



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



John Bunker Sands Wetland Center

WATER COMMITTEE MEETING

MAY 25, 2022 (Via Videoconference)



AGENDA

ACTION ITEMS

- A. Consider approval of Water Committee meeting minutes – April 27, 2022**

DISCUSSION ITEMS

- A. Lake Level Modeling and Drought Forecast update**
- B. Bois d'Arc Lake and reservoir yield discussion**
- C. Preliminary water operations key performance indicators**
- D. Opportunity for Committee members to provide feedback on Water Committee meeting or request potential future agenda items**



AGENDA

Opening Remarks

- A. Chairman/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



AGENDA

Action Items

- A. Consider approval of Water Committee meeting minutes – April 27, 2022**

Recommend approval of Water Committee meeting minutes



AGENDA

Discussion Items

A. Lake Level Modeling and Drought Forecast update

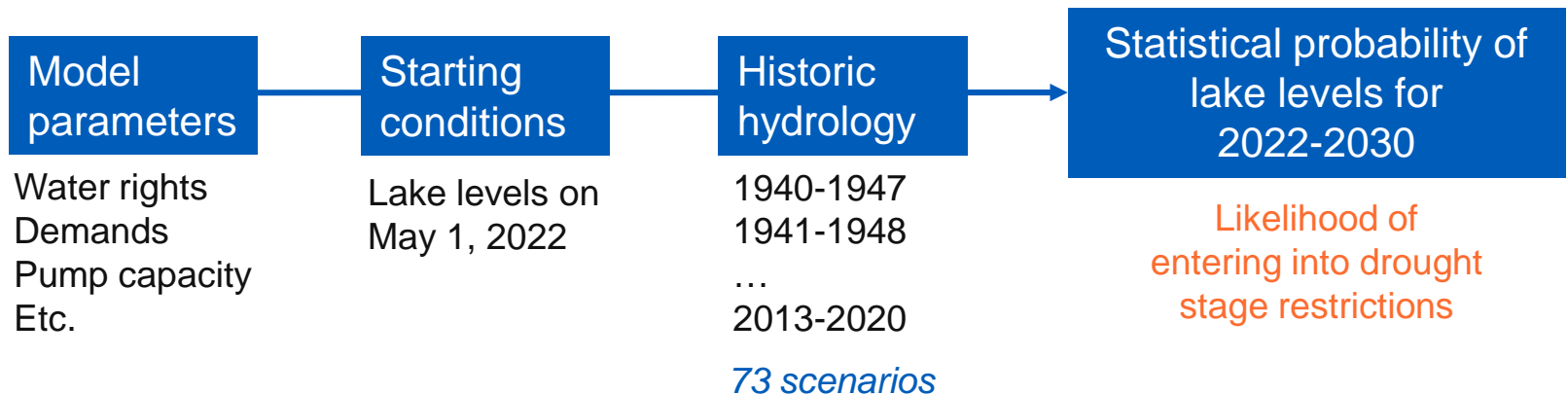


WATER SUPPLY MODELING OUTLOOK

Riverware Model for NTMWD Raw Water System

• Hydrology

- Accounts for water rights, pipeline and pump station capacities, and drought restrictions (when applicable)
- Utilizes historic weather, streamflow and lake elevation data for NTMWD water supply reservoirs from 1940-2020
- Model runs from 2022-2030 using each historic 8-year interval (73 total scenarios)





WATER SUPPLY MODELING OUTLOOK UPDATED MODEL

Major Assumptions

- **Basics**

- Model starts on May 1, 2022

Reservoir	4/30/2022 Elevation (ft)	Conservation Pool (ft)
Lavon Lake	491.97	492
Bois d'Arc Lake	513.55	534
Chapman Lake	437.81	440
Lake Bonham	564.36	565
Lake Ray Hubbard	435.28	435.50

- **Chapman Lake Estimates**

- NTMWD starting reservoir storage account of 85,536 ac-ft (out of 106,607 ac-ft authorized storage capacity) - Estimate
- NTMWD year to date diversions of 16,439 ac-ft



WATER SUPPLY MODELING OUTLOOK

Major Assumptions & Updates

- Current Leonard WTP Expansion Schedule



- Texoma System Capacity





WATER SUPPLY MODELING OUTLOOK

Major Assumptions & Updates

- **Chapman Lake**
 - Introduced 3 weeks of downtime for maintenance in January
- **Bois d'Arc Lake**
 - Adjusted pumping in lower zone from 60 MGD to 40 MGD due to Bois d'Arc Lake's current elevation
- **Lake Fork/Tawakoni**
 - Assumed interim supply *does* renew after October 2025



WATER SUPPLY MODELING OUTLOOK

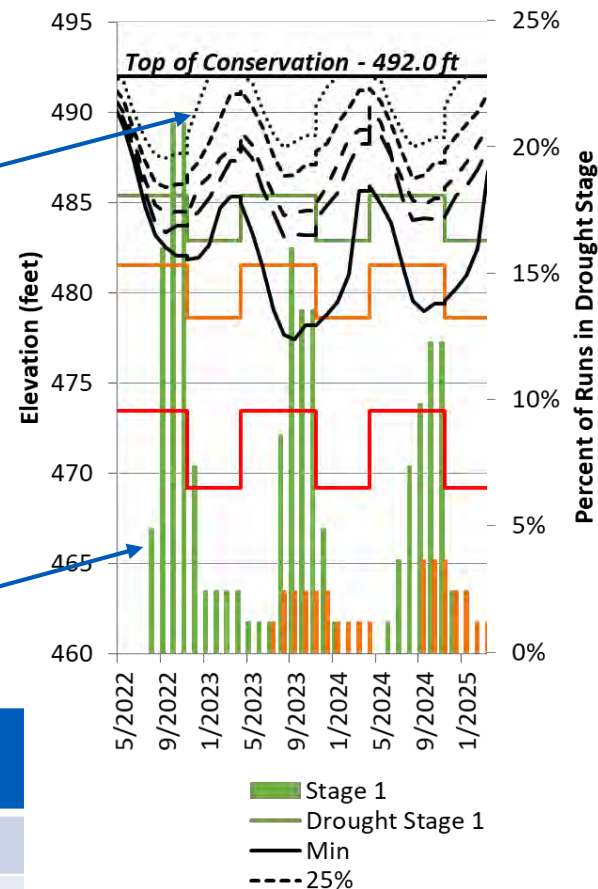
Model Outputs

• Lavon Lake Elevation Percentiles

- Shows water surface elevations
 - 5th Percentile = 95% of model runs were above this lake elevation
 - Minimum = Compilation of driest years in period of record (*worst-case, has not actually occurred previously*)

• Percent of Model Runs in Drought Stage

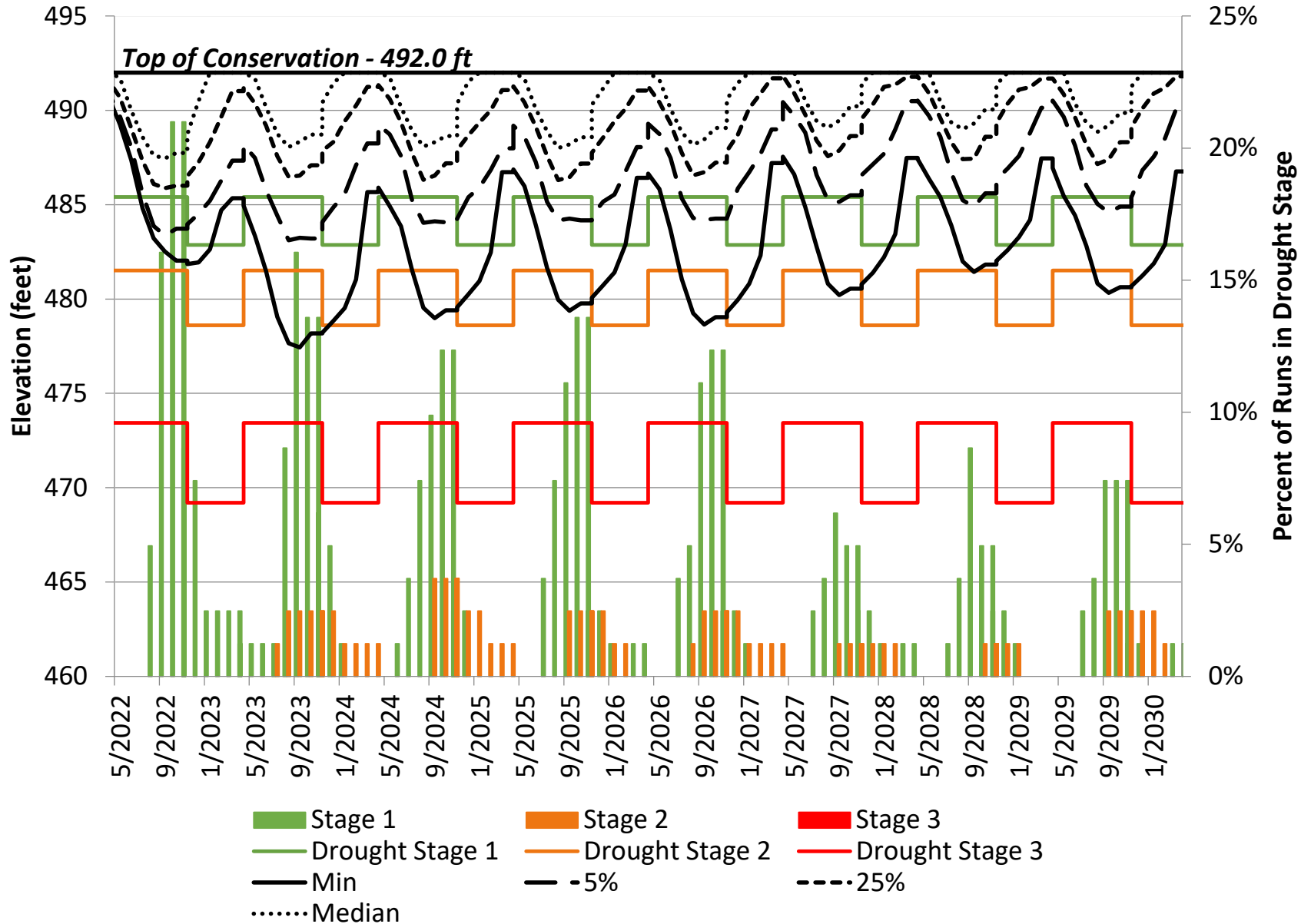
- Number of model runs that resulted in a Lavon Lake elevation below a drought stage trigger



NTMWD Drought Response Stage	Lavon Lake Trigger (April-October)	Lavon Lake Trigger (November-March)
Stage 1	485.4' MSL	482.9' MSL
Stage 2	481.5' MSL	478.6' MSL
Stage 3	473.4' MSL	469.2' MSL



May Start - Lavon Elevations - Monthly Percentiles





WATER SUPPLY MODELING OUTLOOK

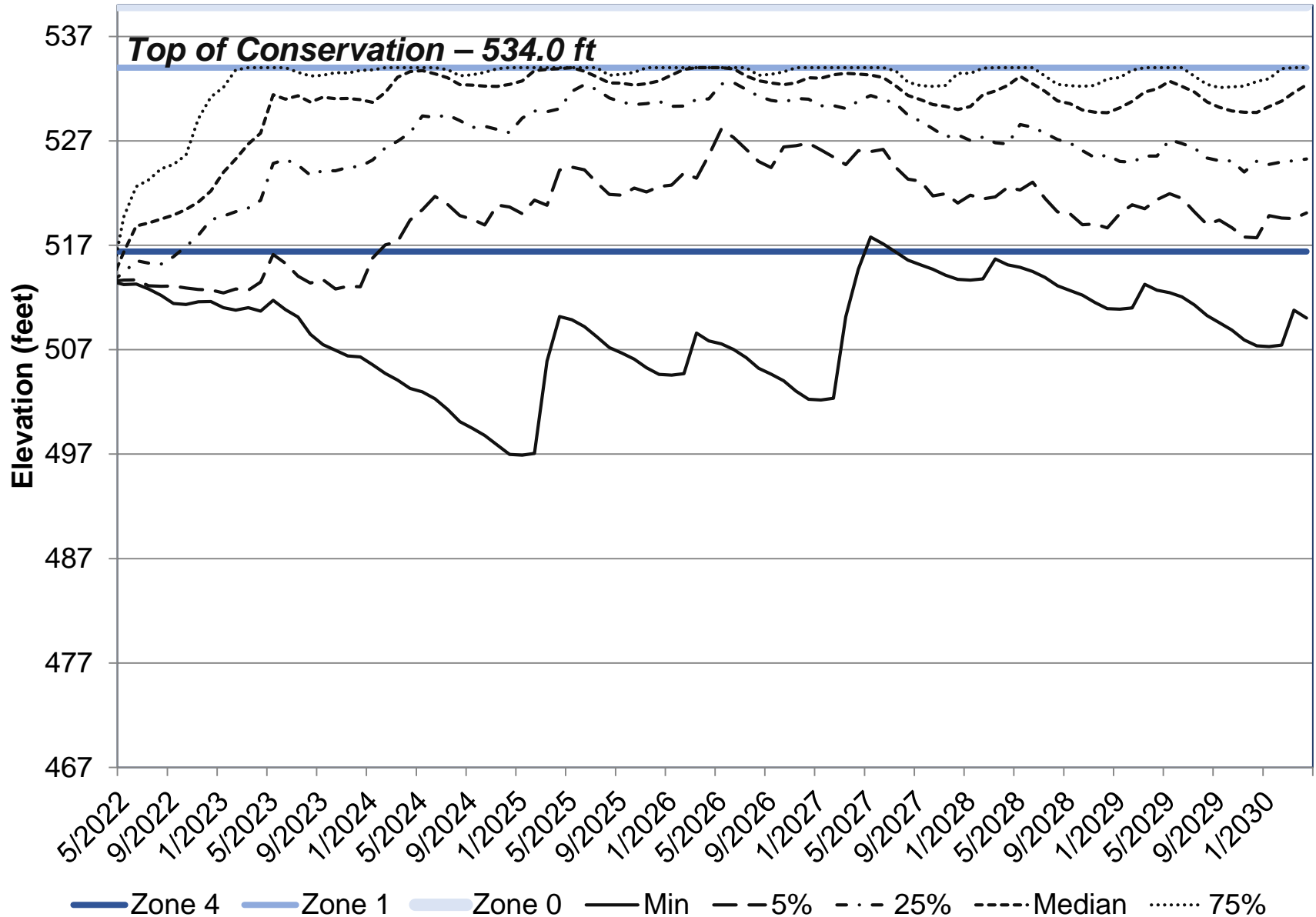
Model Run Results

- May 1st run avoids Drought Stage 2 and 3 this year

Date	No Drought Stage	Drought Stage 1
5/2022	100%	0%
6/2022	100%	0%
7/2022	100%	0%
8/2022	100%	0%
9/2022	95%	5%
10/2022	84%	16%
11/2022	79%	21%
12/2022	91%	9%

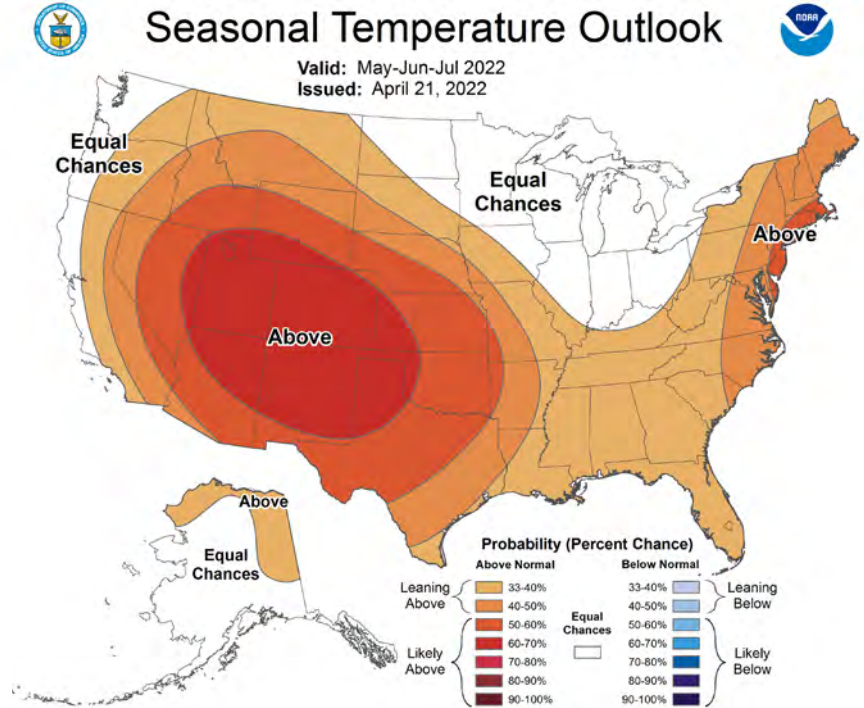
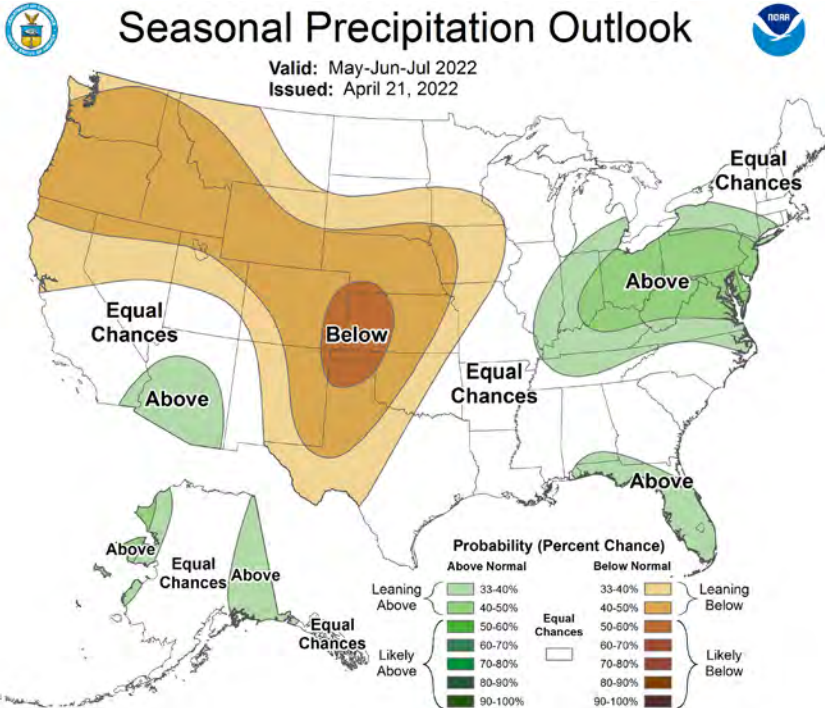
May Start - Bois d'Arc Elevations - Monthly Percentiles

RESULTS





3-MONTH OUTLOOK (NWS CLIMATE PREDICTION CENTER)



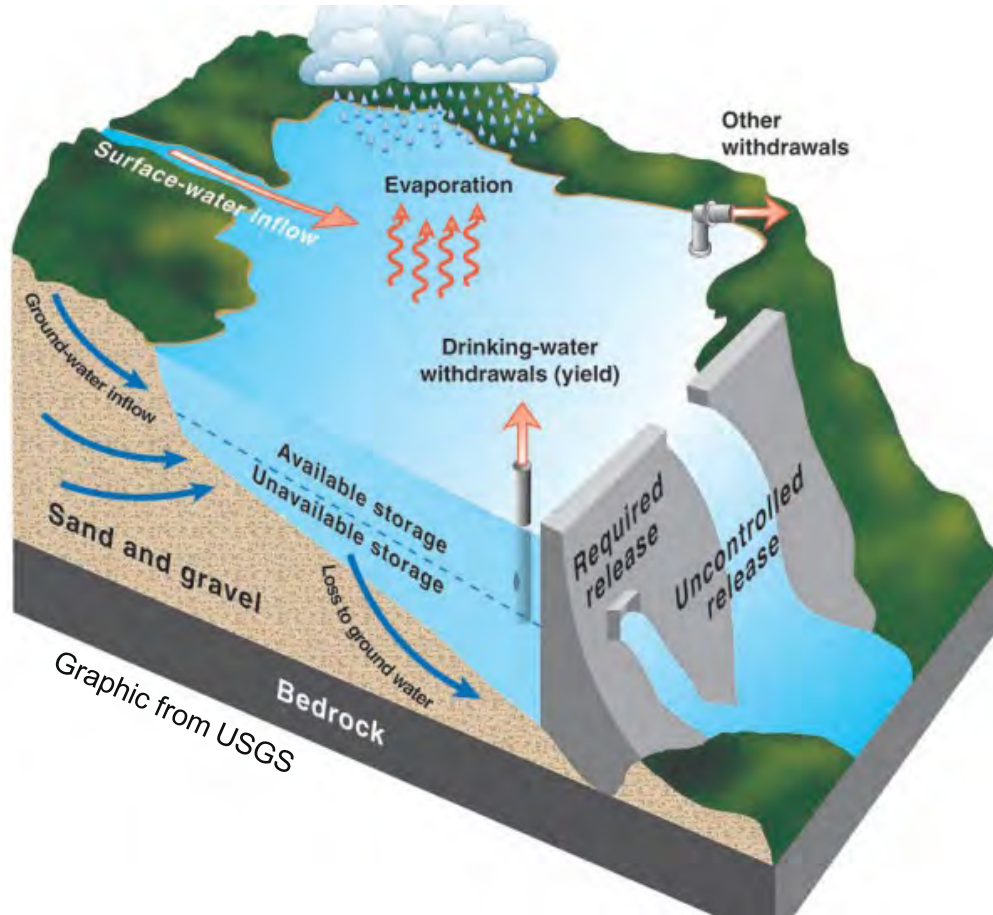
La Niña Advisory: La Niña conditions are still projected to continue though the summer months but the seasonal outlook for precipitation has improved



AGENDA

Discussion Items

B. Bois d'Arc Lake and reservoir yield discussion



Firm Yield: the maximum supply a reservoir can provide during a repeat of the drought of record.

How do we determine yield?

- Inflow
- Evaporation
- Spills/releases
- Groundwater interaction
- Withdrawals

How much can you take out every year such that available storage goes empty just before the worst historical drought ends?

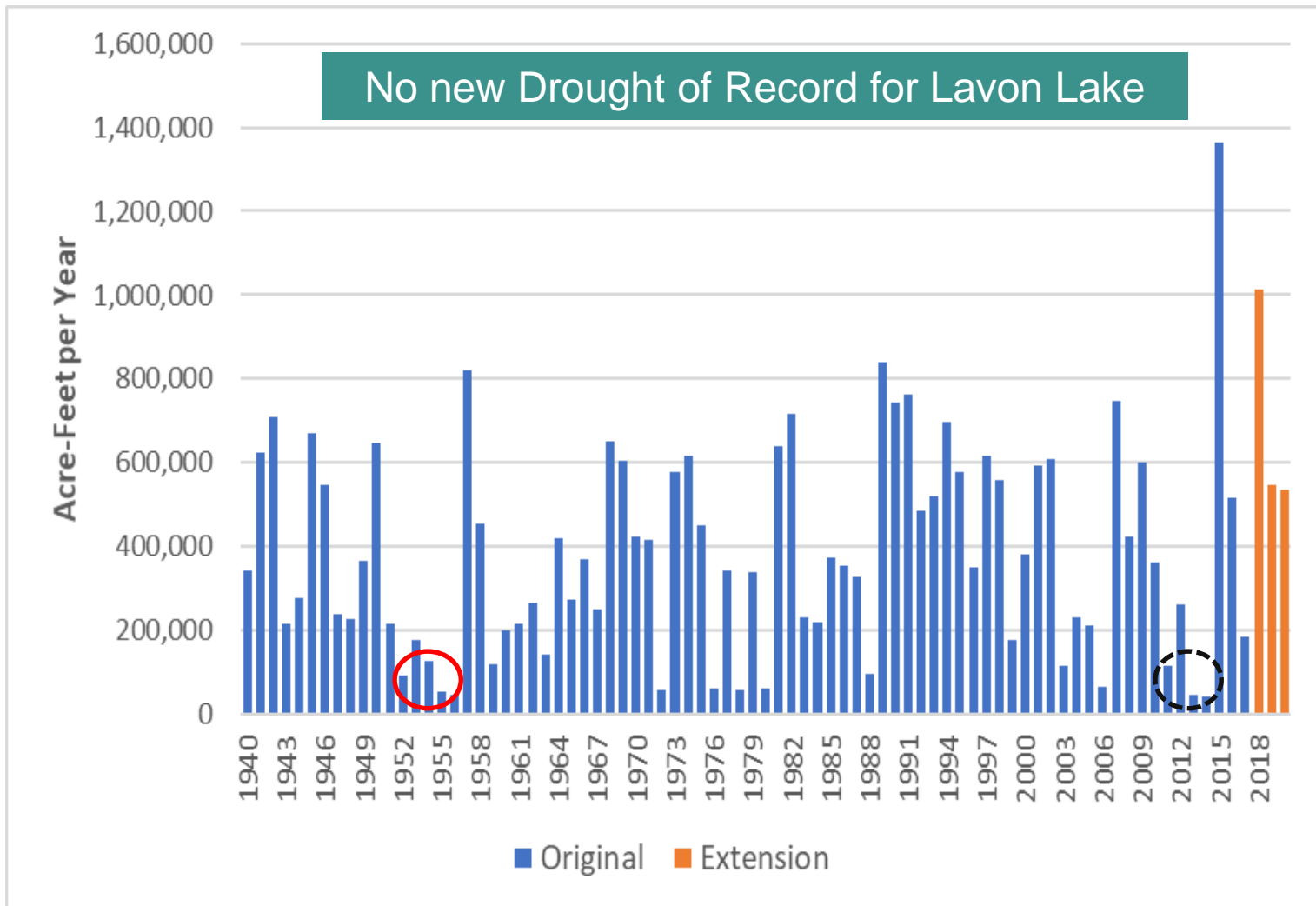
Why would you want use more than the firm yield of a reservoir?

- **Most years aren't drought years**
- **So, often you can use more water - known as overdrafting**
 - When you have multiple sources, you can operate as a system
 - Saves costs
 - Water quality
 - Drought stages



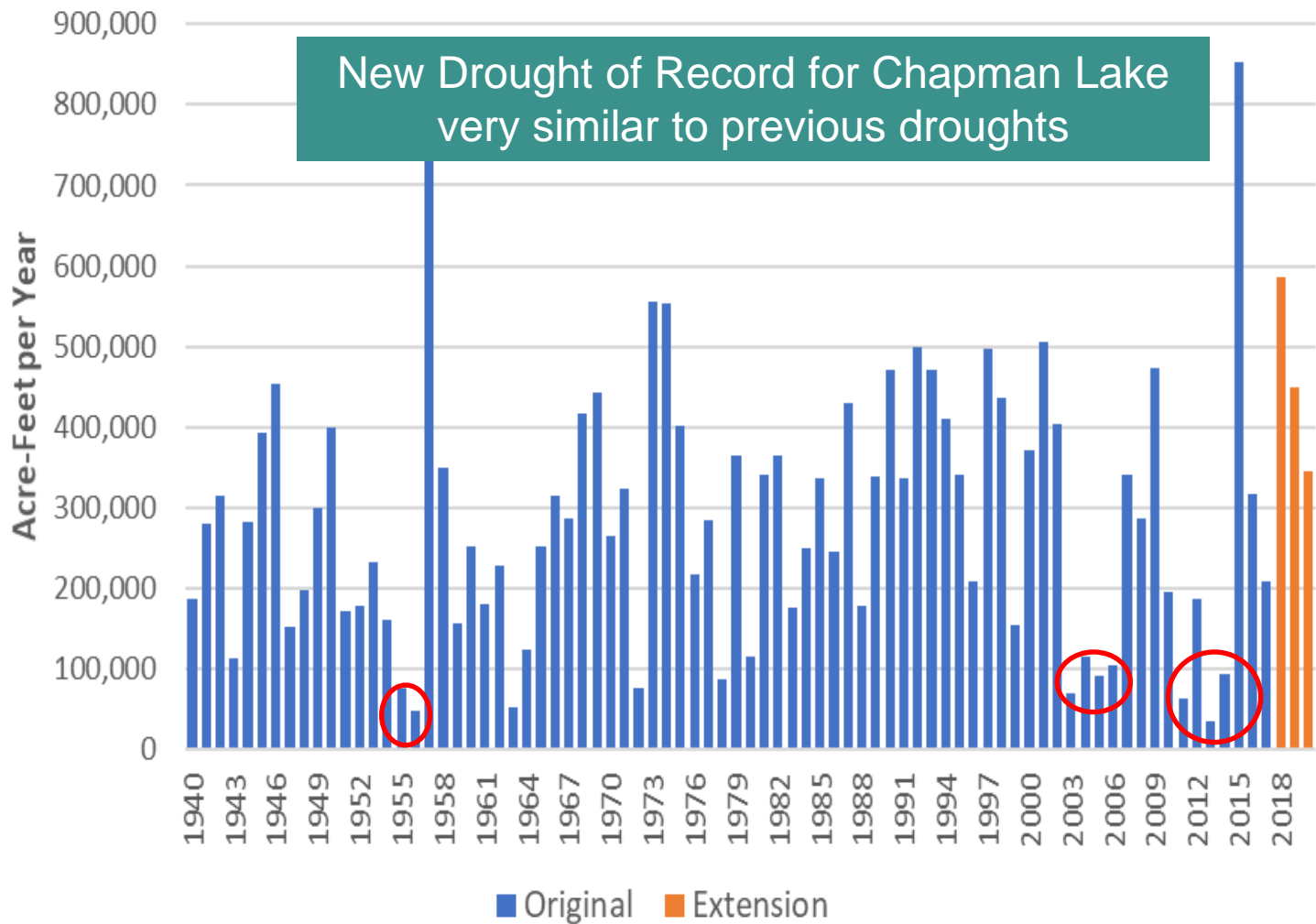


LAVON LAKE INFLOWS PER YEAR



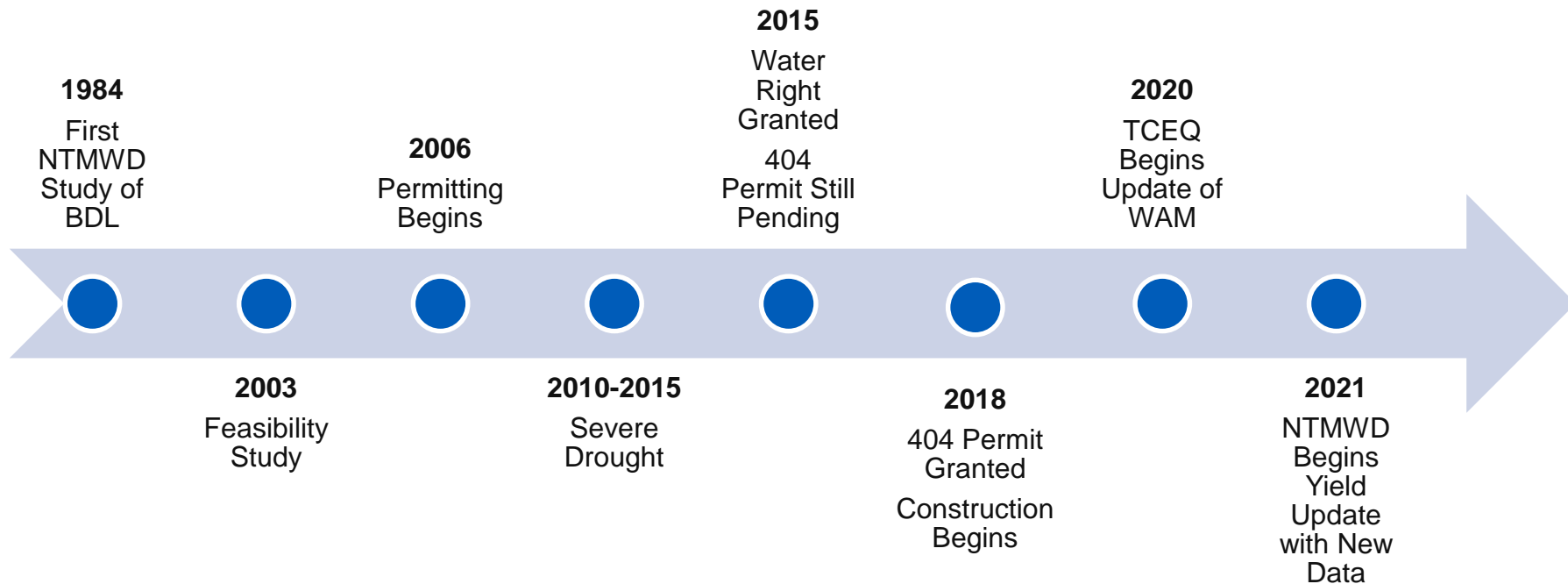


CHAPMAN LAKE INFLOWS PER YEAR



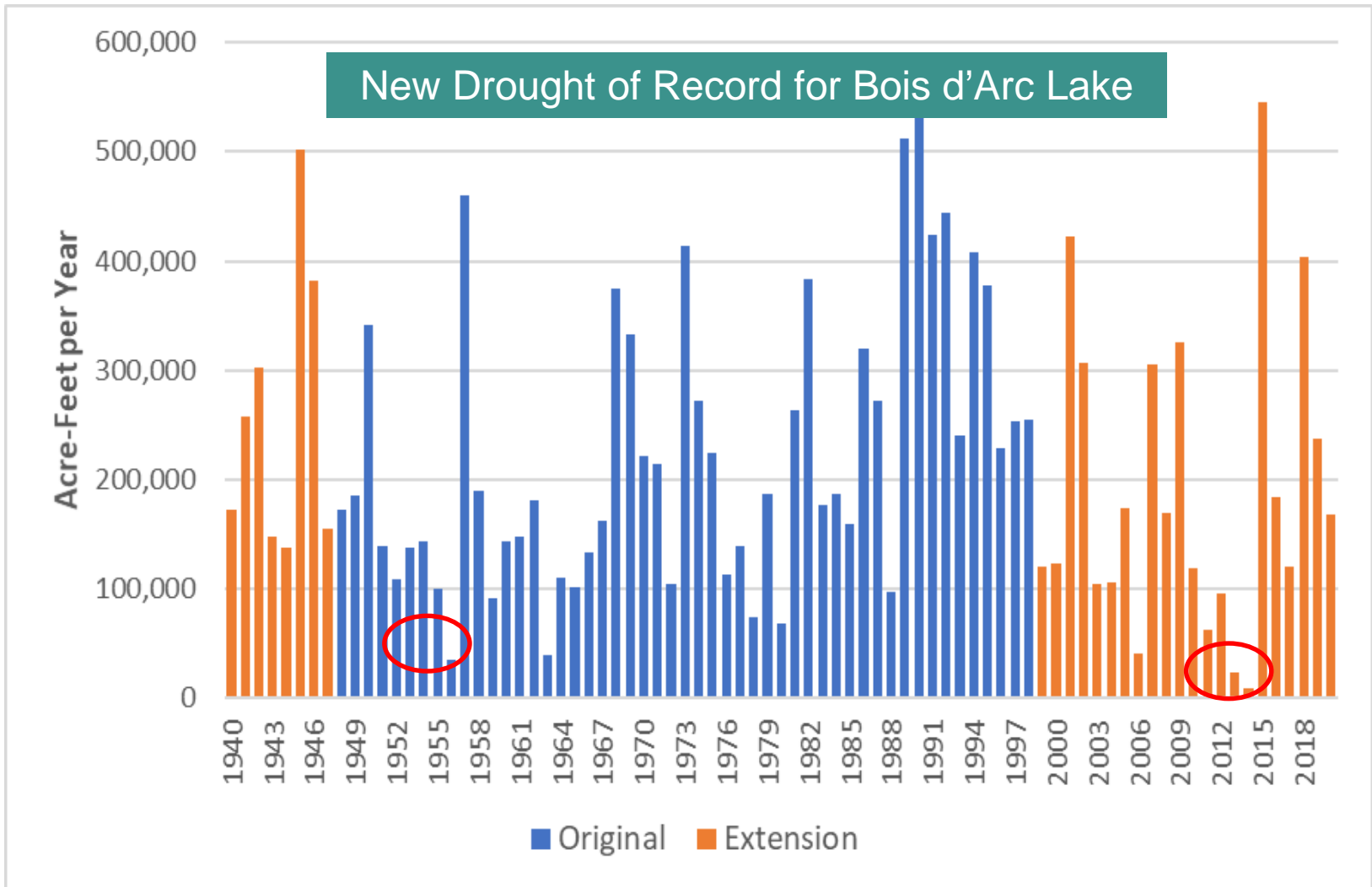


Bois d'Arc Lake - History



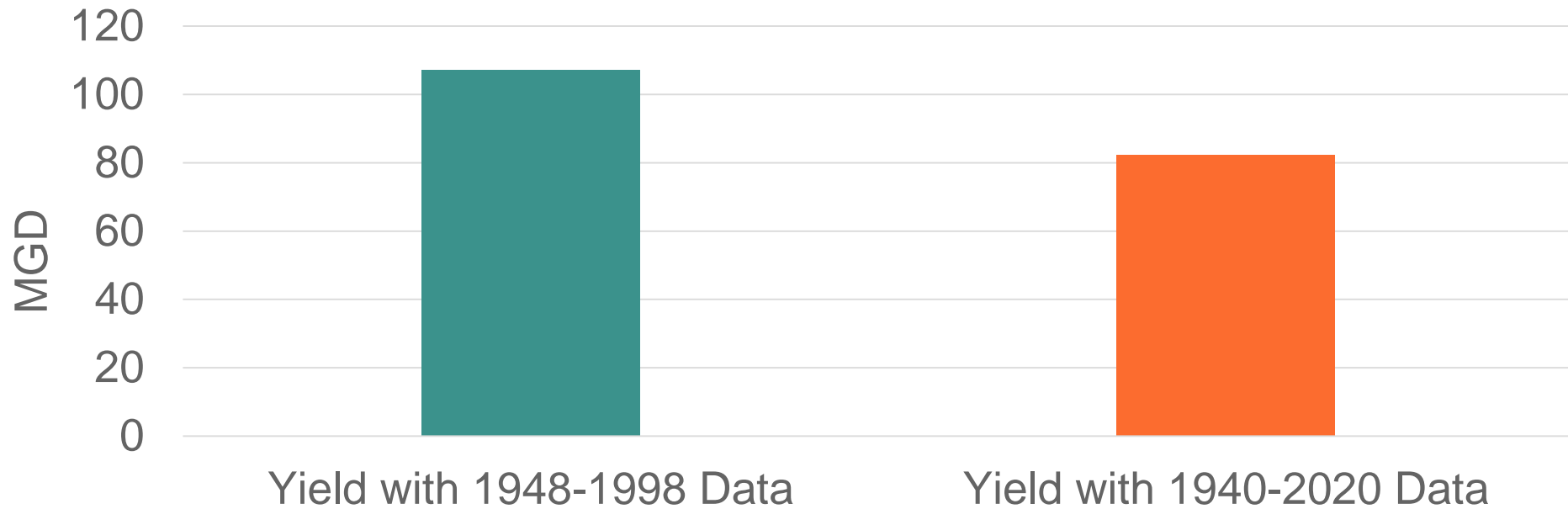


BOIS D'ARC LAKE INFLOWS PER YEAR





UPDATED FIRM YIELD FOR BOIS D'ARC LAKE

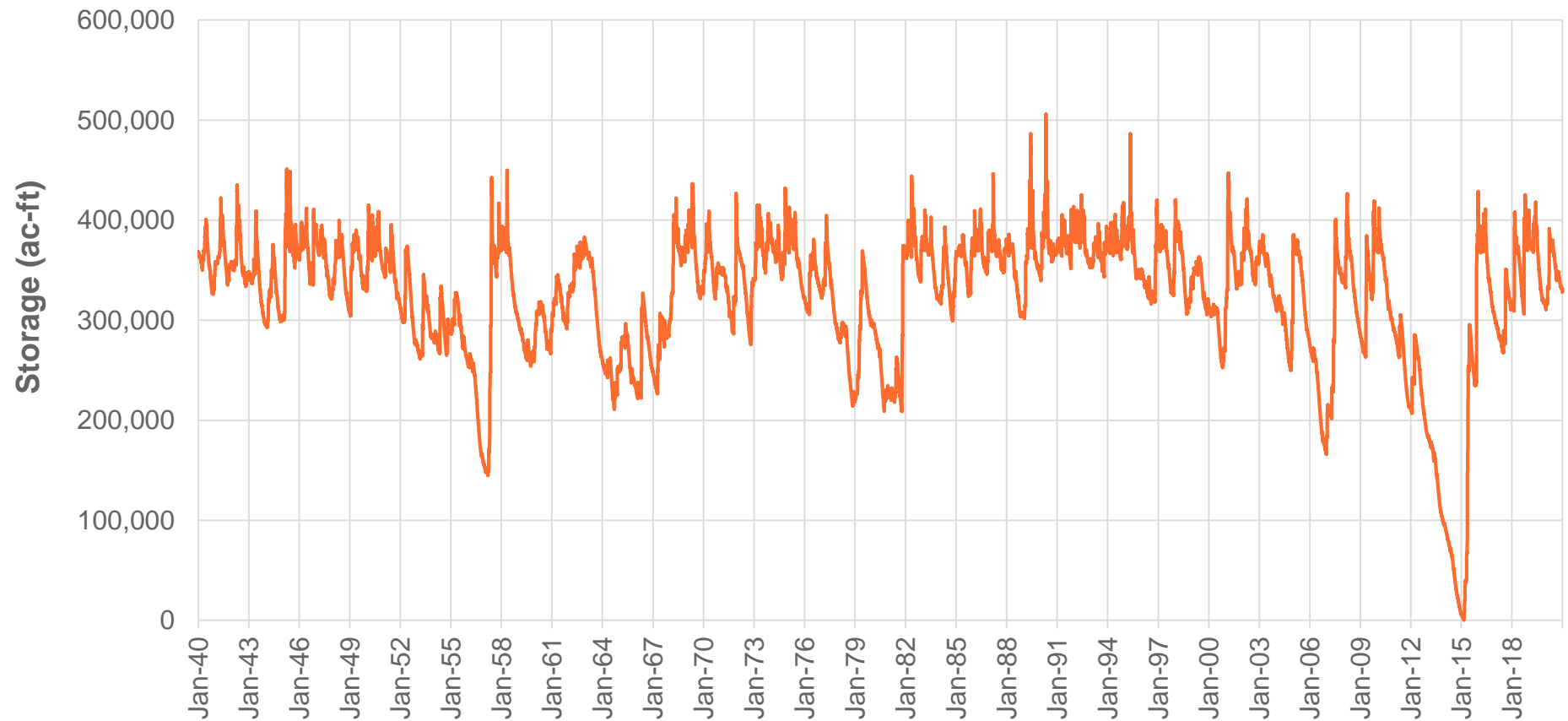


	Ac-Ft/Yr	MGD	% Change from 2006
Previous Hydrology (1948-1998)	120,100	107.1	--
Updated Hydrology (1940-2020)	92,300	82.3	-23%

Note: BDL Water Right 175,000 ac-ft/yr (156 MGD)

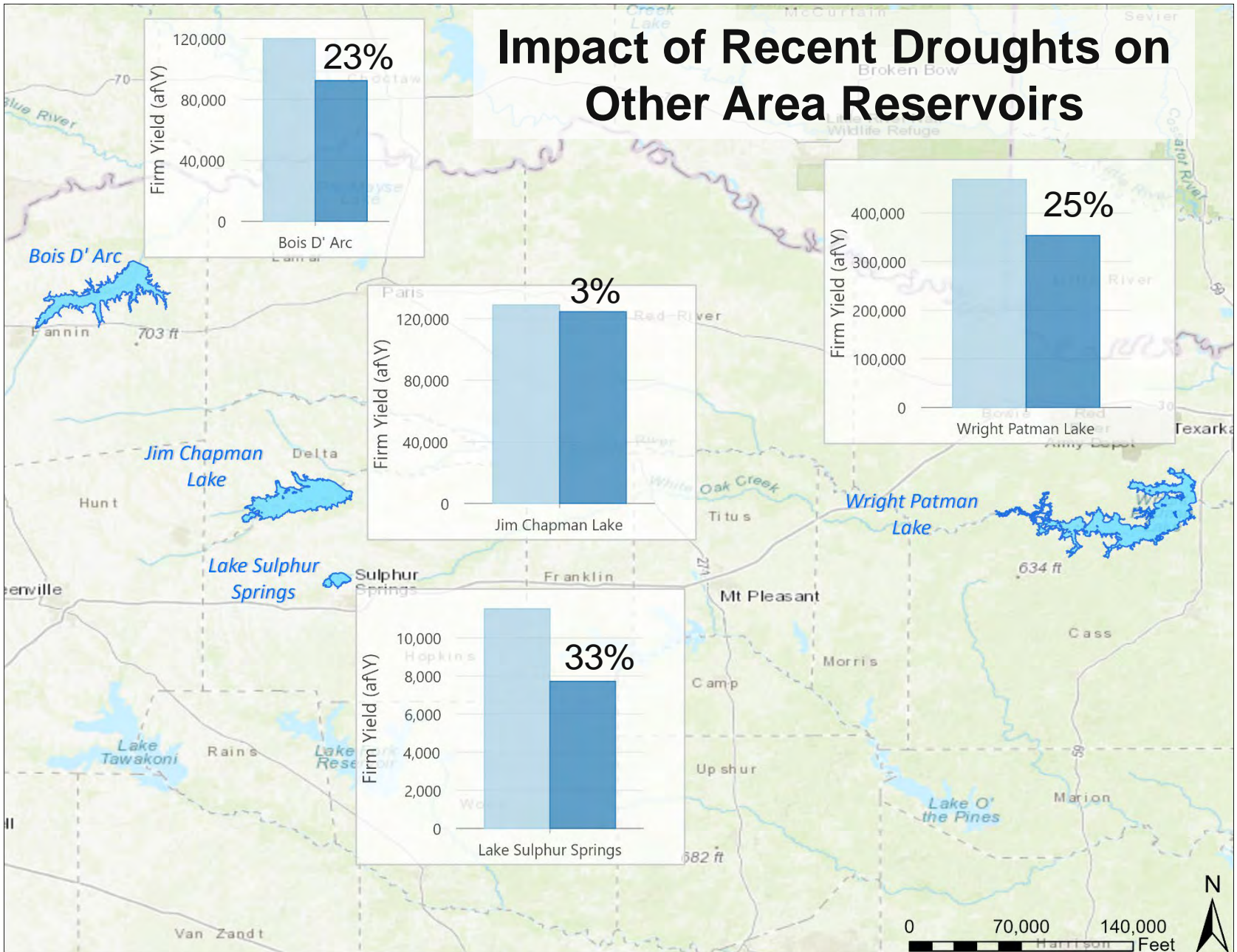


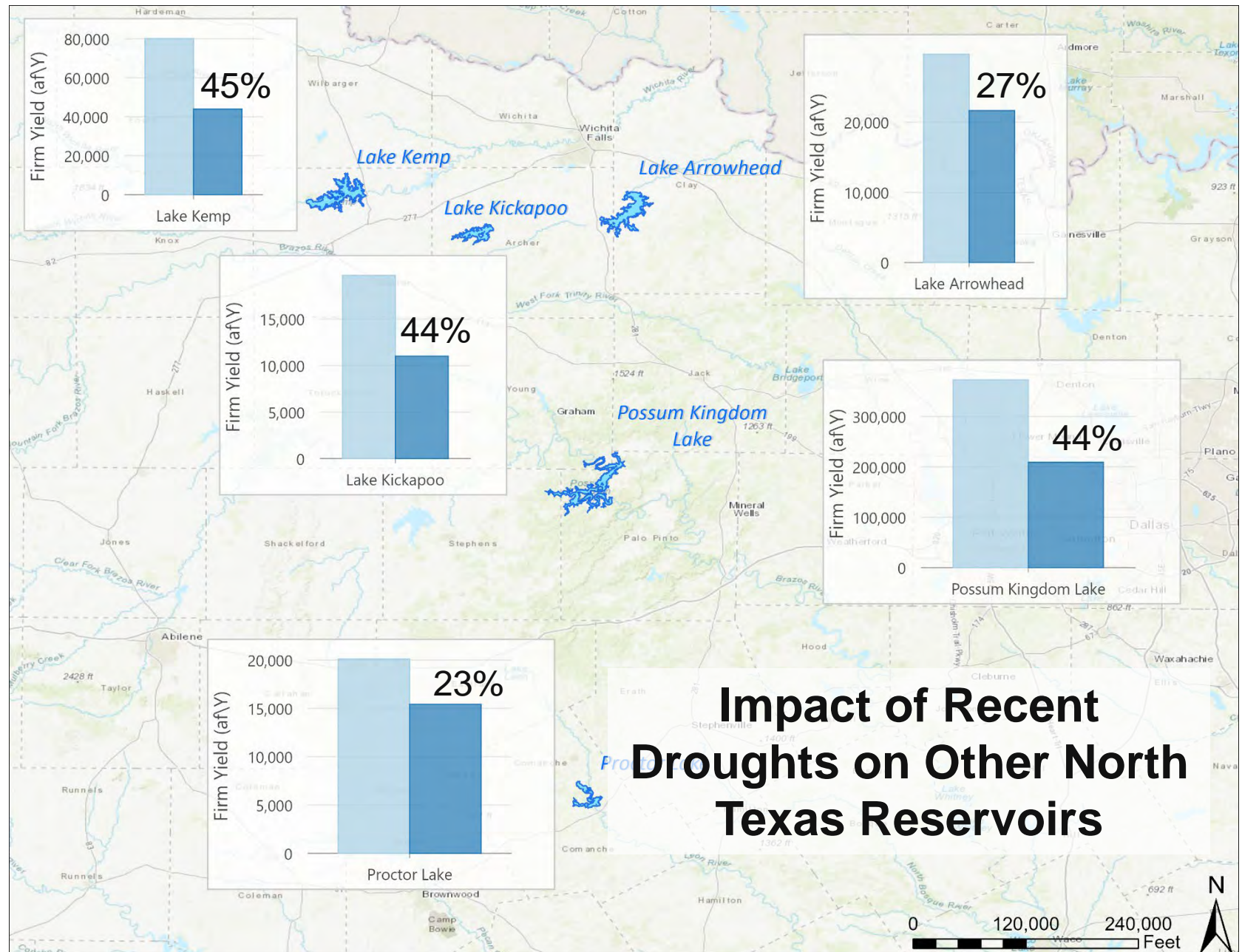
New Drought of Record: 2010-2015





Impact of Recent Droughts on Other Area Reservoirs





Studies for Impact of 2010-2015 Drought on Potential Supplies

- **Studying Sulphur Basin supplies for NTMWD and others**
 - WAM already updated
 - Looking at yield of Marvin Nichols, Wright Patman
- **Updating yield of supplies from the Cypress Basin (Lake O' the Pines)**
 - Updating WAM for NTMWD and Northeast Texas MWD
 - Will use updated model to look at yields



EXISTING WATER RIGHTS AND RELIABLE SUPPLIES

Source	2022 Supply (MGD)		Comment
	Permitted	Dry-Year Reliable	
Lavon Lake	106	84	Supply limited by yield with minimum elevation = 467.
Lake Chapman	51	40	NTMWD share of yield with minimum elevation = 415.5.
Wilson Creek WWTP	64	51	Supply limited by current return flows.
East Fork Raw Water Supply Project	140	39	Supply limited by current return flows and bypass requirements.
Main Stem Pump Station	50	50	Limited by contract with TRA.
Lake Texoma (Wylie WTP)	176	60	Supply limited by 4-parts other water to 1-part Texoma water blending at the Wylie WTP. Note additional future blending is planned at the Leonard WTP.
Upper Sabine (Permanent)	10	10	
Upper Sabine (Temporary)	36	29	Current contract with SRA expires in 2025.
Lake Bonham	5	2	Usable supply limited by Bonham demands.
Bois d'Arc Lake	156	82	Currently under construction.
Total	794	447	



EXISTING WATER RIGHTS AND RELIABLE SUPPLIES

Source	Permitted Supply (MGD)	Dry-Year Reliable Supply (MGD)						
		2025	2030	2040	2050	2060	2070	2080
Lavon Lake	106	80.5	78.6	74.9	71.3	67.7	63.3	59.9
Lake Chapman*	51	37.5	36.8	35.4	34.2	32.8	31.1	29.9
Wilson Creek*	64	55.6	64.9	85.8	95.4	104.2	105.7	106.9
Sister Grove*	64 ¹							
East Fork *	140	41	41	41	41	41	41	41
Main Stem Pump Station*	50	50	50	50	50	50	50	50
Lake Texoma (Wylie WTP)	176	61.8	67.9	69.8	68.3	69.6	68.8	68.1
Lake Texoma (Leonard WTP)		0	26.5	25.8	25.0	24.2	23.4	22.6
Upper Sabine (Permanent)	10	9.6	9.2	8.8	8.5	8.1	7.7	7.4
Upper Sabine (Temporary)*	36	27.8	25.6	25.6	0	0	0	0
Lake Bonham	5	1.7	1.9	2.6	3.4	3.3	3.2	3.1
Bois d'Arc Lake	156	56.0	79.8	77.5	75.1	72.7	70.4	68.0
Total	794	421.5	482.2	497.2	472.2	473.6	464.6	456.9

¹Pending water right application

*Supply delivered through Lavon Lake



AGENDA

Discussion Items

C. Preliminary water operations key performance

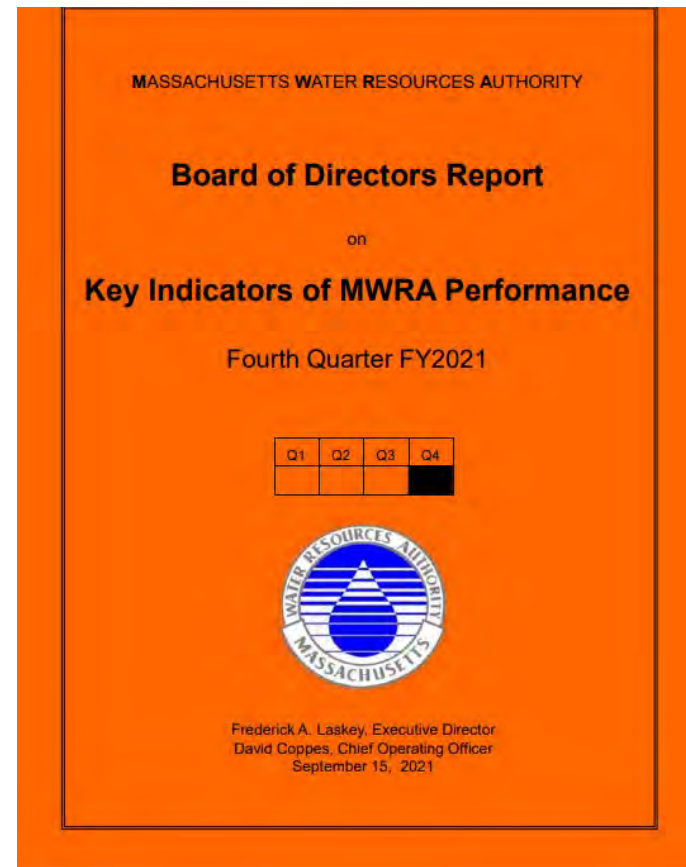


BACKGROUND

Peer Utility Water Key Performance Indicators

Amawalk referenced
Massachusetts Water Resources
Authority's Key Indicators of
Performance as an example of
water utility reporting

- Quarterly report produced by staff to track a variety of performance metrics for routine review by their Board
- Recommended as a best practice for utilities





NTMWD Preliminary Key Performance Indicators (KPI)

Water System currently tracks internal KPIs and metrics that are used to support operations

- Alignment with NTMWD 2022-2027 Strategic Plan

Seeking feedback on an initial draft of selected KPIs to:

- Determine what information the NTMWD Board would like to see on a quarterly basis

Focus on 3 main categories

- Source Water – with focus on treatment operations
- Regulatory
 - Treatment Plants
 - Conveyance system
- Unaccounted Water Volumes (water loss)



SOURCE WATER

Taste and Odor

Geosmin - produced by cyanobacteria, filamentous bacteria and other organisms, is found in surface water sources and is one of the most reported taste and odor compounds.

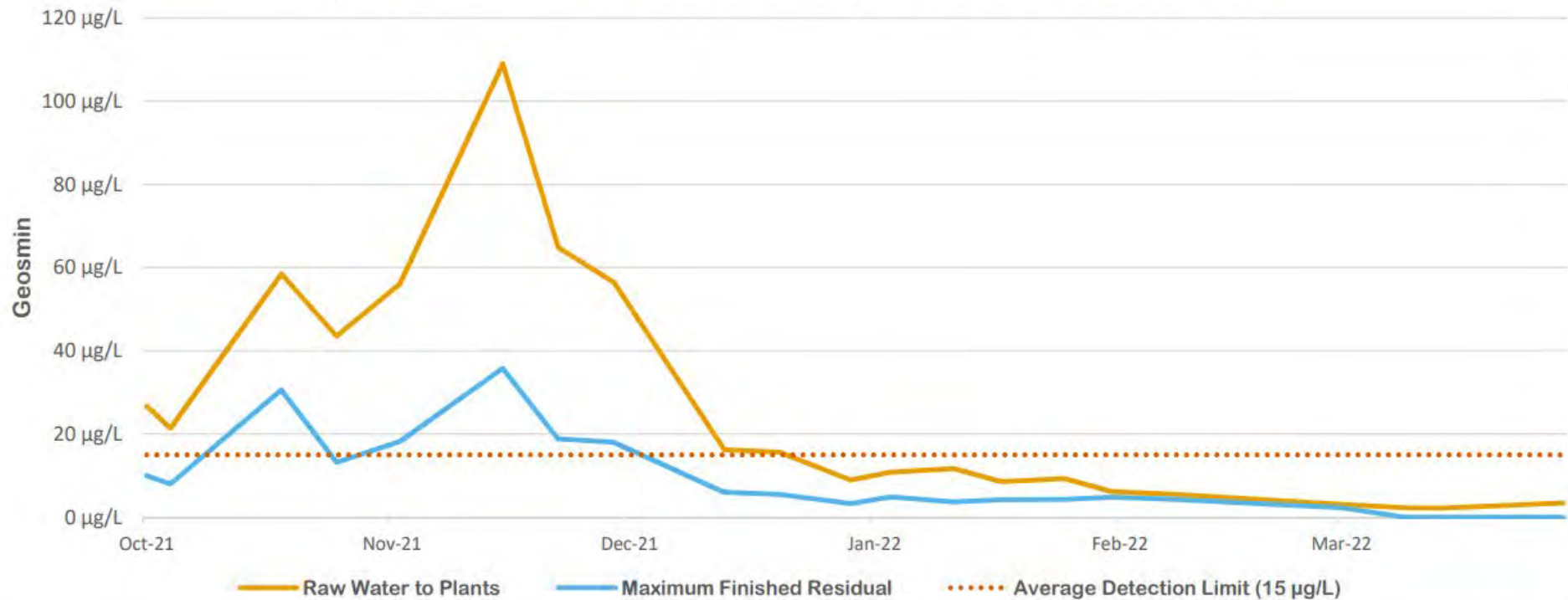
- Earthy-musty odor and is difficult to remove by conventional water treatment processes.
- Ozonation is used to mitigate
 - Removes approximately 90%

Why it is important

- Taste and odor issue with many lake waters
- Most people sensitive to taste and odor over 15 ug/L
- Potential impact to plant ozonation dosing dependent on levels (increased chemical use)



Wylie Treatment Complex - Geosmin in Raw and Treated Waters



- Seasonal variation seen in source water.
- Treatment with ozone generally reduces geosmin levels below the target threshold.
- Ozone dosing is adjusted as data are received from the lab (previous mention of lag).



SOURCE WATER

Total Dissolved Solids (TDS)

Total Dissolved Solids - made up of dissolved salts such as calcium, sodium and magnesium.

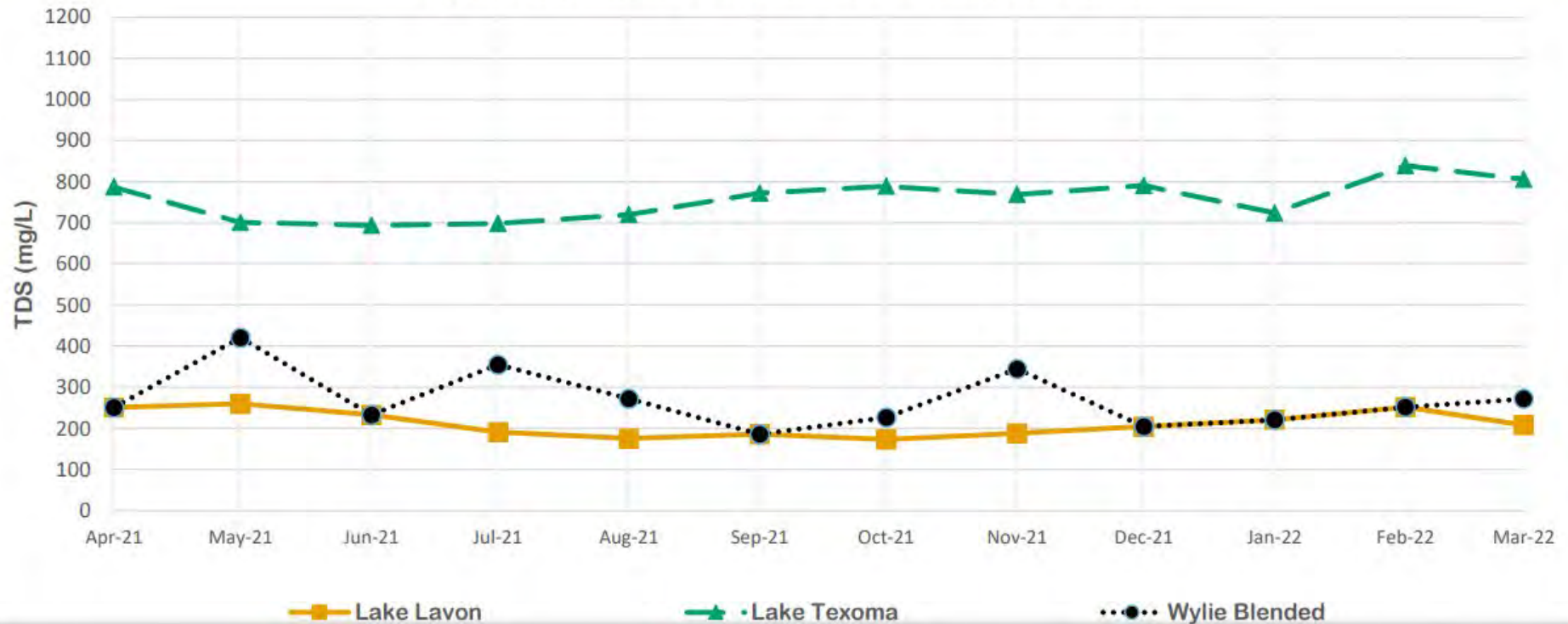
- Some waterbodies like Lake Texoma have naturally high TDS due to the soils and geology in the watershed.
- Elevated levels affect the taste of drinking water.

Why it is important

- TCEQ sets secondary standard of 1000 mg/L
- NTMWD target is less than 600 mg/L under normal conditions
- Taste and Odor – high TDS can cause metallic taste in water
- Impacts to treatment – blending and corrosion control



Wylie Treatment Complex Total Dissolved Solids



- Typically blend at a 4:1 ratio Lavon to Texoma
- Important parameter to monitor for reuse systems



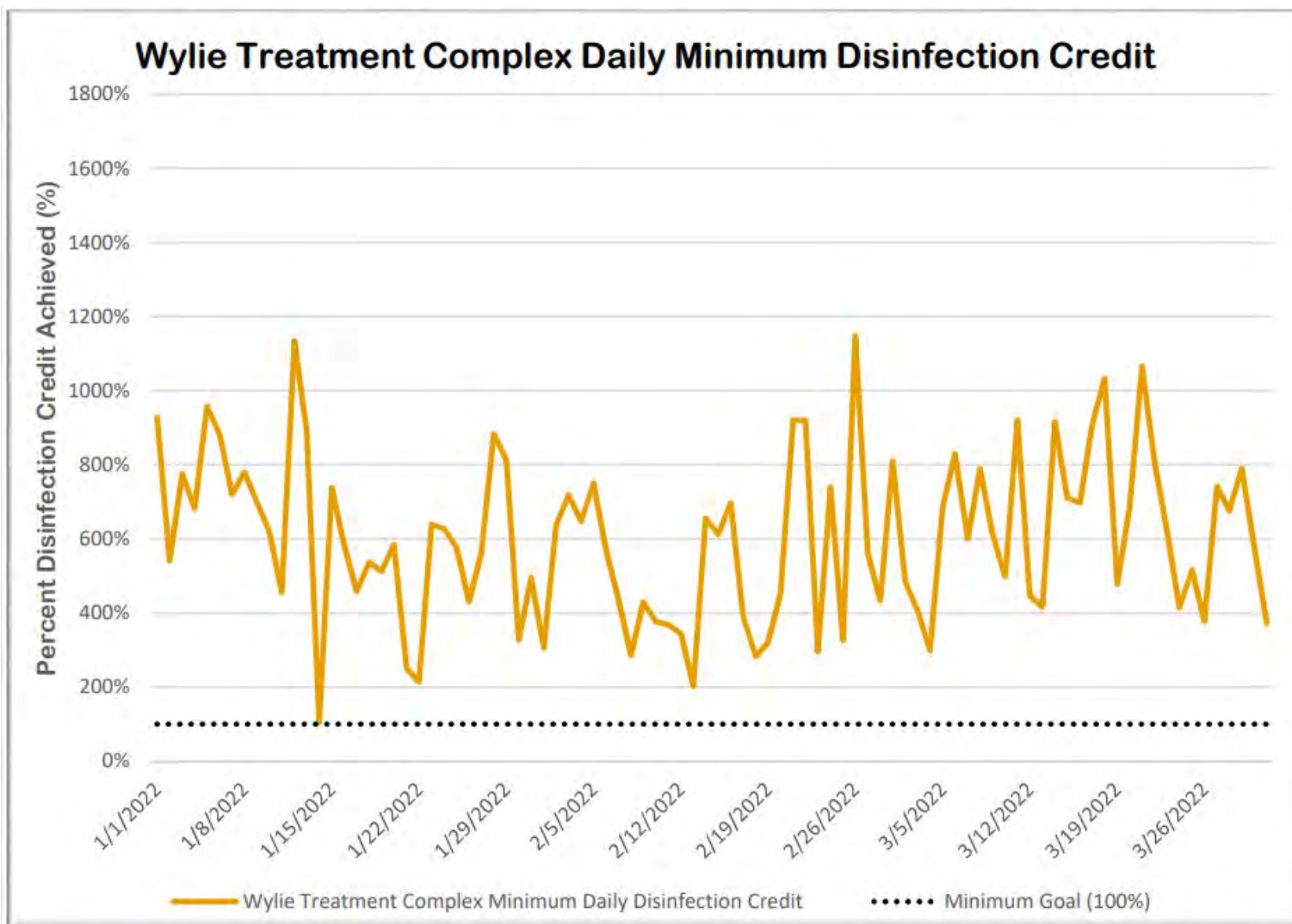
REGULATORY

Disinfectant Credit

- The minimum TCEQ required removal and/or inactivation of parasites and viruses
- Should the plant meet these minimum removal requirements, a 1.0 Inactivation Ratio is achieved providing 100% Disinfection Credit.
- The performance of a water plant's disinfection process is determined by the effective contact time (CT) of each disinfectant used through treatment.

Why it is important

- Most important step in the treatment process
- Killing of pathogens such as bacteria, viruses and protozoa critical for public health
- TCEQ regulation
 - Reported monthly



- Values above are the lowest reported CT of all plants at the Wylie WTP Complex currently in operation.
- Percent CT includes credit from ozone and chlorine disinfection
- CT credit is a function of by temperature, flow, time and disinfectant dose



REGULATORY

pH and Alkalinity

pH and alkalinity are important parameters used to measure the corrosive potential of treated water

- Alkalinity is the buffering capacity of water

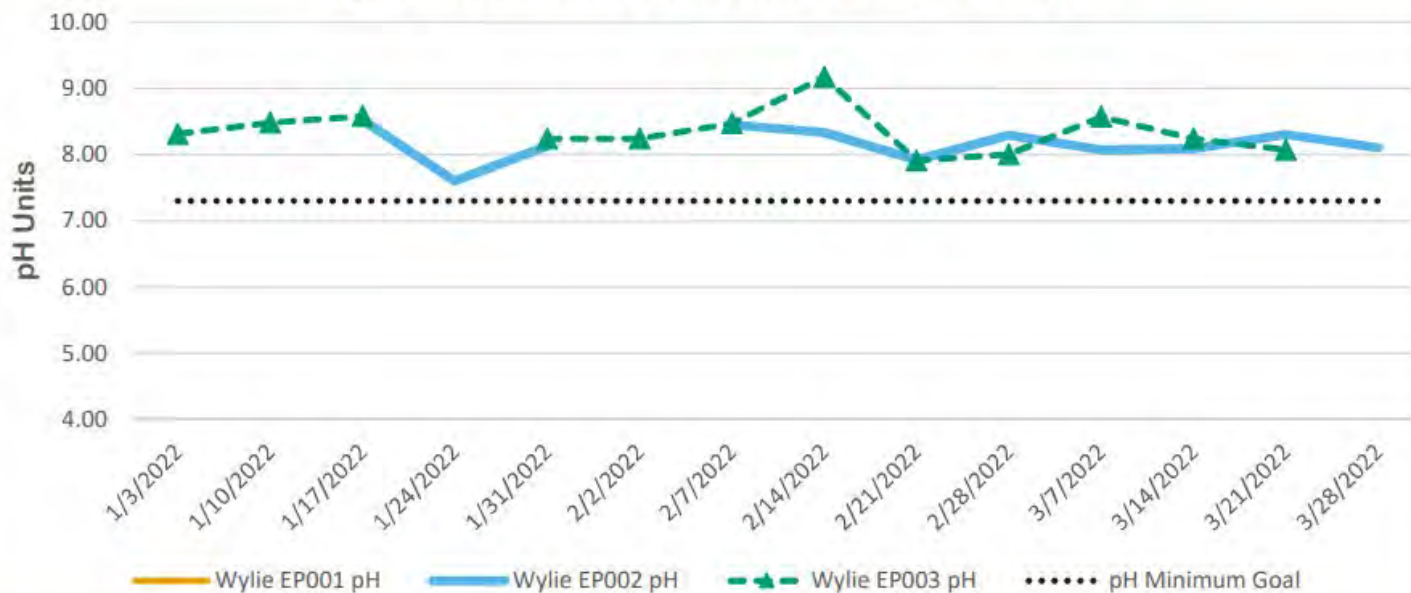
Corrosion control is important for conveyance and distribution systems

- Lead and Copper Rule requires water systems to have optimized corrosion control to minimize lead and copper release in water infrastructure and home plumbing

Why it is important

- Lead is considered unsafe for human consumption
- Flint Michigan national example of ineffective corrosion control
- Water systems have optimized pH and alkalinity requirements approved by TCEQ

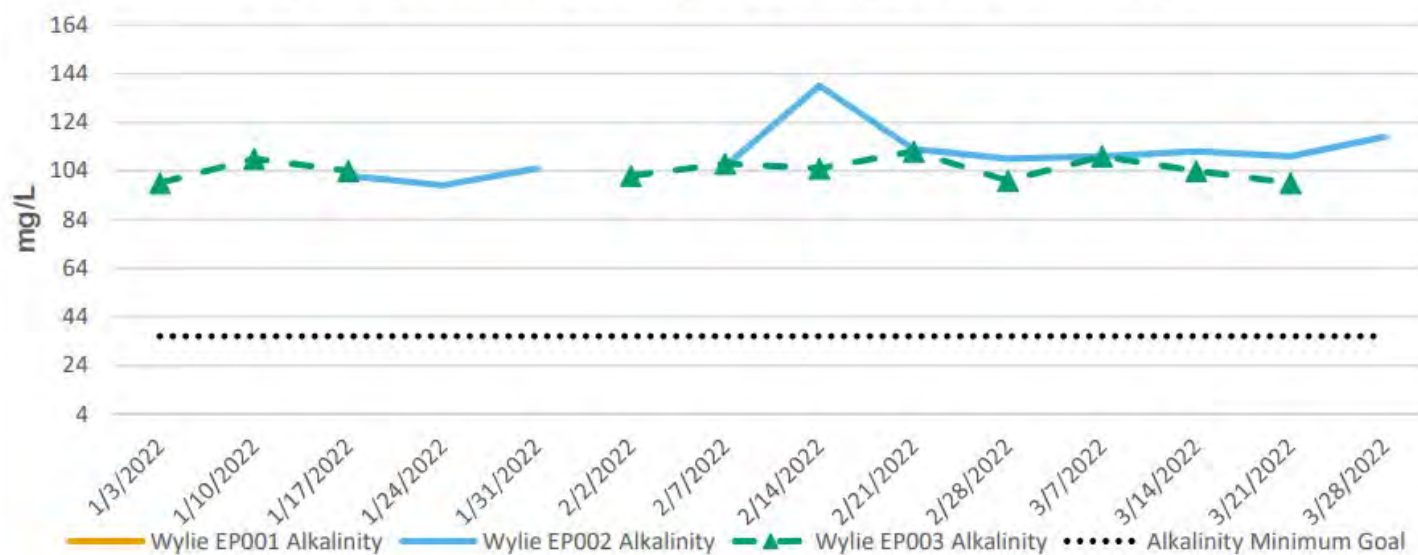
Wylie Treatment Complex - Entry Point pH



Key Takeaways

- Target pH dependent on blending ratio with Lake Texoma water
- Meet our optimization targets

Wylie Treatment Complex - Entry Point Alkalinity





REGULATORY

Filter turbidity

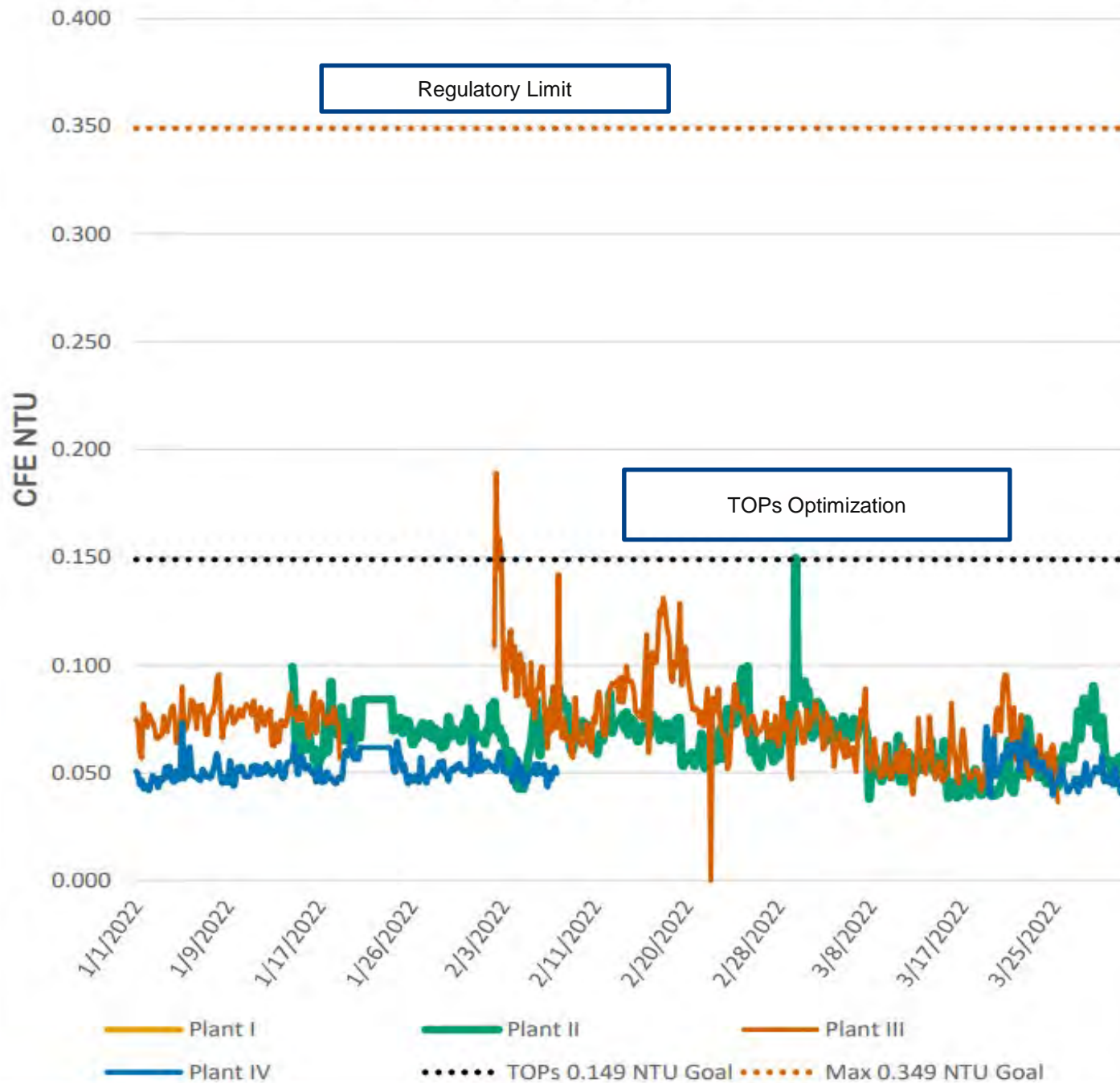
Combined Filter Effluent (CFE)

- Measure turbidity (cloudiness) of filtered water
- Individual filters measured but also measured as a combination of filters
- Regulatory requirement by TCEQ

Why it is important

- Monthly reporting to TCEQ
- Remove particles that could hide pathogens
- Plant/Filter performance indicator
- Optimization program criteria
 - Texas Optimization Program (TOPs)
 - Partnership for Safe Water (PSW)

Wylie Treatment Complex Turbidities



Key Takeaways

- Turbidities are much lower than required by regulations
- Optimization goals met for Plant 4 and met with a few exceptions at the other plants



REGULATORY

Disinfection Byproducts (DBPs)

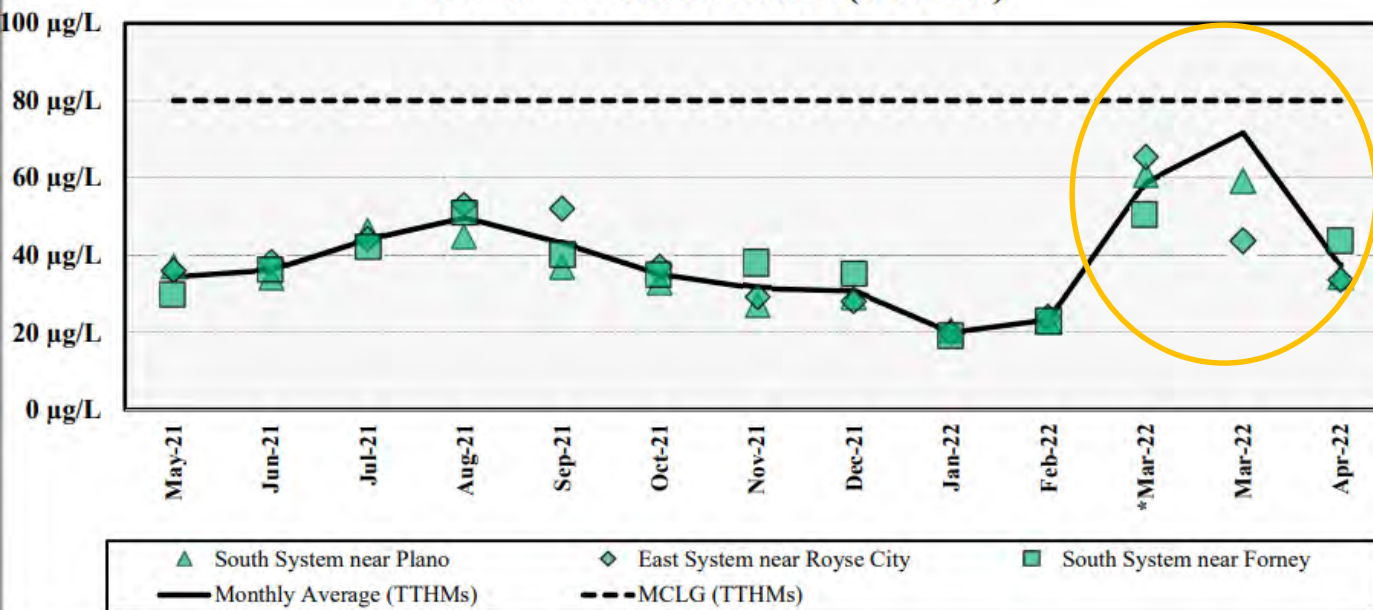
Formed when chlorine interacts with organic matter

- Higher organic content in water general results in higher DBPs
- Currently 2 primary regulated DBPs
 - Trihalomethanes (THMs)
 - Haloacetic acids (HAA5s)
- Regulatory standard for THMs and HAA5s is a running annual average, not a single data point

Why it is important

- Regulated for public health
- Monitored in conveyance system as DBPs can increase with water age
 - Compliance points in NTMWD conveyance system and respective distribution systems of customers

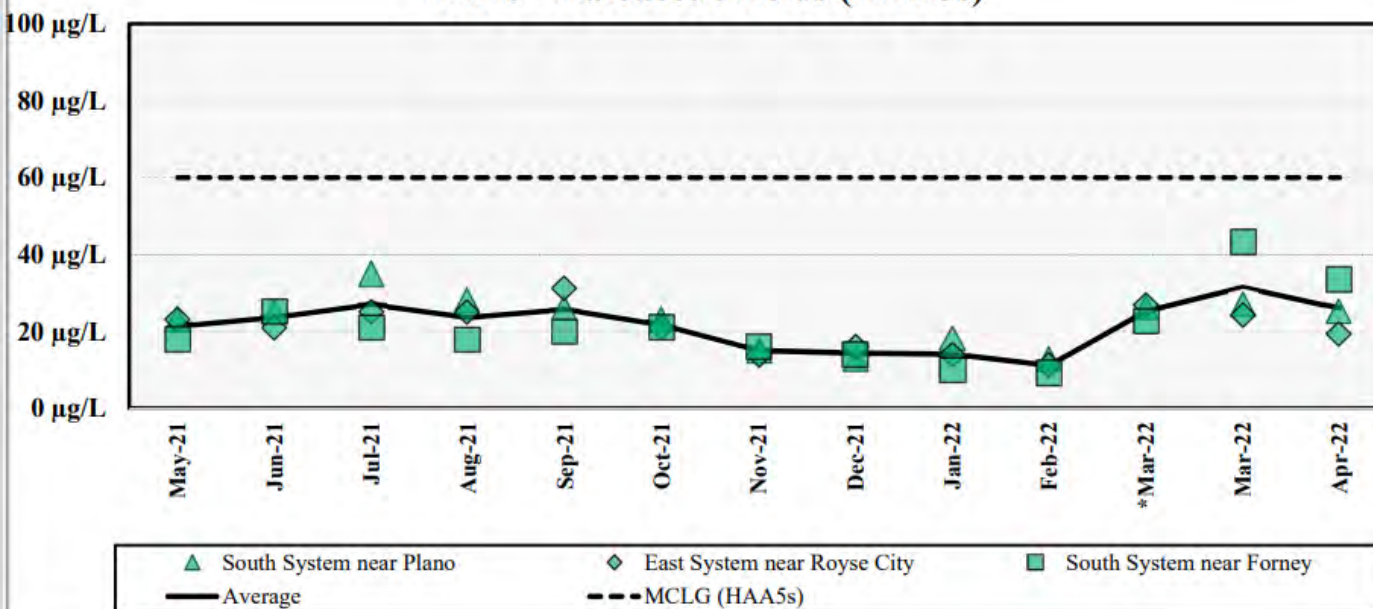
DBPs - Trihalomethanes (TTHMs)



Key Takeaways

- DBPs are typically half of the regulatory limit
- Under the regulatory limit in the temporary change in disinfectant

DBPs - Haloacetic Acids (HAA5s)





WATER LOSS

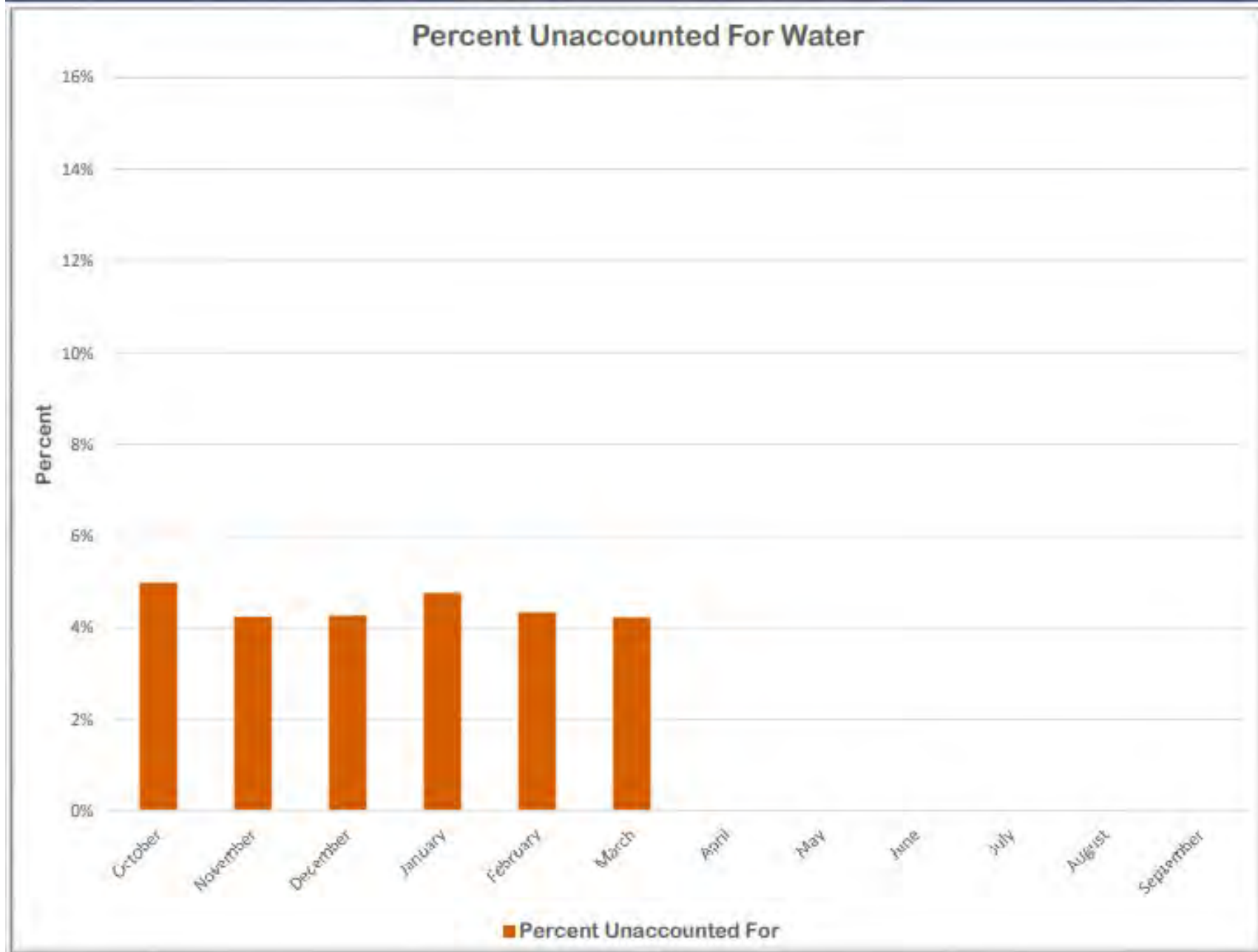
Unaccounted Water

NTMWD Unaccounted Water –

- Difference between our Raw Water Pumping Volume and Treated Water Volumes recorded at Member & Customer delivery points
 - Measure of water loss from treatment, pipeline leaks, and more
 - Does not include non-revenue water used for a defined purpose, such as flushing and pipeline dewatering

Why it is important

- Common water industry KPI
- Industry standard for potable water distribution systems is 10-16%
 - Doesn't account for raw water pipeline or treatment losses
- Indicator of operations and maintenance efficiency



Water loss between 4-6% is well below industry averages



AGENDA

Discussion Items

- C. Opportunity for Committee members to provide feedback on Water Committee meeting or request potential future agenda items**

Adjournment