Zink Lake Improvements

City of Tulsa Public Meeting
A Gathering Place for Tulsa

February 27, 2024

CITY OF TULSA

Mentimeter Q&A

During and after the presentation, please ask questions!

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- Paper comment cards are available at front table

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- Click "Ask new question"
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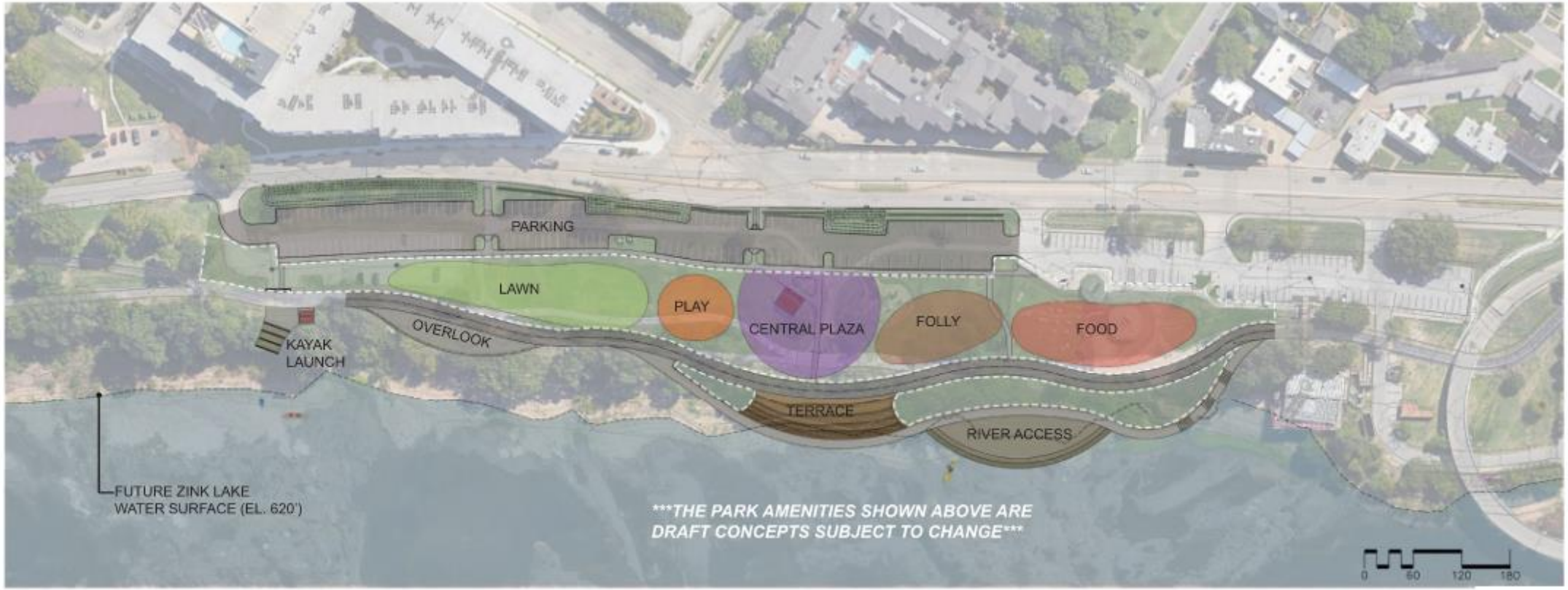
- Questions will be answered after presentation

Presentation Outline

- Amenities
- Construction Progress
- Water Quality Program
- Public Comment
- 1 on 1 Inquiries

Potential Amenities – East Bank



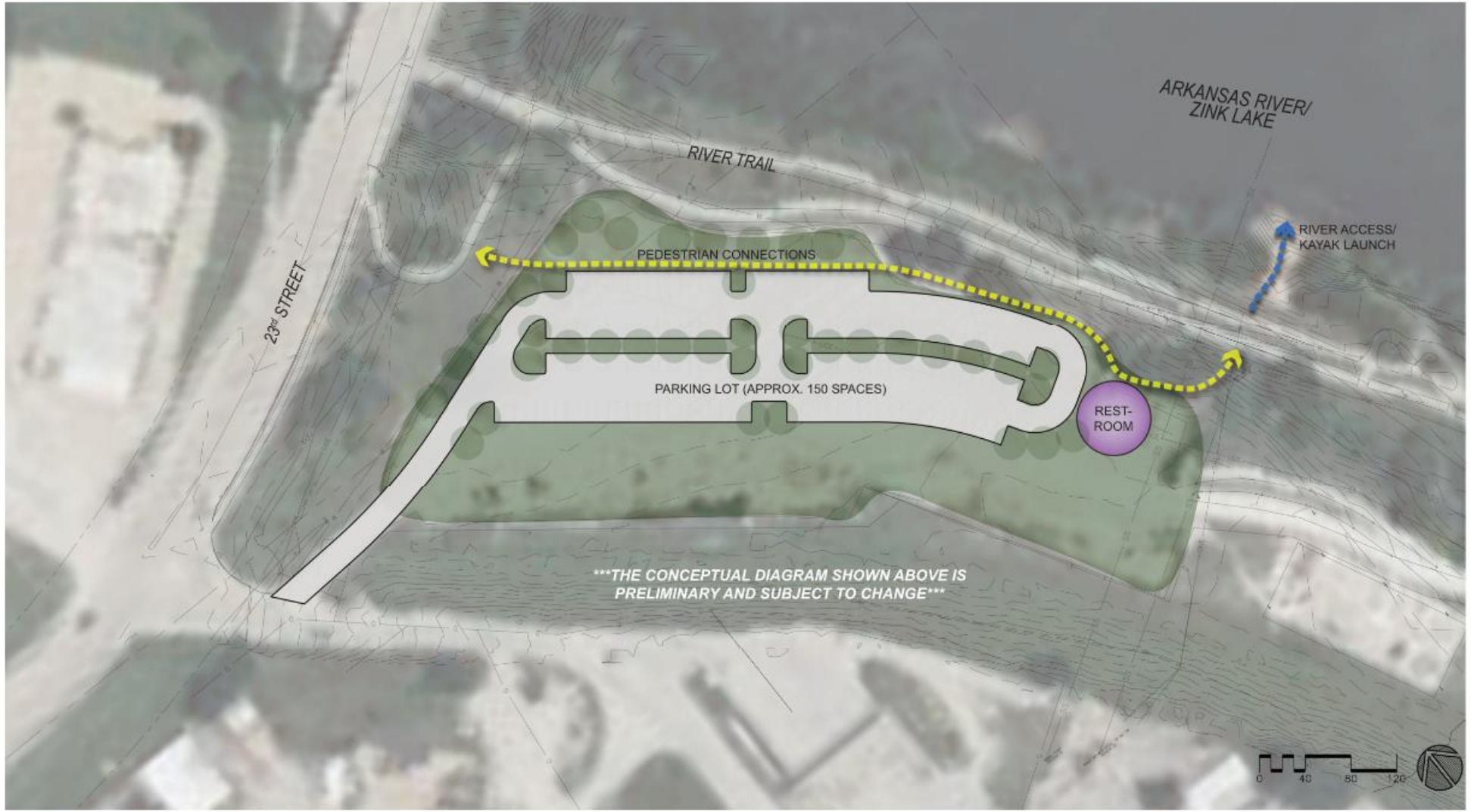
Labor Day 2024

- Parking
- Restroom Renovations
- Kayak Launch

Future Amenities

- Vendors
- Restaurant
- River Access

Potential Amenities – West Bank

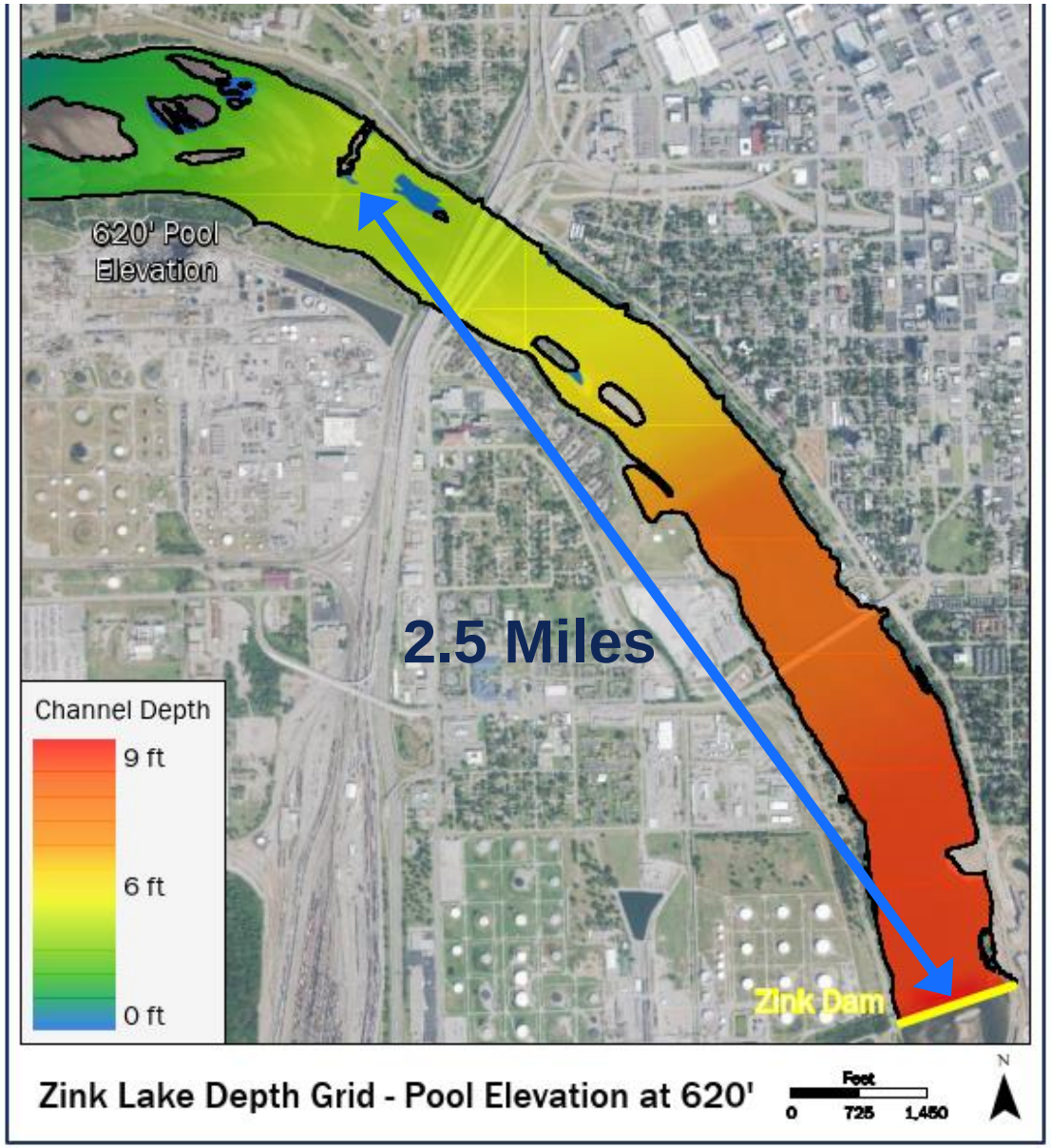


- Parking
- Restrooms
- Lake Entry

Zink Dam – Zink Lake Project Goals

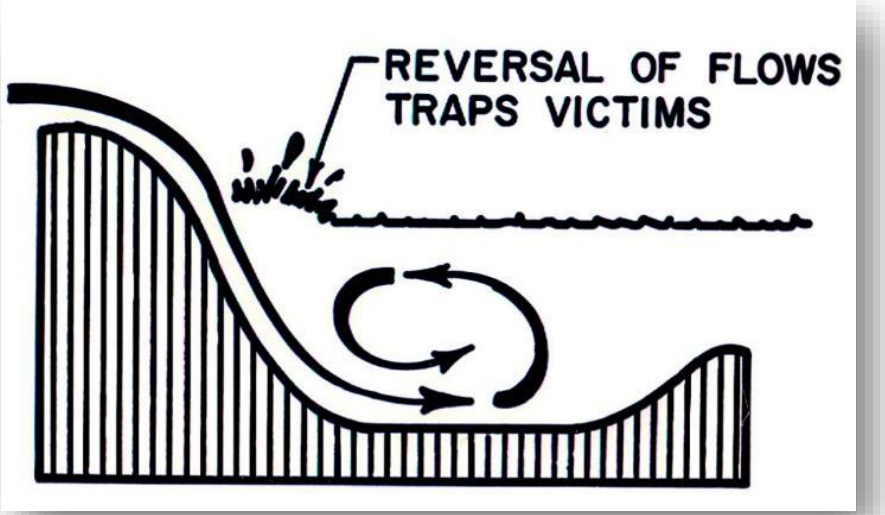
- Public Access – Bring people to the water
- Enhanced Safety – roller mitigation
- Improved Operations and Maintenance
- Improved Sediment Management
- Recreation Opportunities

Public Access

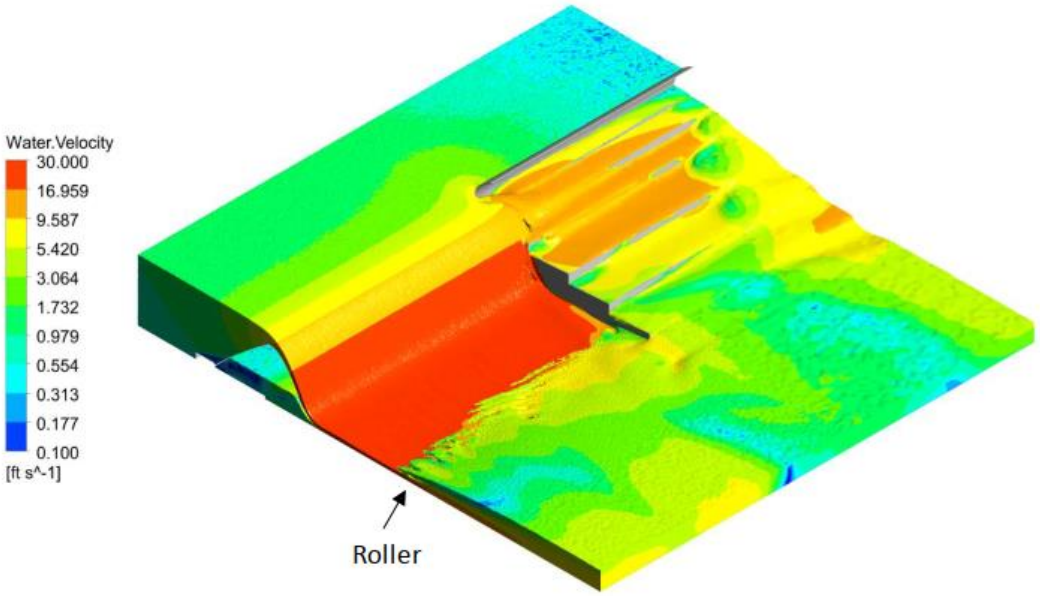


- Paths and trails adjacent to water's edge
- Pedestrian bridge connections with sidewalks/trails
- Fishing from banks
  - (no fishing in the flume)

Enhanced Safety



- Existing Ogee weir
- New step design reduces hazard



Sediment Management

- During high flow conditions (> 40k cfs) all gates will be down enabling sediment transport
- Provides “no rise” to base flood elevation

Recreation Opportunities

- Zink Lake – increased length and increased pool depth to 10’ at the dam
- Whitewater flume

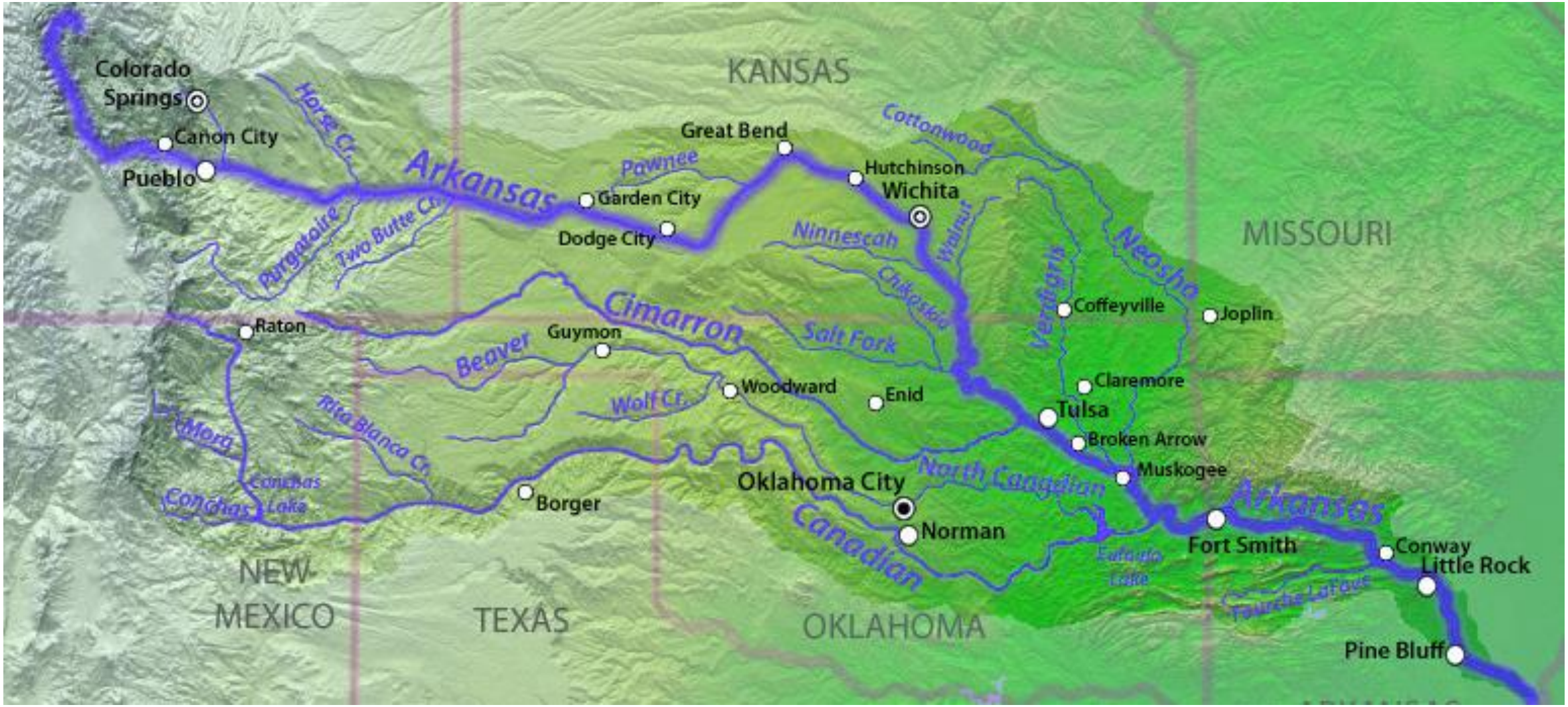
Recreation Opportunities

Water Quality Standards (WQS) - Beneficial Uses

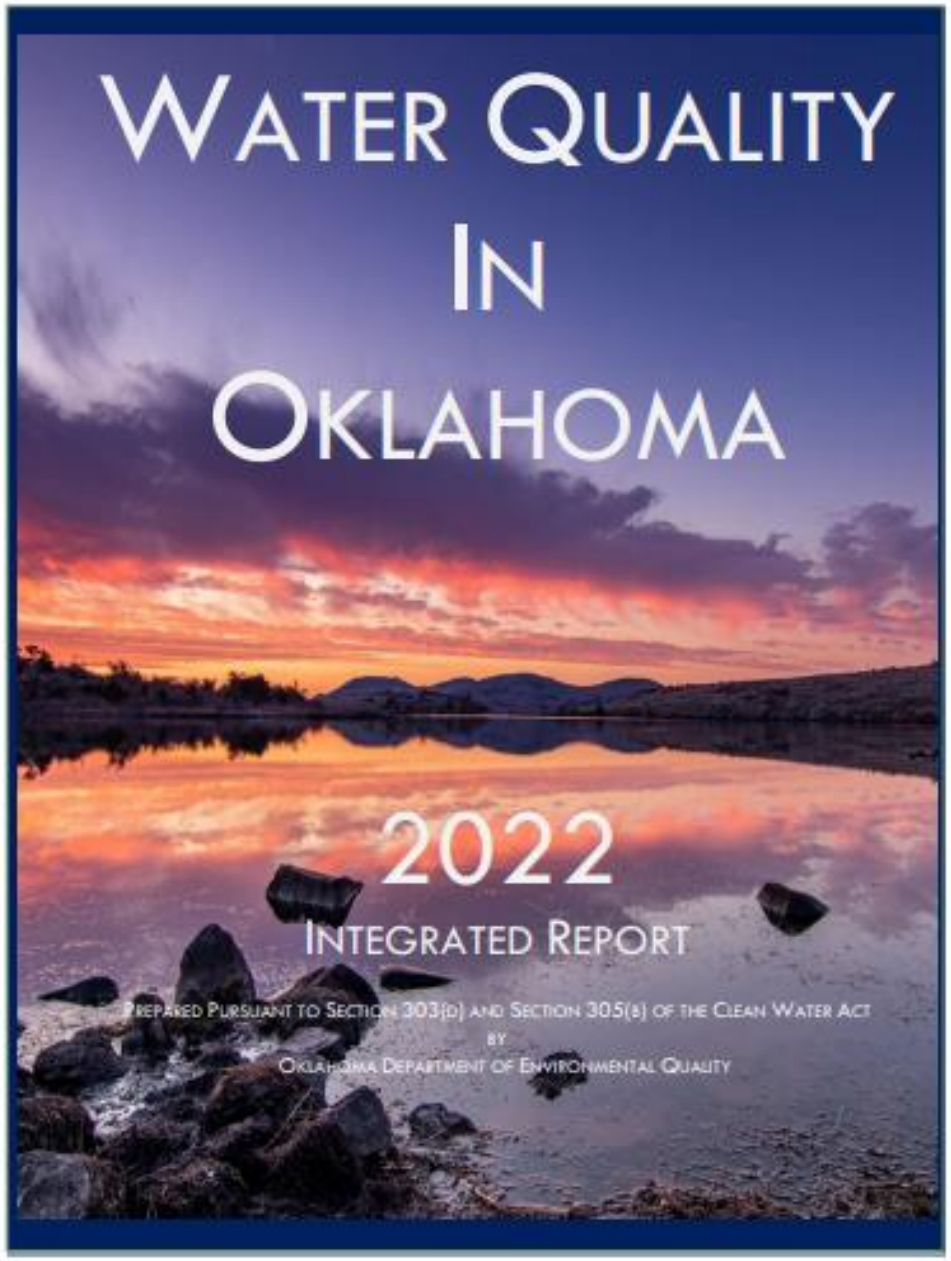
- Beneficial uses are set by Oklahoma Water Resources Board (OWRB)
- Watershed Identification (WID) – 120420010010_10 (Arkansas River – Berryhill Cr. to Cherry Cr.)
  - Primary Body Contact Recreation (PBCR)
  - Fish and wildlife propagation - Warm Water Aquatic Community
  - Fish Consumption
  - Aesthetics
  - Navigation
  - Agriculture
  - Emergency Water Supply

Flows are regulated by discharges from Keystone Dam – the Arkansas River is not a natural, free flowing river.

Arkansas River Basin



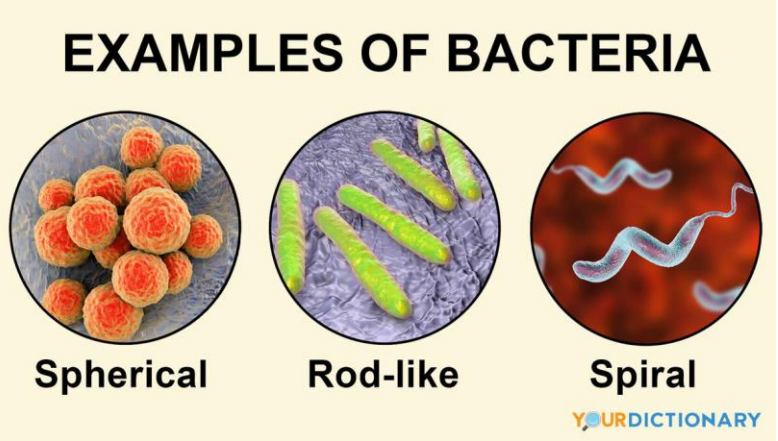
Arkansas River Basin via The Encyclopedia of Earth



Water Quality Standards – 303(d)

- Requires states to develop a list of streams that do not meet WQS
- 2022 is the most recent list
- Arkansas River Zink Lake segment
  - Impaired for Cadmium
  - Historically impaired for bacteria

Water Quality - Bacteria



- What is bacteria?
  - Single-celled organisms that are natural component of lakes, rivers, and streams
  - Most are harmless to humans
  - Some bacteria inhabit the intestinal tract of warm-blooded animals and have the potential to cause sickness and disease

White pelicans on the Arkansas River via News on 6

Water Quality – Bacteria (con't)

- Fecal Indicator Bacteria (FIB)
  - Health risk from water-borne pathogens is usually assessed from concentrations FIBs
- Escherichia coli (E. coli), enterococci
- Originate from the same sources as the pathogens (disease-causing microorganisms)
- High numbers often indicate other harmful bacteria as well as other disease-causing microorganisms and viruses

Water Quality Monitoring Goals

- Project Components / Goals
  1. Collect and **Test** data.
  2. **Share** data with the public so they can make their own informed decision on accessing the water features.
  3. **Educate** the public on what test results mean and provide risks associated with primary and secondary body contact.

Water Quality Monitoring Location Plan

- Location map of Zink Lake and proposed initial water quality monitoring sites
- Zink Lake Water Quality Study Project Work Plan submitted by:

AquaStrategies

in collaboration with

A & M Engineering and Environmental Services, Inc.
Consulting - Design - Construction - Remediation

Water Quality Monitoring Parameters Plan

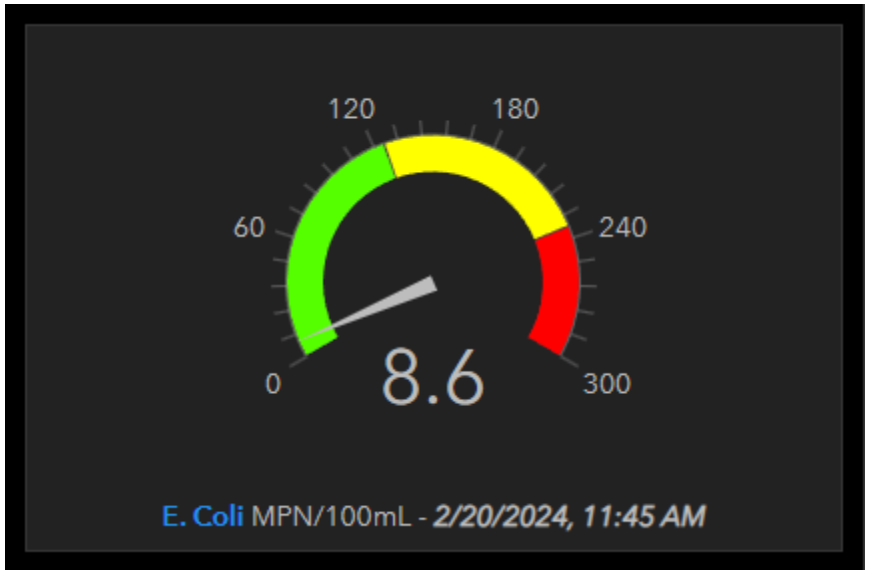
Analysis List	Minimum Frequency	Method	Results
pH	Twice per week	In field	Real time
Temperature	Twice per week	In field	Real time
Dissolved Oxygen	Twice per week	In field	Real time
Turbidity	Twice per week	In field	Real time
Electrical Conductivity	Twice per week	In field	Real time
E. coli	Twice per week	Lab analysis	24 – 36 hours
Enterococci	Twice per week	Lab analysis	24 – 36 hours
Dissolved Cadmium	Monthly	Lab analysis	4 – 5 days
Total Petroleum Hydrocarbon	Monthly	Lab analysis	10 – 14 days

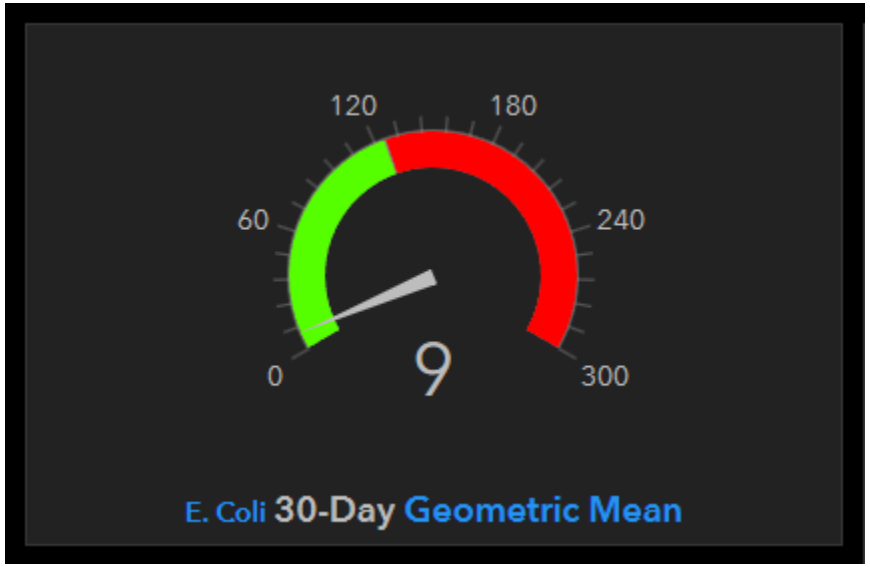
Water Quality Monitoring Plan

- **Real-time Data From Other Sensors (not site-specific)**
  - Streamflow (from proposed USGS station at Gilcrease Expressway)
  - Water surface elevation (existing USGS station, at the I-244 bridge)
  - Air temperature (from existing or new weather station)
  - Wind speed and direction (from existing or new weather station)
  - Recent precipitation (from existing or new weather station)

Water Quality Parameters

- **E. coli**
  - Green – both the geometric mean and the latest reading are 0 – 126 per 100mL from OAC 252:730-5-16 for geometric mean of minimum 5 samples over past 30 days.
  - Yellow – Geometric mean is below 126, but latest sample is between 126 and 235 per 100mL.
  - Red – Either the geometric mean is above 126 or the latest sample is above 235 per 100mL.
  - Oklahoma Water Quality Standards for primary body contact apply May 1 – September 30 from OAC 785:-45-5-16.
  - City of Tulsa will display primary criteria all year.

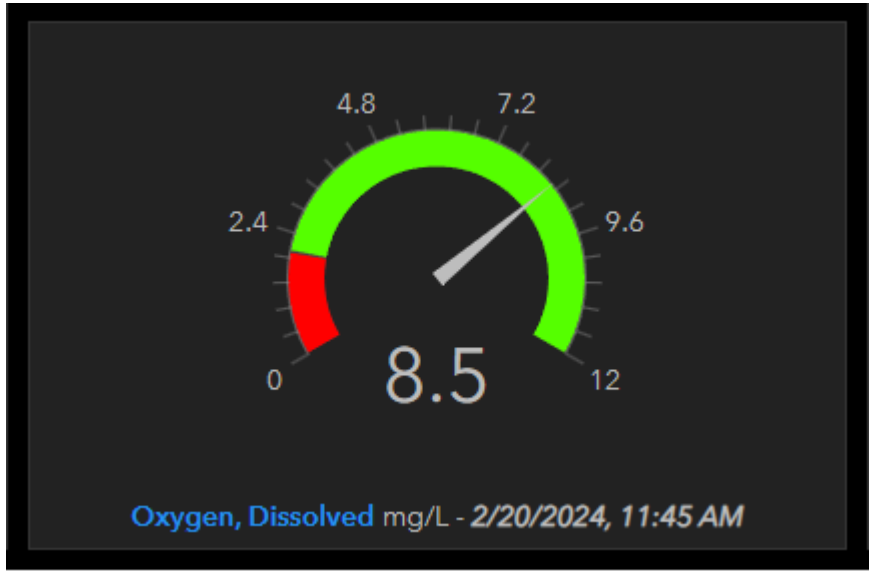




Water Quality Parameters (cont.)

- **Enterococci**
  - The Enterococci geometric mean primary body contact criteria is 33 per 100 mL. Advisory level for individual samples is 33 – 61 per 100 mL, and anything above 61 per 100mL would be cautionary (OAC 252:730-5-16)

- **Dissolved Oxygen (DO)**
  - Oklahoma water quality standard of 2.0 mg/L ensures that “the majority of species can thrive and exhibit healthy growth and survival.”



Water Quality Parameters (cont.)

Cadmium

Cadmium occurs naturally in our environment, but elevated levels can cause health problems in humans when ingested regularly or in large quantities. The Zink Lake section of the Arkansas River has Cadmium in concentrations that are thought to impact aquatic life (and is thus listed) it was decided to continue testing for that metal, even though impacts to humans using the water body for recreational purposes only is minimal. Samples will be taken once per month and the data will be presented on the data viewer.

Total Petroleum Hydrocarbons

Total Petroleum Hydrocarbons (TPH) may be released directly into water through spills or leaks or find their way into the river through non-point sources. Some TPH fractions will float on the water and form surface films. Other TPH fractions will sink to the bottom sediments. TPH is present in all rivers that have some degree of urbanization and while the concentrations recently experienced do not present a significant health risk to humans that will be recreating on Zink Lake, samples will be taken once a month as a precautionary measure and reported on the data viewer.

Water Quality Results

	E. Coli				
Date	ZL1	ZL2	ZL3	ZL4	Geometric Mean
1/30/2024	1	5.2	2	1	1.8
2/1/2024	1	1	3.1	1	1.3
2/6/2024	1	15.8	9.6	22.8	7.7
2/8/2024	6.3	34.5	28.8	52.9	24.0
2/13/2024	34.1	19.7	18.7	41.4	26.9
2/15/2024	20.1	9.8	7.5	14.6	12.1
2/20/2024	1	8.6	4.1	1	2.4
2/22/2024	1	22.3	17.1	4.1	6.3

< 126 per 100ml = Green

126 - 235 per 100ml = Yellow

> 235 per 100ml = Red

	Enterococci				
Date	ZL1	ZL2	ZL3	ZL4	Geometric Mean
1/30/2024	5.2	2420	2420	980	415.6
2/1/2024	9.7	4840	4840	50.4	327.1
2/6/2024	10.8	45.7	921	90.6	80.1
2/8/2024	21.8	52	378	172	92.7
2/13/2024	250	365	50.4	127	155.5
2/15/2024	71.2	461	93.4	210	159.3
2/20/2024	23.8	98.4	613	18.1	71.4
2/22/2024	40.4	1200	2420	33.3	250.0

	Dissolved Oxygen (> 2.0 mg/L)			
Date	ZL1	ZL2	ZL3	ZL4
1/30/2024	13.7	9.31	9.6	10.6
2/1/2024	14.4	9.19	9.63	10.9
2/6/2024	10.7	10	9.47	9.65
2/8/2024	8.18	8.25	9.07	9.49
2/13/2024	9.84	10.5	10.4	9.94
2/15/2024	10.1	10.3	10.4	10.3
2/20/2024	10.6	8.51	10.5	13.4
2/22/2024	11.8	8.78	11.8	13.4

	Turbidity (< 25 NTUs)			
Date	ZL1	ZL2	ZL3	ZL4
1/30/2024	4.3	14	10	11
2/1/2024	6.2	15	8.6	8.4
2/6/2024	6.2	11	11	12
2/8/2024	6.3	14	14	15
2/13/2024	14	14	14	14
2/15/2024	13	15	13	15
2/20/2024	12	21	9.4	8.5
2/22/2024	17	21	8.8	5.3

Water Quality Results

	pH (6.5 - 9.0)			
Date	ZL1	ZL2	ZL3	ZL4
1/30/2024	**8.03**	**6.58**	**7.7**	**6.51**
2/1/2024	**8.91**	**7.59**	**7.94**	**8.71**
2/6/2024	**8.79**	**8.07**	**8.45**	**7.95**
2/8/2024	**8.91**	**8.24**	**8.12**	**8.5**
2/13/2024	**7.8**	**7.96**	**8.04**	**7.98**
2/15/2024	**6.22**	**6.43**	**6.37**	**6.36**
2/20/2024	**8.1**	**7.53**	**7.7**	**7.97**
2/22/2024	**8.36**	**8.01**	**8.18**	**8.74**

	Specific Conductance			
Date	ZL1	ZL2	ZL3	ZL4
1/30/2024	**2800**	**3400**	**3600**	**3700**
2/1/2024	**2600**	**3800**	**4000**	**4100**
2/6/2024	**3000**	**3500**	**3500**	**3400**
2/8/2024	**2900**	**3700**	**3700**	**3700**
2/13/2024	**2700**	**2100**	**2100**	**2600**
2/15/2024	**2600**	**2200**	**2200**	**2700**
2/20/2024	**2200**	**2500**	**2600**	**2700**
2/22/2024	**2300**	**2400**	**2500**	**2400**

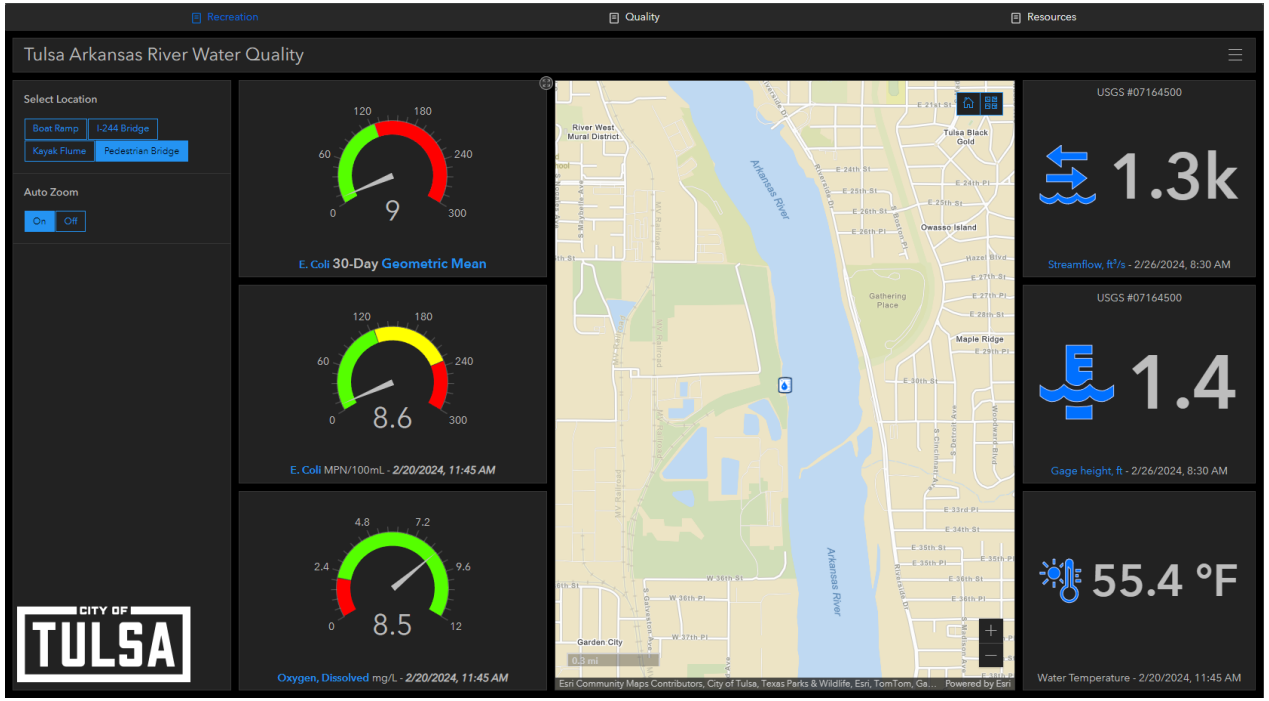
	Cadmium			
Date	ZL1	ZL2	ZL3	ZL4
1/30/2024	**<0.500**	**<0.500**	**<0.500**	**<0.500**

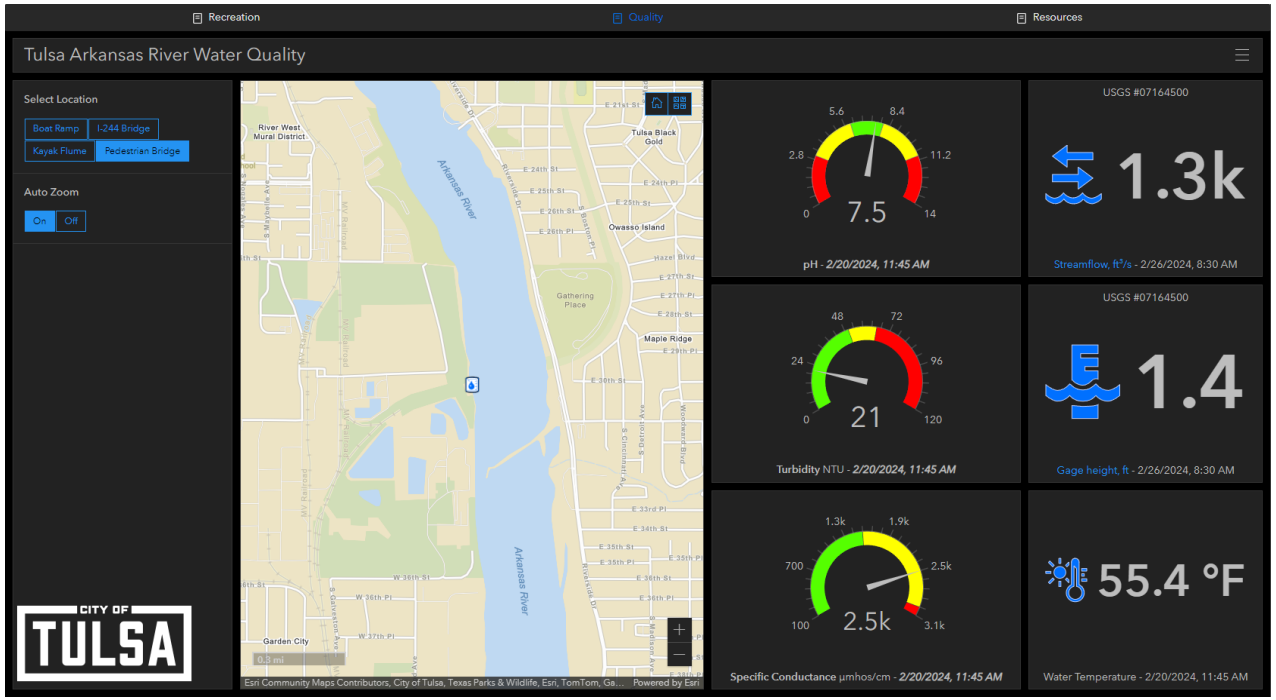
	Diesel Range Organics			
Date	ZL1	ZL2	ZL3	ZL4
1/30/2024	**<4.55**	**<4.55**	**<4.55**	**<4.55**

	Gasoline Range Organics			
Date	ZL1	ZL2	ZL3	ZL4
1/30/2024	**<4.55**	**<4.55**	**<4.55**	**<4.55**

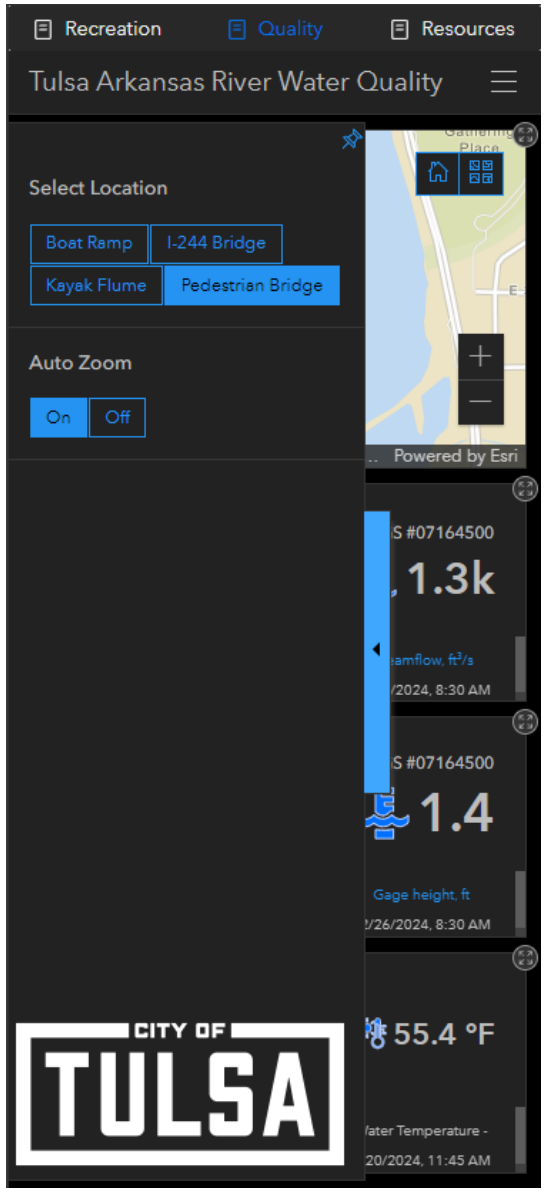
	Oil Range Organics			
Date	ZL1	ZL2	ZL3	ZL4
1/30/2024	**<4.55**	**<4.55**	**<4.55**	**<4.55**

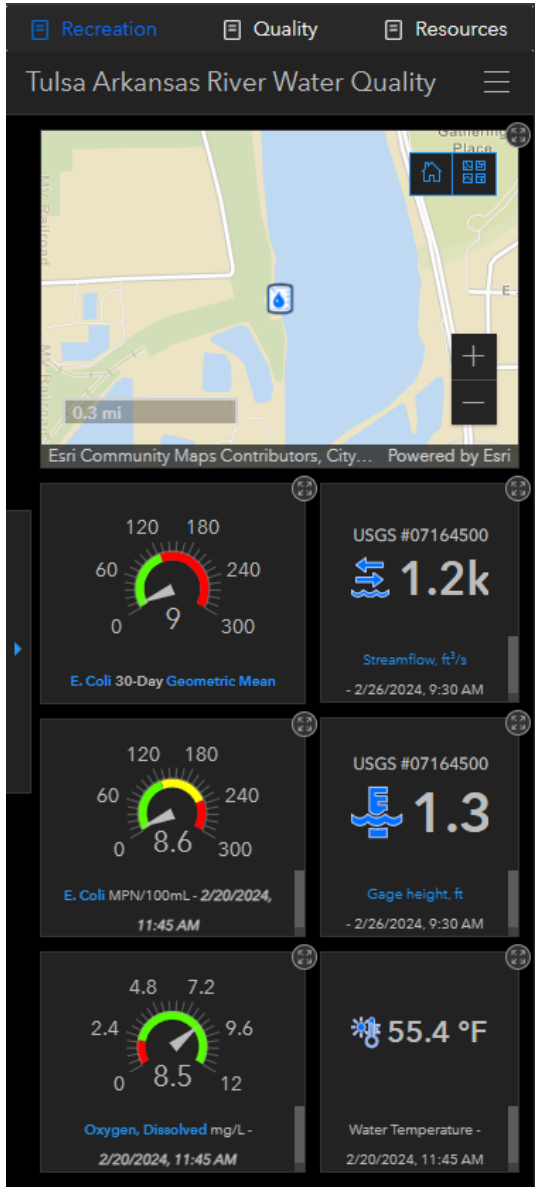
Public Information – Web Dashboard

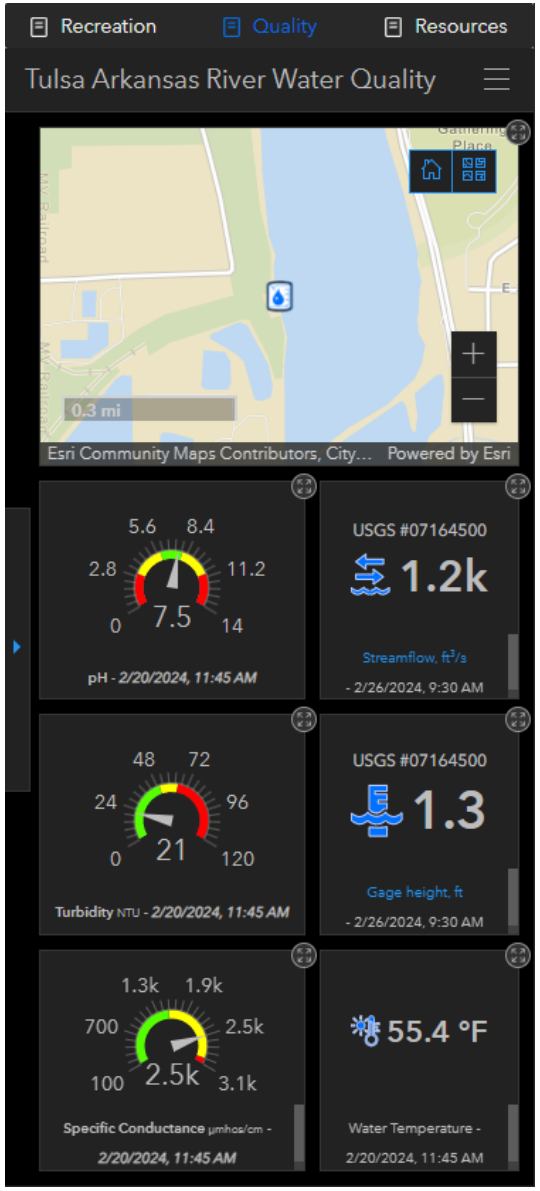




Public Information – Mobile Dashboard







Water Quality – Communication

- Outreach and Communication with public
  - Onsite communication methods are being discussed, i.e., flagging, signs, lights, etc.
  - Website communication methods
  - The communication tool will be coordinated with City, County, and River Parks Authority
  - The communication must present data and contain an educational component that is simple and easy to interpret
  - Provide advisory warnings, e.g., "Rainfall runoff can carry pet waste, agricultural waste, fecal contaminants from brief sewage overflows, and other pollutants".

Water Quality Education

- **Additional Resources – Available on Dashboard**
  - USGS Stream Gage (Legacy)
  - USGS Stream Gage (Modern)
  - USGS Stream Dashboard
  - National Weather Service - TSA
  - EPA Recreational Water Quality Criteria PDF
  - OWRB Oklahoma's Water Quality Standards PDF
  - EPA Enterococci Information
  - USGS Bacteria and E. Coli in Water
  - EPA Dissolved Oxygen Information
  - EPA National Aquatic Resource

Zink Lake Water Quality Monitoring – Timeline

	Calendar Year 2024											
Schedule of Water Quality Activities	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Visit to proposed sampling sites	✓											
Presentation of Draft Work Plan to Tulsa City Council	✓											
Zink Lake WQ sampling to begin	✓											
Public Meeting Presentation of Water Quality Plan												
Water quality dashboard finalized and online												
Zink Lake impoundment begins												
Sampling and continued WQ data analysis												
Reporting and recommendations for next steps												
New USGS streamgage goes live (optimistic scenario)												

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Thank You

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