2018 FloodWarn Training

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Senior Service Hydrologist/Meteorologist
National Weather Service - Houston/Galveston, TX
Outline

Flooding Importance
Flooding Types and Causes
Flood Products
River Flooding
Partners
Flood Risk
Flood Safety
Reporting Flooding
Flooding Importance
Flooding is Deadly!

In the 4 year period from 2013 to 2016*, more people have died in Texas from flooding than all other weather hazards combined.

*Data not available yet for 2017

Data from NWS National Hazard Statistics
Flood Fatalities

Texas Flood Fatalities by Shelter from 2013-2016

- Vehicle: 51.0%
- Permanent Home: 10.6%
- In Water: 26.0%
- Other: 12.5%

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

Data from NWS National Hazard Statistics
Houston Floods: April 18, 2016
Recent Big Floods...

Memorial Day 2015
Tax Day 2016
Brenham 2016
Harvey 2017

And other historic floods...
Tropical Storm Allison 2001
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:

- $\geq 3$ feet of standing water (less if threatening life or property), and/or
- $\geq 6$ 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

<table>
<thead>
<tr>
<th><strong>Urban / Small Stream Advisory</strong></th>
<th><strong>Flood Watch</strong></th>
<th><strong>Flash Flood Watch</strong></th>
<th><strong>Flood Warning</strong></th>
<th><strong>Flash Flood Warning</strong></th>
<th><strong>Flash Flood Emergency</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WHAT IS IT?</strong></td>
<td>Flooding is possible – typically within a 6 to 48 hours before rain is expected to reach the area.</td>
<td>Flooding is possible – typically 6 to 48 hours before rain is expected to reach the area.</td>
<td>Flooding impacts are occurring or imminent.</td>
<td>Flooding impacts are occurring or imminent.</td>
<td>Flash flood situation that presents a clear threat to human life due to extremely dangerous flooding conditions.</td>
</tr>
<tr>
<td><strong>WHAT TO DO?</strong></td>
<td>Stay away from areas that are prone to flooding and stay clear of rapidly moving water.</td>
<td>Stay tuned to local river forecasts; prepare for areas near rivers to spread towards nearby roads and buildings.</td>
<td>Have a way to receive local warnings, expect hazardous travel conditions and have alternate routes available.</td>
<td>Conditions will rapidly become hazardous! Do not cross flooded roadways or approach inundated areas as water may still be rising.</td>
<td>Immediately reach higher ground by any means possible.</td>
</tr>
</tbody>
</table>
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 Advisory

Increasing Impact Potential
ALL Situations Represent Threatening Conditions to Life and/or Property

Note: Flooding can (and does) occur without a Flash Flood Watch!
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
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.
River Forecast Process

Rainfall Analysis

Precipitation estimates and forecasts merged into continuous dataset

Hydrologic Modeling

Precipitation dataset ingested into hydrologic model. Forecasters adjust model parameters in real time

Forecast

Warning
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

**FORECAST:**
Forecast River Stages

**CREST:**
Peak Stage
**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?**
A basketball is roughly a cubic foot, so 20,000 cfs is 20,000 basketballs of water passing the gage every second.
### Understanding River Criteria Levels

<table>
<thead>
<tr>
<th>Below Criteria</th>
<th>Action</th>
<th>Minor</th>
<th>Moderate</th>
<th>Major</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Impact:</strong> 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.</td>
<td><strong>Impact:</strong> 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.</td>
<td><strong>Impact:</strong> 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.</td>
<td><strong>Impact:</strong> 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.</td>
<td><strong>Impact:</strong> 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.</td>
</tr>
</tbody>
</table>
A watershed is an area of land that drains runoff from rainfall, also known as stormwater, to a body of water, either a river, bayou, creek, or lake.

Harris County has 22 watersheds that all drain to the Gulf. This includes the San Jacinto River.

A watershed can flow into another watershed.

Several watersheds flow into the San Jacinto River.

Watersheds vary in shape and size which ultimately lead to unique challenges.

Topography plays a big role in how watershed boundaries are defined.
Upper San Jacinto River Watershed

- West Fork San Jacinto River at Humble, TX
Forecasting the San Jacinto River

- 9 Basins
- 15 Forecast Points
  - 1 on Lake Creek
  - 3 on West Fork of San Jacinto River
  - 3 on Spring Creek
  - 3 on Cypress Creek
  - 2 on East Fork of San Jacinto River
  - 1 on Peach Creek
  - 1 on Caney Creek
  - 1 on San Jacinto River
- 2 Reservoirs:
  - Lake Conroe
  - Lake Houston
Tax Day 2016 Event

15”
Partners
Hydrology in Harris County

Jeff Lindner
Meteorologist/Director, Hydrologic Operations Division
Harris County Flood Control District
Harris County Open Channel Network

2,500 Miles of Bayous and Creeks

Area = 1,756 Square Miles
± 1,500 Channels
± 2,500 Miles of Channels
Population = 4.1 Million (County)
2.1 Million

(Houston)
Understanding Our Flooding

HARRIS COUNTY’S 4 TYPES OF FLOODPLAINS

- Valley Floodplain
- Major River Floodplain
- Shallow Floodplain
- Coastal Floodplain
Everyone Has a Flood Risk!
Ponding & Sheet Flow Flooding

STREET SEWERS

FLOODING FROM INTENSE LOCAL RAINFALL
(Longer Duration)
Addicks and Barker Watersheds
Flood Warning System
All FWS Gages
Public Website – Channel Status
Public Website – Water Level

Stream Elevation
K166_1190 Little Mound Creek @ Mathis Road

Cross Section

Stream Elevation for sensor 1193 is 205.21'
Reading on 4/19/2016 7:21 AM

Flood Frequency

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>10% (10-year)</td>
<td>208.80'</td>
</tr>
<tr>
<td>2% (50-year)</td>
<td>209.70'</td>
</tr>
<tr>
<td>1% (100-year)</td>
<td>210.10'</td>
</tr>
<tr>
<td>.2% (500-year)</td>
<td>211.10'</td>
</tr>
</tbody>
</table>

Historical Storm

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
<th>Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/12/2012</td>
<td></td>
<td>207.80'</td>
</tr>
<tr>
<td>4/18/2016</td>
<td></td>
<td>209.30'</td>
</tr>
<tr>
<td>5/27/2016</td>
<td></td>
<td>208.05'</td>
</tr>
<tr>
<td>8/27/2017</td>
<td>Harvey</td>
<td>205.90'</td>
</tr>
</tbody>
</table>

High water mark elevations are approximate.
Future Enhancements

• Near real time inundation mapping

• Public customizable alarms
  Rainfall and stage
  Text or e-mail

• Expansion of FWS gages (regional)

• Add roadway flooding (transtar)
Inundation Mapping
Important Information Sources

• Harris County Flood Control District
• City of Houston
• Harris County Office of Emergency Management
• National Weather Service
• San Jacinto River Authority

Important Twitter Handles

@hcfcd       @jefflindner1
@sjra
@readyharris
@houstonOEM
@nwshouston
Briefing Regarding Lake Conroe Operations

May 1, 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
Key Points Regarding Lake Conroe Operations

Lake Conroe Dam

- Service Outlet Structure
- GRP Intake and Pump Station
- Main Spillway with Five Tainter Gates
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
Water supply reservoirs REDUCE downstream flooding

• 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 reduction and lake level rise
Water detained in Lake Conroe

Discharge from Lake Conroe

Flow at I-45

Peak Flow Into Lake Conroe

~130,000 cfs
The flow hydrographs and precipitation data was obtained from the USGS on 9/6/2017. The total observed rainfall at I-45 was 22.84 inches in 4 days.
Lake Conroe makes up roughly 10 to 20 percent of the flows into Lake Houston.
Impact from Lake Conroe watershed:

- Lake Houston = 10-20%
- The Woodlands W of I-45 = 0%
- Tomball = 0%
- Woodforest = 0%
- Cleveland = 0%
- Plum Grove = 0%

Jeff Lindner, HCFCD

https://www.youtube.com/watch?v=SowuK0T41Rc
San Jacinto River Basin Estimated Peak Flows
Hurricane Harvey August 25-30, 2017

- Estimated Peak Inflow into Lake Conroe: 130,000 cfs
- Release from Lake Conroe Dam: 76,000 cfs
- Lake Creek Sendera Ranch Rd: 55,300 cfs
- I-45: 122,000 cfs
- Caney Creek Near Splendora, TX: 21,100 cfs
- Peach Creek Splendora, TX: 77,000 cfs
- East Fork San Jacinto River New Caney, TX: 120,000 cfs
- West Fork San Jacinto Near Porter, TX: 131,000 cfs
- Cypress Creek Westfield, TX: 31,500 cfs
- Spring Creek Tomball, TX: 48,900 cfs
- Spring Creek Spring, TX: 78,400 cfs

San Jacinto River Authority
USGS Stream Gage
Direction of Flow
Rainfall Totals (Inches)

Lake Houston
Estimated Peak Inflow: 430,000 cfs
(Based on Limited Available Information)
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
ONE OF THESE THREE CONDITIONS WAS PURCHASED FOR ADJACENT LANDS DURING LAND ACQUISITIONS FOR THE LAKE.

PORTIONS OF THE PROPERTY IN THIS SUBDIVISION ARE SUBJECT TO ONE OF THE FOLLOWING: AS PER SAN JACINTO RIVER AUTHORITY EASEMENT RECORDED IN VOL 657, PG. 788, M.C.D.R.

(1) A FLOWAGE AND INUNDATION EASEMENT UP TO 207 M.S.L. IN FAVOR OF THE SAN JACINTO RIVER AUTHORITY (S.J.R.A).

(2) A WAIVER OF DAMAGES CAUSED BY FLOODING OR INUNDATION IN FAVOR OF S.J.R.A ABOVE 201 M.S.L.

(3) A WAIVER OF DAMAGES CAUSED BY FLOODING OR INUNDATION IN FAVOR OF S.J.R.A BETWEEN 201 M.S.L. AND 207 M.S.L.
Most water supply reservoirs in Texas do not pre-release prior to storm events

- Primary reason – high risk of making downstream flooding problems worse
- Downstream partners want empty rivers prior to a storm
- It would take weeks to safely lower Lake Conroe any significant amount
- Small increase in storage makes almost no difference in large storm event like Harvey
- Weather predictions not accurate enough
## Time required to safely lower Lake Conroe

<table>
<thead>
<tr>
<th>Release Rate (cfs)</th>
<th>Daily Volume Released (acre-feet)</th>
<th>Daily Reduction in Lake Level (inches)</th>
<th>Retained daily rainfall for entire watershed assuming 50% infiltration (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>625</td>
<td>1,250</td>
<td>0.75</td>
<td>0.1</td>
</tr>
<tr>
<td>1,250</td>
<td>2,500</td>
<td>1.5</td>
<td>0.2</td>
</tr>
<tr>
<td>2,500</td>
<td>5,000</td>
<td>3</td>
<td>0.4</td>
</tr>
</tbody>
</table>
Storm dissipated from forecasts six days from ultimate landfall.

August 22 (three days from landfall), NWS announced:

- “remnants of Harvey centered over Yucatan.”

- “likely to redevelop into a tropical storm or hurricane over the warm waters of the Bay of Campeche.”
One day before landfall, heavier rainfall projected downstream of Lake Conroe

- Timing of onset and end of heavier rains uncertain
- Most likely start Matagorda, Jackson Counties, closest to the hurricane, Friday/Friday night continuing
- Bands east of the center to set up into areas farther east Saturday and Sunday
- Could be sharp gradient north to south with coastal counties seeing most rain over the multiday period
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 agencies
- 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 throughout storm events.
Regional Flood Management Initiative

- Taking leadership role regarding flood management.
- Regional partner with HCFCD.
- Modelling, studies, communications, mitigation strategies, and project implementation.
- Limited by funding.
Flood Risk
FloodWarn Workshop

May 2, 2018

Diane Cooper
FEMA Floodplain Management and Insurance
Topics

- What is Flood Risk?
- Flood Hazard Mapping and FIRMS
- NFIP – National Flood Insurance Program.
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.”
What is a FIRM?

Flood Insurance **Rate** Map
- Identifies the Special Flood Hazard Area (SFHA) and Non-SFHA’s
- Used for rating flood insurance policies
- Mandatory purchase requirement if property is in SHFA AND is a federally backed mortgage.

FIRM for Kingwood Town Center

**FIRM’s show Riverine flood risk.**
What is a Flood Zone?

Zones on a FIRM:

- **SFHA (high risk)**
  - A, AE, AO, AH, VE, V etc. (Aqua)
    - 1% annual chance of flood
    - 26% chance of flooding in a 30-yr mortgage

- **Non-SFHA (low to moderate risk)**
  - B, C and X (Shaded – orange or gray color & non-Shaded)
    - Even the non-shaded is a flood zone – a minimal risk..

Find your zone at [https://msc.fema.gov/portal](https://msc.fema.gov/portal)
Flood Hazard Mapping

- The maps are **NOT** a prediction or forecast.
- Flood waters are not confined to the at the 1% risk line (aka 100yr flood) on the FIRM.

“Yes, this is a beautiful river. But it wasn’t here when we purchased the land. Maybe we should’ve checked to see if it was in a flood zone before investing in it.”
Flood Hazard Mapping

- FIRMs are a single snapshot for one scenario.
- FIRMS are subdivided by panels to cover a jurisdictional boundary (each has a unique panel number.)
- Assumptions are made in the modeling
  - Precipitation input the 100 year/24 hr design storm (*actual events rain intensities vary - not consistent rate over a 24 hr period.*)
  - Assumptions about the vegetation in the flood plain – do differentiate dead vs growing vegetation (increased friction during growing season)
  - Snapshot of land use when the models were developed – a challenge in rapidly developing areas
- One event is never the same as another, FIRMS will not exactly match an individual event.
Misconception: Only 100yr Floodplain is at Risk

- **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.
Misconception: Homeowners Insurance is Enough

- **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.
Flood Insurance

A tool for individuals to manage risk.

- Everyone is at risk for flooding.
  - For most events 26% of NFIP claims are outside the SHFA.
- A few inches can cause tens of thousands in damage.
- If you mortgage company “forced” you to buy flood insurance, check that structure and CONTENTS are covered. Most cover structure only.
Structure Elevation Impact Insurance Rates

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

High Risk = $$$
Medium Risk = $$
Lower Risk = $

EVERY Structure has a risk…
generally the higher the structure the less the risk.
Harvey Numbers

**Insurance claims in Houston**
- 26,511 insurance claims
- 55.2% of claims were **OUTSIDE** of the 100 yr.

*estimated 17% of Houstonians had flood insurance

**Numbers from City of Houston**
- 30,500 structures in 1% risk area
- 29K in the 0.2% risk area
- Total of ~ 150K structures impacted city wide

~ 90K structures **OUTSIDE** of the 0.2% Risk Area Impacted

Kingwood
Torchy’s
IF in the 1% risk area (100yr floodplain)

AND received FEMA Individual Assistance (IA),

A GFIP policy was purchased

(if they did not have flood insurance.)

GFIP is a 3 yr. abridged Flood Insurance Policy. The policy is paid for from the IA funds.

You can purchase the standard NFIP policy to increase your coverage. (GFIP cancels)
Group Flood Insurance Policy (GFIP)

**Requirement** - property owner MUST purchase and maintain a traditional NFIP policy when GFIP expires.

If not...they are not eligible for IA that would cover the replacement of real or personal property for the damaged location with a future event.

The insurance requirement is forever – including new homeowners.
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.
  • FIRMs focus on river flooding and some overland flow.

Flood insurance allows individual property owners to manage their risk.
  • Buy policies that cover the structure **AND** contents.
Flood Safety

What to do during and after a flooding event
If a **Flash Flood Warning** is in effect

- Turn around, don’t drown when encountering flooded roads. Most flood deaths occur in vehicles.
- 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.
If a **Flash Flood Warning** is in effect

- Avoid areas that are already flooded, especially if the water is flowing fast.
- **NEVER** stand around in flood waters as chemicals, fire ants, and animals could all be found in flood waters.
- **NEVER** drive across flooded roadways or into flooded underpasses
  - If your vehicle is caught in rising water, leave it immediately and seek higher ground
- Have multiple ways to receive weather information (cell phone, NOAA weather radio, television, etc.)
Turn Around, Don’t Drown!

- 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!
- Flooded roads may have hidden dangers, such as washed out road beds or underwater obstructions.

Minnesota road damaged by flood waters, courtesy of FEMA.
Safety During The Flood – Do NOT Sightsee!

- 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!*
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
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).

weather.gov/flood

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
Safety at home 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
Good preparation before a flood strikes, and knowing what to do when a flood occurs, will increase your family’s safety…and possibly its survival. Some flood safety preparation tips include:

- 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.
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
Harris County Flood Control District
San Jacinto River Authority
FEMA