



2018 FloodWarn Training

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Outline

Flooding Importance

Flooding Types and Causes

Flood Products

Coastal Flooding

River Flooding

Partners

Flood Preparedness

Reporting Flooding

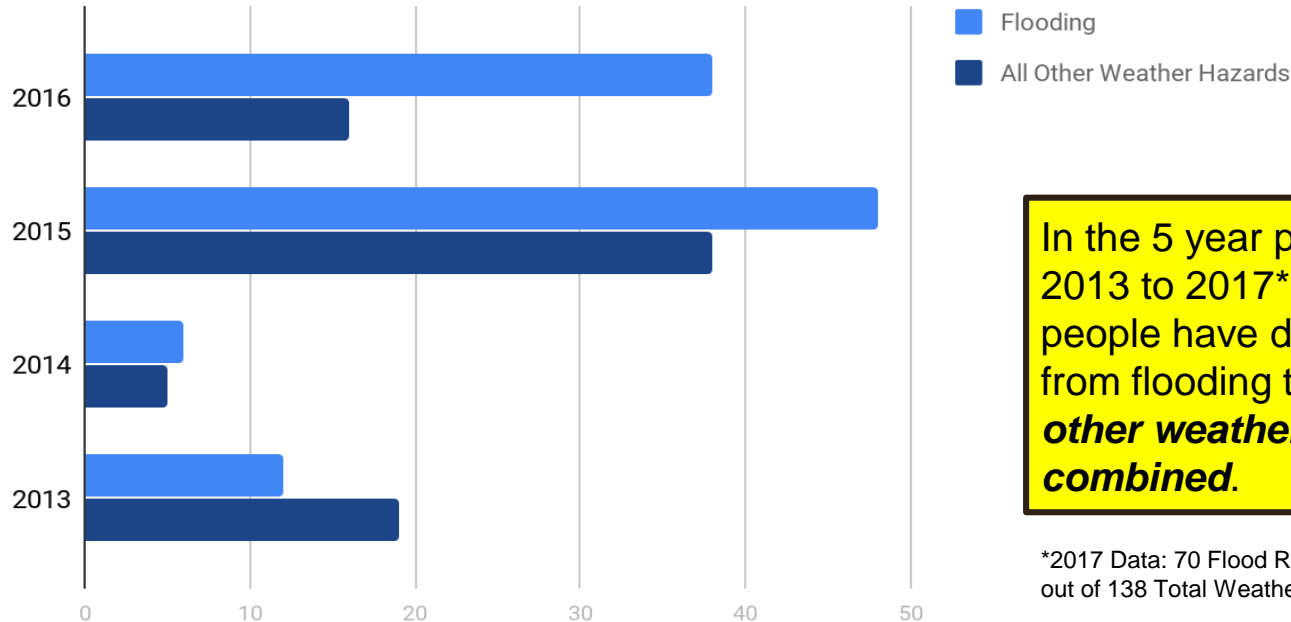




Flooding Importance

Flooding is Deadly!

Weather-Related Deaths in Texas

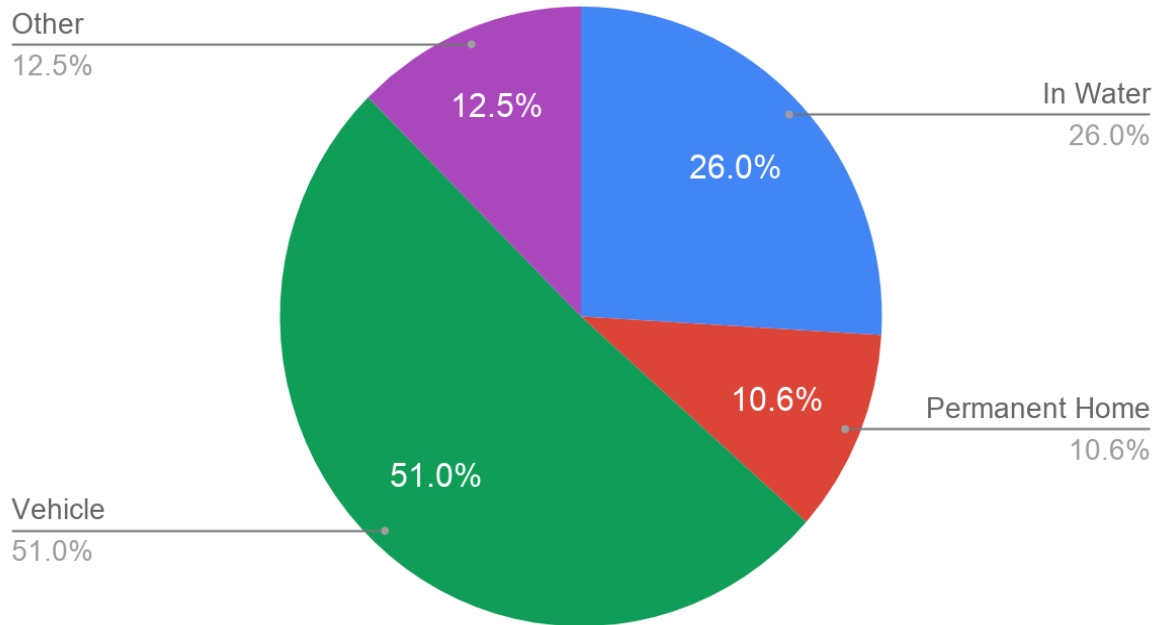


In the 5 year period from 2013 to 2017*, **more** people have died in Texas from flooding than ***all other weather hazards combined.***

*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



Tax Day 2016



Brenham 2016



Harvey 2017

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



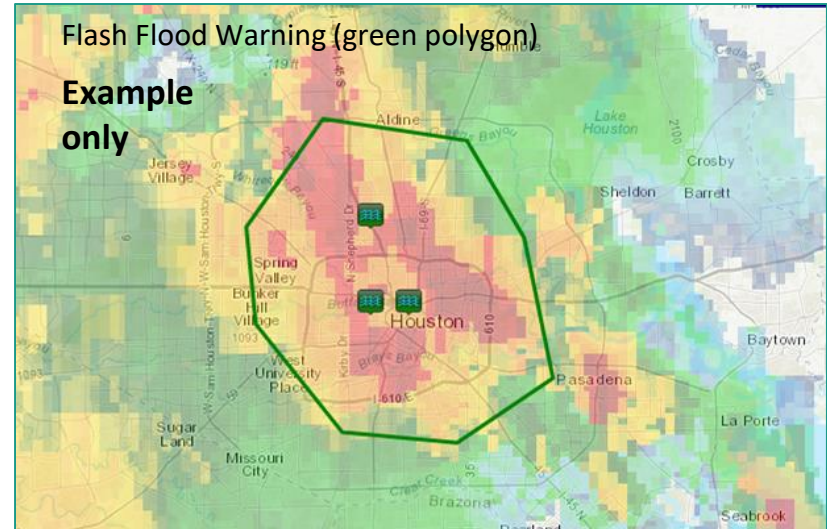
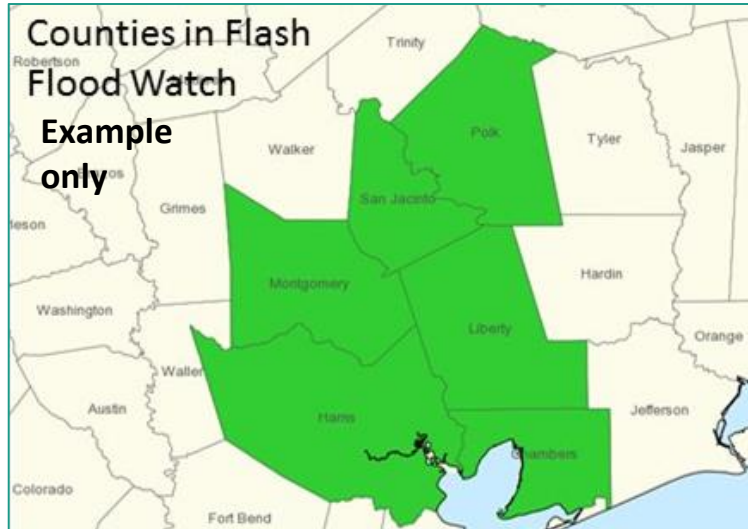


Flood Products

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?

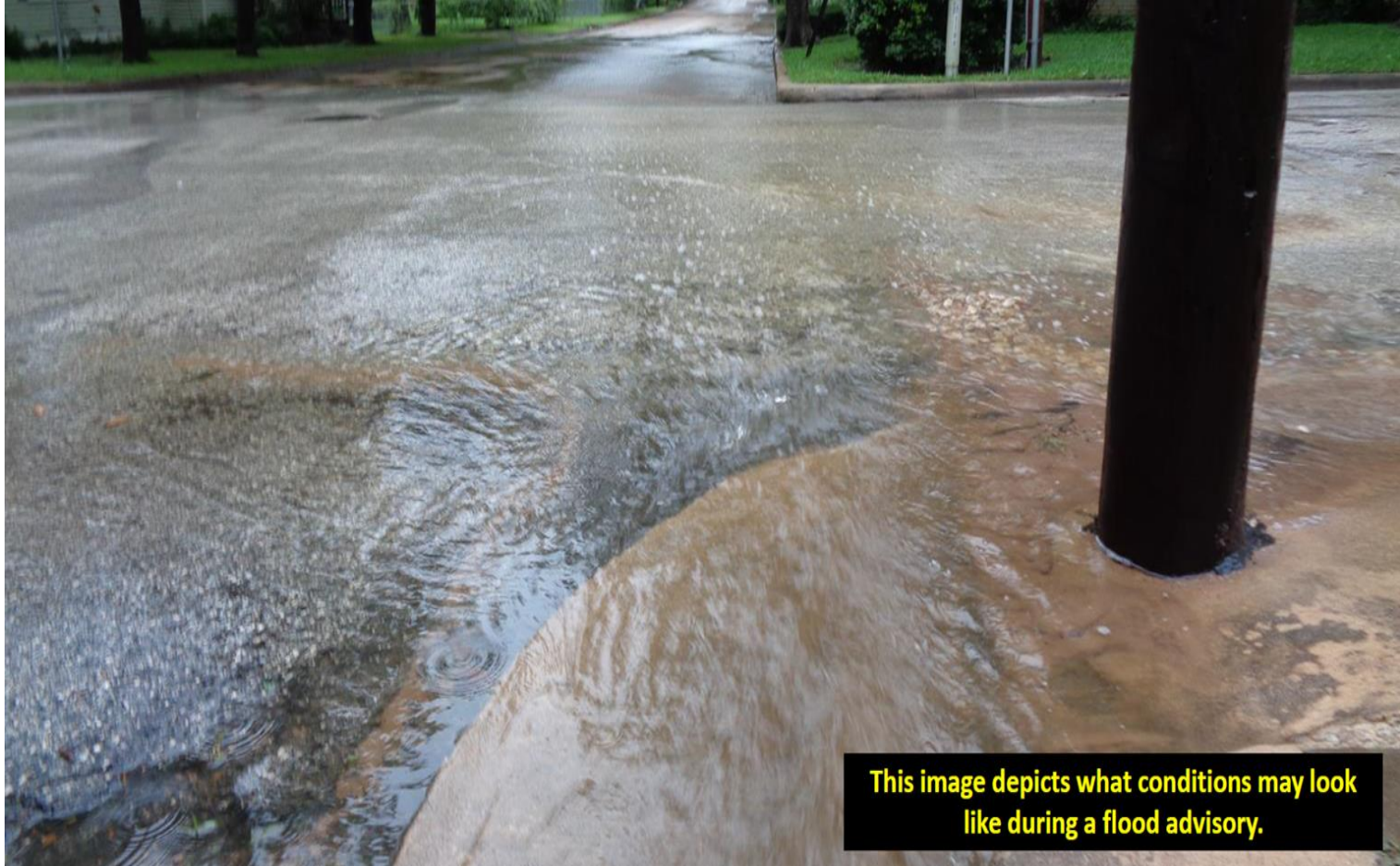
Flash flood situation that presents a clear threat to human life due to extremely dangerous flooding conditions

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



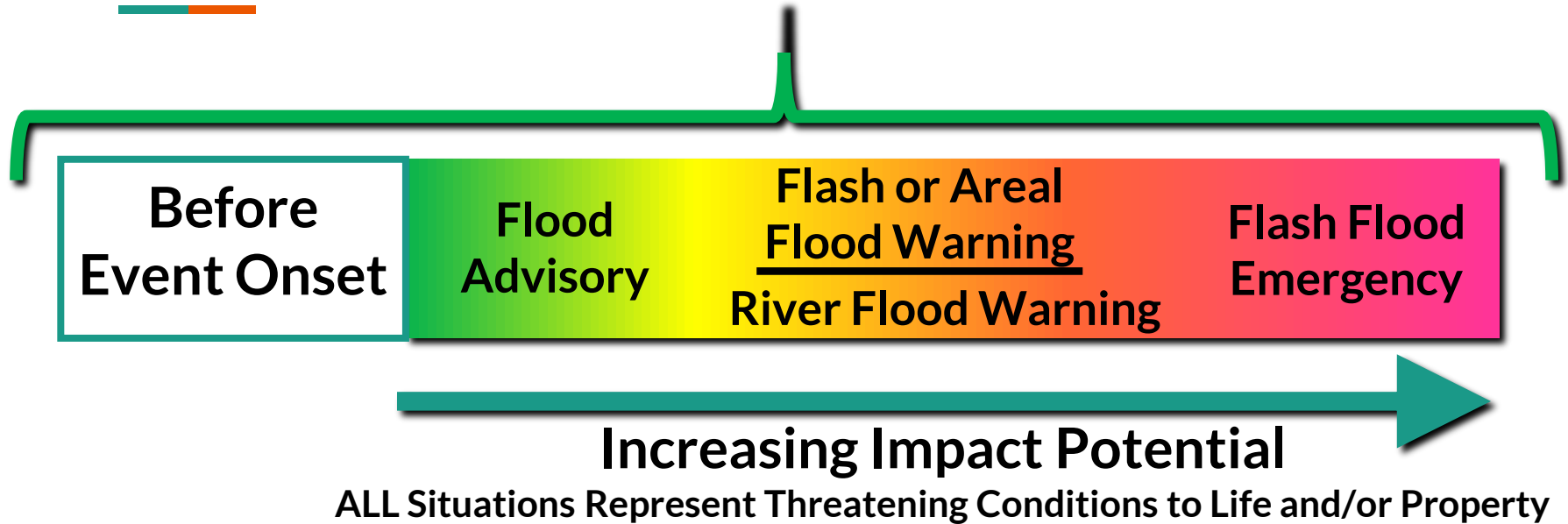
This image depicts what impacts may result from a Flash Flood Emergency. A rapidly moving flood wave resulted in this roadway being completely washed out.

Flood Warning (Areal/ River/ Bayou)



This image depicts what conditions may look like during an Areal Flood Warning.

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



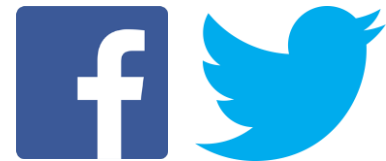
Wireless Emergency Alerts and Weather Apps



TV and Radio



Social Media



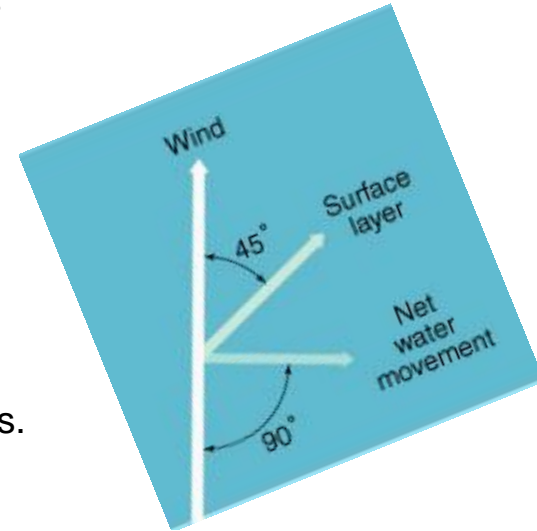
NWS Website: <https://www.weather.gov/hgx/>



Coastal Flooding

What impacts water levels locally?

- ❑ **Ekman Transport:** Water is deflected/transported 45° (at the surface) to 90° (330-500 feet) to the right of the wind.
- ❑ **Wind direction:** An easterly wind component will typically produce higher water levels. Opposite is true about northwesterly directions.
- ❑ **Wind speed:** Higher speeds have a more significant impact than lower speeds.
- ❑ **Duration:** The longer elevated winds persist, the more significant the impacts.
- ❑ **Fetch:** The longer the distance the elevated winds, the more significant the impacts.
- ❑ **Miscellaneous:** Astronomical tides, seas, shelf slope, shape of the coast, etc.





You make the call...

Which scenario is more likely to produce higher water levels?

#1



#2



Which scenario is more likely to produce higher water levels?

#1



#2



Which scenario is more likely to produce higher water levels?

#1

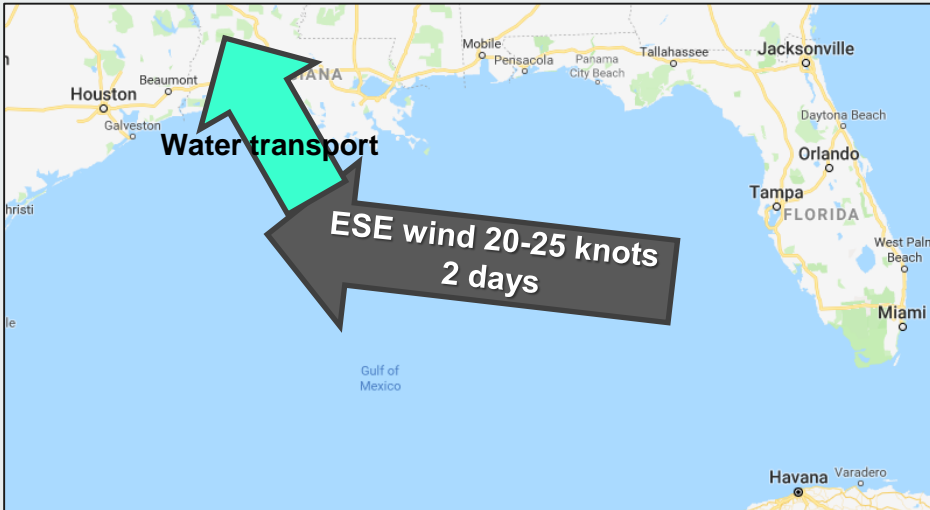


#2



Which scenario is more likely to produce higher water levels?

#1



#2



Which scenario is more likely to produce higher water levels?

#1

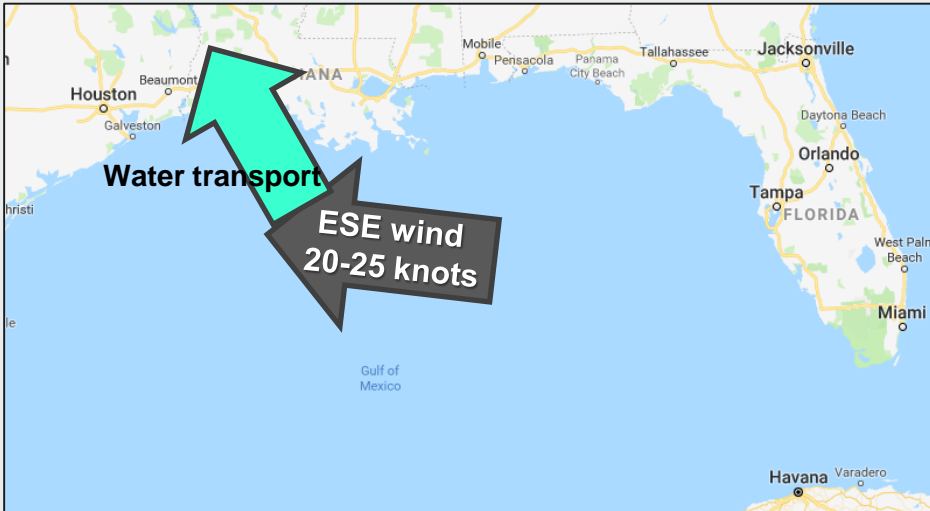


#2

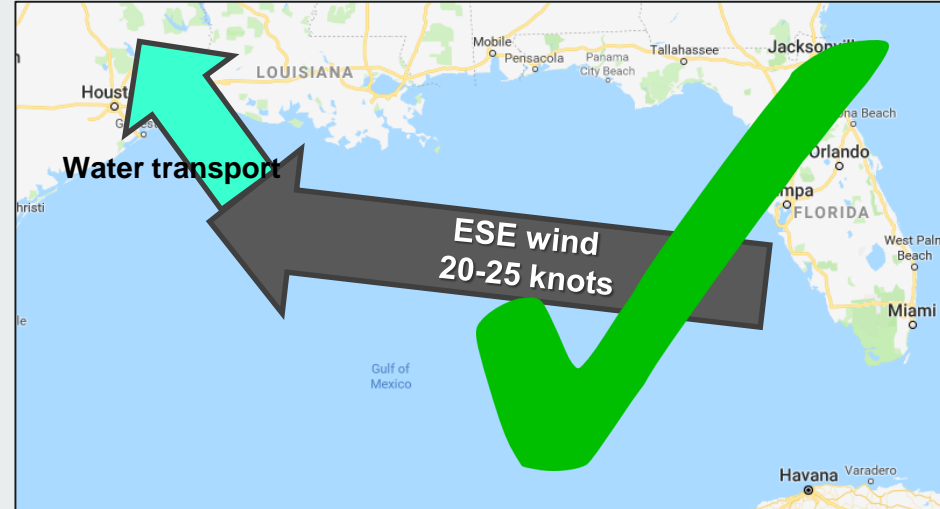


Which scenario is more likely to produce higher water levels?

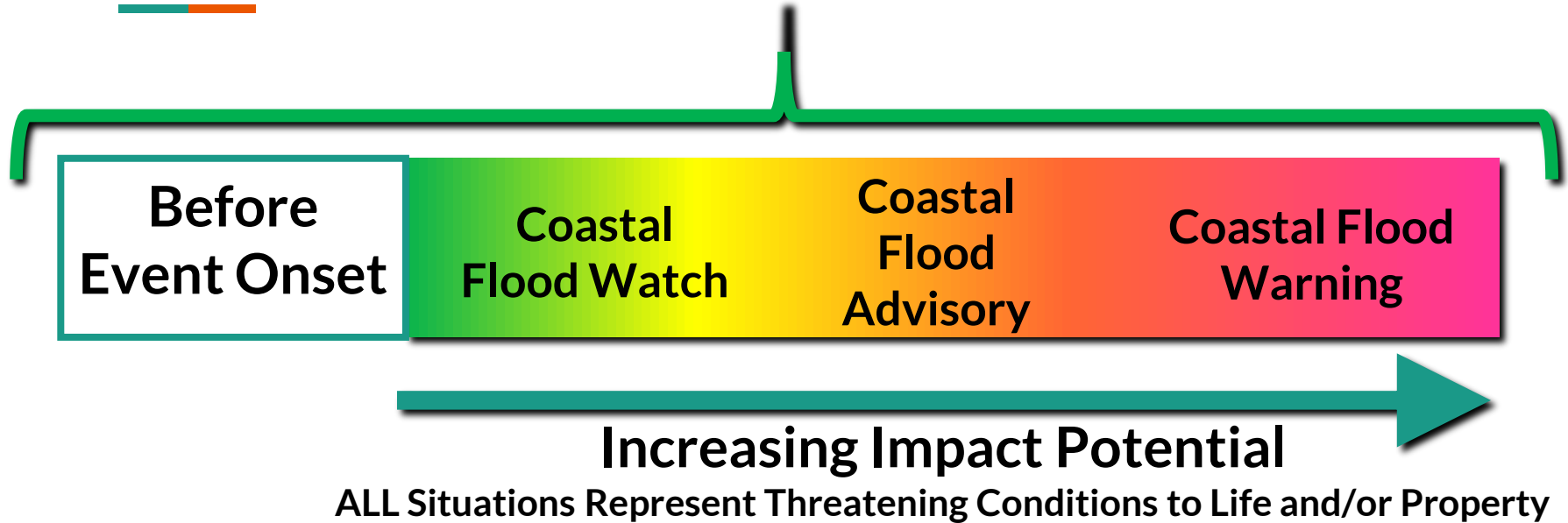
#1



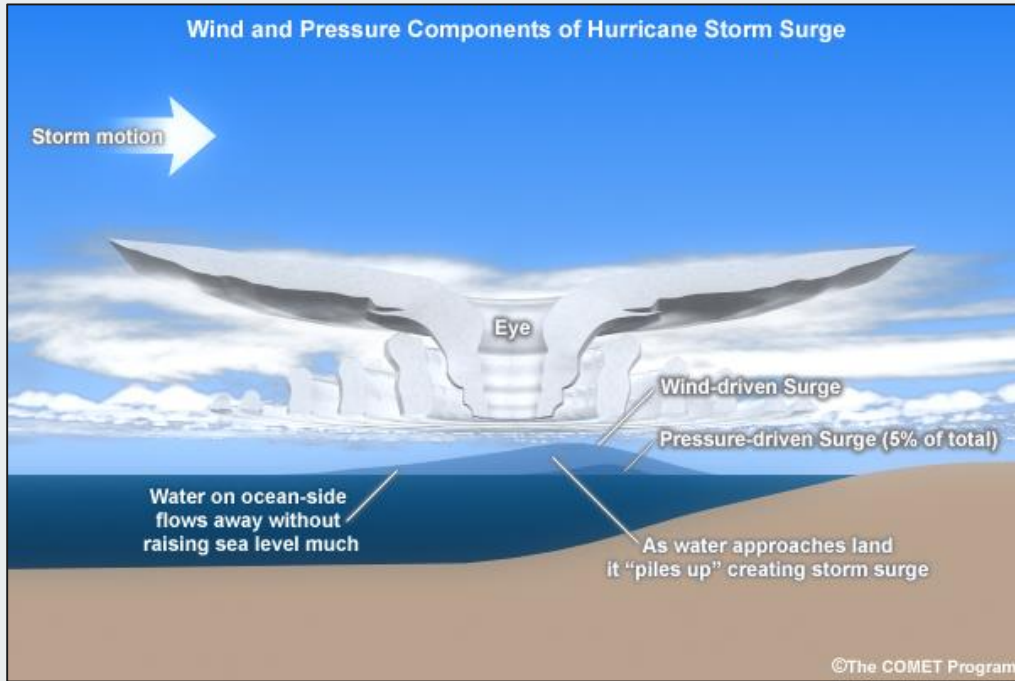
#2



Coastal Flood Timeline



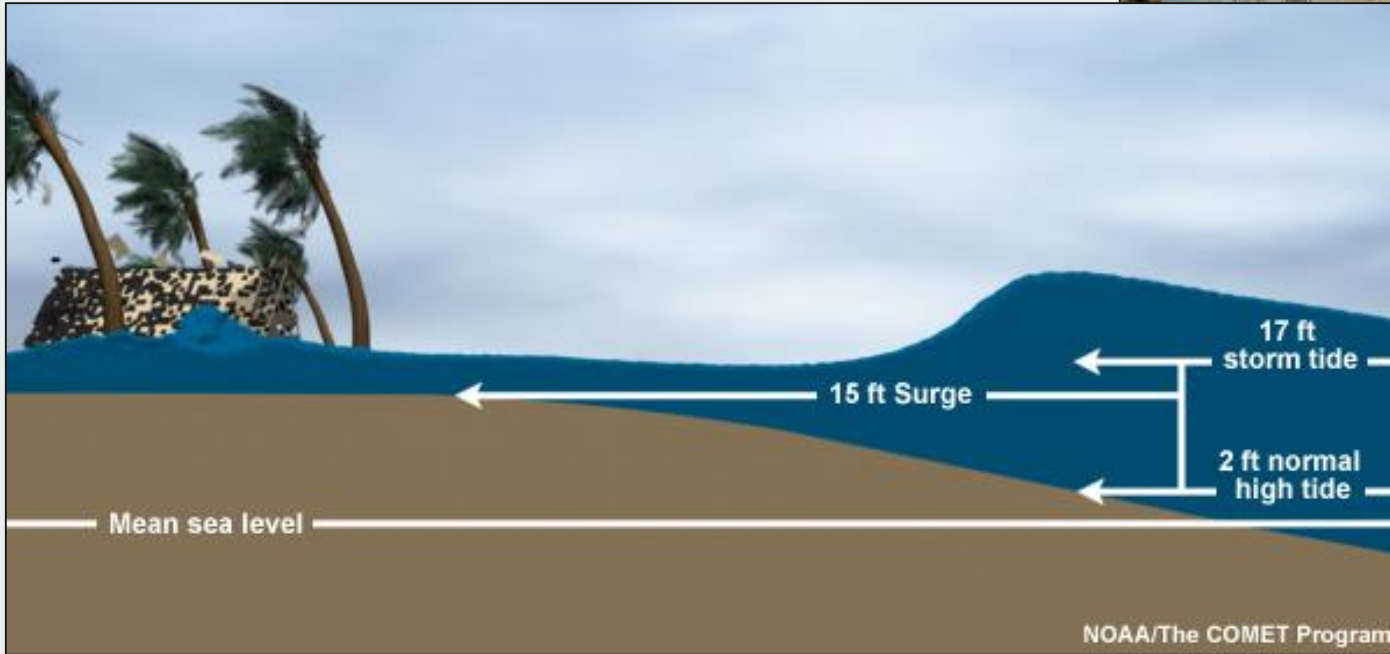
Storm surge



- ❑ Storm surge is an abnormal rise of water generated by a storm, over and above the predicted astronomical tides.
- ❑ Storm surge is produced by water being pushed toward the shore by the force of the winds moving counter-clockwise around the storm.
- ❑ Storm surge is often the greatest threat to life and property from a hurricane.

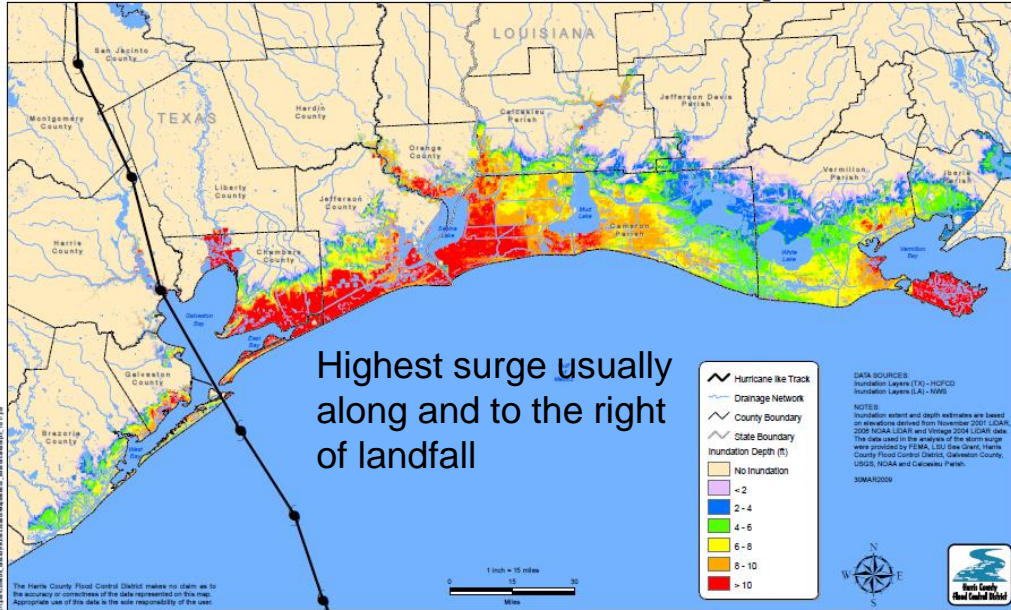
Storm Surge

Waves on top of surge are highly destructive. Water weighs approximately 1,700 pounds per cubic yard.



Storm Surge

Hurricane Ike Inundation Depth



Storm surge values many times do not correspond well to the hurricane wind categories (on the Saffir-Simpson Hurricane Wind Scale) that range from 1 to 5. These categories are based only on winds and do not account for storm surge. Ike was a category 2 storm that produced a 15-20 foot storm surge.

Sensitive to the slightest changes in:

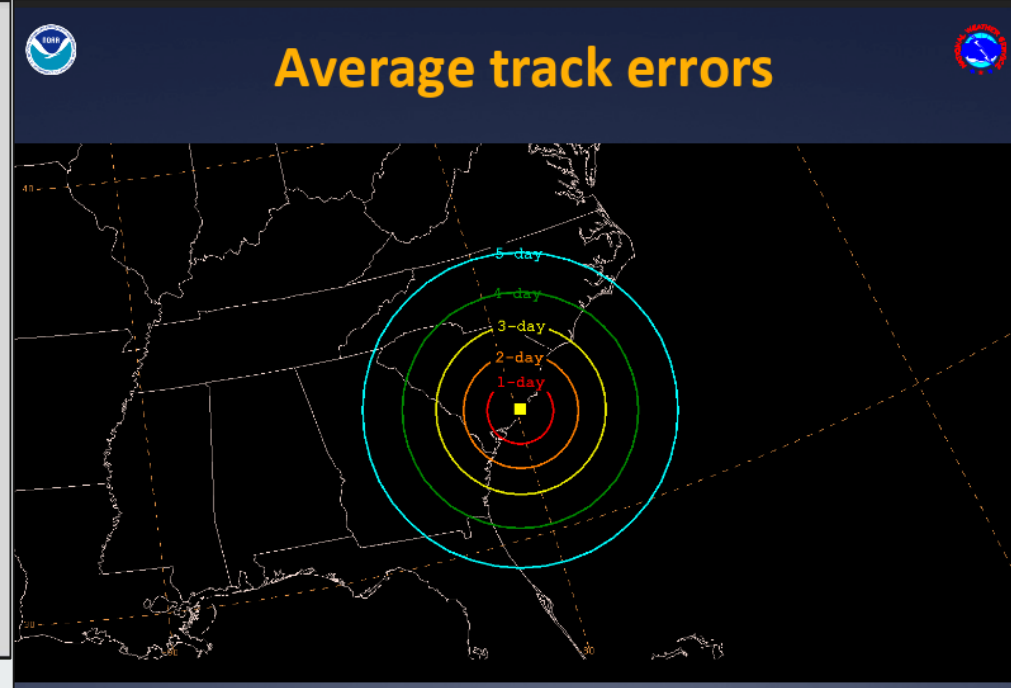
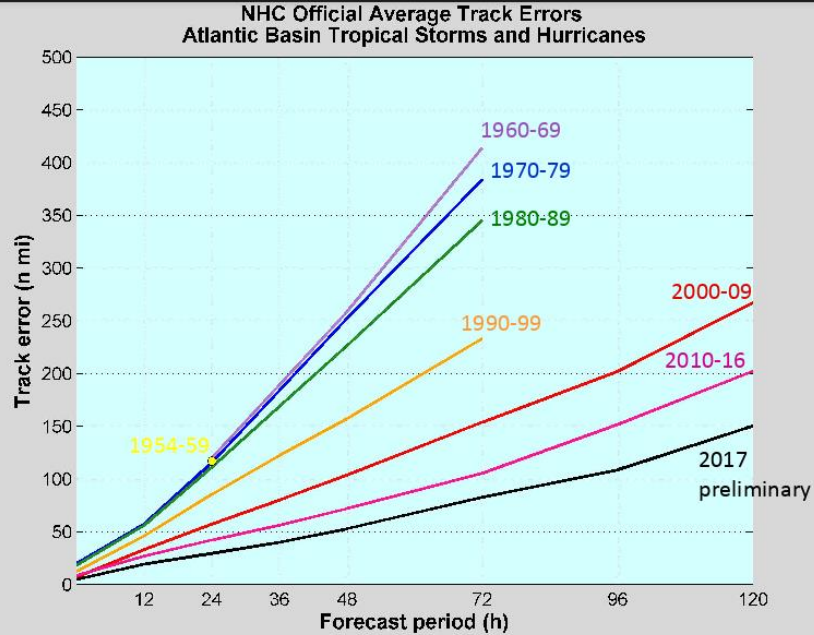
- ☐ Storm track.
- ☐ Storm intensity.
- ☐ Forward speed.
- ☐ Size (radius of maximum winds).
- ☐ Angle of approach to the coast.
- ☐ Shape and characteristics of coastal features such as bays and estuaries.
- ☐ Width and slope of the continental shelf. A shallow slope will potentially produce a greater storm surge than a steep shelf.

Storm Surge

Sometimes high water levels cut off communities well before (sometimes days) bad weather arrives. First responders need to be prepared for this and also ensure your personal family members have a plan in place.

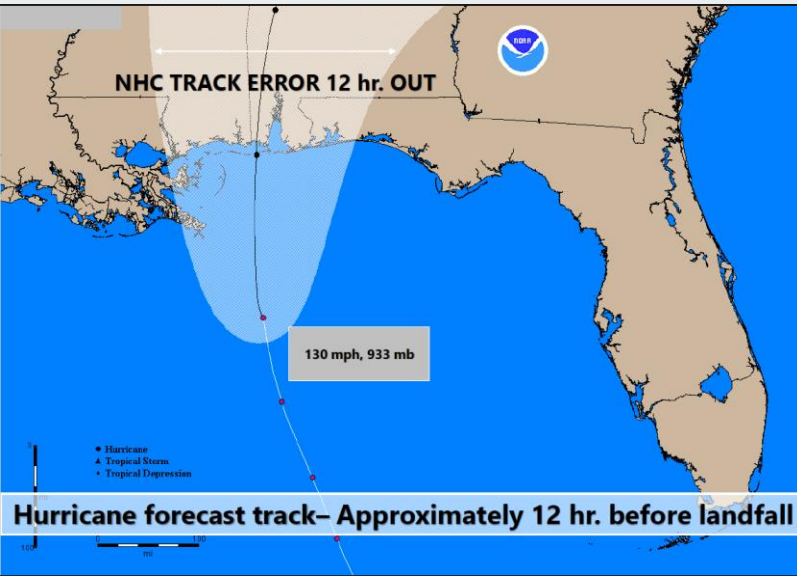


Track Errors

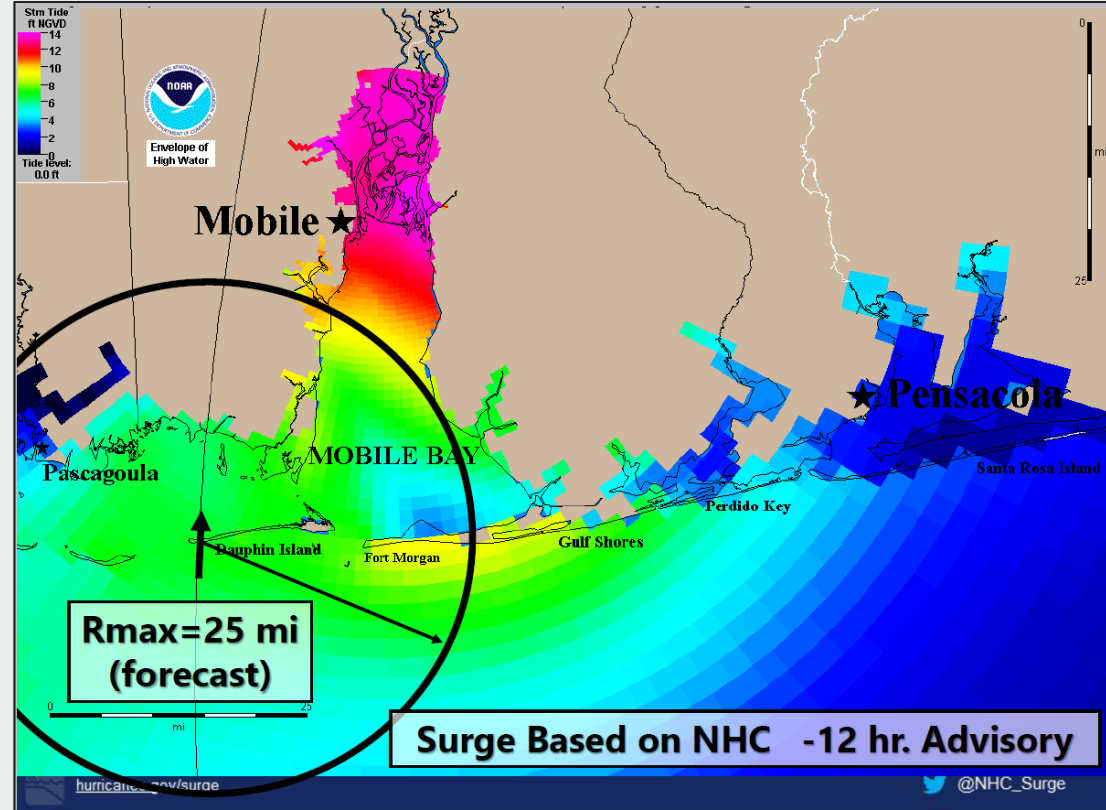


Storm Surge

Real scenario...NHC forecast track

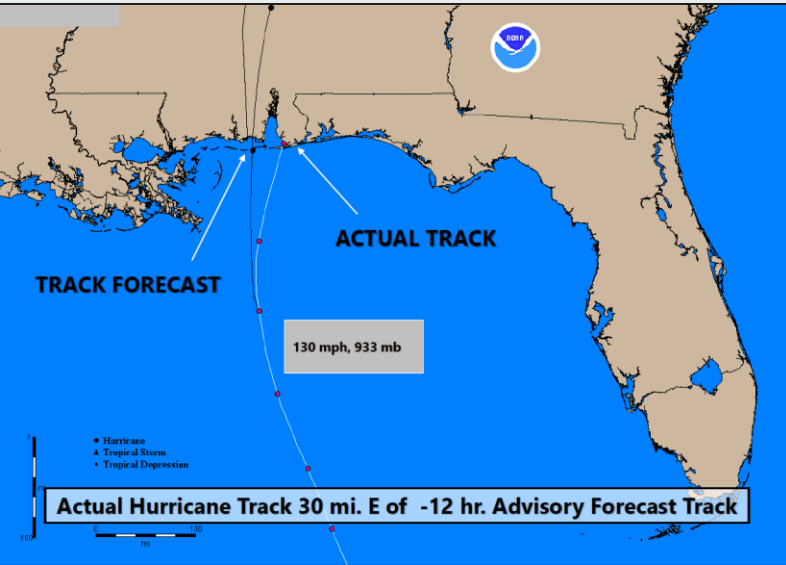


Forecast surge

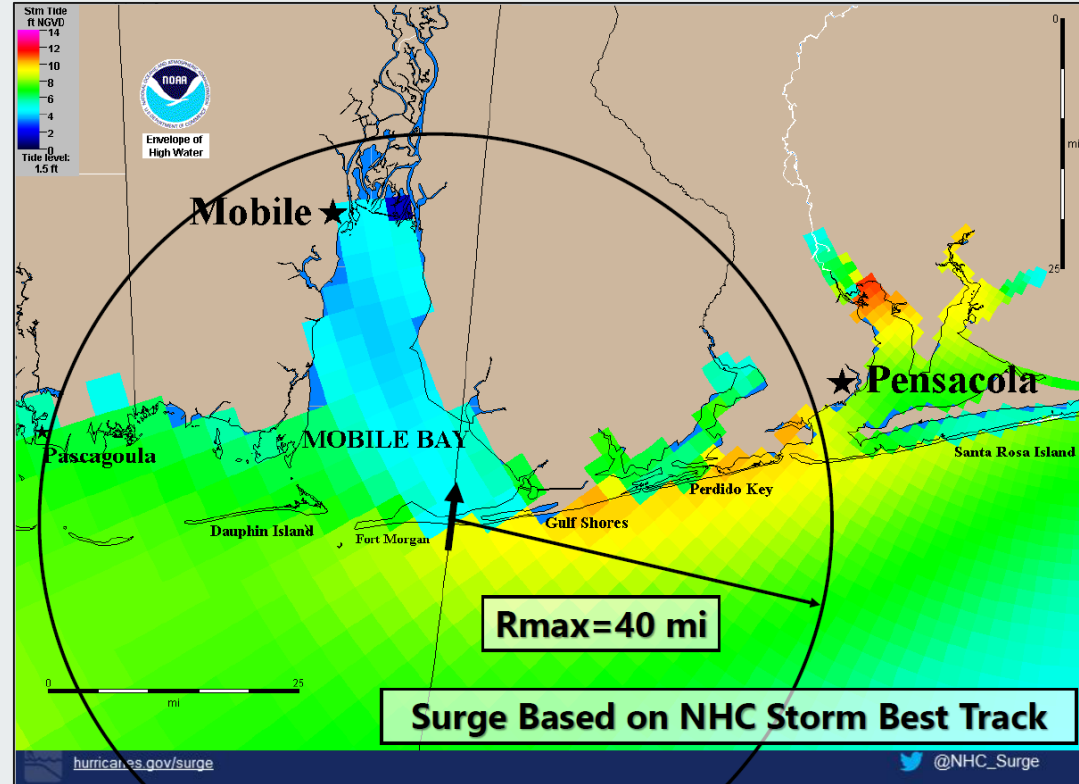


Storm Surge

Actual track

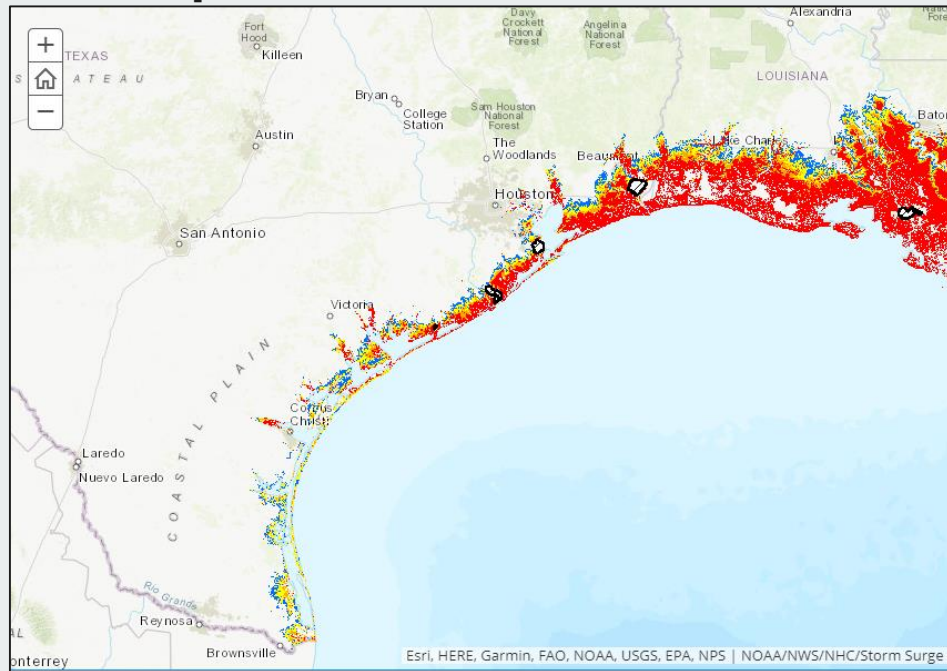


Observed surge



Storm Surge – Readiness, Planning & Mitigation

Landfall 48+ hours out: pre-computed *risk* maps (SLOSH MOMs and MEOWs).



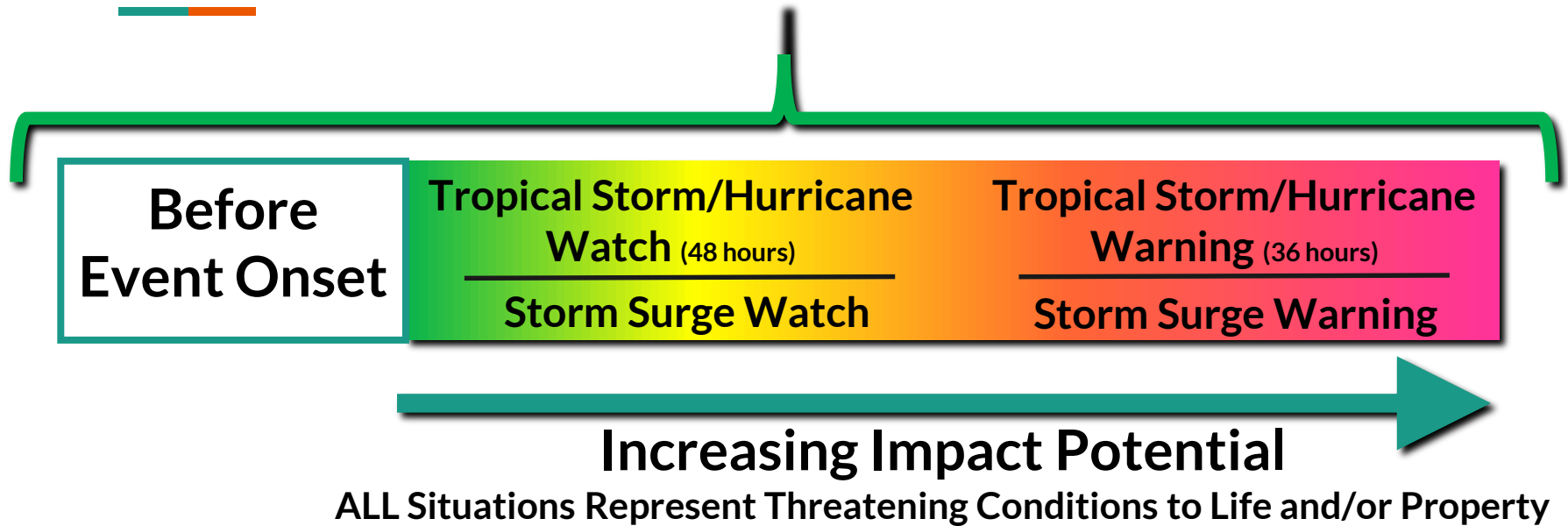
- ❑ Maps made by using up to 100,000 hypothetical storms to compute the maximum storm surge at an individual point.
- ❑ Varying forward speed, radius of maximum wind, intensity, landfall location, tide level, and storm direction.
- ❑ Ask your local NWS where to find these maps and how to read them.

Hurricane X

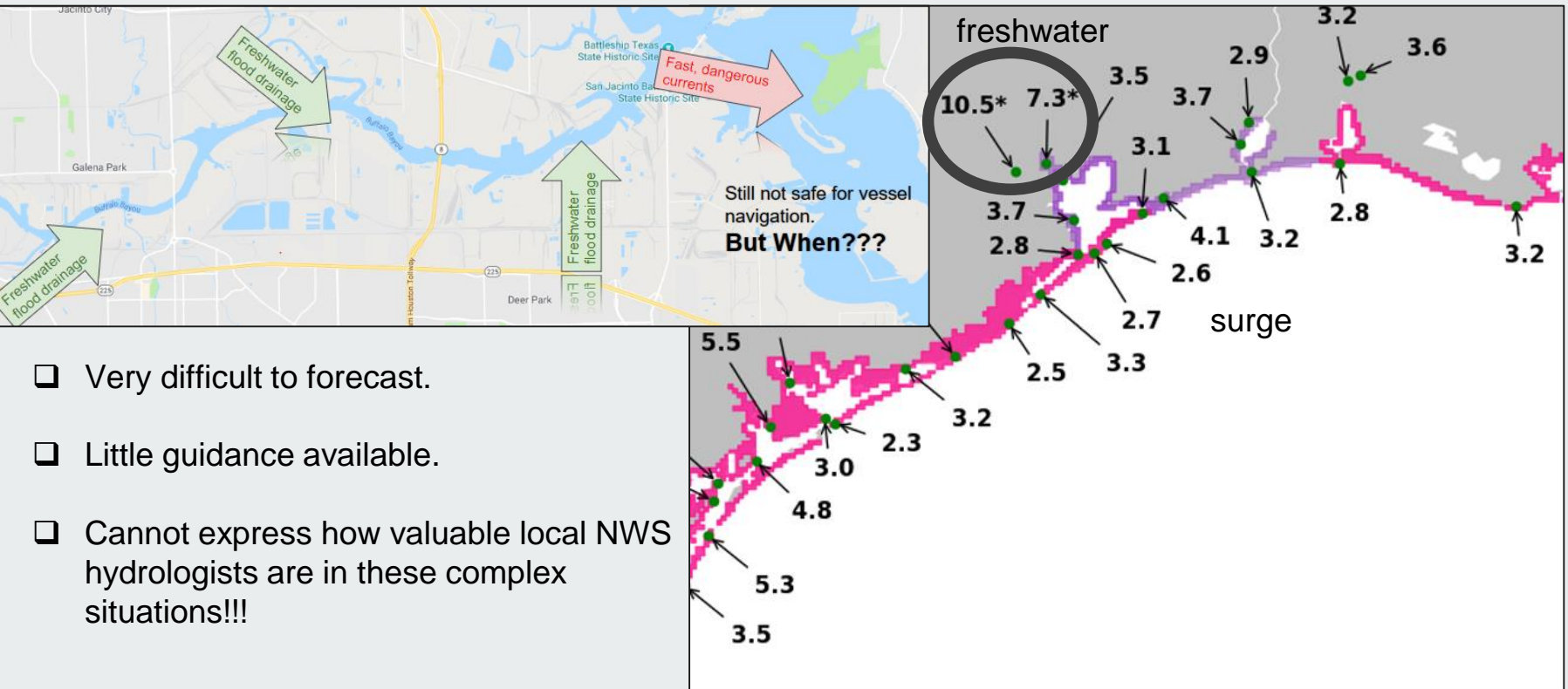


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Tropical Cyclone Timeline



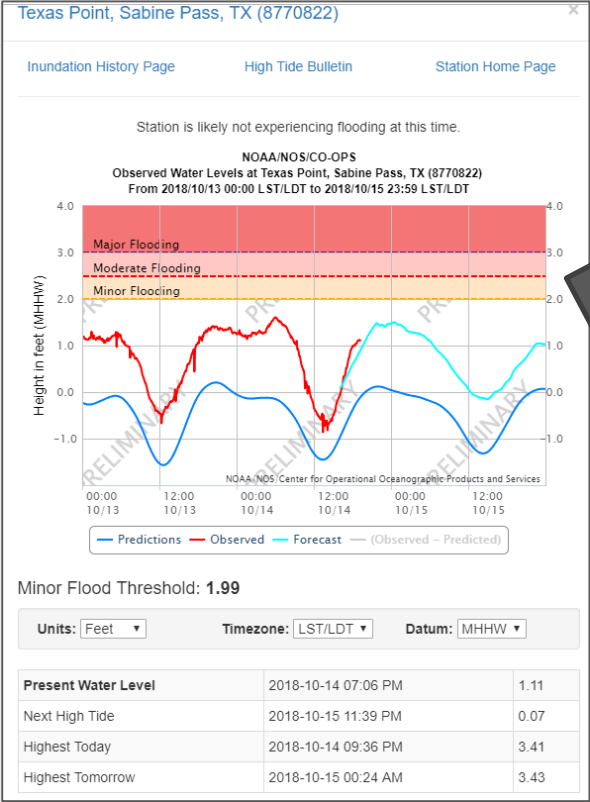
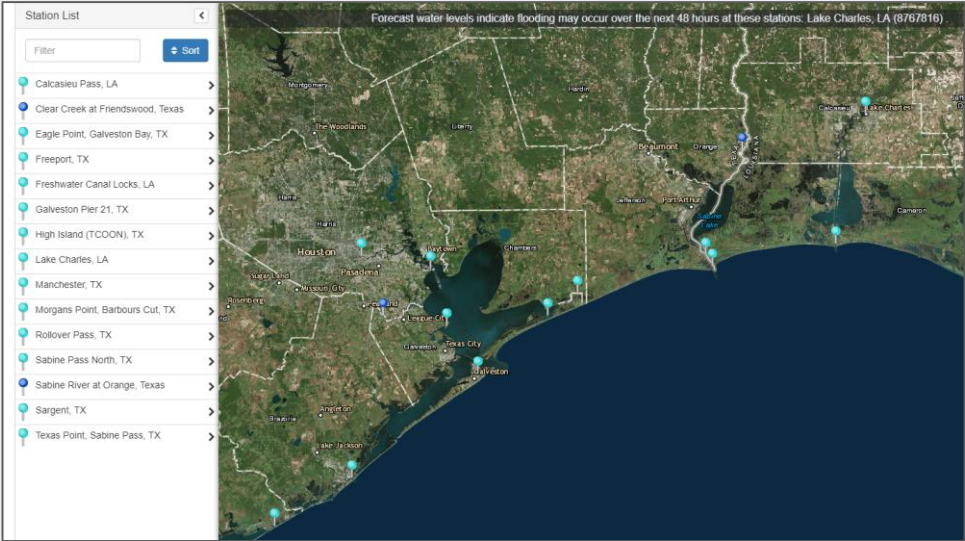
Storm Surge + Freshwater Flooding (Harvey)



- ❑ Very difficult to forecast.
- ❑ Little guidance available.
- ❑ Cannot express how valuable local NWS hydrologists are in these complex situations!!!

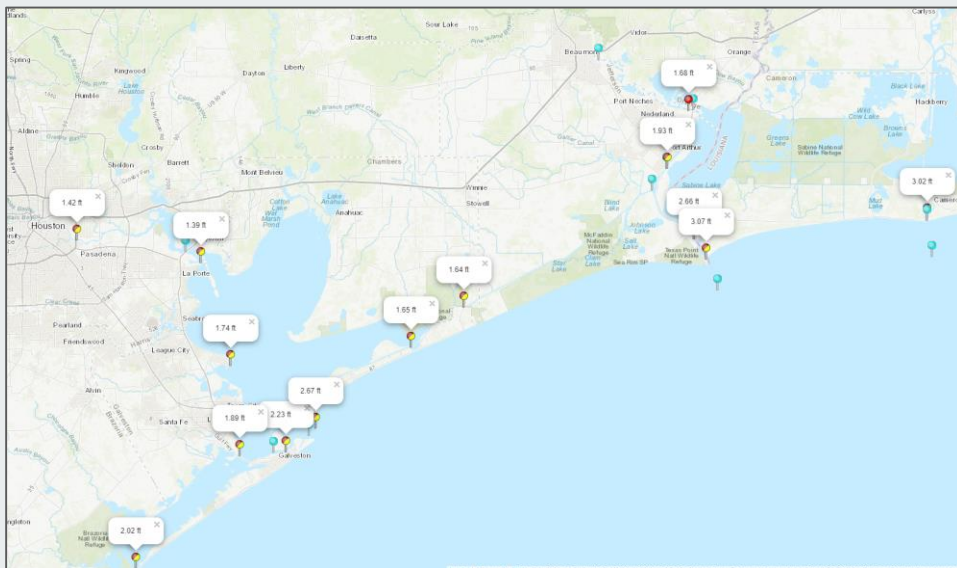
Real Time Water Level Observations & Forecasts

<https://tidesandcurrents.noaa.gov/inundationdb/>

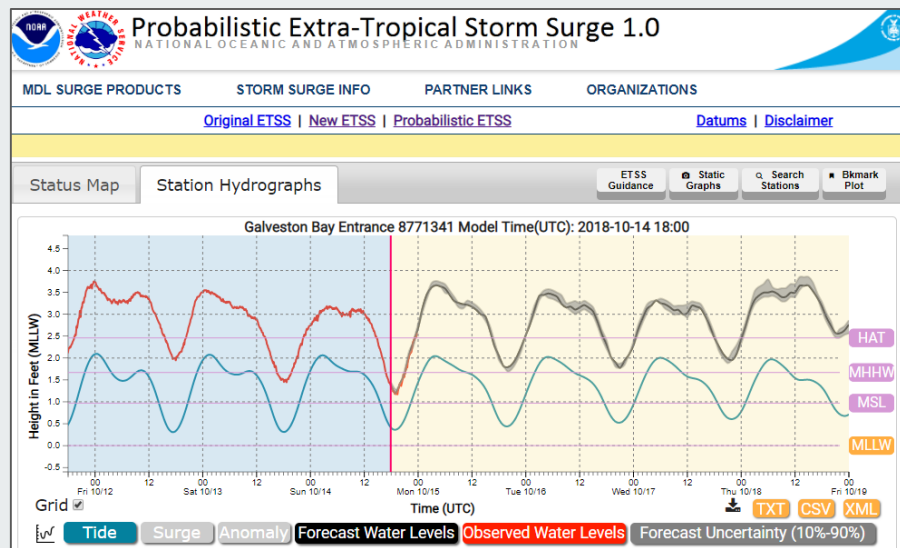


Real Time Water Level Observations & Forecasts

<https://tidesandcurrents.noaa.gov/map/index.html?region=Texas>



<https://slosh.nws.noaa.gov/etsurge2.0>





River Flooding

Llano River Flooding



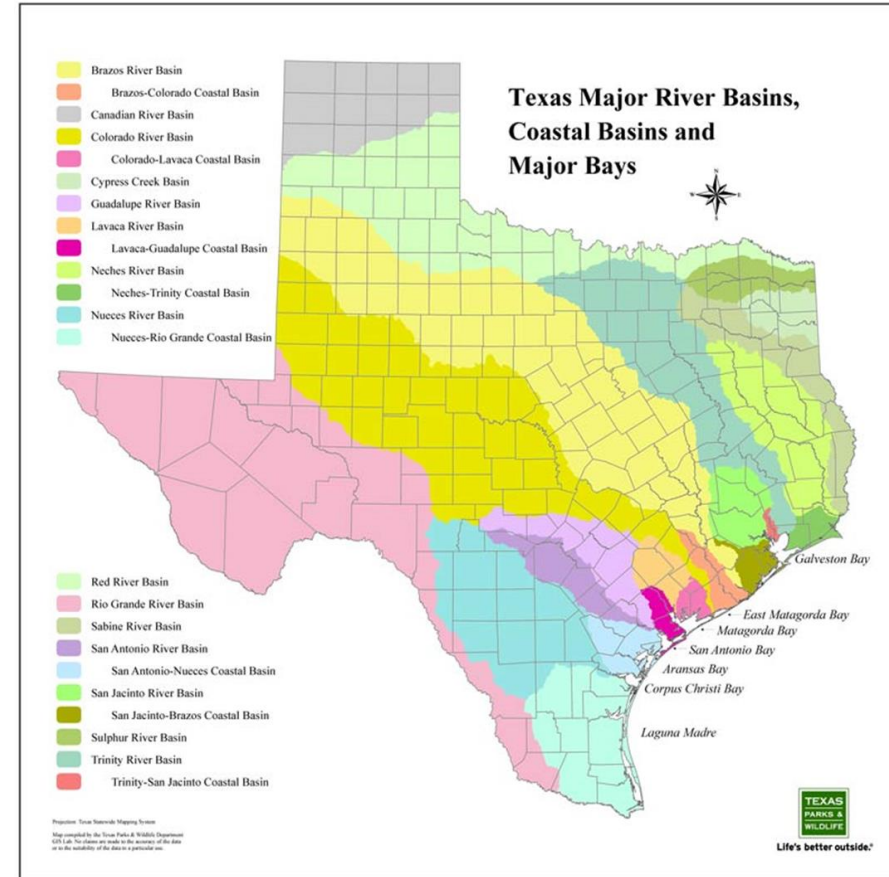
River Flooding



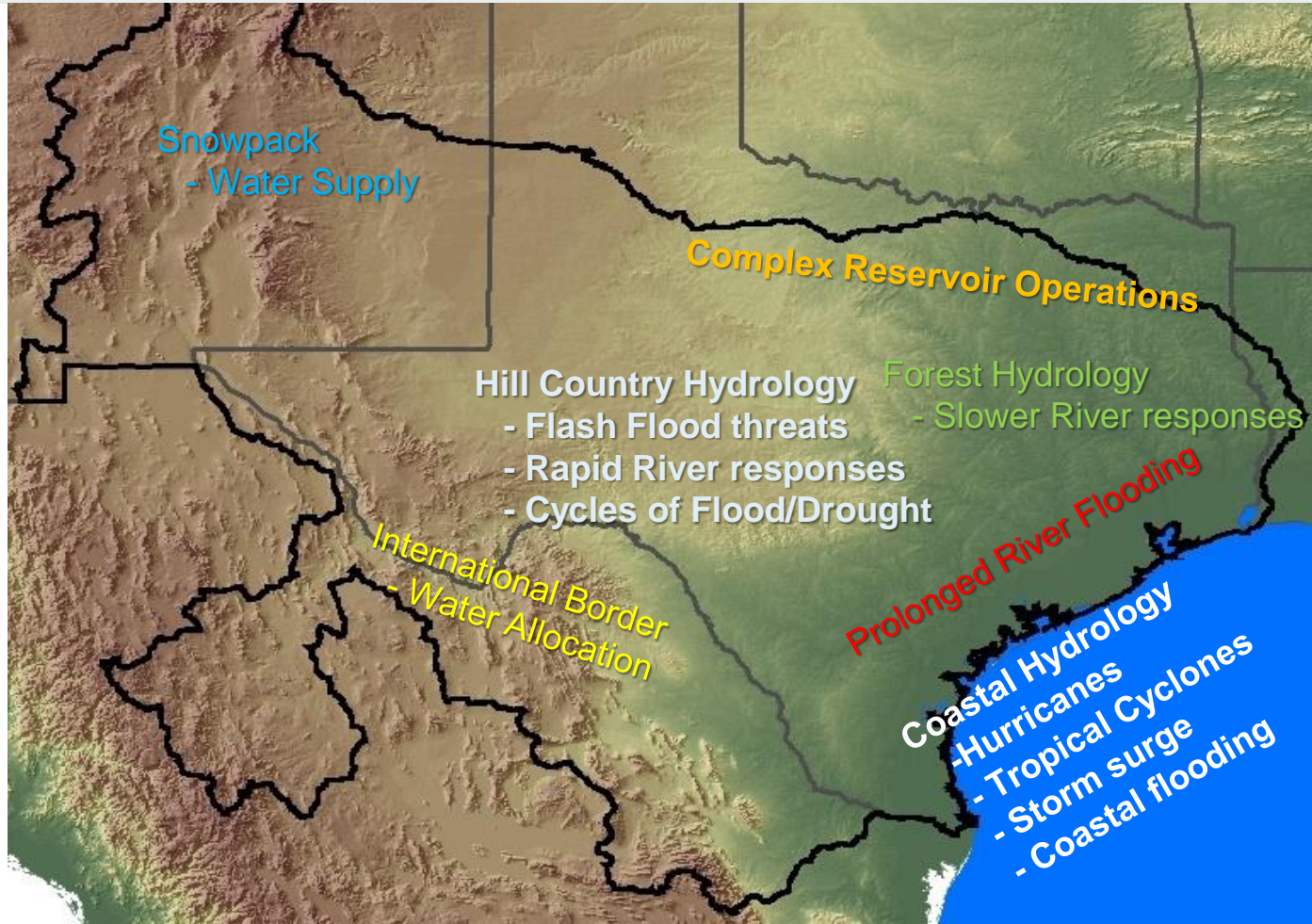
River flooding occurs when water escapes the river banks. There are different thresholds for river flooding: action, minor, moderate, major and record flooding. This image depicts what a river flooding looks like.

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.

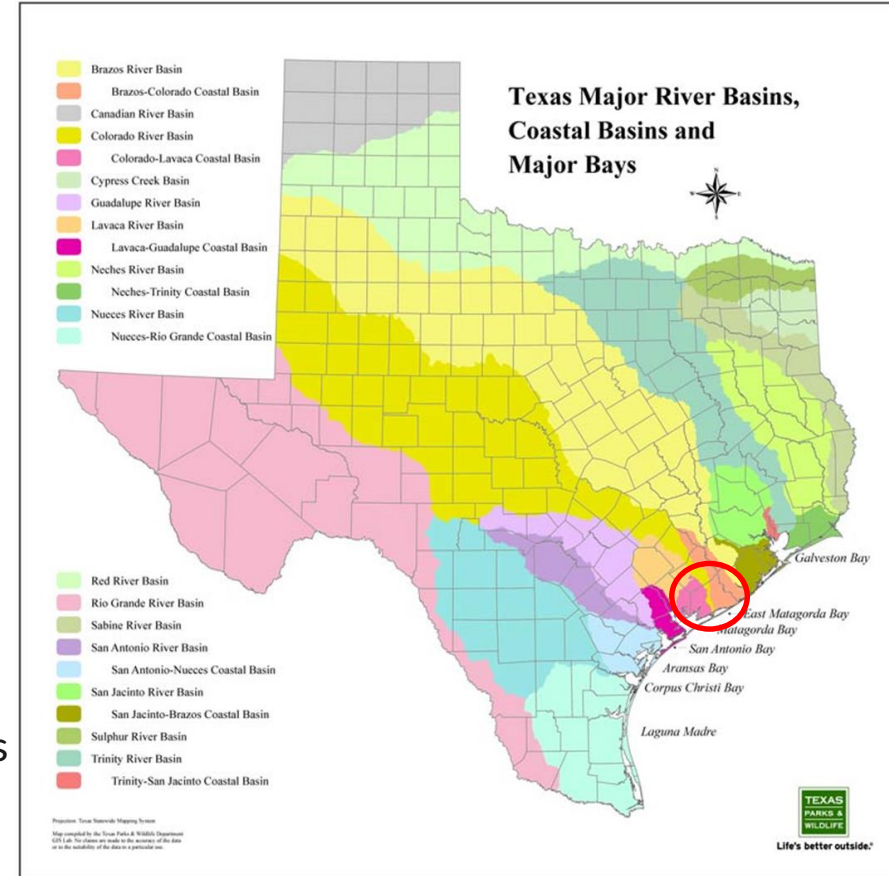


Diverse Watershed Characteristics in Texas



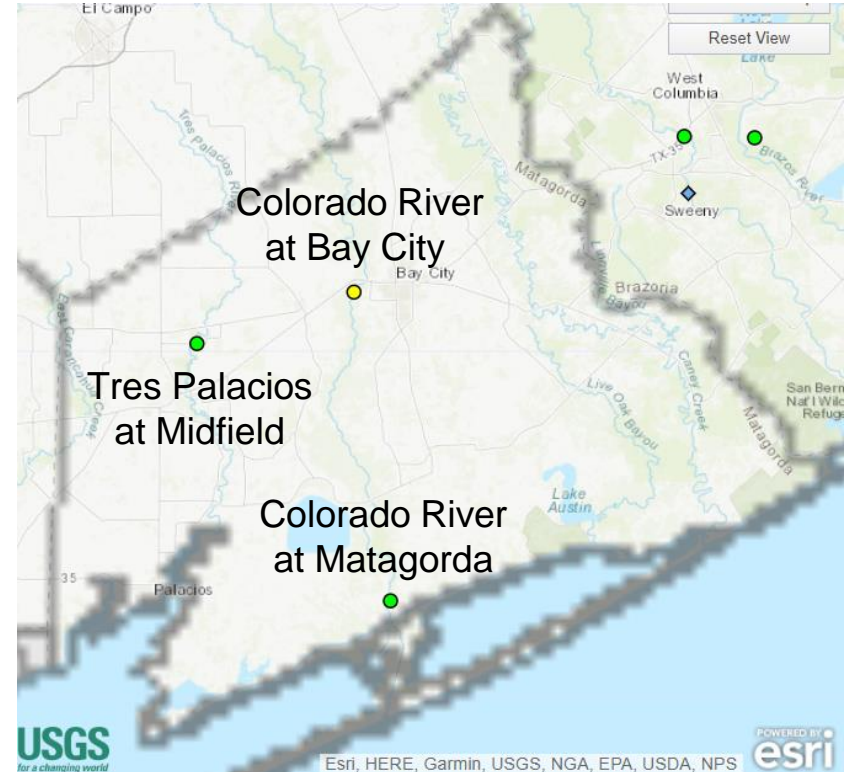
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- Matagorda County has 3 primary watersheds: Colorado, San Bernard, and Tres Palacios Rivers



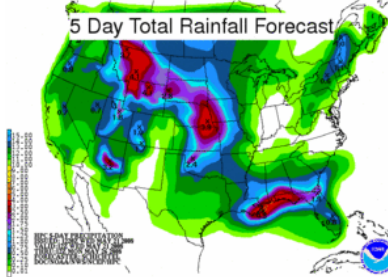
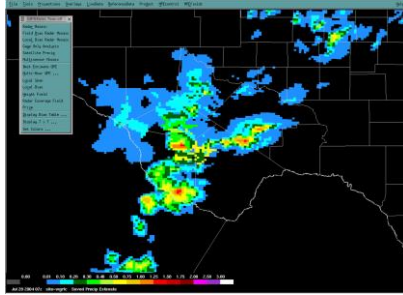
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- A watershed can flow into another watershed.
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- Matagorda County has 3 primary watersheds: Colorado, San Bernard, and Tres Palacios Rivers
- NWS issues river forecasts for 3 sites in Matagorda County.



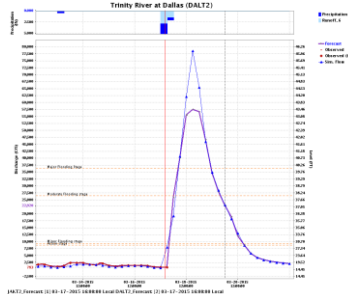
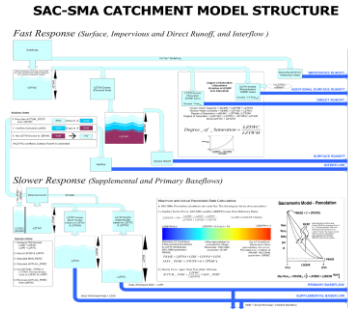
River Forecast Process

Rainfall Analysis



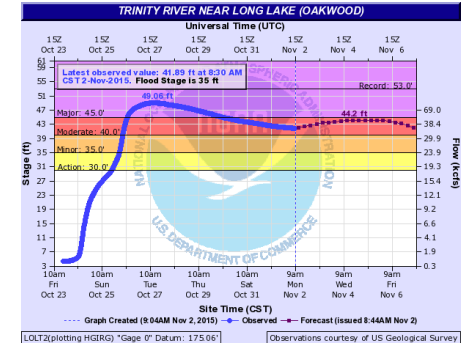
Rainfall estimates and forecasts merged into continuous dataset

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

/X0015-039-157-473-271425-
/O.NEW.KHGX.FL.W.0149.160529707302-00000070000Z/
/R/NOT2.1.ER.160529707302.160531706002.00000070000Z/NO/
126 PM CDT THU MAY 26 2016

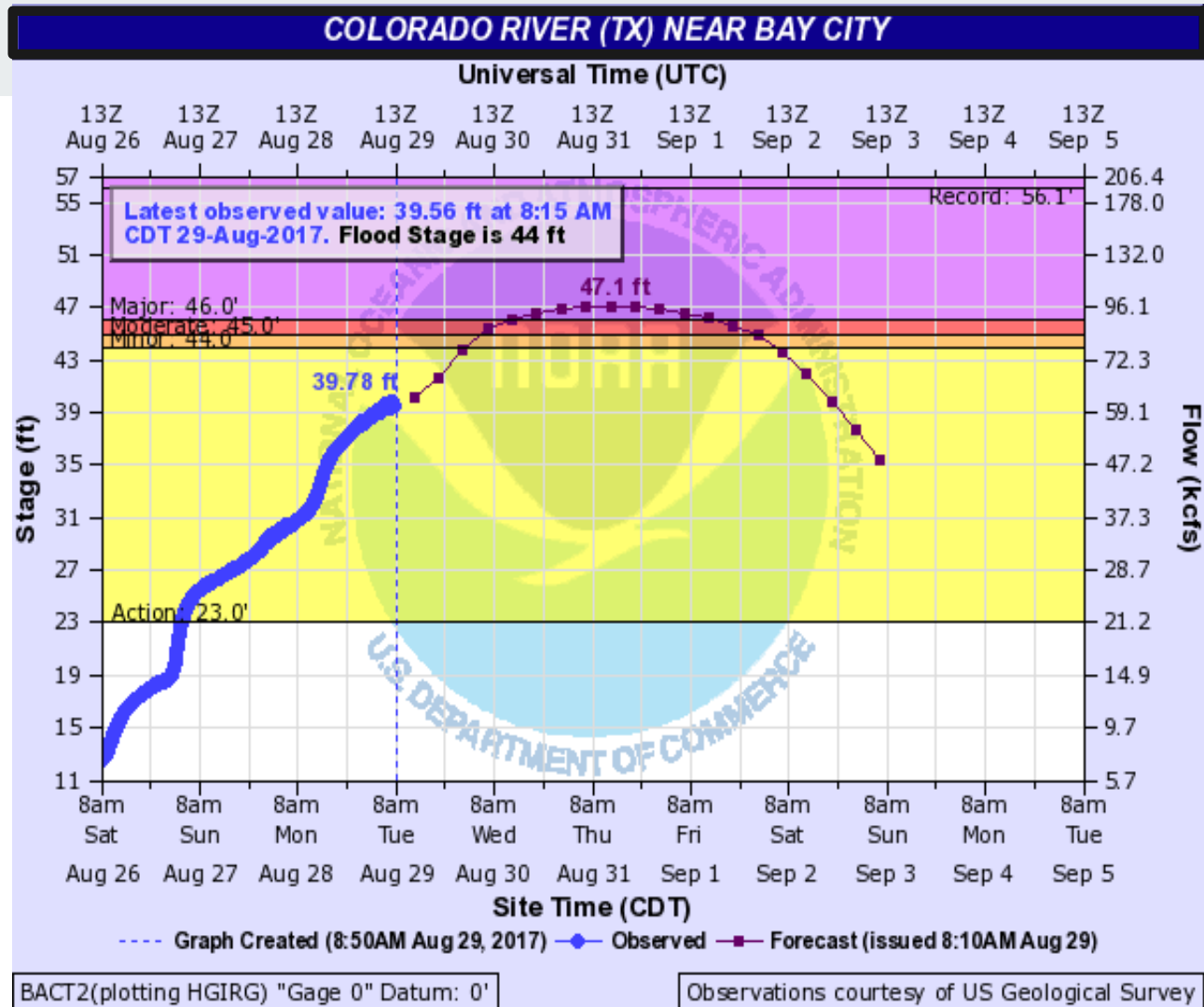
The National Weather Service in Houston/Galveston has issued a

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

Hydrograph Basics

LOCATION:

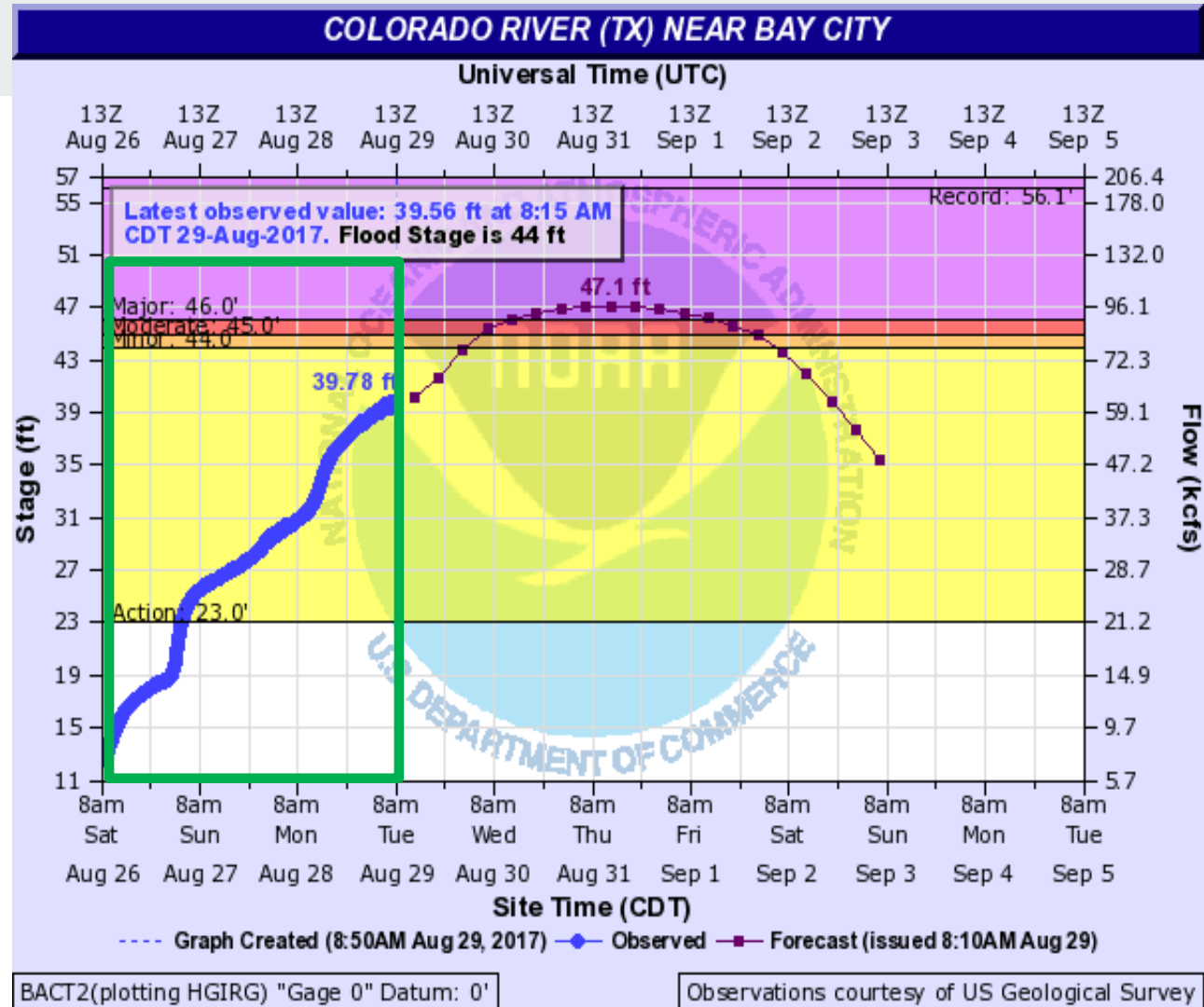
Of the gage the forecast is made, AT means the gage is in the limits of the town/city, NEAR or NR means that town/city has the closest post office



Hydrograph Basics



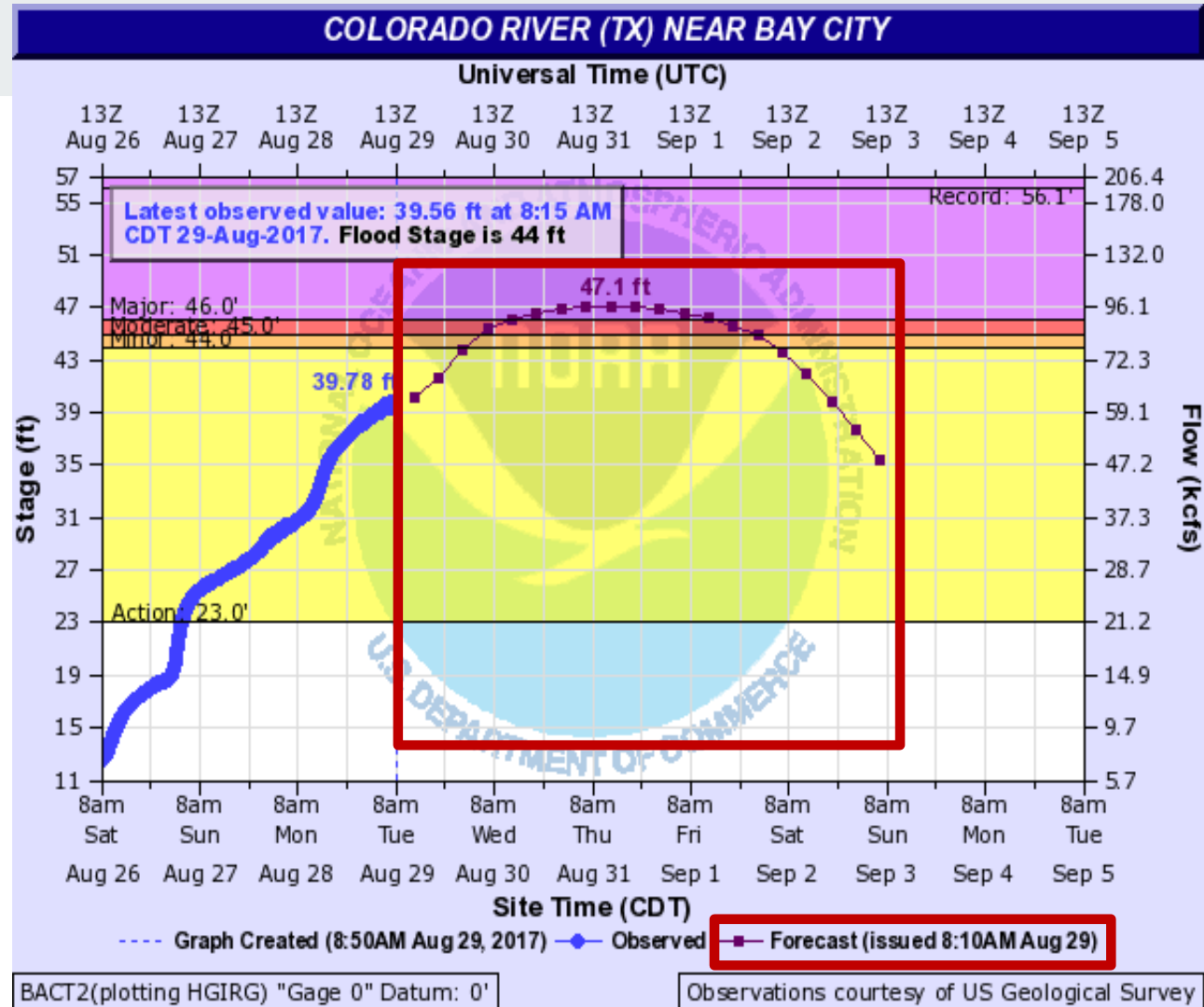
OBSERVATIONS:
Past river stages



Hydrograph Basics

FORECAST:
Forecast River
Stages

CREST:
Peak Stage

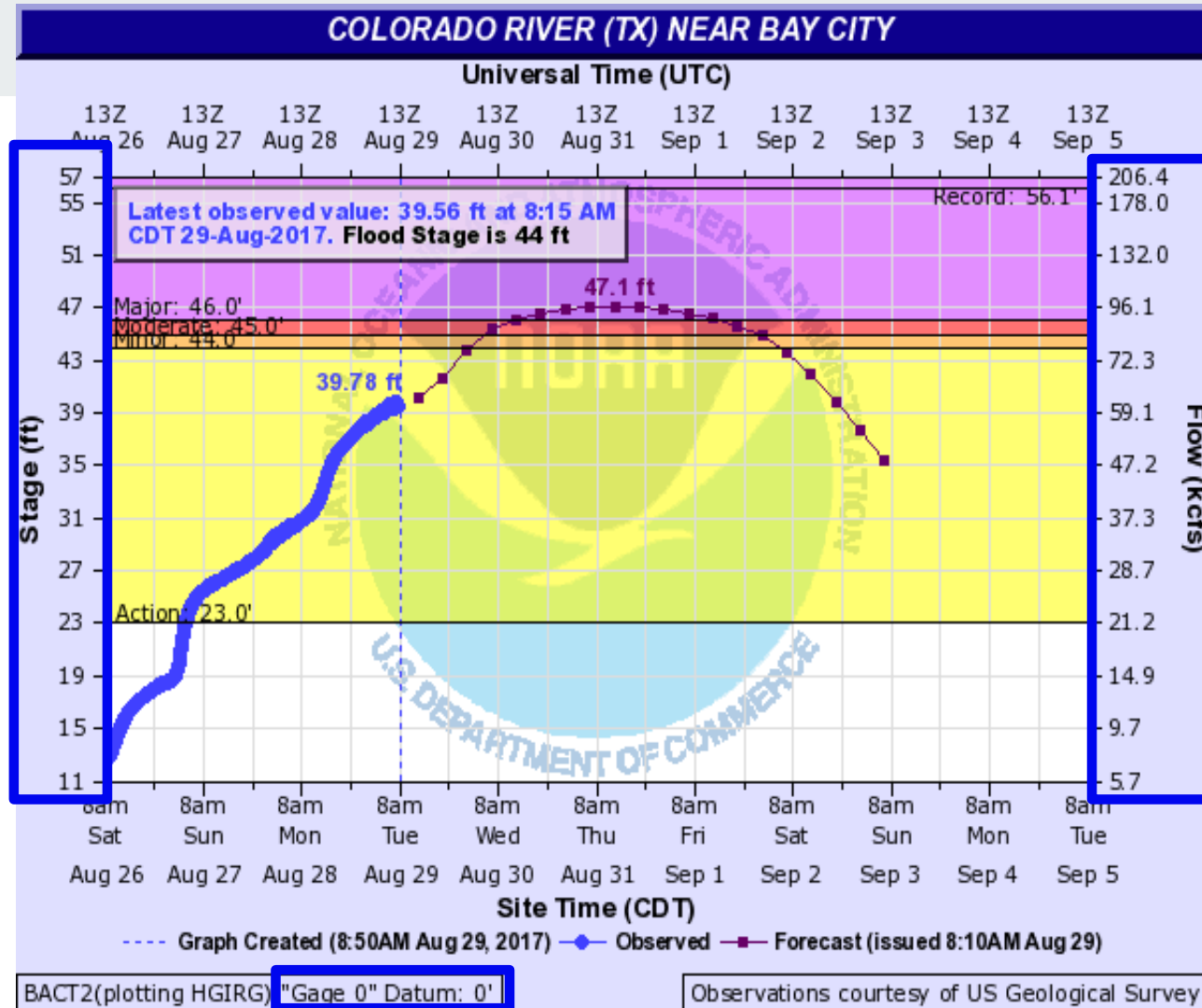


Hydrograph Basics

STAGE VS FLOW:

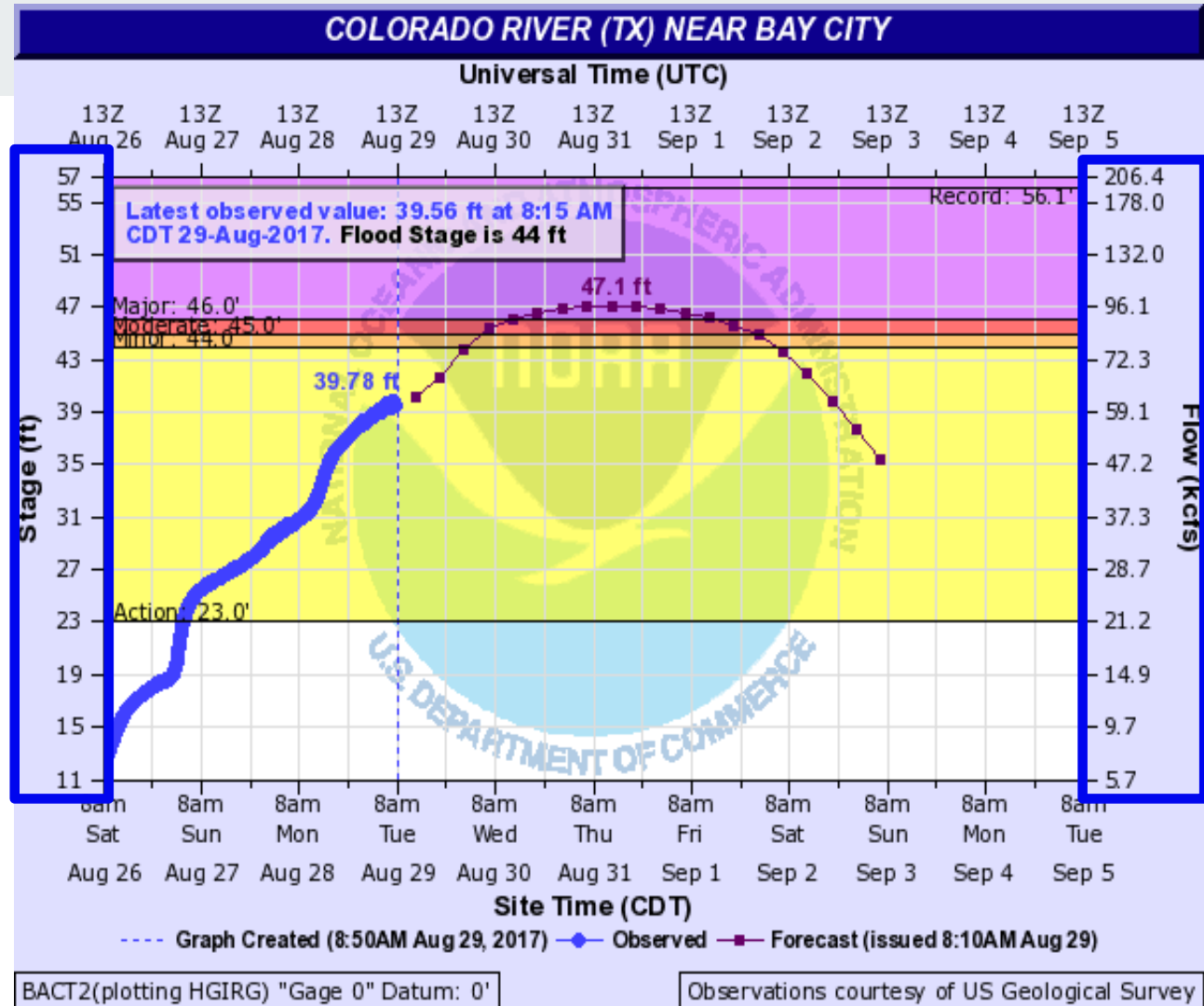
Hydrologists,
models, reservoirs
work in flow.
Emergency
managers, media,
general public work
in stage.

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

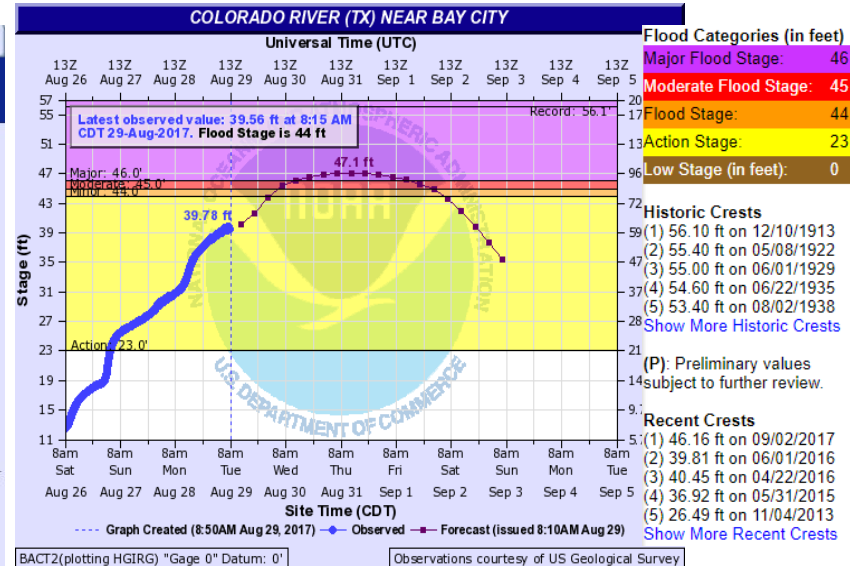
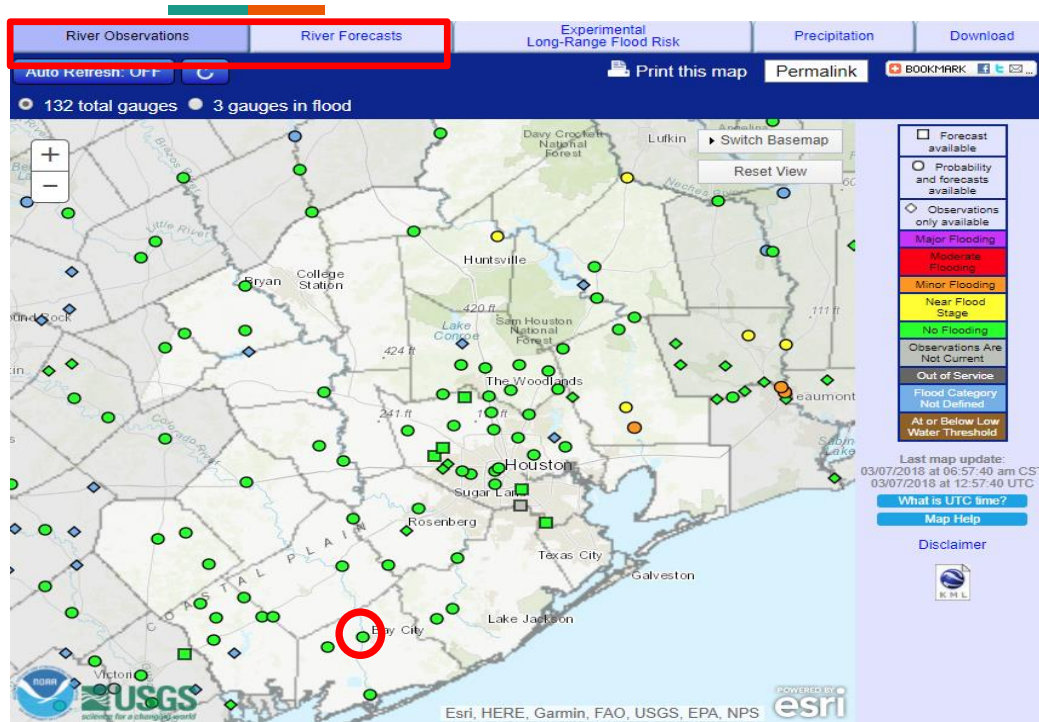
MODERATE

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 Impacts & Photos

If you notice any errors in the below information, please contact our Webmaster

44 levees on the Bay City side of river are overtopped.

<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 and select "Subscribe to WaterAlert"

The screenshot displays the USGS WaterAlert website. At the top, the USGS logo and tagline "science for a changing world" are visible, along with a banner image of people canoeing. Below this is the "WaterAlert" header. The main interface includes a "Select Location" sidebar on the left with search options like "Search by Street", "Search by Place", "Search by Site", "Search by State", and "Search by Waterbody". The "Map" tab is active, showing a map of the Houston area with numerous gauge locations marked by black triangles. One gauge is circled in red. A "Site Information" pop-up window is open, displaying details for the selected gauge: Site Number: 08069500, Site Name: W Fk San Jacinto Rv nr Humble, TX, Site Type: Stream, Agency: USGS, and a link to "Access Data". Below this, it shows "Streamflow: 7260 ft³/sec on 2018-04-02 at 22:15 CDT (TSID 229383)" and "Stage: 42.78 ft on 2018-05-07 at 06:45 CDT (TSID 140334)". A "Subscribe to WaterAlert" button is highlighted with a red box. At the bottom, there are links for "Select Data Type", "About WaterAlert", "How To Use WaterAlert", and "Related Information".

USGS
science for a changing world

WaterAlert

Select Location

News updated September 30, 2013

Search by Street
Enter Street Address

Search by Place
Enter Place Name

Search by Site
Enter Site Number

Search by State
Select an Area

Search by Waterbody
Select a Region

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

Select Data Type

About WaterAlert

How To Use WaterAlert

Related Information

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...](#)
- ☐ My mobile phone
☐ My email address

Notification Frequency:

[about this...](#)

Hourly ☐
 Daily ☒

Streamflow Parameter(s):

[about this...](#) Recent value:

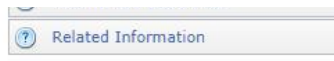
Discharge, in ft³/s ☒ 7260 [\[peak chart\]](#)
 Gage height, in ft ☐ 42.78 [\[peak chart\]](#)

Alert Threshold Condition:

- [about this...](#)
- ☒ Greater than (>)
☐ Less than (<)
☐ Outside a range (< or >)
☐ Inside a range (> and <)

Real-time value is greater than: ft³/s

☐ I have read and acknowledge the [Provisional Data Statement](#) and [Disclaimer](#).



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



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



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

Shared Data and Resources



**US Army Corps
of Engineers®**

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



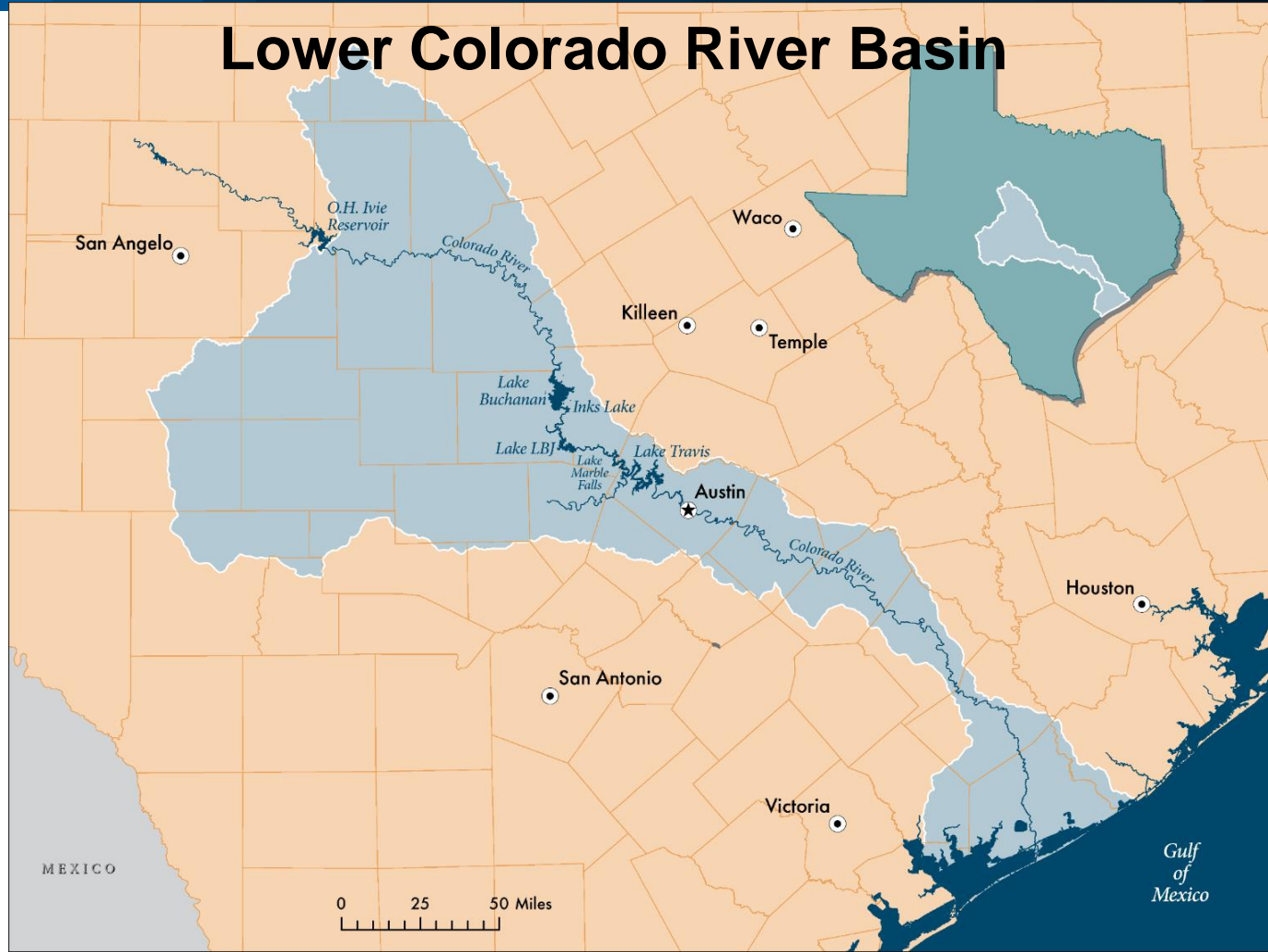
- Gage Maintenance
- Stream Measurements
- Focus Stream Gage Network



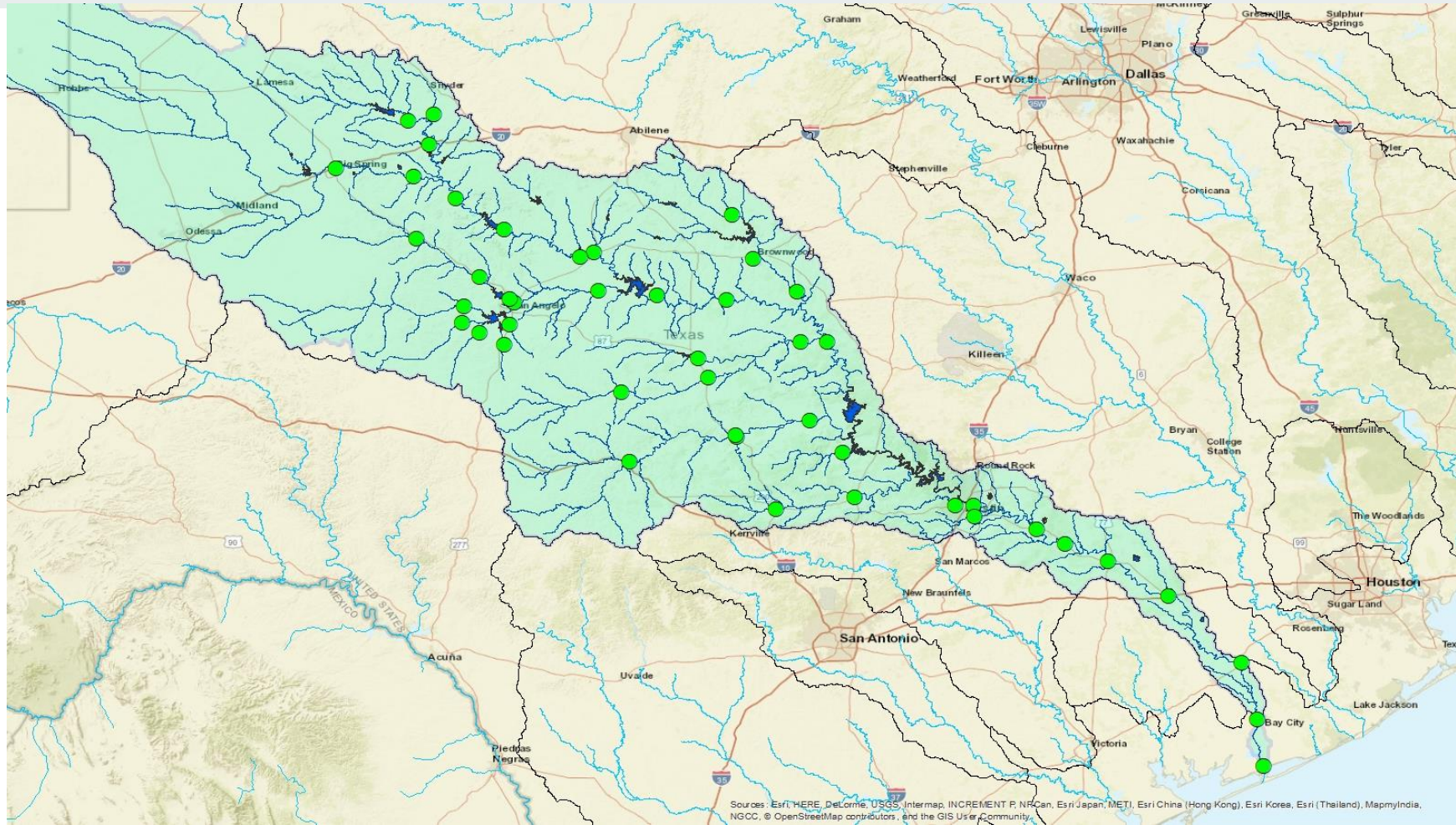
- Cooperative Data Network
- NOAA/NWS Satellite Transmission
- Forecasts/Data for Operations

LCRA FLOOD OPERATIONS AND HYDROMET SYSTEM

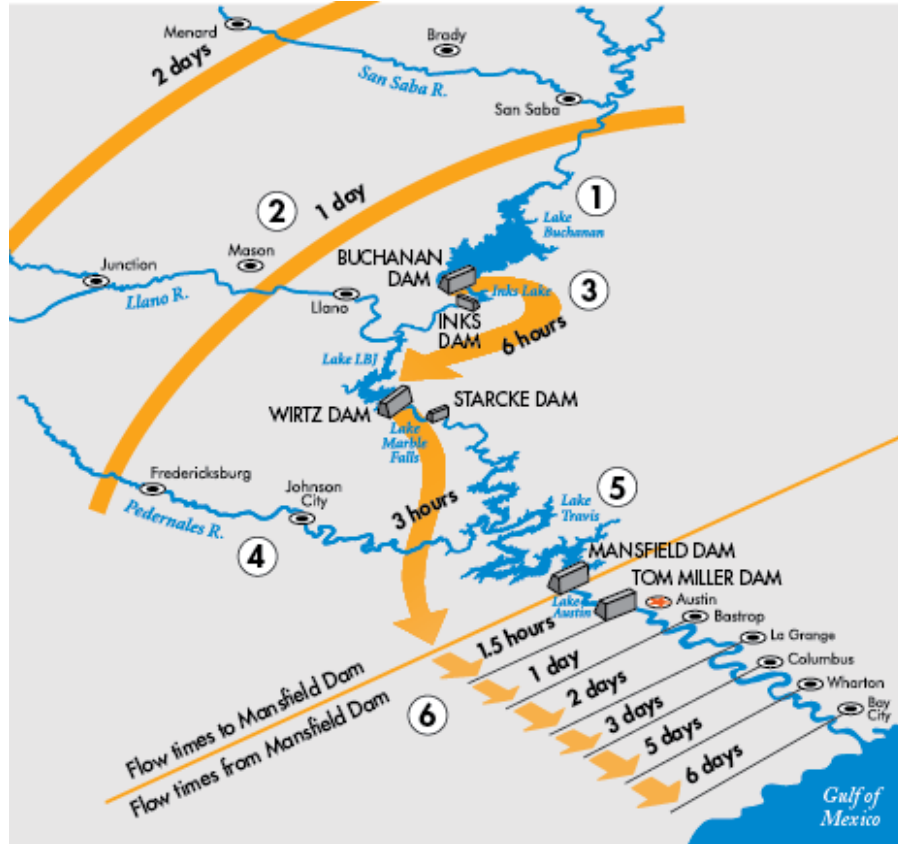
Lower Colorado River Basin



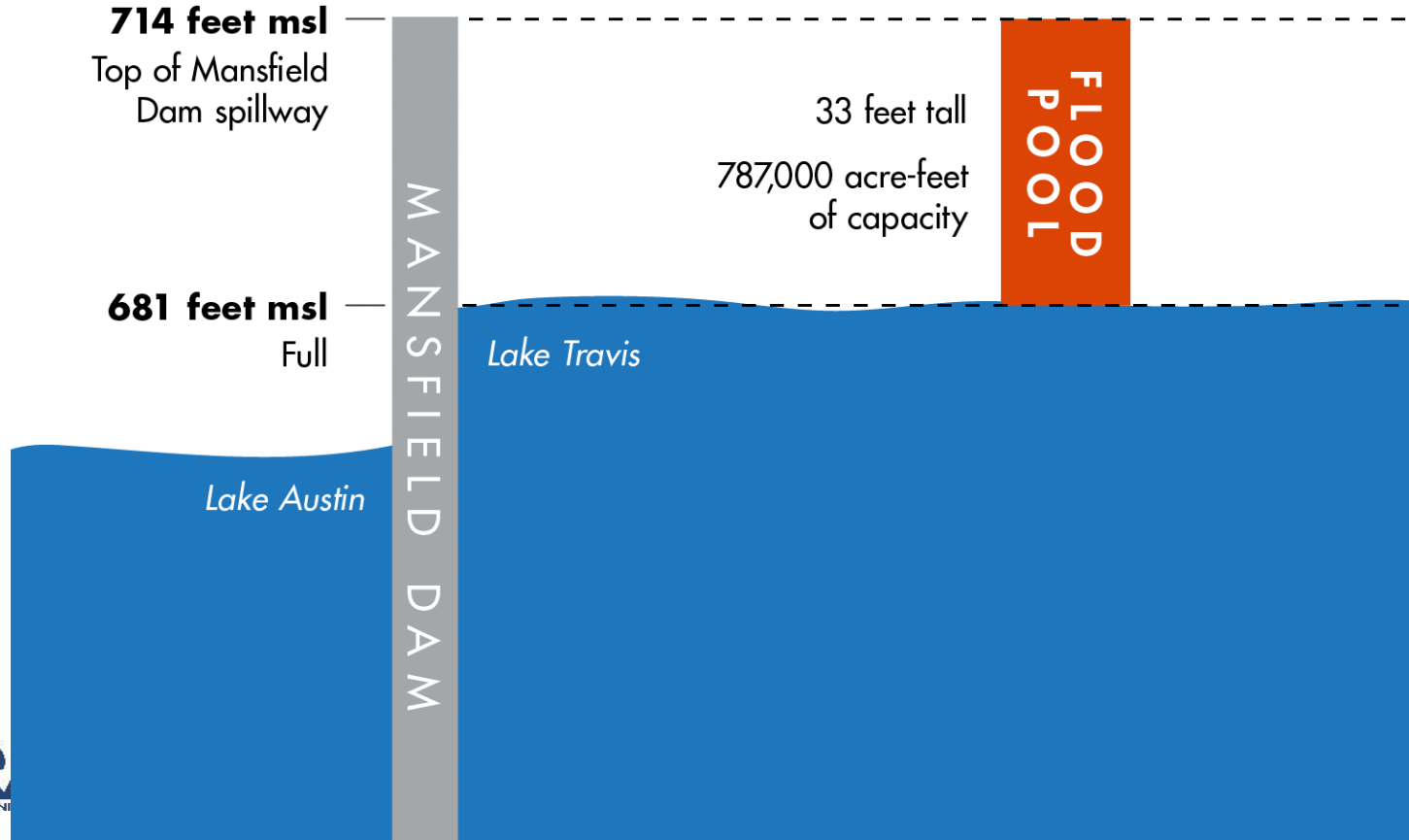
Colorado River Forecast Locations



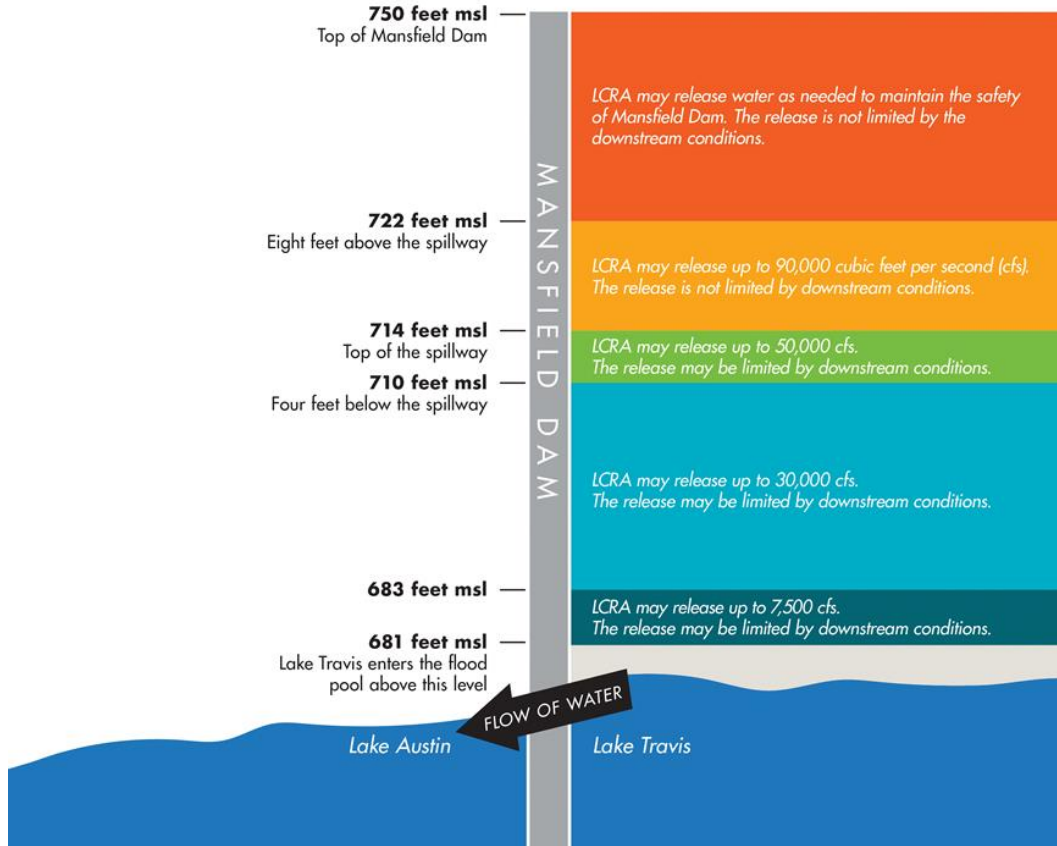
Flood Operations on the Highland Lakes



Lake Travis Elevation



Key Elevations for Mansfield Dam



Flood Releases and Downstream Controls

- Maximum flood release when Lake Travis forecast is 681-683 feet msl: 7,500 cfs
- Downstream controls:
 - 30,000 cfs at Austin
 - 45,000 cfs at Bastrop
 - 50,000 cfs at Columbus

Flood Releases and Downstream Controls

- Maximum flood release when Lake Travis forecast is 683-710 feet msl: 30,000 cfs
- Downstream controls:
 - 30,000 cfs at Austin
 - 45,000 cfs at Bastrop
 - 50,000 cfs at Columbus

Flood Releases and Downstream Controls

- Maximum flood release when Lake Travis forecast is 710-714 feet msl: 50,000 cfs
- Downstream controls:
 - 50,000 cfs at Austin
 - 50,000 cfs at Bastrop
 - 50,000 cfs at Columbus

Flood Releases and Downstream Controls

- Maximum flood release when Lake Travis forecast is 714-722 feet msl: 90,000 cfs
- Releases are not limited by conditions at Austin, Bastrop or Columbus.

Flood Releases and Downstream Controls

- Maximum flood release when Lake Travis forecast is higher than 722 feet msl: inflow into the lake
- Releases are not limited by conditions at Austin, Bastrop or Columbus.

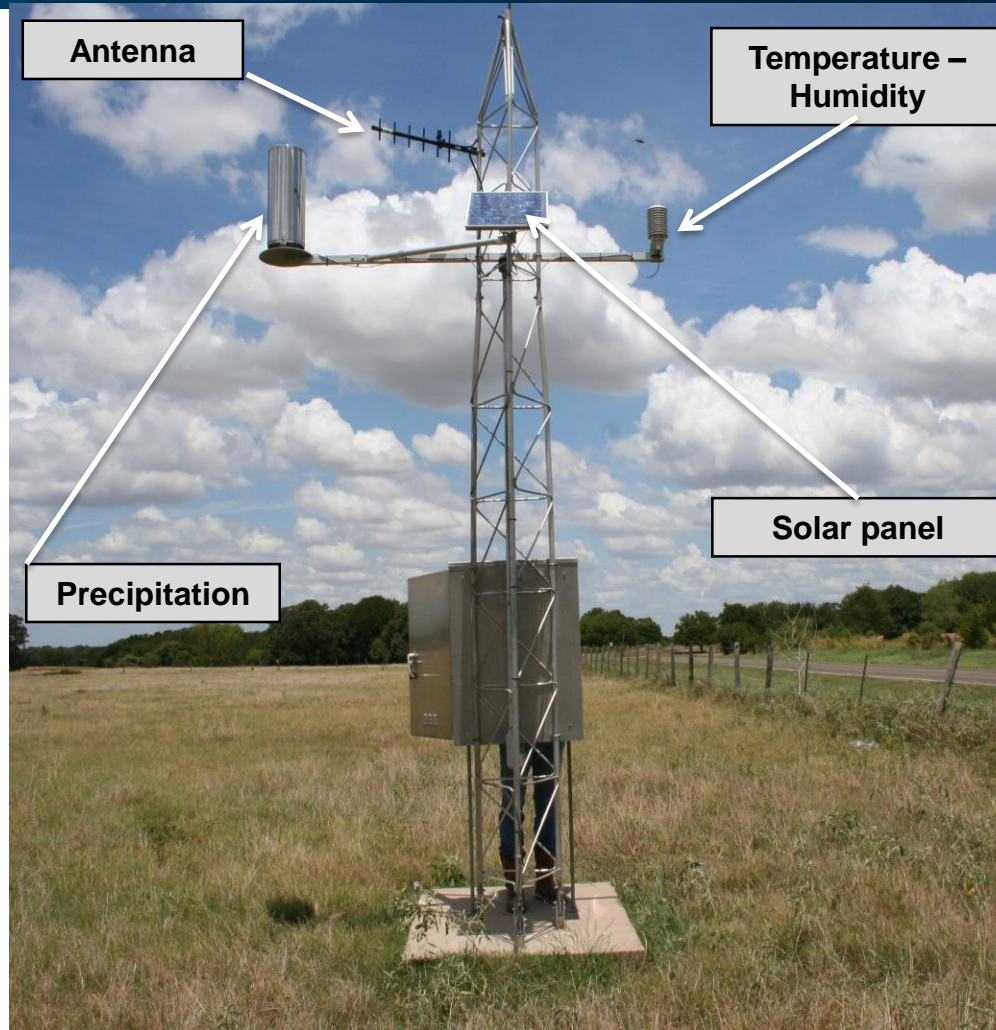
Hydromet System

- Critical for flood management
- LCRA's eyes and ears for water
- Data is shared with many others



Typical Hydromet Station

Redundant
-
Reliable



Flood Response

Team work

- U.S. Geological Survey
- National Weather Service
- U.S. Army Corps of Engineers
- Lower Colorado River Authority
- Emergency Management Officials
- Local elected officials

Communications

- LCRA Flood Operations Notification Service (FONS)
- Internet and social media
- NOAA All Hazard Radios
- LCRA Emergency Hotline
- News media

lcra.org/water/floods

Flood Resources:

- Flood guide
- Fact sheets
- Historic floods on the Colorado River
- Links to floodplain resources

Monitor Flooding:

- Flood Operations Report
- Hydromet
- LCRA on social media
- Flood Operations Notification Service (FONS)

Managing floods in Flash Flood Alley

LCRA dams, expertise help reduce flood damages

The Hill Country and Central Texas have a greater risk of flash flooding than most regions of the United States. The region of Texas is called Flash Flood Alley because of the area's steep terrain, shallow soil and unusually high rainfall rates. Heavy rains can quickly transform into walls of fast-moving water with great destructive potential.

During a flood, LCRA operates the Highland Lakes dams to reduce the intensity of flooding downstream by managing the flow of floodwaters through the lakes and river system.

The Highland Lakes system

When flooding on the lakes or their tributaries is imminent, LCRA works to manage the floodwaters by holding or moving water as needed through a series of dams along the Highland Lakes. Of the six Highland Lakes, only Lake Travis – formed by Mansfield Dam – is designed to hold back floodwaters that otherwise would flood Austin and downstream communities. [See how the Highland Lakes system works.](#)

Lake Travis is considered full at 681 feet above mean sea level (feet msl). At that level, the lake contains 1.1 million acre-feet of water in its conservation pool for water supply. Lake Travis is designed to hold an additional 787,000 acre-feet of water in what is referred to as the flood pool. The flood pool stretches from 681 feet msl up to the Mansfield Dam spillway at 714 feet msl.

Upstream of Lake Travis, Lake Buchanan has no flood pool. It has little additional capacity for floodwaters when it is considered full. The smaller, pass-through lakes – Inks, LBJ, Marble Falls and Austin – have no extra capacity for floodwaters.

Managing a flood

The hydrologists and engineers in the LCRA River Operations Control Center (ROCC) monitor the lower Colorado River and Highland Lakes constantly. Crews at the dams are on around-the-clock alert whenever floods threaten, and work closely with the experts in the ROCC to open floodgates and move water through hydroelectric generation as needed to manage floodwaters.

LCRA conducts flood operations at Buchanan, Inks, Wirtz and Starcke dams according to a 1990 agreement between LCRA and the Federal Emergency Management Agency (FEMA). [Read more](#) about the operation of Buchanan Dam.

LCRA conducts flood operations at Mansfield Dam according to the U.S. Army Corps of Engineers (USACE) Water Control Manual for Mansfield Dam and Lake Travis. The USACE updated its flood regulations for Mansfield Dam and Lake Travis in 2014 to reflect changes since the previous regulations took effect in 1979. The updated Water Control Manual continues to limit flood releases from Mansfield Dam based on [key Lake Travis elevations](#) and expected conditions along the Colorado River downstream of Mansfield Dam.

Operating Mansfield Dam

- 2014 [Letter of Understanding](#) between LCRA and U.S. Army Corps of Engineers
- 2014 [Water Control Agreement](#) between LCRA and U.S. Army Corps of Engineers
- [Federal flood control regulations](#) for Mansfield Dam and Lake Travis

Flood Resources

- [Mansfield Dam Flood Operations](#)
- [Management of Lake Buchanan](#)
- [Flood Guide](#)
- [LCRA Flood Operations Communications](#)
- [How the Highland Lakes Work](#)
- [Major Floods on the Colorado River](#)
- [Texas Colorado River Floodplain Coalition](#)
- [FEMA Flood Map Service Center](#)

Monitor Flooding

- [Flood Operations Report](#)
- [Hydromet](#)
- [Flood Operations Notification Service \(FONS\)](#)
- [LCRA on Twitter](#)
- [LCRA on Facebook](#)
- [NOAA Weather Radio All Hazards rebroadcasts on AM 1610 around the Highland Lakes and AM 1670 along the Colorado River downstream of Austin](#)

LCRA Flood Operations Report



Flood Operations

- [Current Lake Levels at Dams and Gate Operations](#)
- [Lake Levels Over the Last 14 Days and Forecasts](#)
- [River Levels - Current Conditions](#)
- [River Levels - Forecast Conditions](#)
- [Links](#)
- [Words and Definitions](#)

Last Update: Mar 30 2018 4:23PM

Summary

This report provides the latest information when LCRA conducts flood operations, and is updated when conditions warrant. Flood operations are not anticipated at this time.

Unscheduled releases from the Highland Lakes dams may occur suddenly and unexpectedly due to emergency hydroelectric generation or other reasons. The public should exercise caution and avoid being in the water near the dams.

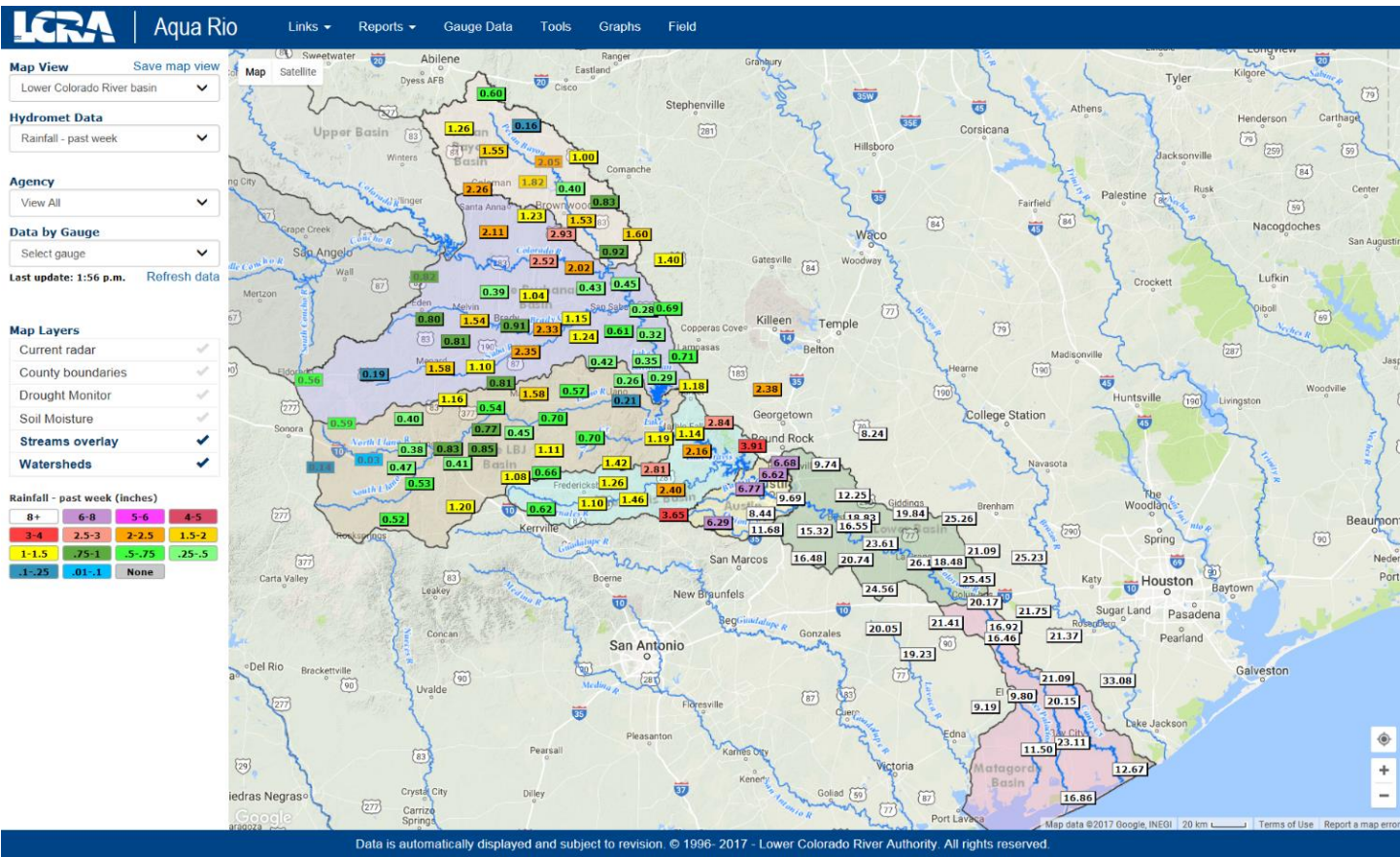
For information about current water supply operations, including long-range forecasts for lakes Buchanan and Travis, see the [River Operations Report](#).

Current Lake Levels at Dams and Gate Operations

*Disclaimer: Data is automatically retrieved and subject to revision.

Lake/Dam	Time	Head Elevation (Above Dam)	Tail Elevation (Below Dam)	Gate Operations/Spillway
Buchanan/Buchanan	Apr 25 2018 10:15AM	1015.82	887.43	Mar 30 2018 4:23PM No gate operations to pass floodwaters are expected at Buchanan Dam at this time.
Inks/Inks	Apr 25 2018 10:15AM	887.36	825.01	Mar 30 2018 4:23PM Flow over the spillway of Inks Dam is not expected at this time. (Inks Dam has no floodgates.)
Wirtz/LBJ	Apr 25 2018 10:15AM	824.77	736.75	Mar 30 2018 4:23PM No gate operations to pass floodwaters are expected at Wirtz Dam at this time.
Starcke/Marble Falls	Apr 25 2018 10:15AM	736.42	675.93	Mar 30 2018 4:23PM No gate operations to pass floodwaters are expected at Starcke Dam at this time.
Mansfield/Travis	Apr 25 2018 10:15AM	667.71	491.73	Mar 30 2018 4:23PM No gate operations to pass floodwaters are expected at Mansfield Dam at this time.

[Back to Top](#)

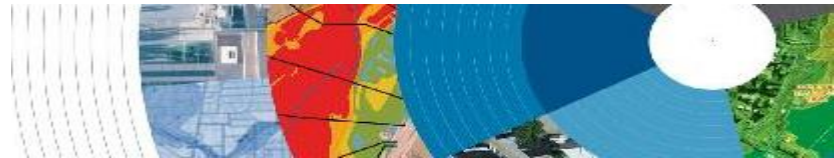




Flood Preparedness

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.”

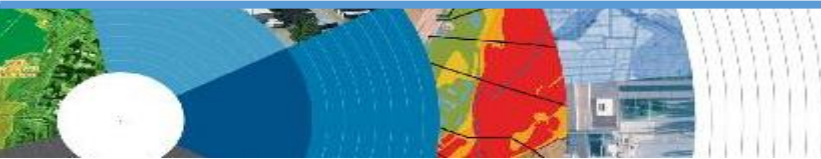


FEMA

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



FEMA

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.

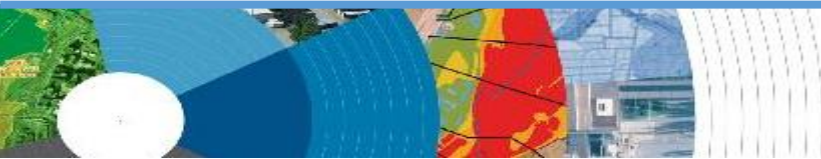
Renters and Business owners should also consider flood insurance for contents.

■ Misconception:

"I don't live in a flood zone."

■ Facts:

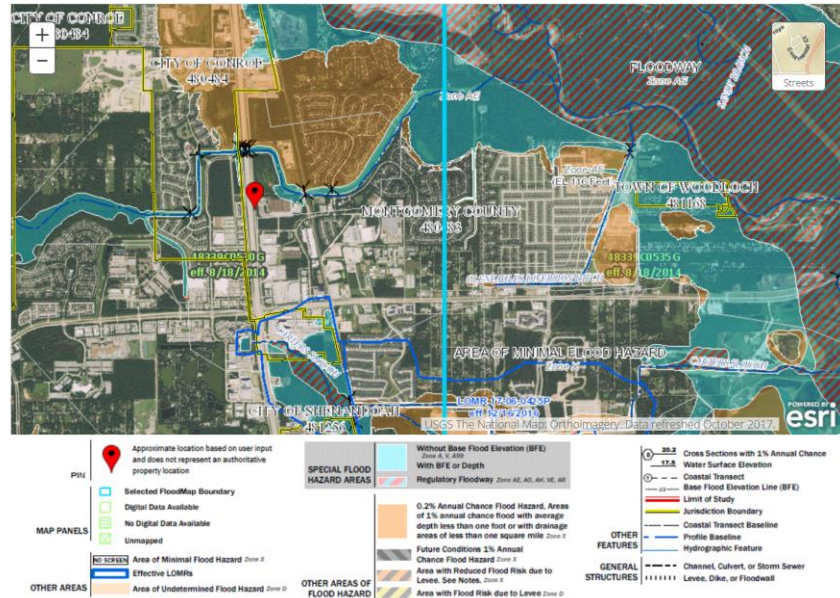
- Floods are the #1 natural disaster in the United States.
- If it can rain, it can flood.
- FIRMs do not show localized flooding from drainage ditches/sewers/road ponding.
- To some degree overland flooding...but not property to property drainage problems.



FEMA

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 Coastal and Riverine flood risk



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

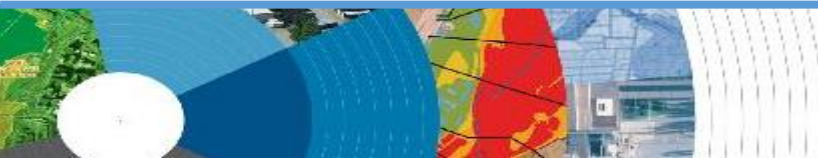


FEMA

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



FEMA

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**
- Matagorda County(unincorporated only) 16 (Losses over 125K)
- Bay City (unincorporated only) 1 Loss over 125K

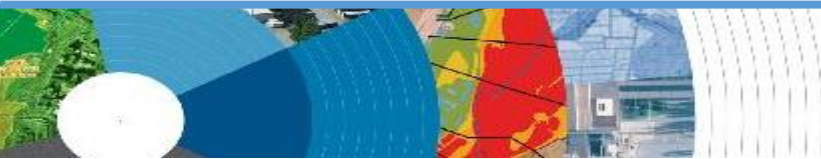
New GFIP's Due to Harvey

- Matagorda County-34
- Bay City - 3

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.**

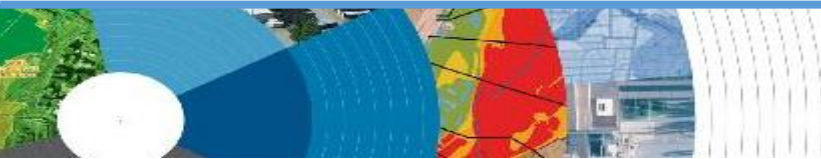
**Data HCFCFCD Finale Hurricane Harvey Storm and Flood Information –
<https://www.hcfcfd.org/media/2678/immediate-flood-report-final-hurricane-harvey-2017.pdf>



FEMA

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.**



FEMA

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

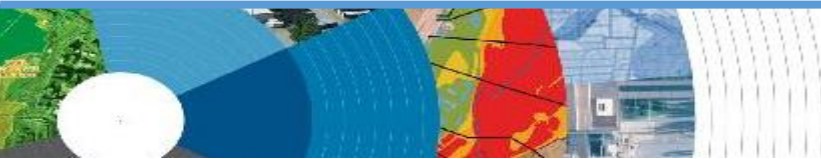
Cell 202-812-6164 | Lauren.Schmied@fema.dhs.gov

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](mailto:Larry.Fordham@fema.dhs.gov)



FEMA

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!

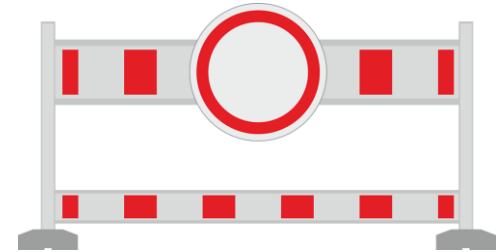
- Most flood deaths occur in vehicles.
- It only takes **six inches of water** for a vehicle to lose contact with the road surface.
- Most vehicles can be swept away in just 18 to 24 inches of water!
- Don't Rely on Your Big Vehicles
- Flooded roads may have hidden dangers, such as washed out road beds 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

- 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.
- Stay out of the flood waters!
- 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 After a Flood

- Don't put yourself in danger.
- Return home only when authorities indicate it is safe.
- Use extreme caution when entering buildings
- Cut power to flooded areas of your home
- Only use generators in well-ventilated areas – **Not** in a closed garage!)
- Do not use power tools while standing in water
- If you smell or hear gas, call the Fire Department.

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



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

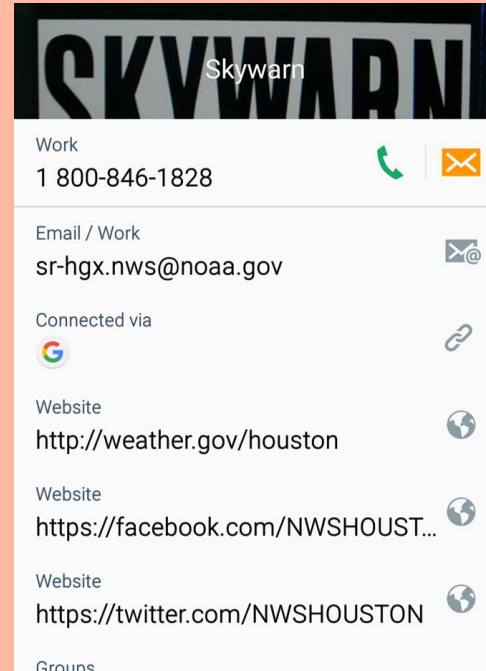
Email

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
FEMA