Texas Drought and Impacts to Raw Water Supplies

Texas Municipal Utilities Association

Tom Gooch – Freese and Nichols

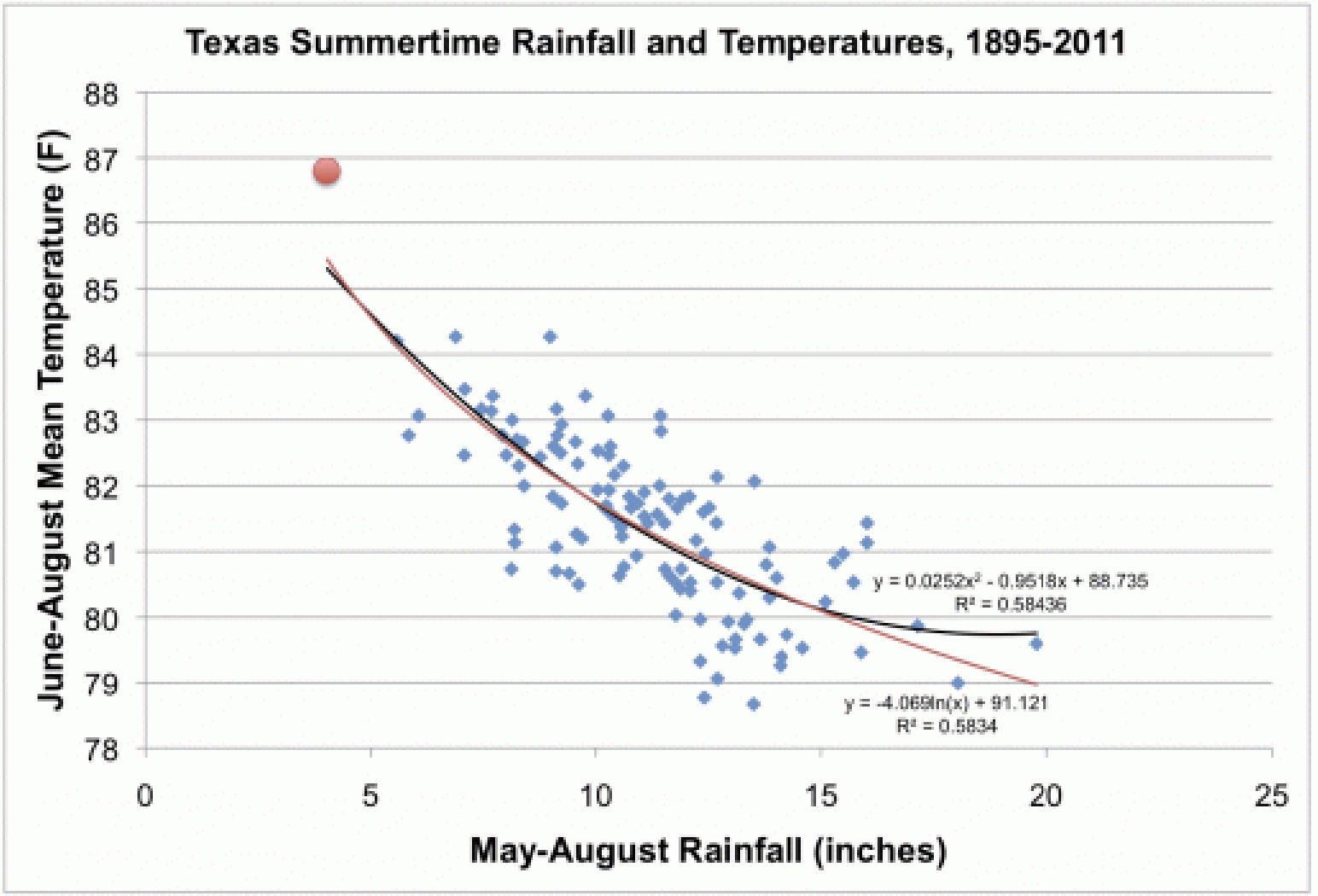
January 26, 2012

Outline

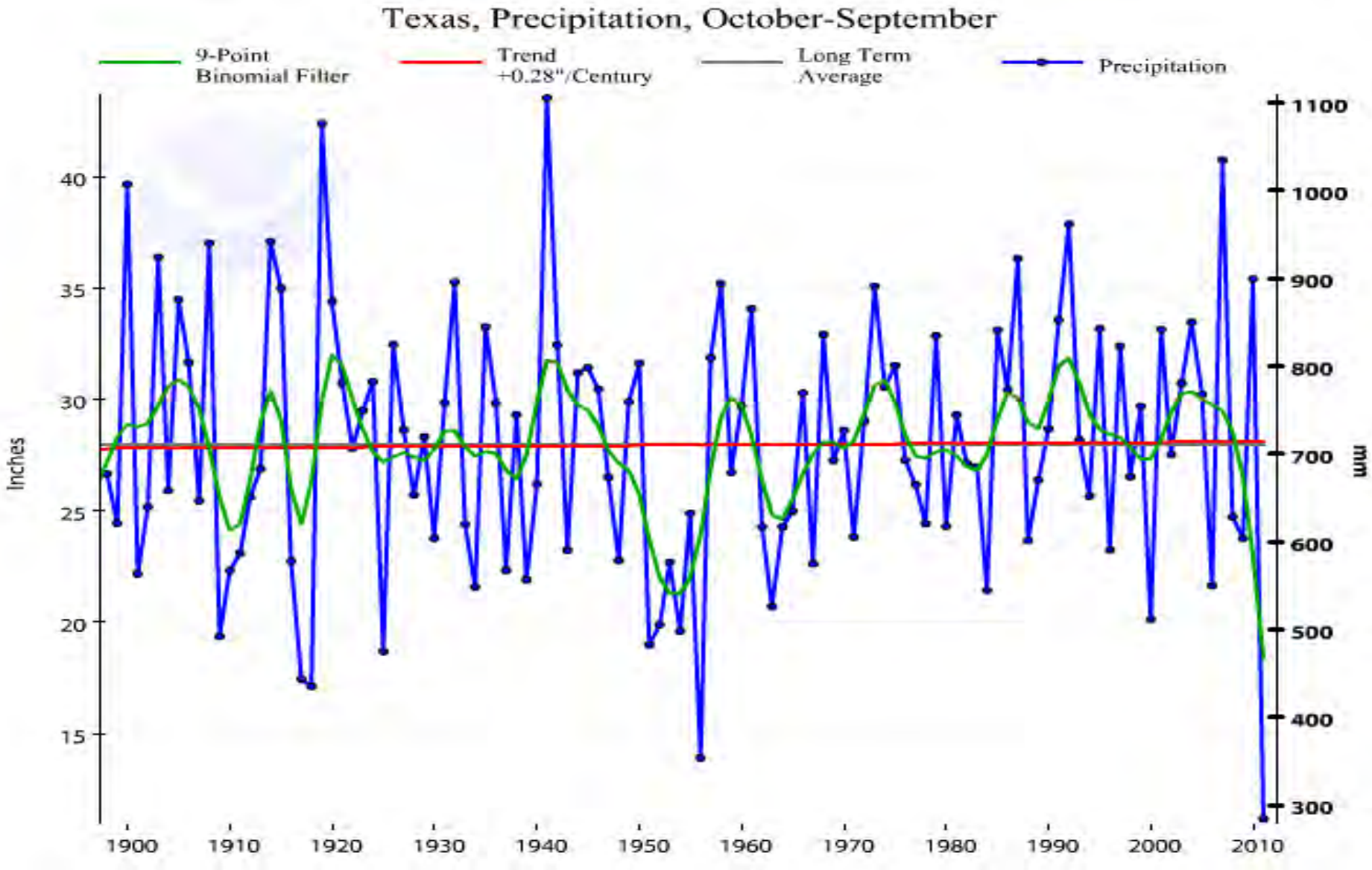
- Overview of 2011 Drought
- Water Right Calls in 2011
- Responses to Drought
- Key Points

Overview of 2011 Drought

This Summer's Record Heat and Dryness Were Off the Chart!



Overview of 2011 Drought



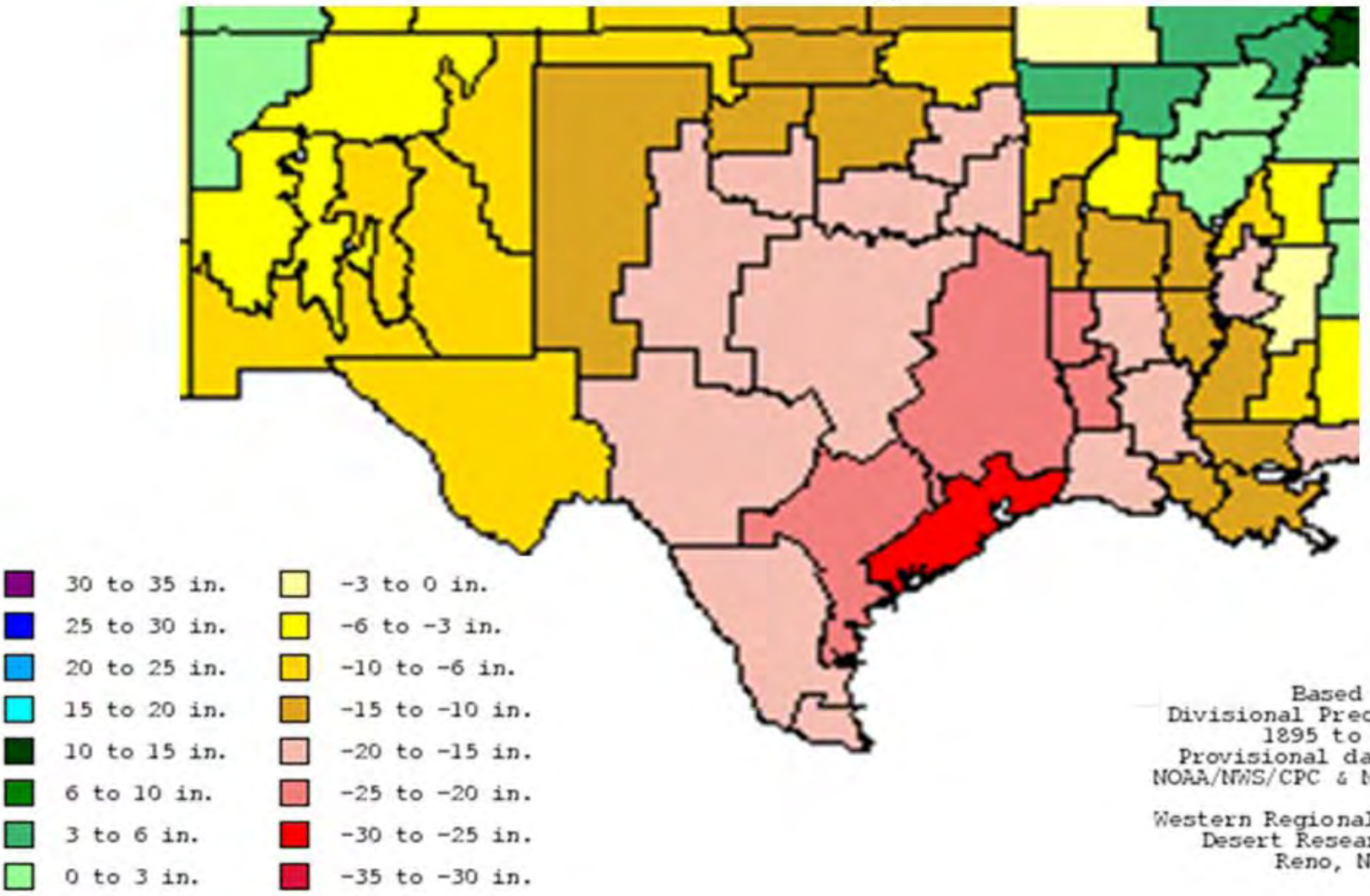
Overview of 2011 Drought

October 2010 – September 2011:

- Driest October-September in Texas history
- Statewide average rain = 11.18 inches
  - Normal 29.11 inches
  - Previous low 13.91 inches (1955-56)

Overview of 2011 Drought

Rainfall Departure from Normal, October 2010-September 2011



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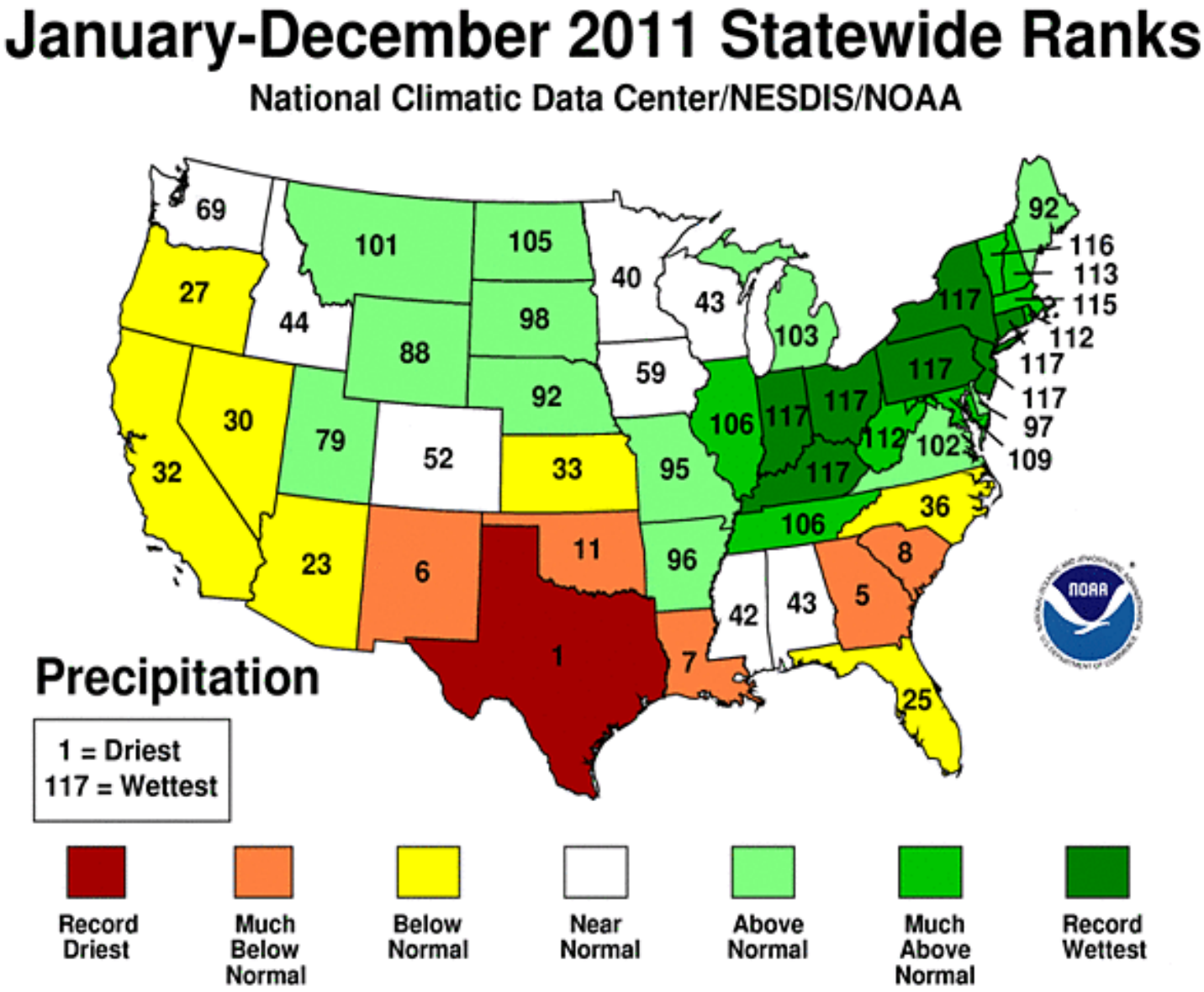


Overview of 2011 Drought

Driest calendar year on record with just **14.88** inches! Previous record was 14.99 inches in 1917.

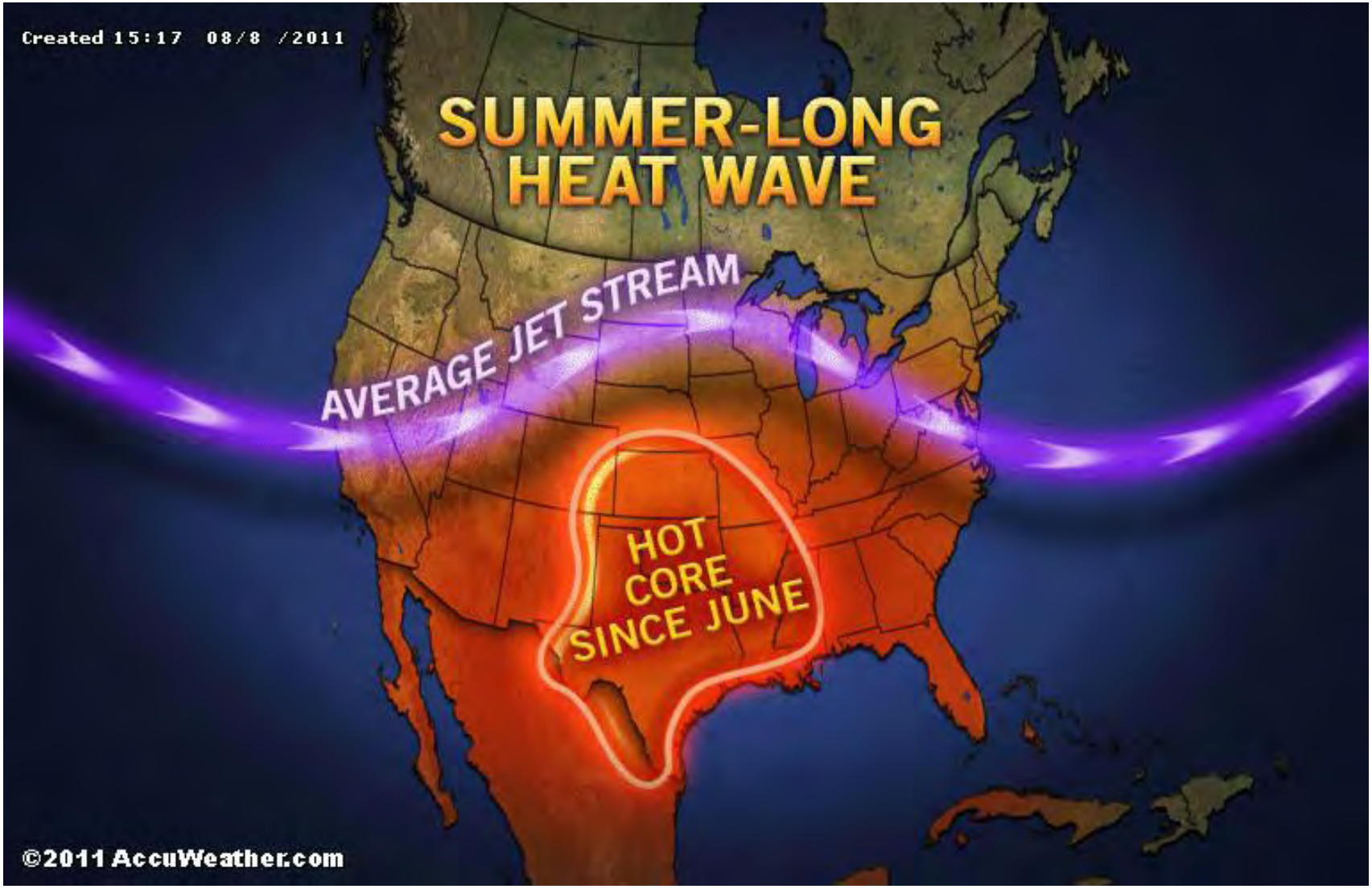
Average Temperature **67.2** degrees. *Second hottest year on record.* Hottest year was 67.5 degrees in 1921.

Overview of 2011 Drought

The Unprecedented Summer Heat!

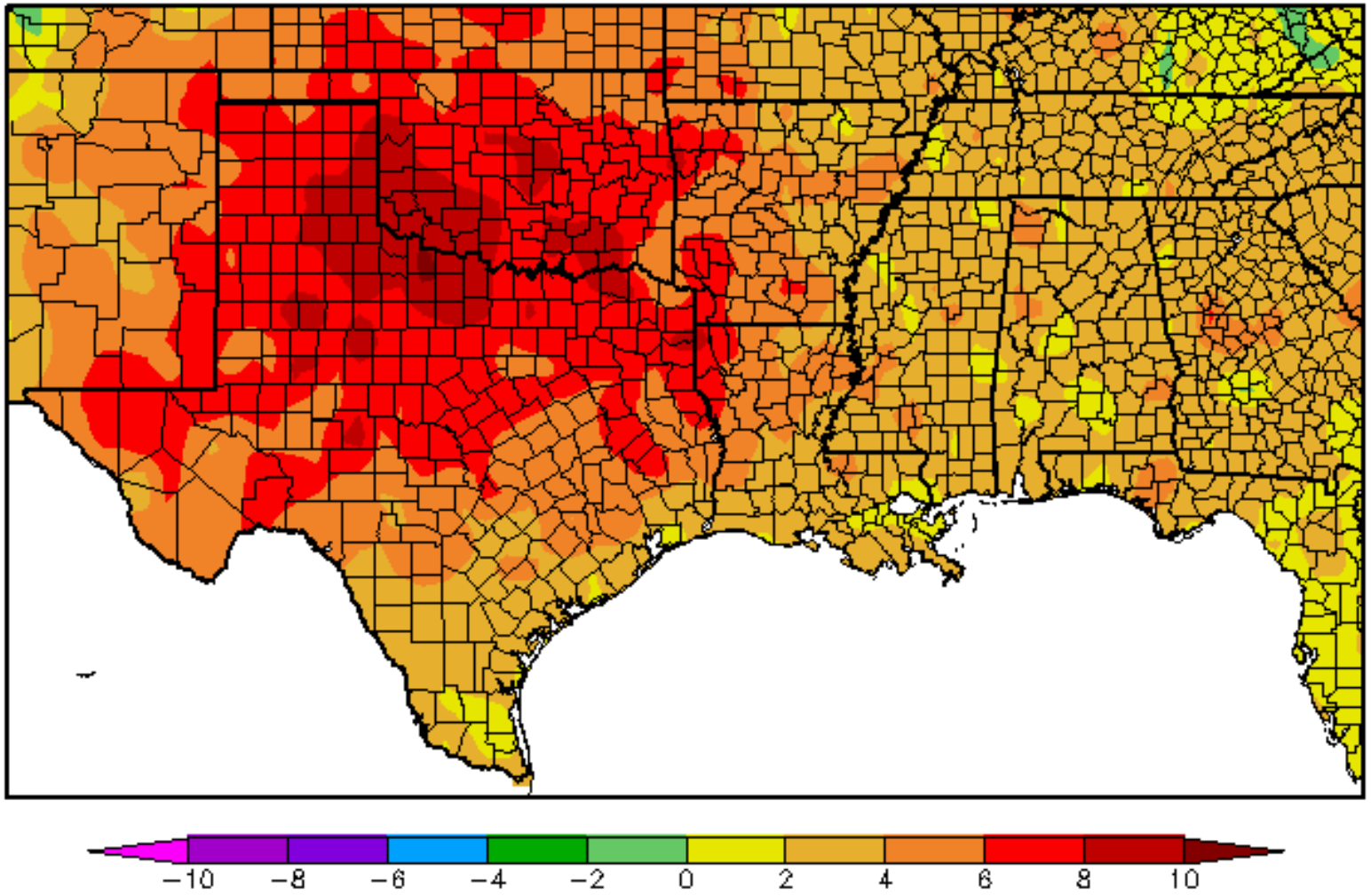
Overview of 2011 Drought

Heat Dome Developed Early and Persisted throughout the Summer



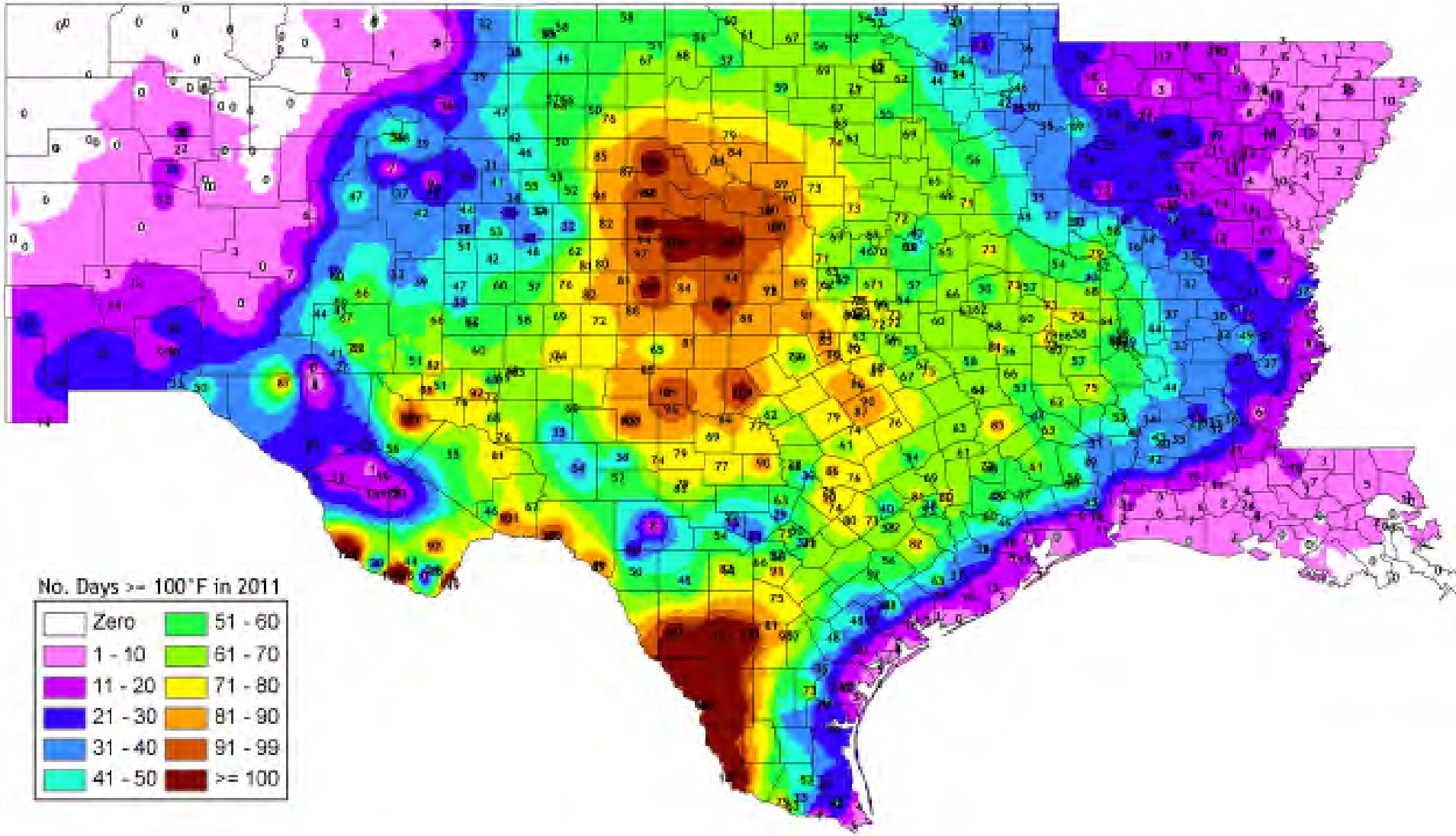
Overview of 2011 Drought

Temperature Departure from Normal, June 1st – August 31st



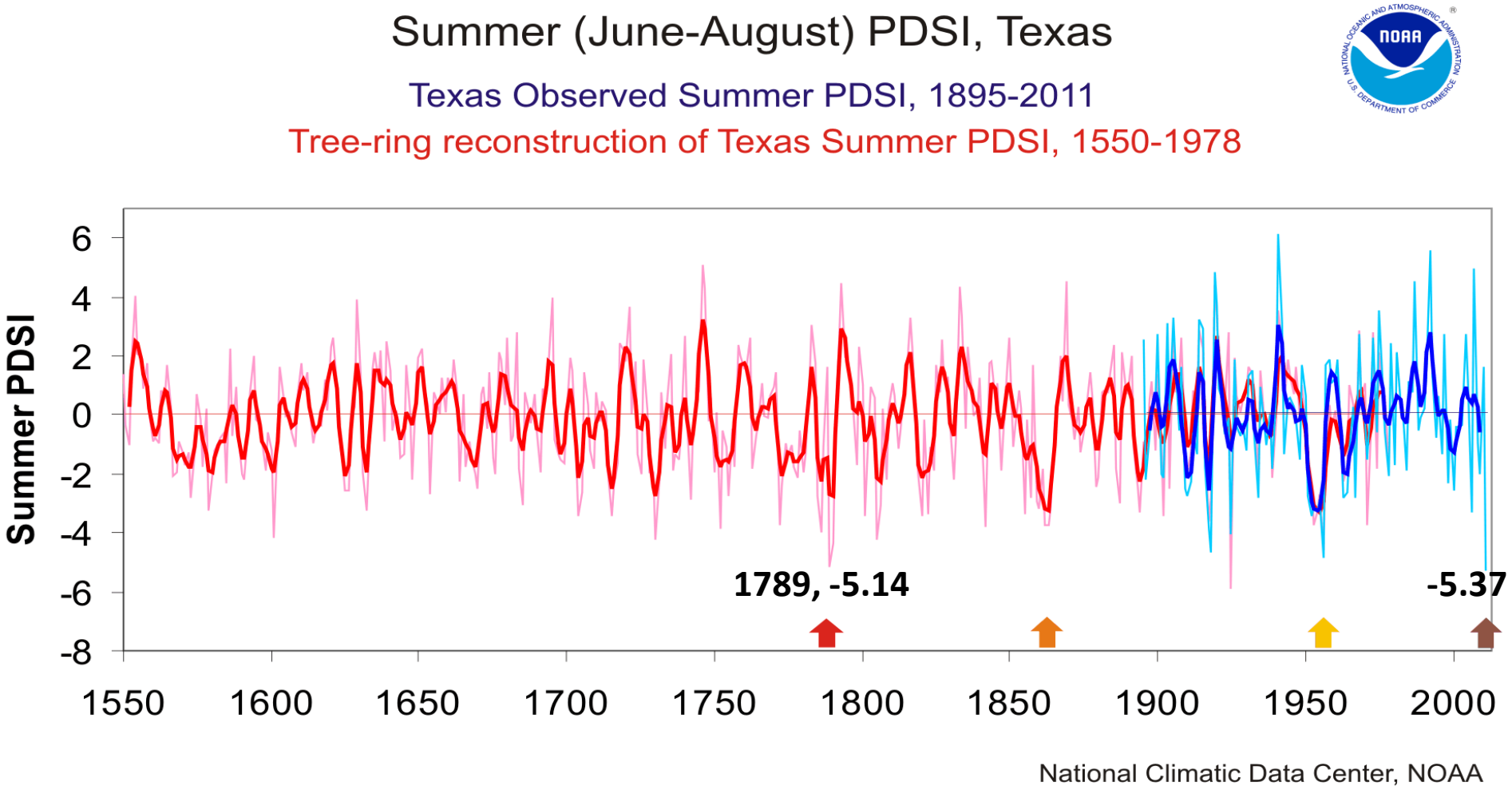
Overview of 2011 Drought

Number of Days at or above 100°



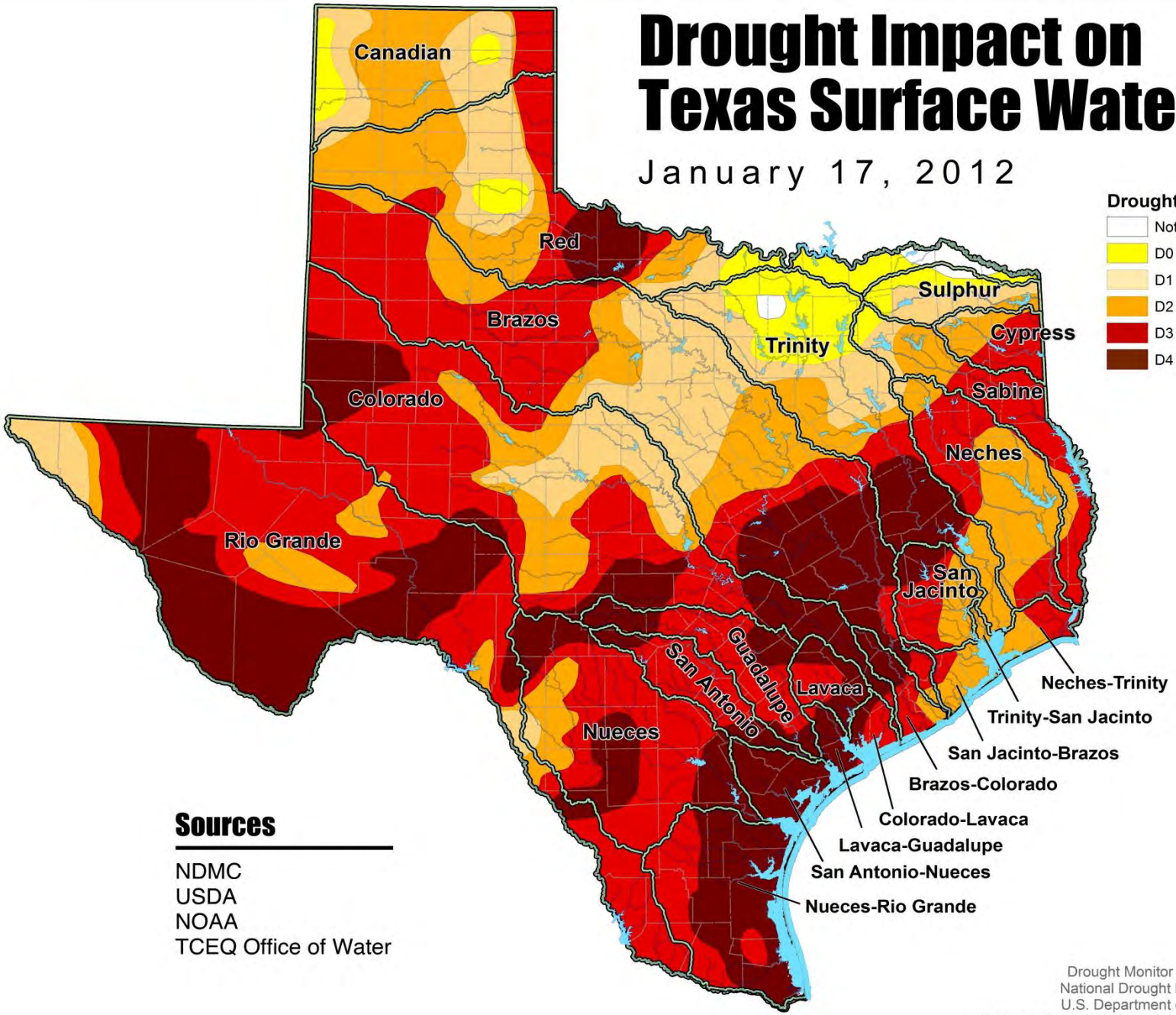
Overview of 2011 Drought

Putting the 2011 Drought into Historical Perspective



Drought Impact on Texas Surface Water

January 17, 2012



Drought Severity Index

- Nothing
- D0 - Abnormally Dry
- D1 - Drought - Moderate
- D2 - Drought - Severe
- D3 - Drought - Extreme
- D4 - Drought - Exceptional

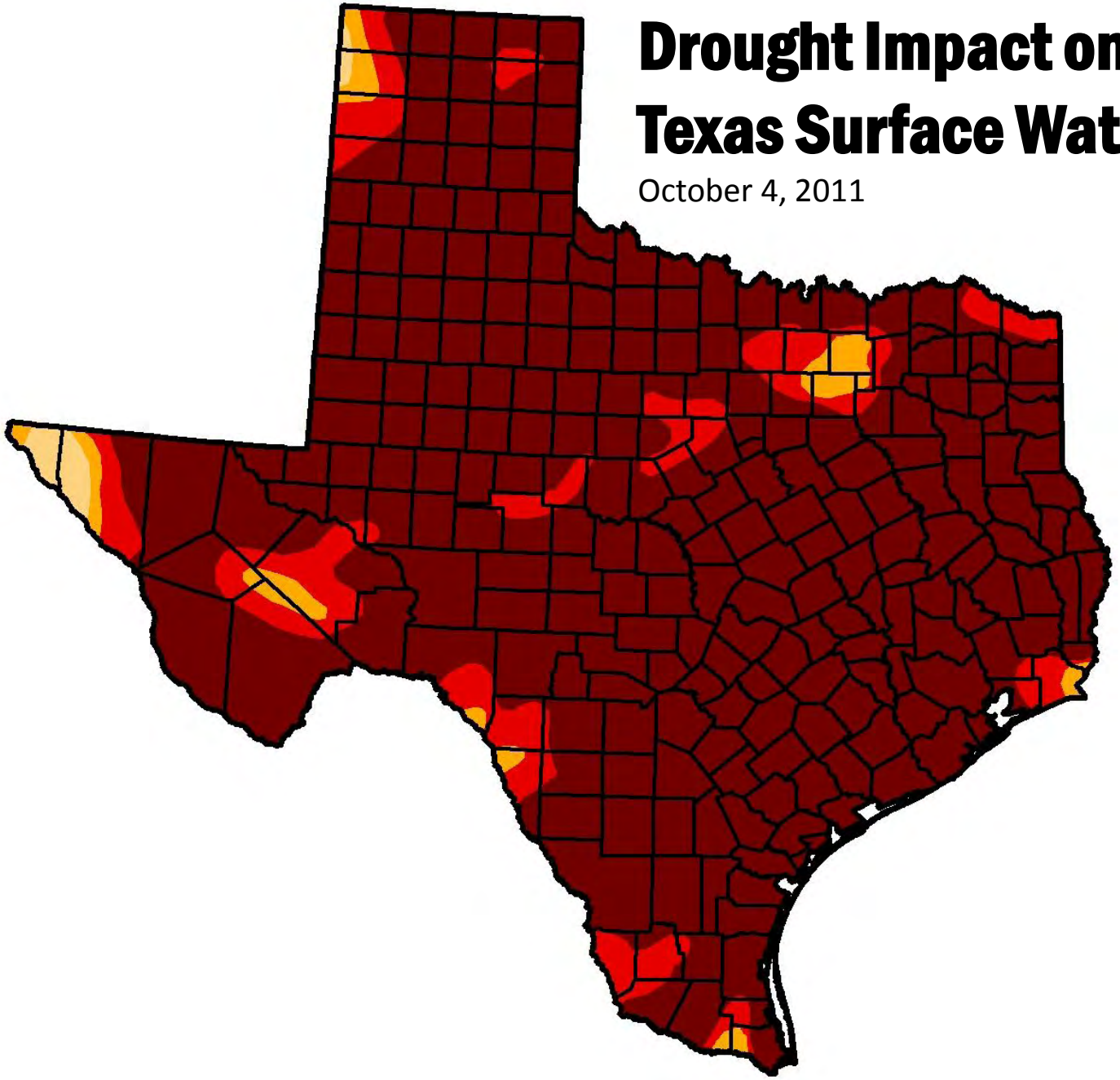
Sources

NDMC
USDA
NOAA
TCEQ Office of Water

Drought Monitor Dataset developed by the
National Drought Mitigation Center (NDMC)
U.S. Department of Agriculture (USDA) and
National Oceanic & Atmospheric Administration (NOAA)

Drought Impact on Texas Surface Water

October 4, 2011



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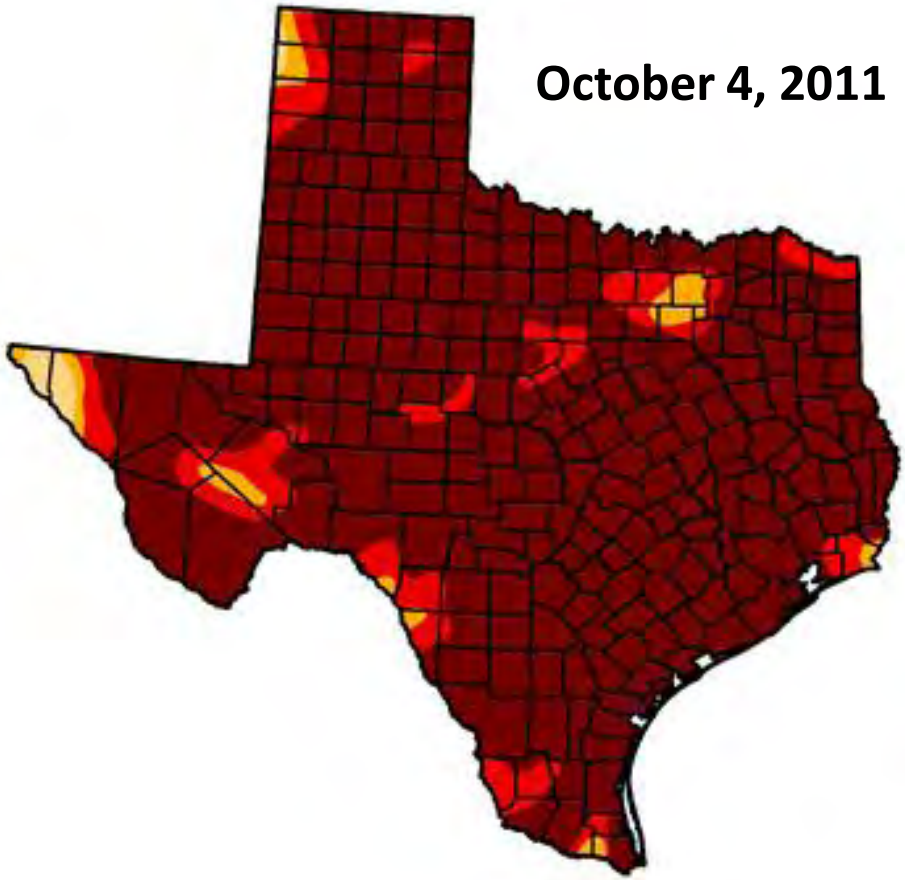
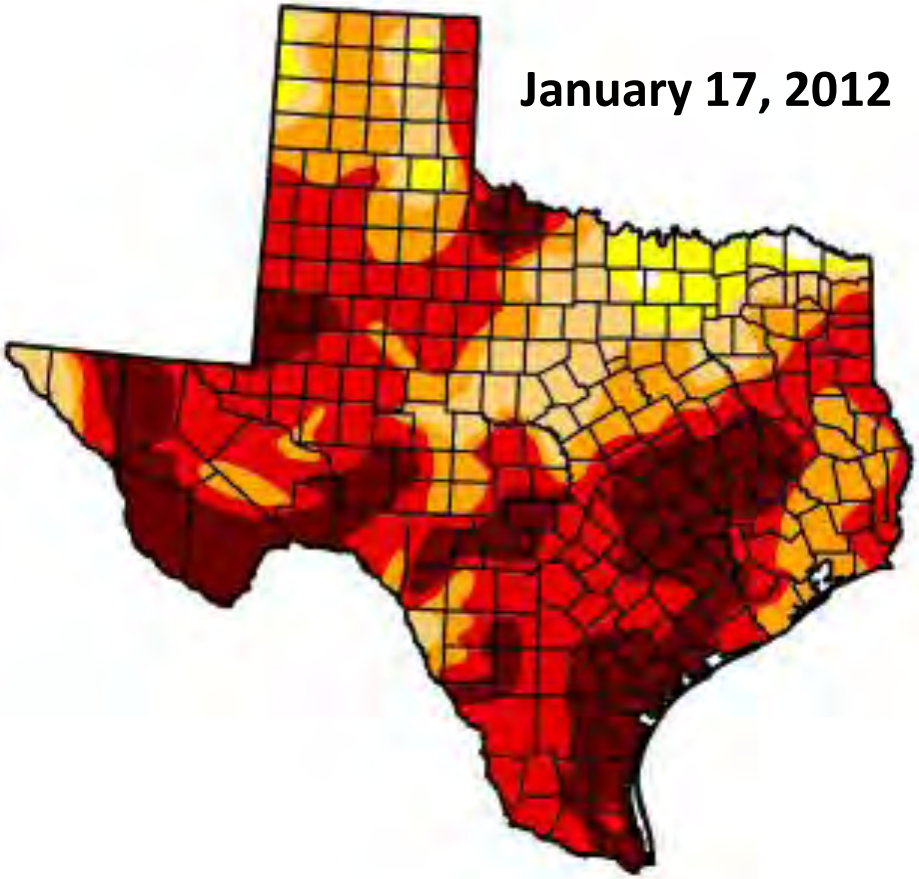


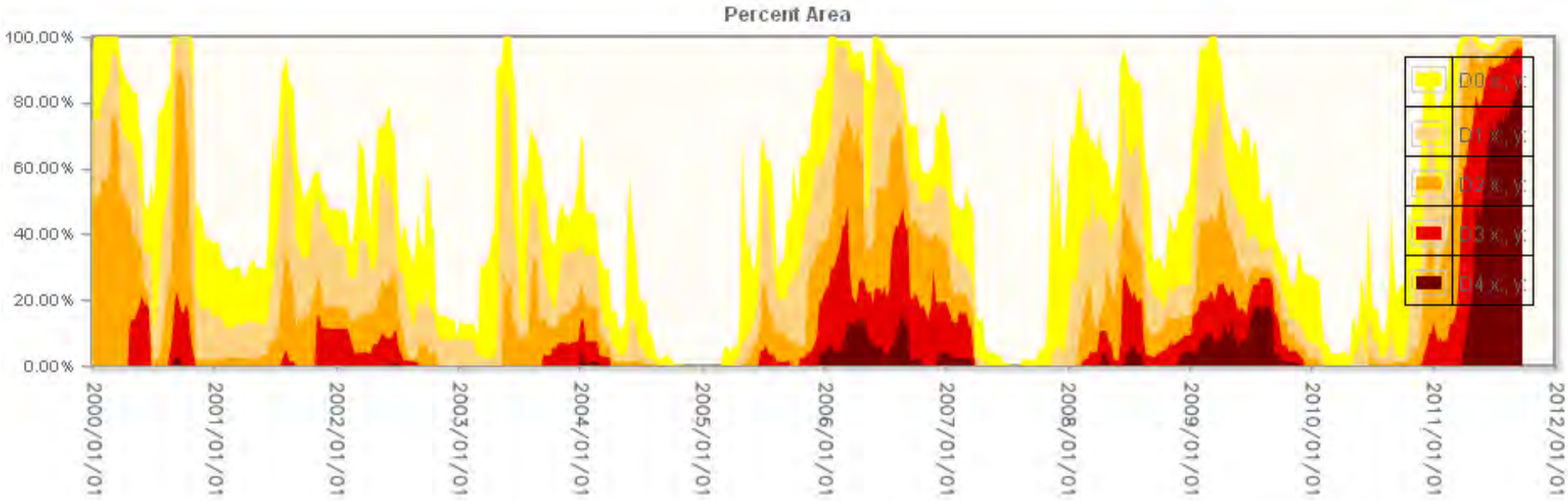
October 4, 2011



January 17, 2012

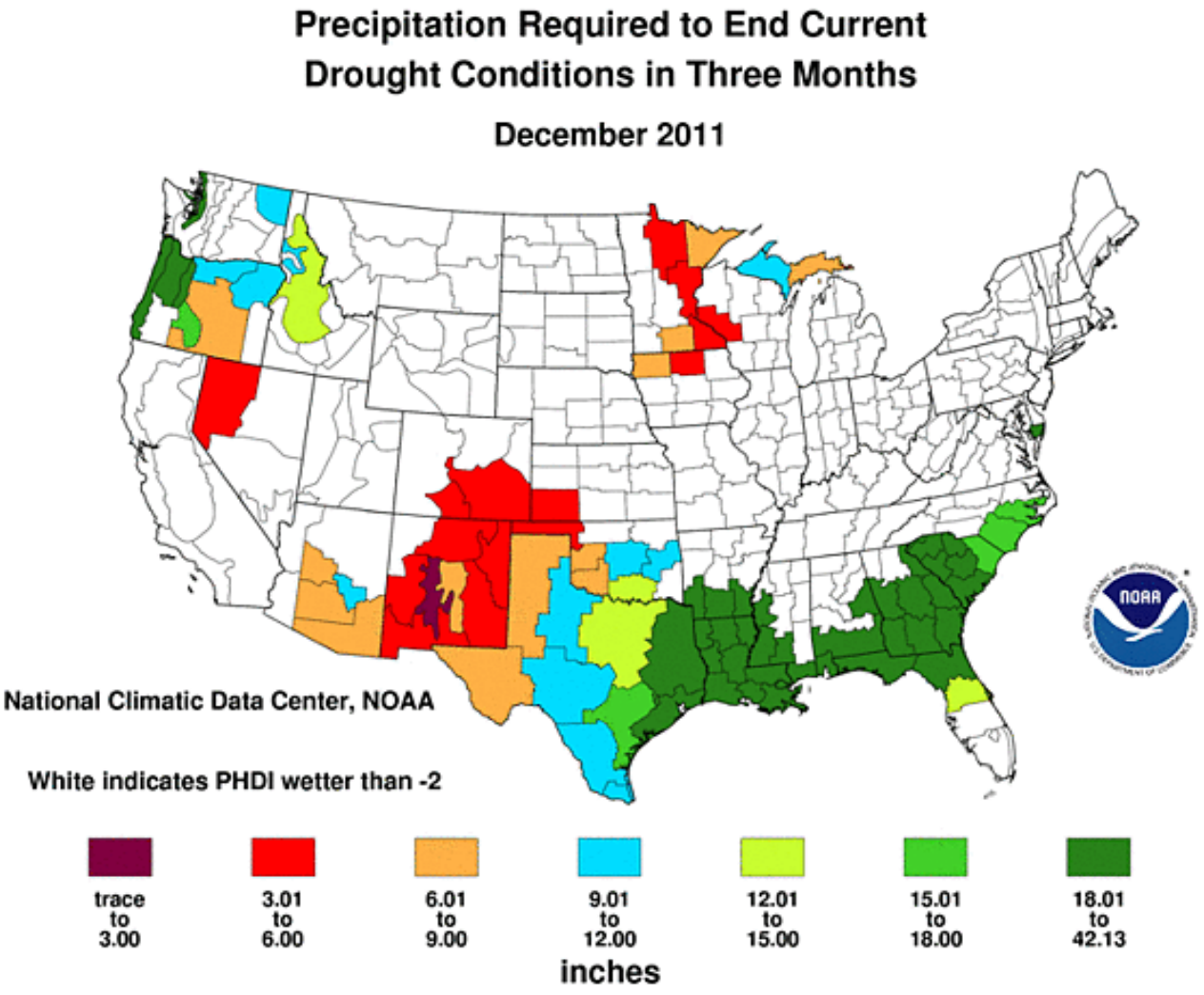
Overview of 2011 Drought

Percent Area of Texas in Drought – 2000 through 2011



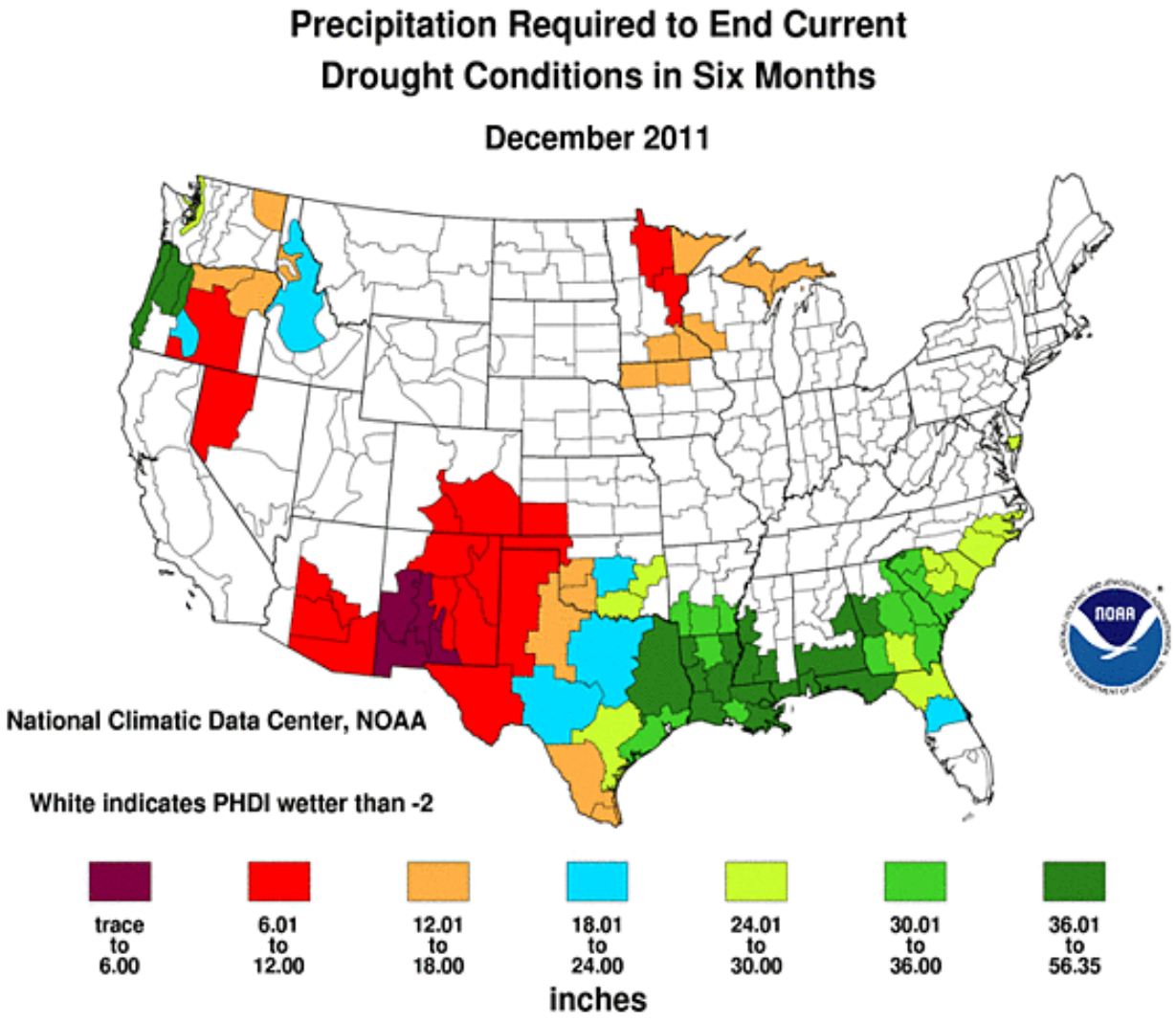
Overview of 2011 Drought

Rain Needed to End the Drought in 3 Months



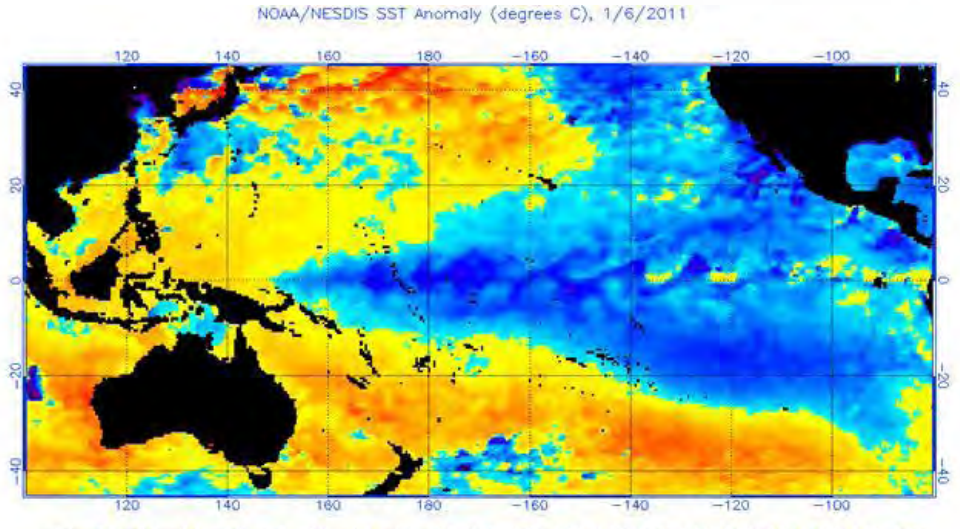
Overview of 2011 Drought

Rain Needed to End the Drought in 6 Months

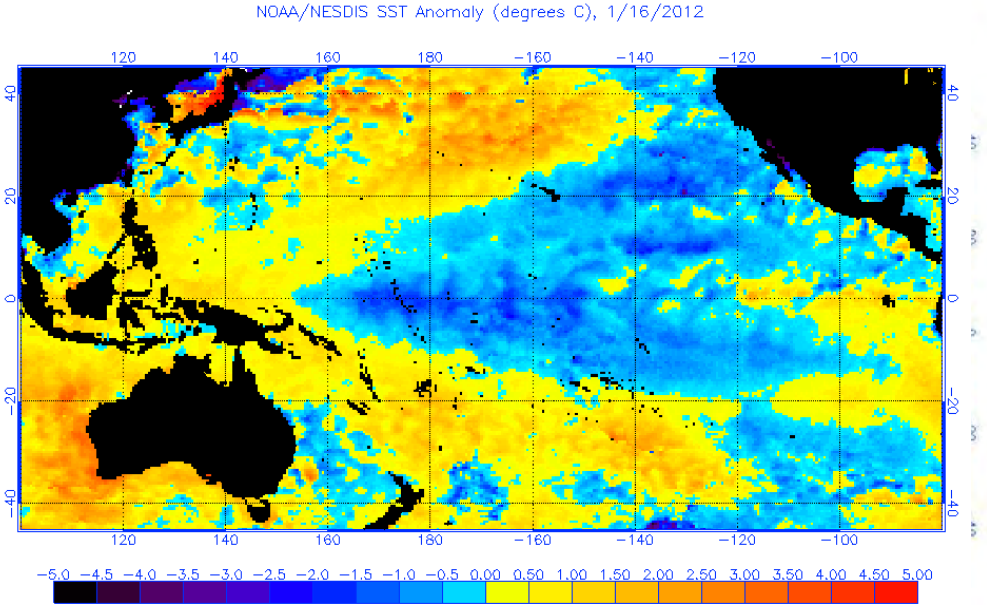


Overview of 2011 Drought

Now In the Second Year of La Niña



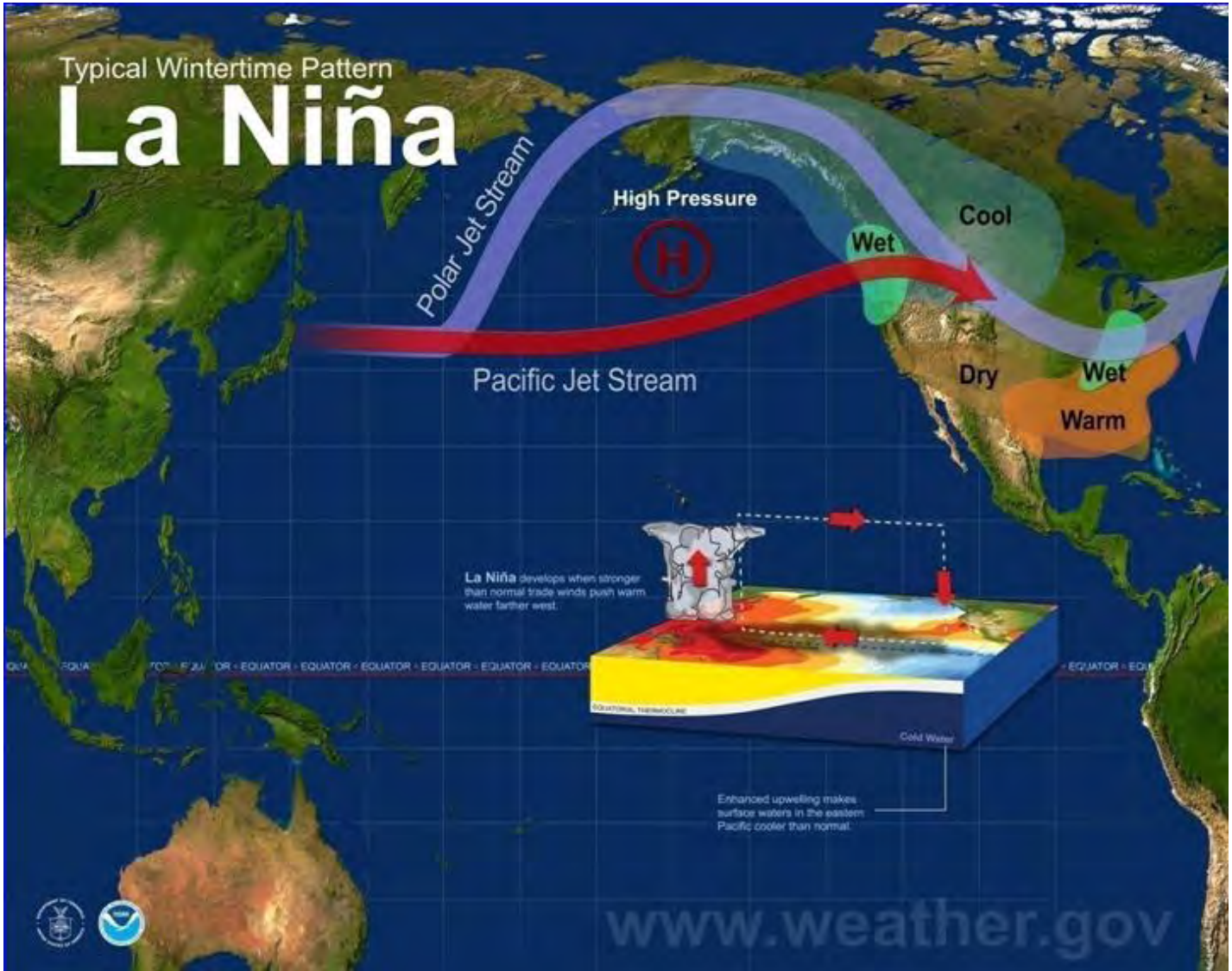
January 6, 2011



January 16, 2012

Overview of 2011 Drought

Typical Patterns Associated with La Niña



Overview of 2011 Drought

Take Home Points

- No clear end to drought - could last well into 2012.
- Conditions will likely get worse before seeing improvement.
- Scattered rains will continue winter in to early spring but not heavy enough to significantly change the drought.
- Intense droughts are hard to break.
- La Niña will cause drier than normal weather this winter into spring.

Water Right Calls in 2011

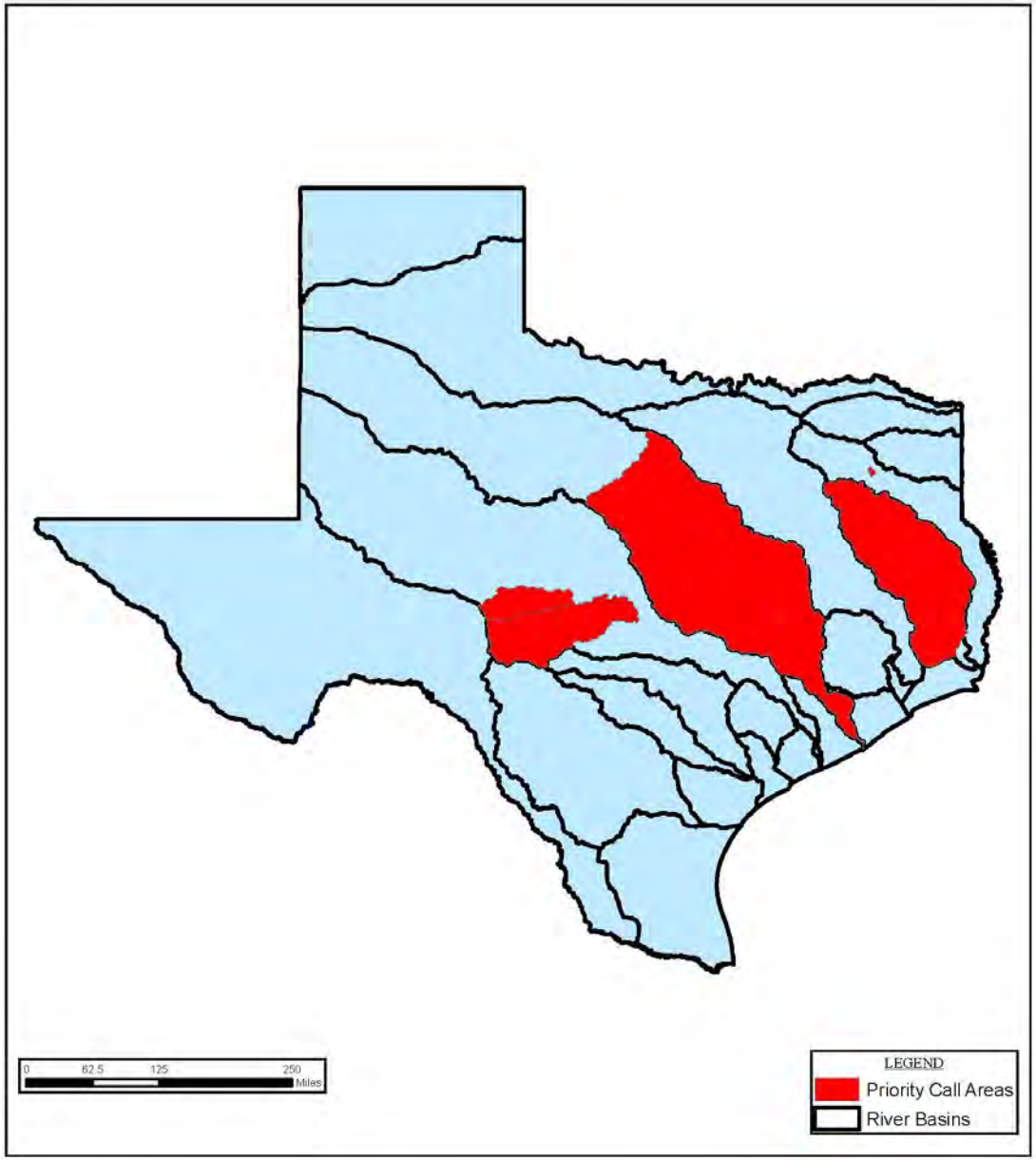
TCEQ's Role in a Drought

- Consults with water suppliers
- Monitors public system use restrictions
- Tracks water rights and streamflow
- Implements priority calls to protect senior water rights
- Monitors surface water flows
- Operates drought hotline: **800-447-2827**
- Maintains drought web page
- Provides news releases in areas where water rights have been curtailed
- Coordinates with other agencies and public

Water Right Calls in 2011

- Calls are made by senior water rights
- TCEQ staff examines validity of call
- Calls in 2011 in:
  - Colorado Basin
    - San Saba River Watershed
    - Llano River Watershed
  - Brazos Basin
    - Basin below Possum Kingdom Lake
  - Neches Basin
    - All of basin above Salt Water Barrier
  - Sabine Basin
    - Little Sandy Creek Watershed

Water Right Calls in 2011



Responses to Drought – What to Think About

- Contracts and water rights
- Drought contingency plan
- Coordination
  - Supplier
  - Customer
  - Regulatory agency
  - Governing bodies
- Supply and demand
- Reactions of others
- Lake levels and intake elevations

Responses to Drought – What to Think About

- Transmission system restrictions
- Increased channel losses
- Impacts on water demand
- Impacts on water quality
- Available drought response measures
- Financial impacts
- Public response and public information

Responses to Drought – What to Do

Review

- Water right permit(s)
- Groundwater permits
- Contracts with suppliers and customers
- Drought contingency plan
- Conservation plan

Responses to Drought – What to Do

Communicate

- Brainstorm on drought situation and response
- Meet with water suppliers
- Meet with major customers
- Communicate with your governing body
- Communicate with the public

Responses to Drought – What to Do

Analyze

- Water availability
- Water quality
- Lake levels
- Contingency plans
- Trigger points
- Additional measures

Responses to Drought – What to Do

Implement

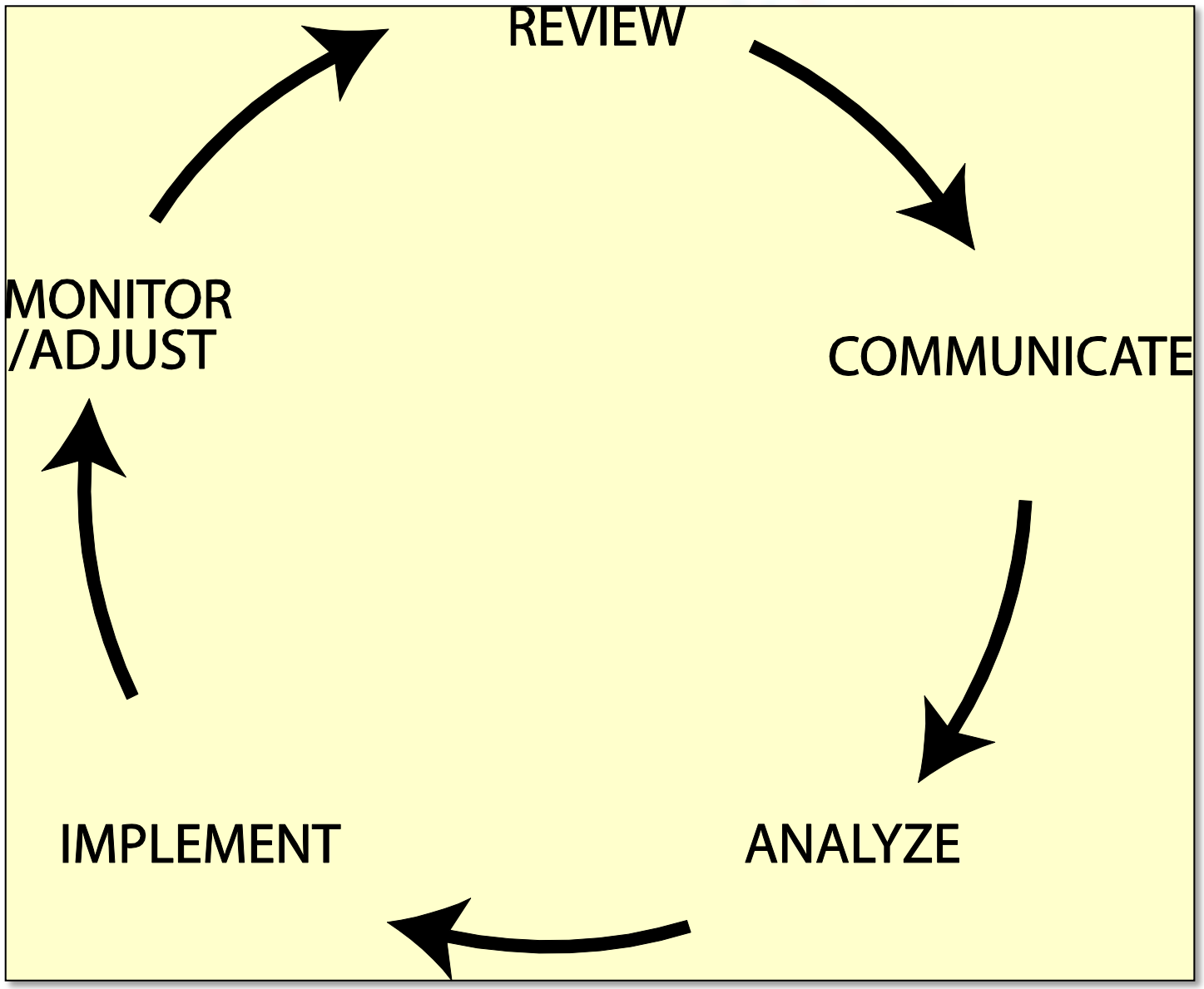
- Develop additional measures, if needed
  - New supplies are complex
  - Time is of the essence
  - Permitting is often **the** prime consideration for emergency supplies
  - Political assistance can be essential
  - Drought can accelerate the process

Responses to Drought – What to Do

Monitor

- Water use
- Implementation of drought responses
- Supplies
- Public reaction
- Political reaction
- Regulatory decisions
- Development of new supplies

Responses to Drought – What to Do



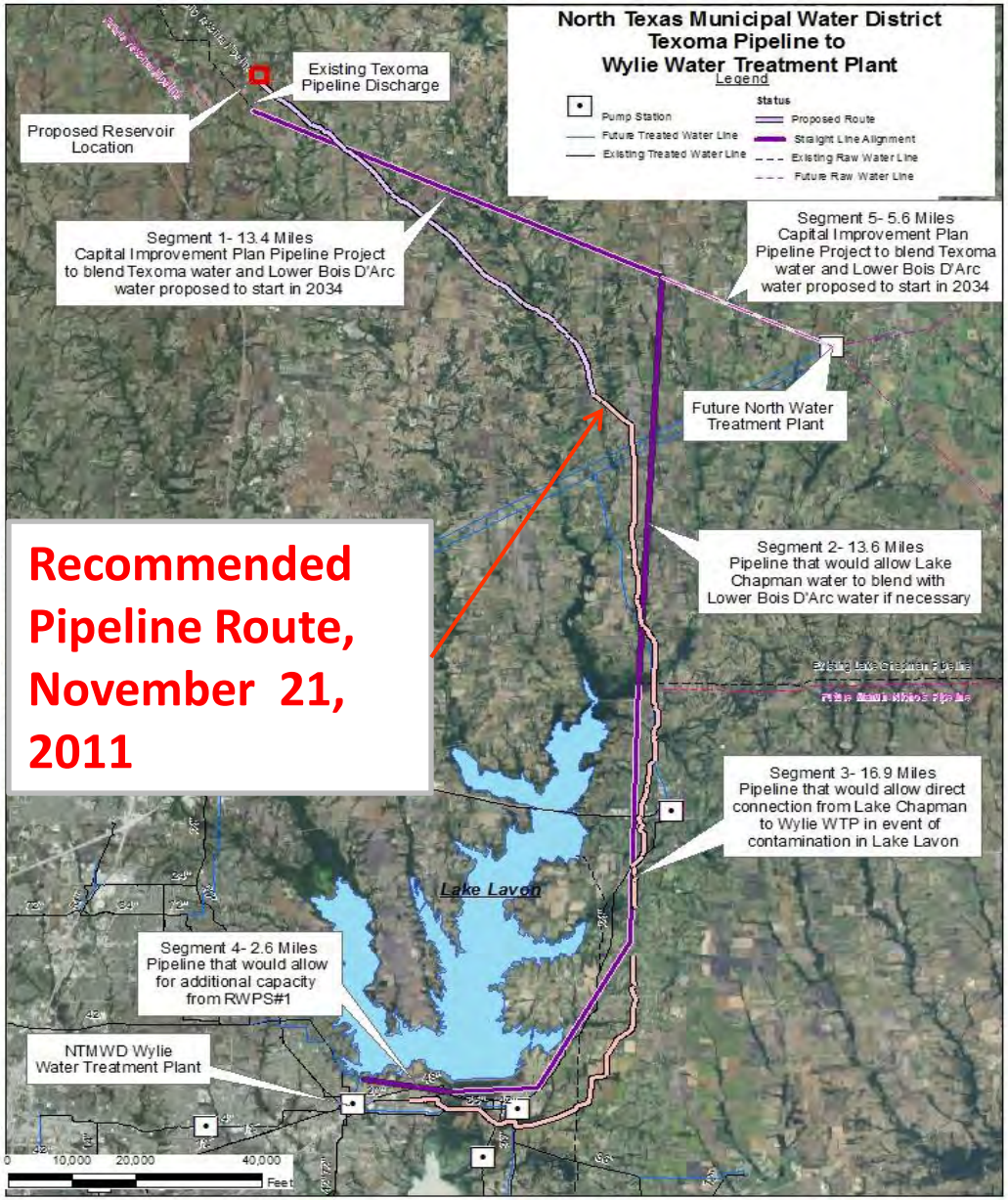
Responses to Drought – North Texas MWD

- Supply 1.5 million people in North Texas
- Multiple sources (Lake Lavon, Lake Texoma, Chapman Lake, Reuse)
- Lost supply from Lake Texoma
  - ¼ of supply
  - Cannot pump because of Zebra Mussel infestation
- Drought of 2011
  - Lake Chapman supply at 9%
  - Lake Lavon supply at 53%
  - Lake Level concerns

Responses to Drought – North Texas MWD

- Implement Drought Contingency Plan
- Purchase up to 60 mgd from Dallas
- Monthly meetings with customers
- Begin studies for a pipeline - Lake Texoma to Wylie
  - Phased approach
  - Can be built in 20 months
  - Reestablishes Lake Texoma supply
- Accelerate pipeline from main stem Trinity
- Pursue restoration of Lake Texoma pumping with USACE
- Monitor Lake Lavon elevations

Responses to Drought – North Texas MWD



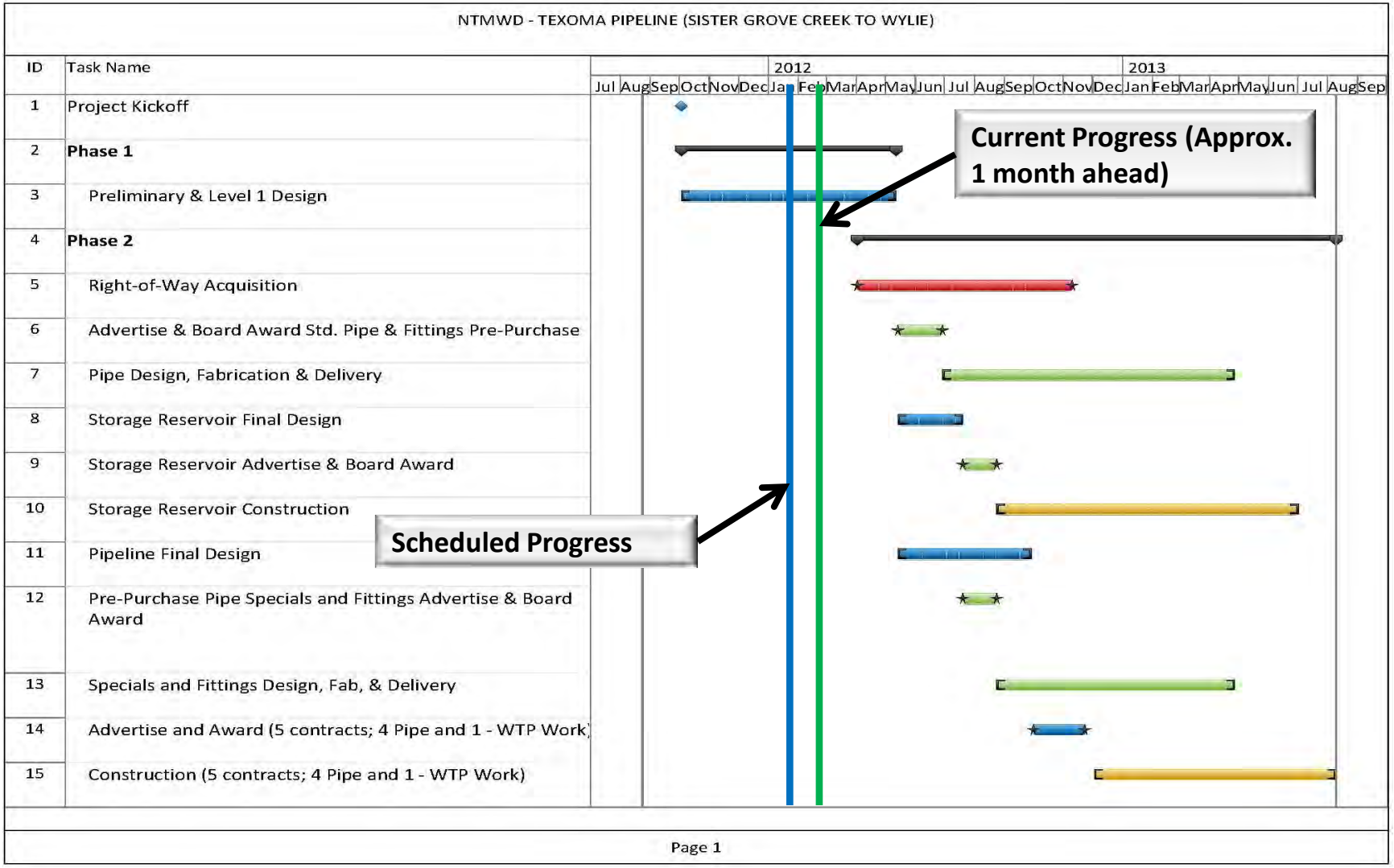
Responses to Drought – North Texas MWD

Key Project Milestones to Date

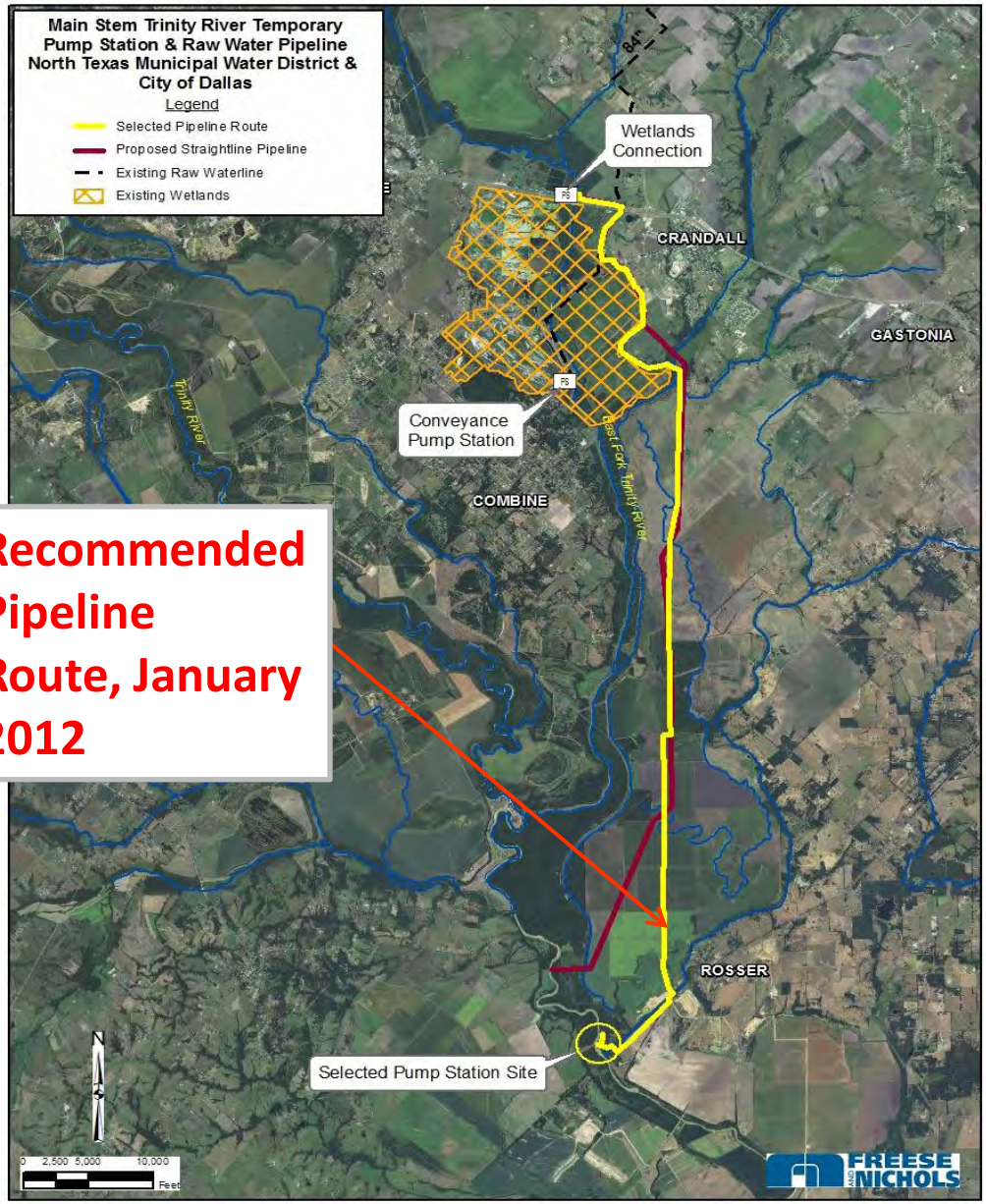
- Over 20 alternate pipeline alignments evaluated (48 miles)
- Right of entry from over 300 landowners
- Option contract on reservoir site
- Aerial Survey completed
- Property boundary survey complete
- Concept to connect to Wylie WTP developed
- Bi-weekly status meetings
- Construction Manager at Risk (CMAR) selected

Responses to Drought – North Texas MWD

Overall Schedule



Responses to Drought – North Texas MWD



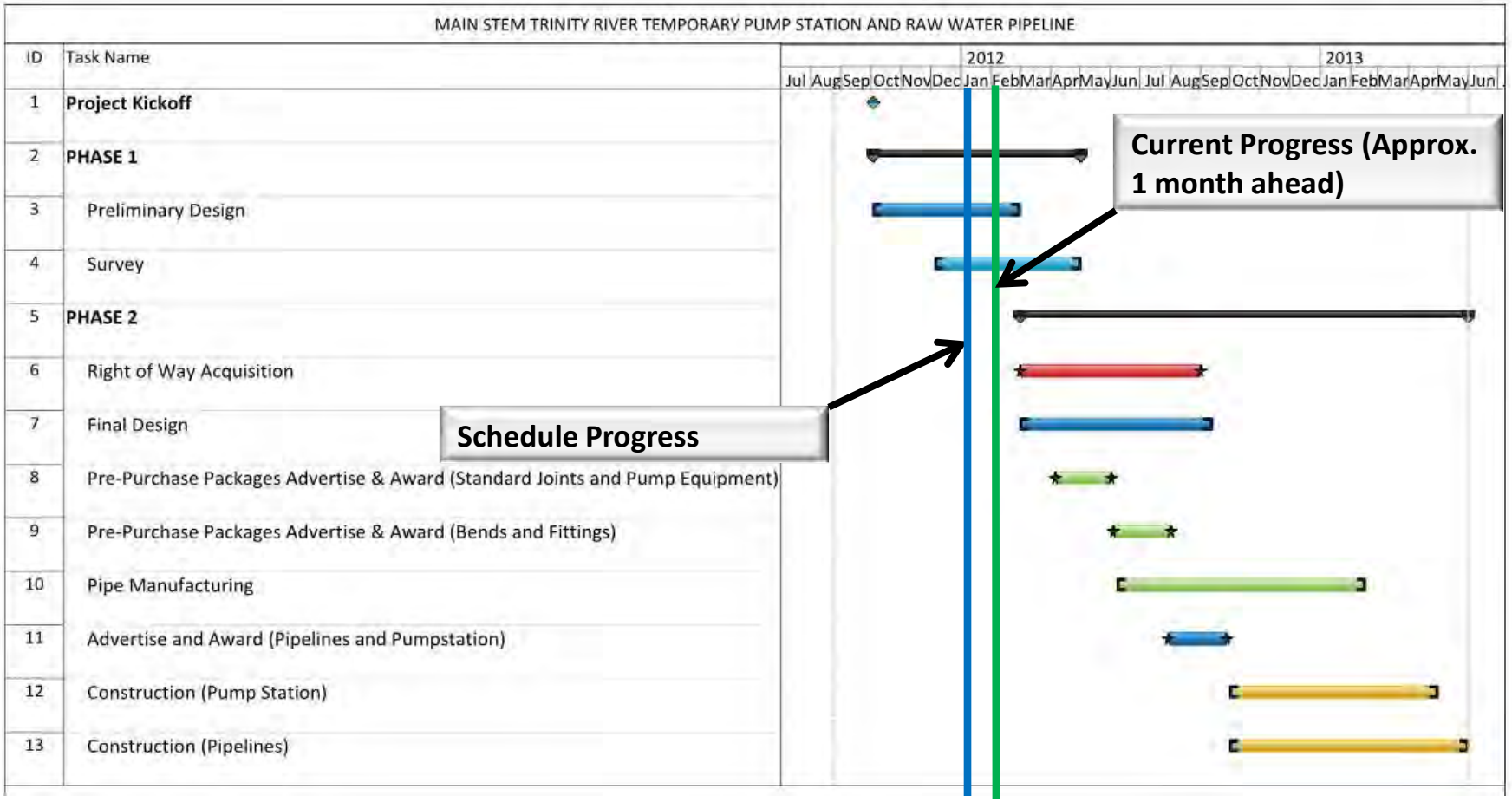
Responses to Drought – North Texas MWD

Key Project Milestones to Date

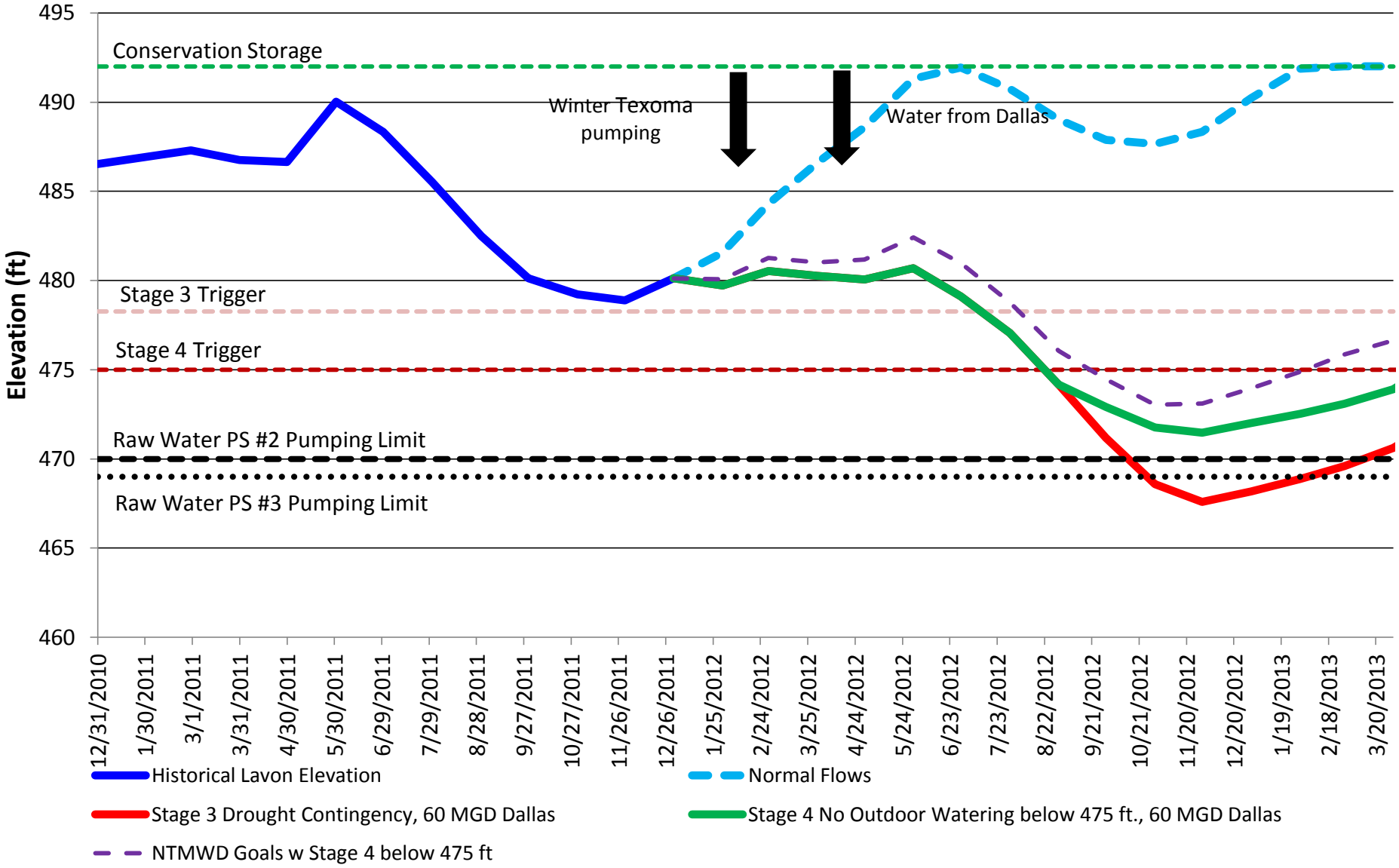
- Evaluated 13 alignments
- Evaluated and surveyed 3 pump station sites (bathymetric)
- Aerial and LIDAR flight surveys
- Bi-weekly status meetings
- Construction Manager at Risk (CMAR) selected

Responses to Drought – North Texas MWD

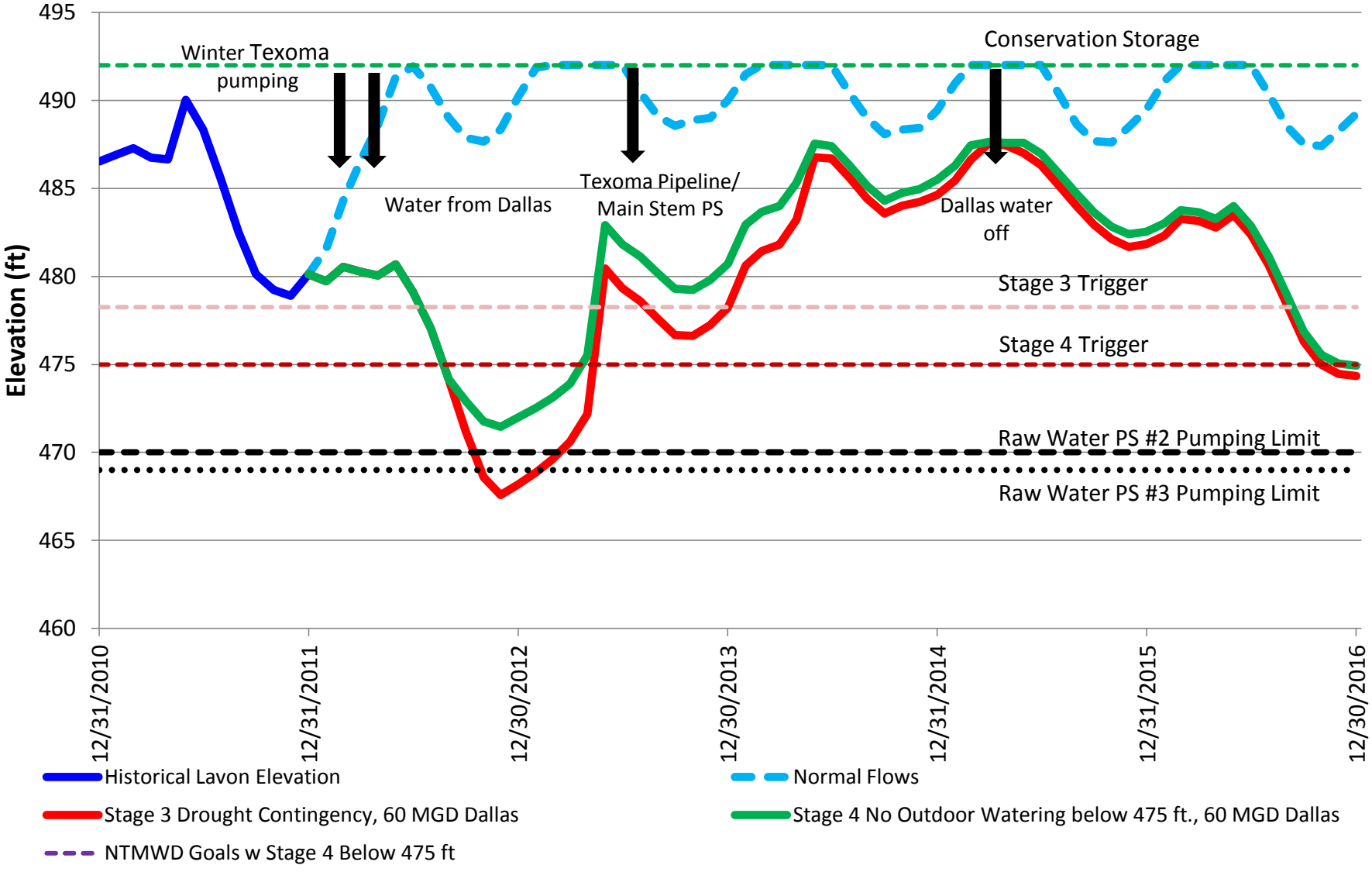
Overall Schedule



Lake Lavon Elevations - Worst 15-Month Inflows (1/56 - 3/57)
60 MGD from Dallas

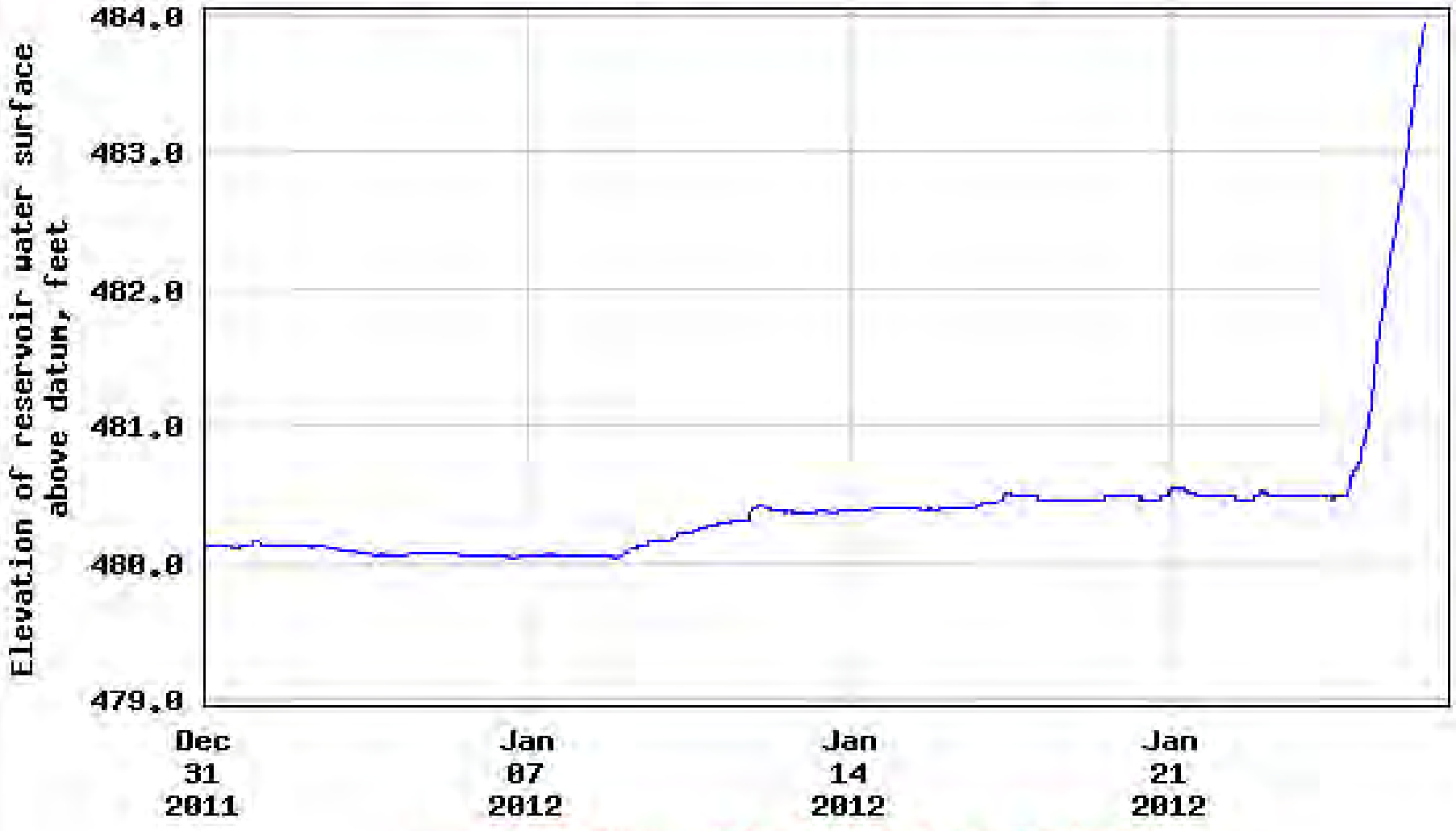


Lake Lavon Elevations - Five More Years of Drought
60 MGD from Dallas – Texoma and Main Stem in July 2013



USGS

USGS 08060500 Lavon Lk nr Lavon, TX



Responses to Drought – North Texas MWD

- Lake level below elevation 470 - Raw Water Pump Stations 2 and 3 cannot pump (lose 92% of pumping capacity)
- With Stage 4 (no outdoor watering) don't reach 470 this year, even if flows are extremely low
- Without Stage 4, could reach during October 2012 with extremely low flows
- Studying emergency pumping options
  - Requires temporary pumps and pipeline
  - Costs $15 million to $21 million
  - With pump purchase in March, can be done in October
  - Requires some funds committed in March

Colorado River Municipal Water District

Big Spring - Odessa - Snyder

SYSTEM MAP

MEMBER CITIES

BIG SPRING

ODESSA

SNYDER

MUNICIPAL CUSTOMERS

ABILENE

GRANDFALLS

MIDLAND

MILLERVIEW-DOOLE WSC

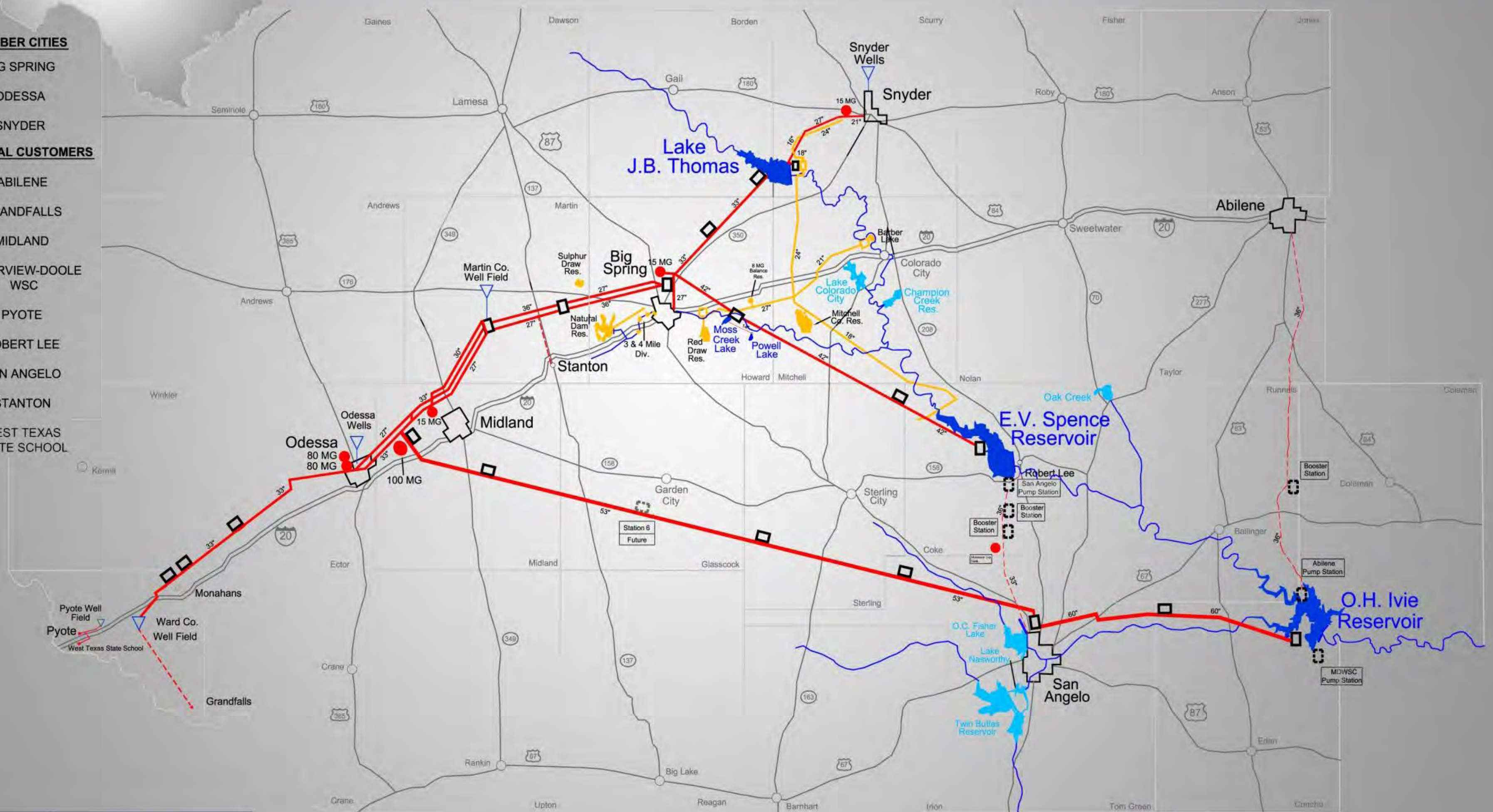
PYOTE

ROBERT LEE

SAN ANGELO

STANTON

WEST TEXAS STATE SCHOOL



Raw Water

Pump Station

Diverted Water

Pump Station

System Storage

Others

District Reservoir

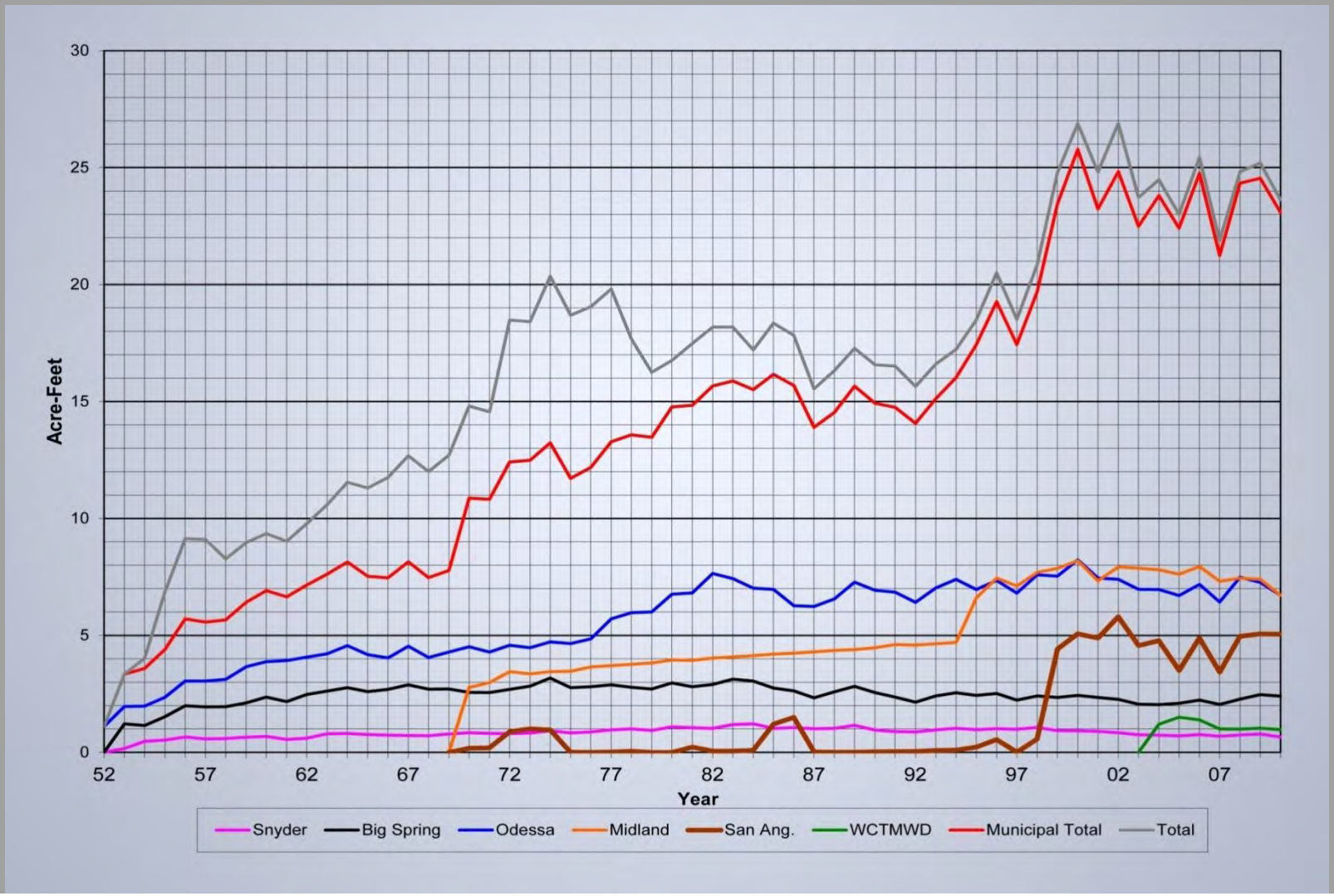
Evaporation Res.

Non - District Res.

WARD COUNTY **Pipeline** CONNECTION

Responses to Drought – Colorado River MWD

Water Use – 1952 through 2010



Responses to Drought – Colorado River MWD

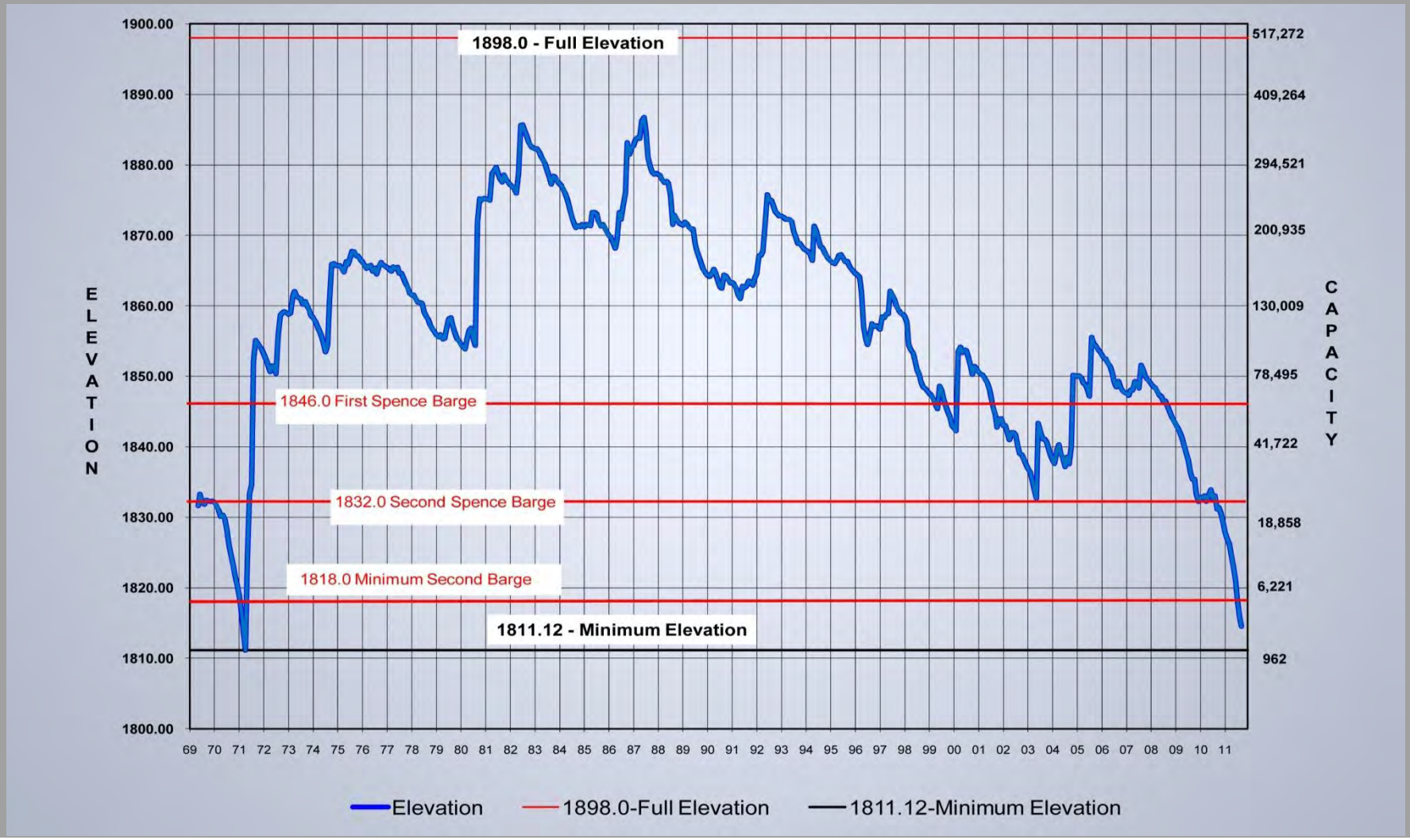
E.V. Spence Reservoir Levels

FULL

Current Level

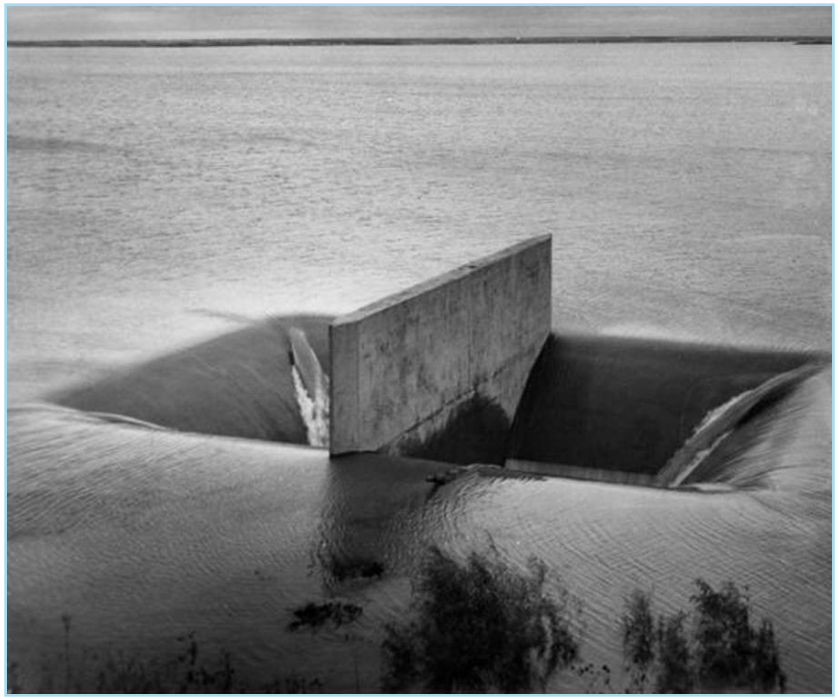
Responses to Drought – Colorado River MWD

E. V. Spence Elevation May 1969 – September 2011



Responses to Drought – Colorado River MWD

J.B. Thomas Reservoir Levels

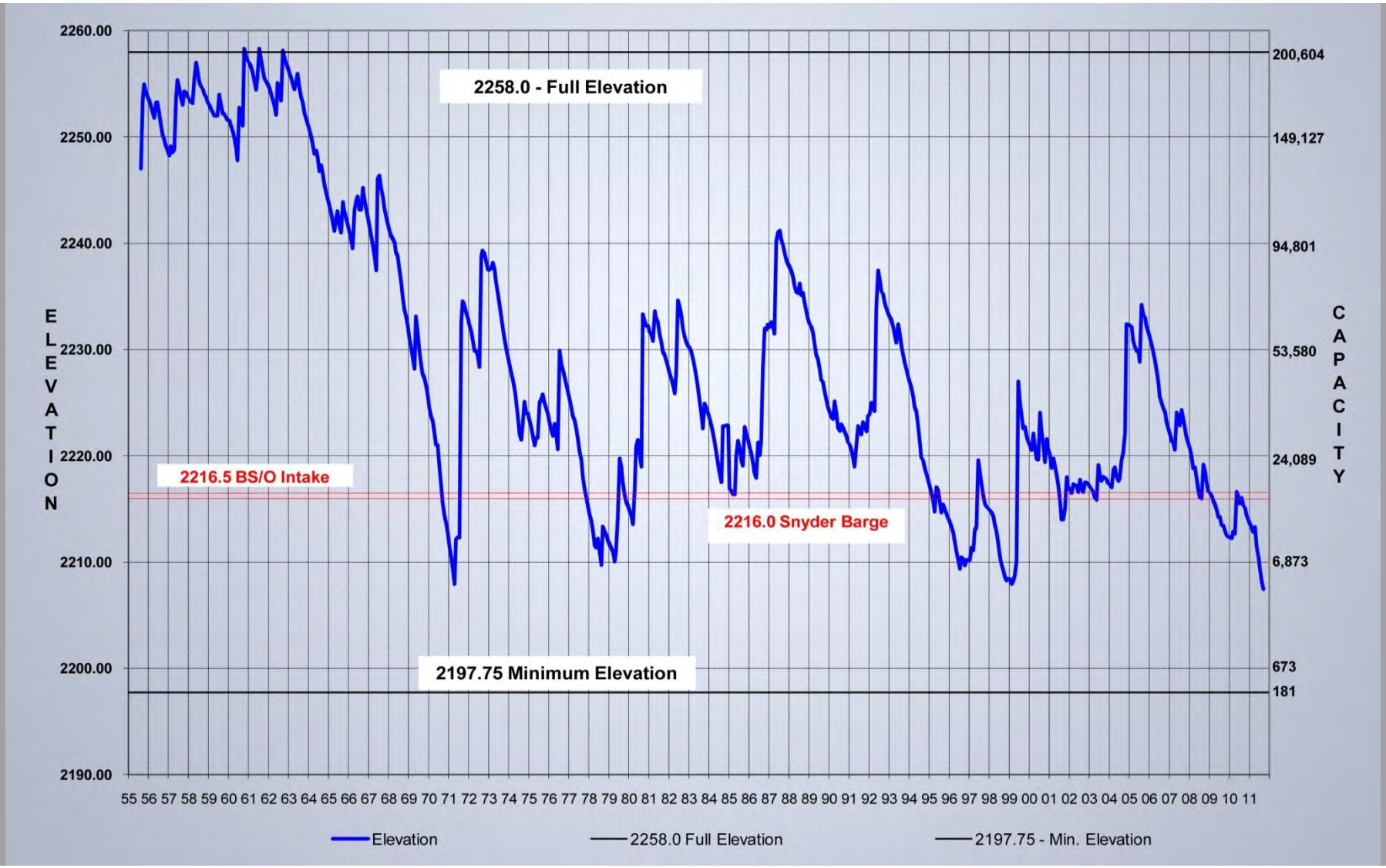


FULL

Current Level

Responses to Drought – Colorado River MWD

J.B. Thomas Elevation August 1955 – September 2011



Responses to Drought – Colorado River MWD

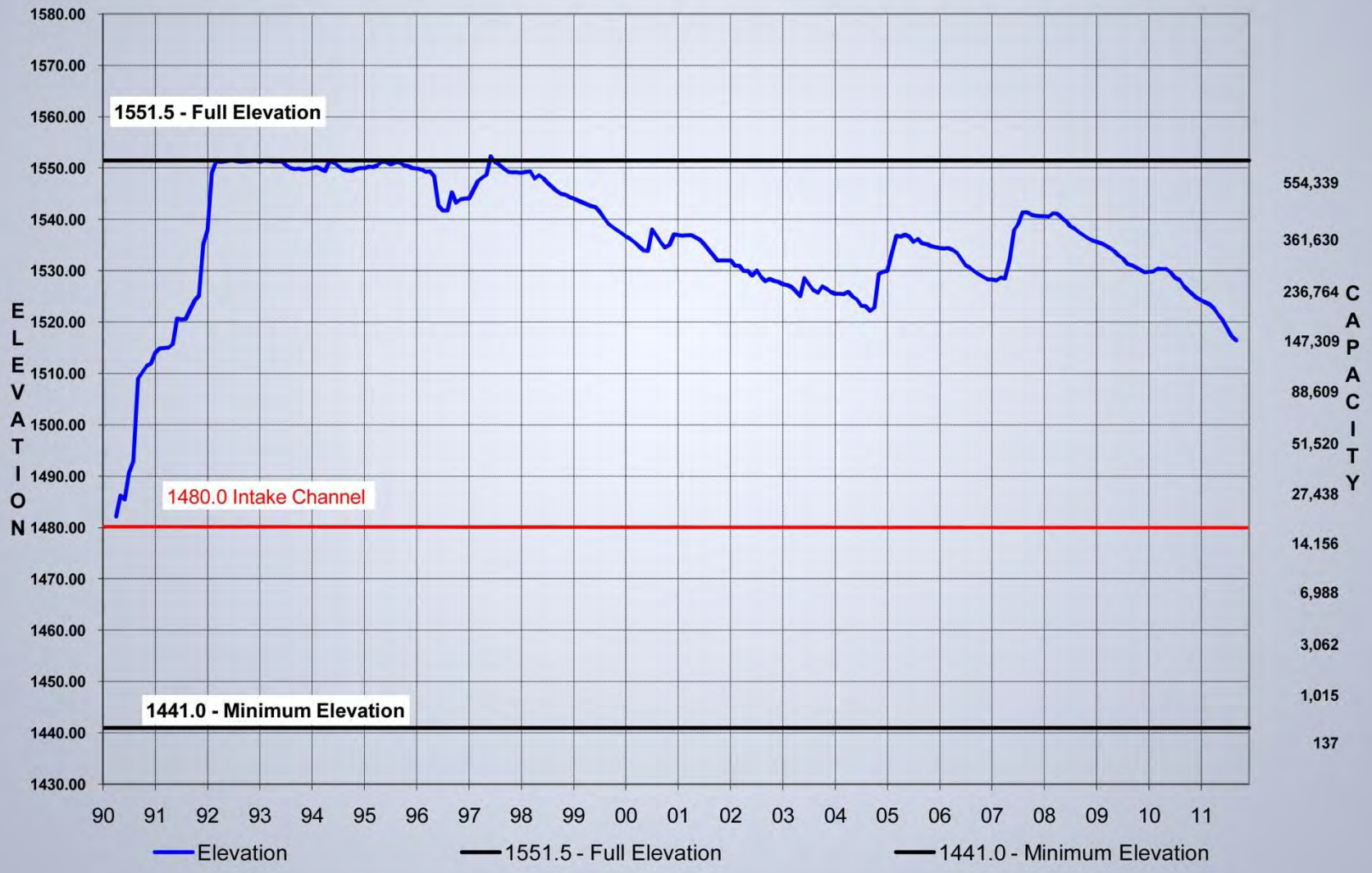
O.H. Ivie Reservoir Levels

NEAR FULL

Current Level

Responses to Drought – Colorado River MWD

O.H. Ivie Reservoir Elevation April 1990 – September 2011

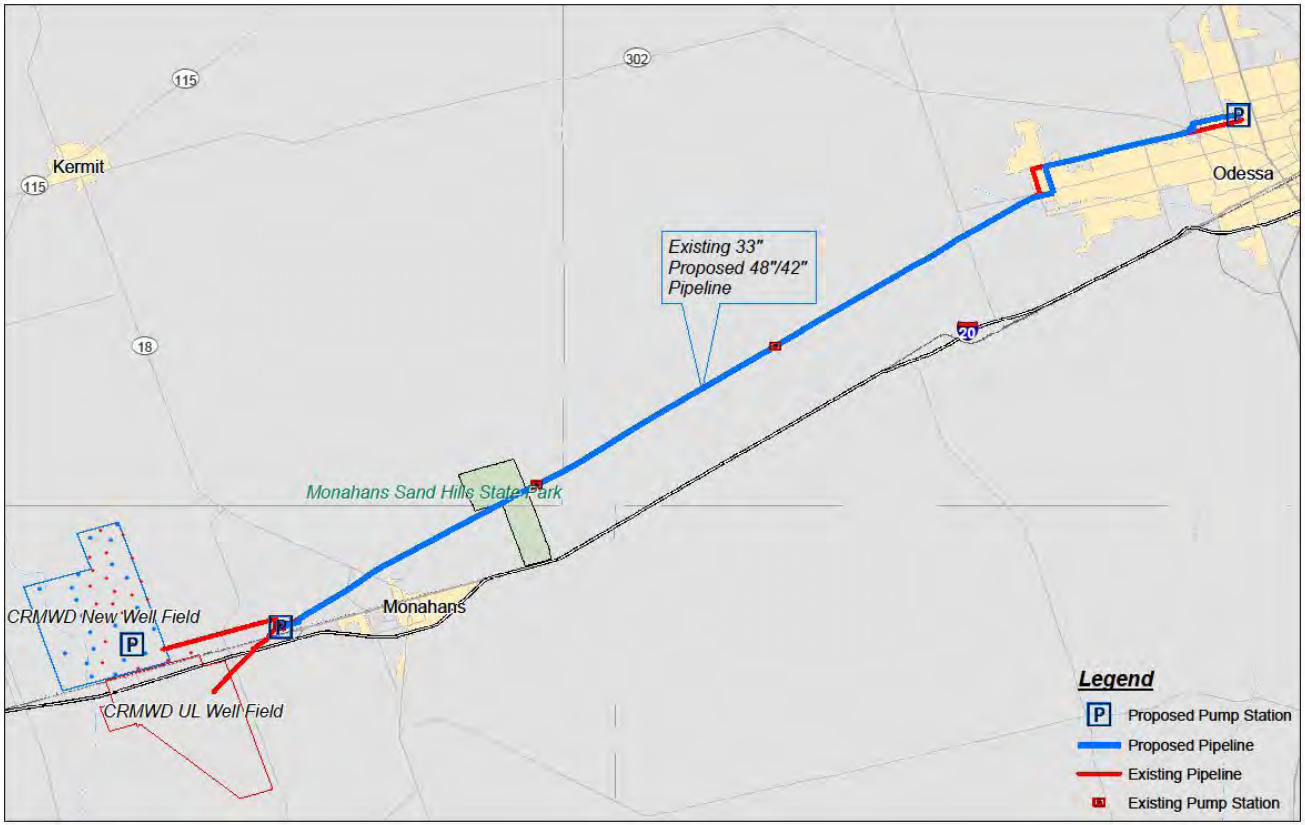


Responses to Drought – Colorado River MWD

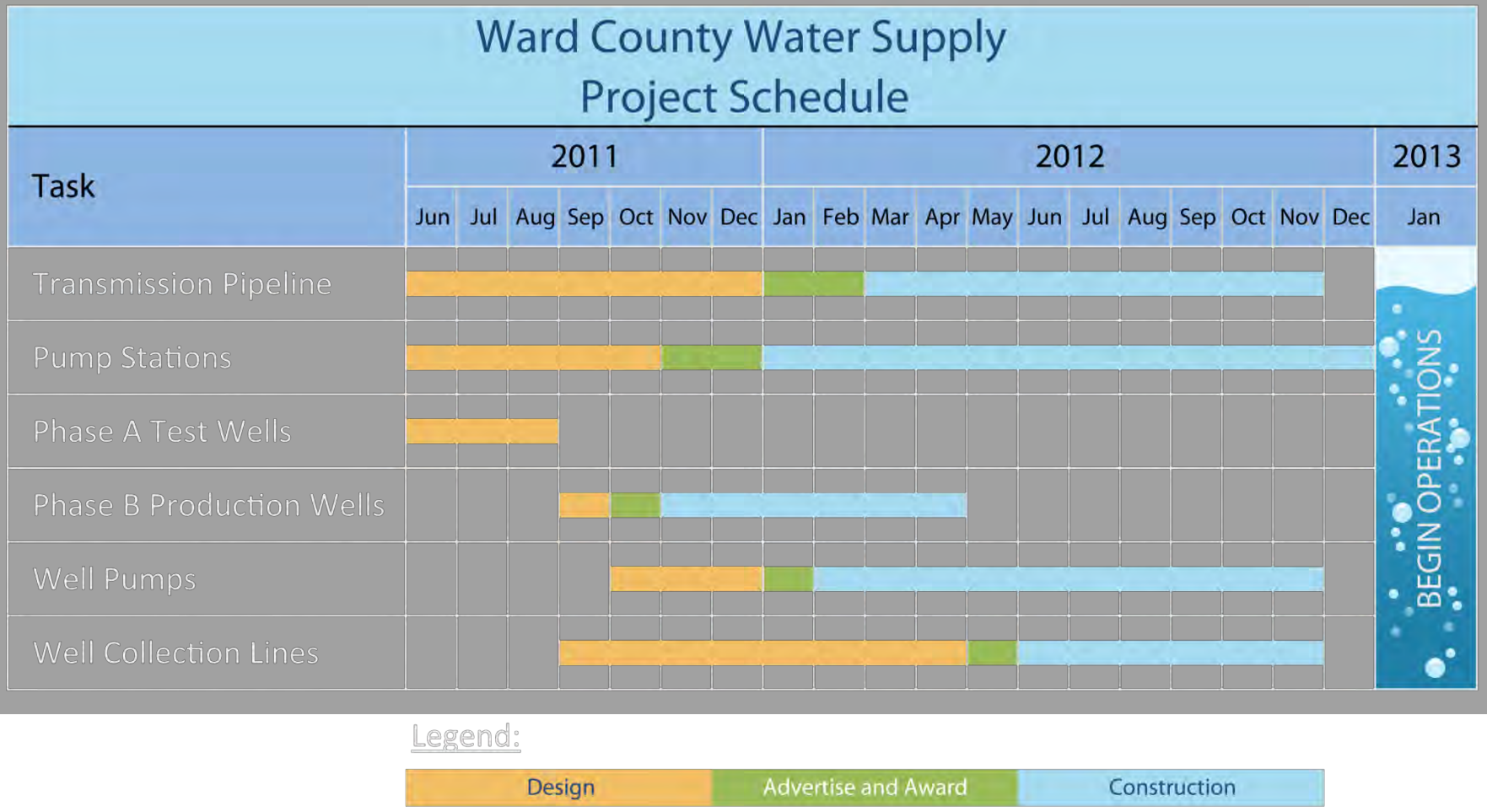
Low Lake Levels CRMWD

Responses to Drought – Colorado River MWD

Ward County Pipeline



Responses to Drought – Colorado River MWD



Responses to Drought – Colorado River MWD

• Well Field Purchase	$50 million
• Transmission Pipeline	$69.2 million
• Transmission Pump Station	$13 million
• Well Field Booster Pump Station	$6.6 million
• Odessa Booster Pump Station	$6 million
• Big Spring Booster Pump Station	$1.5 million
• Wells	$12.6 million
• Well Field Collection Pipelines	$11.9 million
• Existing Pipe Cathodic Protection	$2.2 million
• Engr, Survey, Land, Financing	$16 million
Project Total	**$189 million**

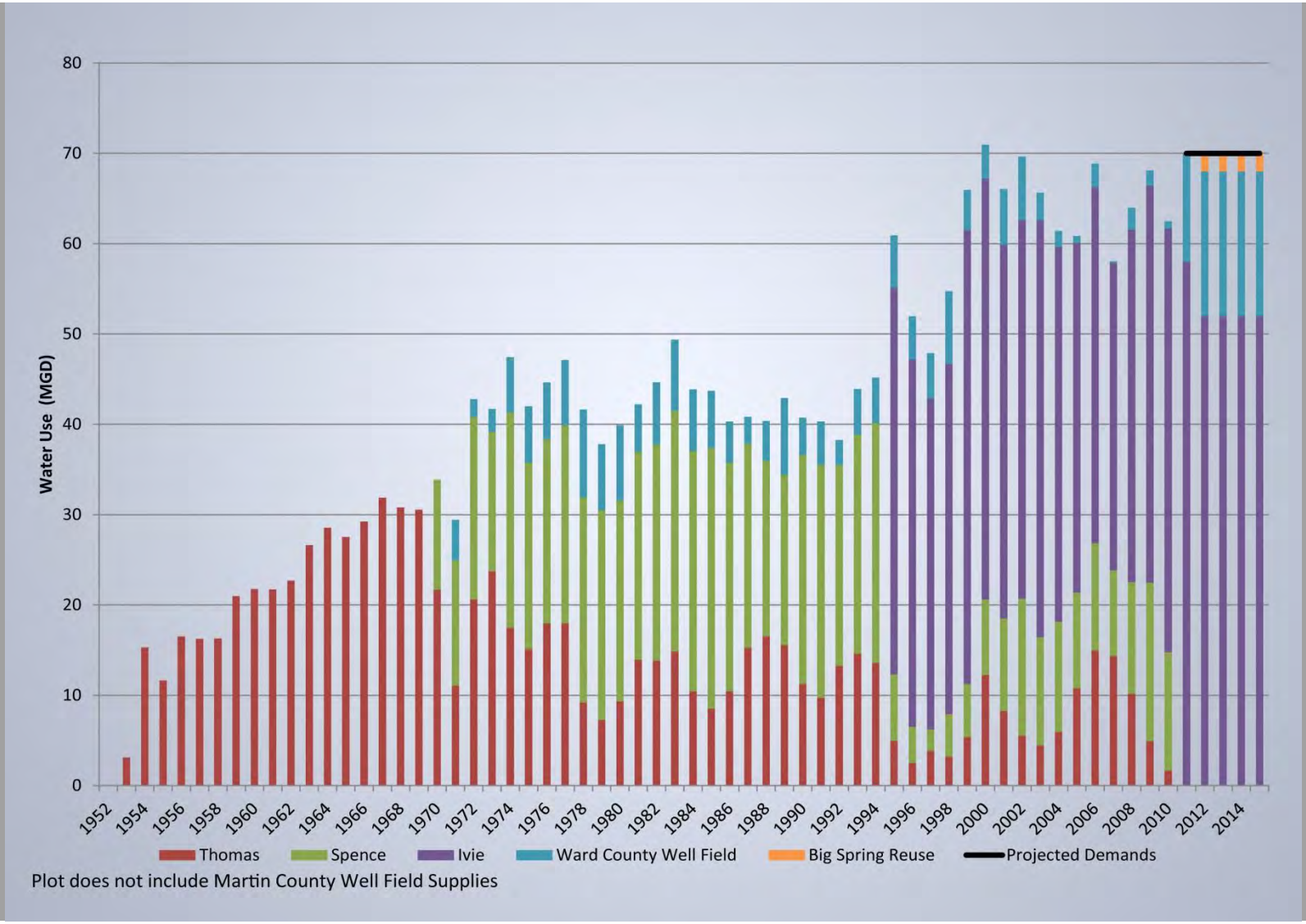
Responses to Drought – Colorado River MWD

CRMWD Reclamation Project

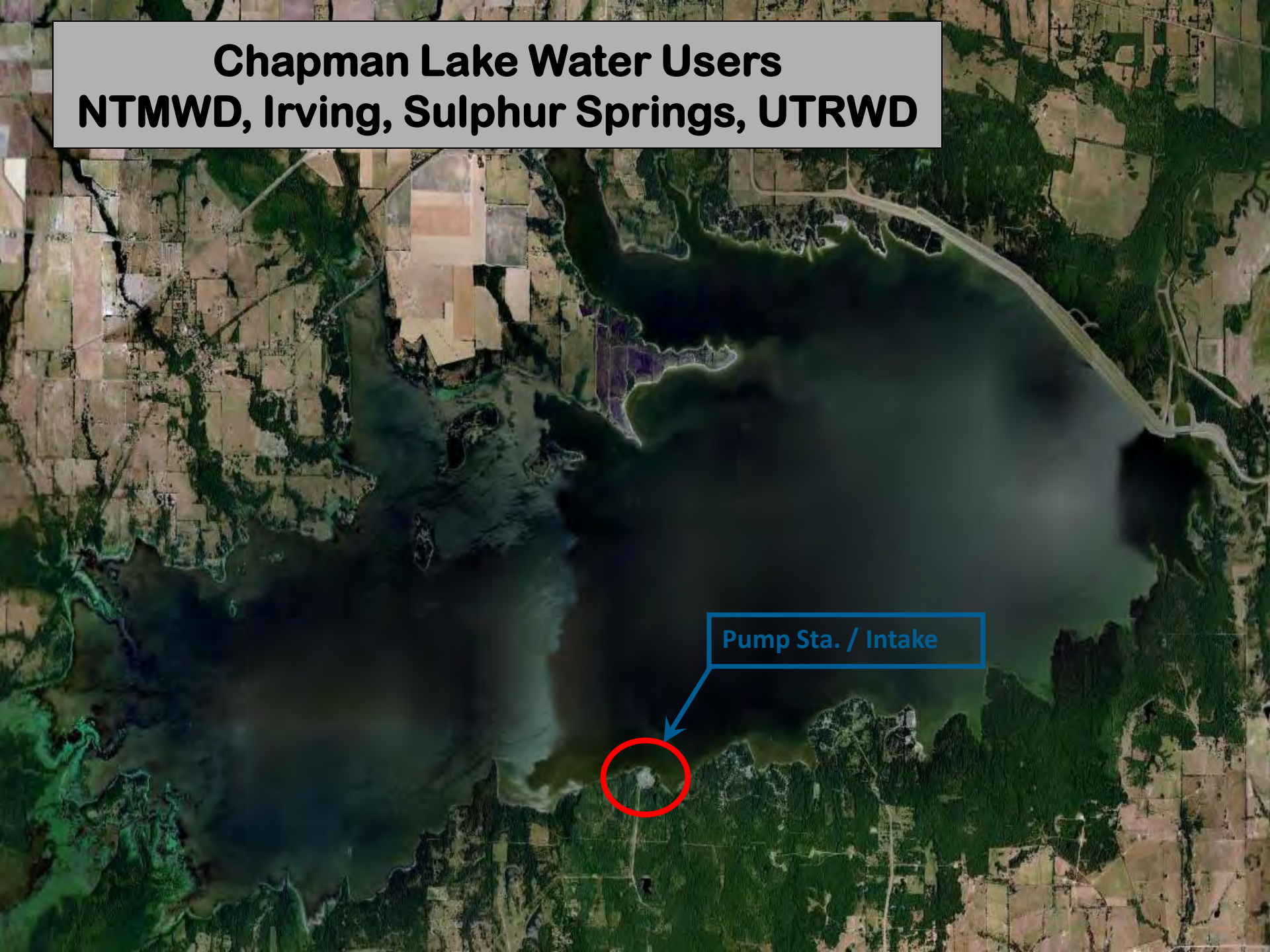
- Started in March 2005
- Projected completion August 2012
- First potable reuse facility directly blending reclaimed water into a raw water delivery system

Responses to Drought – Colorado River MWD

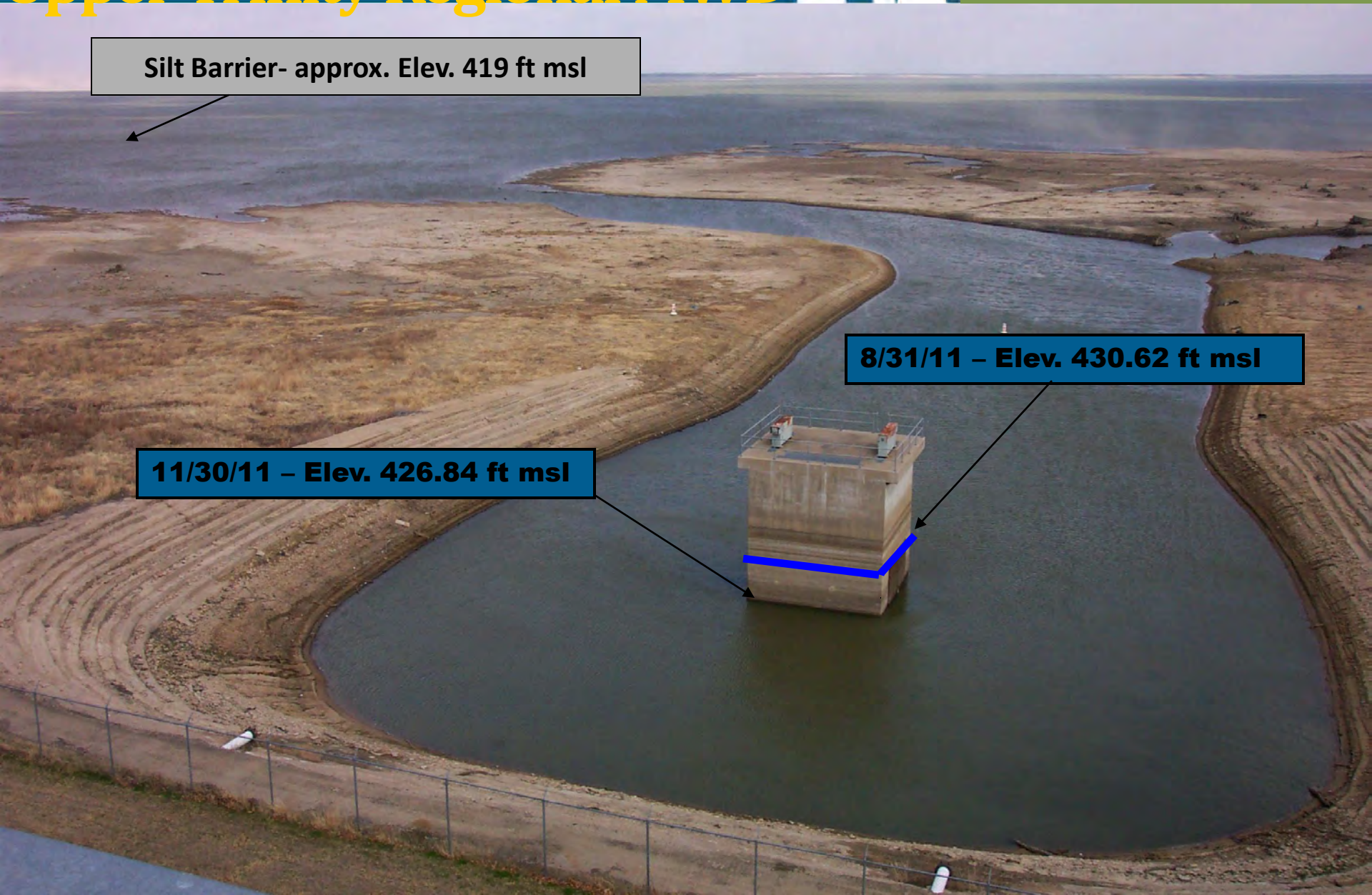
CRMWD Water Use by Source



Chapman Lake Water Users
NTMWD, Irving, Sulphur Springs, UTRWD



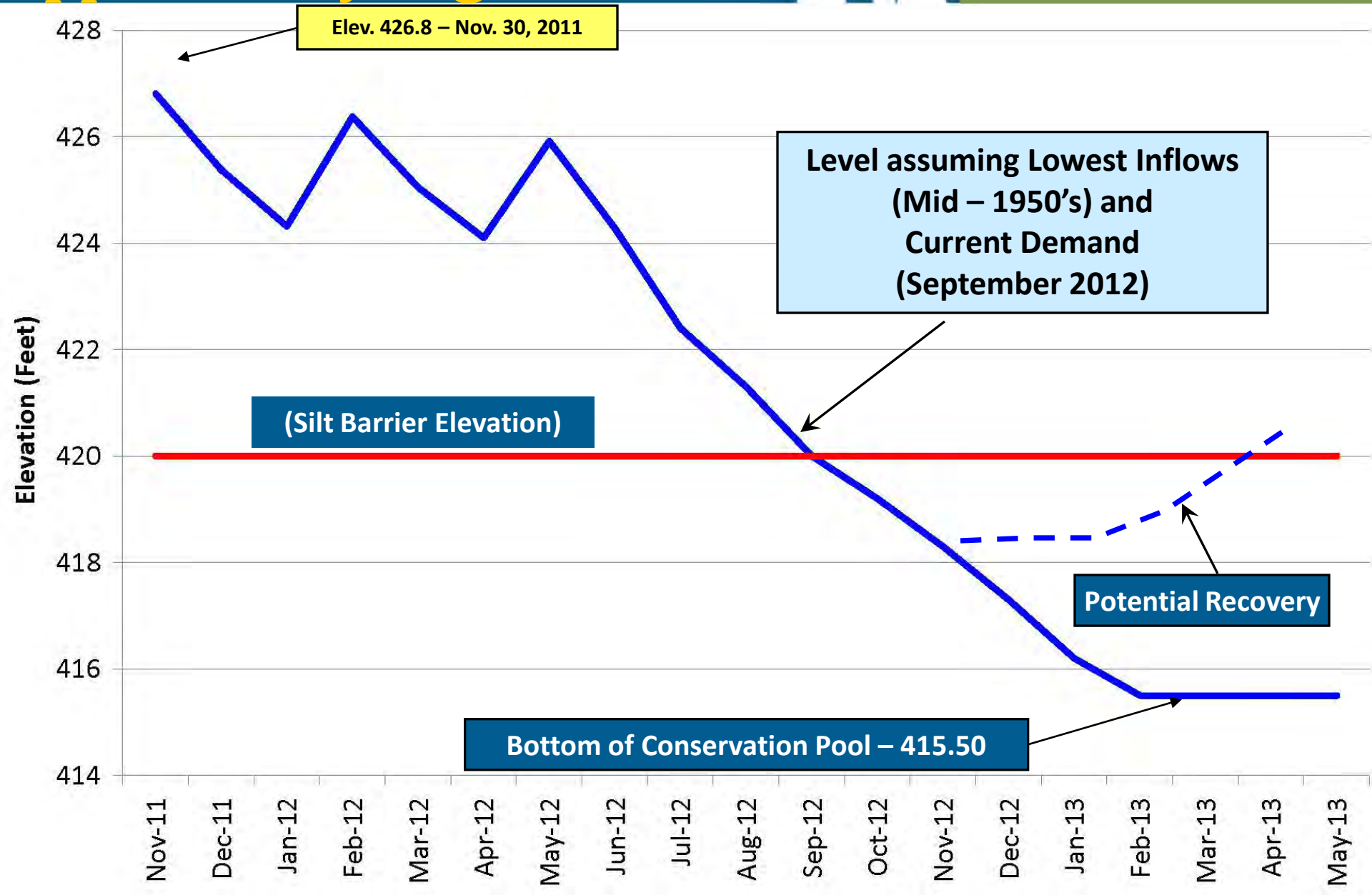
Responses to Drought – Upper Trinity Regional MWD



Responses to Drought – Upper Trinity Regional MWD

- Develop interim strategy to allow water users full access to conservation pool
- Predict lake level considering various weather scenarios and estimated future withdrawals
- Develop pumping alternatives to secure the water from behind the silt barrier
- Identify permitting requirements
- Develop cost estimates and action plan timetables
- Prepare study and brief participants

Responses to Drought – Upper Trinity Regional MWD



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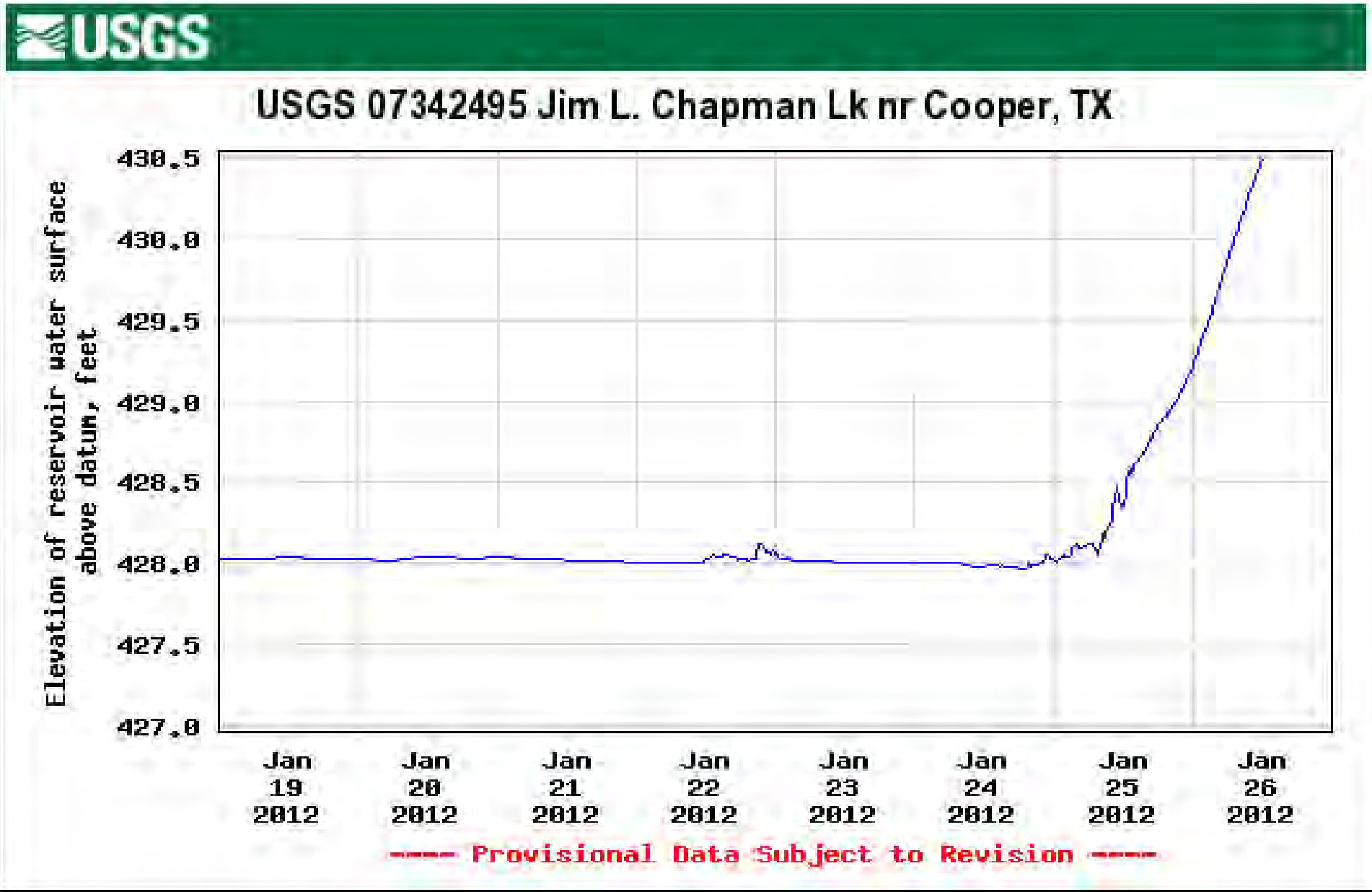
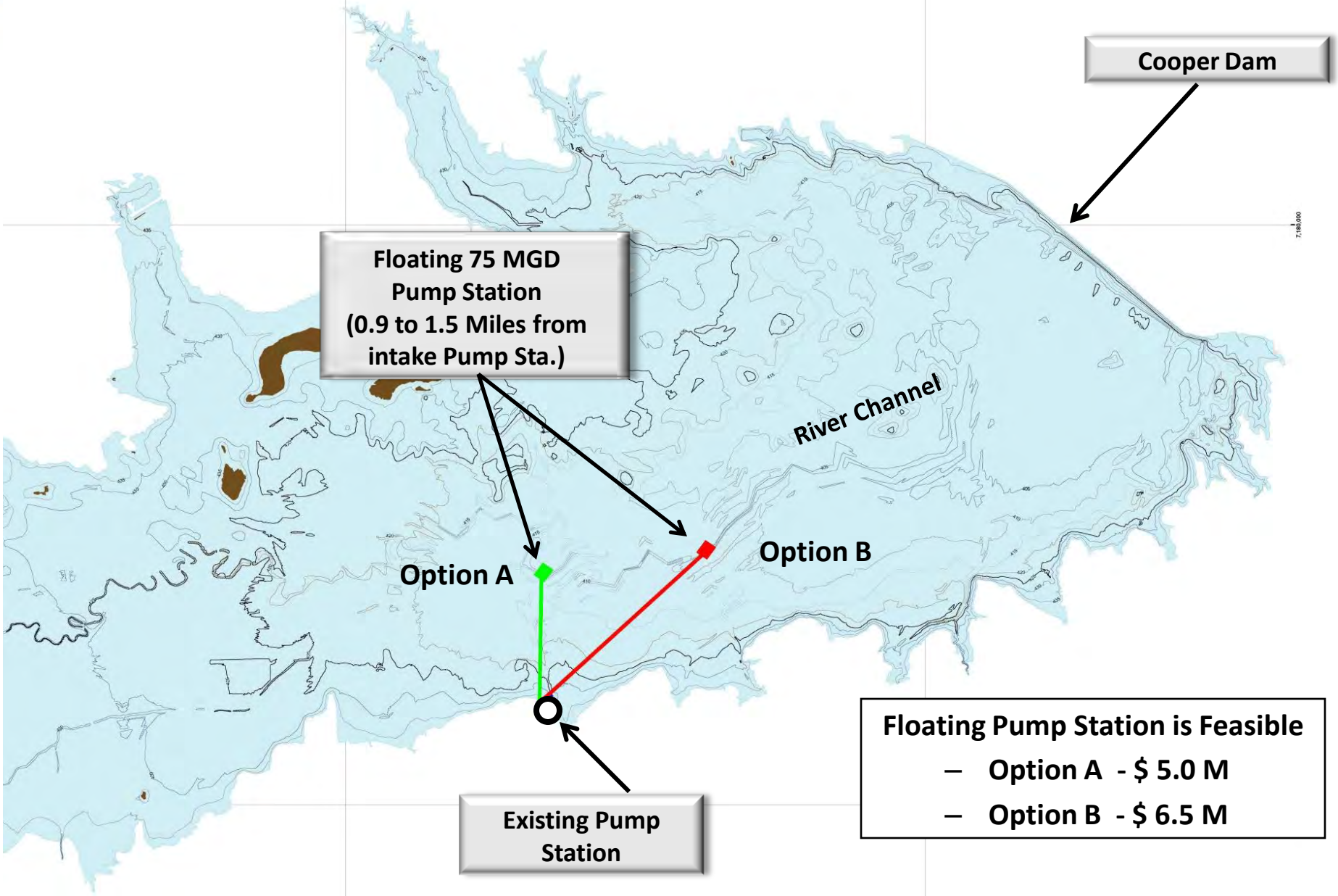


Responses to Drought – Upper Trinity Regional MWD

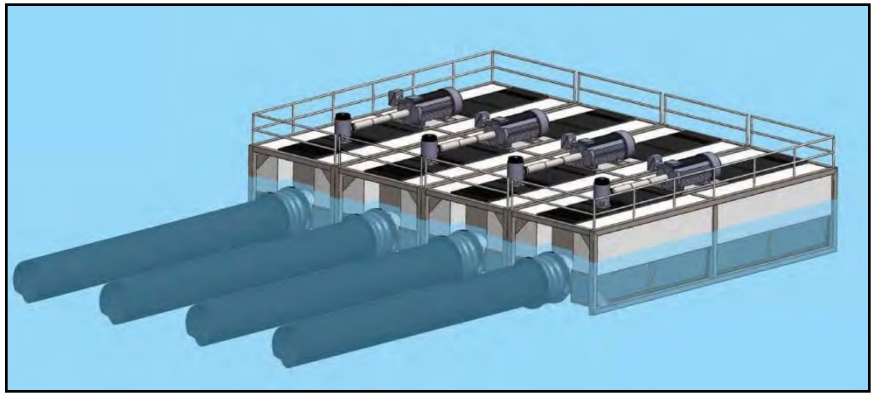


Floating Pump Station is Feasible

- Option A - $ 5.0 M
- Option B - $ 6.5 M

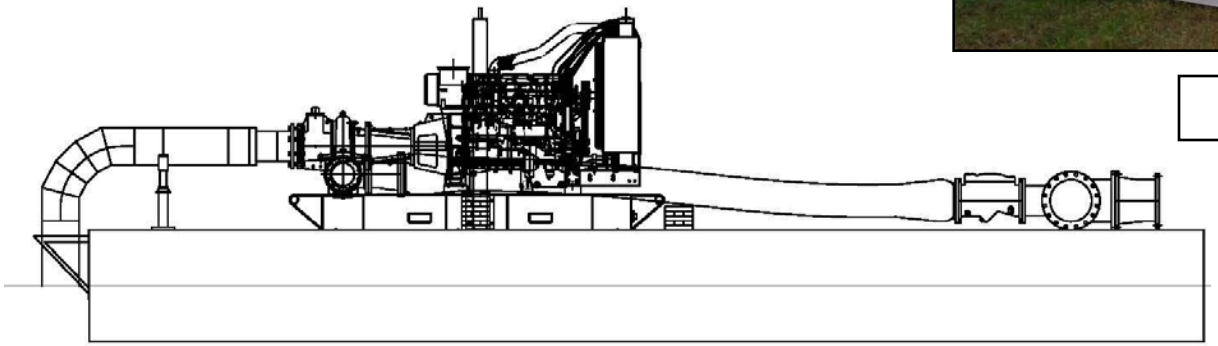
Responses to Drought – Upper Trinity Regional MWD

Multiple Pump Options



Horizontal Pumps

Vertical Pumps



Temporary Pumping System
(Lake Thomas – near Snyder, Texas)

Responses to Drought – Upper Trinity Regional MWD

- Modeled various demand and inflow conditions
- Floating pump station is preferred option
- Pump station location to be determined
  - Lake survey data needed
  - Access to sediment pool water
- Temporary pump station to be authorized as an amendment to existing USACE easement
- Rental or used pumps reduce estimated project cost
- Competitive Sealed Proposals for construction contracts should be considered to expedite construction

Responses to Drought – Upper Trinity Regional MWD

Path Forward

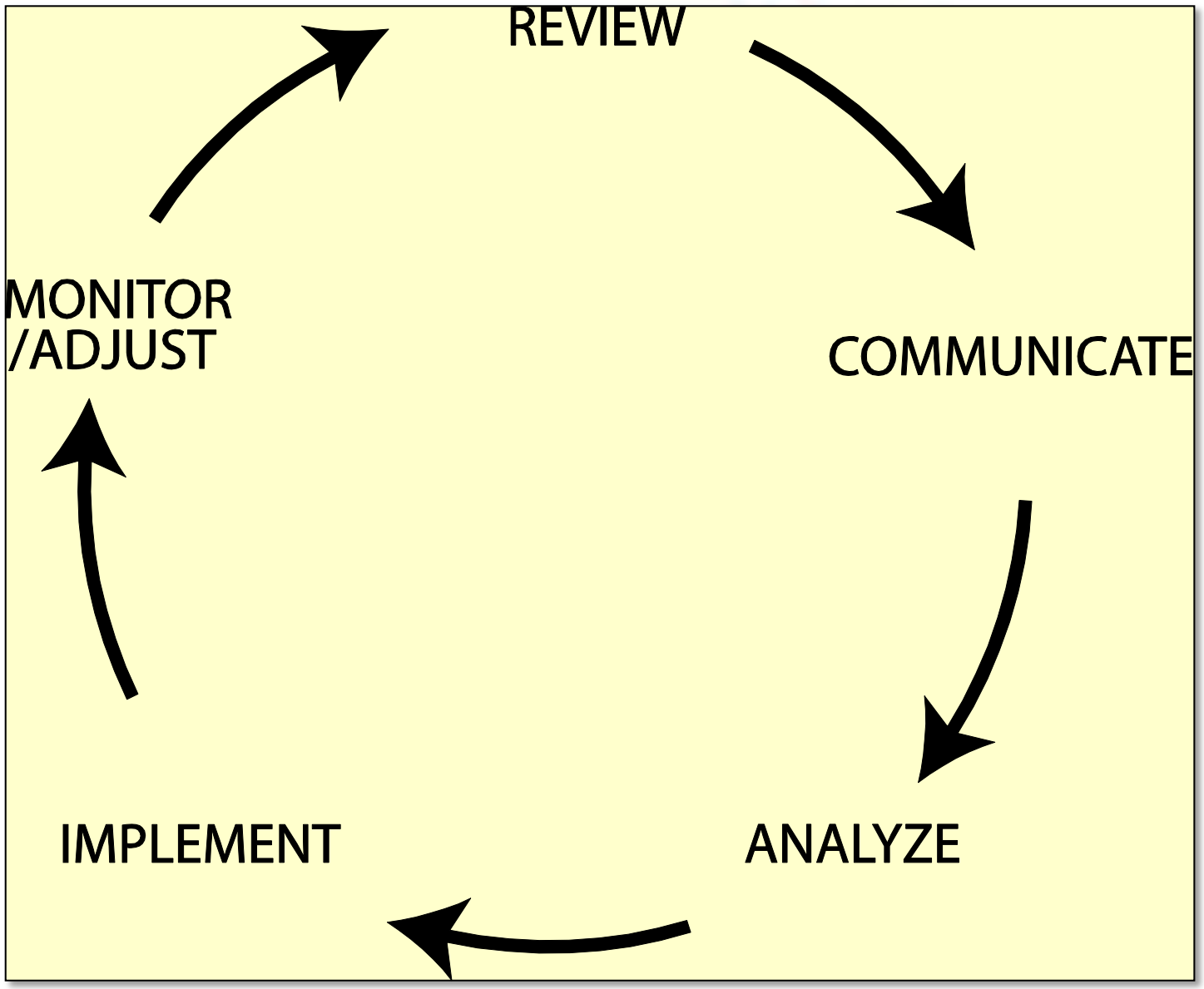
- Accept Feasibility Study
- Hire engineer
- Commit to participation by Dec. 7th
- NTMWD Board to authorize next contract: Dec 19th
- Submit Permit Request to USACE by mid Jan. 2012
- Monitor lake level to assist in project implementation decisions
- Final Design development: Feb - Apr 2012
- Contract Award: Apr/May 2012
- Start Up: Sep/Oct 2012

UPPER TRINITY
REGIONAL WATER DISTRICT

Key Points

- 2011 was the driest year we have had
- Drought may continue into 2012
- Response to drought should be:
  - Organized
  - Energetic
  - Timely
- Communication is a key in drought response

Responses to Drought – What to Do



Discussion

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