



NORTH
TEXAS
MUNICIPAL
WATER
DISTRICT

Regional Service Through Unity... Meeting our Region's Needs Today and Tomorrow



Leonard Water Treatment Plant

WATER COMMITTEE MEETING

February 24, 2021 (Via Teleconference)



AGENDA

ACTION ITEMS

- A. Consider approval of Water Committee meeting minutes – January 27, 2021
- B. Authorize execution of potable water supply contract with Bear Creek Special Utility District – Administrative Memorandum No. 5673-1 (Tabled by Board of Directors at January 28, 2021 meeting)
- C. Authorize Amendment No. 1 to Construction Manager At-Risk Agreement on Wylie Water Treatment Plant (WTP) Biologically Active Filtration and Wylie WTP Ammonia System Improvements projects – Administrative Memorandum No. 5692
- D. Authorize execution of engineering services agreement for Long Range Water Supply Plan study and raw water Capital Improvement Program update – Administrative Memorandum No. 5694
- E. Authorize execution of engineering services agreement for planning study and water transmission system Capital Improvement Program update – Administrative Memorandum No. 5695

DISCUSSION ITEMS

- A. State Climatologist briefing
- B. Bois d'Arc Lake Operations Center wall display exhibits presentation
- C. Opportunity for Committee members to provide feedback on Water Committee meeting
- D. Opportunity for Committee members to request potential future agenda items
(No substantive discussion of items will take place at this time)



AGENDA

Opening Remarks

A. Chairman/Interim Executive Director/Committee Champion Status Report concerning legislation and regulatory matters, budgets, current projects and ongoing programs of the District including the Regional Water System, Watershed Protection, and Water Conservation

- *Please note that an update on the impacts of the February 2021 Winter Storm Event will be provided at the February 25, 2021 Board meeting.*



AGENDA

Action Items

- A. Consider approval of Water Committee meeting minutes –
January 27, 2021**

Recommend approval of Water Committee meeting minutes

**At this time, we'd like to rearrange the agenda and go to
Discussion Item A. State Climatologist briefing.**



AGENDA

Discussion Items

A. State Climatologist briefing

John Nielsen-Gammon is Regents Professor of Atmospheric Sciences at Texas A&M University. He earned a Ph.D. from the Massachusetts Institute of Technology in 1990 and has served as the Texas State Climatologist since 2000. His recent research has focused on historic and future trends in droughts and extreme rainfall.

The Outlook for Weather, Climate, and Runoff

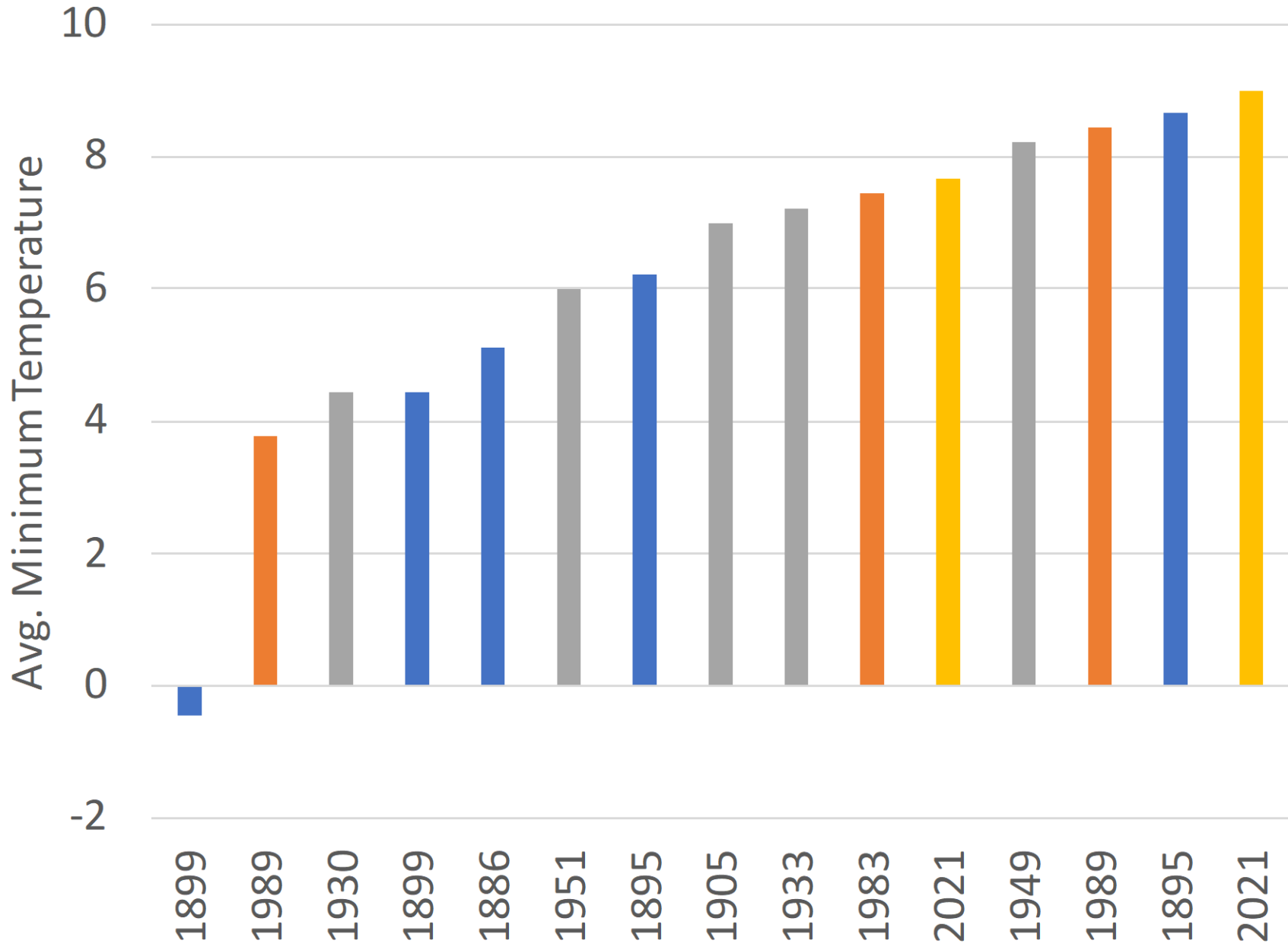
John W. Nielsen-Gammon

Texas A&M University

Texas State Climatologist

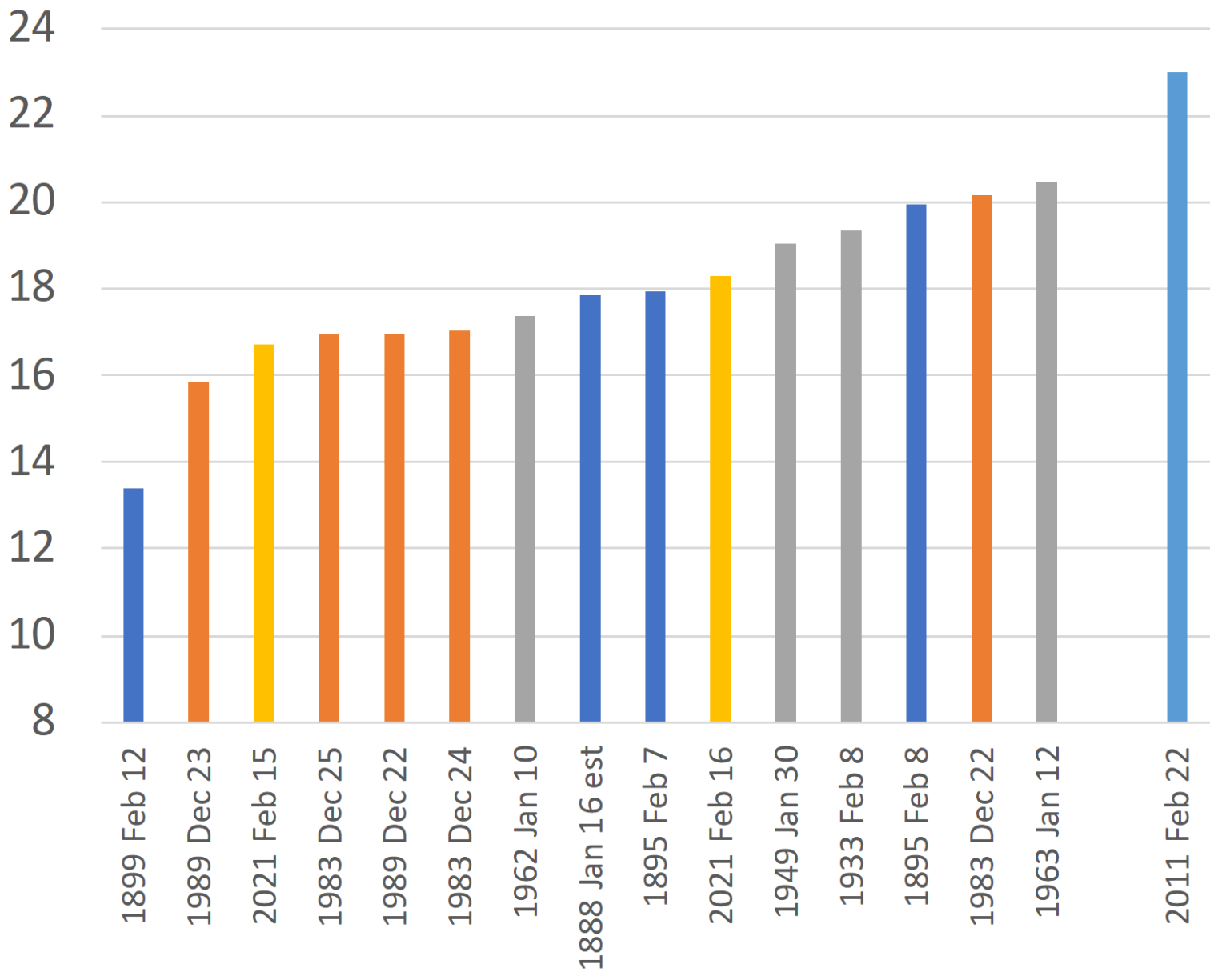
Outline

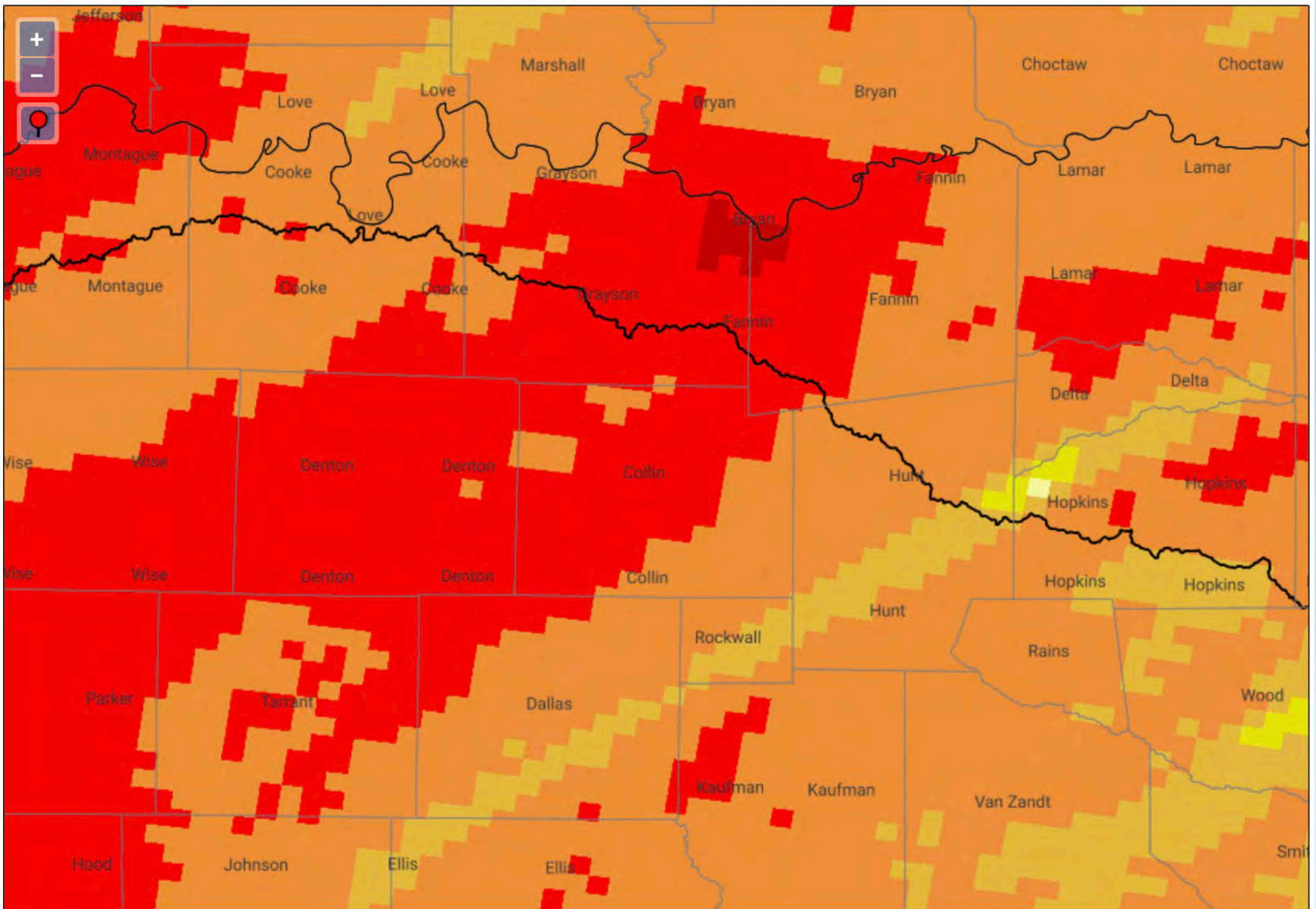
- Recent conditions
- Long-range outlook
- Climate considerations



Population Weighted Daily Average

Temperature



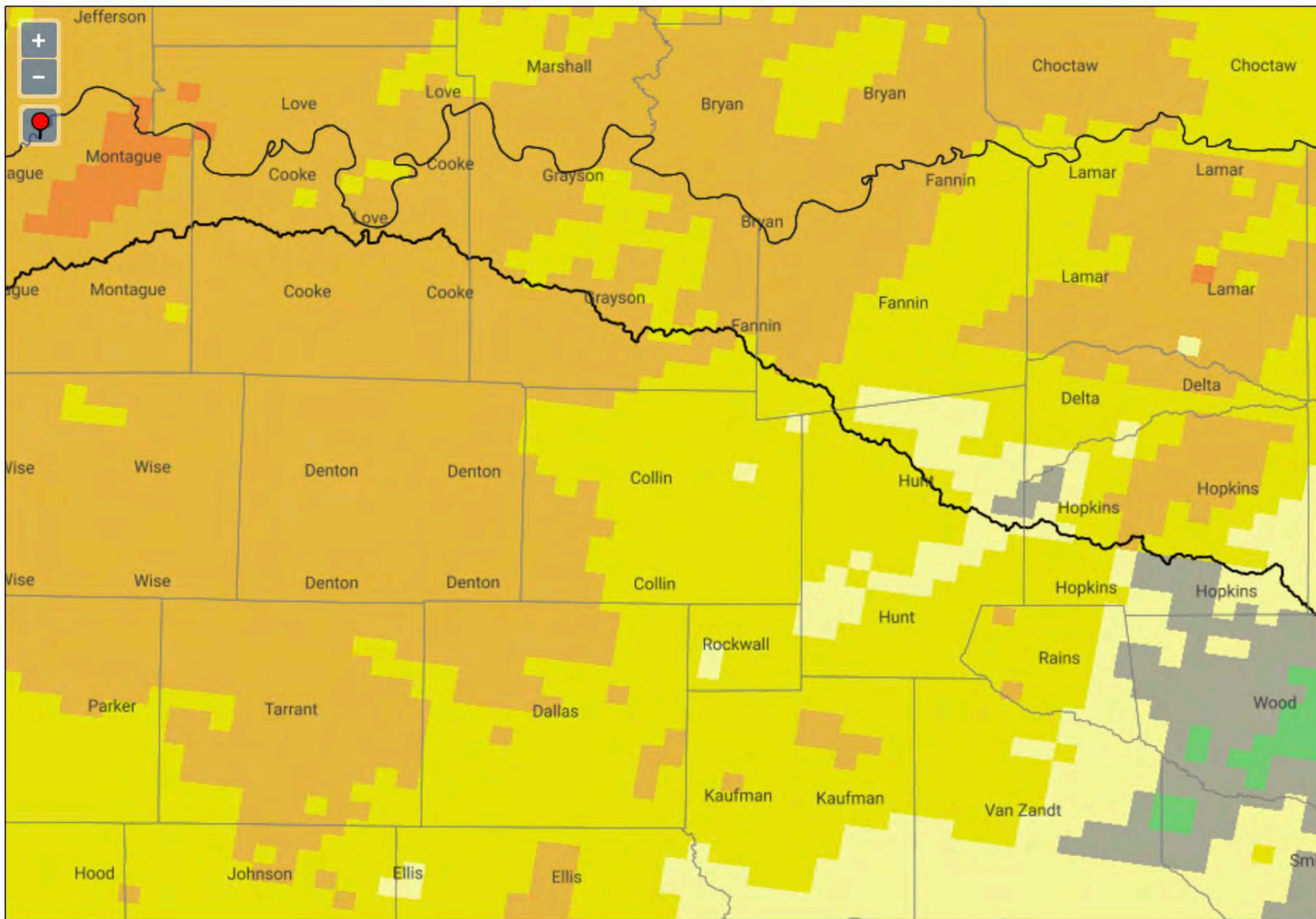


Feb 21, 2021

Past 30 days % normal

Percent of Normal Precip. (%)

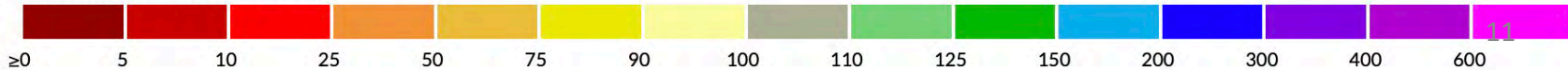


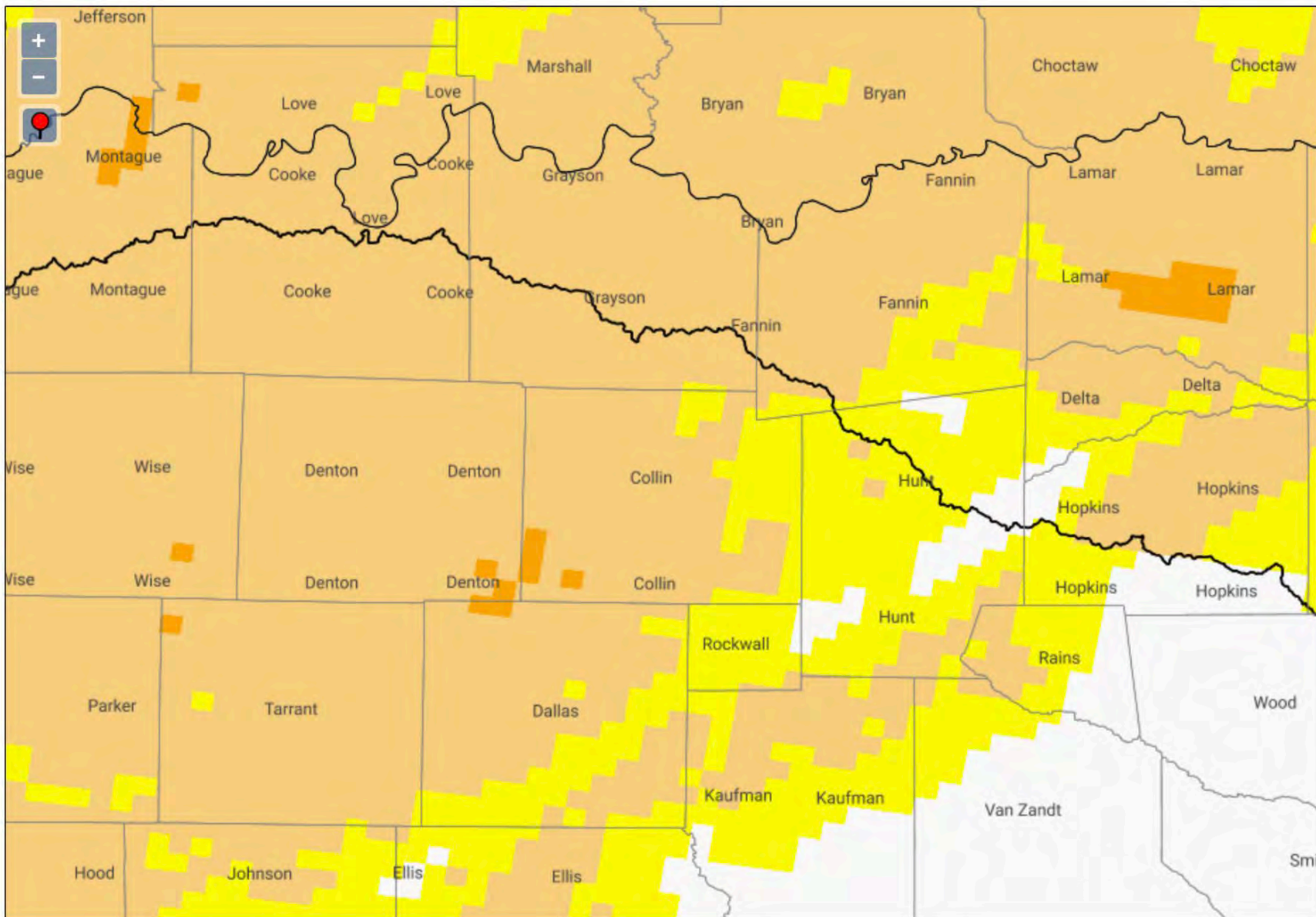


Feb 21, 2021

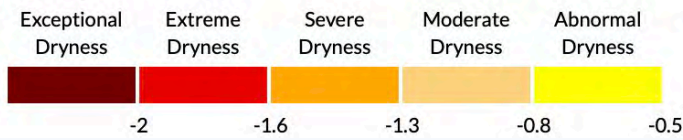
Past 90 days % normal

Percent of Normal Precip. (%)

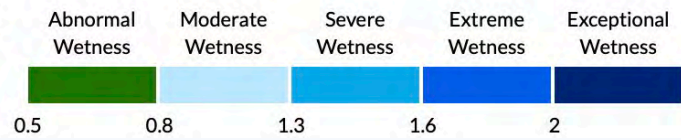


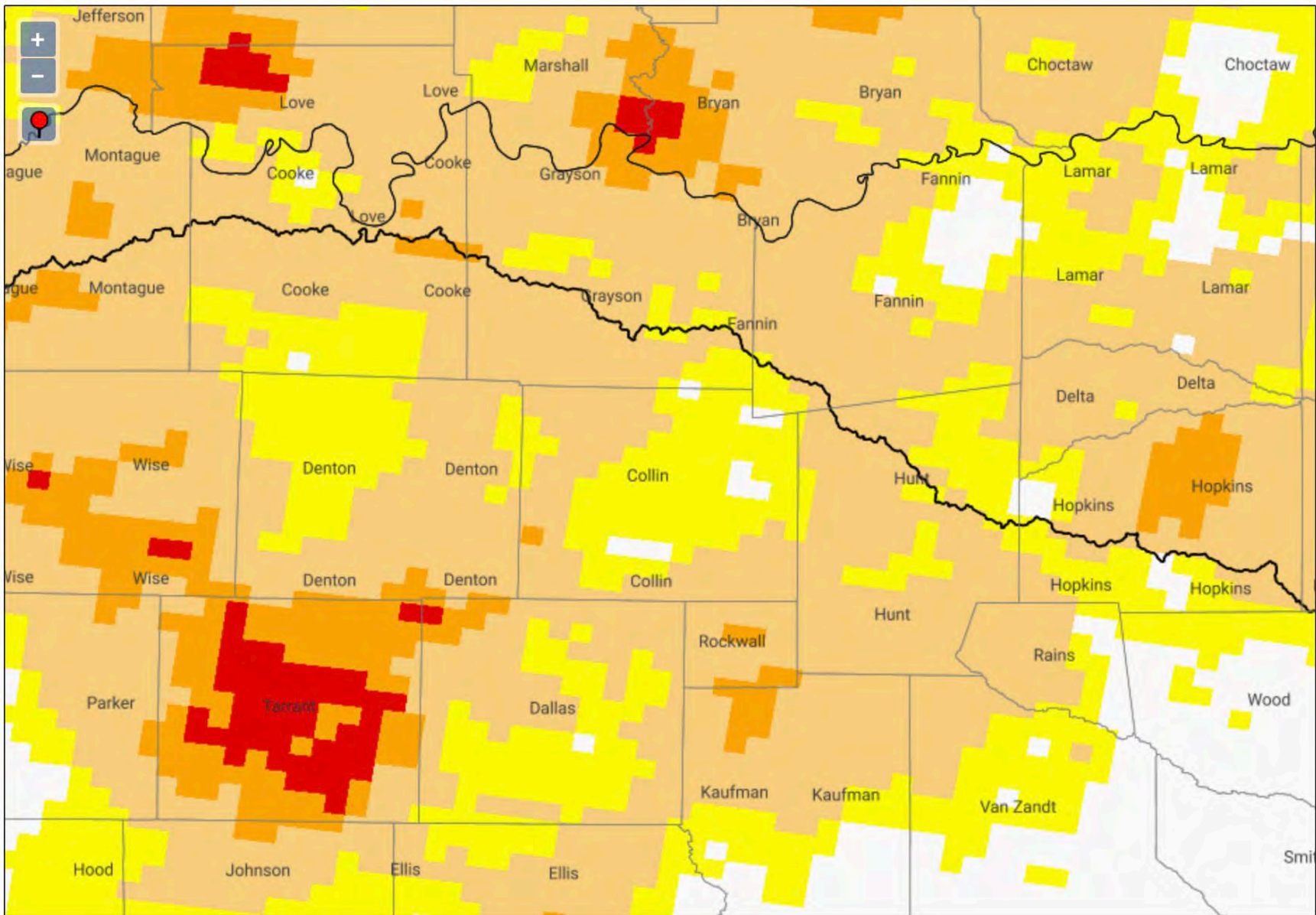


60-day SPI Blend



Two-month dryness





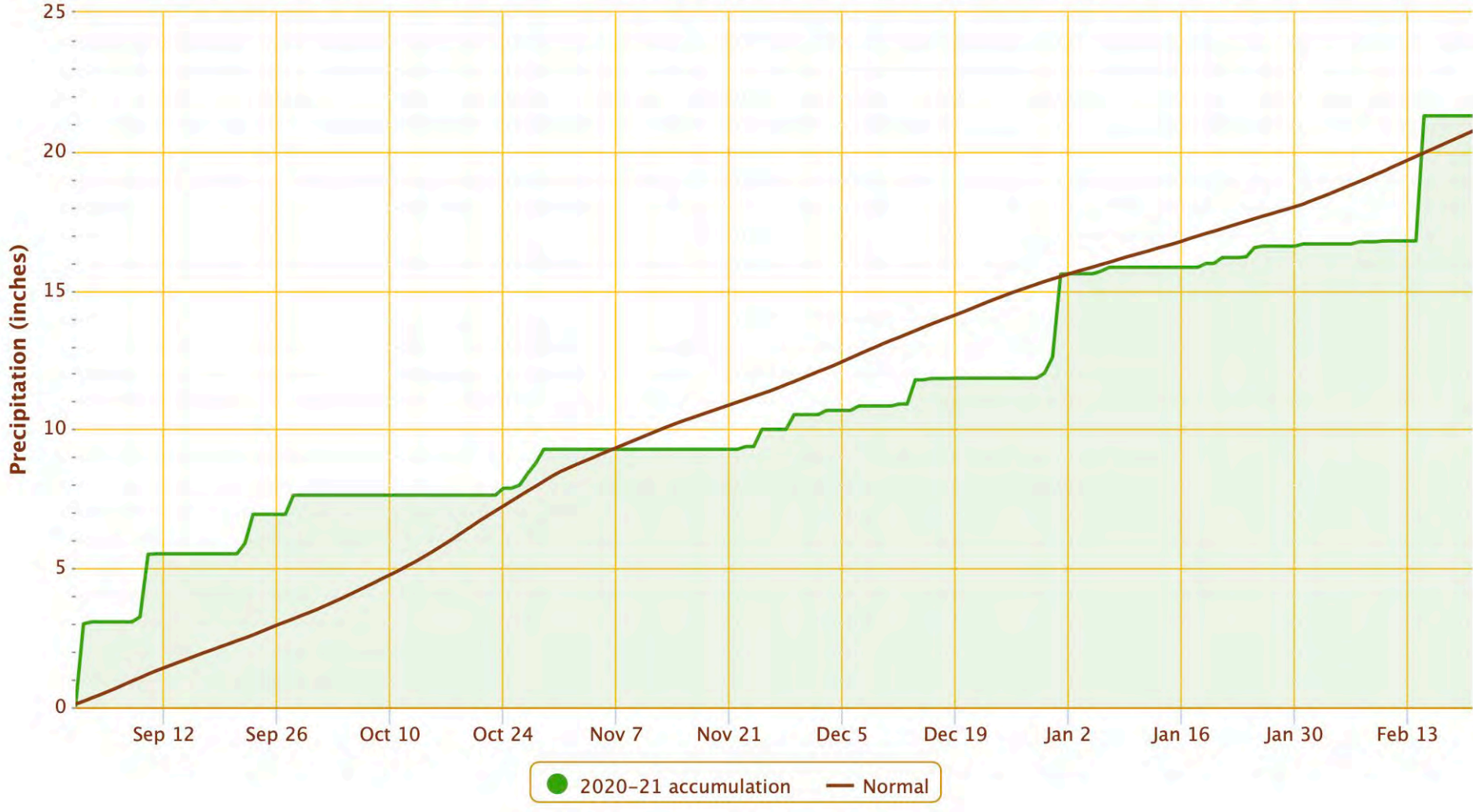
Six-month dryness

6-month SPI Blend



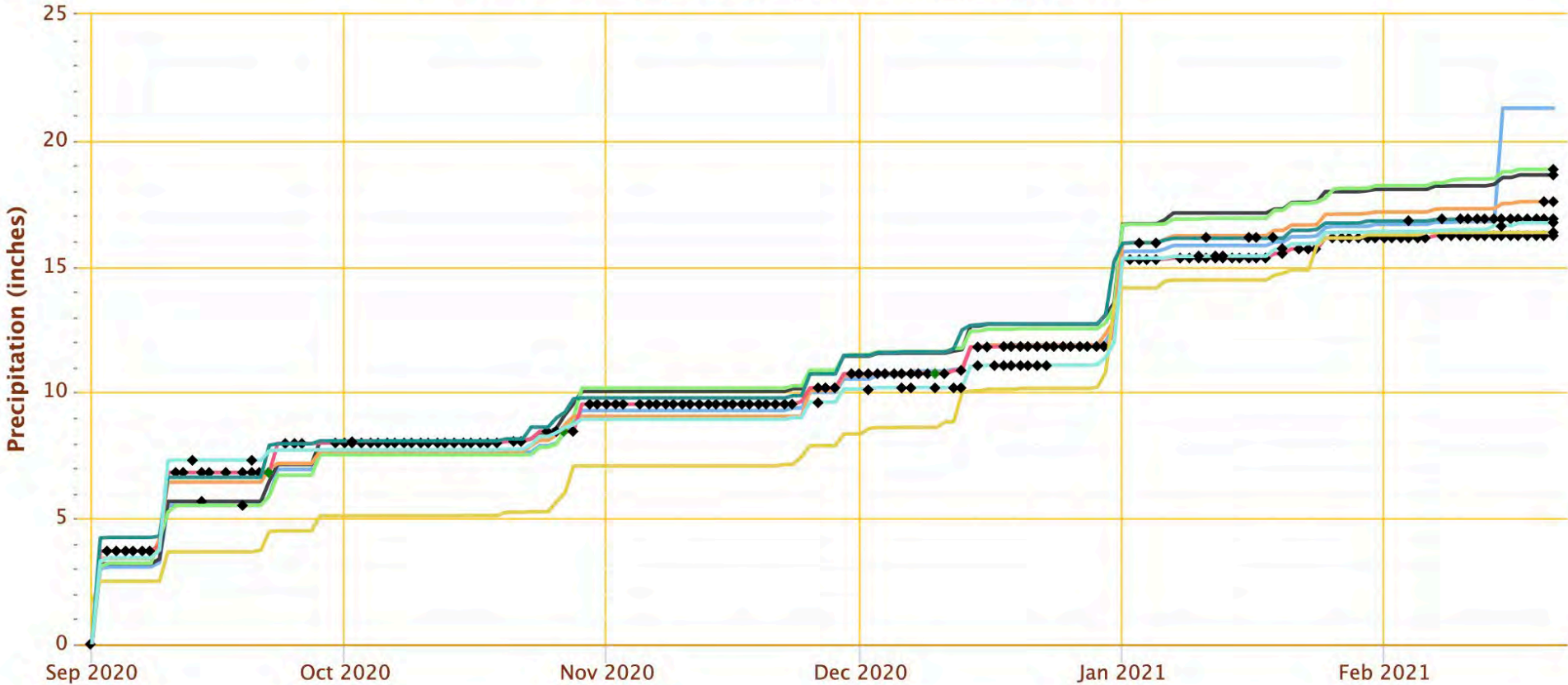
Accumulated Precipitation – BONHAM 3NNE, TX

Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values



Accumulated Precipitation

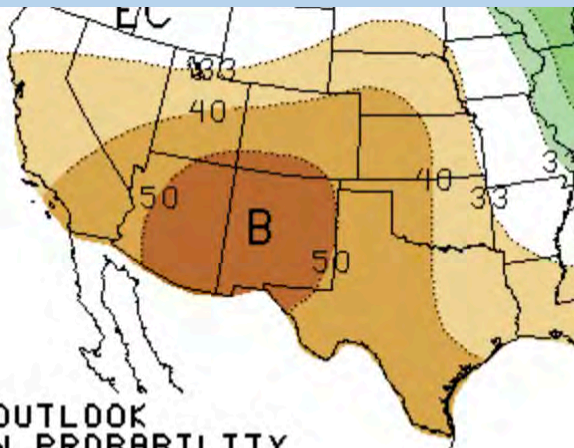
Green/black diamonds represent subsequent/missing values



[\(Click to hide/show lines\)](#)

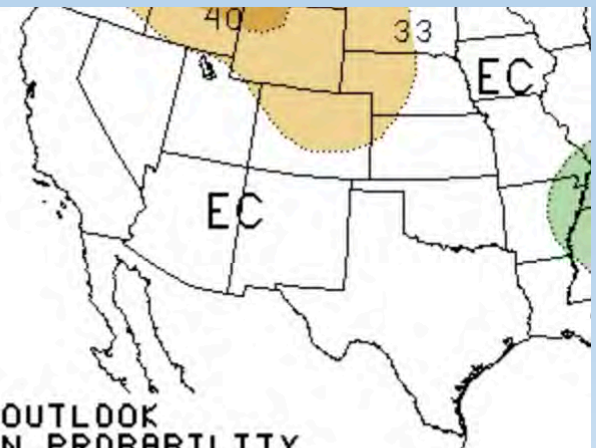
- BONHAM 3NNE, TX:Precip
 — BONHAM 4.0 NE, TX (CoCoRaHS):Precip
 — DODD CITY 3.0 NNW, TX (CoCoRaHS):Precip
- RAVENNA 1.7 SE, TX (CoCoRaHS):Precip
 — TRENTON, TX:Precip
 — BELLS 1.1 WSW, TX (CoCoRaHS):Precip
 — HONEY GROVE, TX:Precip
- DENISON 9.9 ESE, TX (CoCoRaHS):Precip
 — WOLFE CITY, TX:Precip
 — VAN ALSTYNE 6.2 ENE, TX (CoCoRaHS):Precip

March-May



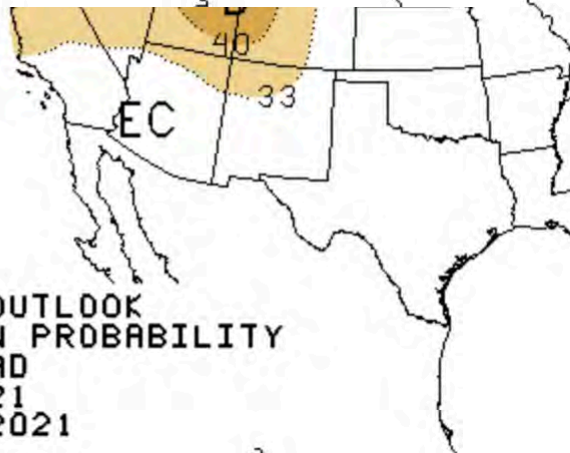
THREE-MONTH OUTLOOK
PRECIPITATION PROBABILITY
0.5 MONTH LEAD
VALID MAM 2021
MADE 18 FEB 2021

June-August



THREE-MONTH OUTLOOK
PRECIPITATION PROBABILITY
3.5 MONTH LEAD
VALID JJA 2021
MADE 18 FEB 2021

Sept-Nov



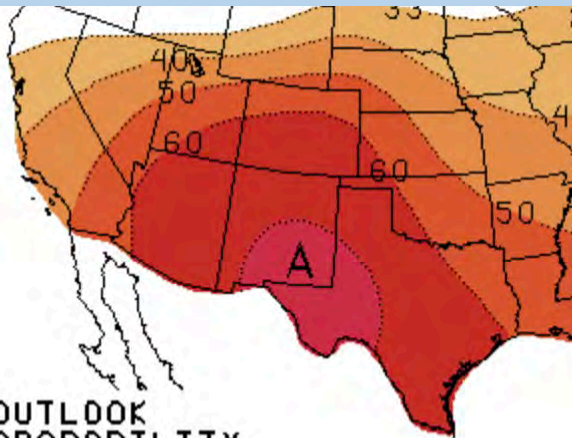
THREE-MONTH OUTLOOK
PRECIPITATION PROBABILITY
6.5 MONTH LEAD
VALID SON 2021
MADE 18 FEB 2021

Dec-Feb



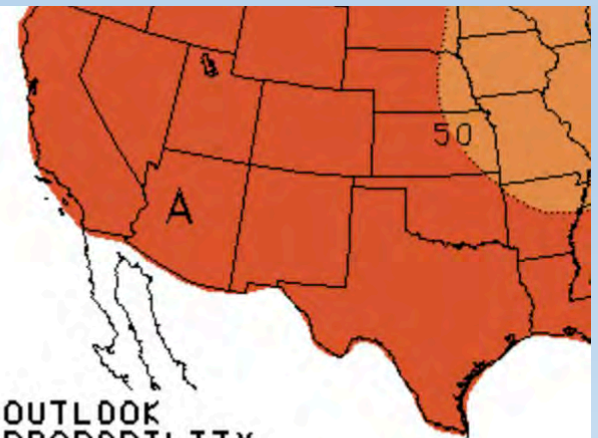
THREE-MONTH OUTLOOK
PRECIPITATION PROBABILITY
9.5 MONTH LEAD
VALID DJF 2021
MADE 18 FEB 2021

March-May



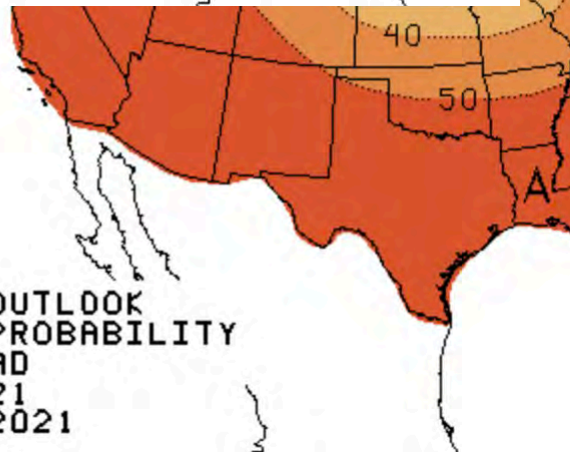
THREE-MONTH OUTLOOK
TEMPERATURE PROBABILITY
0.5 MONTH LEAD
VALID MAM 2021
MADE 18 FEB 2021

June-August



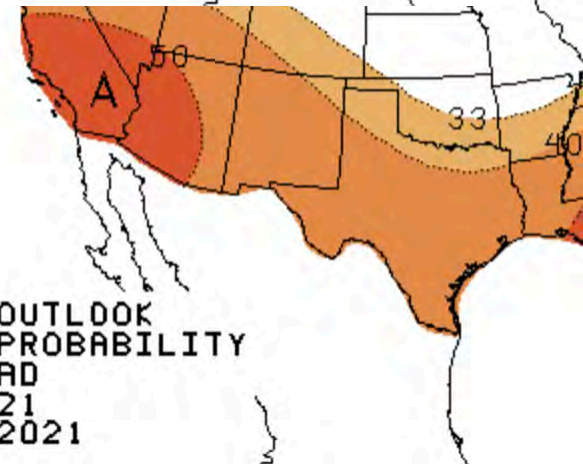
THREE-MONTH OUTLOOK
TEMPERATURE PROBABILITY
3.5 MONTH LEAD
VALID JJA 2021
MADE 18 FEB 2021

Sept-Nov



THREE-MONTH OUTLOOK
TEMPERATURE PROBABILITY
6.5 MONTH LEAD
VALID SON 2021
MADE 18 FEB 2021

Dec-Feb



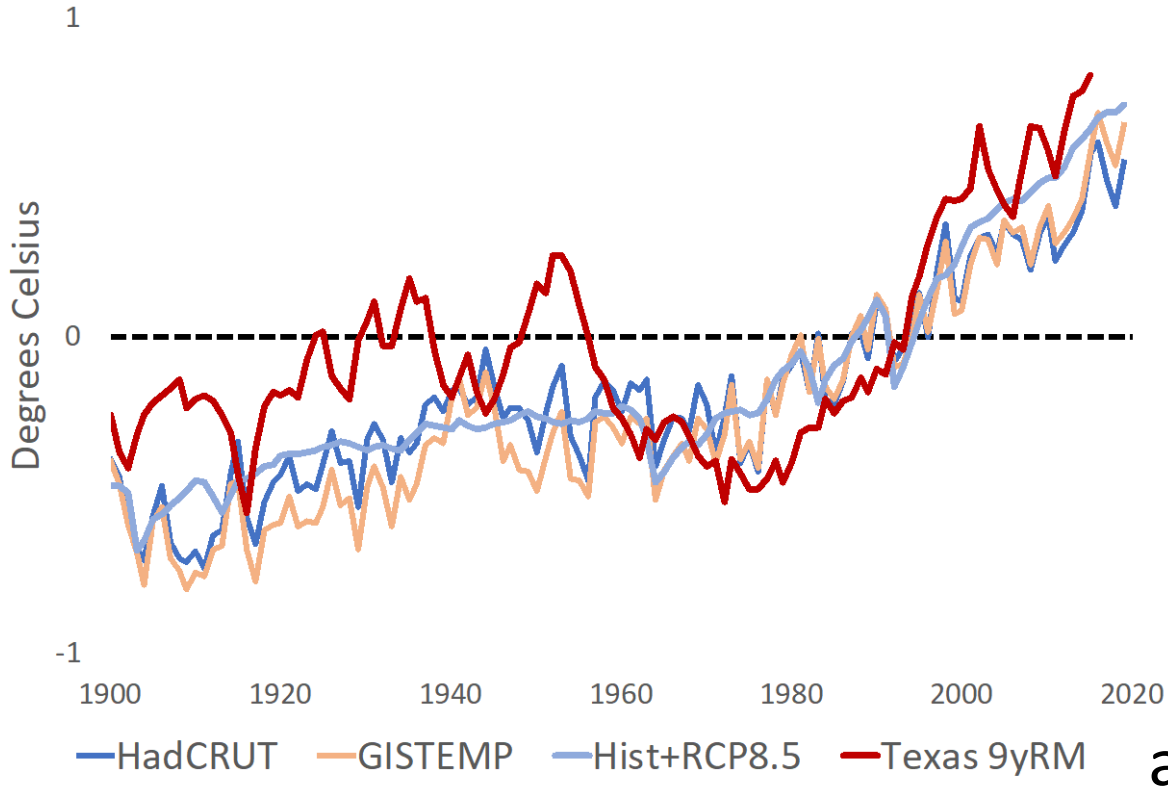
THREE-MONTH OUTLOOK
TEMPERATURE PROBABILITY
9.5 MONTH LEAD
VALID DJF 2021
MADE 18 FEB 2021

Unprecedented drought challenges for Texas: what do scientists and stakeholders need to know?

- John Nielsen-Gammon, Texas A&M
- Jay Banner, UT Austin
- Benjamin Cook, NASA GISS
- Darrel Tremaine, UT Austin
- Corinne Wong, UT Austin
- Robert Mace, Texas State
- Huilin Gao, Texas A&M
- Zong-Liang Yang, UT Austin
- Marisa Flores Gonzalez, City of Austin
- Richard Hoffpauir, Hoffpauir Consulting, Bryan
- Tom Gooch, Freese and Nichols, Fort Worth
- Kevin Kloesel, Univ. of Oklahoma
- With help from Katharine Hayhoe, Ron Anderson, and Tim Finley

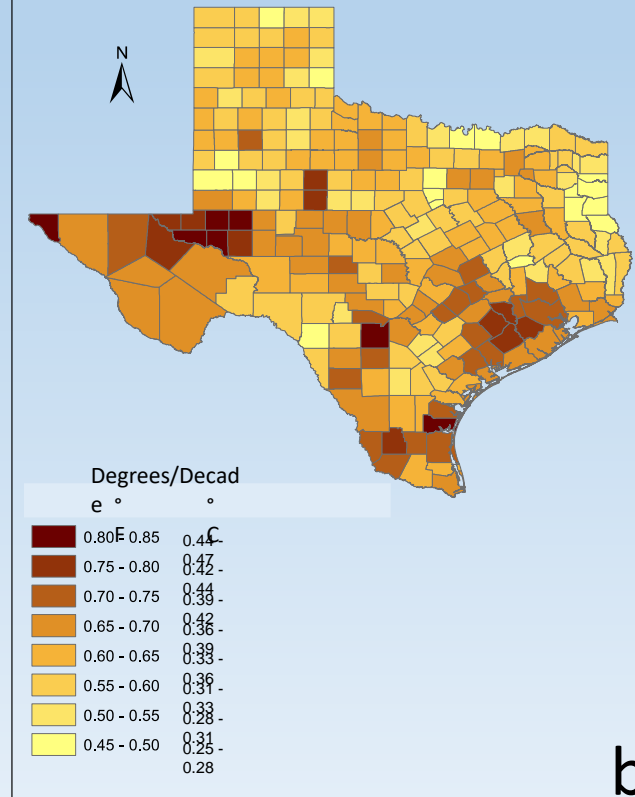
Supported by: The National Science Foundation Coupled Natural and Human Systems program, grant number AGS-1518541, the Cynthia and George Mitchell Foundation grant number G-1809-55892, and by The University of Texas at Austin's Planet Texas 2050 Bridging Barriers research initiative.

Annual Temperature Anomalies



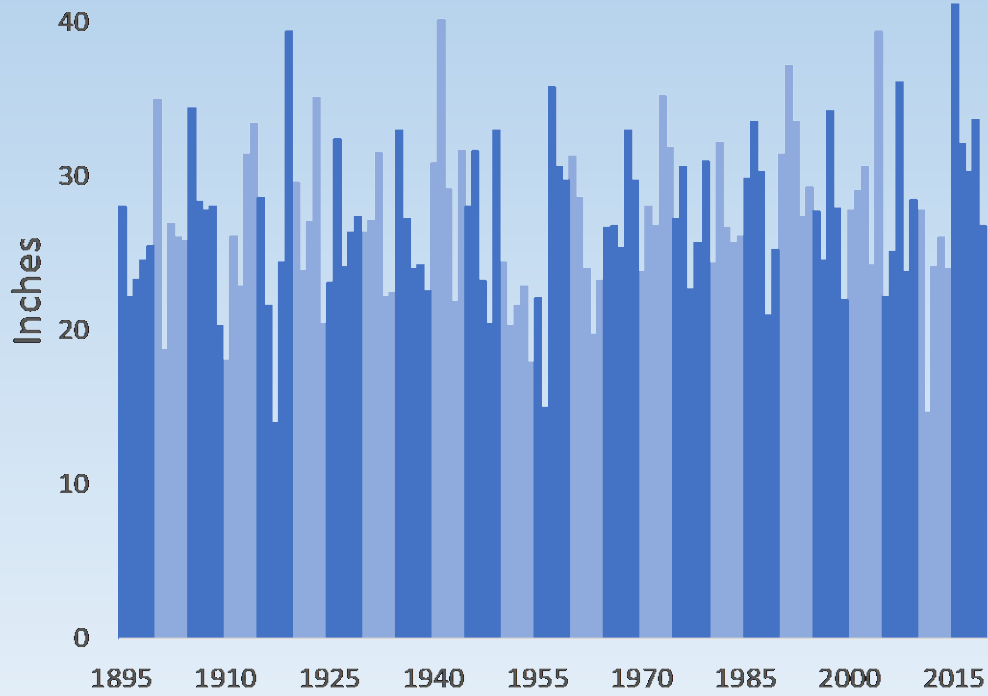
a

Temperature Trends, 1975-2018

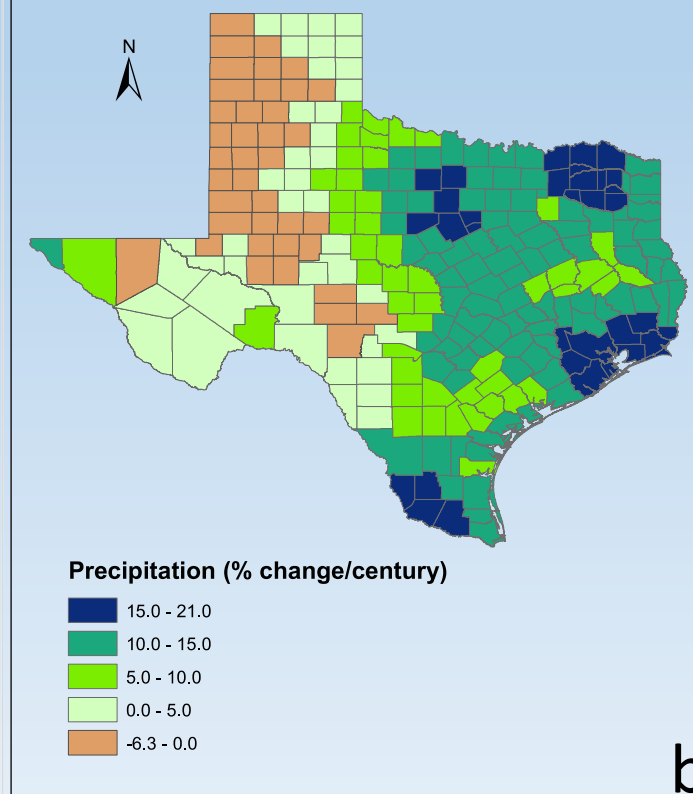


b

Texas Annual Precipitation



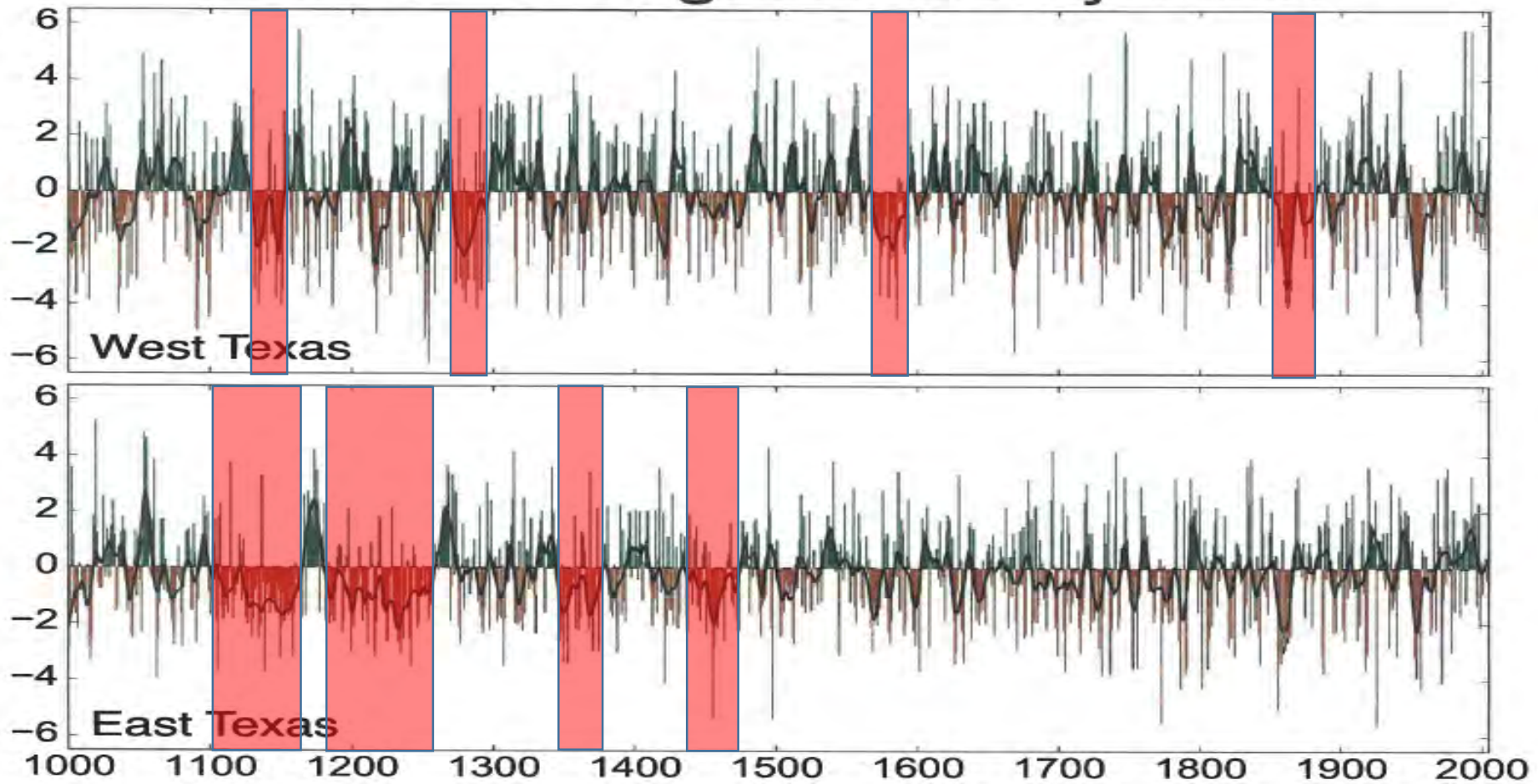
Precipitation Trends, 1895-2018

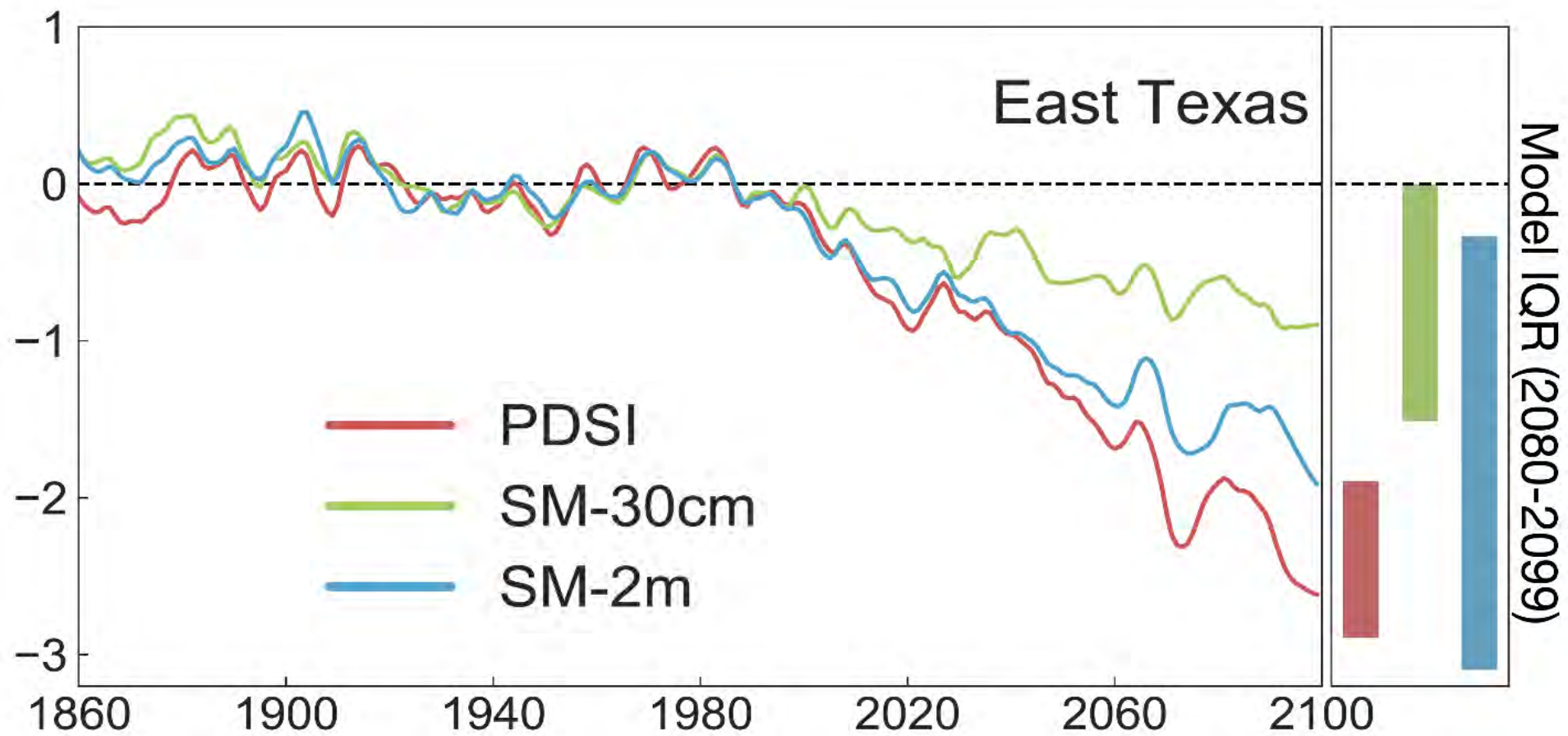


a

b

Palmer Drought Severity Index





Why more droughts? Or more aridity?

- **On the drying side...**

- Decreases in annual precipitation
- Increases in temperature
- Increases in rainfall extremes, month to month
- Changes in rainfall seasonality
- Changes in biomass (short term)

- **On the wetting side...**

- Increases in annual precipitation
- Changes in biosphere water use efficiency
- Changes in biomass (long term)

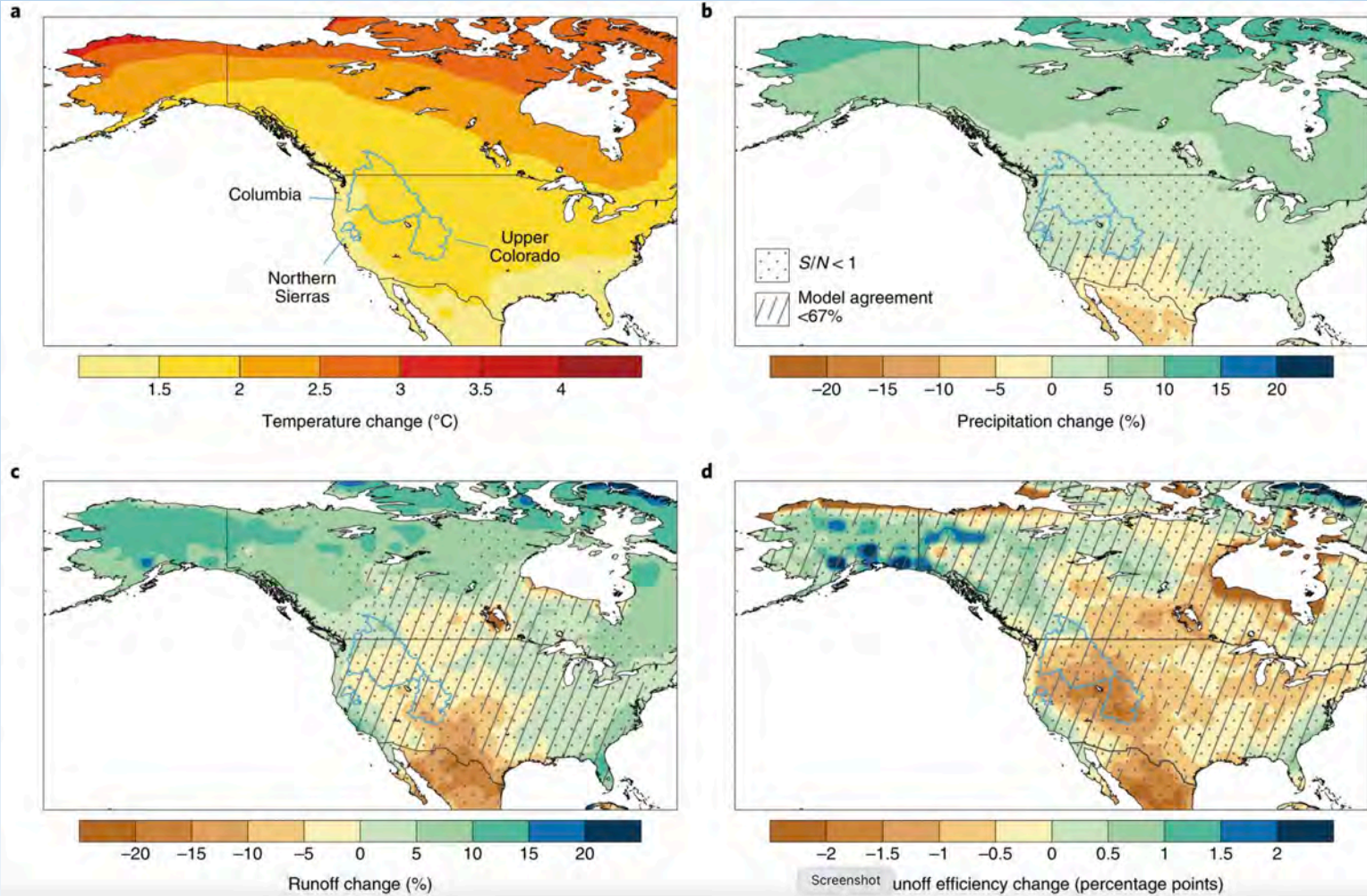
- **On the mixed effects side...**

- Changes in rainfall extremes, single storms
- Changes in soil moisture

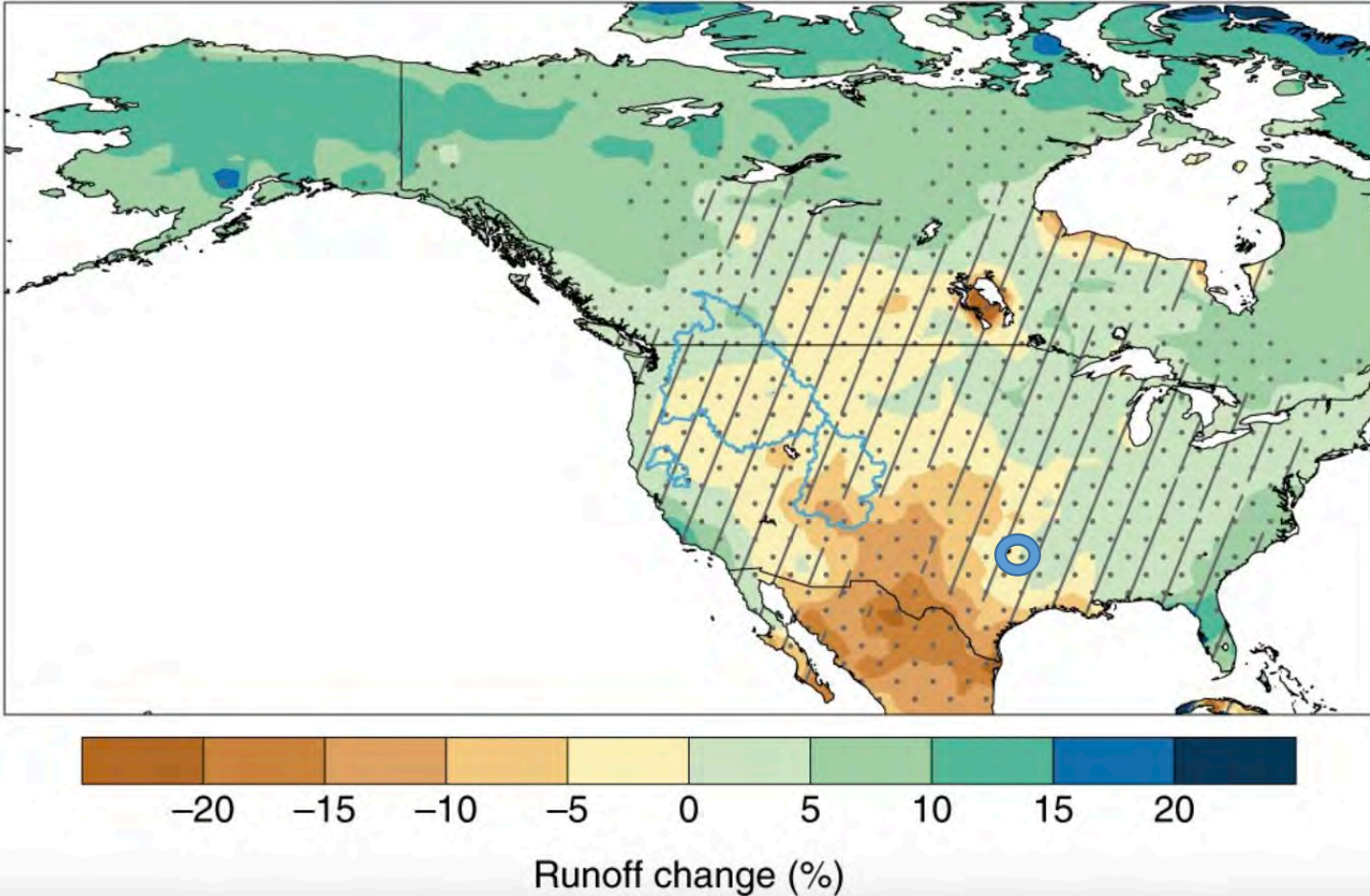
What does this mean for surface water supply?

- Uncertainty for future
 - How much will the climate system respond?
 - How do we model the hydrology?
 - How much carbon dioxide etc.?
 - How important is climate change compared to natural variability?
 - How do we infer local details, given the climate system response?

Lehner et al. 2019
 Nature Climate
 Change



Lehner et al. 2019
Nature Climate
Change



What does this mean for surface water supply?

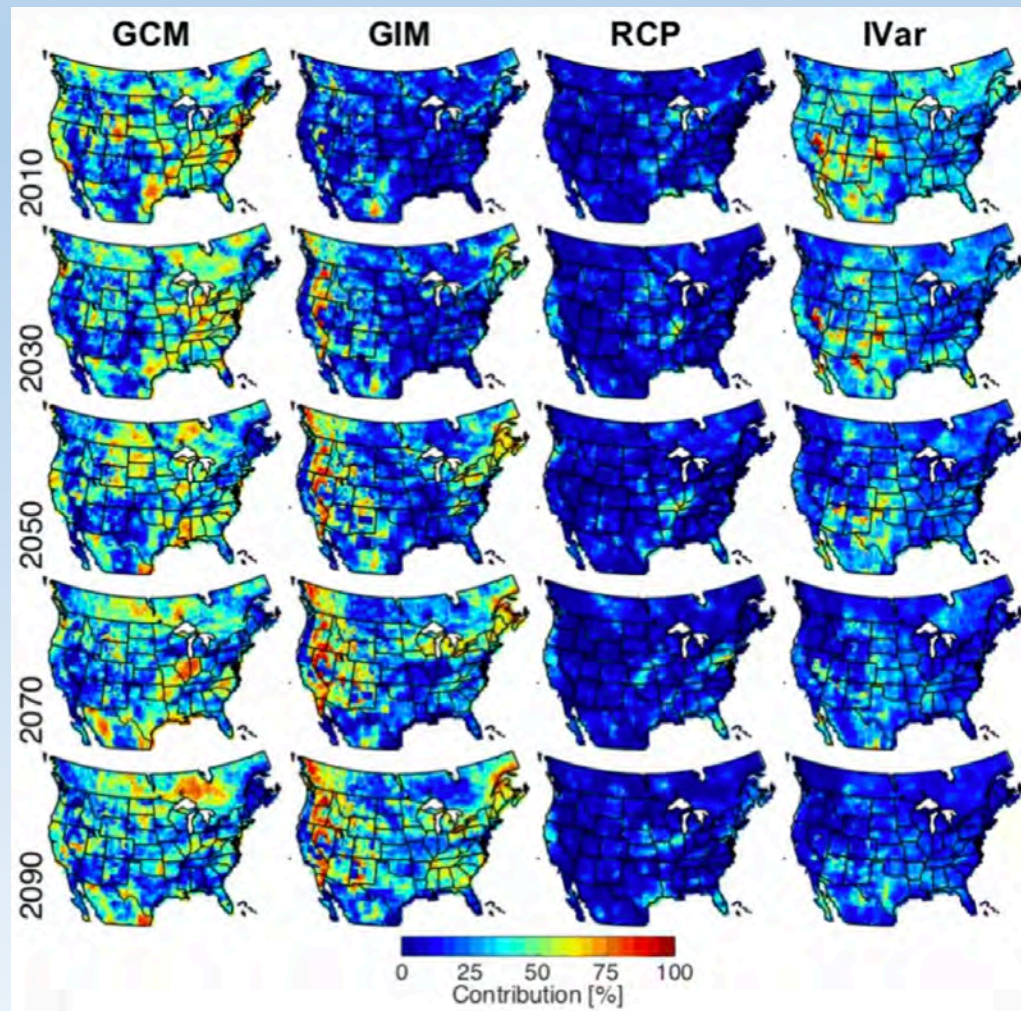
- Uncertainty for future
 - How much will the climate system respond? (**GCM**)
 - How do we model the hydrology? (**GIM**)
 - How much carbon dioxide etc.? (**RCP**)
 - How important is climate change compared to natural variability? (**IVar**)
 - How do we infer local details, given the climate system response?

Giuntoli et al., 2018 Climatic Change

Conclusions

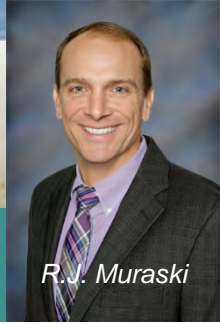
First two columns: models are s***

Last two columns: natural variability dominates for next several decades



Contact Information

- John Nielsen-Gammon
- Texas A&M University
- n-g@tamu.edu
- 979-862-2248
- climatexas.tamu.edu



AGENDA

Action Items

B. Authorize execution of potable water supply contract with Bear Creek Special Utility District – Administrative Memorandum No. 5673-1 (Tabled by Board of Directors at January 28, 2021 meeting)

- Consider recommendation on authorizing execution of potable water supply contract with Bear Creek Special Utility District for a term of 20 years

What: Authorize execution of a Potable Water Supply Contract with Bear Creek Special Utility District, a current customer of NTMWD.

Why: NTMWD and Bear Creek Special Utility District wish to restate and enter into a new Potable Water Supply Contract. The customer and NTMWD wish to modify points of delivery.



BACKGROUND & SCOPE OF AGREEMENT

PROJECT BACKGROUND:

- Bear Creek SUD entered into a potable water supply contract with NTMWD on December 15, 2005, with a contract term of 20 years.
- NTMWD and Bear Creek SUD have requested a new agreement to address the following:
 - Moving connection of Delivery Point No 2 from the 36” Farmersville-Rockwall to the 42” Royse City Pipelines
 - Relocating Delivery Point No. 1 location that will be moved as part of the District’s set point control projects (Future)



BEAR CREEK SUD AMENDED WATER CONTRACT

BEAR CREEK SUD CURRENT AND FUTURE DELIVERY POINT #1





SCOPE OF AGREEMENT

STANDARD CONTRACT PROVISIONS:

- Contract term of 20 years
- Conservation Measures
- Increased need for adequate water storage facilities by customers
- Rate set by Board of Directors
- Peak delivery flow rate
- Surcharge for exceeding peak delivery flow rate
- An annual minimum of 255,565,000 gallons per year
- Annual maximum of 1,095,000,000 gallons per year



RECOMMENDATION

Contracting

Party: Bear Creek Special Utility District

Purpose: Potable Water Supply Contract

Contract

Term: 20 years



AGENDA

Action Items

C. Authorize Amendment No. 1 to Construction Manager At-Risk Agreement on Wylie Water Treatment Plant (WTP) Biologically Active Filtration and Wylie WTP Ammonia System Improvements projects – Administrative Memorandum No. 5692

- Consider recommendation on authorizing Amendment No. 1 to Construction Manager At-Risk Agreement with Montgomery Watson Harza (MWH) Constructors in the amount of \$118,489 for additional pre-construction and procurement services on Project No. 101-0390-15, Wylie WTP Biologically Active Filtration, No. 101-0496-18, Wylie WTP Ammonia System Improvements, and No. 101-0517-18, Wylie WTP II Structural and Mechanical Improvements

What: Authorize funding for Amendment No. 1 to the Construction Manager At-Risk (CMAR) agreement for Wylie Water Treatment Plant (WTP) Biologically Active Filtration project, to add Pre-Construction and Procurement Services associated with incorporating the Ammonia System Improvements, Project No. 101-0496-18, into the CMAR effort for Biologically Active Filtration (BAF) Implementation.

Why: Design of the ammonia system improvements by HDR, Inc. are currently in progress. Many key elements of these improvements are closely related and interdependent with facilities and improvements of the BAF Implementation. The close coordination of facilities, working spaces and treatment process impacts that are common among these improvements would be most efficiently conducted under the direction and oversight of the CMAR.



AMENDMENT NO. 1 CMAR AGREEMENT ON WYLIE WTP

- The CMAR delivery method allows engineering design of the project to progress with active input from the construction manager
- This adds a layer of efficiency to complex projects through constructability reviews, scheduling, cost estimating, and construction phasing
- Conversion of the ammonia process involves key elements that are common to the BAF process:
 - Strategic ammonia feed points
 - Contact time for chemical reaction
 - Space planning for storage and feed facilities
 - Coordination of process conversion



AMENDMENT NO. 1 CMAR AGREEMENT ON WYLIE WTP

- Additional Services to MWH for Preconstruction and Procurement
- Meetings, document review, planning coordination to add input for design.
- Consideration of the ammonia elements into work package bundling and bidding
- Current Funding Breakdown:

Design Project	Current Funding	Revised Funding
101-0390-15 (BAF)	\$446,253	\$446,253
101-0517-18 (Struct/Mech)	\$365,116	\$365,116
101-0496-18 (Ammonia)	--	\$118,489
Total	\$811,369	\$929,858



RECOMMENDATION

Contractor: Montgomery Watson Harza Constructors

Scope: Additional CMAR Pre-Construction and Procurement Services

Project: No. 101-0390-15, Wylie WTP Biologically Active Filtration,
No. 101-0496-18, Wylie WTP Ammonia System Improvements,
and No. 101-0517-18, Wylie WTP II Structural and Mechanical
Improvements

Amount: No. 101-0496-18: \$118,489



AGENDA

Action Items

D. Authorize execution of engineering services agreement for Long Range Water Supply Plan study and raw water Capital Improvement Program update – Administrative Memorandum No. 5694

- Consider recommendation on authorizing the Interim Executive Director to execute an engineering services agreement with Freese and Nichols, Inc., in the amount of \$1,985,000 for planning study and raw water Capital Improvement Program Update, Project No. 101-0587-21, Long Range Water Supply Plan

What: Authorize an engineering services agreement for development of the Long Range Water Supply Plan and update to the Raw Water Capital Improvement Program.

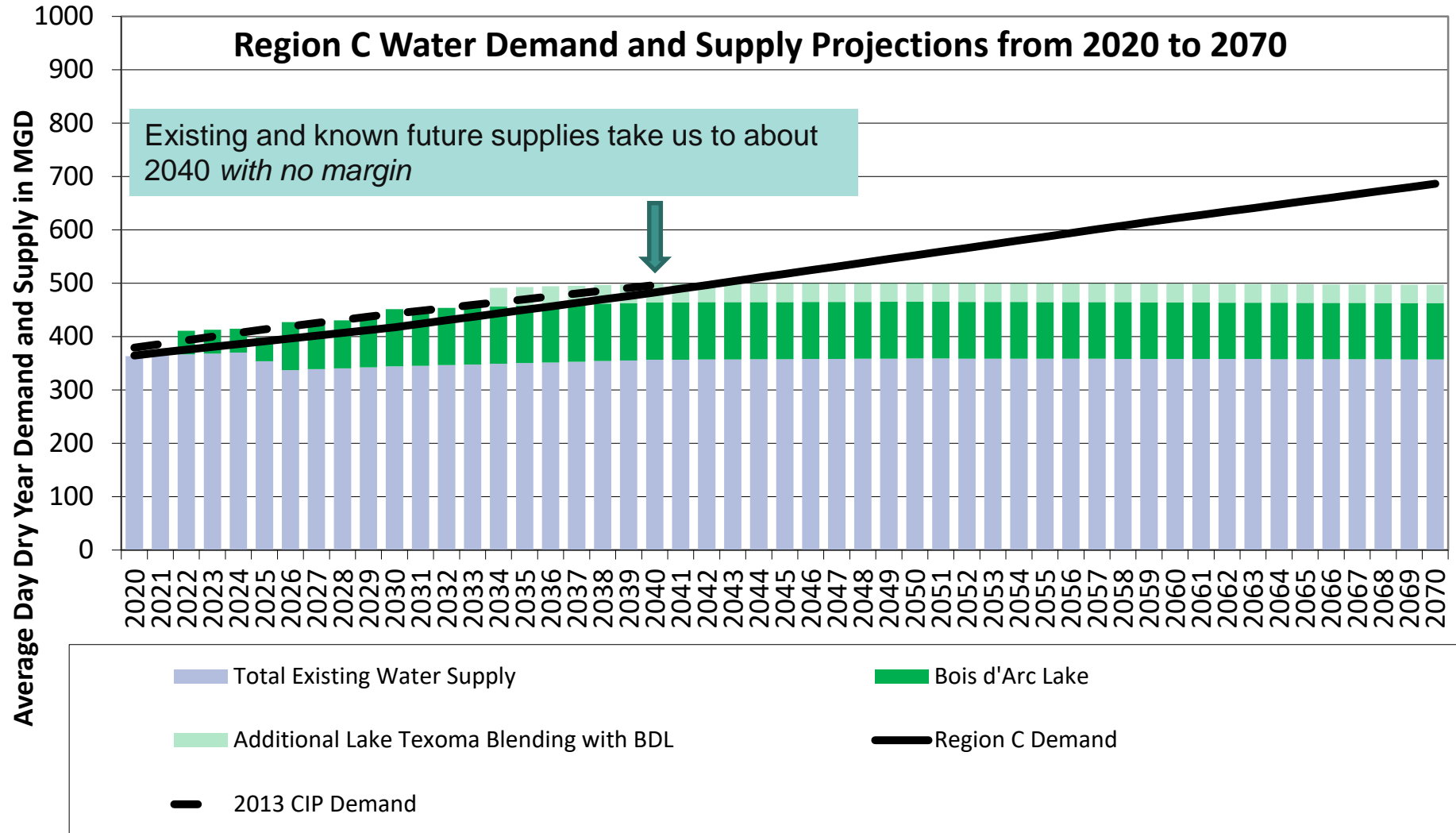
Why: Identify and evaluate potential raw water supply sources for NTMWD through 2080, develop and prioritize associated actions needed to pursue selected projects, and update and add projects in the Capital Improvements Program as needed.



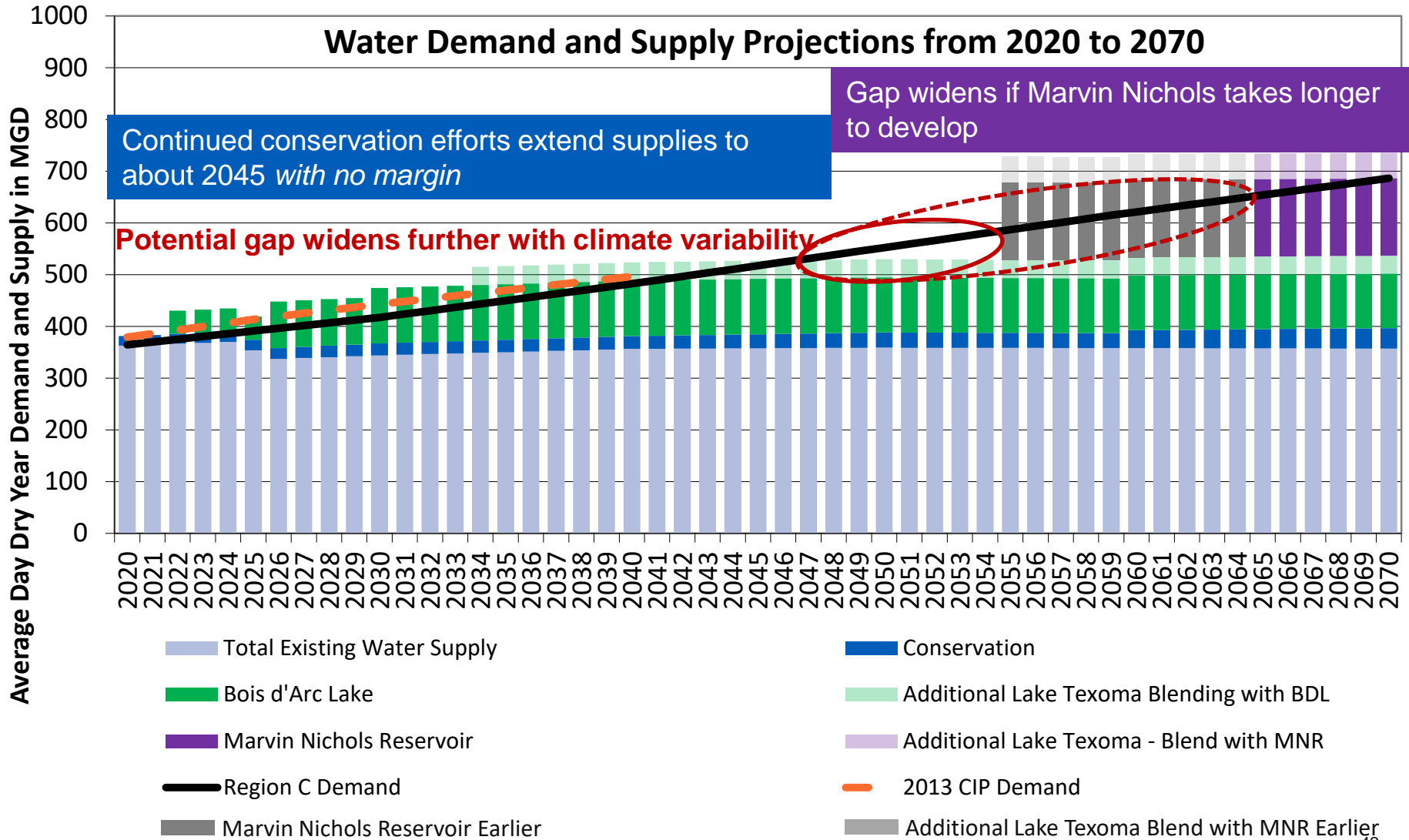
OVERVIEW

- **Need for Long Range Water Supply Plan**
- **Region C Water Demand and Supply Projections from 2020 to 2070**
- **Existing Raw Water Supplies**
- **Build on previous efforts**
 - **Supply & Demand Implications of Climate Variability for NTMWD**
 - **Evaluate Medium & Long-Range Water Demands & Supplies**
- **Raw Water System Condition Assessment**

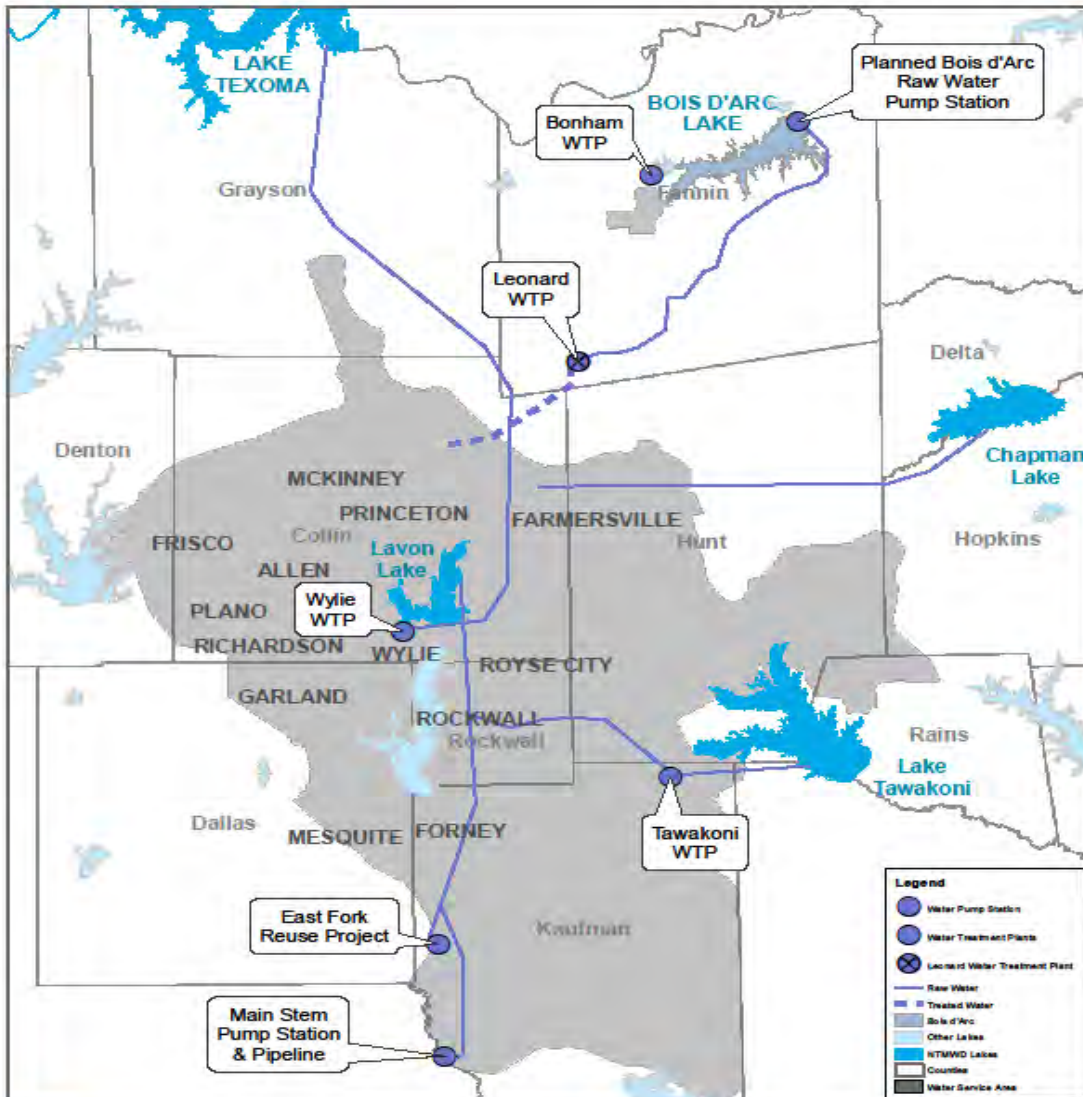
BACKGROUND



WHAT'S NEXT?



EXISTING RAW WATER SUPPLIES



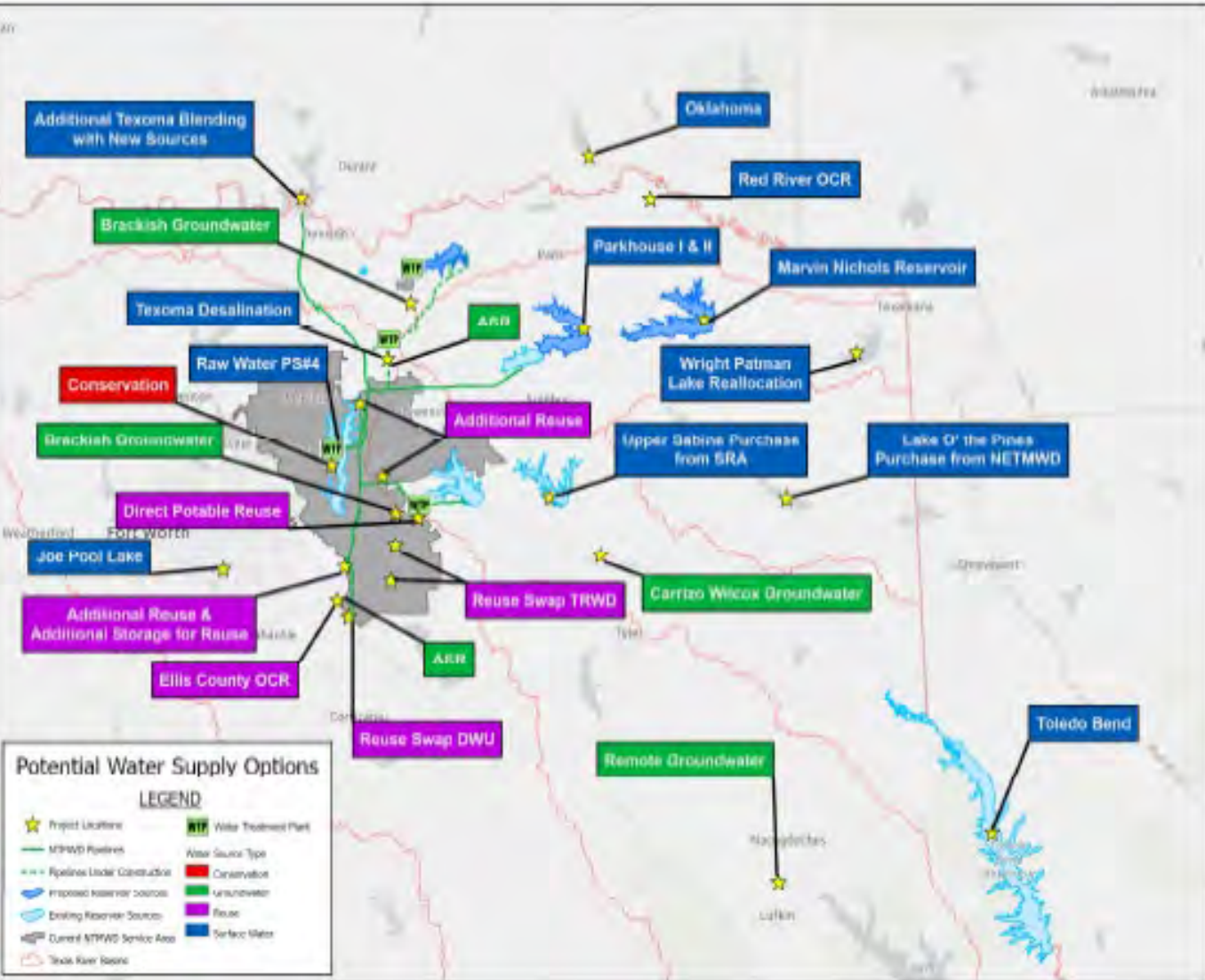
Existing:

- Lavon Lake
- Lake Texoma
- Lake Tawakoni
- Chapman Lake
- Reuse/Wetland

In Progress:

- Bois d'Arc Lake

EXAMPLE OF OPTIONS TO EXPLORE



Options:

- Connecting existing supplies
- Oklahoma
- Additional Reuse
- Groundwater
- ASR



ELEMENTS OF THE LONG RANGE WATER SUPPLY STUDY

- Update water demand projections through 2080 (last updated in 2013 CIP)
- Determine range of need for future water supplies
- Conduct comprehensive evaluation of future raw water supply options
- Develop and Analyze Water Supply Scenarios for NTMWD
- Develop and recommend a plan of action and alternative plan of action for water sources to pursue after Bois d'Arc Lake and Additional Blending from Texoma at Leonard WTP



ELEMENTS OF THE LONG RANGE WATER SUPPLY STUDY

- Level of Service and Future Supply Needs
 - Level or Reserves/Safety Margin
- Review need for condition driven projects for the raw water system
- Update and add projects to the Raw Water Capital Improvements Program as appropriate
- Will provide updates to the Board and seek input
- 18 Month duration



RECOMMENDATION

Consultant: Freese and Nichols, Inc.

Scope: Planning Study and Raw Water Capital Improvement Program Update

Project: No. 101-0587-21, Long Range Water Supply Plan

Amount: \$1,985,000



AGENDA

Action Items

E. Authorize execution of engineering services agreement for planning study and water transmission system Capital Improvement Program update – Administrative Memorandum No. 5695

- Consider recommendation on authorizing the Interim Executive Director to execute an engineering services agreement with Hazen and Sawyer in the amount of \$1,383,700 for planning study and water transmission system Capital Improvement Program Update, Project No. 101-0588-21, Water Transmission System CIP Update

What: Authorize an engineering services agreement for development and update of the Water Transmission System Capital Improvement Program (CIP).

Why: Identify alternatives and make recommendations for improvements and phasing of projects for the water transmission system.



TRANSMISSION SYSTEM CIP UPDATE

Background

- **Last Water System CIP Update in 2010**
 - Updated system-wide water demand projections
 - Adjusted schedule of growth-driven capital projects
 - Response to economic downturn
- **Water System CIP Update in 2011**
 - Minor adjustments to population and demand projections after receiving 2010 US Census data
- **Water System Demands Update in 2013**
 - System-wide water demand projections and water supply project schedule



TRANSMISSION SYSTEM CIP UPDATE

Background cont'd

- **Various study and preliminary design projects executed for sub-systems and major capital projects to refine demand projections and project schedules,**
 - **East System Hydraulic Analysis**
 - **North Garland System Hydraulic Optimization**
 - **Leonard WTP High Service Pump Station Hydraulic Analysis**
- **Will seek Board authorization this month to start Water Transmission System CIP Update and Long Range Water Supply Plan**



ELEMENTS OF TRANSMISSION SYSTEM CIP UPDATE

Transmission System CIP Update

- **Update the water transmission system Capital Improvements Program**
- **Based on Demand Projection and Level of Service Review**
 - From the Long Range Water Supply effort
- **Water Transmission System Modeling**
- **Transmission System Facilities Condition Assessment**
- **Analysis of Alternatives and CIP Development**



2021 WATER TRANSMISSION SYSTEM CIP UPDATE

Water Transmission System CIP Update

Components of the 2021 CIP Update



Demand Projection and Level of Service Review

- Member/customer data integration
- Aggregation/disaggregation
- Set point control strategic plan



Water Transmission System Modeling

- Direct interaction with model output
- Comparison of model vs field data
- Identification & display of bottlenecks
- Water quality enhancements



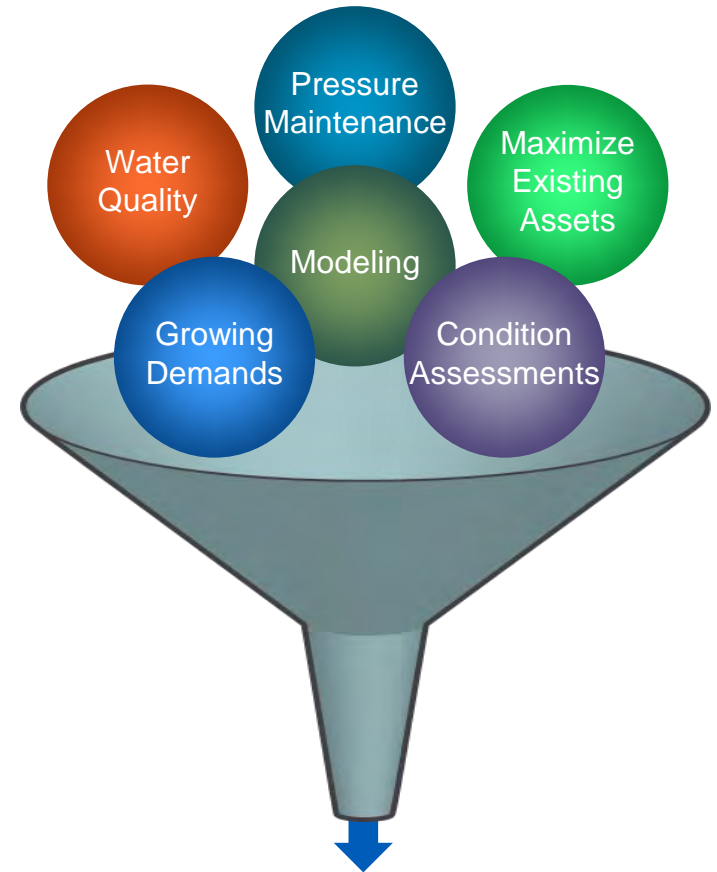
Transmission System Facilities Condition* Assessment

- Age and condition analysis
- Asset class performance analysis



Analysis of Alternatives and CIP Development

- High-level overview AND low-level detail
- Driver and trigger analysis
- What-if analyses
- CIP Report



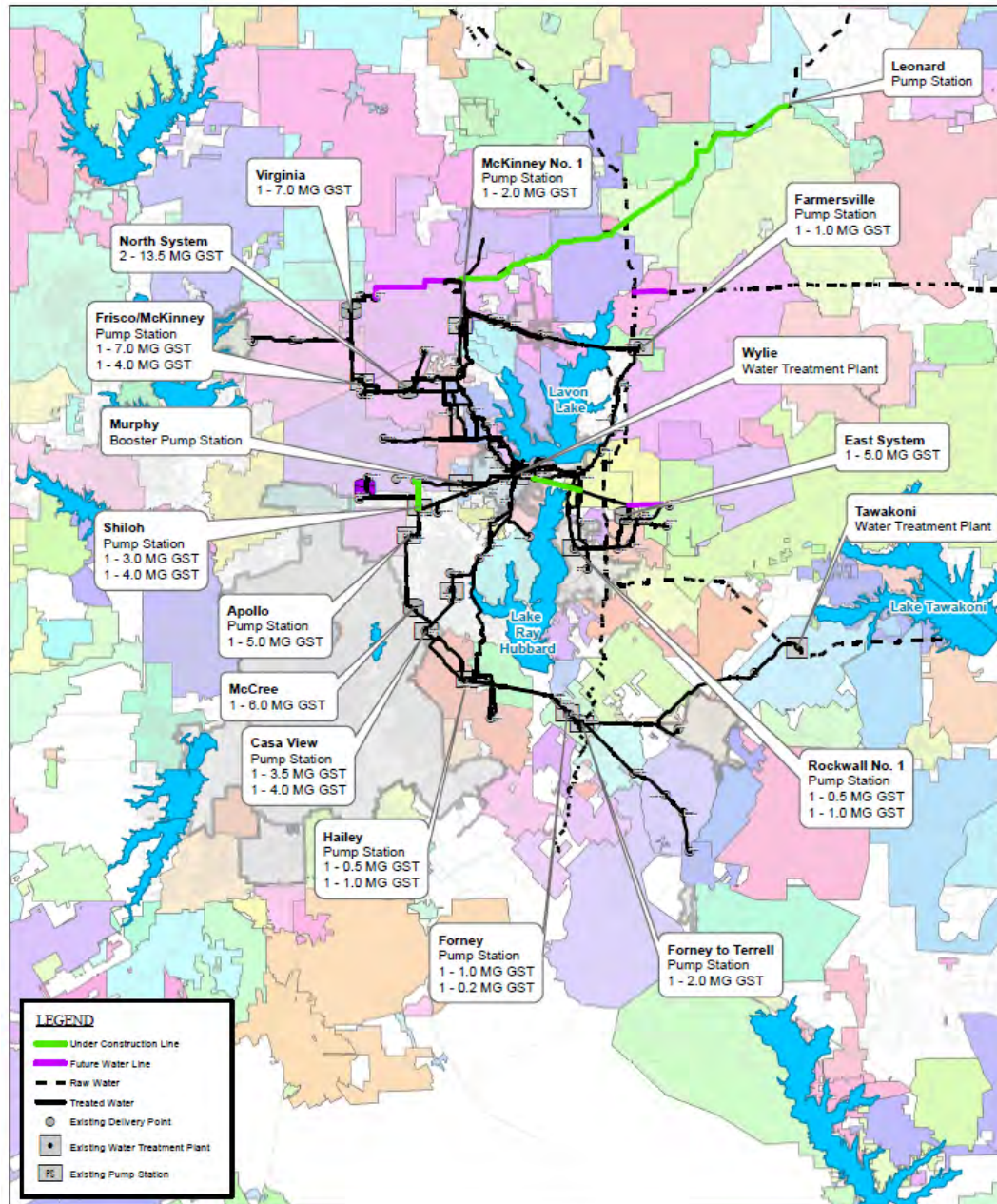
CIP and Operations Plan

2021 WATER TRANSMISSION SYSTEM CIP UPDATE

CIP Update

Update the water transmission system Capital Improvements Program based on demand, condition and regulatory drivers.

The CIP Update will identify short range improvements through year 2030, and long range planning for years 2040 and 2050.





RECOMMENDATION

Consultant: Hazen and Sawyer

Scope: Planning study and water transmission system capital improvement program update

Project: No. 101-0588-21, Water Transmission System CIP Update

Amount: \$1,383,700



AGENDA

Discussion Items

A. State Climatologist briefing

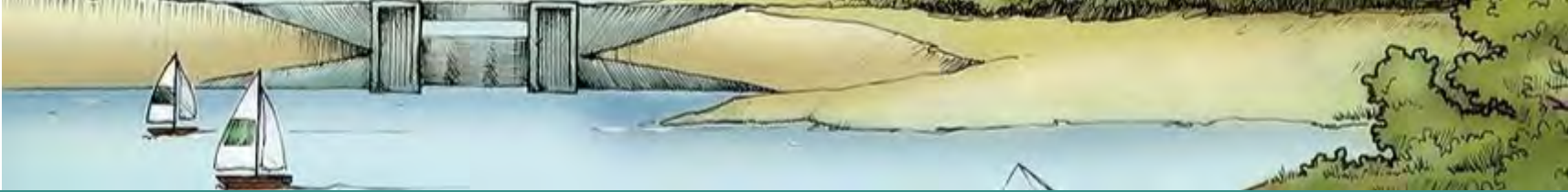
Discussed earlier in the meeting.



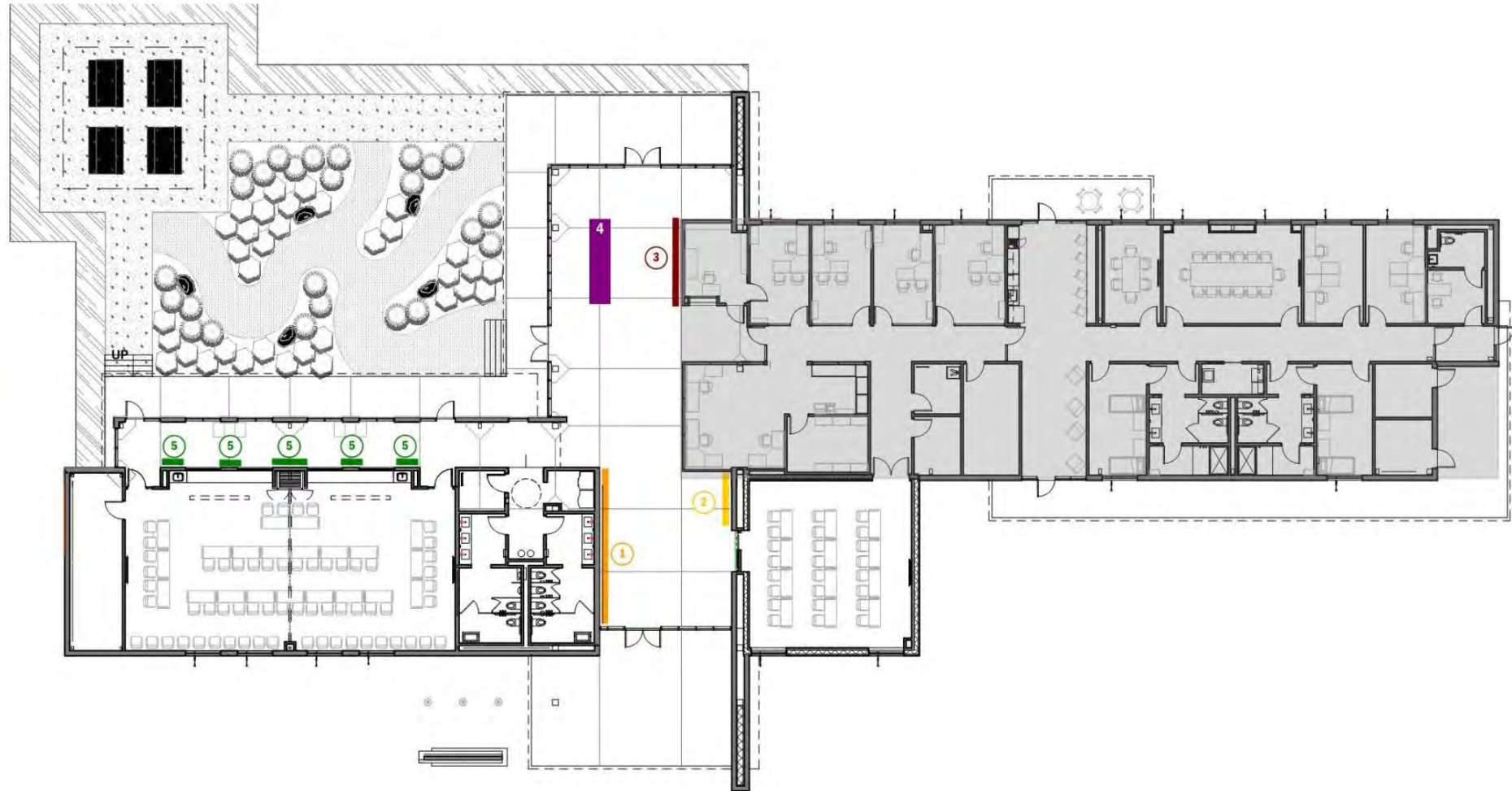
AGENDA

Discussion Items

- B. Bois d'Arc Lake Operations Center wall display exhibits presentation**



BOIS D'ARC LAKE OPERATIONS CENTER EXHIBITS





PROVIDING, PROTECTING AND SAVING WATER

WELCOME

**SOUTH TEXAS MUNICIPAL WATER DISTRICT
LAKE OPERATIONS CENTER**

WELCOME TO HOUSTON! IT'S GREAT TO HAVE YOU VISITING OUR GREAT LAKE!

It's the Lake in one of our lakes that the North Texas Municipal Water District uses to supply water for almost 2 million people. The Lake will provide drinking water for generations to come. It's also a great place to boat, swim, and fish. We'll be sure to have more about water... the ever-ding amount of us can this website.

WATER IS LIFE

BY THE NUMBERS DID YOU KNOW?

80" TV MONITOR

with rotating images + videos

1 million+ people served

100% recycled

100% recycled

100% recycled

1 WATER IS LIFE

"Nothing is more fundamental to life than water. We need it to survive. In fact, you can't live for more than a few days without it." — *Thomas Edison*

"We charge the water gods and the life-giving earth... — *Plato*

All the water that we have ever seen will have already been on the planet. And it circulates and moves. It hardly "flows" into the sea, streams, rivers, and lakes. It's there just and used to move to and from us, circulating and being reused again and over to the convenience of which we could agree.

FACTS:

• There is 1.4 billion cubic kilometers of water on the planet.

• Only 0.02% of that water is fresh water.

• Only 0.001% of that water is available to us.

2 PROVIDING WATER

The North Texas Municipal Water District was founded in 1976. It is a proud of delivering drought-resilient water to our customers. We are committed to providing high-quality water to our customers. We are committed to providing high-quality water to our customers. We are committed to providing high-quality water to our customers.

"Clean water is the foundation of human health and the quality of life." — *John F. Kennedy*

With the District's commitment to providing high-quality water to our customers, we are committed to providing high-quality water to our customers. We are committed to providing high-quality water to our customers.

3 PROTECTING WATER

High water temperatures can be a problem for the fish that live in the lake. High water temperatures can be a problem for the fish that live in the lake. High water temperatures can be a problem for the fish that live in the lake.

"Water is not just a commodity, it's a right." — *Robert Kennedy*

The District's commitment to providing high-quality water to our customers is a commitment to providing high-quality water to our customers. We are committed to providing high-quality water to our customers.

4 SAVING WATER

Water is precious. Water resources are limited. We are committed to providing high-quality water to our customers. We are committed to providing high-quality water to our customers. We are committed to providing high-quality water to our customers.

"The District's commitment to providing high-quality water to our customers is a commitment to providing high-quality water to our customers. We are committed to providing high-quality water to our customers."

The District's commitment to providing high-quality water to our customers is a commitment to providing high-quality water to our customers. We are committed to providing high-quality water to our customers.

WELCOME

NORTH TEXAS MUNICIPAL WATER DISTRICT

LAKE OPERATIONS CENTER

WELCOME TO BOIS D'ARC LAKE!

You are visiting the first major lake built in Texas in decades. Bois d'Arc Lake is one of six lakes that the North Texas Municipal Water District uses to supply water to almost 2 million people. The lake will provide drinking water for generations to come. It's also a great place to boat, swim, and fish. We invite you to learn more about water—the one thing none of us can live without.



WATER IS LIFE

Nothing is more fundamental to life than water. We need it to survive, bathe, grow food, keep our yards healthy and the economy humming.

"We forget the water cycle and the life cycle are one." – Jacques Cousteau

All the water that we have – or ever will have – is already on the planet. And it recycles over and over. In North Texas, rain fills our streams, creeks, and lakes. It's then piped and treated to make it safe for our uses. After being used, it's treated again and returned to the environment to start the cycle again.

DID YOU KNOW?

- About 71% of the earth's surface is covered with water
- 97% of all water on earth is salt water





PROVIDING WATER

The North District Municipal District was founded in the 1950s when a period of devastating droughts encouraged local leaders to work together to build and share a regional water system. That collaboration transformed North Texas.

“Anyone who can solve the problems of water will be worthy of two Nobel Prizes, one for peace and one for science.” – John F. Kennedy

Today, the District provides safe drinking water for 80 communities spanning 2,200 square miles, twice the size of Rhode Island. On average, we treat and deliver more than 90 billion gallons of water every year. Getting water to your tap involves many steps and the dedicated expertise of many people.



PROTECTING WATER

Being water stewards starts with taking care of the land that rainwater falls upon and flows across. Anything on that land, including fertilizers, pesticides, and even pet waste, can eventually end up in the lake. Protecting water quality starts with preventing contaminants from entering the water.

“When we try to pick out anything by itself, we find it hitched to everything else...” – John Muir

Since Bois d’Arc Lake’s primary purpose is to supply drinking water, it’s important that activities on and around the lake don’t compromise the water’s quality. The people living near the lake and visitors all play an important role in protecting the lake’s water.





SAVING WATER

Water is a precious, finite resource. Every drop counts. North Texas is among the fastest growing U.S. regions. Reducing the amount of water we use and increasing efficiency helps stretch limited supplies. The District is counting on water savings of up to 25% to meet our needs.

“All the water that will ever be is, right now.”

– National Geographic

The more people know, the less water they use. The District partners with the communities it serves and other water providers to educate the public on many ways to conserve water.

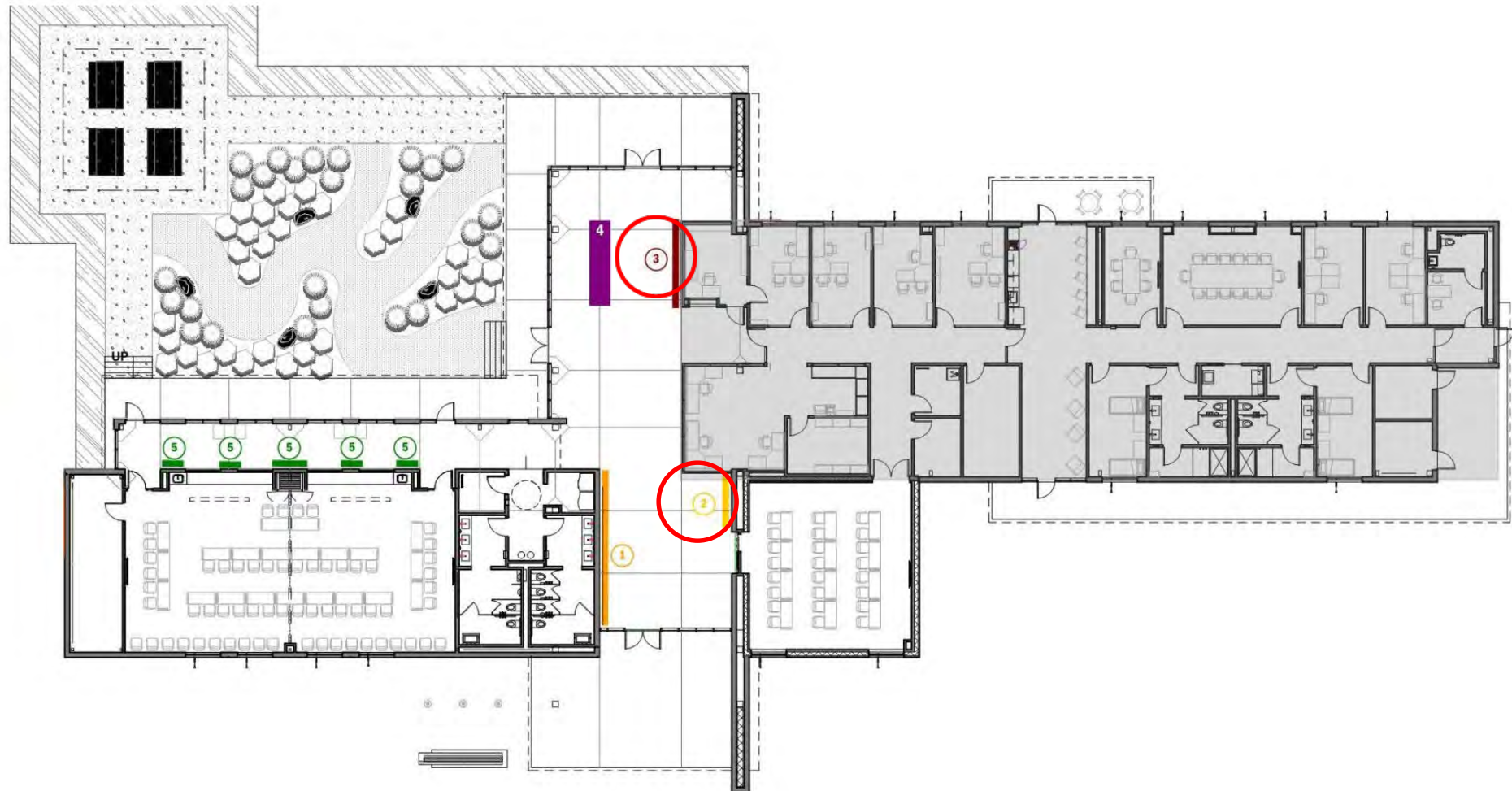
DID YOU KNOW?

- Water regulates the earth's temperature
- Human bodies are mostly made of water





BOIS D'ARC LAKE OPERATIONS CENTER EXHIBITS



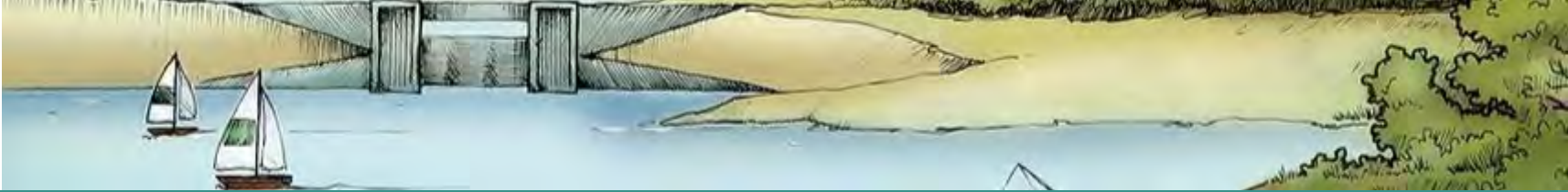


WELCOME DESK





NORTH
TEXAS
MUNICIPAL
WATER
DISTRICT



BOIS D'ARC LAKE CONSTRUCTION

The rendering shows a wall with a brick pattern on the left and a horizontal ribbed pattern on the right. A large informational display is mounted on the wall. The display includes a map of Bois d'Arc Lake with labels for 'DAM', 'RAW WATER PUMP STATION', 'NEW FM 897 RD AND BRIDGE', 'BOIS D'ARC LAKE', 'BONHAM', and 'BOIS D'ARC CREEK'. The map also shows 'THE TOWN OF BOIS D'ARC' and 'US 75'. The main title on the display is 'A LEGACY OF WATER BUILDING BOIS D'ARC LAKE'. Below the map is a 'DECADES IN THE MAKING' timeline from 1951 to 2022. To the left of the timeline is a '50" TV MONITOR with rotating images + videos' showing construction. To the right of the timeline are silhouettes of a child and an adult. A vertical dimension line on the right indicates a height of 9'-0".

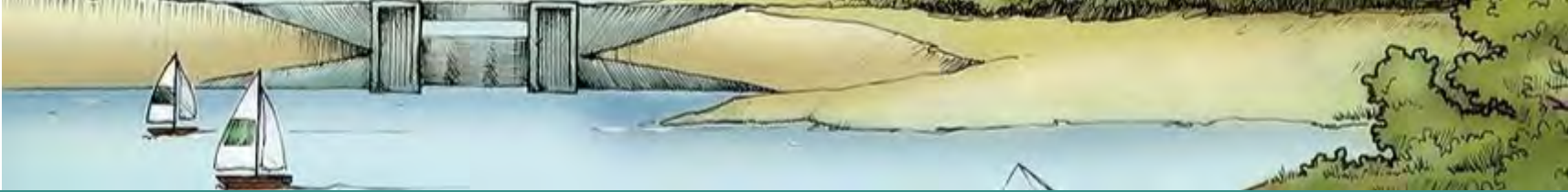
A LEGACY OF WATER BUILDING BOIS D'ARC LAKE

DECADES IN THE MAKING

- 1951 - Construction of the dam begins
- 1954 - Completion of the dam
- 1972 - Completion of the lake
- 1973 - Completion of the lake
- 2001 - Completion of the lake
- 2003 - Completion of the lake
- 2010 - Completion of the lake
- 2018 - Completion of the lake
- 2019 - Completion of the lake
- 2020 - Completion of the lake
- 2021 - Completion of the lake
- 2022 - Completion of the lake

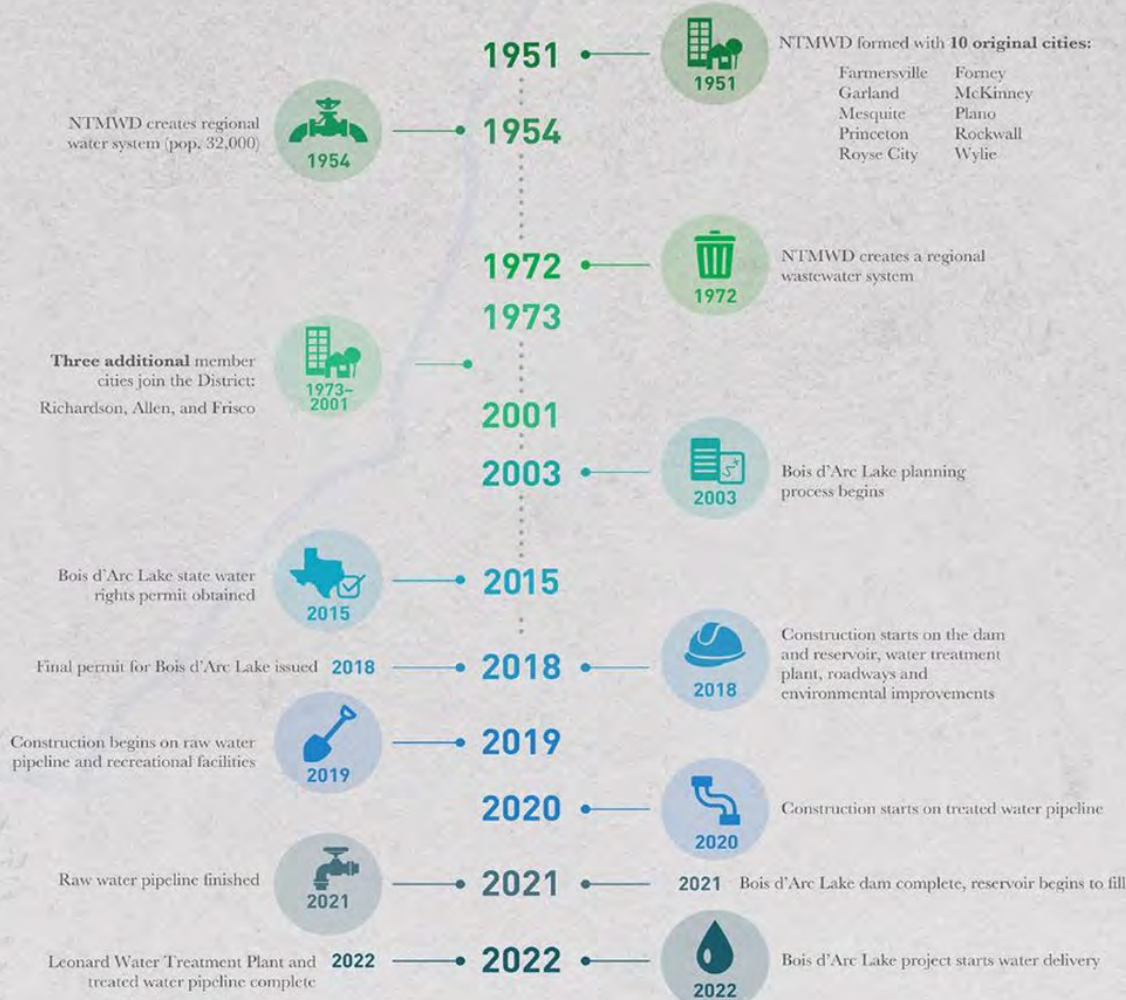
50" TV MONITOR
with rotating images + videos

9'-0"



DISTRICT AND LAKE CONSTRUCTION TIMELINE

DECADES IN THE MAKING



- BOAT RAMPS
- ★ LAKE OPERATIONS CENTER

GETTING WATER TO YOU

Water flowing from North Texas taps starts here. But before it gets to the faucet, it goes through several steps.

BOIS D'ARC LAKE

DRINKING WATER. FUN WATER.

Bois d'Arc Lake is a man-made lake built to supply drinking water. Owned and operated by the North Texas Municipal Water District, the lake can provide an average of 108 million gallons of water each day – enough water for 6 million daily showers!

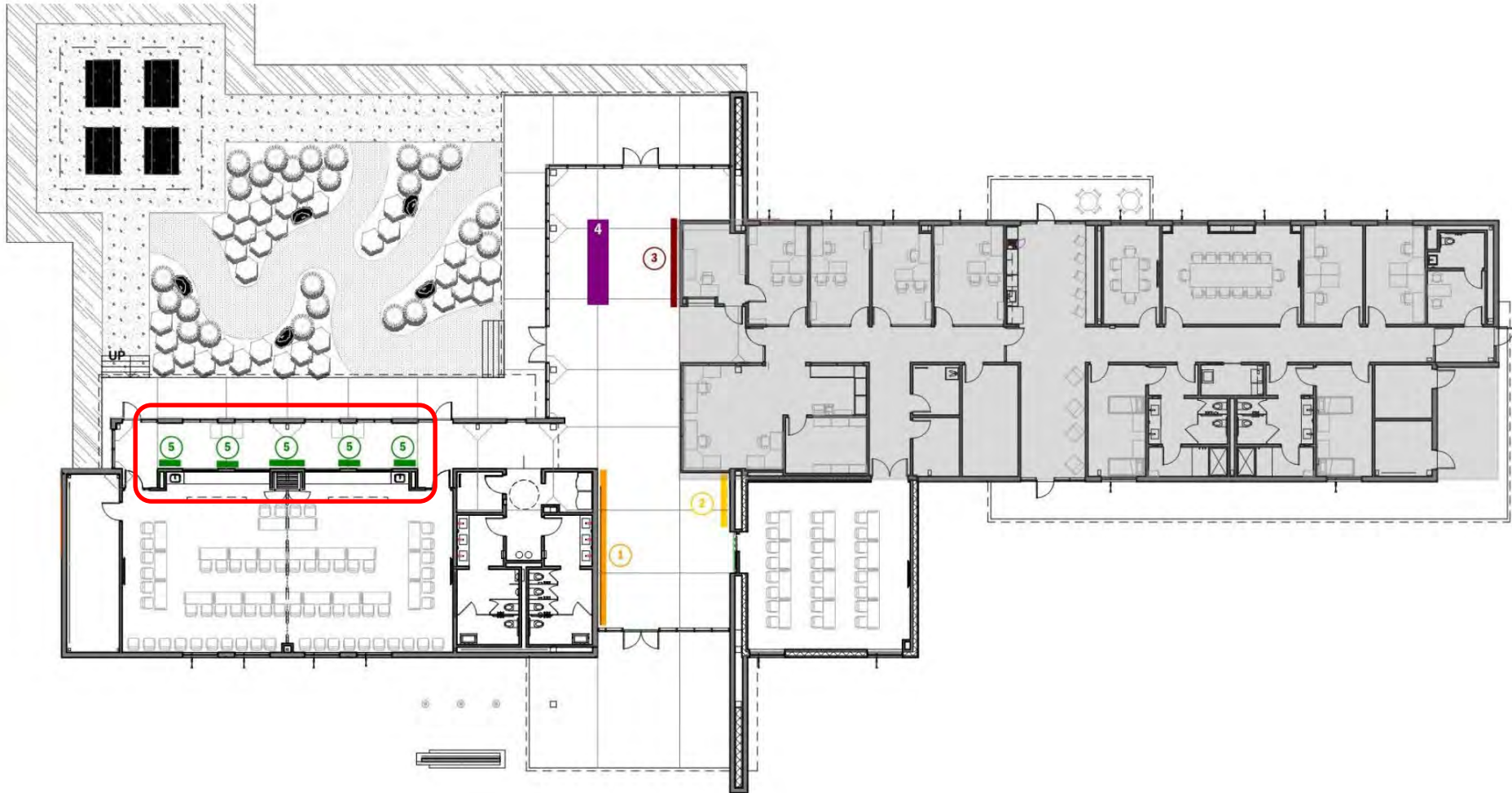
The lake spans 26 square miles and ranges in depth up to 70 feet. Stocked with specially bred trophy bass, Bois d'Arc Lake is an ideal destination for fishing, water sports and wildlife viewing and an economic boost to Fannin County.

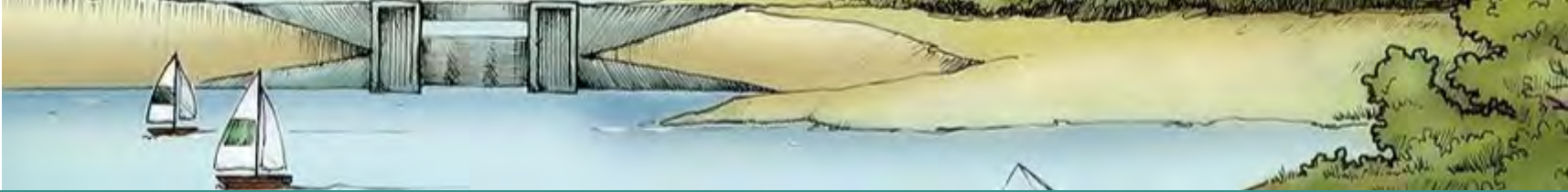
DID YOU KNOW?

- Lake and water treatment/delivery system built in 4 years
- 10 million+ worker hours to build
- 60 miles of underground pipe installed
- 2-mile long, 90-foot tall earthen dam

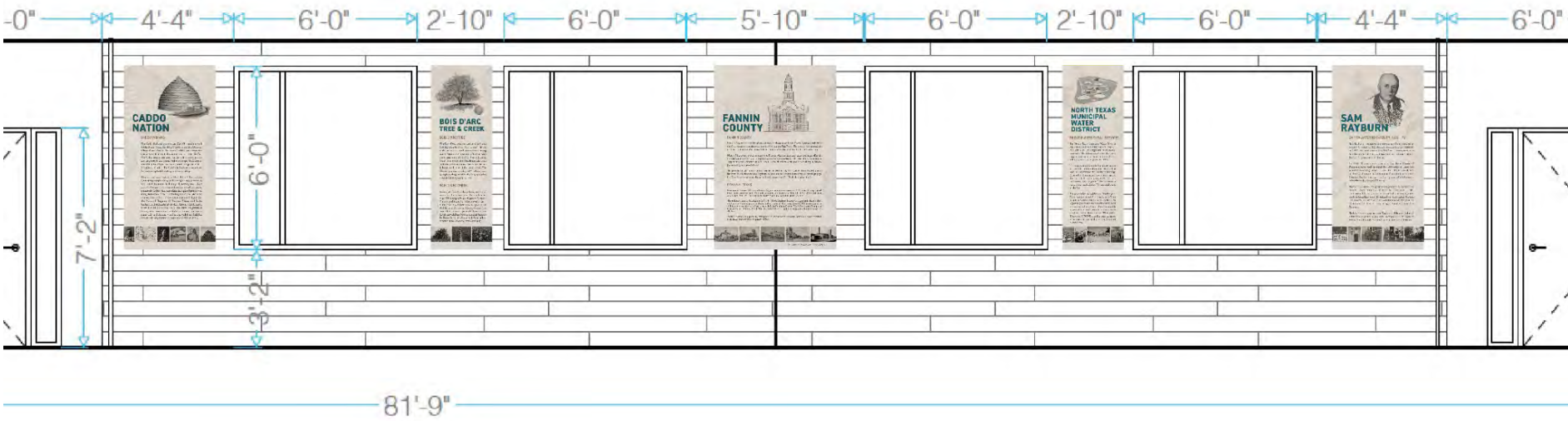


BOIS D'ARC LAKE OPERATIONS CENTER EXHIBITS





HISTORICAL PANELS





CADDO NATION

CADDO INDIANS

The Caddo Indians (pronounced Cad-Oh) are aboriginal to Oklahoma, Texas, Northern Mexico, Louisiana, Arkansas, Missouri, and Kansas. The name Caddo comes from the native word Kadohadacho, which means "real chiefs." The Caddo people developed a successful farming economy growing corn, beans, squash and other crops. Their homes resembled beehives and were made of grass over a framework of poles. The Caddo Indians were renowned for their exceptional pottery and bow making.

Prior to the construction of Bois d'Arc Lake, Fannin County was considered to be the marginal western-extent of Caddo habitation. Archeological investigations done prior to the reservoir's construction uncovered numerous prehistoric Caddo sites, extending the region further west along Bois d'Arc Creek, including where the lake now resides. Among those, 6 sites were determined eligible for the National Register of Historic Places and State Antiquities Landmarks given their historic significance. More than 500,000 artifacts were uncovered and preserved during these excavations -- including ceramics, stone tools, plant seeds, and charcoal -- and have provided new insights into the life of prehistoric Caddo in Northeast Texas.



BOIS D'ARC TREE & CREEK

BOIS D'ARC TREE

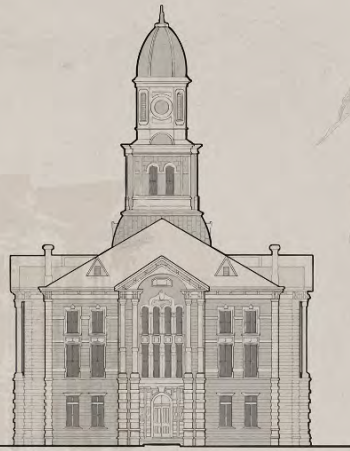
The Bois d'Arc [pronounced bō-dā(r)k and literally translated as "bow wood"] tree is native to this area and known for its strong wood. Prior to the invention of barbed wire, these trees were planted for livestock pens. Some trees removed to build the lake were anchored down and now serve as underwater habitat for fish to shelter and breed. The District planted a variety of 5 million trees to replace those within the lake footprint removed during construction.

BOIS D'ARC CREEK

Bois d'Arc Creek is the primary source of water for Bois d'Arc Lake. The creek starts near Whitewright in southeastern Grayson County and flows 60 miles, mostly across Fannin County, before it meets up with the Red River at the Lamar County border. The area where it converges with Honey Grove Creek provided the ideal geological features for Bois d'Arc Lake. About 65 billion gallons of water flow down the creek annually.



FANNIN COUNTY



FANNIN COUNTY

Fannin County is one of the oldest counties in the state of Texas. Daniel Rowlett established the first permanent settlement here in 1836 on the Red River. The county was created the next year and named for James Walker Fannin, who was killed in the Texas Revolution.

Many of the county's early settlers were farmers who raised cotton, corn and hogs. After the railroad came in 1873, cotton production greatly increased. The prosperity from cotton supported local businesses as well as education, churches, social and fraternal organizations, philanthropy and government.

The population of Fannin County peaked in 1900 at 51,793. Today, about 35,000 people live here. In addition to Sam Rayburn, notable natives include Erwin Smith (photography), Dr. Tom Spies (medicine), Roberta Dodd (music) and Ela Hockaday (education).

BONHAM, TEXAS

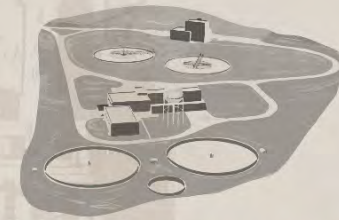
Bonham is the seat of Fannin County's government and dates to 1837, when Bailey English built a fort about one mile from the city's current downtown. First called Bois d'Arc, the town was renamed in 1844 after James Butler Bonham, who died at the Alamo.

The railroad came to Bonham in 1873. By 1885, Bonham boasted colleges and schools, three weekly newspapers, grain and saw mills, a power plant and about 2,300 inhabitants. In addition to agriculture, industry included the Bonham Cotton Mill, Southwest Pump and General Cable. During World War II, Jones Field was a pilot training camp for the U.S. Army Air Forces.

Today Bonham is a growing city proud to showcase its history, economic opportunities, recreation and small-town quality of life.



**Photos provided by Fannin County Museum of History.*



NORTH TEXAS MUNICIPAL WATER DISTRICT

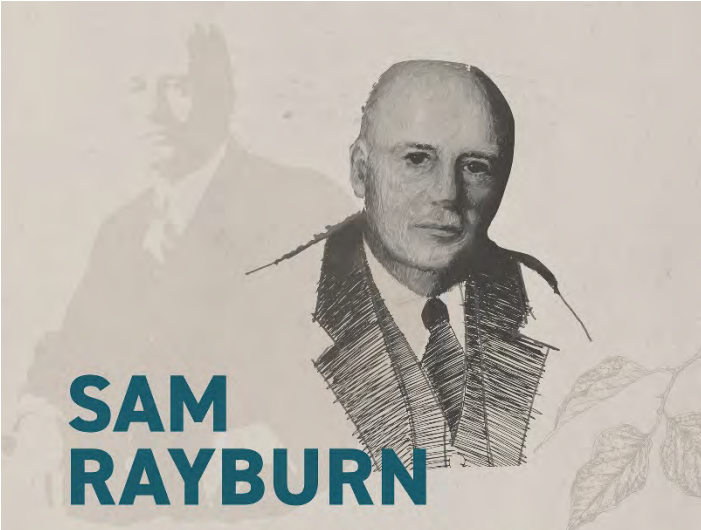
PROVIDING ESSENTIAL SERVICES

The North Texas Municipal Water District was created in 1951 by 10 North Texas cities with a shared vision for growth and economic prosperity. The cities needed to develop water supplies and reduce reliance on groundwater following severe drought in the 1950s.

No one city could provide the infrastructure to secure the amount of water needed on their own, so they formed the District to leverage the combined resources of their entire region. The Texas legislature approved the District, and water service began in 1956. Wastewater services were added in the '70s and solid waste in the '80s.

The population served by the District grew from 32,000 in 1956 to nearly 2 million people in North Texas by 2020. By sharing a regional system and the investments needed to operate and maintain it, the cities are able to provide vital and cost-effective services to residents and businesses across 10 counties. Today, the NTMWD member cities continue to be instrumental in shaping the future of North Texas.





SAM RAYBURN

SAM TALIAFERRO RAYBURN, 1882–1961

Sam Rayburn—legislator, congressman and longtime speaker of the U.S. House of Representatives—was born in Tennessee in 1882. His family moved in 1887 to a cotton farm near Windom in Fannin County, Texas. Bonham eventually became Rayburn's permanent residence.

In 1906, Rayburn won a seat in the Texas House of Representatives and attended the University of Texas law school between legislative sessions. In 1912, he was elected to the U.S. Congress as a Democrat from the Fourth Texas District. Rayburn served as either speaker of the house or minority leader for over 20 years.

Rayburn's personal integrity was legendary: he accepted no money from lobbyists. Within his Northeast Texas congressional district, he was instrumental in advancing many projects including rural electrification, roads, lakes Texoma and Lavon and the Veterans Administrative Hospital in McKinney. He died of cancer at age 79 and was buried in Bonham.

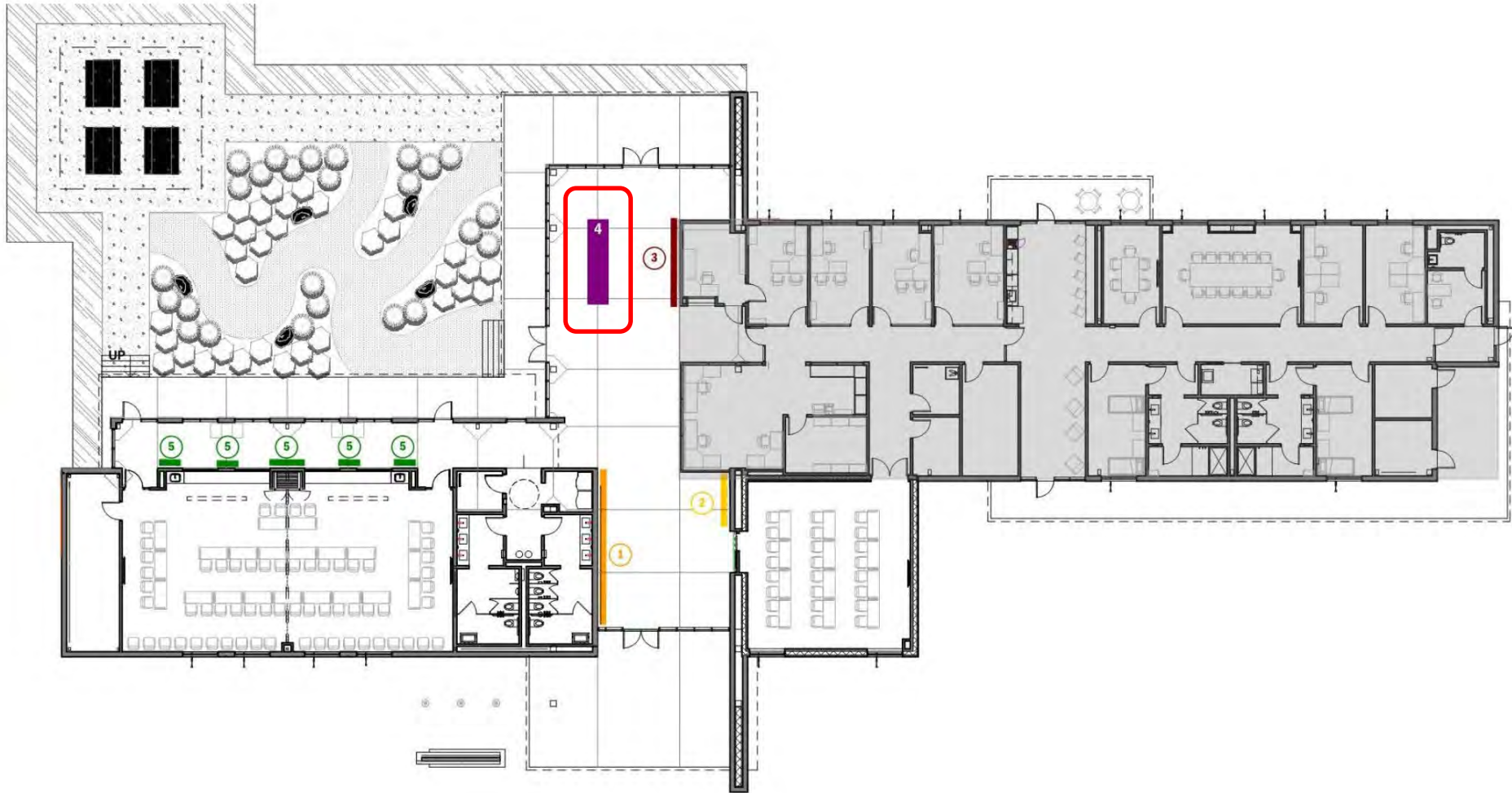
Today, visitors can explore Rayburn's life and political achievements at two museums in Bonham: the Sam Rayburn House State Historic Site and the Sam Rayburn Museum.



**Courtesy of the Sam Rayburn House State Historic Site, Texas Historical Commission.*

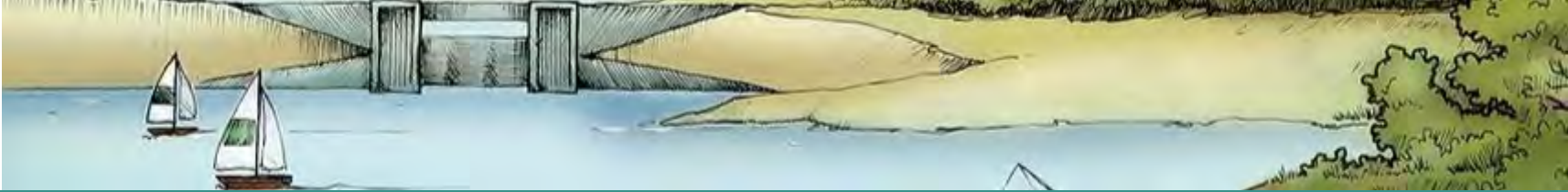


BOIS D'ARC LAKE OPERATIONS CENTER EXHIBITS

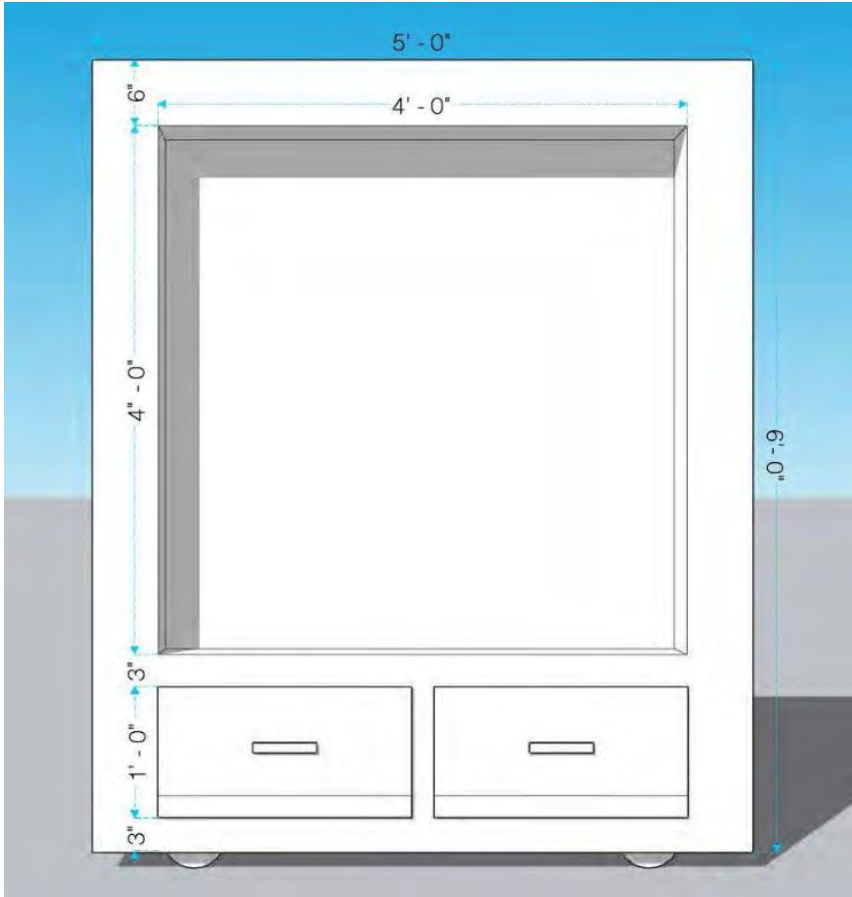




NORTH
TEXAS
MUNICIPAL
WATER
DISTRICT



ROTATING DISPLAYS





NORTH TEXAS MUNICIPAL WATER DISTRICT
BOIS D'ARC LAKE OPERATIONS CENTER

Established on March 31, 2021

BOARD OF DIRECTORS

President: Larry Parks – Rockwall

Vice President: Darrell Grooms – Forney

Secretary: Phil Dyer – Plano

Past President: Don Gordon – Garland

Joe Farmer – Allen

Joe Joplin – McKinney

John Murphy – Richardson

James Kerr – Allen

Robert Appolito – McKinney

John Sweeden – Richardson

George Crump – Farmersville

Terry Sam Anderson – Mesquite

Chip Imrie – Rockwall

John Carr – Forney

Brenda Jean Patrick – Mesquite

David Hollifield – Royse City

Richard Peasley – Frisco

Ron Kelley – Plano

Blair Johnson – Royse City

Lynn Shuyler – Frisco

Marlo Obrera – Princeton

Keith Stephens – Wylie

Don Gordon – Garland

Vacant – Princeton

Marvin Fuller – Wylie

Jack May – Garland

EXECUTIVE STAFF

Rodney Rhoades
Interim Executive Director

Mike Rickman
Deputy Director

Cesar Baptista
Deputy Director

PACHECO KOCH CONSULTING ENGINEERS — BRW ARCHITECTS — AUSTIN BRIDGE AND ROAD



AGENDA

Discussion Items

- C. Opportunity for Committee members to provide feedback on Water Committee meeting**



AGENDA

Discussion Items

- D. Opportunity for Committee members to request potential future agenda items
(No substantive discussion of items will take place at this time)**

Adjournment