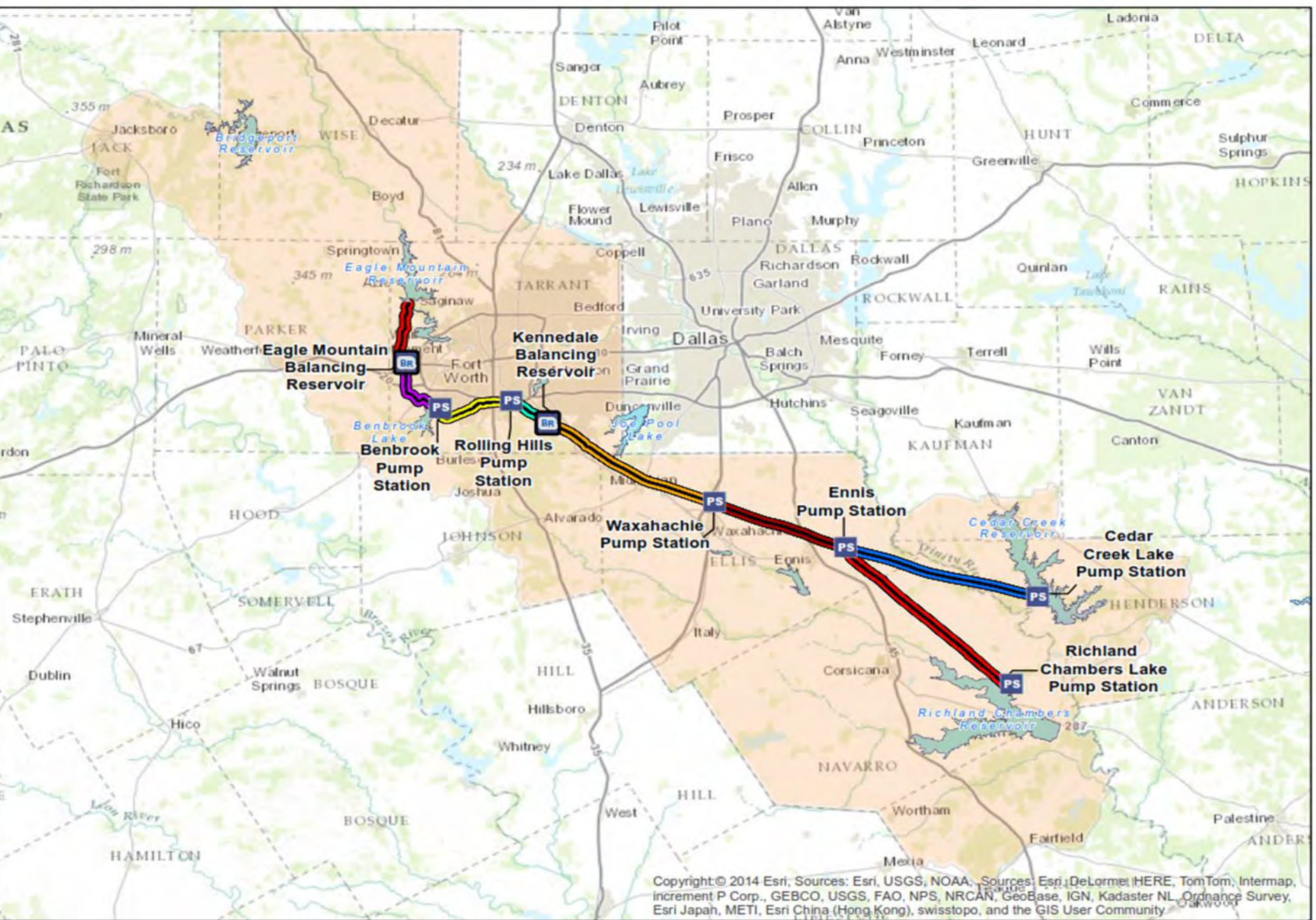




# Reservoir Levels on the West Fork Trinity

David Marshall

Tarrant Regional Water District



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# West Fork Water Supply Operations

- By contract we must run the system in the most efficient manner
- We evaluate pumping costs and reliability for operational decisions
- The reservoir levels fluctuate due to use, evaporation, rainfall and pumping from east Texas reservoirs
- The TRWD reservoir system is designed to deliver all the water we will need during the worst drought, so we will not run out of water
- The reservoir levels will be very low at the end of a severe drought
- The Eagle Mountain Connection supplies additional water to the West Fork to permit Fort Worth to use more water and improve reliability for the West Fork System
- During the drought we experienced, the Eagle Mountain Connection provided almost all the water Fort Worth used.

# Water Supply and Reservoir Levels

- Water Supply - Bridgeport
  - Bridgeport serves six municipal customers and seven irrigation/industrial customers whom withdraw water from the reservoir, with a contractual total of 25,500 acre feet
  - Our water right requires 15,000 acre feet of use be set aside for local customers and up to 78,000 acre feet be used or released to Eagle Mountain
  - The most sustainable use from Bridgeport is about 60,000 acre feet
  - On wet years we use up to the limit, on dry years much less.
  - In 2014, an exceptionally dry year, we used 19,110 acre feet from the reservoir, and no water was released to Eagle Mountain

# Water Supply and Reservoir Levels

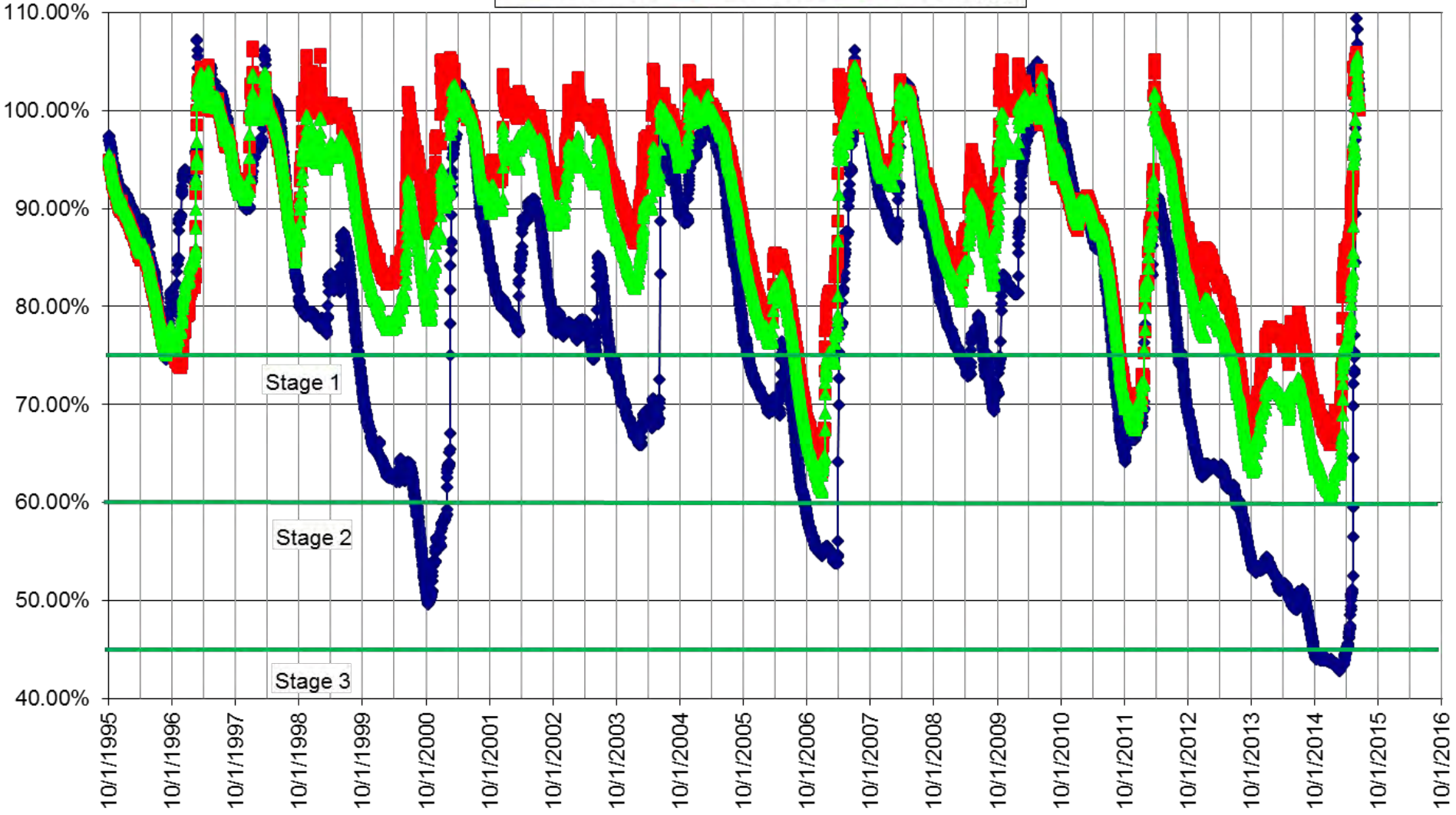
- Water Supply – Eagle Mountain
  - Eagle Mountain serves four municipal customers and three irrigation/industrial users with a contractual total of 105,000 acre feet
  - Fort Worth is restricted by contract to use no more than 100,000 acre feet of “native” water during normal years and 46,000 acre feet during droughts
  - Our water right allows us to use or release up to 159,600 acre feet
  - Sustainable use is about 102,000 acre feet annually.
  - Eagle Mountain is also supplied by pumping from East Texas. On dry years we add water to the reservoir so use may go above the sustainable level
  - In 2014 we added 58,380 acre feet of water to the reservoir, about 1/3<sup>rd</sup> of Eagle Mountain’s total volume
  - In 2014 total use was 67,975 from Eagle Mountain and Lake Worth, 86% supplied by the Eagle Mountain Connection

# Water Supply and Reservoir Levels

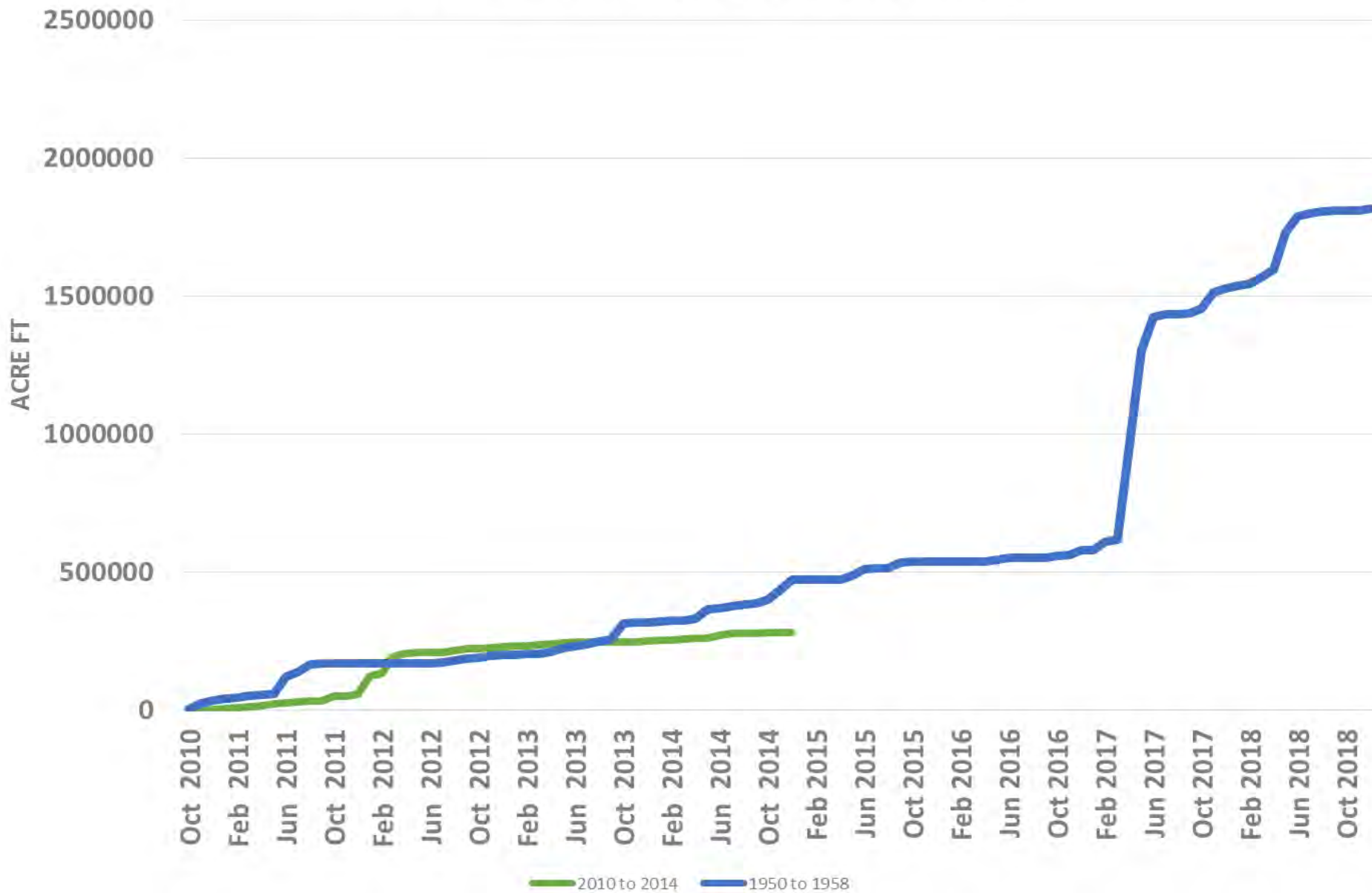
- Water Supply – Lake Worth
  - Provides water to Fort Worth’s Holly Water Treatment Plant, River Oaks and Lockheed Martin
  - To provide water to the water plant and Lockheed, the lake must be no lower than 4 feet below conservation
  - Fort Worth has the right to take 12,143 acre feet from a water rights permit
  - The sustainable use is very low, a few thousand acre feet at most.
  - During drought, TRWD limits evaporation by lowering the water surface through controlled discharges from Eagle Mountain

# TRWD reservoir Supply Status

West Fork East Texas TRWD Supply

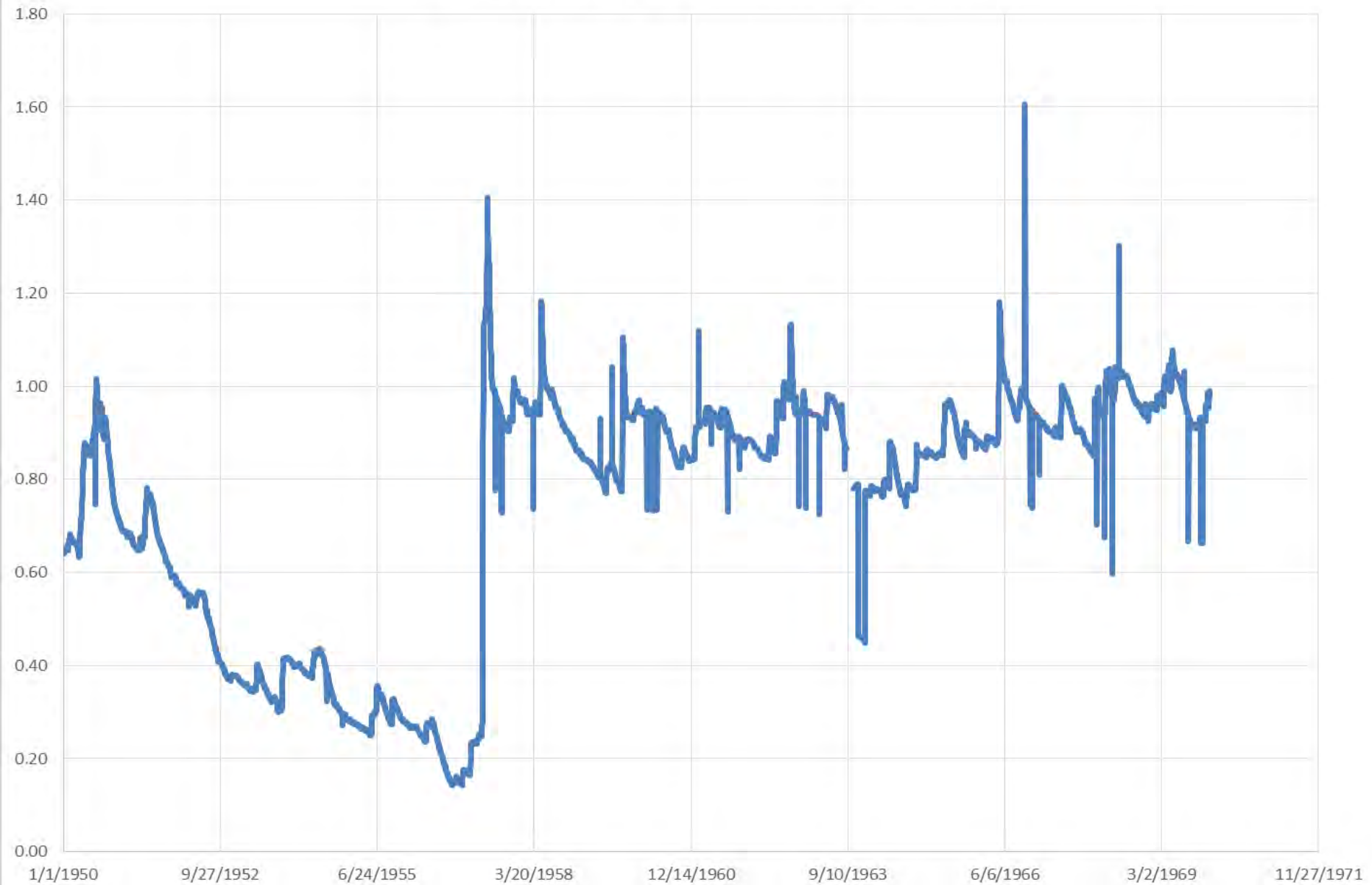


# BP & EM Inflows 2010-2014 & 1950-1958





West Fork Volume, % of Conservation 1950-1969

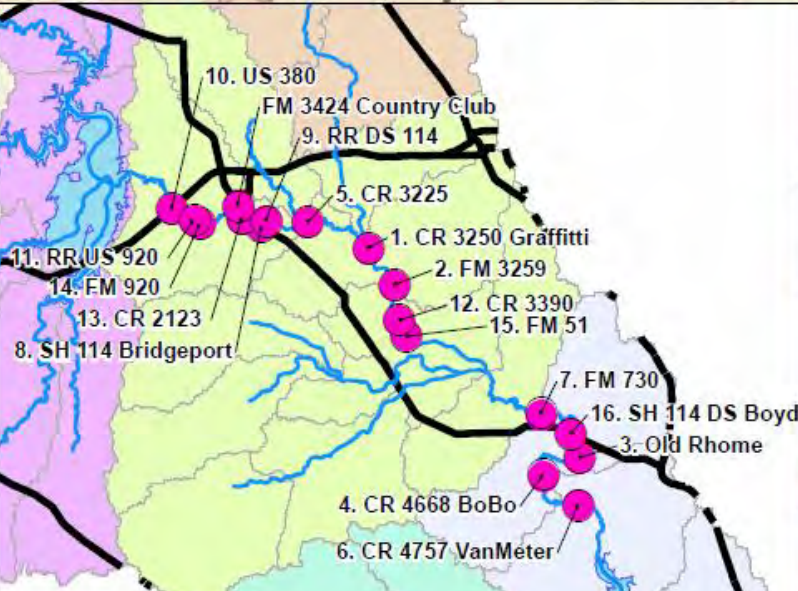
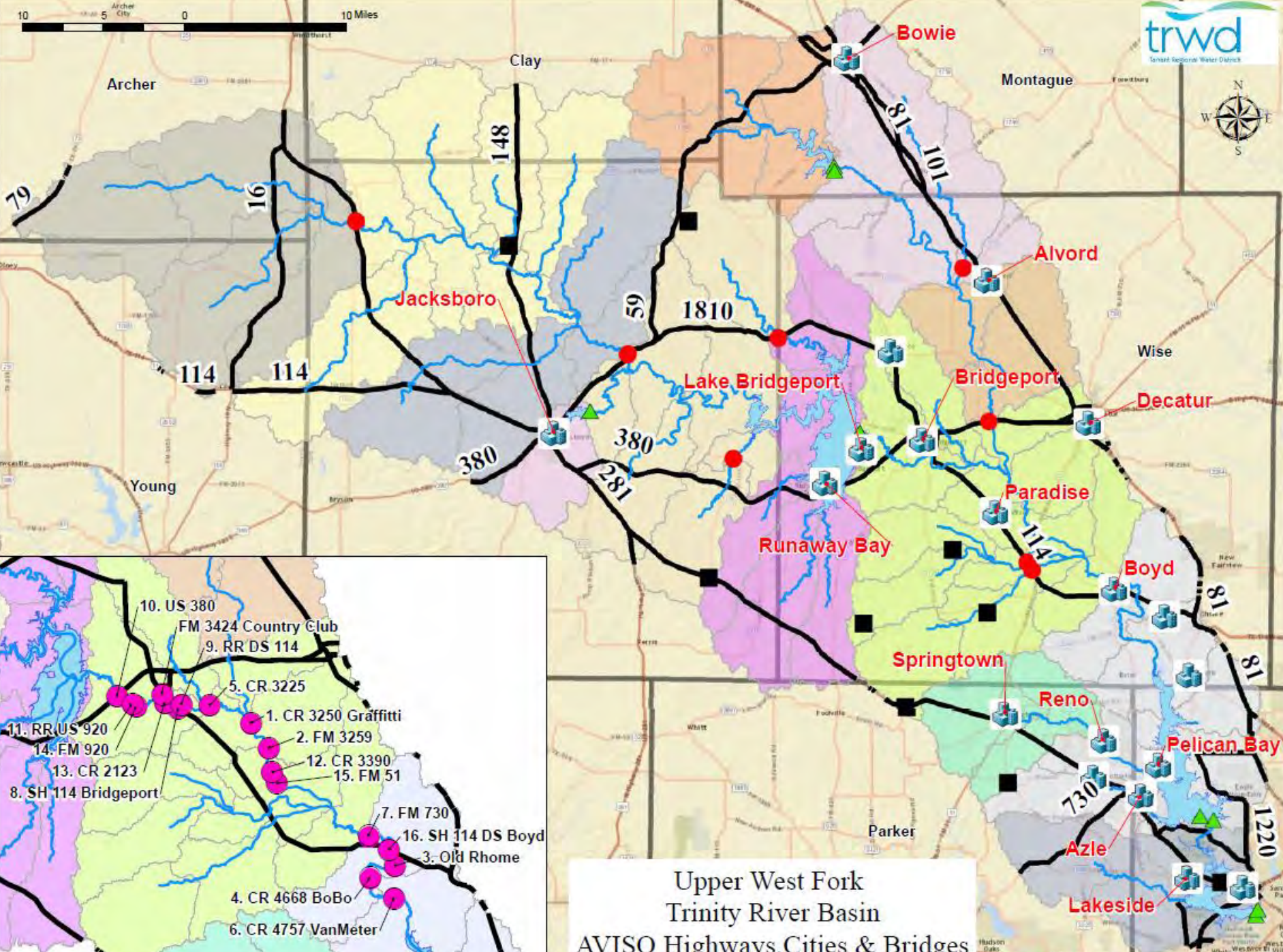
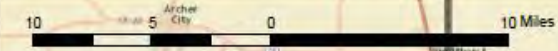


# West Fork Reservoirs as flood control

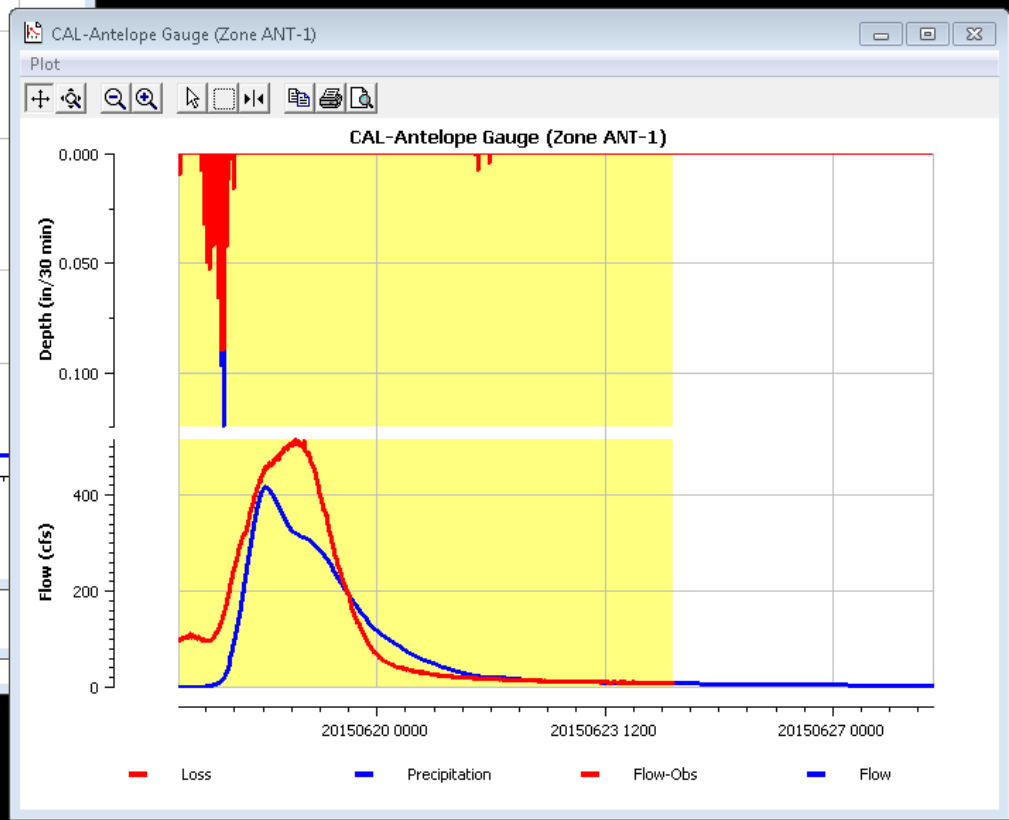
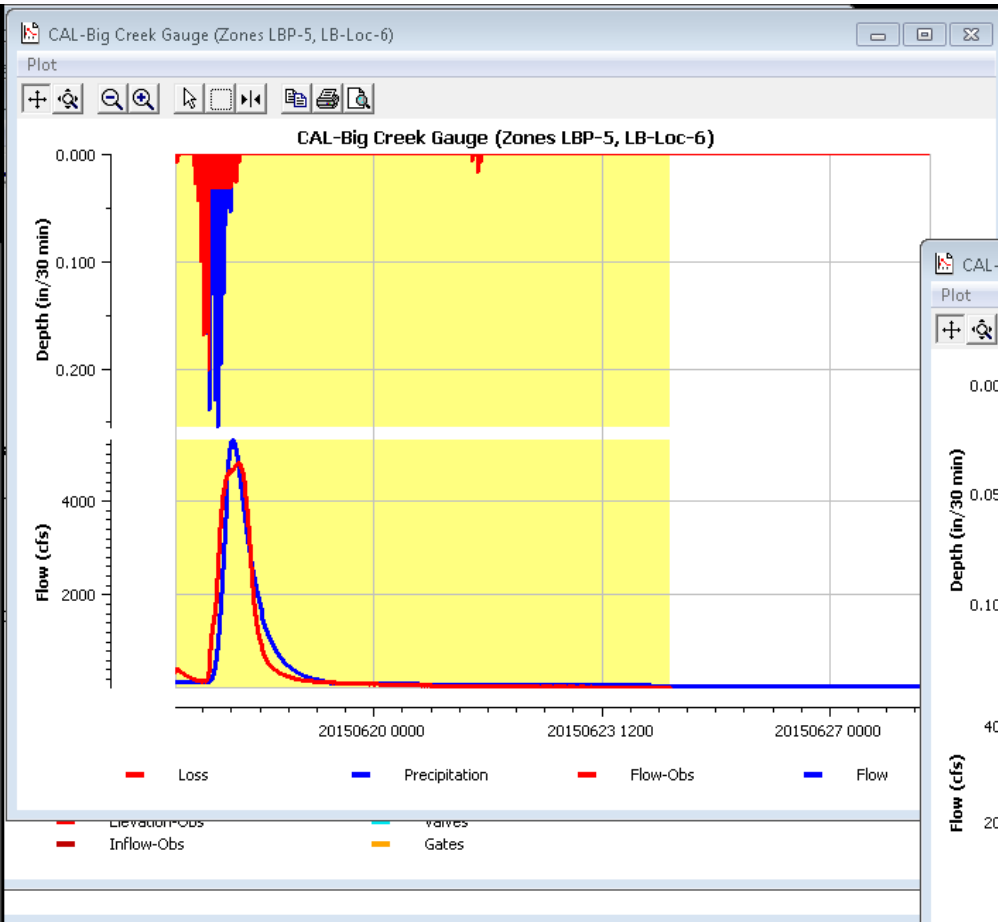
- Bridgeport and Eagle Mountain were designed in the 1920's as flood control reservoirs and used to protect downstream
- Bridgeport has a flood easement up to 851 feet msl, 15 feet above the 836 feet msl conservation level
- Bridgeport has about 325,000 acre feet of flood storage
- Eagle Mountain has a flood easement up to 668 feet msl, 17 feet above the conservation level of 649.1
- Eagle Mountain as about 156,000 acre feet of flood storage
- Lake Worth has a flood easement of 6 feet, elevation 600 feet msl, a storage of about 24,000 acre feet

# West Fork Flooding

- Flood releases from the reservoirs are made considering:
  - Dam integrity
  - Public safety
  - Property damage
- The Eagle Mountain discharge works are designed to limit releases to protect the Fort Worth Floodway
- TRWD's flood easements did not give us the right to control building – there are hundreds of homes within the flood pool boundaries



Upper West Fork  
Trinity River Basin  
AVISO Highways, Cities & Bridges

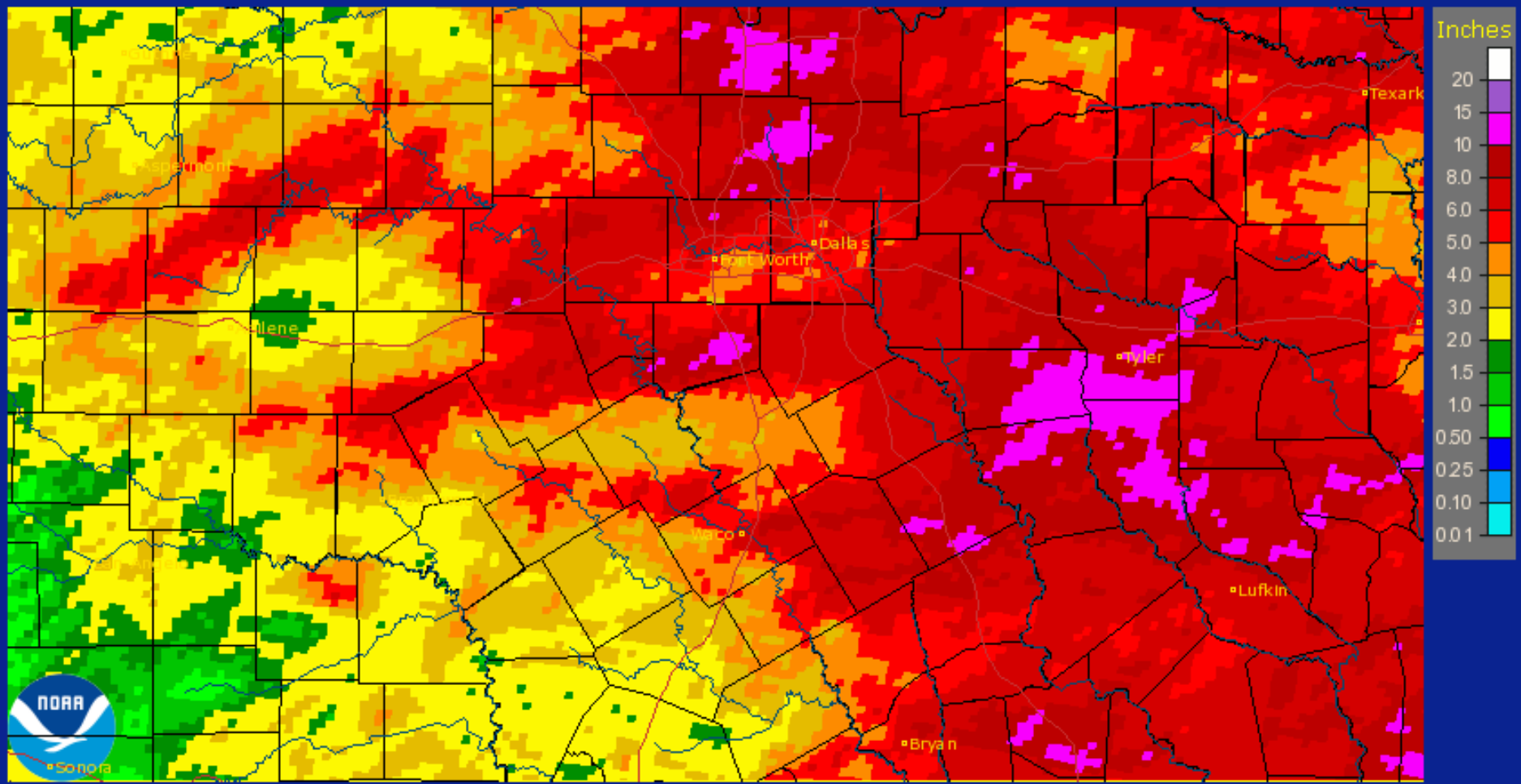


# The 2015 flooding

- Two distinct events
  - May rains
  - Tropical Storm Bill
- May was the wettest on record, recording 16.96 inches of rainfall
- This broke the record of 1982 by 3.3 inches
- Tropical storm Bill recorded 5 to 9 inches of rain in Wise and Jack Counties

# Rainfall- April

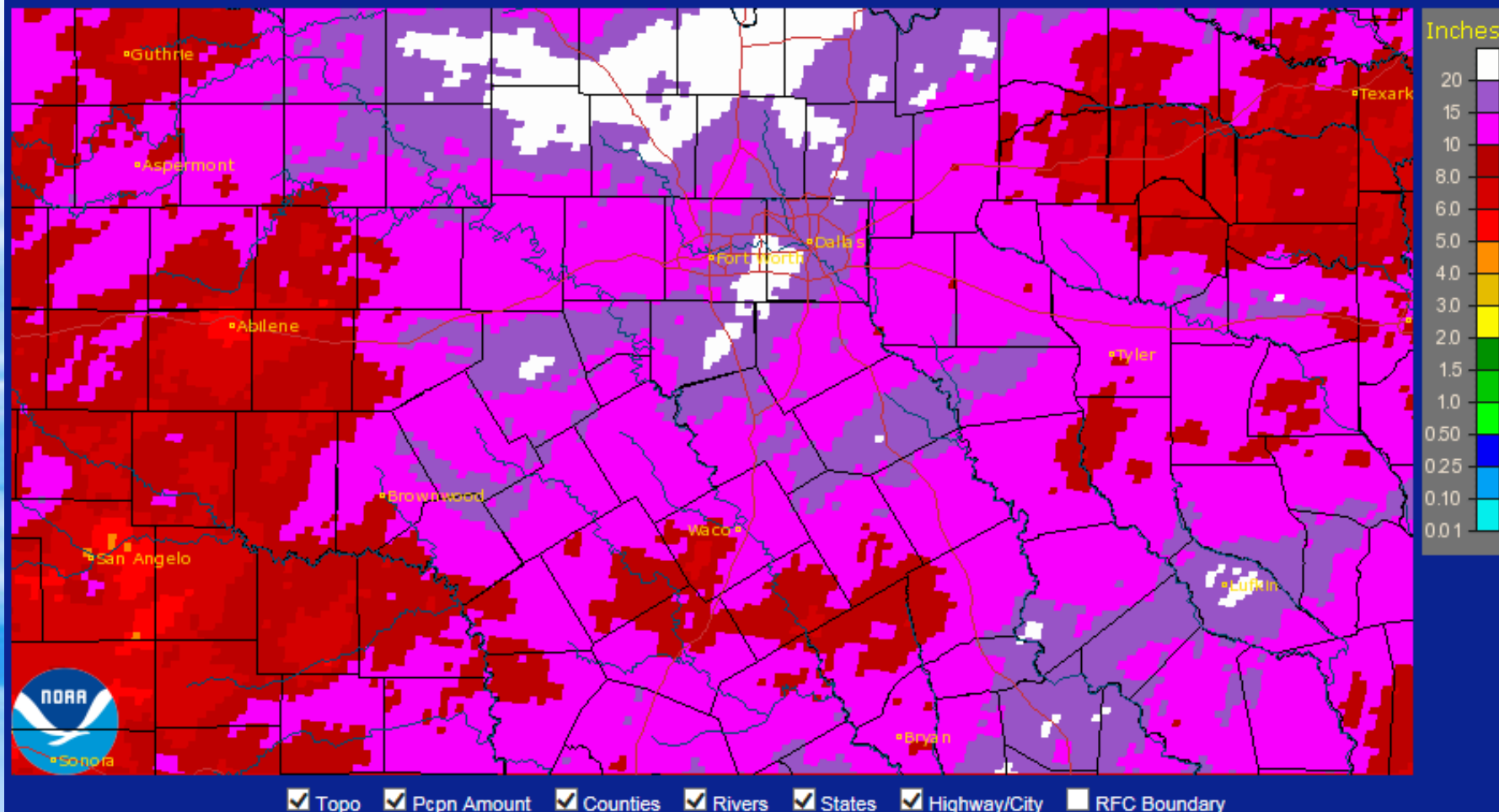
Fort Worth, TX (FWD): April, 2015 Monthly Observed Precipitation  
Valid at 5/1/2015 1200 UTC - Created 5/14/15 10:53 UTC



- Topo
- Pcpn Amount
- Counties
- Rivers
- States
- Highway/City
- RFC Boundary

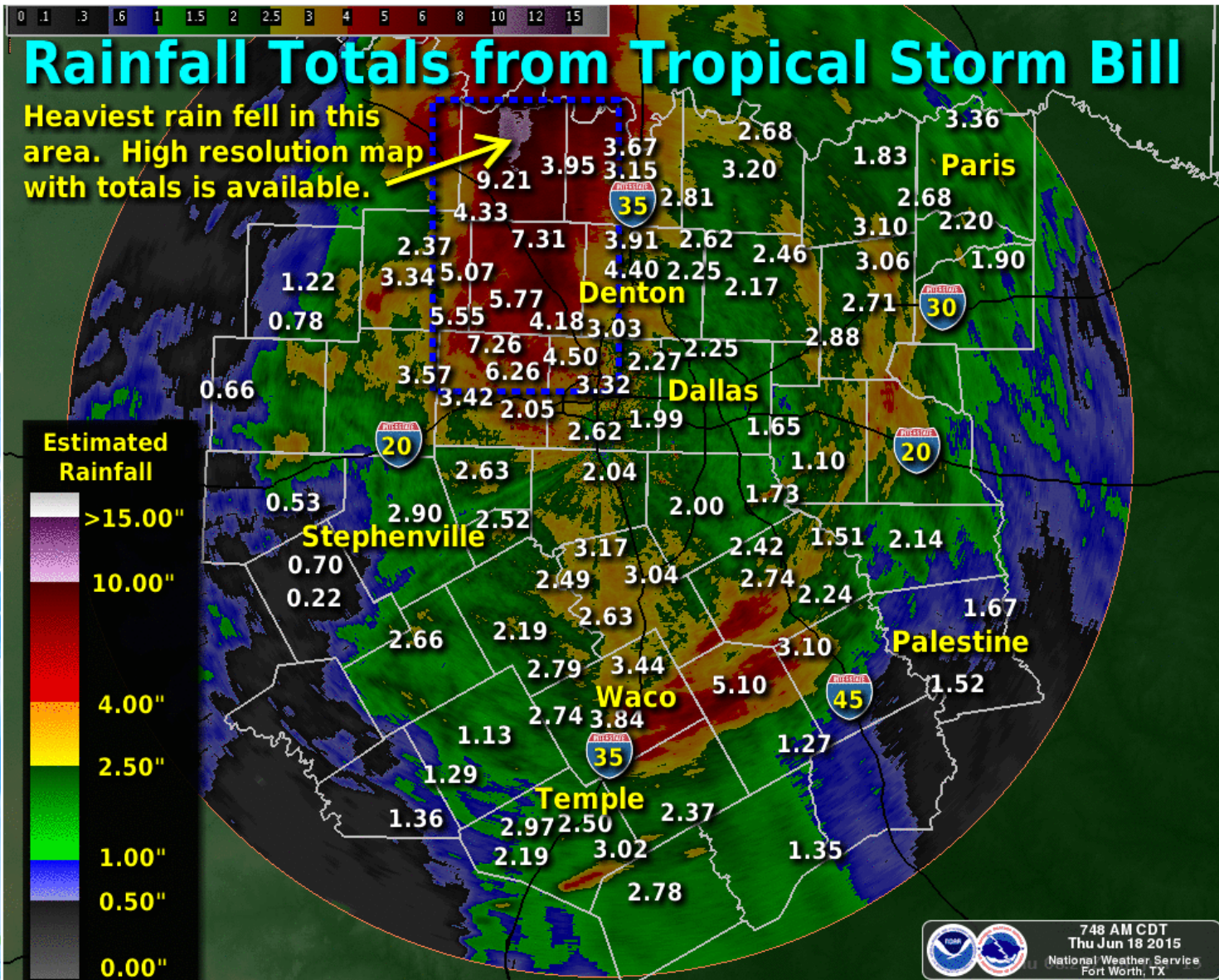
# May Rains

Fort Worth, TX (FWD): May, 2015 Monthly Observed Precipitation  
Valid at 6/1/2015 1200 UTC - Created 6/11/15 19:22 UTC

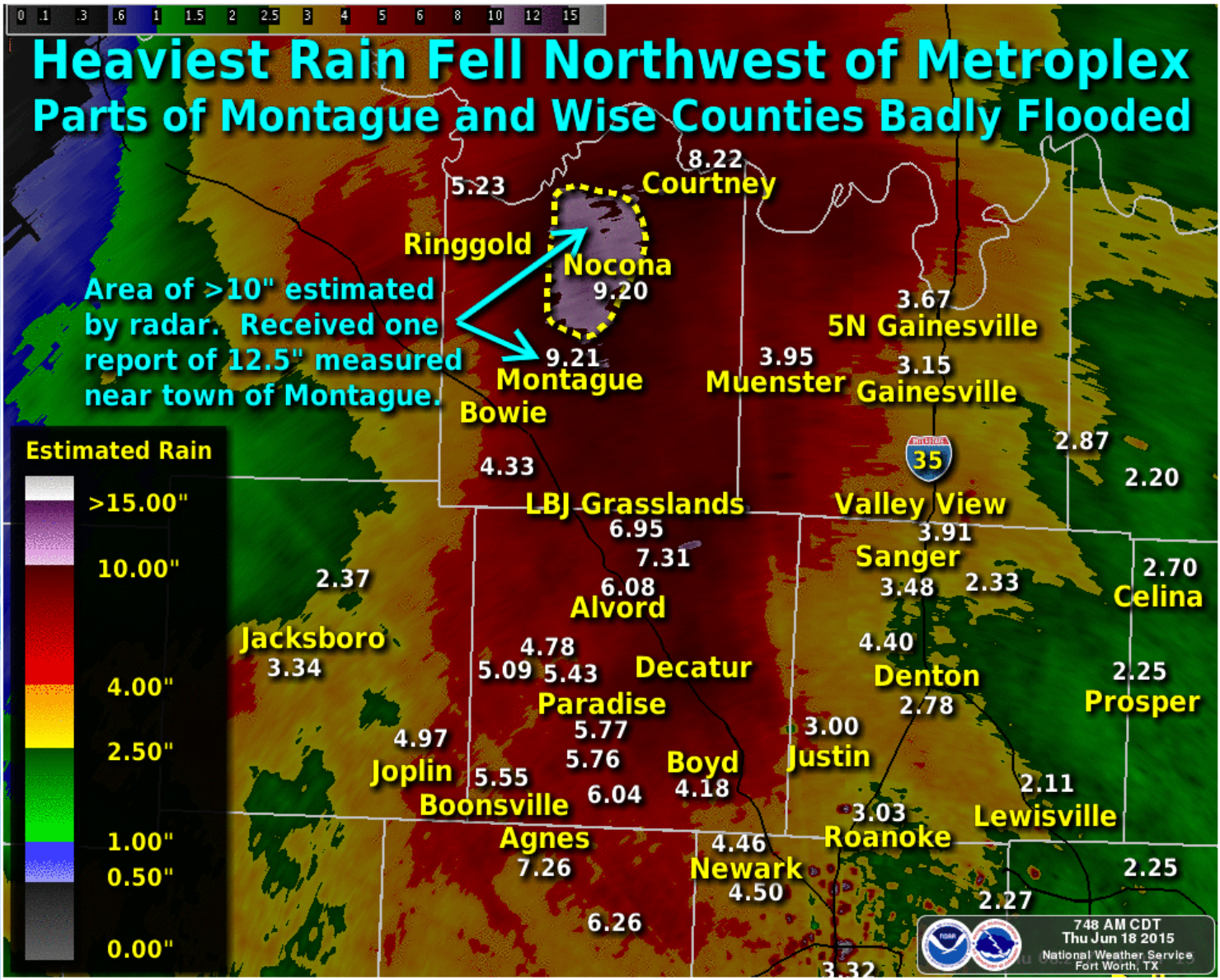




# June 17-18 Tropical Storm Bill



# June 17-18 Tropical Storm Bill



# The May flood (through 6/13) - Bridgeport

- Bridgeport had 405,000 acre feet of flow into the reservoir, about 110% of its conservation volume
- Bridgeport stored 223,000 acre feet to reach conservation
- Maximum inflow was 38,500 cfs and outflow 10,900 cfs.
- Bridgeport rose 4.4 feet above conservation, after starting 24 feet below conservation
- Two homes was flooded and one business.
- Several businesses were flooded downstream and 5 roads closed (pending new information)

# The May Flood – Eagle Mountain & Lake Worth

- 393,000 acre feet flowed into Eagle Mountain, 124% of the conservation volume
- Eagle Mountain stored 51,300 acre feet to reach conservation
- Eagle Mountain rose 2.4 feet above conservation
- Eagle Mountain had a maximum inflow of 15,700 cfs and a release of 11,700 cfs
- One home, possibly two were flooded
- Lake Worth had 342,000 acre feet inflow and stored 11,500 acre feet
- Lake Worth had a maximum inflow of 13,120 cfs and release of 11,582
- Lake Worth rose 2.9 feet above conservation

# TS Bill Flood

- Bridgeport received 100,200 acre feet of inflow. Peak inflow was 41,360 cfs and release 8,806 cfs
- Bridgeport rose 3 feet, and one home was flooded
- Eagle Mountain received 191,500 acre feet of inflow. Peak inflow was 24,800 cfs and release 15,900 cfs
- Eagle Mountain rose 3.4 feet and 5 homes were flooded
- Lake Worth received 204,500 acre feet of inflow. Peak inflow was 23,600 cfs and released 15,300 cfs
- Lake Worth rose 3.5 feet and two homes were flooded

# Flood Frequency – May storm

- Flows above Bridgeport, Trinity at Jacksboro, peaked at 14,600 cfs, a flow that would happen once about every 8 years
- Flow above Eagle Mountain on Big Sandy, peaked at 19,800 cfs, a frequency of once in about 20 years
- Flow above Eagle Mountain, Trinity River at Boyd, peaked at 11,200 cfs, a frequency of one in 6 years
- To fill from 64% to 100% in May had a chance of less than 1 in 100 years.
- The peak flows from the flood were not high, but the total volume of the storm was rare

# Flood Frequency – TS Bill

- Trinity River at Jacksboro peak for was 4,100 cfs, a flow to be expected once every three years
- Big Sandy peaked at 17,000 cfs, a flow seen about once in 15 years
- Trinity River at Boyd's peak flow was 18,500 cfs, a 1 in 18 year event
- Trinity River at Fork Worth's peak flow was 15,000 cfs, a flow that happens about every other year
- Flow through Dallas on the Trinity actually peaked on 5/29 at 47,200 cfs, a flow to be expected once in about 7 years.

# Lake Bridgeport



**June 5, 2015**  
**5728 cfs discharging**



# Impacts at Bridgeport



# Gazebo at Lake Bridgeport

May 11, 2015



# Runaway Bay



**June 1, 2015  
Highway 380**



**June 1, 2015  
Shell Station  
On 380**

# Road Impacts

June 1, 2012  
Bobo Bridge



# FM 730 in Boyd

June 1, 2015



# Eagle Mountain



**June 1, 2015**  
**11,471 cfs discharging**

# Fort Worth Nature Center & Refuge



# Floodway

June 5, 2015  
TRWD Dam by Office





# The flood

- We have been in a very dry period and the flood seems intense
- This flood was not unusually severe
- Historic events show we need to be prepared for much larger events

