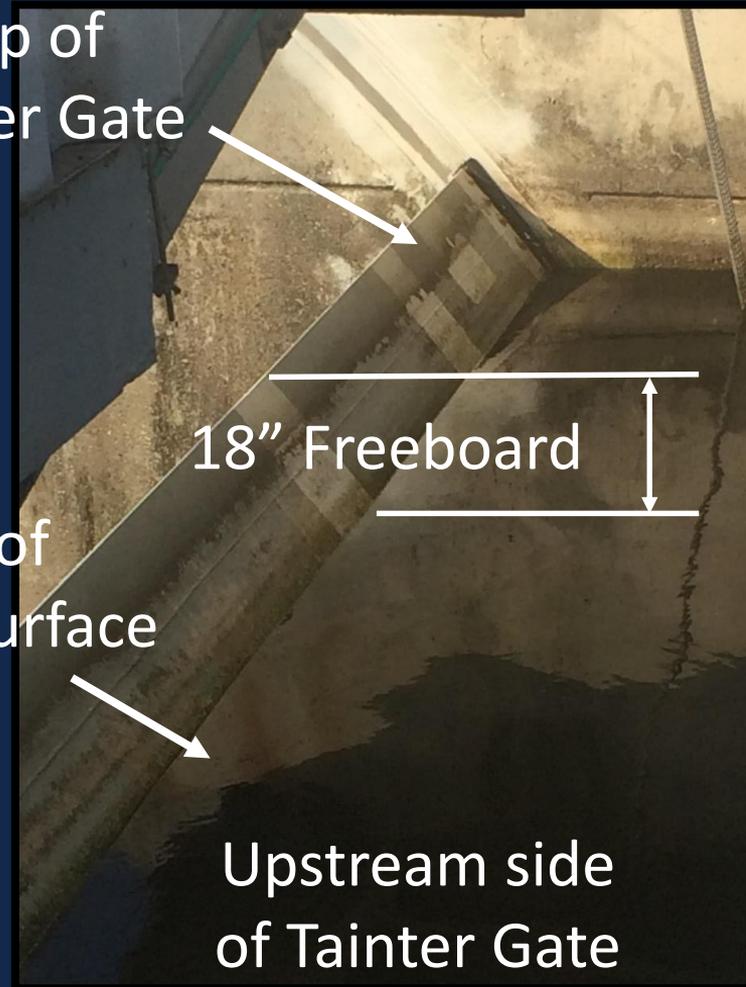




Top of
Tainter Gate

Top of
Water Surface

Downstream side
of Tainter Gate



18" Freeboard

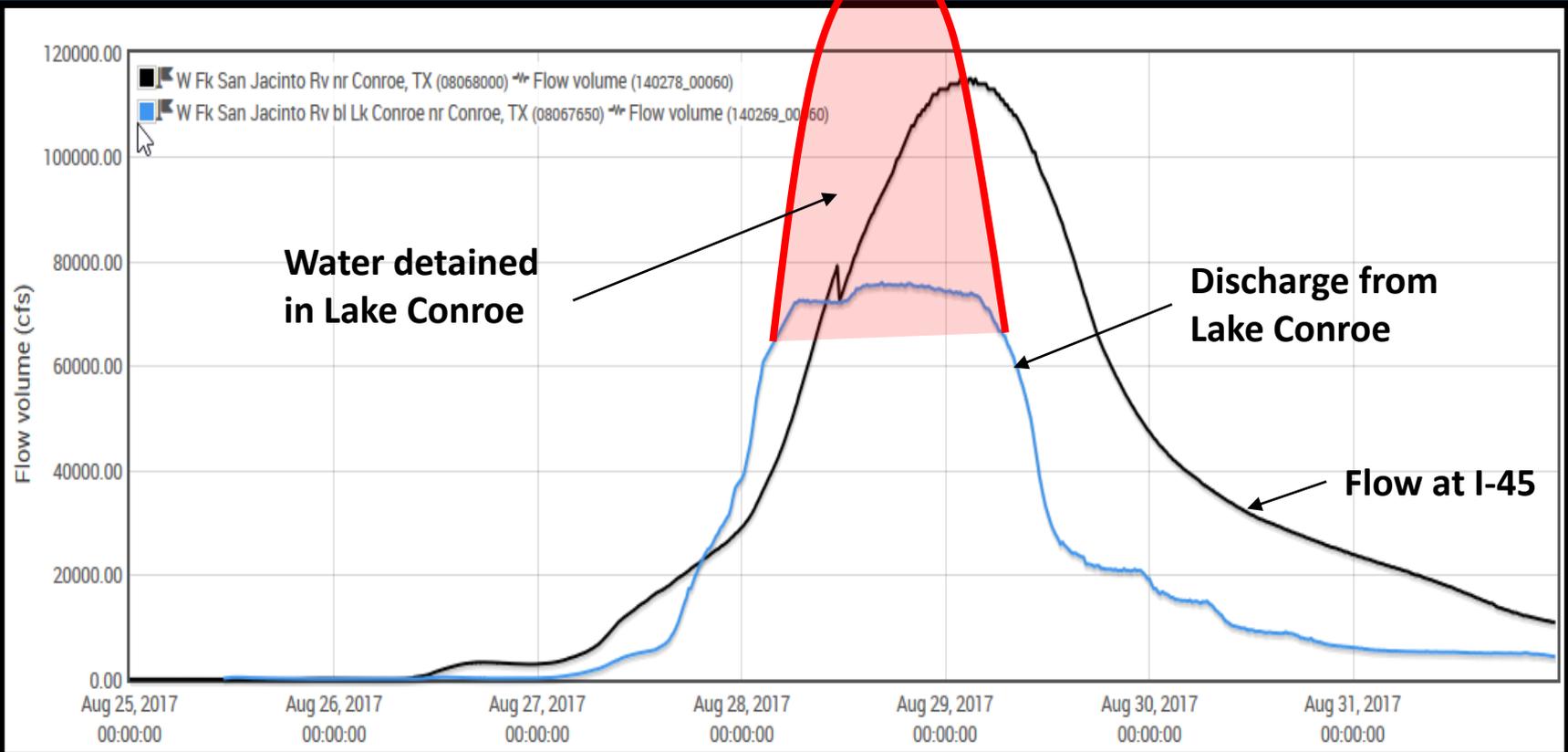
Upstream side
of Tainter Gate

Water supply reservoirs reduce peak flows downstream

- Even though there is no dedicated flood capacity, water supply reservoirs reduce peak flow via temporary storage
- Lake Conroe has a six-foot flowage easement for temporary flood storage
- Operating protocol balances inflow, lake level rise, and discharges

~130,000 cfs

Peak Flow Into
Lake Conroe



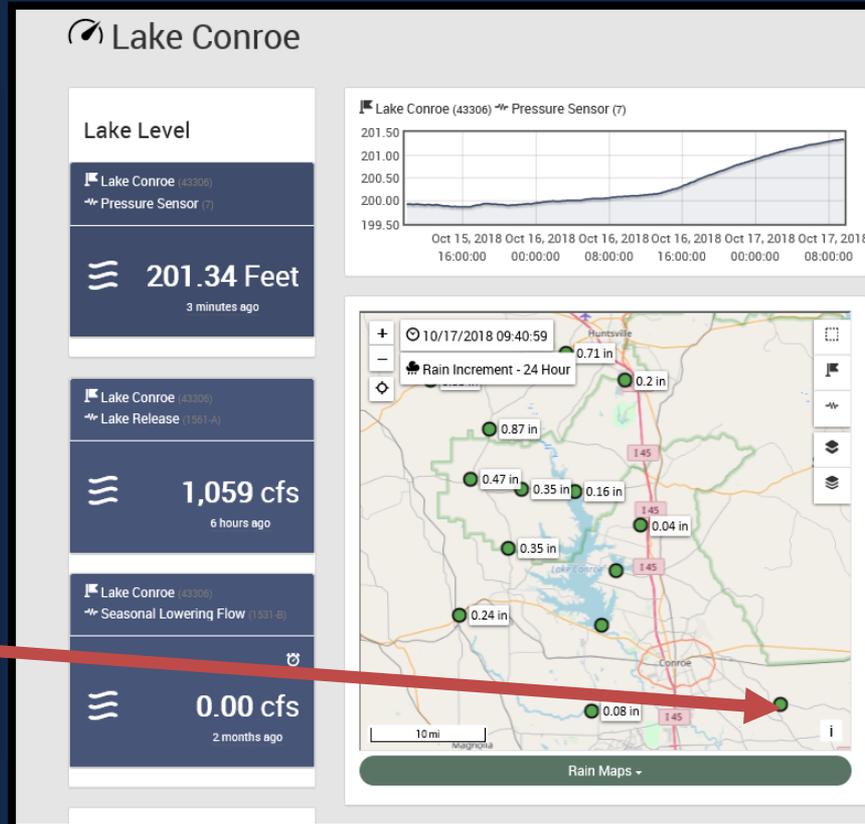
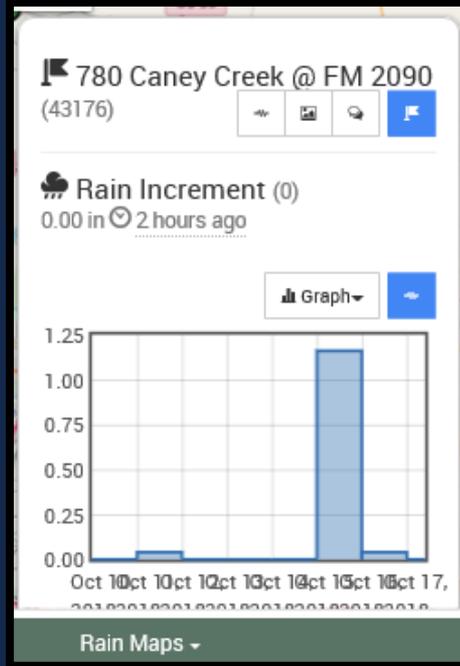
Lake Conroe used almost all of its authorized flowage easement

- Six-foot flowage easement acquired when lake was constructed
- Recorded in deed records
- Authorizes inundation up to 207' msl
- During Harvey, peak elevation was 206.24' msl

Reservoir operators follow pre-planned emergency communications protocols

- ROs partner with emergency response agencies who are the gatekeepers for emergency actions
- ROs have no authority to order or control evacuations or to serve as emergency response
- Role of ROs is to operate the dam and notify appropriate emergency officials
- ROs conduct periodic table top exercises with local emergency agencies

SJRA provides real-time data



Lake Level per USGS site ID: 08067600 LK Conroe nr Conroe, TX
201.01ft. as of 9-22 11:15 (Normal Pool=201ft)
Lake Release
0 CFS
Air Temperature
77 DEG. F
Wind Direction
158 DEG.
Wind Speed
4.93 MPH
Barometric Pressure
25.1 in
Water Temperature
87.4 deg F
Lake & River Conditions

Flood Forecasting & Reservoir Operations Tool

- Develop an operational tool for the Lake Conroe watershed:
 - Real-time data from the rain gauges
 - Precipitation forecasts from NWS
 - Stream flow
 - Current lake level
 - Current gate position
- Provide more accurate predictions for future gate operations during rainfall events (provided to regional stakeholders)



Civic Plus Mass Communication Tool

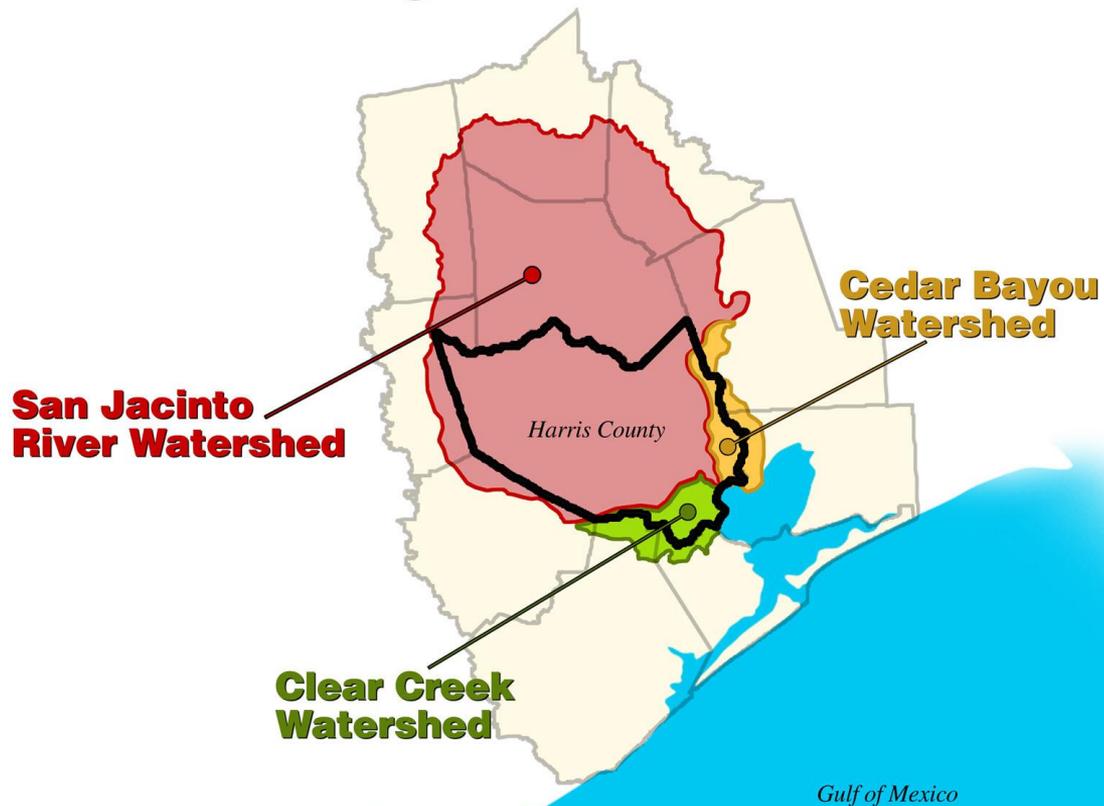
- SJRA implementing new Mass Communications Tool, Civic Ready
- Receive time-sensitive updates and notifications by:
 - Email
 - Phone-in
 - Text
 - Mobile application
- Supplements current updates on SJRA website and social media platforms





Harris County Flood Control District

Harris County Local Watersheds



Flood Warning System





HELP

MAP VIEW OPTIONS

- Watersheds
- Channels
- 0.00 Rainfall
- Channel Status

Mouse over map label for more information

RAINFALL DATA

Current Historical

Rainfall in the last

[Refresh Data](#)

GAGE SELECTIONS

Gages by Agency

Harris County Flood Control District

Gage by Location

(Select Gage)

[Reset to Agency View](#)

ADDRESS SEARCH

Find

e.g. 9900 Northwest Fwy., Houston 77092

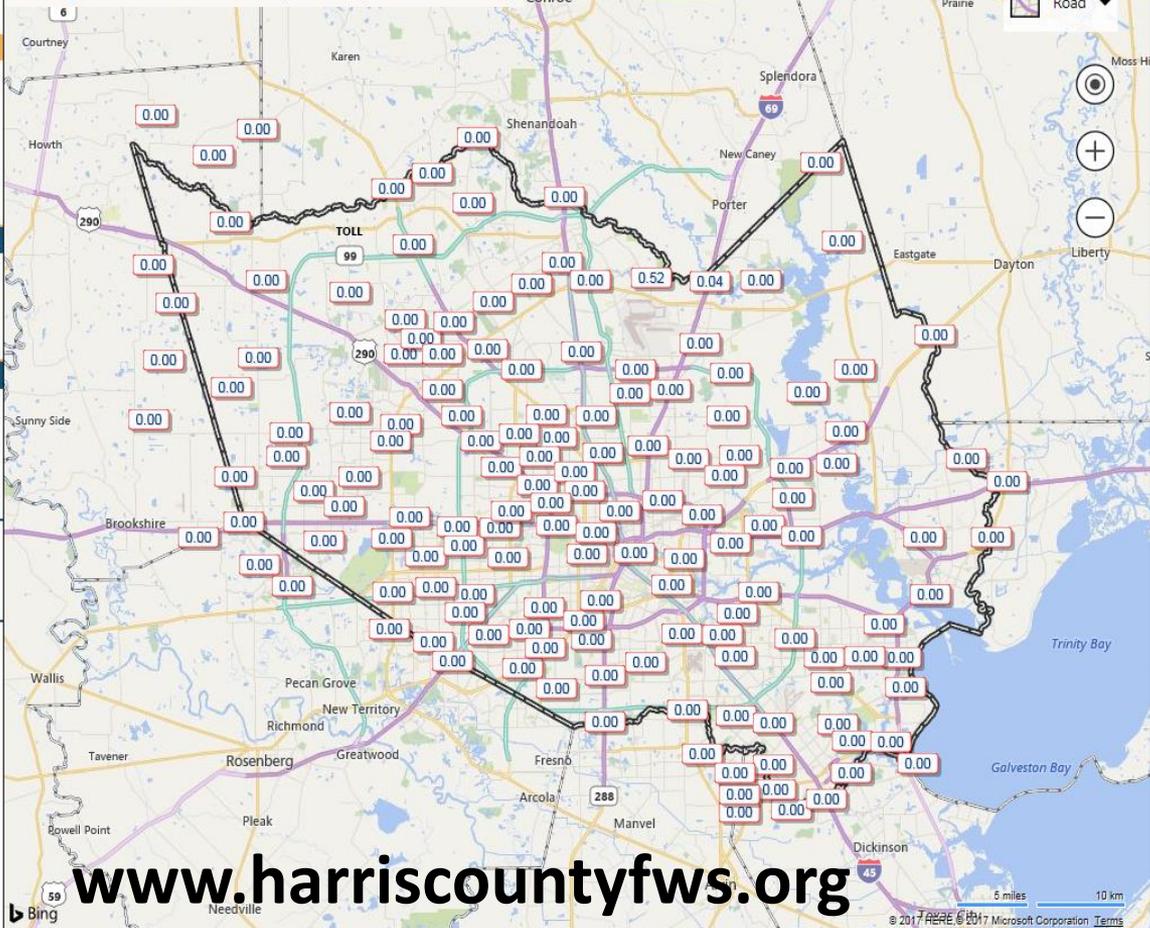
[Clear Search](#)

Agency View

An interactive map of the Harris County Flood Control District

[Disclaimer](#)

Showing rainfall for the last 24 Hours (before 10/7/2017 11:10 AM CDT)



All FWS Gages



CONTACT US

FWS MAP | ALERTS | ABOUT FWS | DOCUMENT LIBRARY | GLOSSARY | FAQs | HELPFUL RESOURCES



Showing rainfall for 30 Days from 2/25/2018 11:27 AM to 3/27/2018 11:27 AM CDT

MAP VIEW OPTIONS

- Watersheds
- Channels
- 0.00 Rainfall
- Channel Status

Mouse over map label for more information

RAINFALL DATA

Current Historical
30 day(s)
before 3/27/2018 11:27 AM
Show Historical

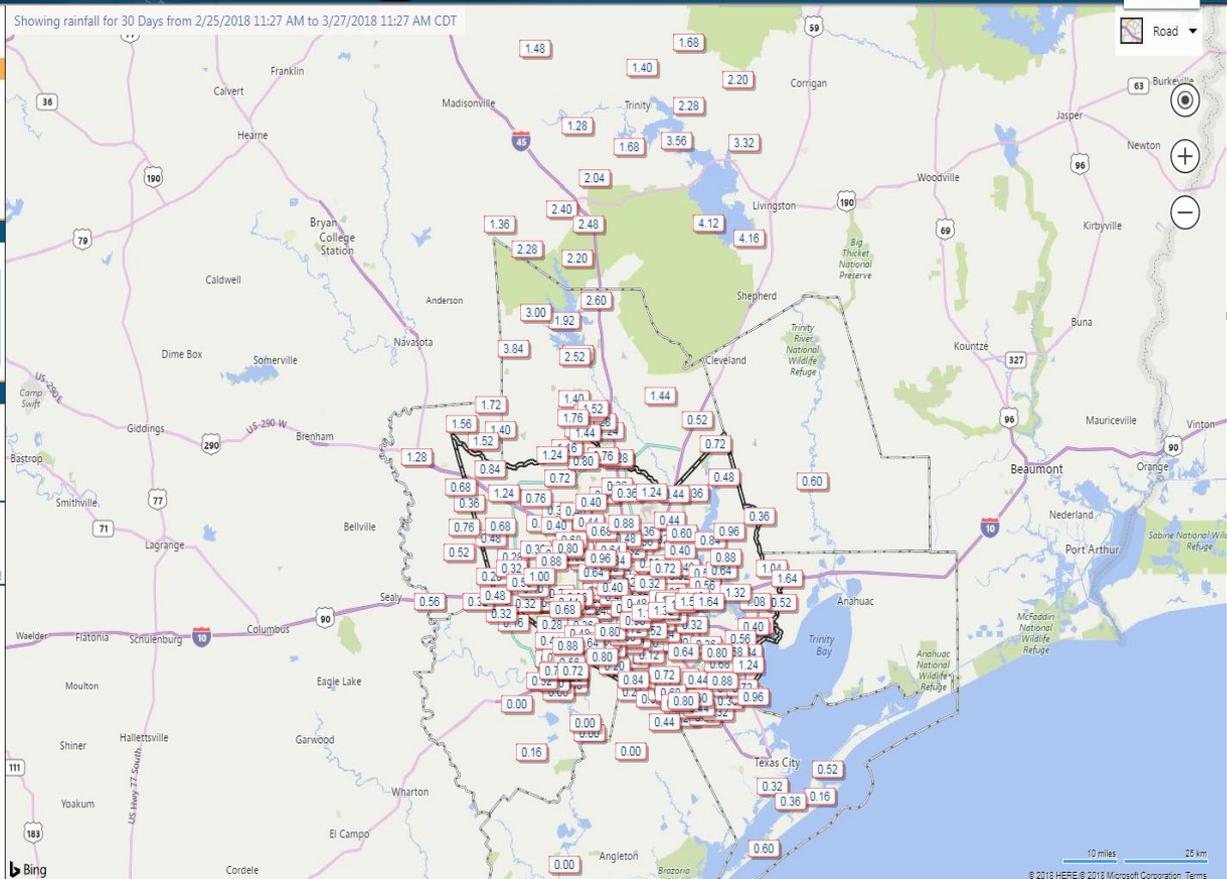
GAGE SELECTIONS

Gages by Agency
ALL
Gage by Location
(Select Gage)

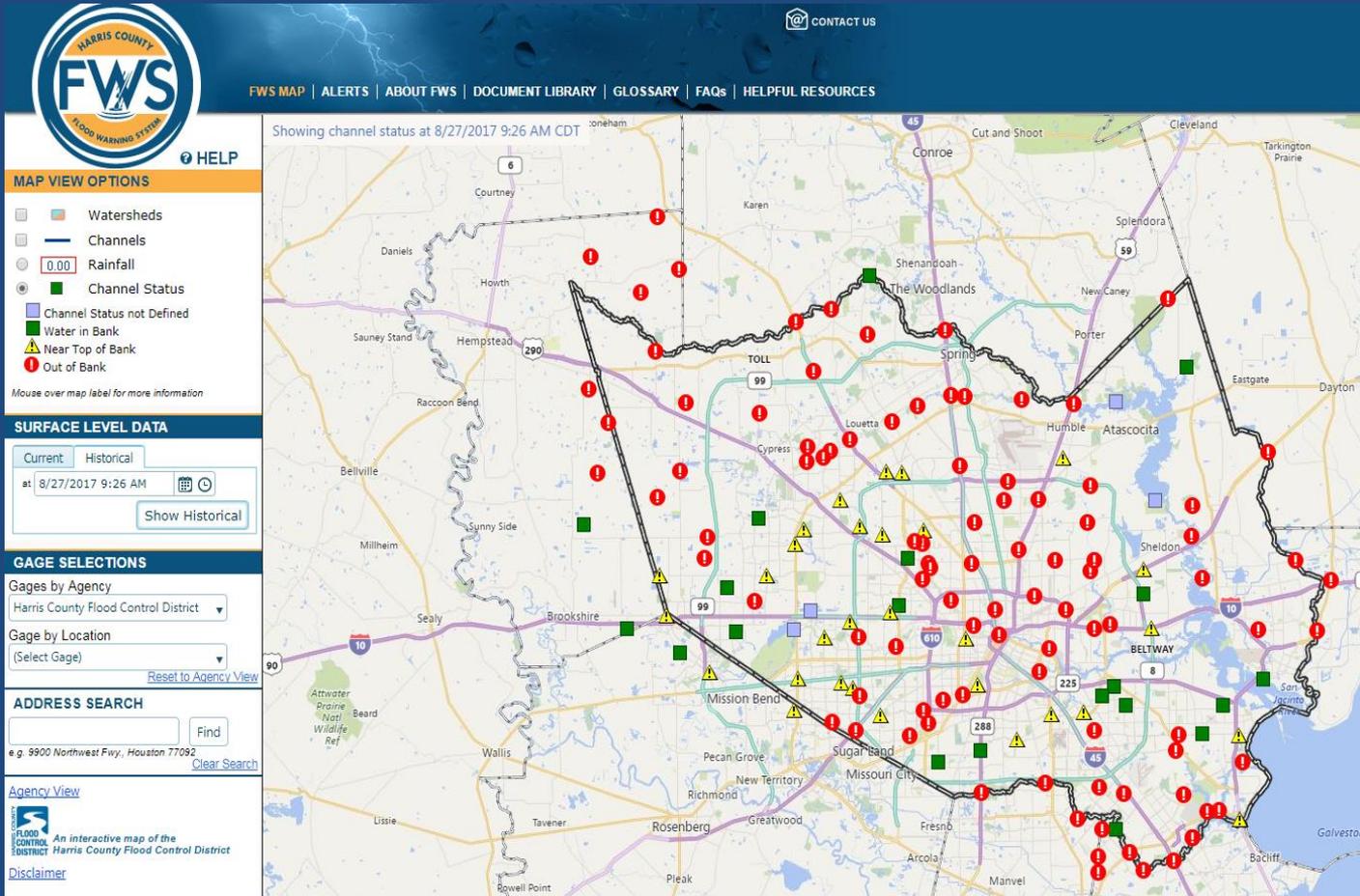
ADDRESS SEARCH

Find
e.g. 9900 Northwest Fwy, Houston 77092
Clear Search

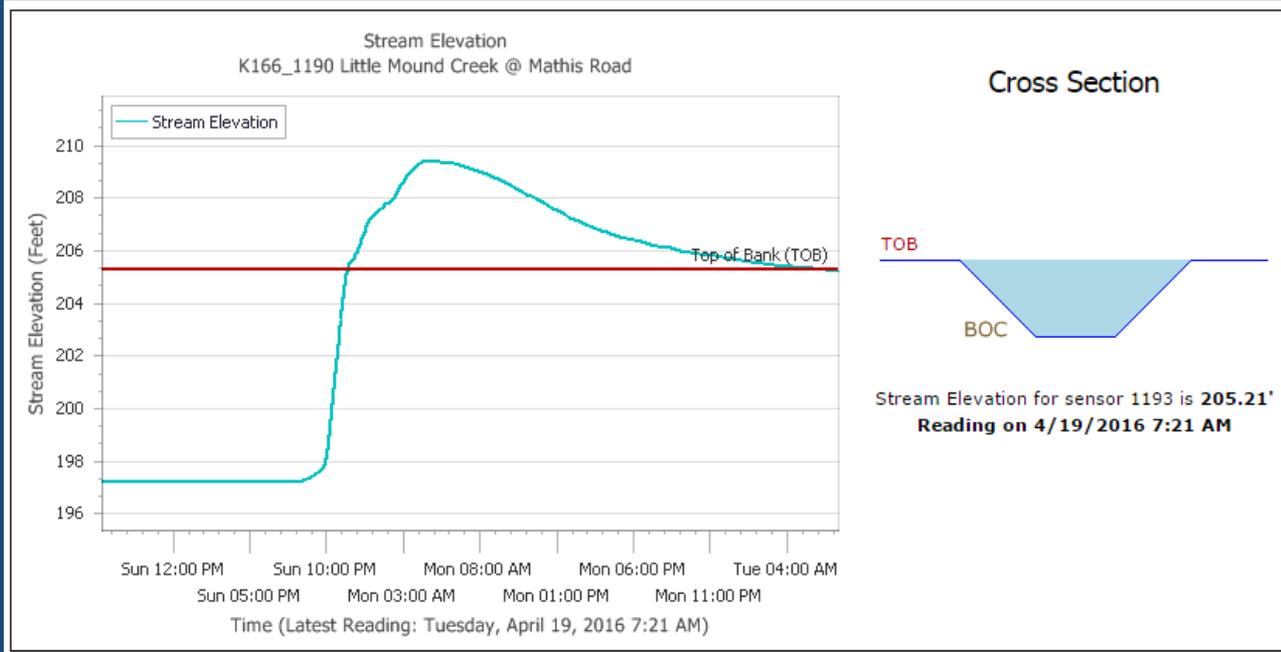
An interactive map of the Harris County Flood Control District
[Disclaimer](#)



Public Website – Channel Status



Public Website – Water Level

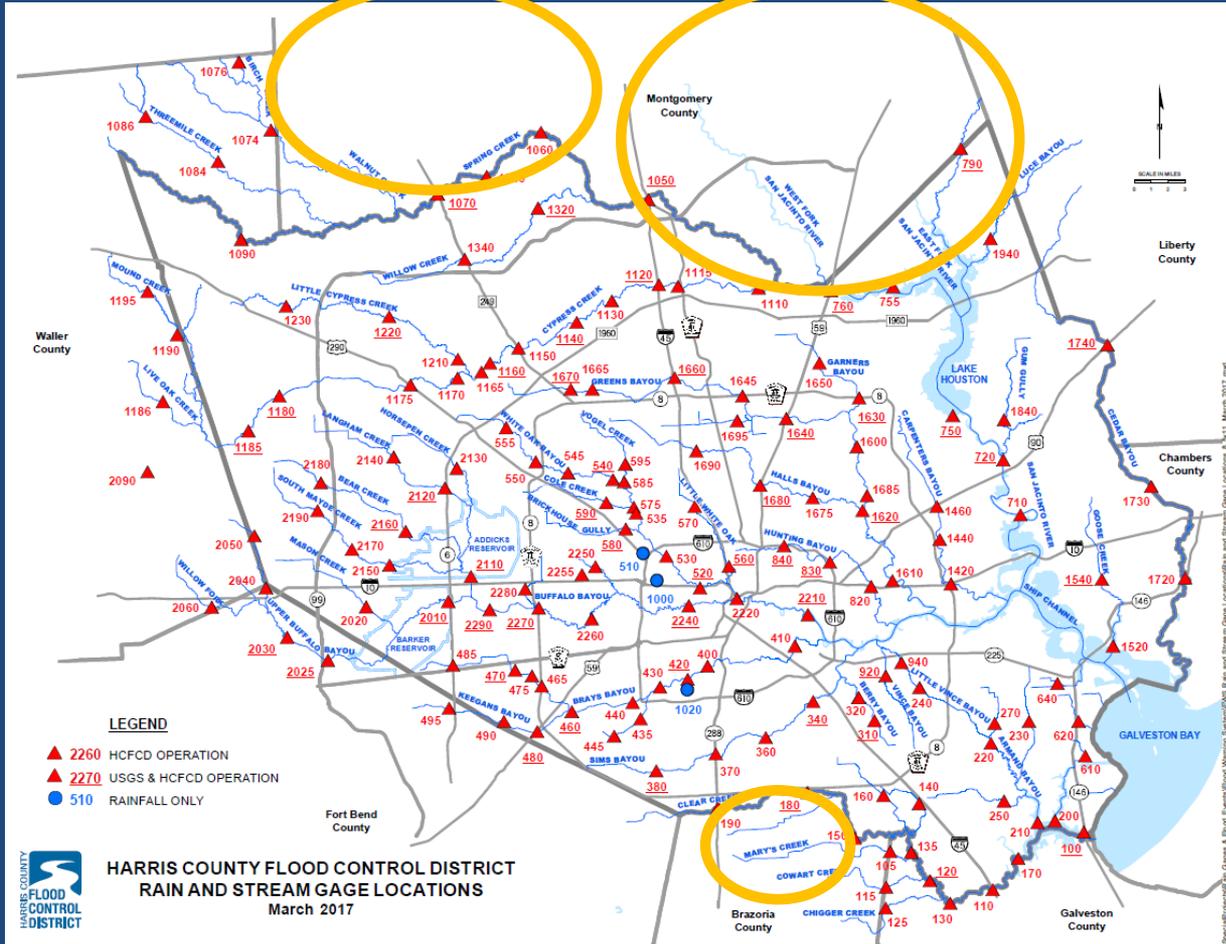


Flood Frequency	Elevation
10% (10-year)	208.80'
2% (50-year)	209.70'
1% (100-year)	210.10'
.2% (500-year)	211.10'

Historical Storm		
Date	Event	Elevation
7/12/2012		207.90'
4/18/2016		209.30'
5/27/2016		208.05'
8/27/2017	Harvey	208.90'

High water mark elevations are approximate.

Gage Network Expansion





Flood Preparedness

What to do before, during, and after a flood?

Flood Risk?

Any situation involving exposure to a Flood danger, harm or loss.

“While levees can help reduce flood risk...they do not eliminate the risk.”

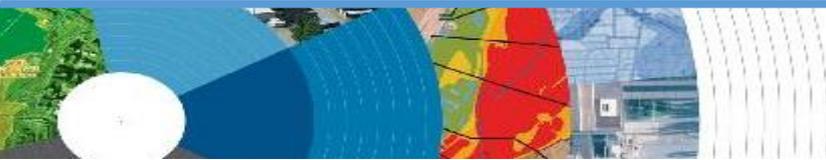


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Flood Insurance/Group Flood Insurance

Everyone is at risk for flooding

- **Brief definition of flooding is any forms of rising water in which 2 properties are affected-one being yours**
- **Structure Coverage**
 - Max coverage \$250,000
- **Contents coverage**
 - Contents is an optional addition, except for Preferred Risk Policy.
 - Max coverage \$100,000 coverage for Actual Cash Value
- **Wait Period**
 - Typically - 30-days from purchase until effective.
- **Average NFIP pay out for Harvey was \$112K (March 2018)**
- **Group Flood Insurance**
 - Available during a Presidential Declared event
 - If qualified for a IA grant a GFIP will be purchased in the amount of \$600
 - Policy is good for 3 years
 - Must maintain insurance on the property forever
 - Max amount on the policy is 33,500 this includes structure and dwelling
 - Average pay out for Harvey for IA was \$6000



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Insurance Misconception

▪ Misconception:

“I’m already covered—my homeowners policy covers flooding.”

▪ Fact:

Most insurance policies do not cover flooding; only flood insurance covers flood damage.

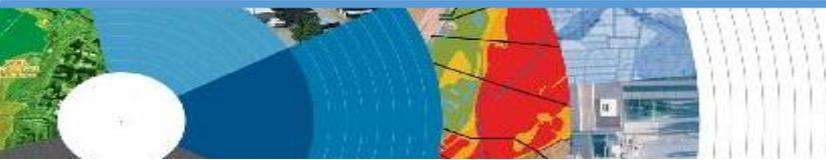
Renters and Business owners should also consider flood insurance for contents.

▪ Misconception:

“I don’t live in a flood zone.”

▪ Facts:

- Floods are the #1 natural disaster in the United States.
- If it can rain, it can flood.
- FIRMs do not show localized flooding from drainage ditches/sewers/road ponding.
- To some degree overland flooding...but not property to property drainage problems.

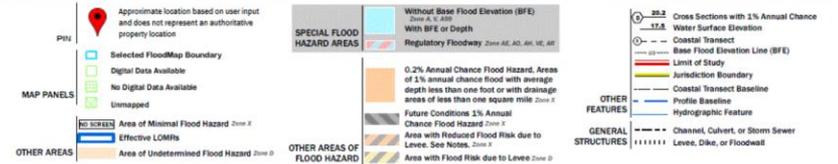
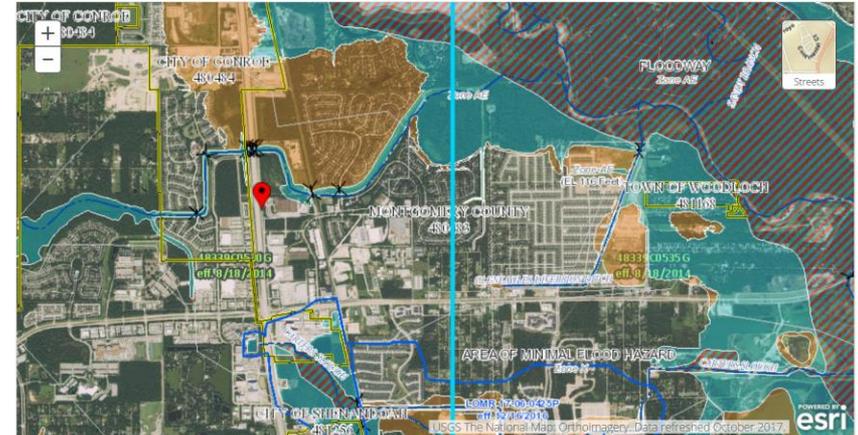


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What is a FIRM?

Flood Insurance Rate Map

- Identifies the flood zones
- SFHA (high risk)
 - A, AE, AO, AH, VE, V etc. (Aqua)
 - 1% annual chance flood
- Non-SFHA (low to moderate risk)
 - B, C and X (Shaded – orange or gray color & non-Shaded)
 - Orange/Gray area – outlines areas protected by Levees
 - Even the non-shaded is a flood zone – a minimal risk.
- Used for rating flood insurance policies
- Are subdivided by panels to cover jurisdictional boundary.
- Shows what the BFE within the zones
- FIRM's show Costal and Riverine flood risk



Find your zone at <https://msc.fema.gov/portal/home>

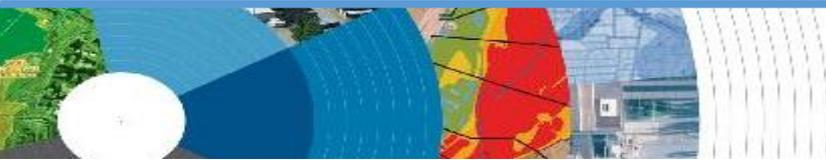


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Cost of Flood Damage?

2,500 sqft, one-story home with possessions worth \$50,000

Interior Water Depth (Inches)	Cost to Home	Cost to Personal Property	Combined Loss Potential
1"	\$23,635	\$3,172	\$26,807
2"	\$23,720	\$3,172	\$26,892
3"	\$24,370	\$4,917	\$29,287
4"	\$31,345	\$7,207	\$38,552
5"	\$31,425	\$13,914	\$45,339
6"	\$37,260	\$14,777	\$52,037
7"	\$37,691	\$17,700	\$55,391
8"	\$38,122	\$20,624	\$58,746
9"	\$38,553	\$23,547	\$62,100
10"	\$38,983	\$26,470	\$65,453
11"	\$39,414	\$29,394	\$68,808
12"	\$39,845	\$32,317	\$72,162
24"	\$44,325	\$43,001	\$87,326
36"	\$47,905	\$46,633	\$94,538
48"	\$53,355	\$50,000	\$103,355



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Structure Elevation Impact Insurance Rates



High Risk =
\$\$\$

Medium Risk =
\$\$

Lower Risk = \$

The elevation is just one factor, others include: when was the structure, has it flooded in the past, etc.

EVERY Structure has a risk...
generally the higher the structure the less the risk.

Harvey Numbers

Insurance claims

- Harris Co (includes cities such as Houston) – all claims 55,570**
- Montgomery (unincorporated only) 739 (Losses over 125K)

New GFIP's Due to Harvey

- Montgomery County –271

Harris County

Numbers**

- 154,170 Homes 48,850 in 1% Risk Area (100-yr)
- 34,970 in 0.2% (500-yr) floodplain
- **68% OUTSIDE of the 1% Risk Area.**

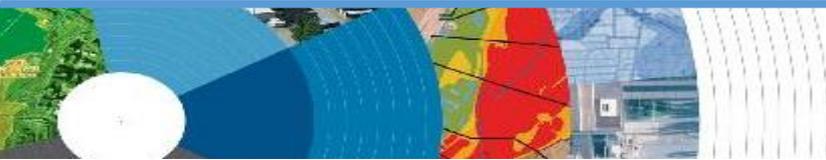
**Data HCFCD Finale Hurricane Harvey Storm and Flood Information –
<https://www.hcfcd.org/media/2678/immediate-flood-report-final-hurricane-harvey-2017.pdf>



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Summary

- Living in Texas means we have a flood risk even with heavy rain.
 - Tax Day 2016 and Memorial Day 2015 – not with a tropical system
- Flood Risk is from multiple sources.
- Flood insurance allows individual property owners to manage their risk.
 - **Buy policies that cover the structure AND contents.**



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Contact Information

Angela Harrison, Insurance

Cell 470-557-2794 | Angela.Harrison@fema.dhs.gov

Yho-Meka Conway, Insurance

Cell 470-572-0803 | Yho-Meka.Conway@fema.dhs.gov

NFIP Hotline

1-800-427-4661

www.fema.gov/nfip

Lauren Schmied, PE, Floodplain Management

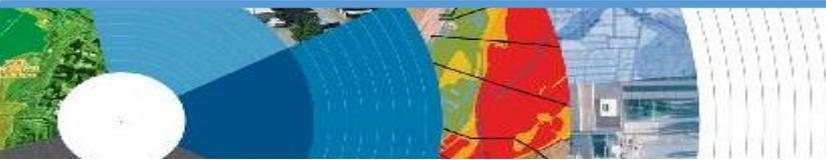
Cell 202-812-6164 | Lauren.Schmied@fema.dhs.gov

Larry Fordham ANFI, CFM, ACA

Acting Senior Regional Insurance Specialist, FEMA Region 6

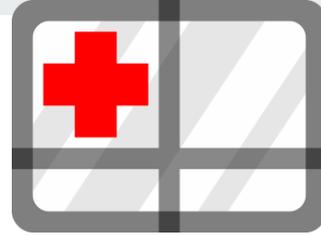
Phone: 940-383-7253 | Cell: 202-394-4483

| Larry.Fordham@fema.dhs.gov



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Safety Before a Flood



- Prepare a family disaster plan.
- Check if your insurance covers flood damages. If not, get flood insurance.
- Keep insurance and other important documents, such as copies of driver's licenses and credit cards, and other valuable items, in a safe deposit box.
- Assemble a disaster supplies kit. Be sure to include prescription medications, food, and water.
- Find out where you can go if ordered to evacuate.
- Arrange to keep in contact with relatives and friends.
- Know your resources.

Knowing what to do when a flood occurs will increase your family's safety and possibly its survival.

Safety During a Flash Flood

- Turn around, don't drown when encountering flooded roads.
- Be especially cautious at night when it is harder to recognize the dangers of flooding.
- Stay away or be swept away. River banks and culverts can become unstable and unsafe.
- You should monitor the latest forecasts and be prepared to take action should additional Flash Flood Warnings be issued.
- Have multiple ways to receive weather information (cell phone, NOAA weather radio, television, etc.)

Turn Around, Don't Drown!

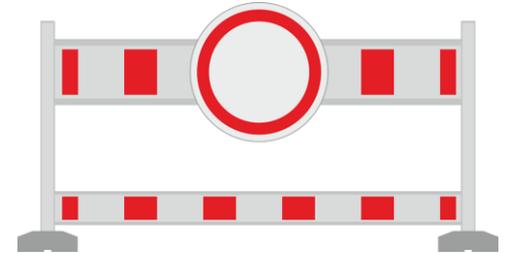
- Most flood deaths occur in vehicles.
- It only takes **six inches of water** for a vehicle to lose contact with the road surface.
- Most vehicles can be swept away in just 18 to 24 inches of water!
- Don't Rely on Your Big Vehicles
- Flooded roads may have hidden dangers, such as washed out road beds or underwater obstructions.
- If your vehicle is caught in rising water, leave it immediately and seek higher ground.



Minnesota road damaged by flood waters, courtesy of FEMA.

Safety During a Flood

- Have multiple ways to receive weather information (cell phone, NOAA weather radio, television, etc.)
- Do not sightsee!
- Evacuations are ongoing and first responders are working hard to get people to safety. Do not get in their way!
- Flood waters from creeks, bayous and rivers will be swiftly moving. *Do not go near the flood waters!* They will sweep you away if you go in the water.
- Roads may still be closed as they could be damaged or still under water. **Barricades are for your protection; do not drive around them!**



Safety During a Flood

- Stay out of the flood waters!
- Floodwaters can contain chemicals, sewage, disease, and animals
- Unseen underwater debris can be sharp and cause injury
- Downed power lines under the water could lead to death or injury from electrocution
- Water depth can change unexpectedly (storm drains, washed-out roads)

Safety After a Flood

- Don't put yourself in danger.
- Return home only when authorities indicate it is safe.
- Stay away from damaged areas unless your assistance has been specifically requested by police, fire, or a relief organization.
- Use extreme caution when entering buildings; there may be hidden damage, particularly in foundations.

Flooding Resources

Flood Safety

Turn Around Don't Drown

State Flood Information

Flood Hazards

NWS Flood Related Products

Forecasts and Observations

National Water Center

Education and Outreach Materials

Partner Agencies

[weather.gov/flood](https://www.weather.gov/flood)

Safety After a Flood

- Don't leave lit candles unattended
- Cut power to flooded areas of your home
- Only use generators in well-ventilated areas—never in a closed garage!
- Take breaks and drink plenty of fluids
- Do not use power tools while standing in water
- If you smell or hear gas, call the Fire Department.





Reporting/Wrap Up

What to Report

Flash Flooding

- Underpasses filling with water
- Impassible roadways
- Any fast-moving water greater than 6 inches in depth

Any River or Bayou Flooding



Flooding, Washington County (2016)

Formatting Reports



Reports should include the following information:

WHO is calling

WHERE the flooding is located

WHAT type of flooding is occurring (flash, river, or bayou)

WHEN the flooding occurred (is it ongoing?)

HOW deep is the water (if you can *safely* evaluate this)



The Good

“I’m a storm spotter located in Sealy at the intersection of Meyer and FM 2187. Water is flowing over curbs; it’s at least 6-8 inches deep in some locations on the road.”

The Bad

“Hey, we got some flooding here a few minutes ago!”

The Ugly

“My sister-in-law said the bayou got really closer to her house, did you have a warning out for that?”

How to Report

Call us!

Spotter line: 1-800-846-1828

Report via amateur radio

Call sign WX5HGX

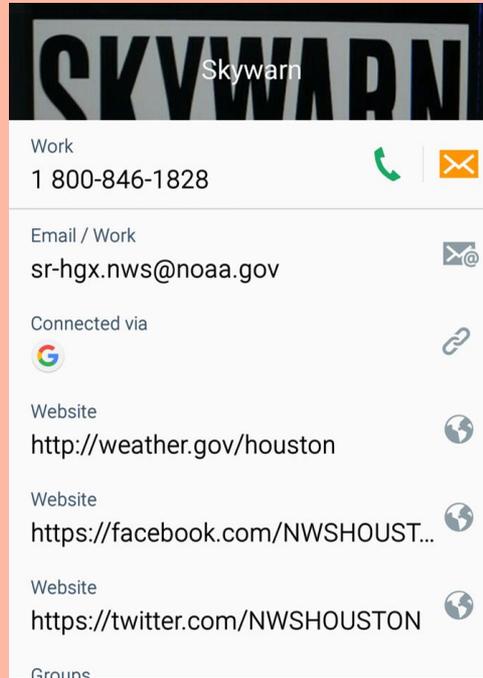
Email

sr-hgx.nws@noaa.gov

Social Media

Twitter: @NWSHouston

Facebook: NWSHouston



Spotter Tip

Set up SKYWARN as a contact
in your smartphone



Questions

National Weather Service
San Jacinto River Authority
FEMA