

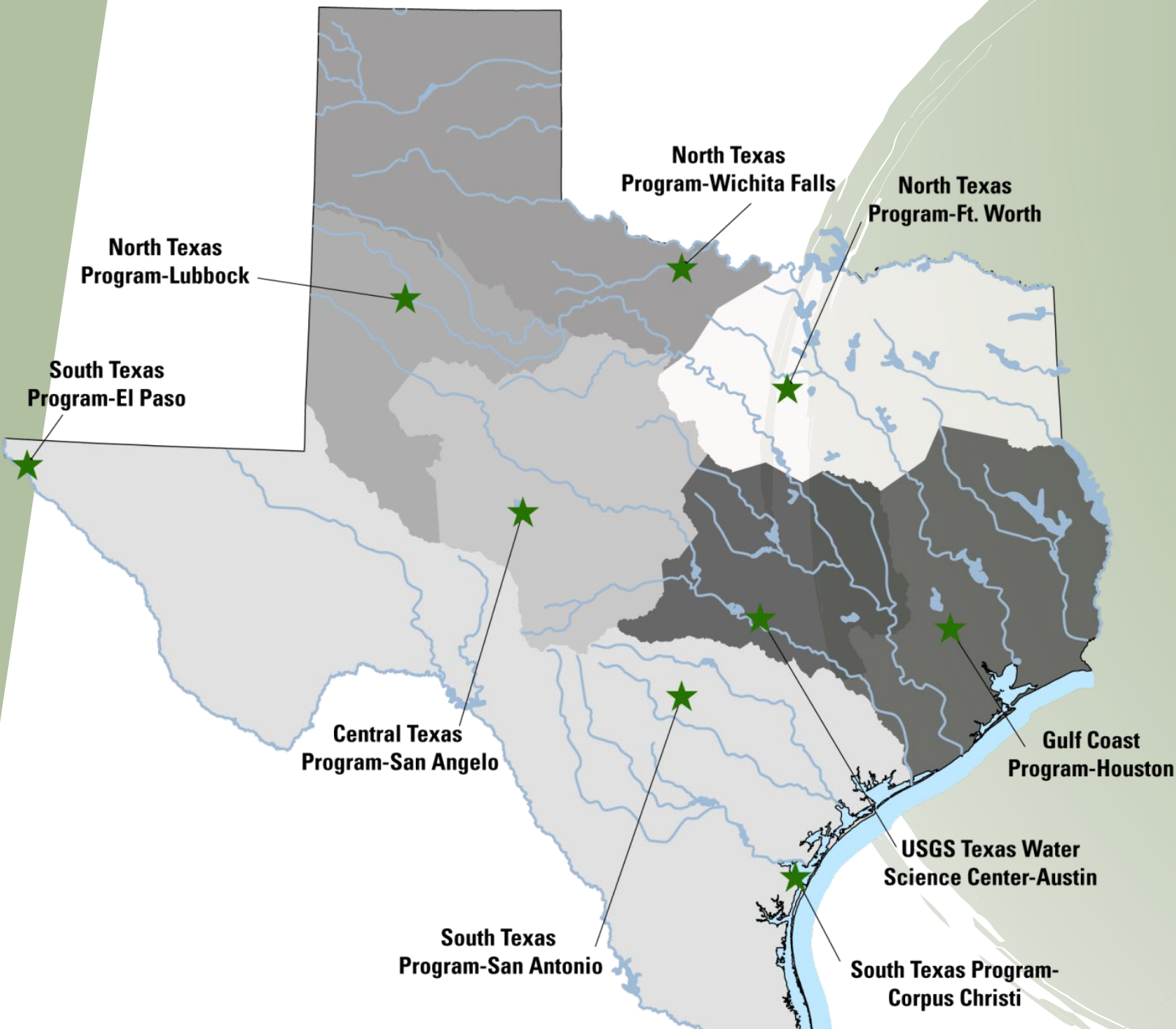


SAN ANTONIO REGIONAL FLOOD PLANNING GROUP

17 AUGUST 2021

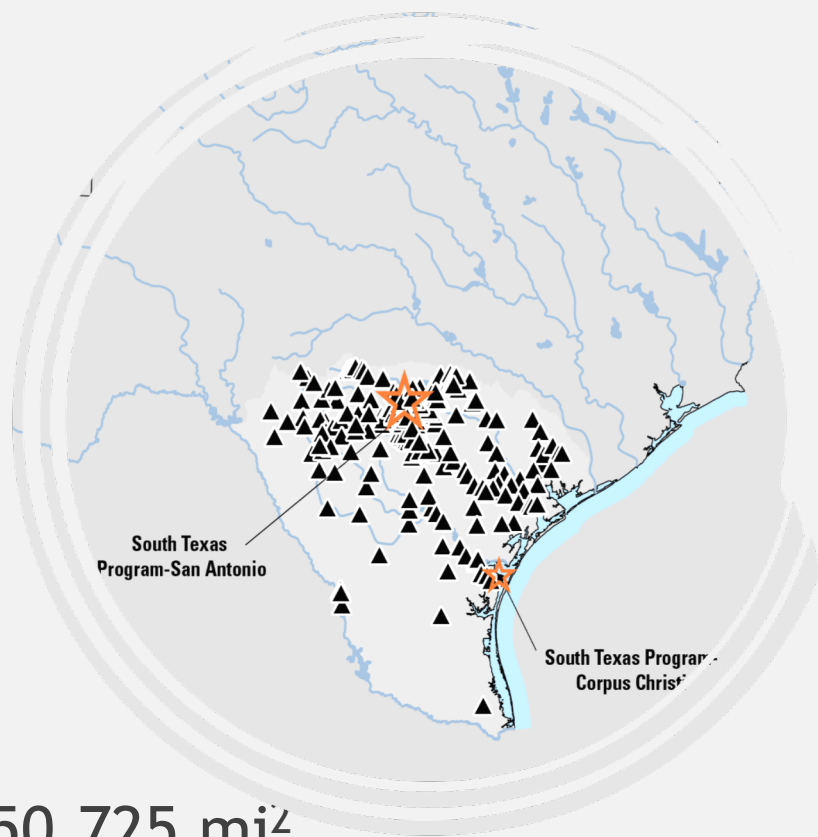
MICHAEL NYMAN

Oklahoma-Texas Water Science Center



More than just volcanoes
and maps





- ▶ 50,725 mi²
- ▶ 165 streamflow and 6 lake sites
- ▶ 10 groundwater sites
- ▶ 20 water quality sites

South Texas
Branch Office
5563 De Zavala
Suite 290
San Antonio, TX
78249



Agenda



USGS STREAMGAGE DATA



FLOOD INUNDATION MAPS



IMPLEMENTATION OF
FLOOD TOOLS



USGS National Water Information System

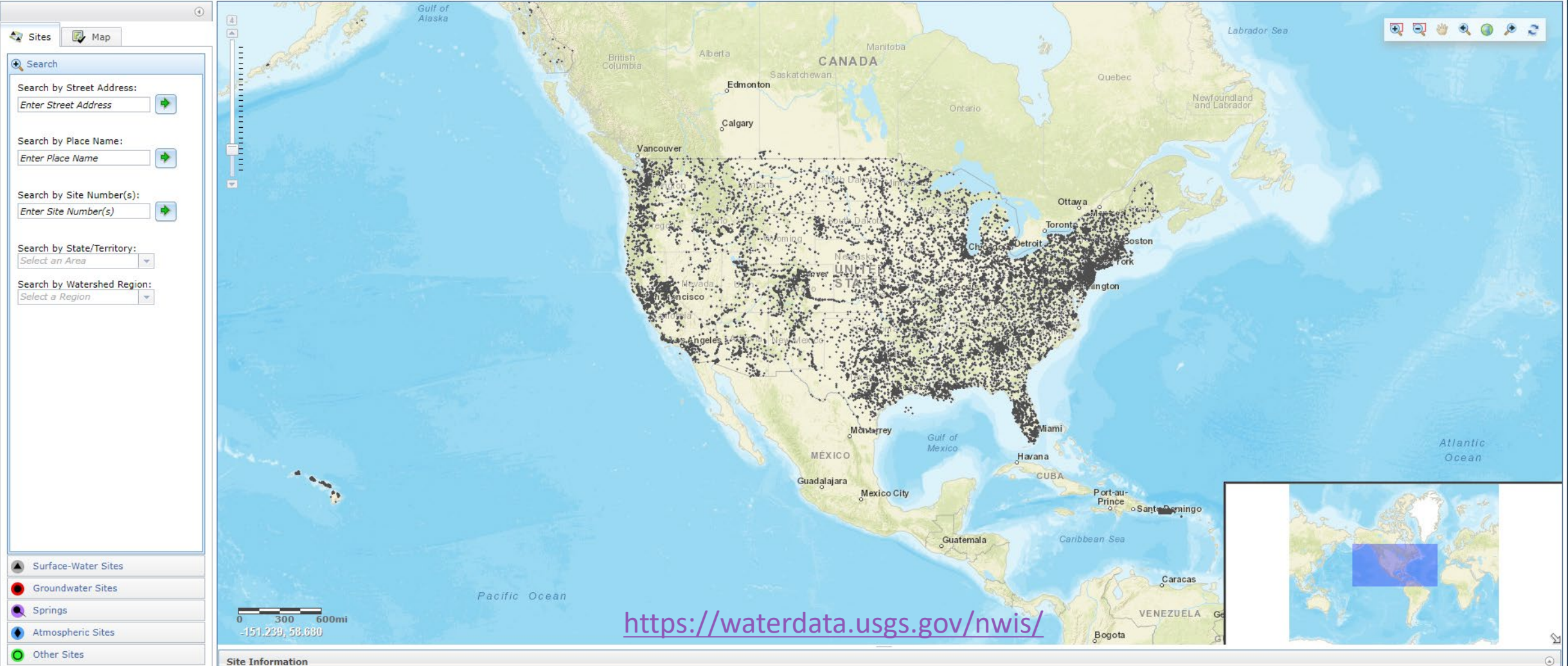
maps.waterdata.usgs.gov/mapper/index.html



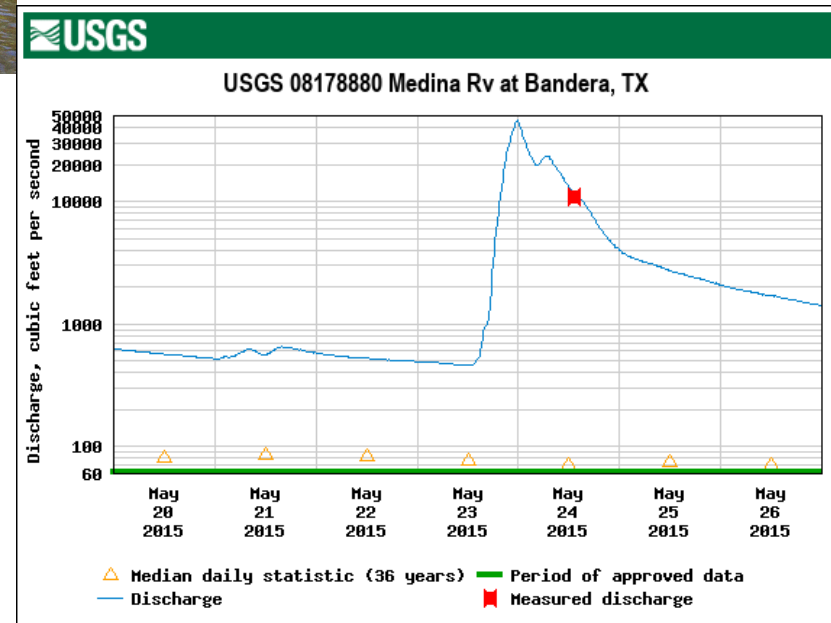
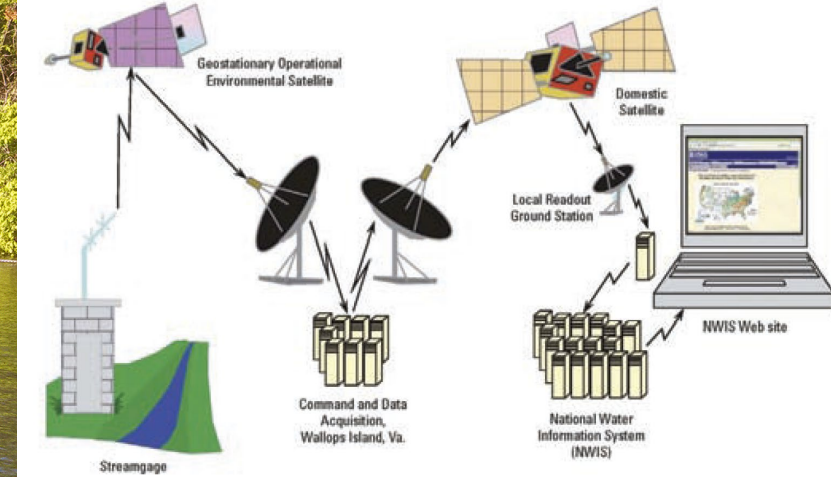
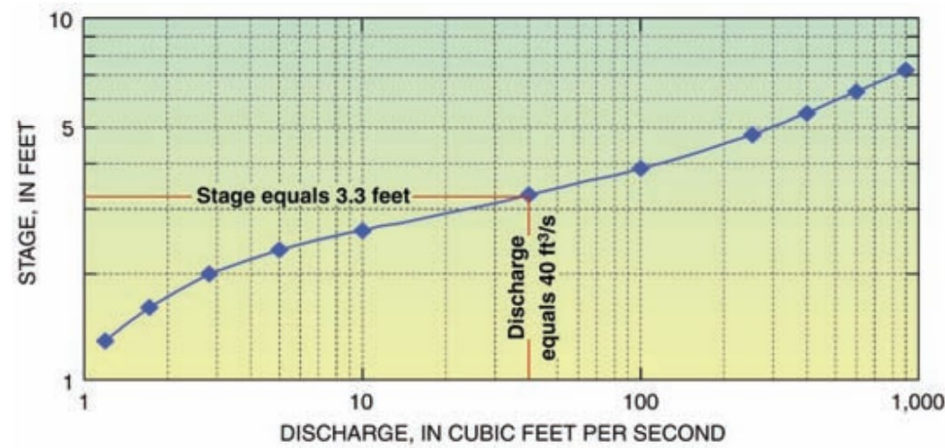
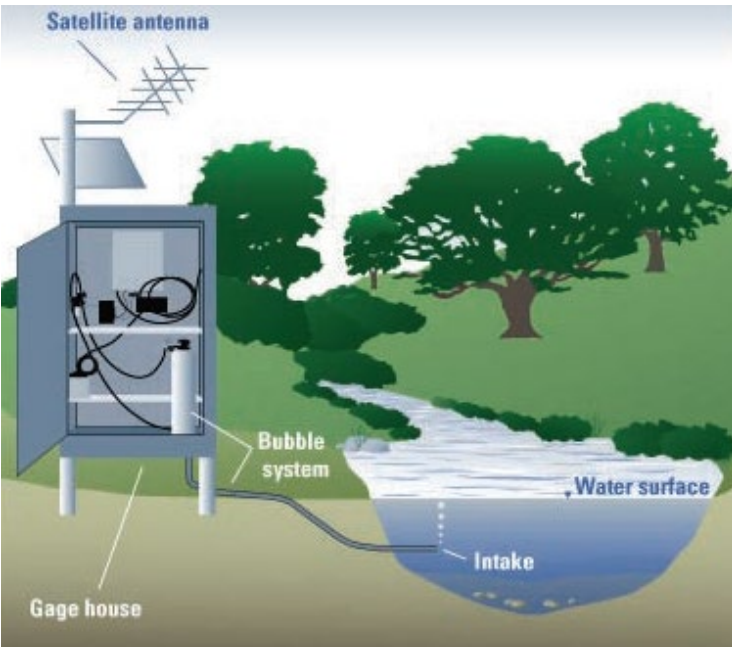
National Water Information System: Mapper

USGS Home
Contact USGS
Search USGS

Help Info



What is a streamgage?



Source: Lurry 2011 (<https://pubs.usgs.gov/fs/2011/3001/>)

USGS Flood Activities

USGS employees head into danger to ensure data flows to NWS forecasters during floods

- ▶ Verify streamflow ratings
- ▶ Repair gages
- ▶ Flag high-water marks
- ▶ Communicate with NWS and emergency managers



Stream Trace Detailed Report

About This Report

This report provides information about the water bodies, streams, and streamflow gaging (measuring) stations along the routes that you trace using [Streamer](#). It also identifies places (states, counties, and cities) your trace encounters as it moves downstream or upstream. Streamer uses one million-scale map layers from [The National Map Small-Scale Collection](#).

The U.S. Geological Survey (USGS) maintains a [national network of gaging stations that measure streamflow](#) and other water characteristics.

Click [here](#) for more information about this report and how to download The National Map Small-Scale Collection data.

Trace Details

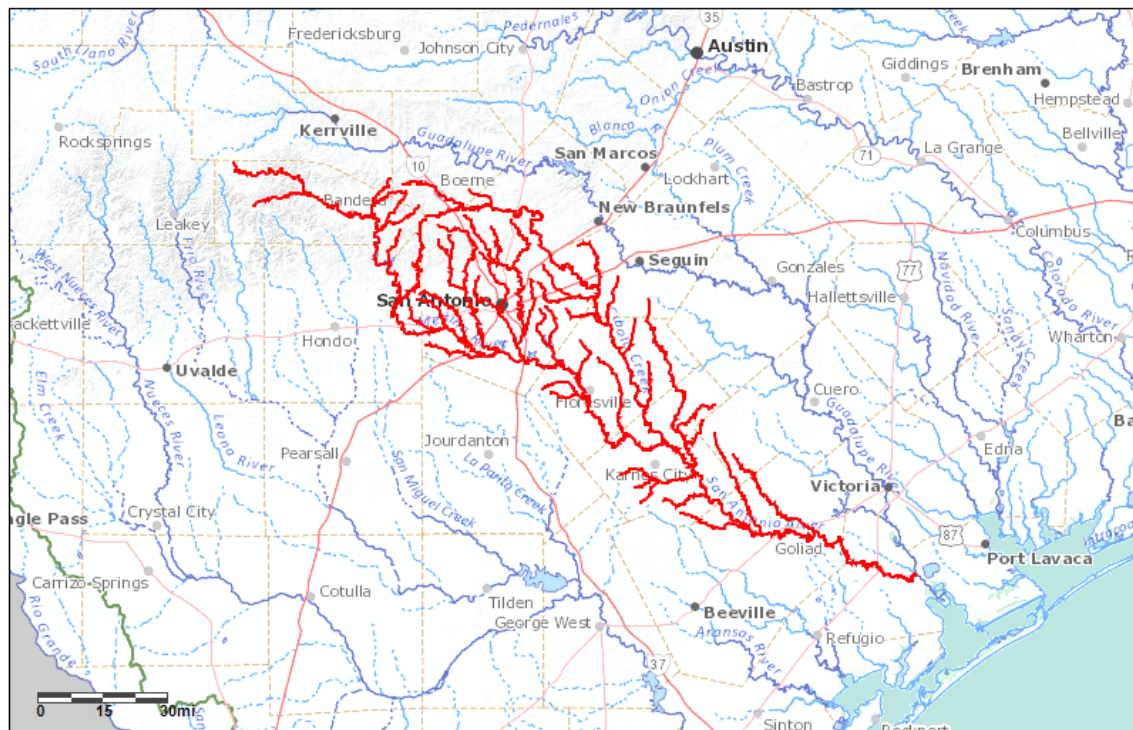
Trace Direction: **Upstream**
Trace Origin Stream Name: **San Antonio River**
Trace Origin (latitude, longitude): **28.507, -96.891**
Trace Origin Elevation (feet): **3**

Water Features

Total Length of Traced U.S. Streams (miles): **1,331**
Outlet Waterbody: **Gulf of Mexico**
USGS Stream Gages (count): **53**
Stream Names (count): **56**
Waterbody Names (count): **2**

Political Features

U.S. States (count): **1**
U.S. Counties (count): **14**
Total County Population (2010): **2,304,910**
Cities (count): **65**

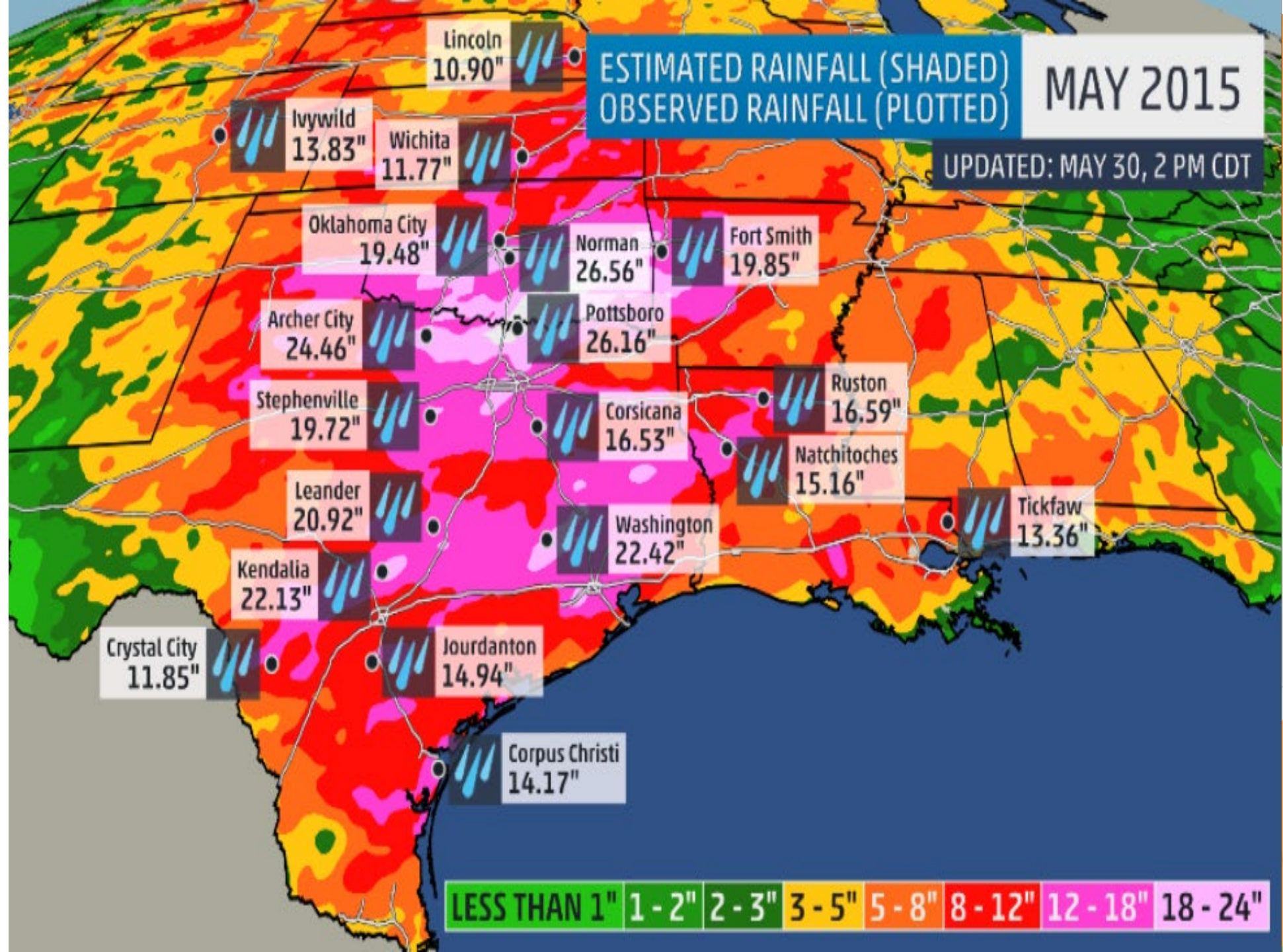


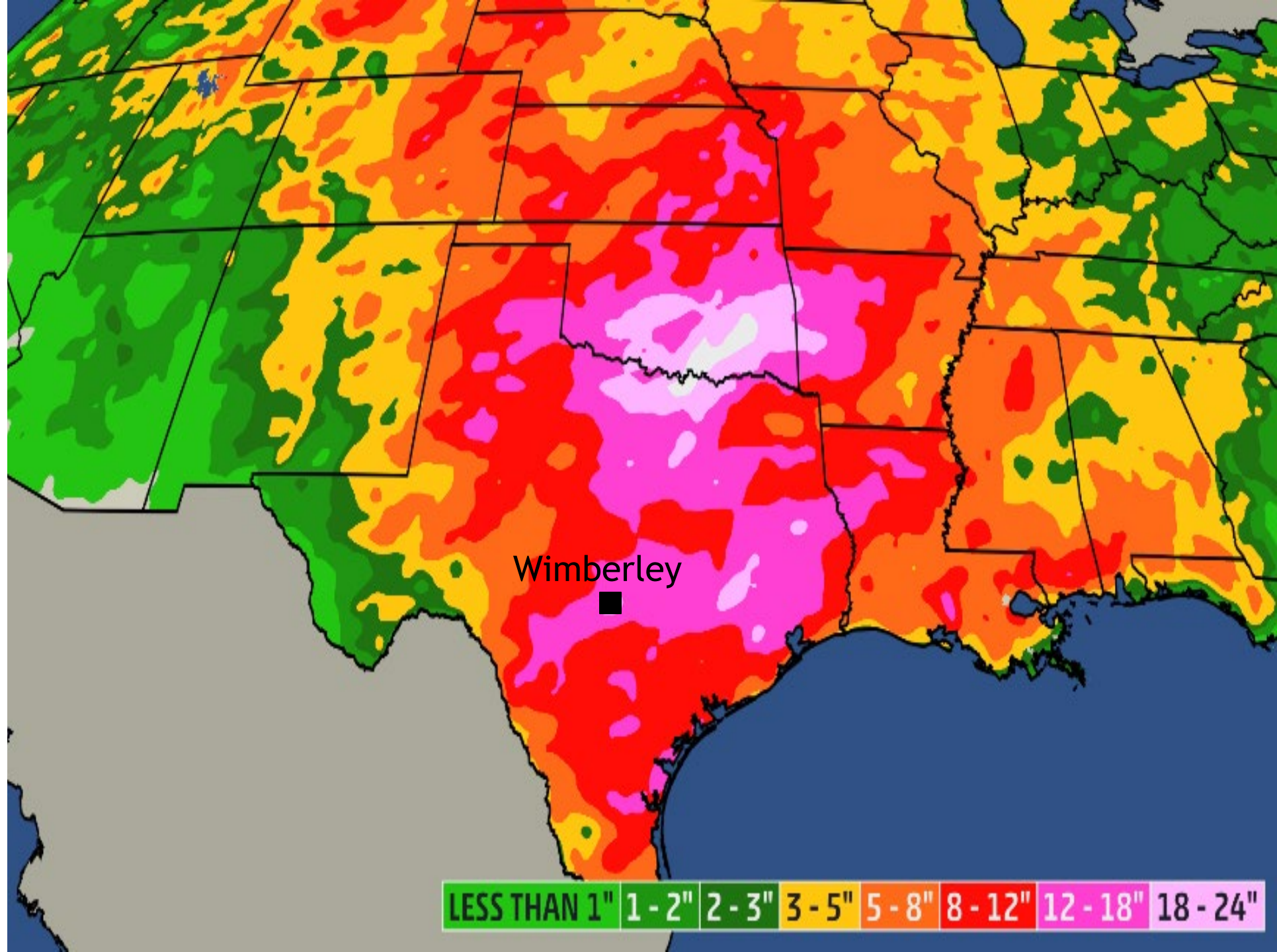
San Antonio River Basin

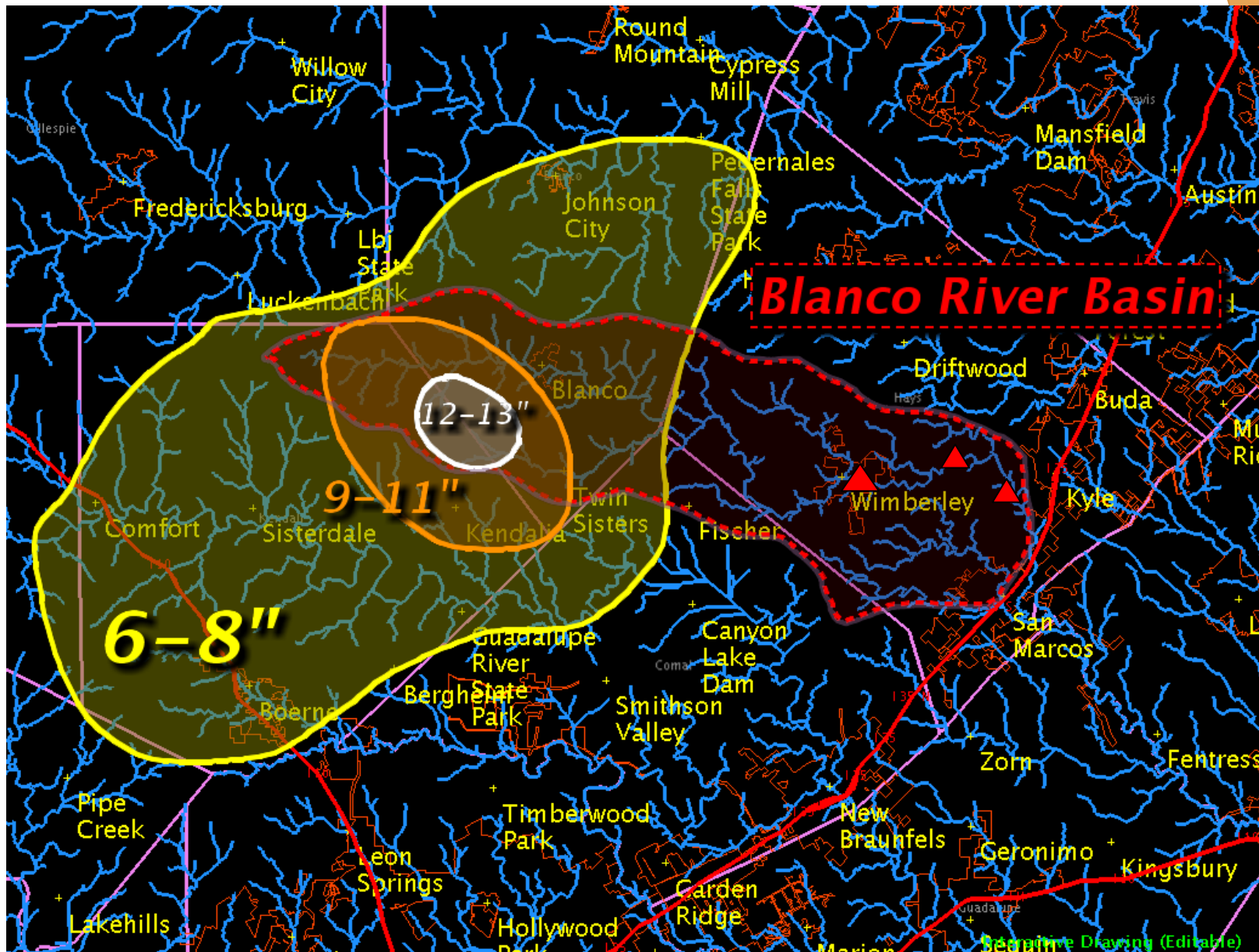
USGS Stream Gages

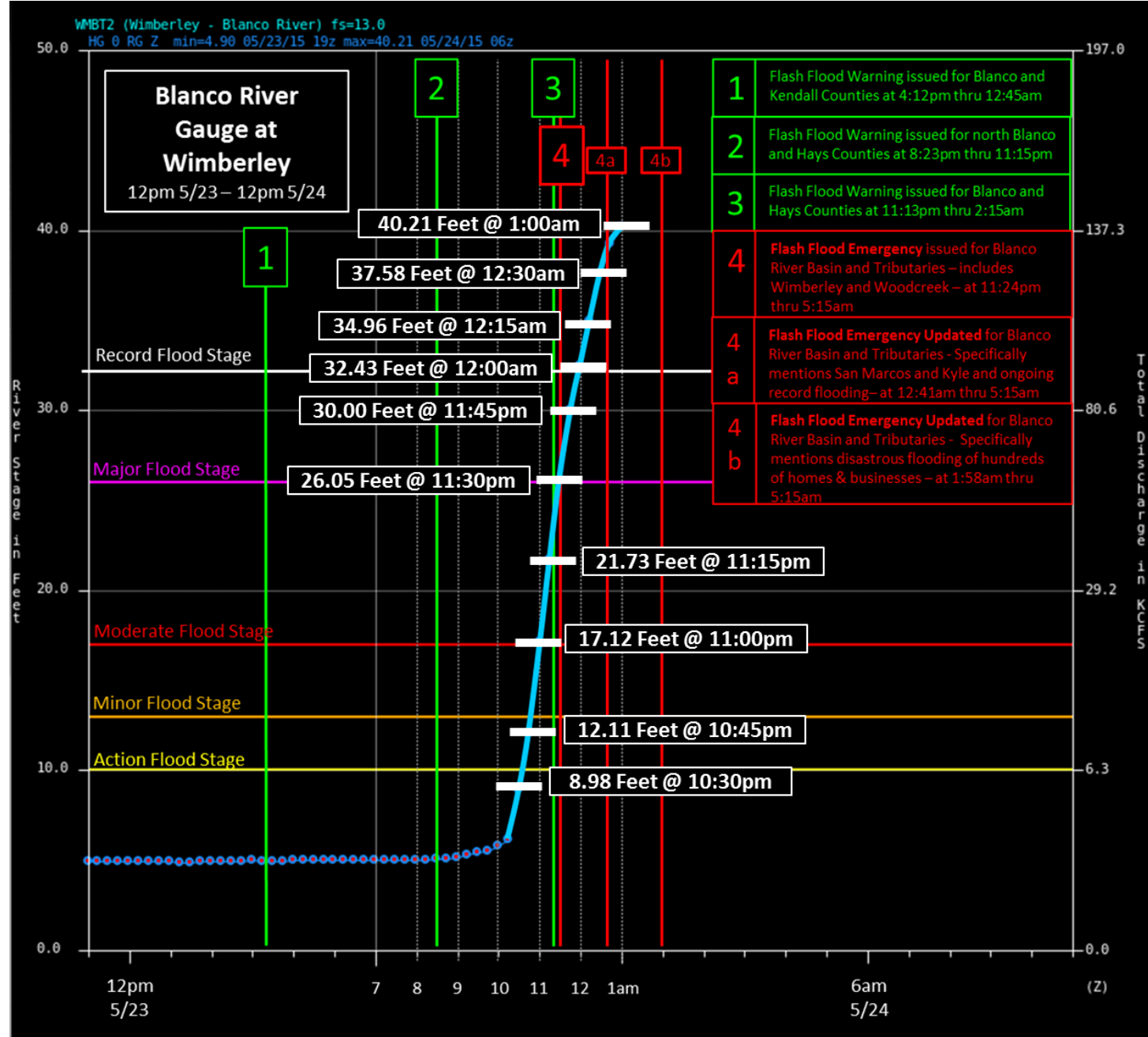
08177700* Olmos Creek at Dresden Drive, San Antonio, TX	08180750 Medio Creek at Pearsall Road at San Antonio, TX
08177800 Olmos Res at San Antonio, TX	08180800* Medina River near Somerset, TX
08177860 San Antonio River at Woodlawn Ave, San Antonio, TX	08180945 Leon Creek at Scenic Loop Road near Leon Springs, TX
08177920 San Antonio River at Dolorosa St, San Antonio, TX	08181050 Leon Creek at Prue Road, San Antonio, TX
08178000* San Antonio River at San Antonio, TX	08181400* Helotes Creek at Helotes, TX
08178030 San Antonio River at Lone Star Blvd, San Antonio, TX	08181480* Leon Creek at Interstate Highway 35, San Antonio, TX
08178050* San Antonio River at Mitchell Street, San Antonio, TX	08181500* Medina River at San Antonio, TX
08178500* San Pedro Creek at Furnish St, San Antonio, TX	08181800* San Antonio River near Elmendorf, TX
08178505 San Antonio River at Theo Ave, San Antonio, TX	08182500 Calaveras Creek near Elmendorf, TX
08178565* San Antonio River at Loop 410, San Antonio, TX	08183000 San Antonio River at Calaveras, TX
08178585 Salado Creek at Wilderness Road at San Antonio, TX	08183200* San Antonio River near Floresville, TX
08178593 Salado Creek at Blanco Road San Antonio, TX	08183500* San Antonio River near Falls City, TX
08178700 Salado Creek at Loop 410, San Antonio, TX	08183850 Cibolo Creek at Interstate Highway 10 above Boerne, TX
08178800* Salado Creek at Loop 13, San Antonio, TX	08183890 Cibolo Creek at Cibolo Nature Center near Boerne, TX
08178880* Medina River at Bandera, TX	08183900* Cibolo Creek near Boerne, TX
08178990 Medina River at English Crsg near Pipe Creek, TX	08184000 Cibolo Creek near Bulverde, TX
08179000 Medina River near Pipe Creek, TX	08184500 Cibolo Creek abv Bracken, TX
08179100 Red Bluff Creek near Pipe Ck, TX	08185000* Cibolo Creek at Selma, TX
08179110* Red Bluff Creek at FM 1283 near Pipe Creek, TX	08185065* Cibolo Creek near Saint Hedwig, TX
08179500 Medina Lake near San Antonio, TX	08185100* Martinez Creek near Saint Hedwig, TX
08179520 Medina River below Medina Lake near San Antonio, TX	08185500* Cibolo Creek at Sutherland Springs, TX
08180010* Diversion Lake near Riomedina, TX	08186000* Cibolo Creek near Falls City, TX
08180500* Medina River near Riomedina, TX	08186500* Ecletto Creek near Runge, TX
08180600 San Geronimo Creek Res near Riomedina, TX	08187500* Escondido Creek at Kenedy, TX
08180640* Medina River at La Coste, TX	08188500* San Antonio River at Goliad, TX
08180700* Medina River near Macdona, TX	08188570* San Antonio River near McFaddin, TX
08180720 Medina River near Von Ormy, TX	

* Indicates a USGS real-time stream gage









Supergage

Zacate Ck at Jacaman Rd, Laredo, TX

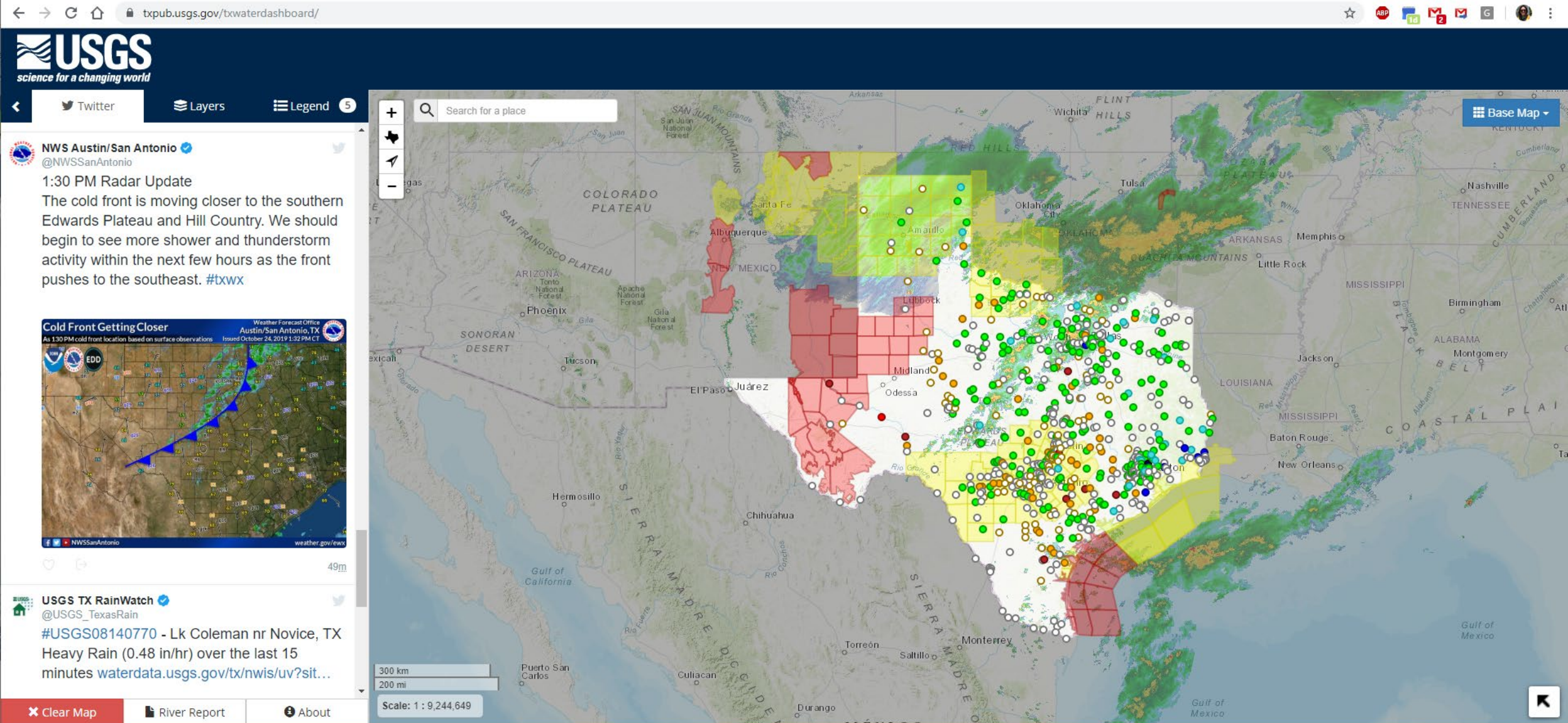


217 LOCATIONS

- ▶ 164 Surface water sites
 - ▶ 20 Water Quality sites
 - ▶ 17 Published Precip
 - ▶ 10 Groundwater sites
 - ▶ 6 Lakes



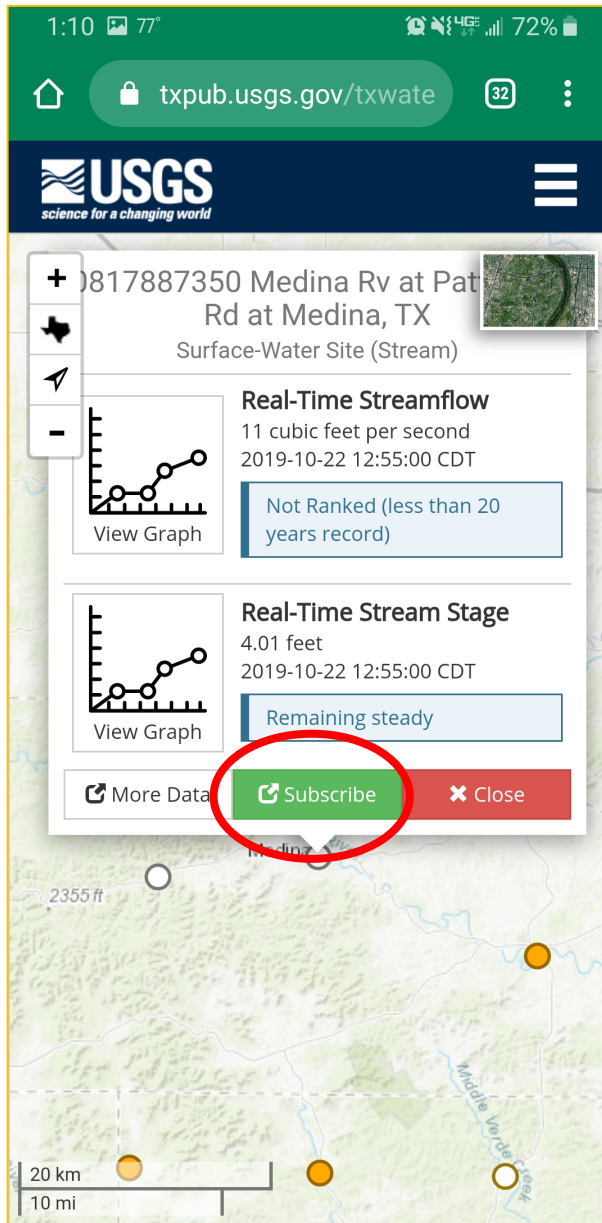
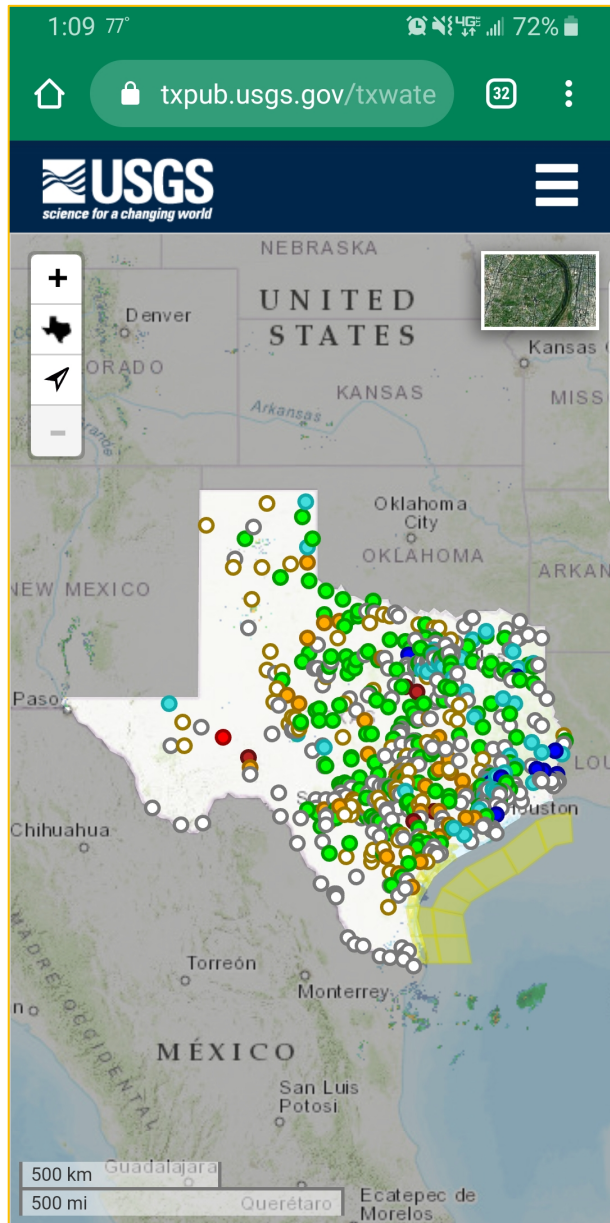
USGS Texas water dashboard



<https://txpub.usgs.gov/txwaterdashboard/>

USGS Wateralert - mobile

* Use Texas Water Dashboard
txpub.usgs.gov/txwaterdashboard/



1:10 77° 72%
water.usgs.gov/wateral

USGS science for a changing world
USGS WaterAlert

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: 0817887350
Name: Medina Rv at Patterson Rd at Medina, TX
Agency: USGS
Transaction ID: k7Qd3

Send Notification To:
☐ My mobile phone
☐ My email address

Notification Frequency:
☐ Hourly
☐ Daily

Streamflow Parameter(s):

Discharge, in ft³/s: 11.0 [look up](#)
Gage height, in ft: 4.01 [look up](#)

Alert Threshold Condition:
☐ Greater than (>)
☐ Less than (<)
☐ Outside a range (>= <=)
☐ Inside a range (>= <=)
Real-time value is greater than: _____ ft³/s

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

2:04 80° 69%
USGS WaterAlert
(470) 219-3519

Tuesday, October 22, 2019

USGS: 4.01 ft Gage height, 2019-10-22 12:55:00 Medina Rv at Patterson Rd at Medina, TX
Help: water.usgs.gov/hns?27yzm 1:03 PM

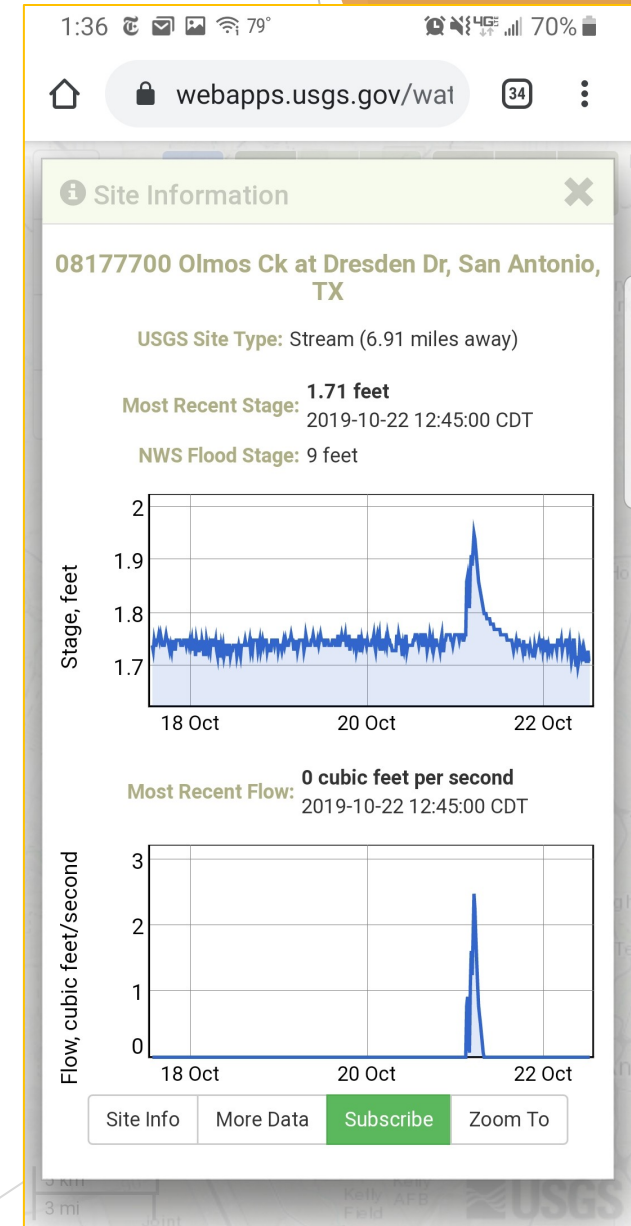
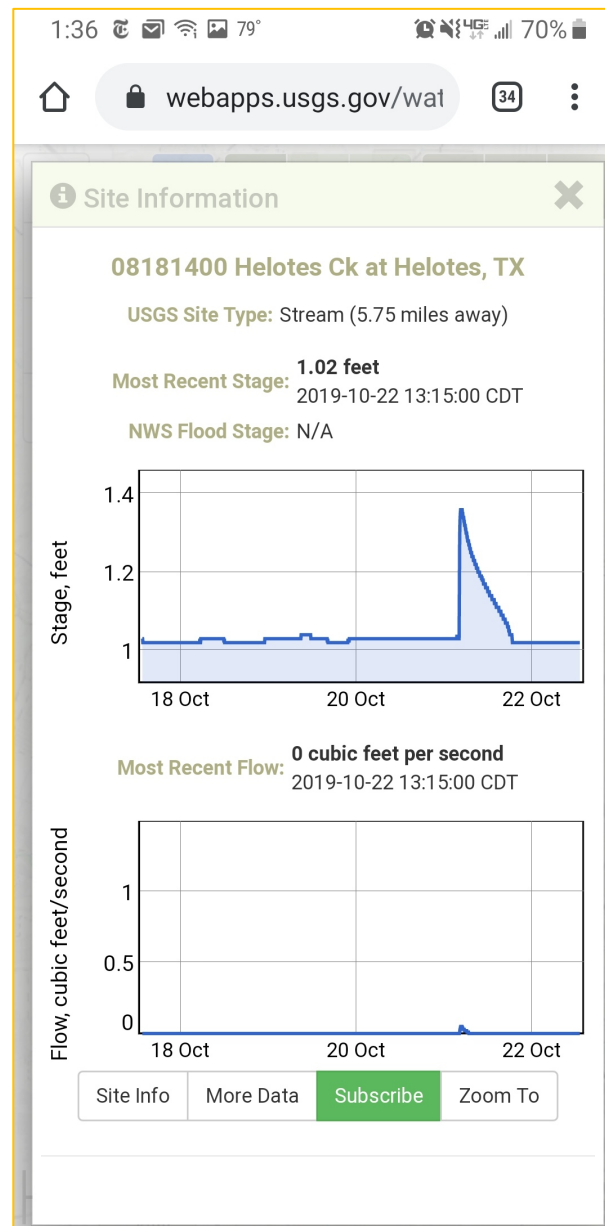
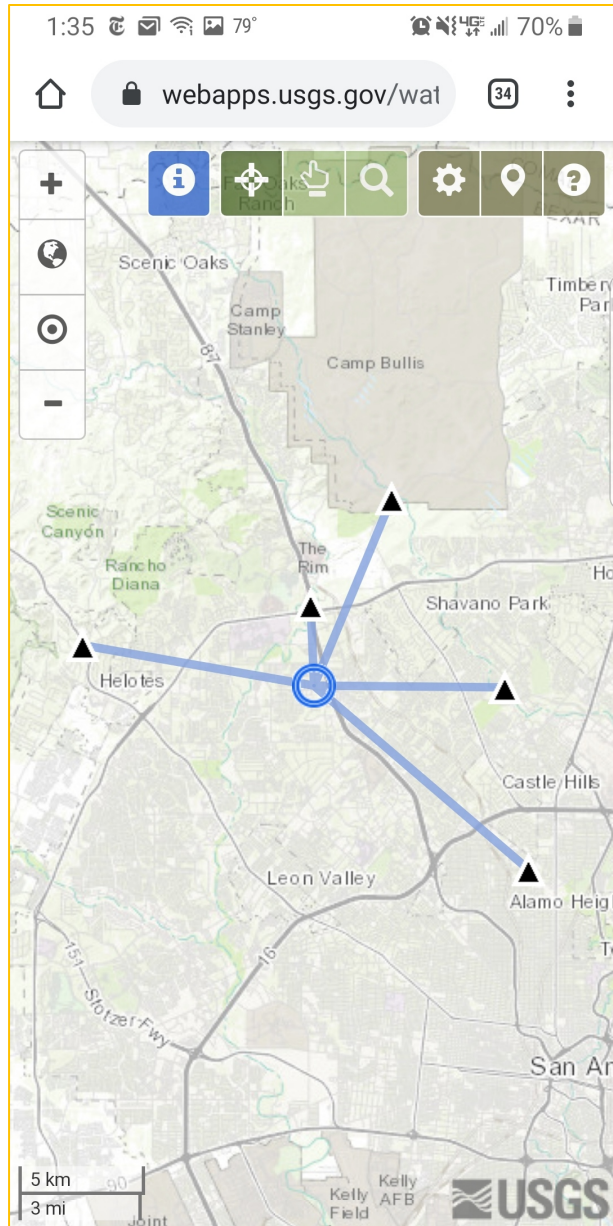
USGS: 4.01 ft Gage height, 2019-10-22 13:55:00 Medina Rv at Patterson Rd at Medina, TX
Help: water.usgs.gov/hns?27yzm 2:03 PM

Subscribe

+ Enter message

USGS Water on-the-go - mobile

txpub.usgs.gov/water-onthego/



Agenda



USGS STREAMGAGE DATA



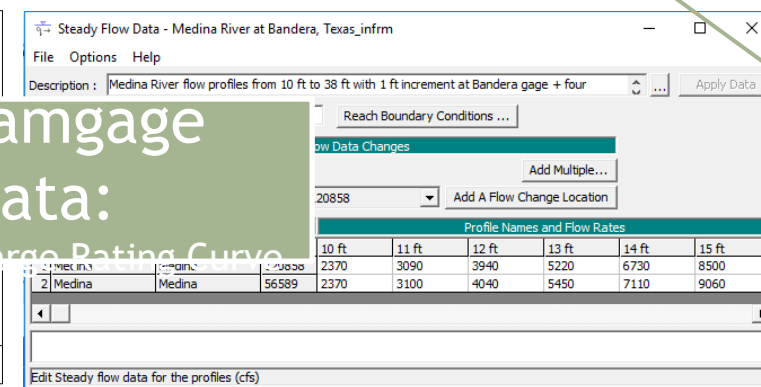
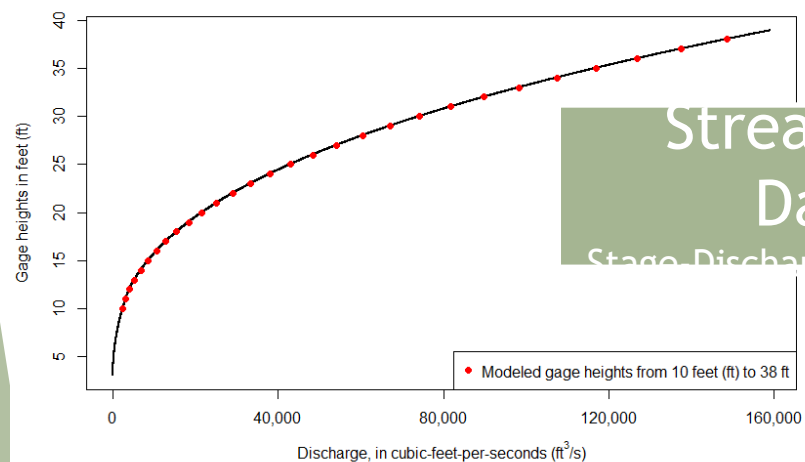
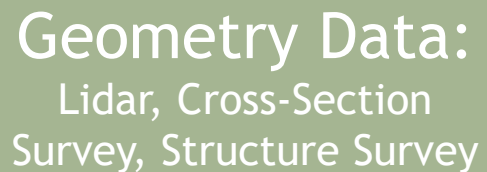
FLOOD INUNDATION MAPS



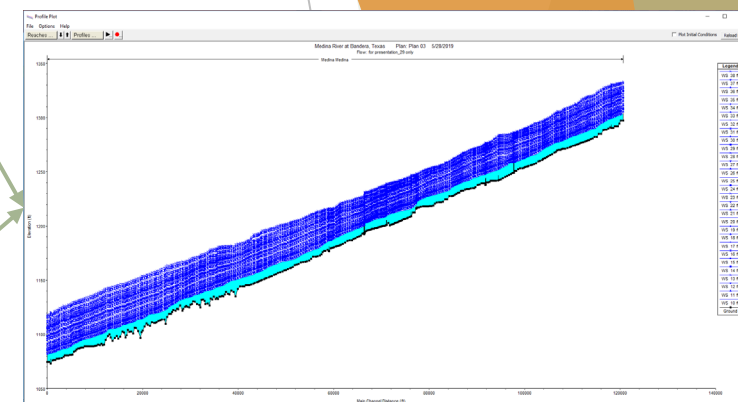
IMPLEMENTATION OF
FLOOD TOOLS



StratMap 2014 50cm Bandera & Lampasas Lidar



HEC-RAS Model



Model Calibration

Flood-Inundation Maps



Flood Inundation Maps

- ▶ Maps that show where flooding may occur over a range of water levels in the river



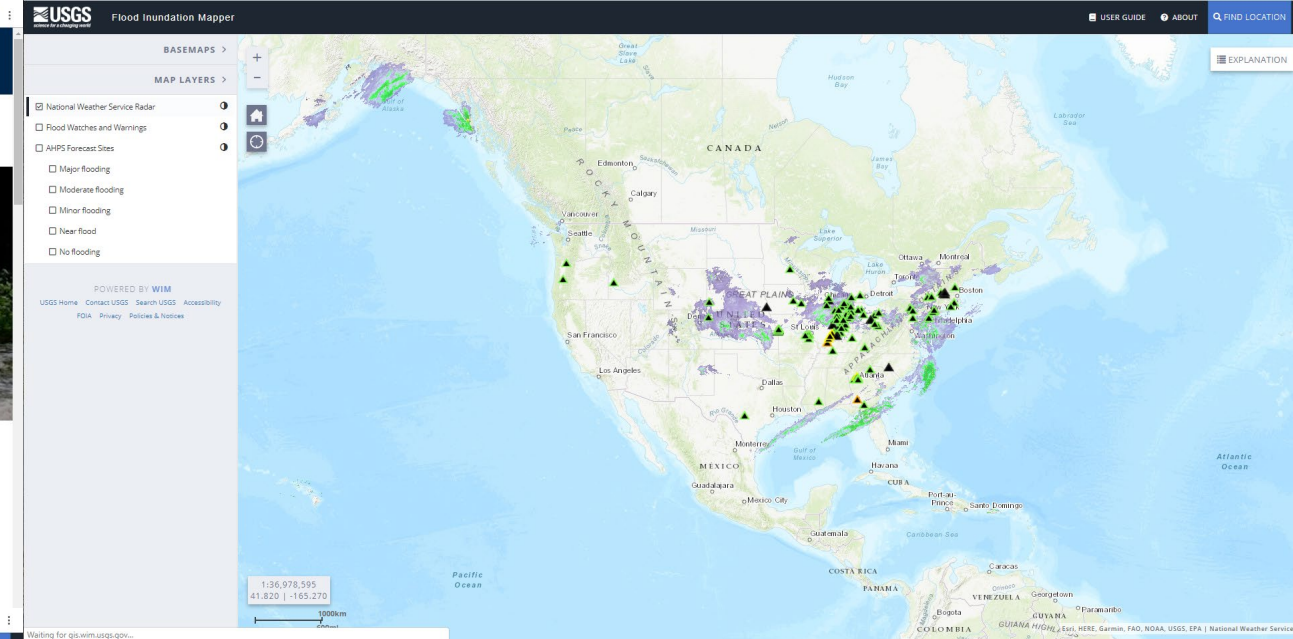
National Weather Service Flood Categories (ft)

1% Annual Exceedance Flood (Maximum recorded peak stage)	38
Major Flood Stage:	24
Moderate Flood Stage:	14
Flood Stage:	13
Action Stage:	10

<https://fim.wim.usgs.gov/fim/>

The screenshot shows the USGS Flood Inundation Mapping (FIM) Program homepage. At the top is the USGS logo and navigation links for Science, Products, News, Connect, and About. A search bar is also present. Below the navigation is a large banner image of a person in a yellow safety vest standing in floodwater next to a road. The text "USGS Flood Information" is overlaid on the banner, with a "Learn more" button. Below the banner is a section titled "Flood Inundation Mapping (FIM) Program" with a sub-header "Water Resources". The main content area includes a paragraph about floods being the leading cause of natural-disaster losses in the U.S., a "Status - Active" indicator, and a "Contacts" section listing Marie C. Peppier as the Bureau Emergency Manager. A footer section mentions that the FIM program helps communities protect lives and property by providing tools and information.

The screenshot shows the USGS Flood Inundation Mapper interface. The main map displays the Medina River at Bandera, Texas, with a blue line representing the river and surrounding areas shaded in light blue to indicate flood inundation. A "Water depth" pop-up window shows a range of 0 to 10 feet. A "Flood Tools" panel on the right includes a "Hydrograph" tab and a "Services and Data" tab. The "Hydrograph" tab displays a graph of water depth over time, with a selected gage height of 38 feet. The "Services and Data" tab shows "Current Conditions" for the gage, including a gage height of 3.80 feet and a discharge of 23.5 cfs. The USGS logo is visible in the bottom right corner of the map area.



- Managed by USGS OKIWSC
- Covers contingent US
- From 10 ft to 38 ft with 1 ft increment (makes up to 29)
- Links to associated report and data release available

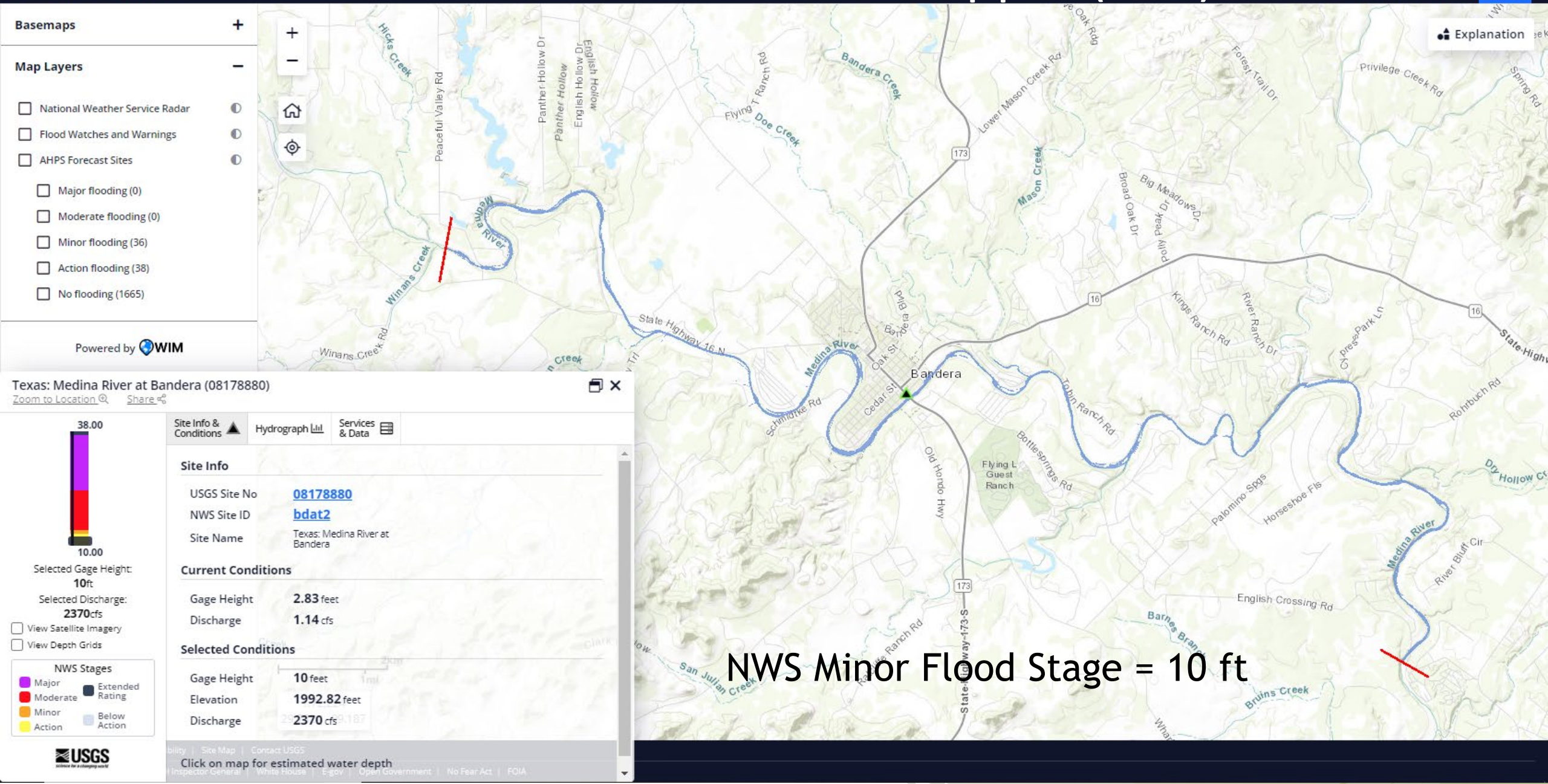


Flood inundation maps summary

- ▶ **USGS FIM:** US Geological Survey Flood Inundation Mapper
(<https://fim.wim.usgs.gov/fim/>)
- ▶ **InFRM FDST:** Interagency Flood Risk Management Flood Decision Support Toolbox
(<https://webapps.usgs.gov/infrm/fdst/> or <https://infrm.us/>)



USGS Flood Inundation Mapper (FIM)




USGS Flood Inundation Mapper (FIM)

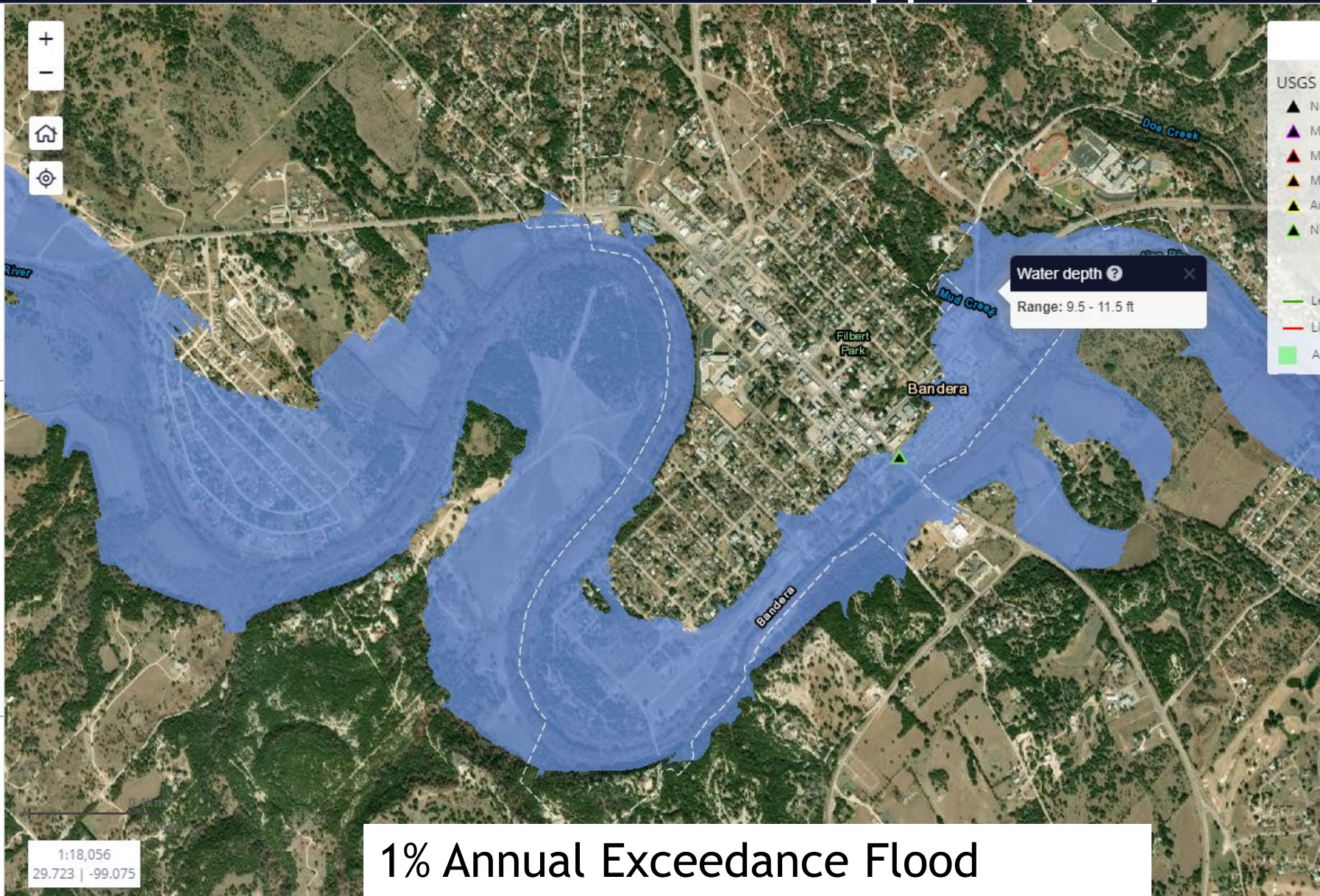
Basemaps

- Streets
- Satellite
- Hybrid
- Topo
- Terrain
- Gray
- OSM
- NatGeo
- Nat'l Map

Map Layers

- ☐ National Weather Service Radar
- ☐ Flood Watches and Warnings
- ☐ AHPS Forecast Sites
 - ☐ Major flooding (0)
 - ☐ Moderate flooding (0)
 - ☐ Minor flooding (36)
 - ☐ Action flooding (38)
 - ☐ No flooding (1665)

Powered by  **WIM**



Explanation

USGS FIM Sites (NWS forecast category)

- No forecast information available
- Major Flooding
- Moderate Flooding
- Minor Flooding
- Action Stage
- No Flooding

Supplemental layers

- Levee centerline (where applicable)
- Limit of study area
- Area of uncertainty (where applicable)

Flood Tools

USGS Site No: 08178880
 NWS Site ID: bdat2

Current Conditions

Gage height:	2.83ft
Discharge:	1.14cfs

Selected Conditions

Gage height:	38ft
Discharge:	148000cfs
Elevation:	1227.82cfs

1% Annual Exceedance Flood
 (Maximum recorded peak stage) = 38 ft

Agenda



USGS STREAMGAGE DATA



FLOOD INUNDATION MAPS



IMPLEMENTATION OF
FLOOD TOOLS



InFRM Flood Decision Support Toolbox



Interagency Flood Risk Management

Collaborating Nationally. Empowering Locally.

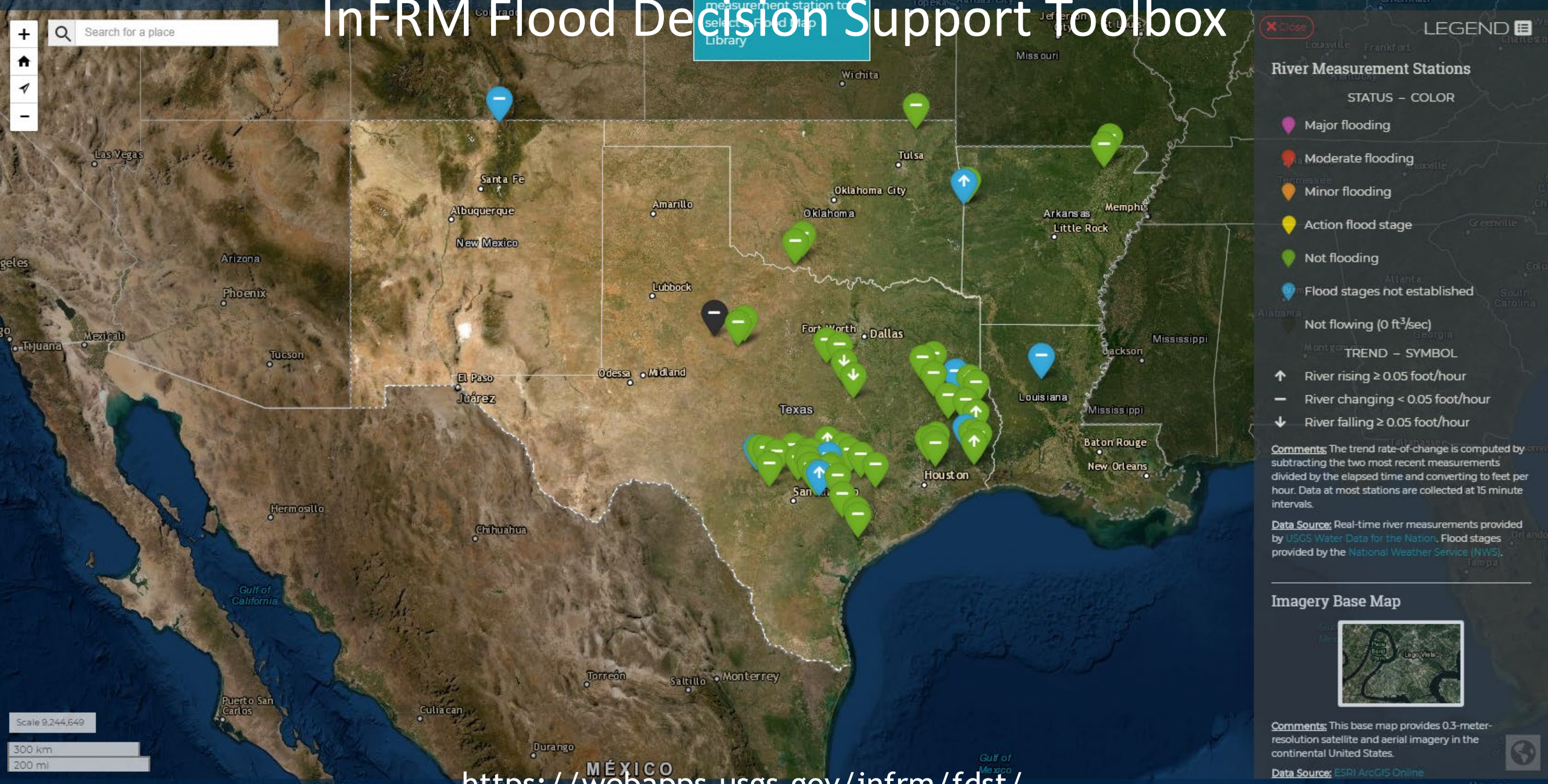
Flooding remains the leading cause of natural-disaster loss across the United States. The Interagency Flood Risk Management (InFRM) team brings together Federal Partners with mission areas of hazard mitigation, emergency management, floodplain management, natural resources management or conservation to leverage the skillsets, resources and programs to determine the needs of communities and define solutions and implement measures to reduce long term flood risk throughout the States of Arkansas, Louisiana, New Mexico, Oklahoma and Texas.

In 2014, the Federal Emergency Management Agency (FEMA) began sponsorship of the InFRM team initiative to allow Federal teams across the States of Texas, Oklahoma, New Mexico, Louisiana and Arkansas to better align and integrate. Currently, the InFRM team is comprised of FEMA, US Army Corps of Engineers, US Geological Survey, and the National Weather Service. No single agency has all the answers, but through a coordinated effort of multiple programs and various perspectives, a cohesive solution can be found. By applying their shared knowledge, the InFRM team can also enhance response and recovery efforts when flood events do occur.



InFRM Flood Decision Support Toolbox

Click a river measurement station to select Flood Map Library



LEGEND

River Measurement Stations

STATUS - COLOR

- Major flooding
- Moderate flooding
- Minor flooding
- Action flood stage
- Not flooding
- Flood stages not established

TREND - SYMBOL

- River rising ≥ 0.05 foot/hour
- River changing < 0.05 foot/hour
- River falling ≥ 0.05 foot/hour

Comments: The trend rate-of-change is computed by subtracting the two most recent measurements divided by the elapsed time and converting to feet per hour. Data at most stations are collected at 15 minute intervals.

Data Source: Real-time river measurements provided by USGS Water Data for the Nation. Flood stages provided by the National Weather Service (NWS).

Imagery Base Map

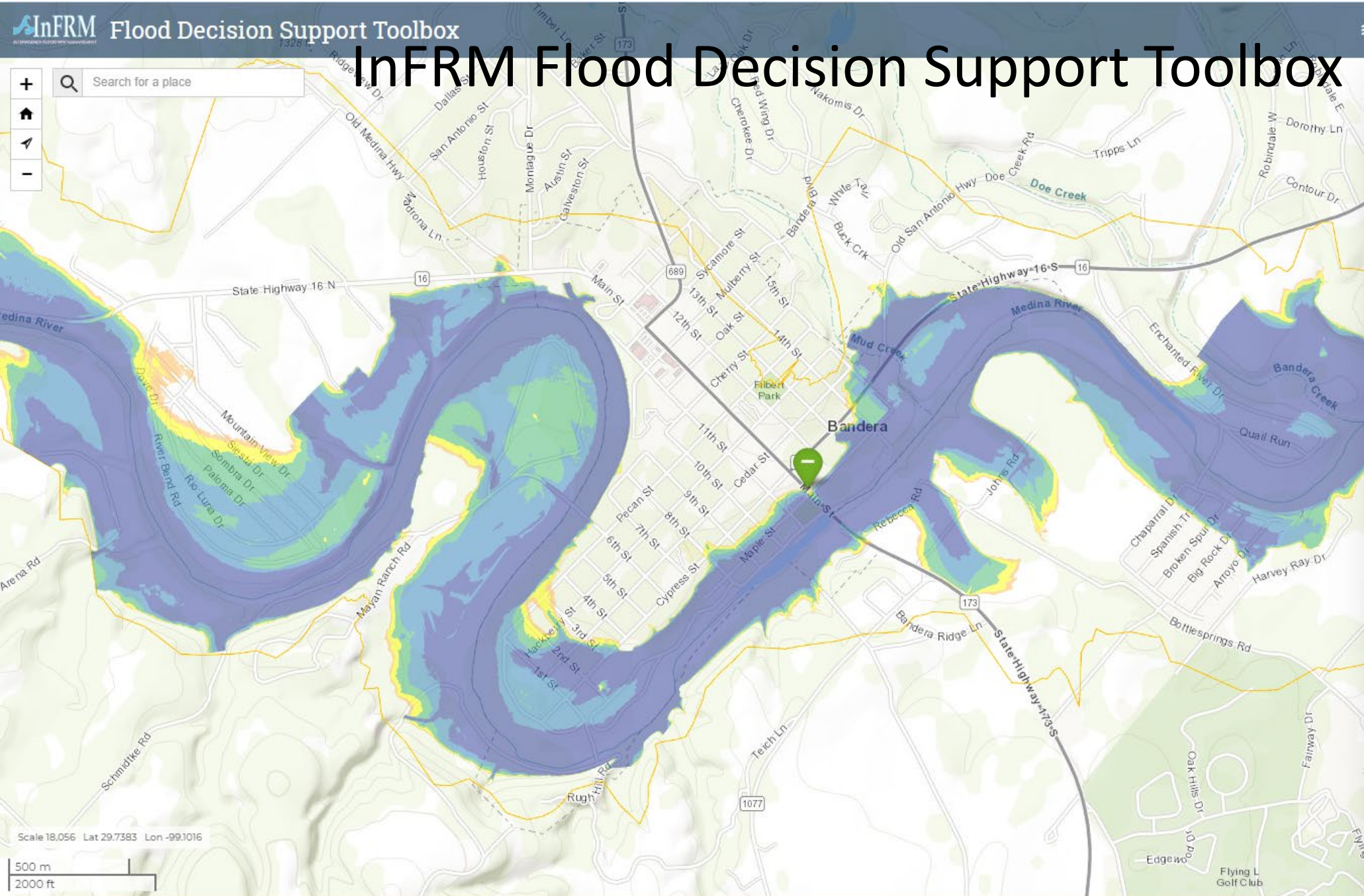
Comments: This base map provides 0.3-meter-resolution satellite and aerial imagery in the continental United States.

Data Source: ESRI ArcGIS Online

<https://webapps.usgs.gov/infrm/fdst/>

InFRM Flood Decision Support Toolbox

Search for a place



Close

LEGEND

Flood Map

Layer Opacity:

≤1 foot	>6 to 9 feet
>1 to 3 feet	>9 feet
>3 to 6 feet	Flood map limits

Comments: Value indicates estimated water depth. The flood depth grid is truncated outside of the flood model boundary.

Data Source: Data prepared by the [USGS Texas Water Science Center](#). Click [here](#) for additional information and data sources.

TIP Click colored flood areas to show estimated water depth.

River Measurement Stations

STATUS – COLOR

- Major flooding
- Moderate flooding
- Minor flooding
- Action flood stage
- Not flooding
- Flood stages not established
- Not flowing (0 ft³/sec)

TREND – SYMBOL

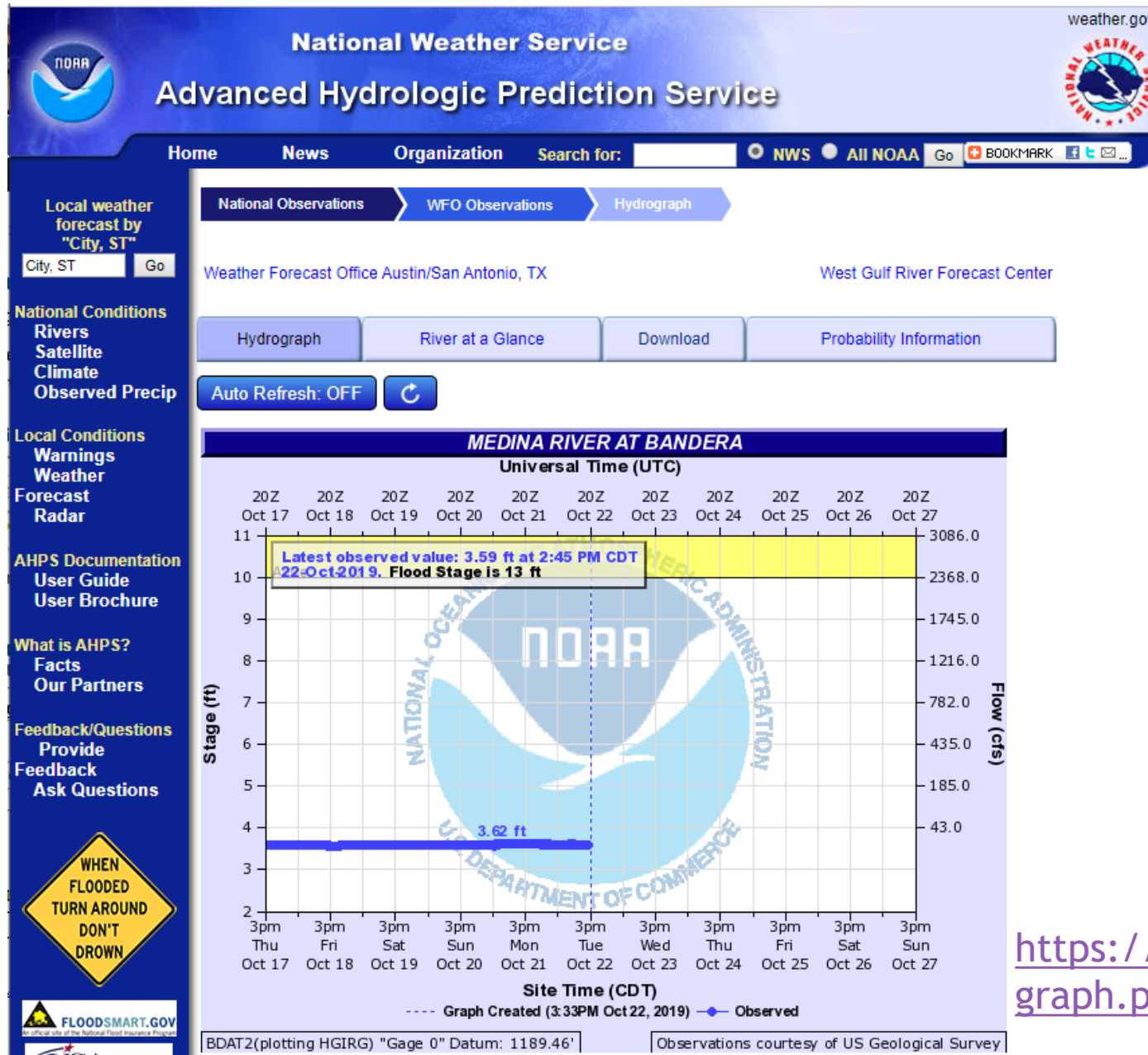
- River rising ≥ 0.05 foot/hour
- River changing < 0.05 foot/hour

Scale 18,056 Lat 29.7383 Lon -99.1016

500 m

2000 ft

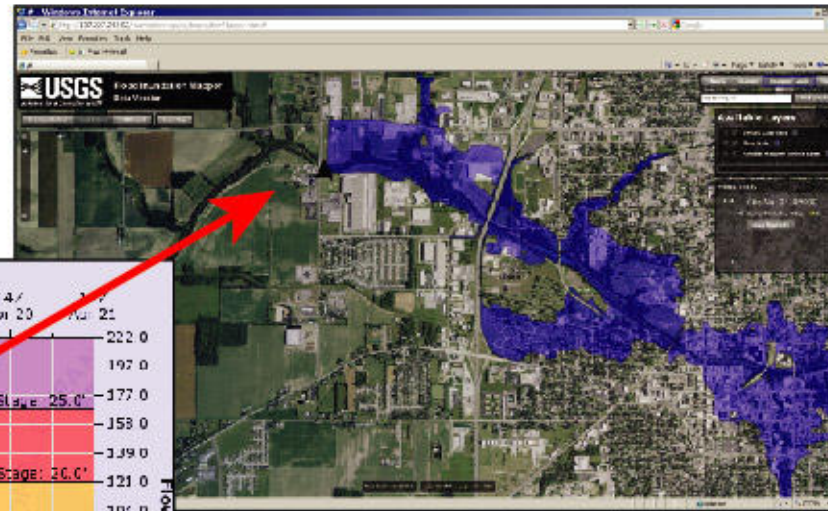
NWS River Forecast (Medina River at Bandera)



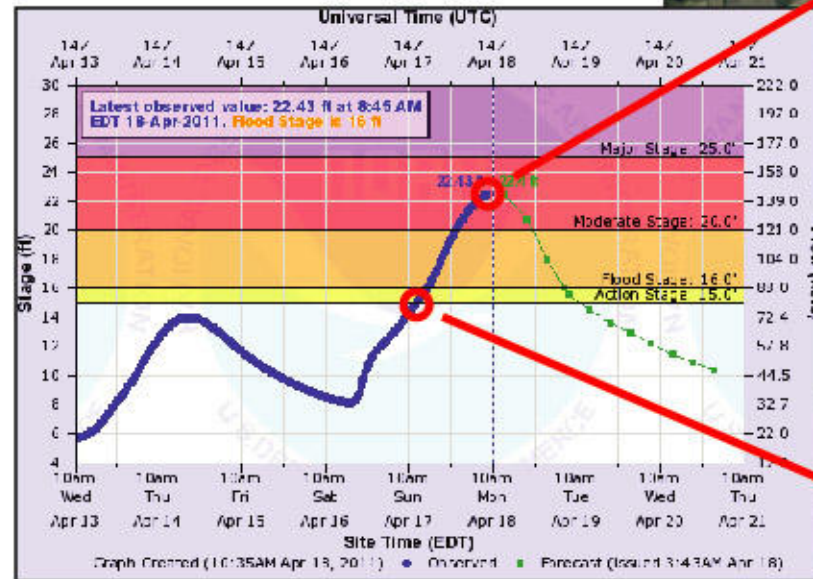
<https://water.weather.gov/ahps2/hydrograph.php?wfo=ewx&gage=bdat2>

NWS River Forecast + Flood-Inundation Maps

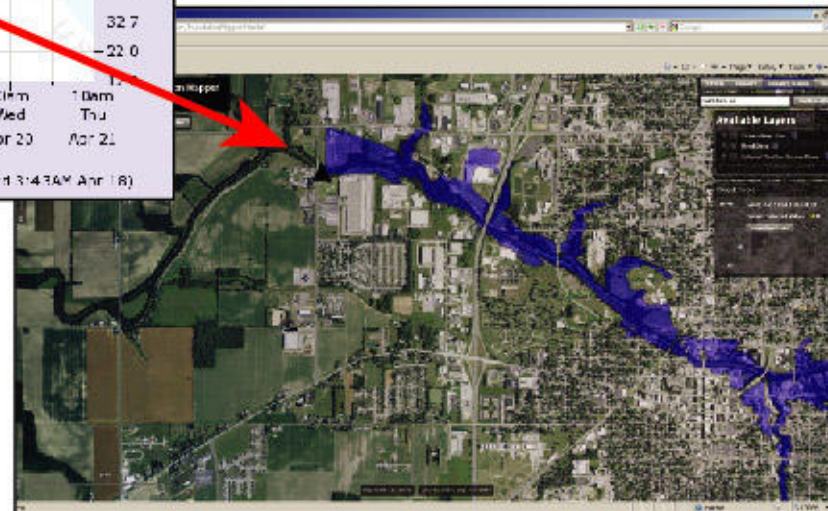
High flood stage inundation map:



Example hydrograph of a flood:



Low flood stage inundation map:



Inundation maps translate flood data into operational maps that communicate risk and the consequences of current and forecasted flooding.

<https://www.usgs.gov/media/images/monitoring-a-flood>





Contact us



5563 De Zavala Rd Suite 290
San Antonio, TX 78249



(210) 691-9200



USGS Texas Water Science Center
<https://www.usgs.gov/centers/tx-water>



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Doug Schnoebelen dschnoebelen@usgs.gov

