

# Flooding in Texas, May 2015



# Flooding in May 2015

- ▣ Who is USGS and why are we involved?
- ▣ What do we do during floods?
- ▣ Information about May 2015 Flood

# U.S. Geological Survey

- Nation's premiere earth and biological science agency.
- Our job is to collect data and provide information to better understand the environment, and how humans interact with the environment.



# U.S. Geological Survey Mission Areas

- ▣ Ecosystems
- ▣ Climate and Land-Use Change
- ▣ Natural Hazards
- ▣ Water
- ▣ Energy and Minerals
- ▣ Environmental Health
- ▣ Core Science Systems

# Water Resources Mission

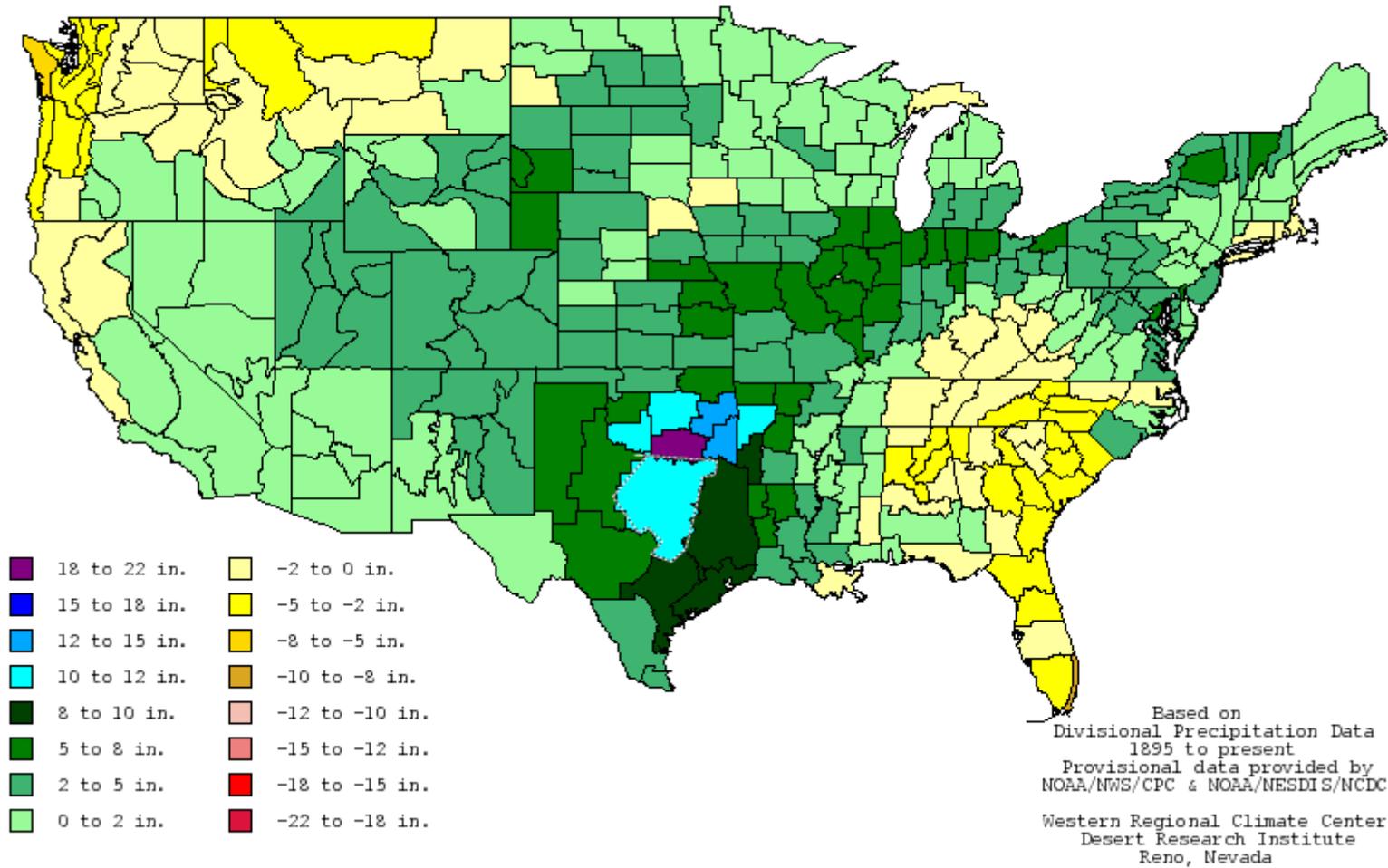
To provide reliable, impartial, timely information that is needed to understand the Nation's water resources

- Minimize loss of life and property from water-related hazards, such as floods, droughts, and land movement

# Flooding in Texas, May 2015

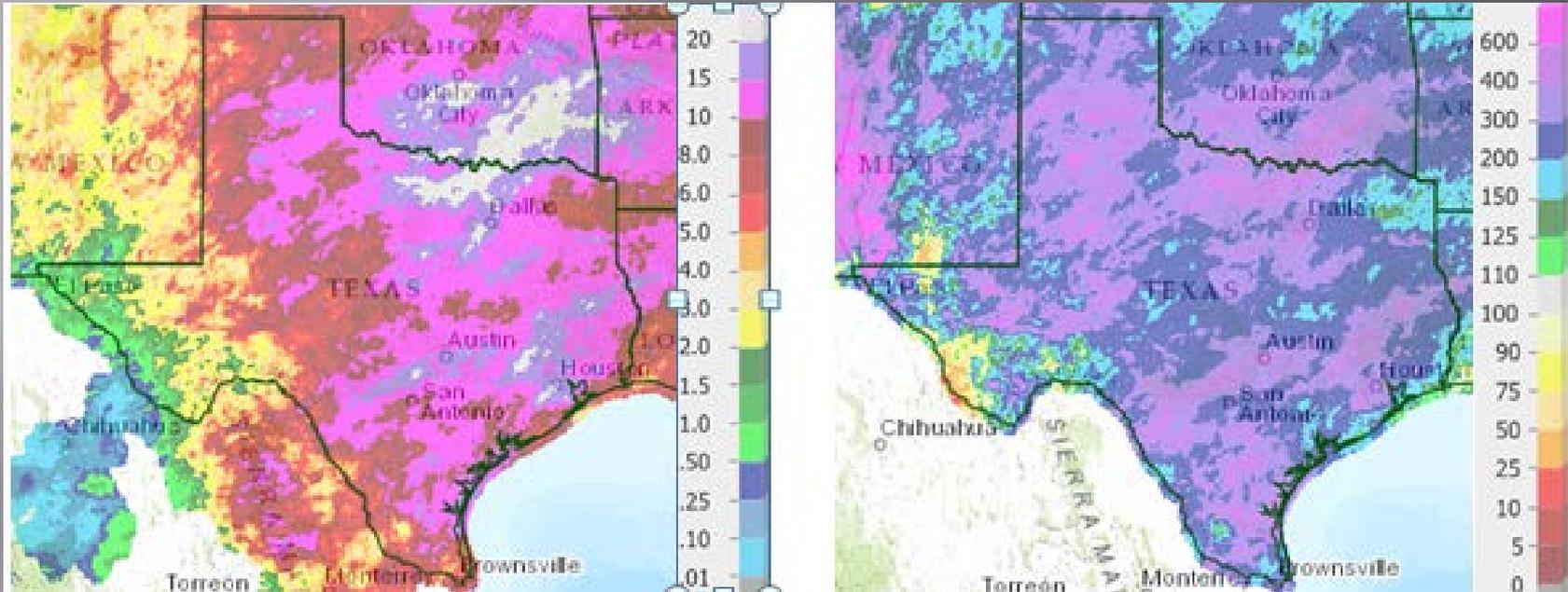
- Flooding was a result of extended rainfall across the entire State of Texas due to persistent upper-level low in northern polar jet stream
- According to NWS, May 2015 was **“wettest month on record, with statewide average precipitation of 9.06 inches”**
- USGS response to flooding began in Lubbock in early May and spread to all other offices (Austin, Houston, Fort Worth, San Angelo, San Antonio, and Wichita Falls) by the middle of the month. USGS response continued into June 2015.
- During the month, **all major rivers (except the Rio Grande)** experienced flooding
- Damages in Houston area estimated to be \$45 million according to Harris County Office of Homeland Security and Emergency Management. Hays county estimated \$32.7 million in damage due to Blanco River flooding. Texas Department of Transportation estimated damages to their infrastructure at \$27 million. (Source: <http://www.theguardian.com>)

2-month Accumulated Precipitation Departure from Normal through the end of June 2015



From Western Regional Climate Center, Desert Research Institute, <http://www.wrcc.dri.edu/>

# Precipitation in May 2015



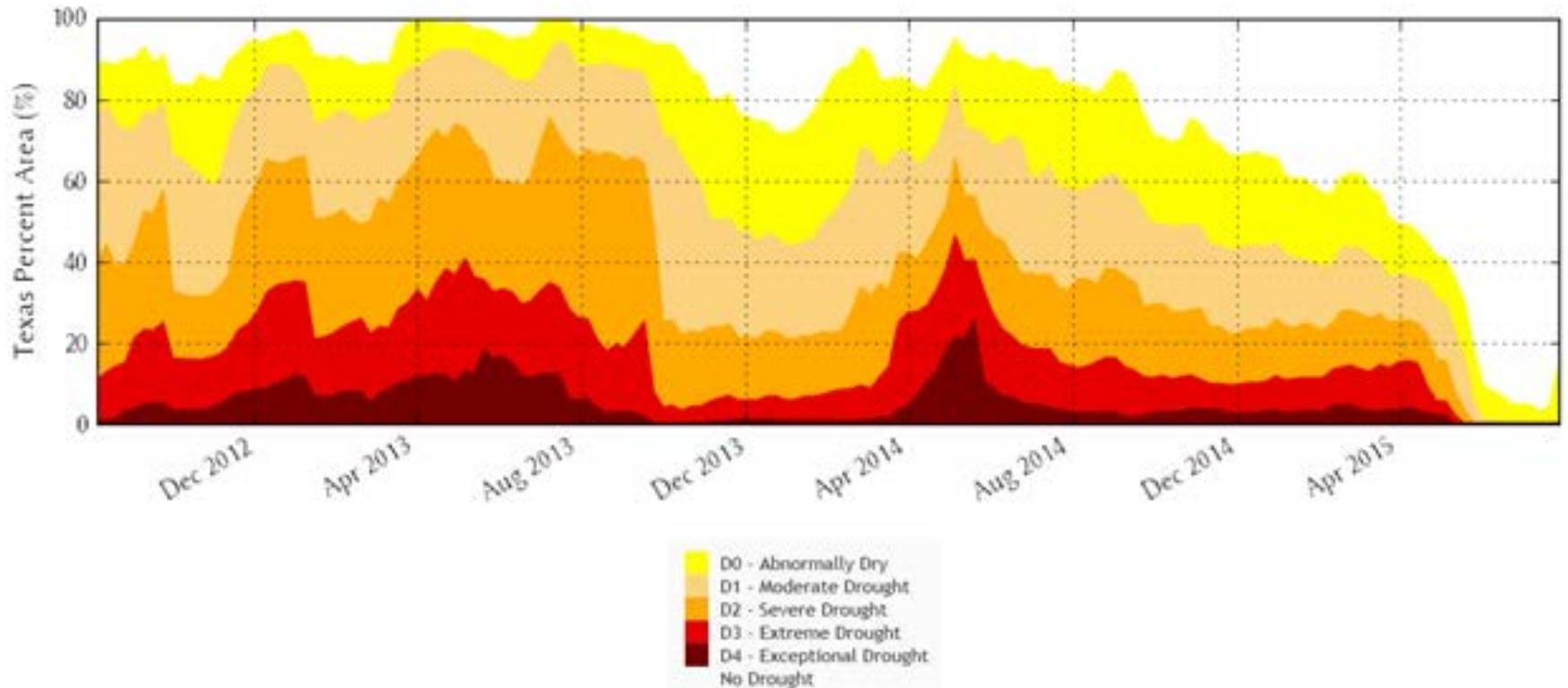
Precipitation in Inches

Precipitation in Percent of Normal

# Flow Conditions at USGS Stations May 2015

Flow Conditions in May

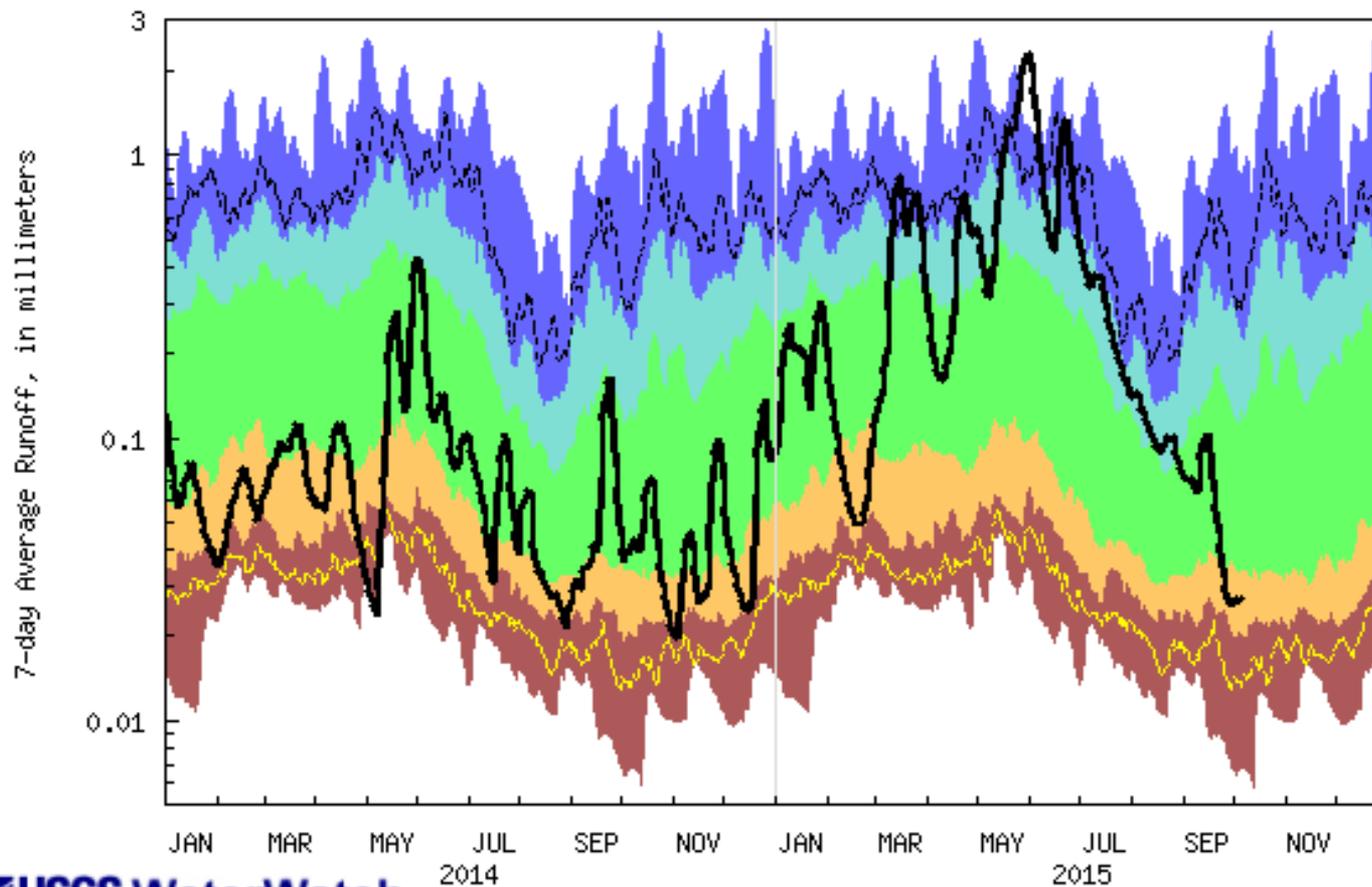
# Palmer Drought Index April 2012 - July 2015



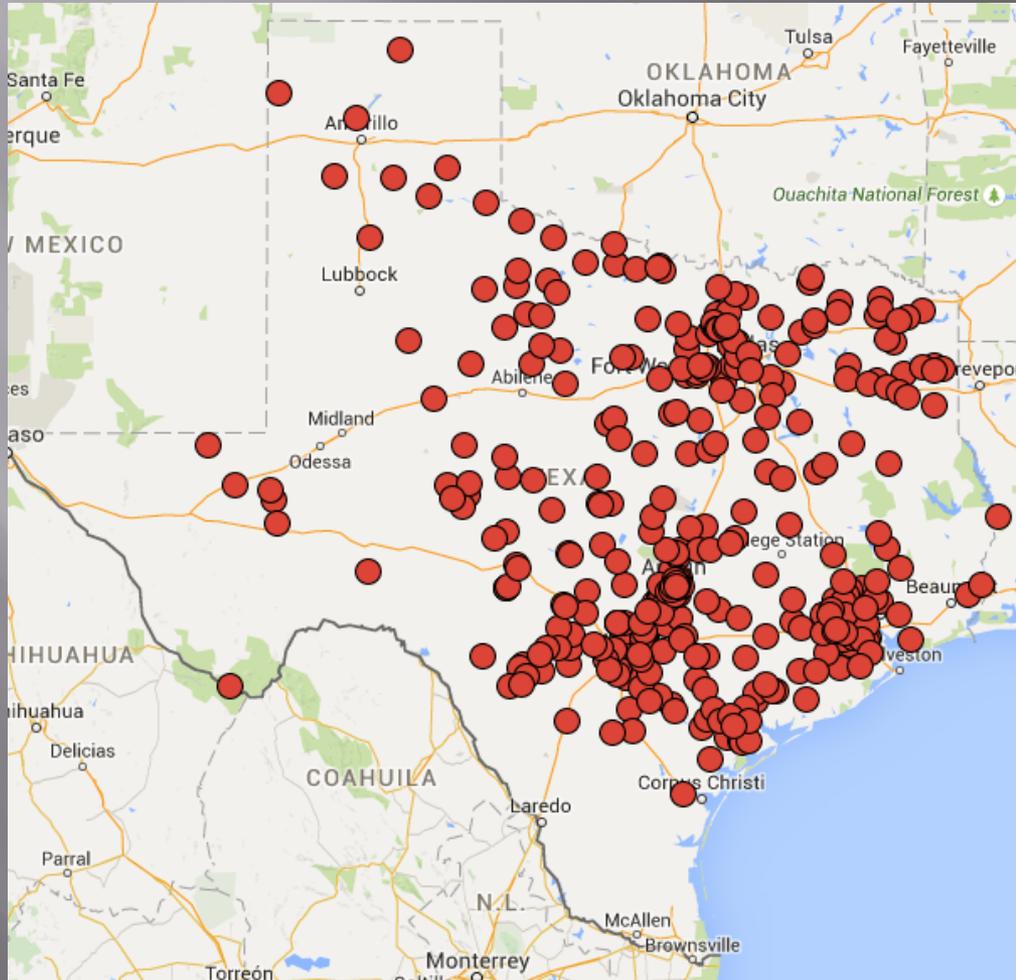
Data from U.S. Drought Monitor,

<http://droughtmonitor.unl.edu/Home/StateDroughtMonitor.aspx?TX/>

Duration hydrograph of 7-day average runoff for Texas

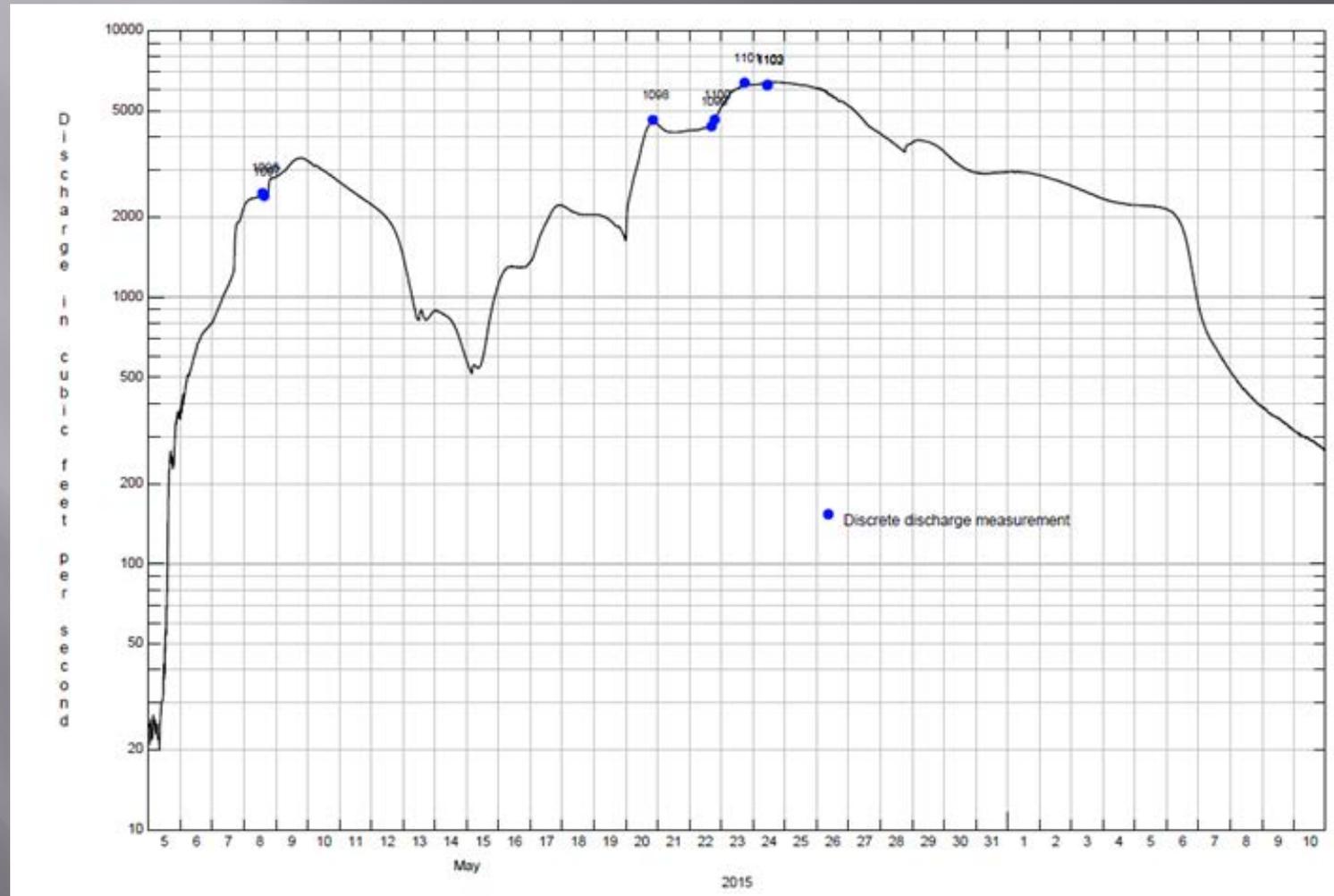


# Sites with Direct Discharge Measurements in May 2015 (539 Msmmts at 356 Stations)



Approximately 200 measurements in a typical month

# Wichita Rv at Wichita Falls, TX



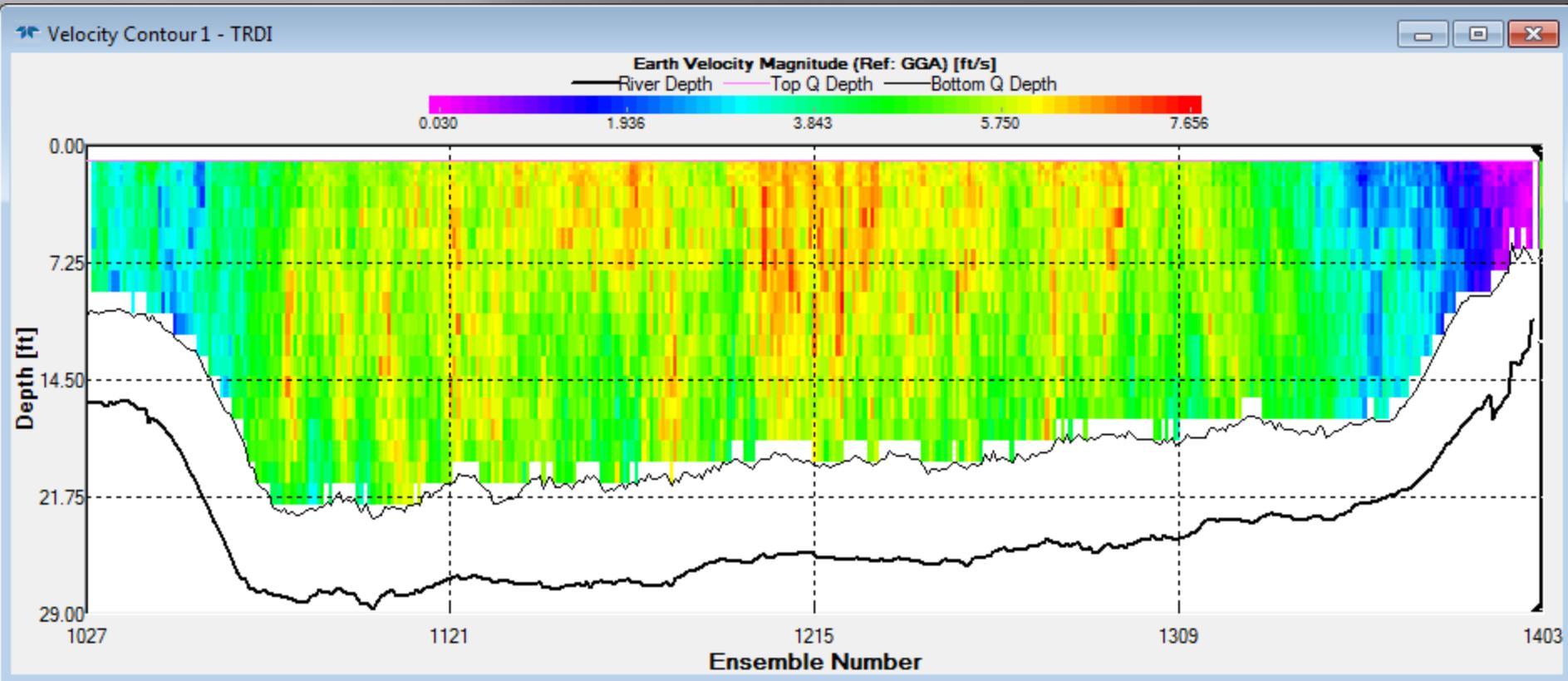
# Traditional Discharge Measurement at 08079600 – DMF Brazos Rv at Justiceburg (9,700 cfs)



# Discharge measurement at 08067000 - Trinity Rv at Liberty (47,000 cfs)



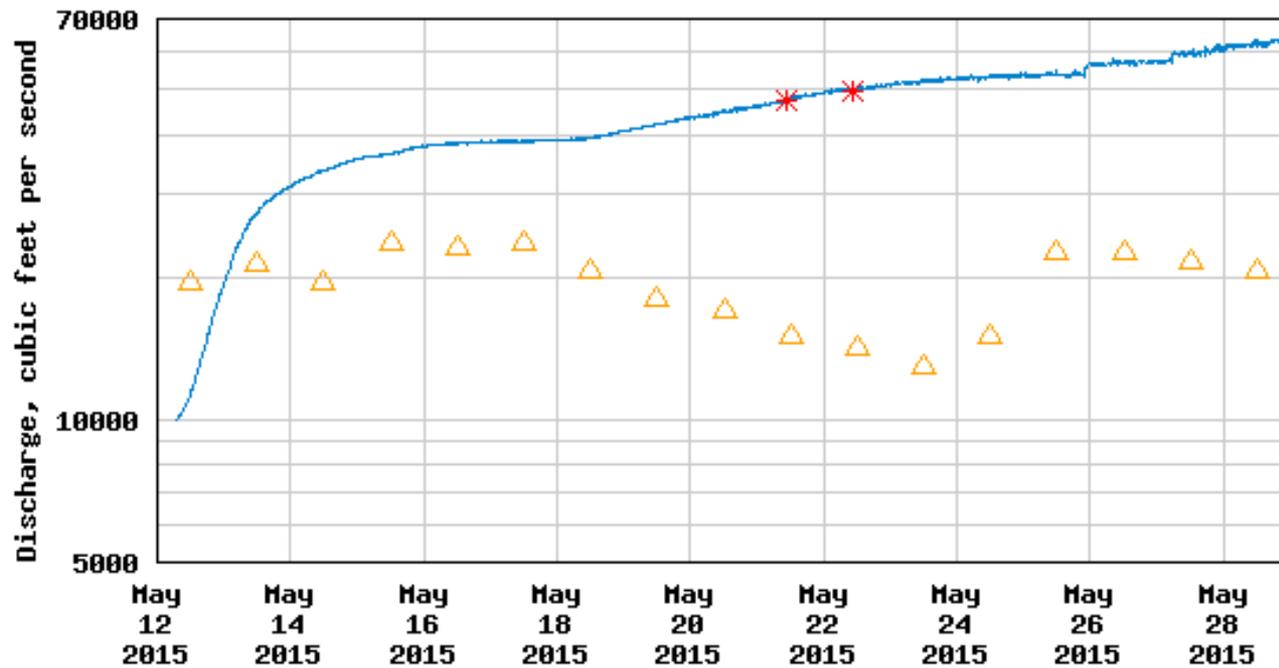
# Discharge Measurement using ADCP



# Discharge Measurement



USGS 08067000 Trinity Rv at Liberty, TX



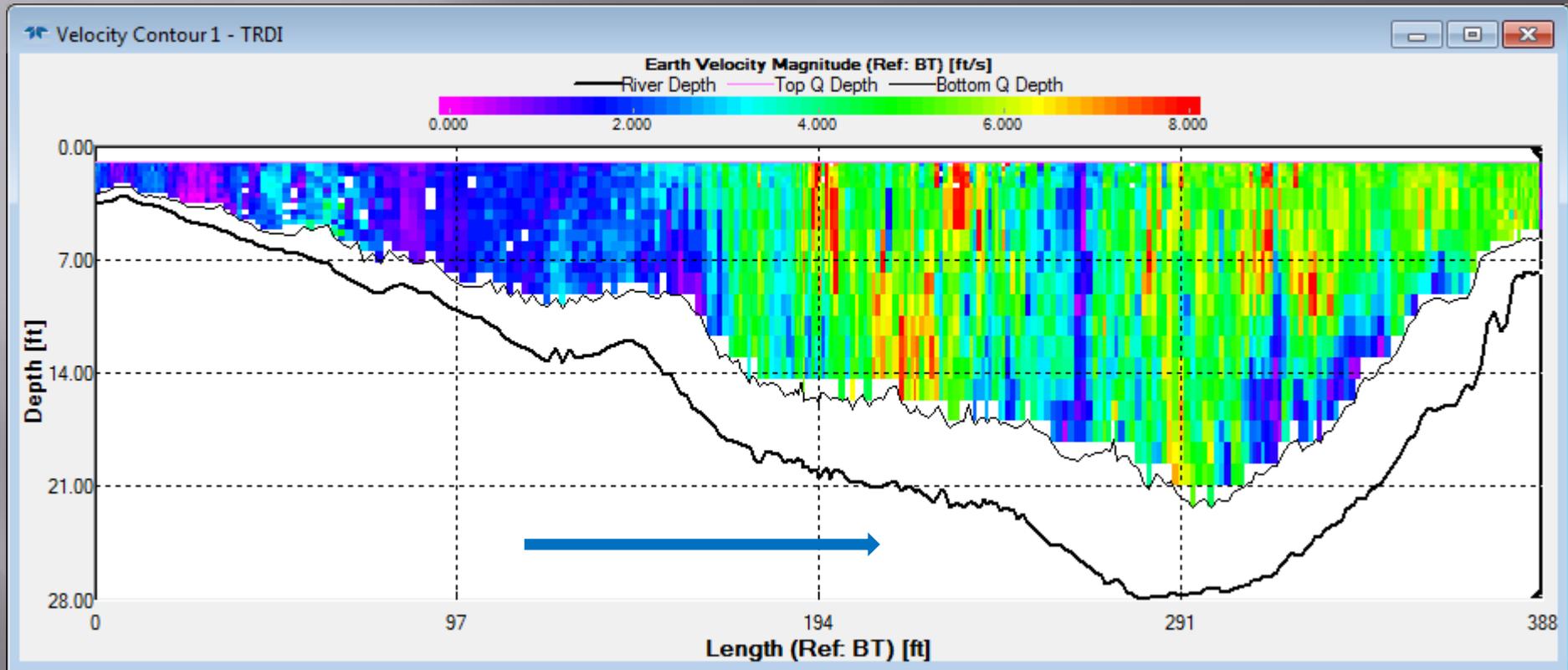
----- Provisional Data Subject to Revision -----

- △ Median daily statistic (16 years)
- \* Measured discharge
- Discharge

# Making a Measurement

ADCP Discharge Measurement

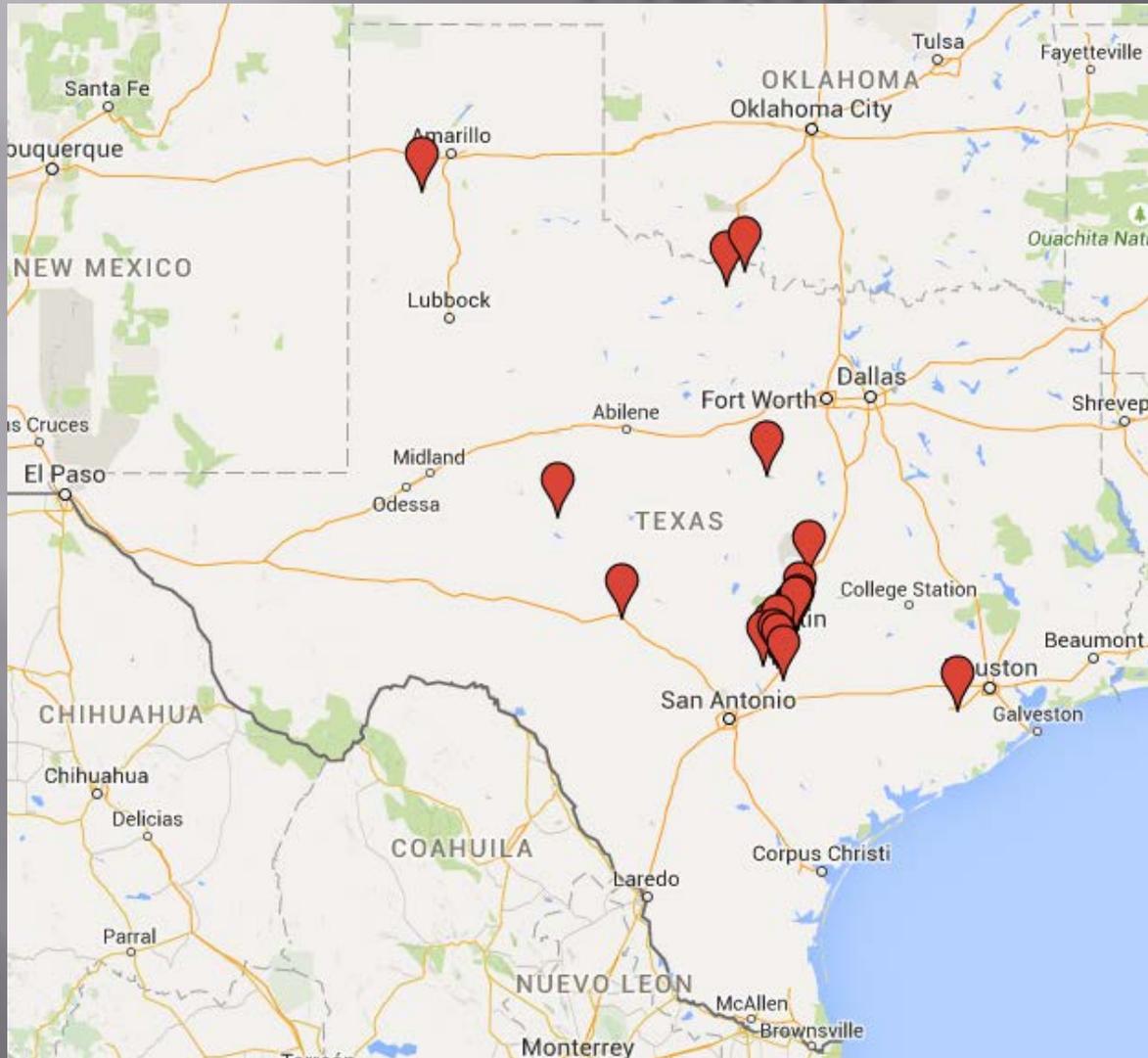
# Making a Measurement



# Indirect Discharge Measurements

Indirect Discharge Measurements in Central Texas

# 15 Sites Requiring Indirect Msmmts



# Damage Caused by Flooding on Blanco River nr Wimberley, TX



# Some of the most Severe Flooding was along the Blanco River in Central Texas

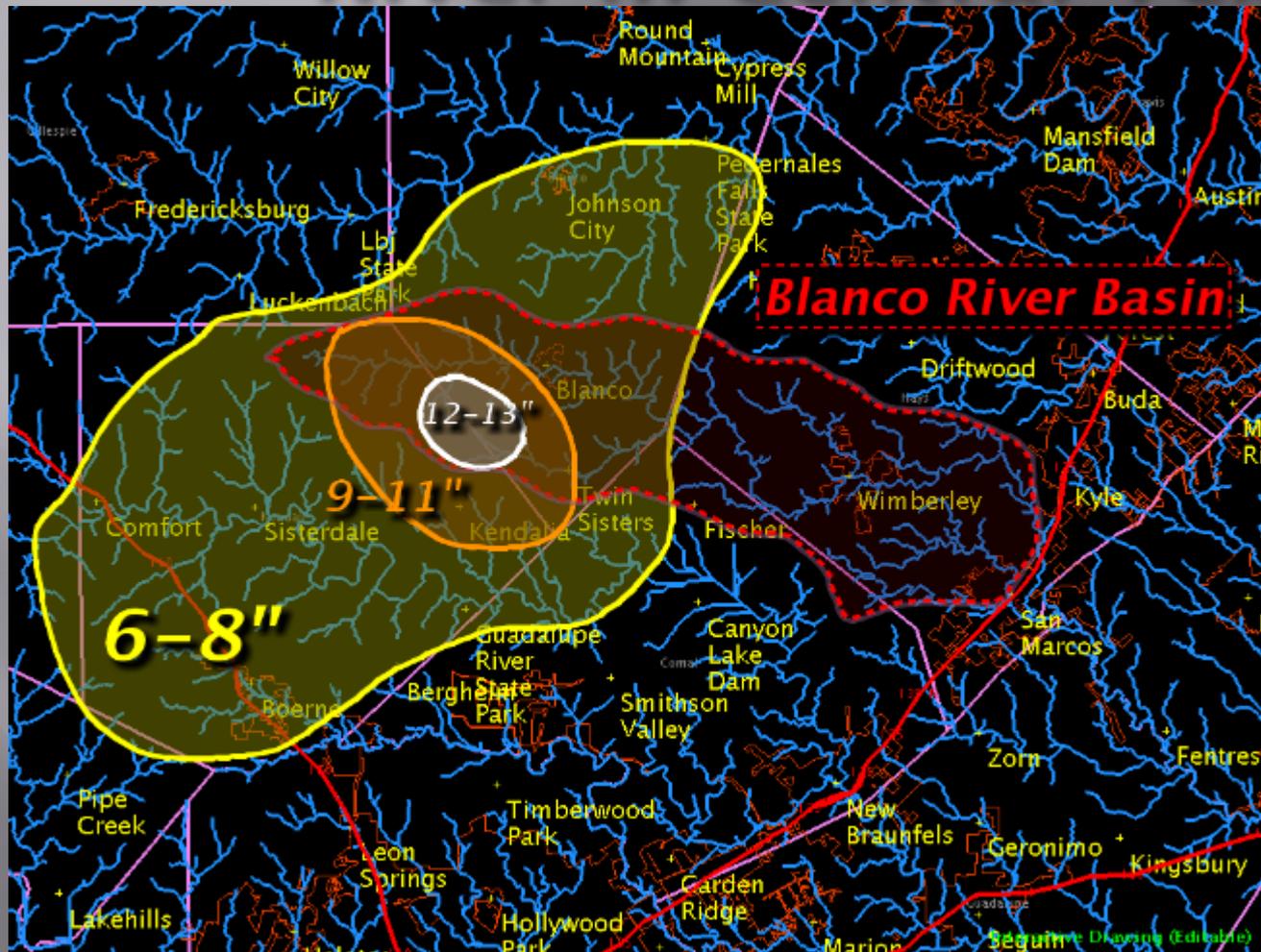
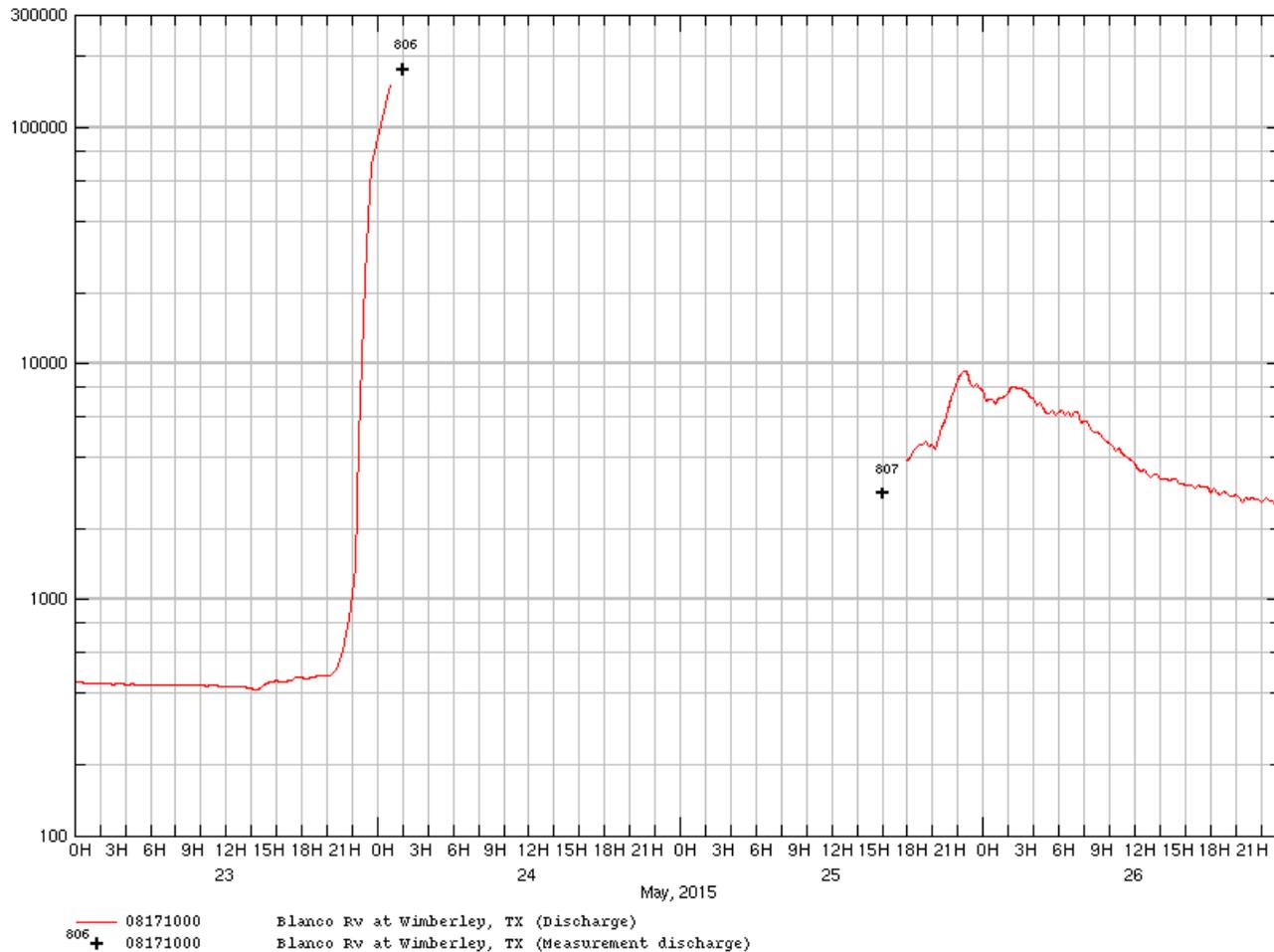


Figure from National Weather Service - Rainfall Amounts over 6 hour period May 23-24, 2015

# 08171000 - Blanco Rv at Wimberley, TX



Stage increased over 40 ft in 4 hours

Discharge increased from 300 cfs to 175,000 cfs in approximately 4 hours

# USGS Gage 08171400 - San Marcos Rv at Martindale, TX

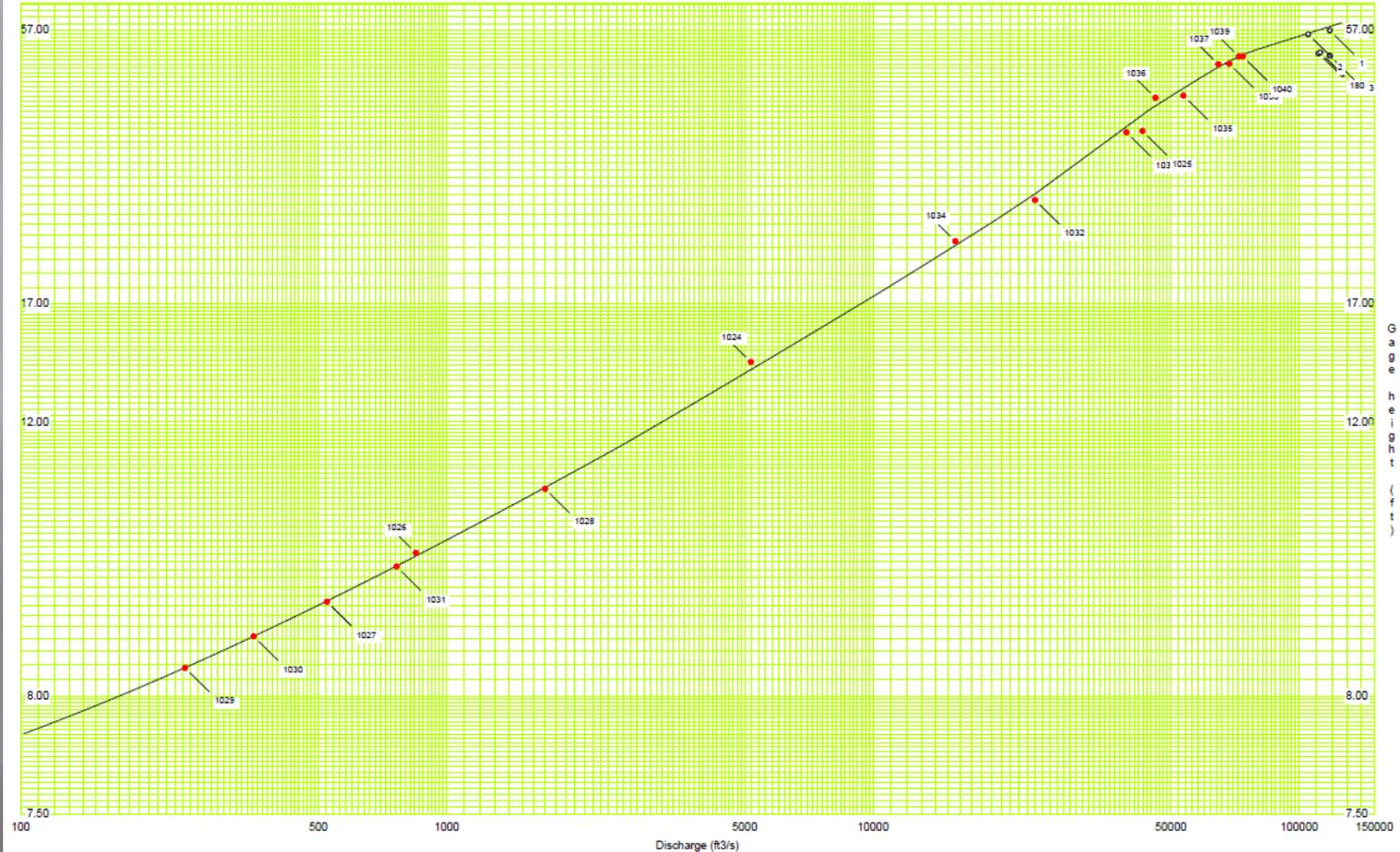




# Updating Existing Ratings

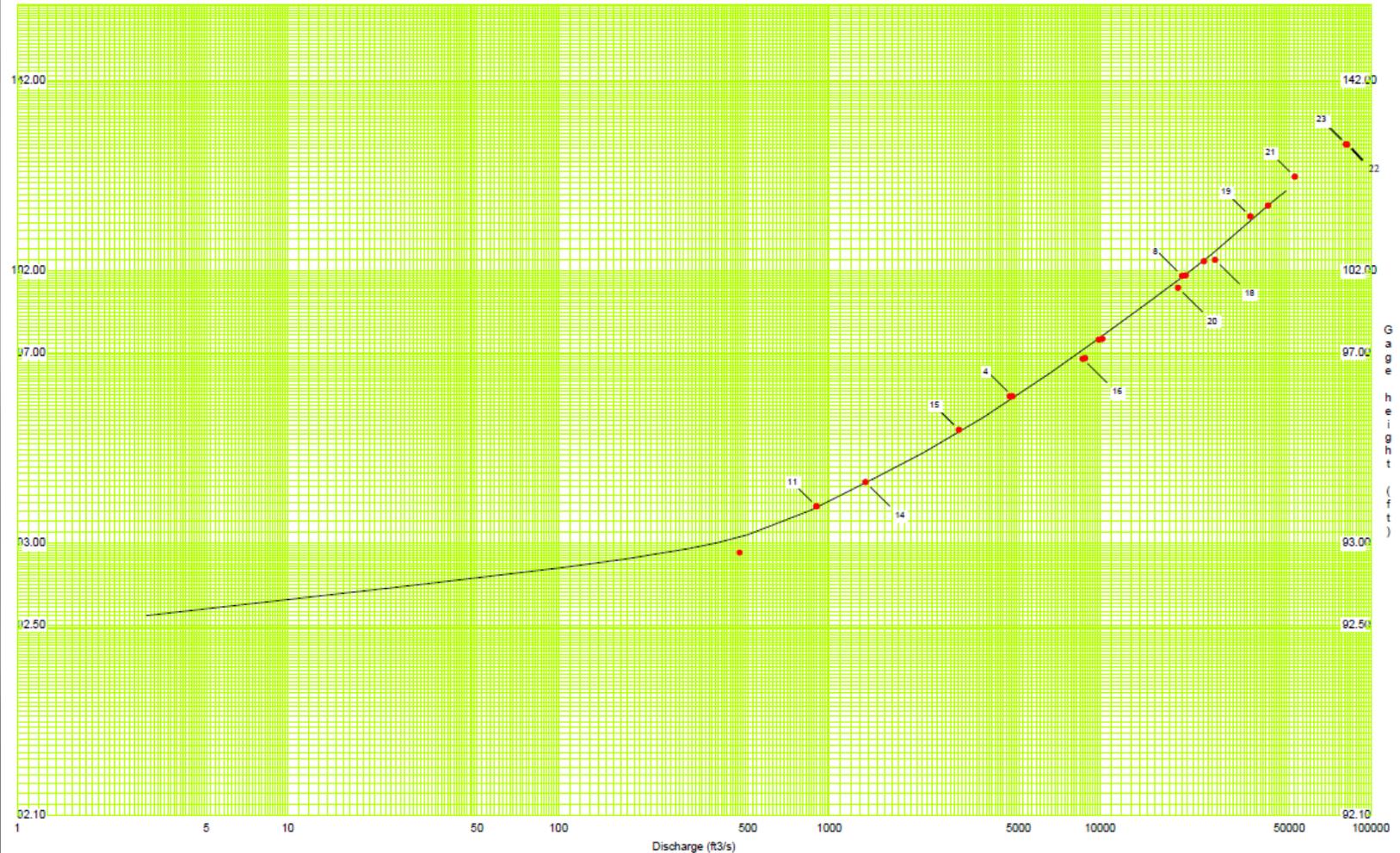
## Rating 17.0 - After May 2015

Brazos Rv at Richmond, TX USGS 08114000 - Rating # 17.0



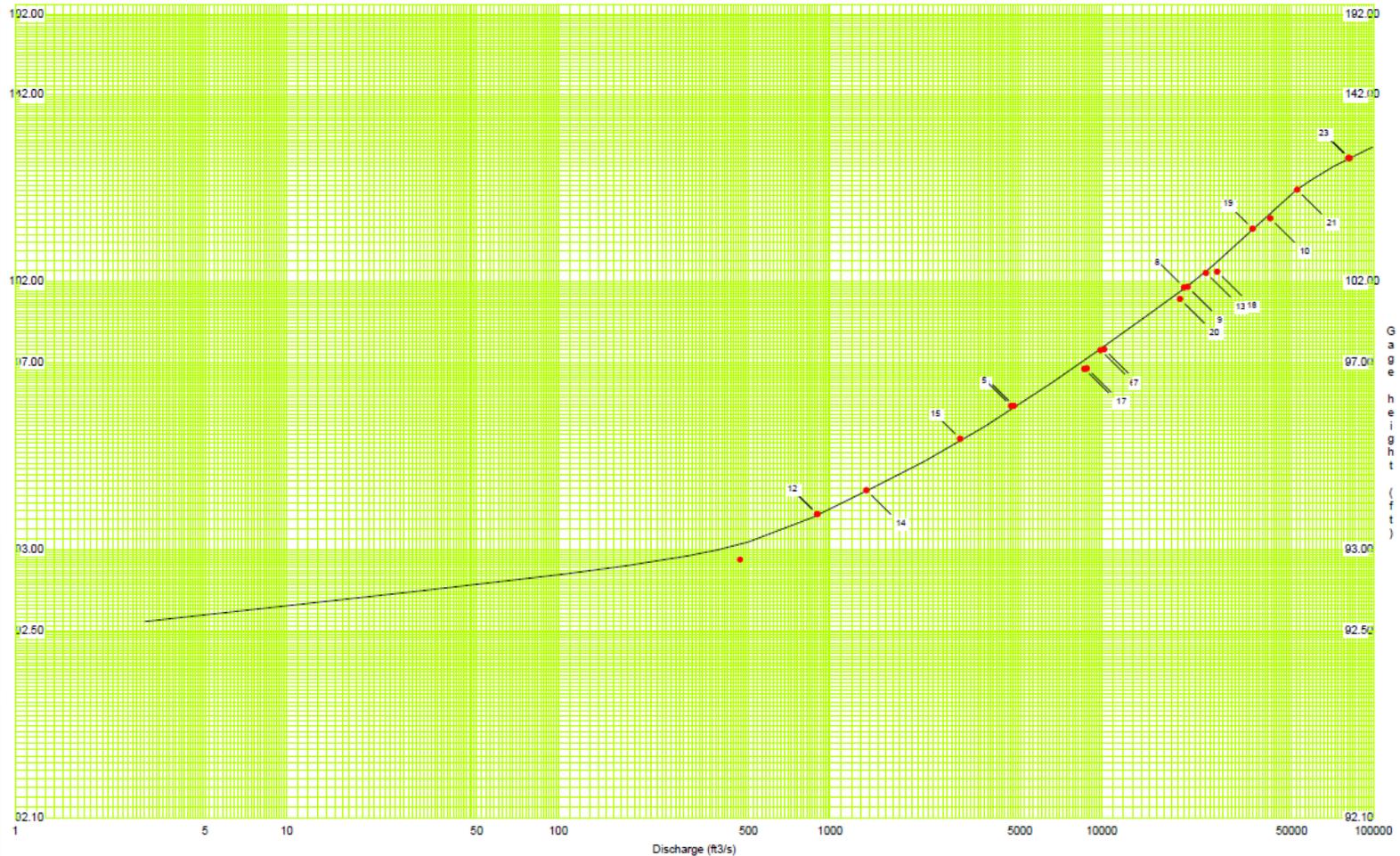
# Extending Existing Ratings Brazos Rv at San Felipe, TX

Brazos Rv at San Felipe, TX USGS 08111850

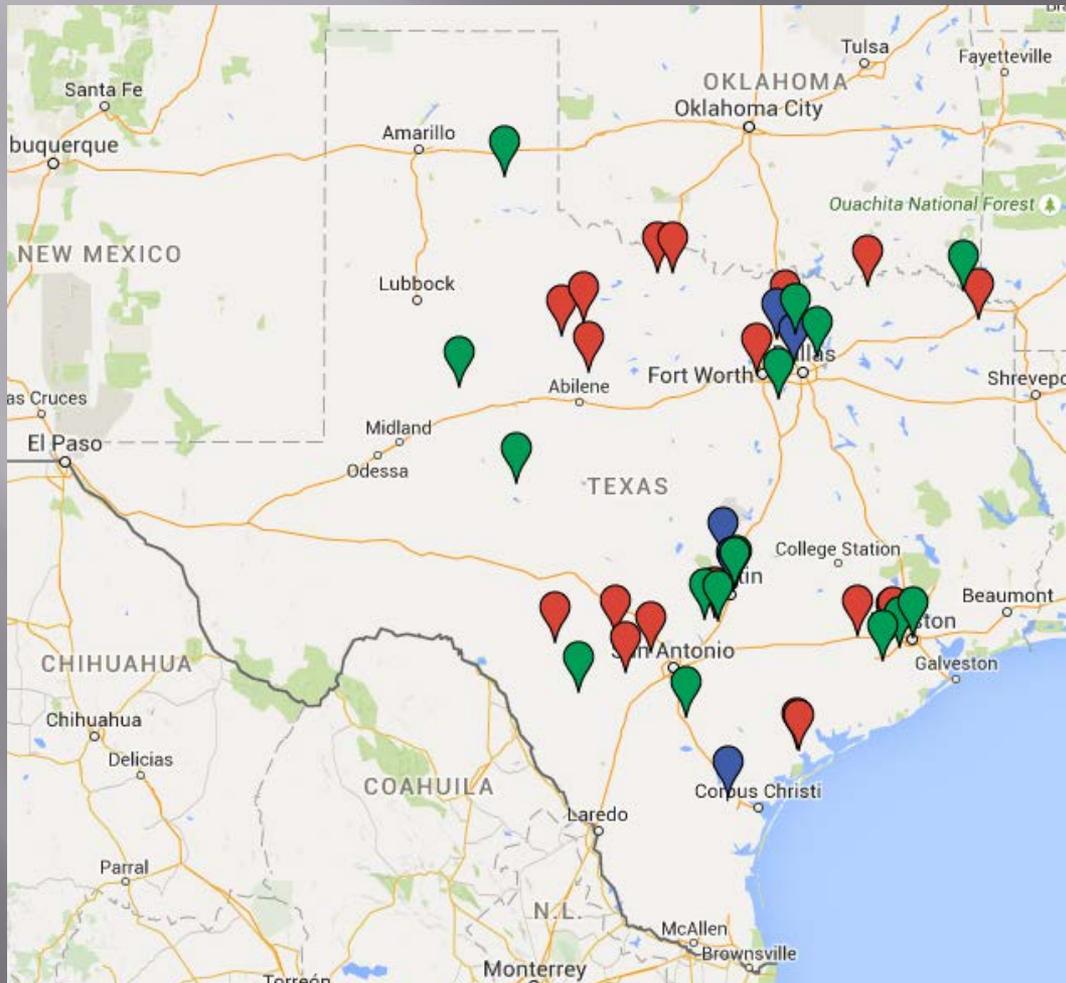


# Extending Existing Ratings Brazos Rv at San Felipe, TX

Brazos Rv at San Felipe, TX USGS 08111850



# Sites with New Peaks of Record

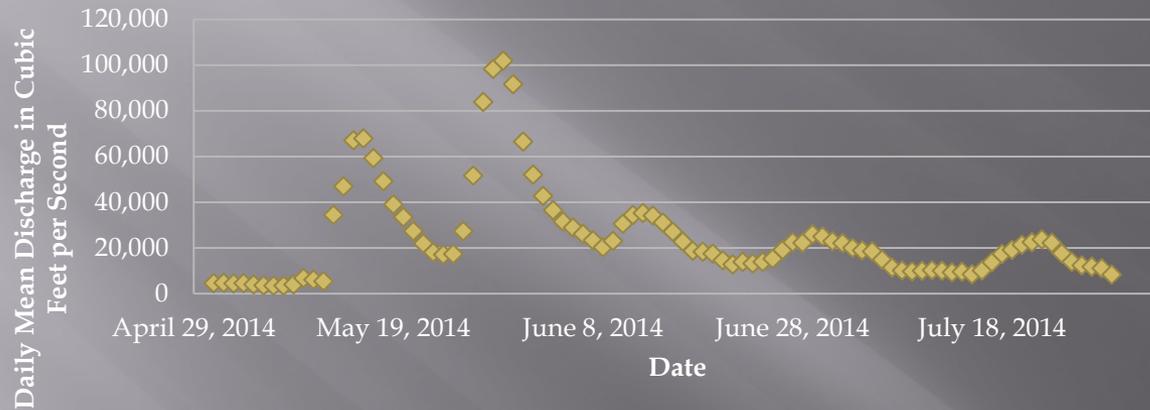


## Period of Record

-  11 years or greater (16)
-  6 to 10 years (7)
-  5 years or less (19)

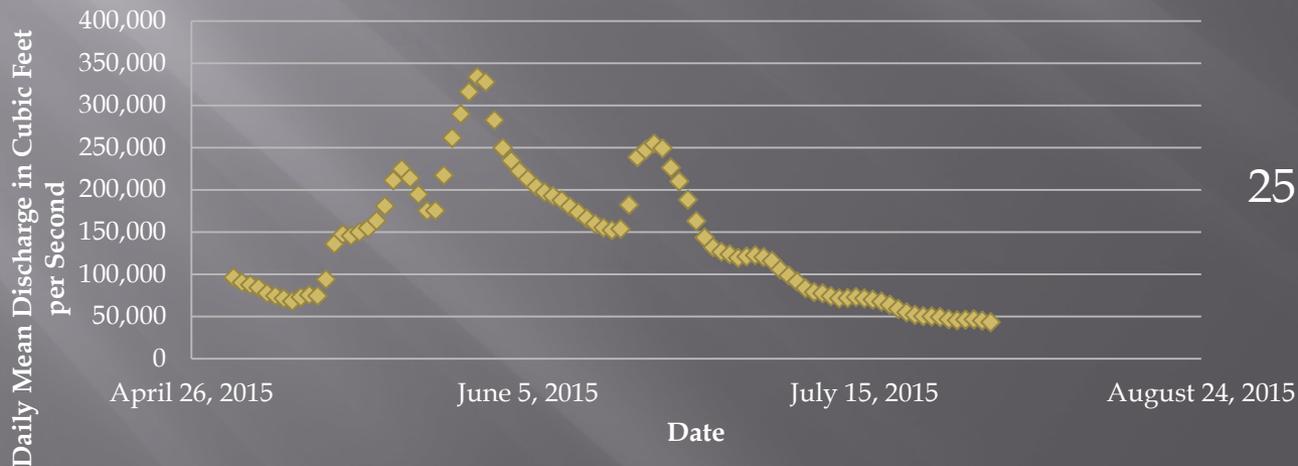
# Total Discharge to Gulf of Mexico from May-July 2015 Flood compared to May-July, 2014

## May 1 - July 31, 2014



4.5 million acre-ft

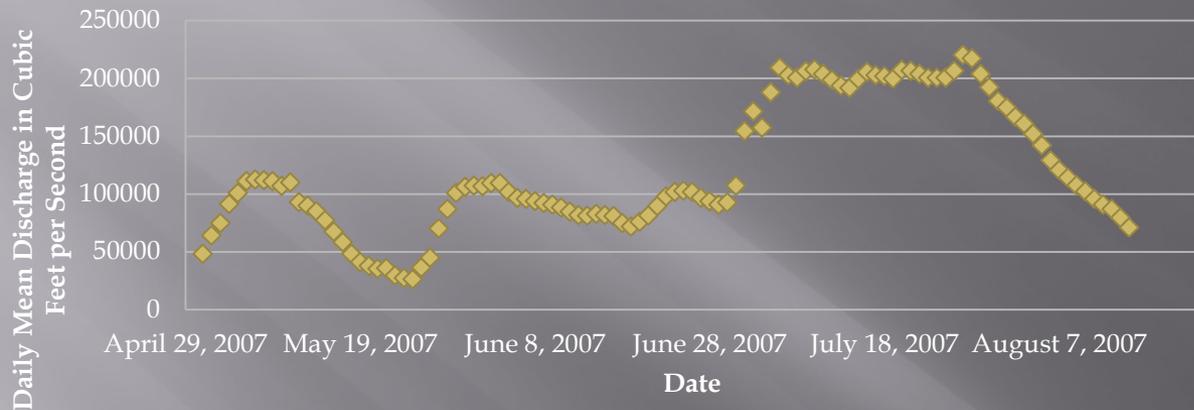
## May 1 - July 31, 2015



25.6 million acre-ft

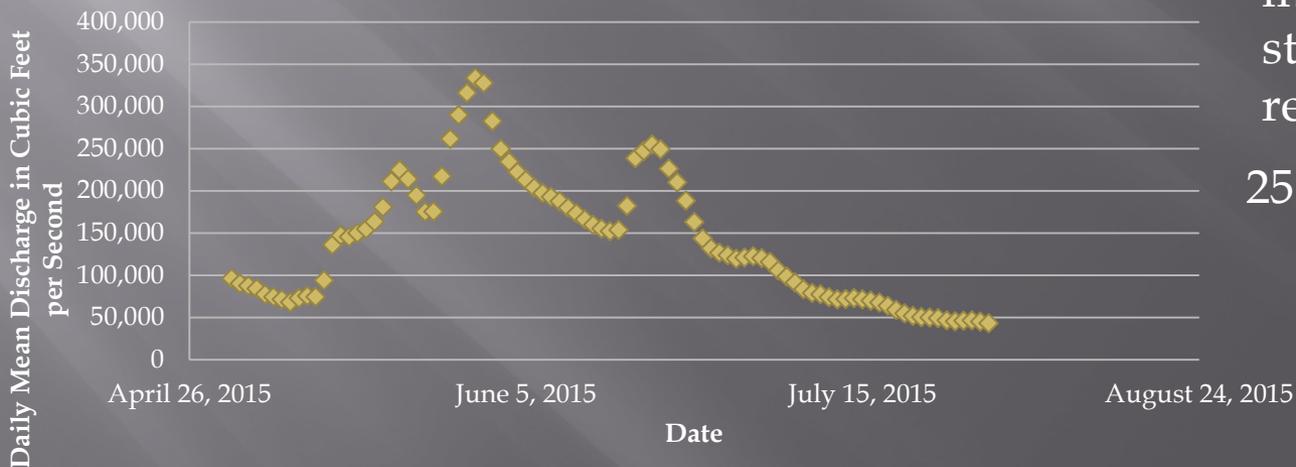
# Total Discharge to Gulf of Mexico Compared to a Recent High-Flow Year

## May 1 - August 15, 2007



25.4 million acre-ft

## May 1 - July 31, 2015



Additional 2.96 million acre-ft storage in reservoirs

25.6 million acre-ft

# Questions

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