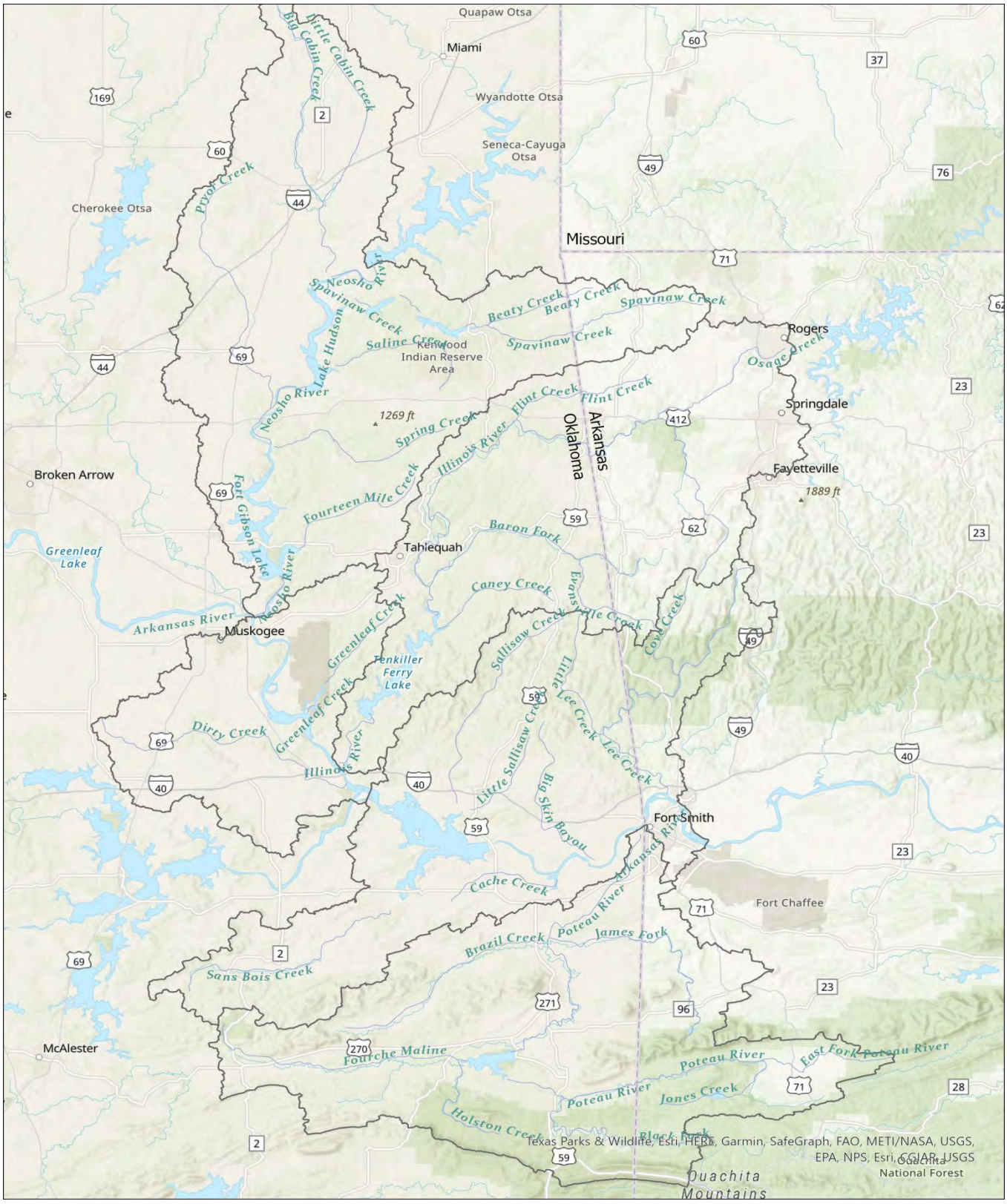
Arkansas-Oklahoma Arkansas River Compact Commission
Environmental Committee Report



September 28, 2023

INTRODUCTION

This document is a compilation of data that has been collected within the Arkansas/Oklahoma Arkansas River Compact area. Items included for review.

	Introduction
	Water Quality Trends at Different Flow Regimes
	OWRB Beneficial Use Monitoring Program - Streams/Rivers
	OWRB Beneficial Use Monitoring Program – Lakes/Reservoirs
	Compact Waters included in the Oklahoma Water Quality Integrated Report – 303(d)
	Oklahoma Water Resources Board Program Updates Relevant to the Arkansas-Oklahoma Compact Commission Area
	TMDL's Completed in the Compact Area
	Oklahoma's Phosphorus Loading Report for the Illinois River Basin
	Funding Provided by OWRB's Financial Assistance Program
	Permits Issued for Water Rights in the Illinois River Watershed
	Oklahoma Conservation Commission Efforts in the Illinois River Watershed

Table 1. Comparison of geometric means to the Oklahoma Scenic River total phosphorus criterion calculated from 1999-2022[1] and 2018-2022.

Station (see footnotes)	1999-2022 (3-month GM'S)			2018-2022 (3-month GM'S)		
	N (Period)	N< 0.037	% Exceeding 0.037	N (Period)	N< 0.037	% Exceeding 0.037
Illinois River near Watts[2]	374	11	97%	66	1	98%
Illinois River near Tahlequah[2]	379	24	94%	71	4	94%
Flint Creek near Kansas[2]	367	0	100%	68	0	100%
Barren Fork near Eldon[2]	368	210	43%	69	39	43%
Little Lee Creek near Nicut[1]	129	127	2%	34	34	0%
Lee Creek near Short	246	244	1%	35	34	3%
Mountain Fork River near Smithville	219	186	15%	41	37	10%

Table 2. Waters Listed on Oklahoma's 2022 303(d) List

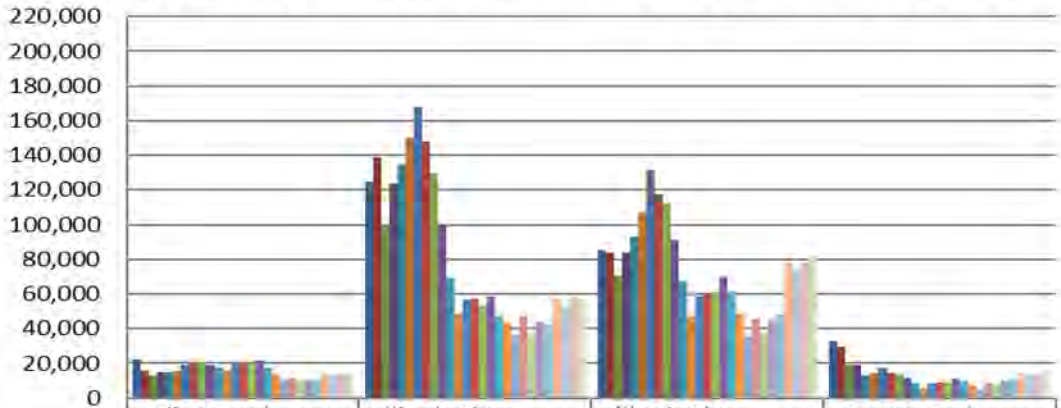
Impaired Waters in the Illinois River Basin

OKWBID	Name	Listed on 303(d) for Impairments
121700020020	Tenkiller Ferry Lake	Dissolved Oxygen, TP
121700020110	Chicken Creek	Fish Bioassessment
121700020220	Tenkiller Ferry Lake, Illinois River Arm	Chlorophyll-a, TP
121700030010	Illinois River – Tahlequah	TP, Enterococcus
121700030040	Tahlequah Creek (Town Branch)	*Eschericia coli*
121700030080	Illinois River	TP, Lead, *Eschericia coli*,
121700030280	Illinois River – Chewey Bridge	TP, *Escherichia coli*. Turbidity, Enterococcus
121700030290	Flint Creek	TP, Dissolved Oxygen
121700030350	Illinois River – Watts	TP, Enterococcus, *Escherichia coli*
121700030370	Ballard Creek	Enterococcus
121700040010	Caney Creek	Enterococcus
121700050010	Illinois River - Baron Fork	TP, Enterococcus
121700050090	Tyner Creek	Enterococcus
121700050120	Peacheater Creek	Enterococcus
121700060010	Flint Creek	TP, Enterococcus
121700060040	Battle Creek (Battle Branch)	Enterococcus
121700060080	Sager Creek	DO, Sedimentation/Siltation, Enterococcus, Macro

Other Notable Impaired Waters in the Compact Area

OKWBID	Name	Listed on 303(d) for Impairments
220100010010	Poteau River (Below Wister)	Silver, Cadmium, Copper, Lead, Selenium, Turbidity
220100020020	Wister Lake	Chlorophyll-a, pH, Dissolved Oxygen, Turbidity TP, listed as an NLW in the OWQS
220200050010	Lee Creek	Lead, Enterococcus
220200050040	Little Lee Creek	Lead

Oklahoma's Average Annual Total P Loading in Kilograms per Year (excluding targeted high flows)



	Flint Creek near Kansas	Illinois River near Watts	Illinois River near Tahlequah	Barren Fork near Eldon
Total P 80-93	22,279	124,832	85,235	33,001
Total P 93-97	15,727	138,508	83,799	29,482
Total P 94-98	12,986	99,898	70,546	19,163
Total P 95-99	14,974	123,581	83,632	19,257
Total P 96-00	15,100	134,986	92,876	13,163
Total P 97-01	15,989	149,927	106,797	14,548
Total P 98-02	19,224	167,987	131,491	17,603
Total P 99-03	20,579	148,151	117,524	14,059
Total P 00-04	20,963	129,533	112,341	13,685
Total P 01-05	19,098	100,347	91,325	11,465
Total P 02-06	17,415	69,482	67,345	8,500
Total P 03-07	15,977	48,448	47,216	5,716
Total P 04-08	19,356	56,951	58,605	8,574
Total P 05-09	19,586	57,272	60,830	9,197
Total P 06-10	19,818	53,127	61,131	9,335
Total P 07-11	21,700	58,493	70,259	11,159
Total P 08-12	17,473	47,682	61,180	9,837
Total P 09-13	13,543	43,412	48,513	7,054
Total P 10-14	10,154	35,998	35,578	5,357
Total P 11-15	11,382	47,254	45,505	8,711
Total P 12-16	9,516	35,758	37,303	7,831
Total P 13-17	10,063	44,029	45,051	9,461
Total P 14-18	10,069	42,044	47,787	10,241
Total P 15-19	13,505	57,100	77,881	14,623
Total P 16-20	12,821	52,558	73,518	12,130
Total P 17-21	13,499	57,816	78,165	12,794
Total P 18-22	14,077	57,599	81,291	15,189

Values represent all available data, which is routinely collected and excludes targeted high flow events.

Water Quality Trends at Different Flow Regimes

Trend analyses were performed on total phosphorus concentrations as well as assessment arithmetic means at four BUMP permanent monitoring stations in the Arkansas River Compact area (Table 1). Using a Seasonal Kendall test, a series of trends were calculated for each station including all total phosphorus data from both 1993-2022 and 1999-2022, total phosphorus concentrations measured at both higher and lower flows from 1999-2022 and use assessment arithmetic means from 1999-2022. Furthermore, for each concentration data set, a trend was calculated using both unadjusted and flow-adjusted total phosphorus data. Graphical representations of these trends are not presented but may be obtained by contacting Monty Porter with the OWRB at 405-530-8933. Some general conclusions may be drawn from the data set.

1. When considering all total phosphorus data with a period of record (POR) beginning in 1993, no station demonstrated a significant upward trend regardless of flow adjusting data. The Barren Fork River demonstrated a slight to moderate significant downward trend for all data, while all other sites and unadjusted Barren Fork data show a highly significant downward trend.
2. When all data from 1999-2022 are analyzed, all stations demonstrate a highly significant downward trend, except Barren Fork adjusted data which showed no significant trend for unadjusted data.
3. When only lower flow data from 1999-2022 are analyzed, all waterbodies show a highly significant downward for total phosphorus concentrations, except the Barren Fork. The Barren Fork shows no significant trend.
4. When only lower flow data from 1999-2022 are analyzed, all stations demonstrate a highly significant downward trend. The unadjusted Barren Fork River data shows no significant trend in total phosphorus concentrations at lower flows, while its flow adjusted data demonstrate a slightly significant downward trend.
5. With the exception of the Barren Fork River, all stations show a highly significant downward trend for use assessment 6-month rolling arithmetic means. The Barren demonstrates no significant trend. (Figures 1-4)

Table 1. Trends calculated for total phosphorus concentrations and use assessment arithmetic means at certain BUMP permanent monitoring stations in the Compact area. (Boxes shaded in yellow represent changes from the 2022 report, and 2022 results are in superscript.)

Station	All Data (1993-2022)		All Data (1999-2022)		Higher Flow Data (1999-2022)		Lower Flow Data (1999-2022)		Arithmetic Mean For Assessment (1999-2022)
	Unadj	Flow Adj	Unadj	Flow Adj	Unadj	Flow Adj	Unadj	Flow Adj	Unadj
Illinois River near Watts	↓↓↓	↓↓↓	↓↓↓	↓↓↓	↓↓↓	↓↓↓	↓↓↓	↓↓↓	↓↓↓
Illinois River near Tahlequah	↓↓↓	↓↓↓	↓↓↓	↓↓↓	↓↓	↓↓↓	↓↓↓	↓↓↓	↓↓↓
Flint Creek near Kansas	↓↓↓	↓↓↓	↓↓↓	↓↓↓	↓↓↓	↓↓↓	↓↓↓	↓↓↓	↓↓↓
Barren Fork near Eldon	↓$^{(↓↓↓)}$	↓↓$^{(NT)}$	NT$^{(↓↓)}$	↓↓↓$^{(NT)}$	NT$^{(↓)}$	NT$^{(↓)}$	NT$^{(↓↓)}$	↓$^{(NT)}$	NT$^{(↓↓↓)}$

↓↓↓ = Decreasing Trend at the 95% Confidence Level
↓↓ = Decreasing Trend at the 90% Confidence Level
↓ = Decreasing Trend at the 80% Confidence Level
No Increasing Trends
NT = No Signficant Trend

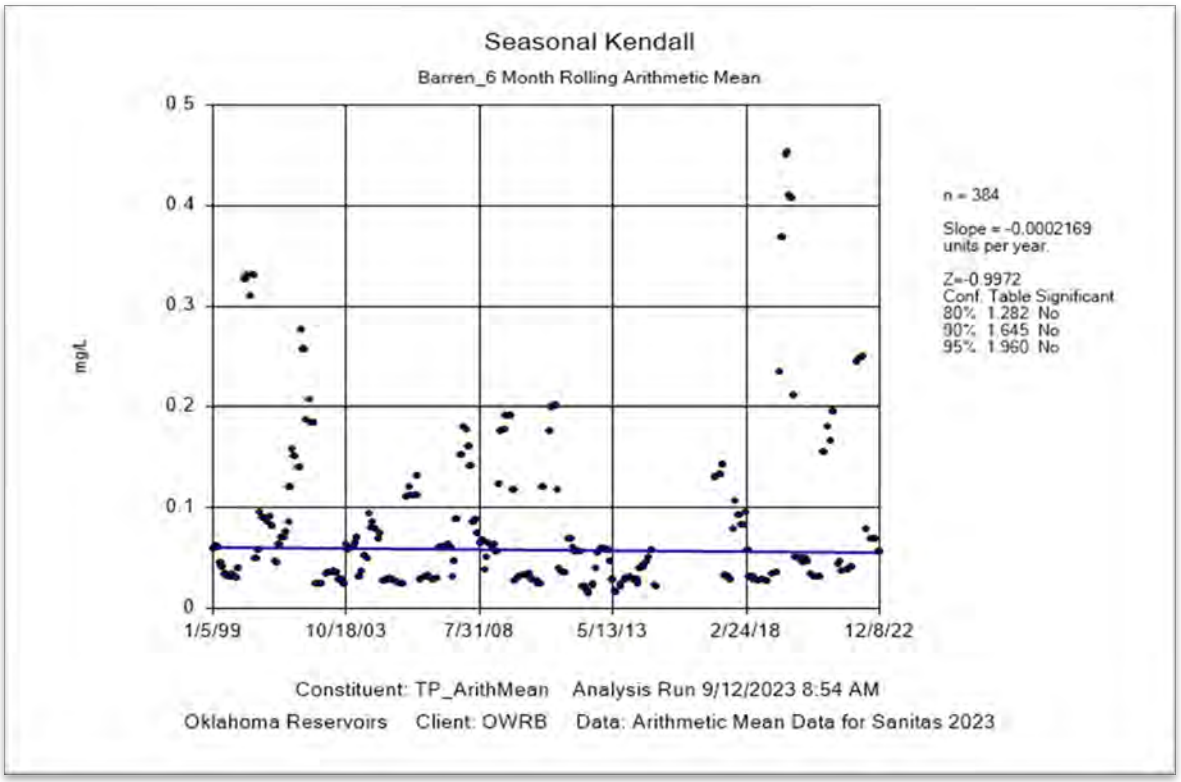


Figure 1. Trend for use assessment arithmetic means (1999-2022) on the Barren Fork River near Eldon.

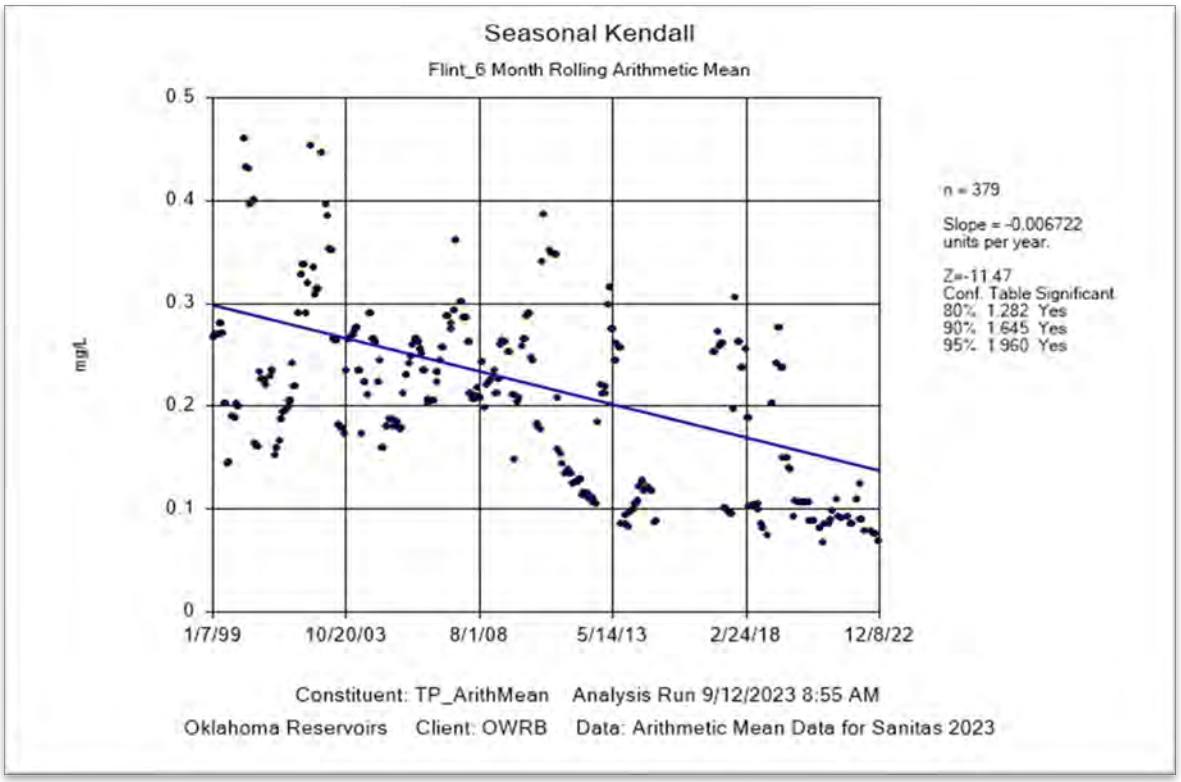


Figure 2. Trend for use assessment arithmetic means (1999-2022) on Flint Creek near Kansas.

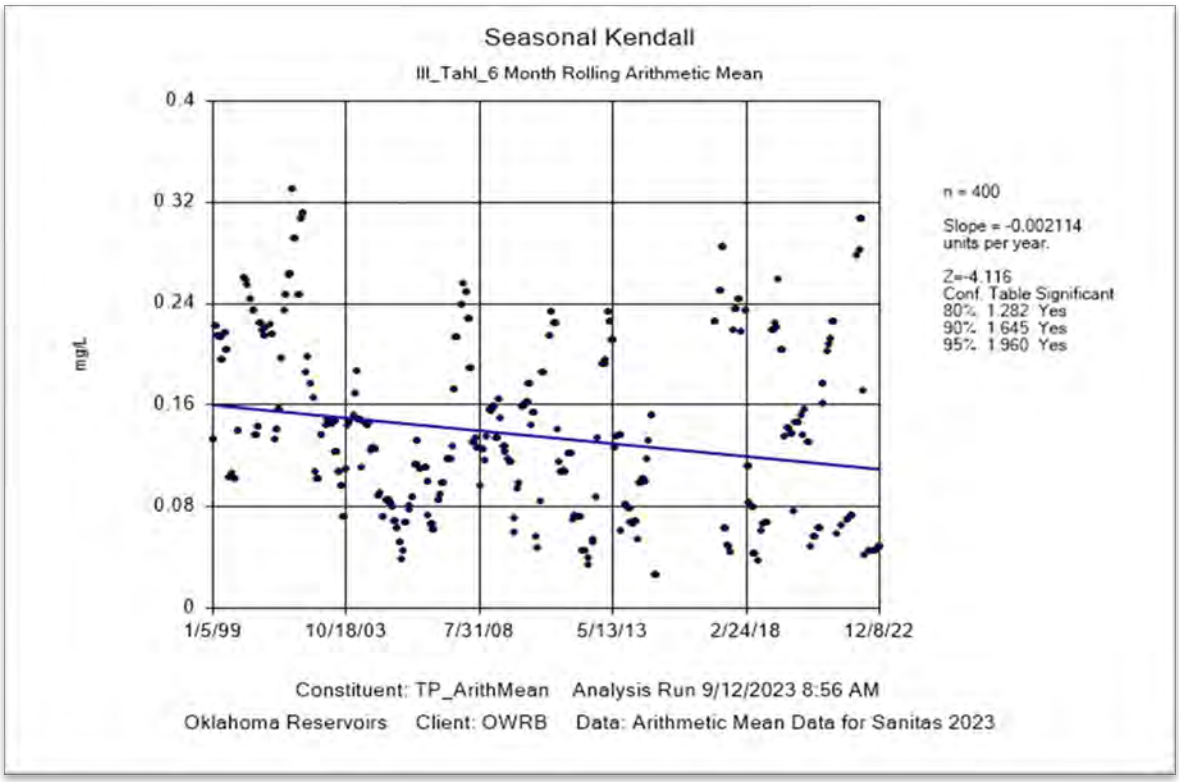


Figure 3. Trend for use assessment arithmetic means (1999-2022) on Illinois River near Tahlequah.

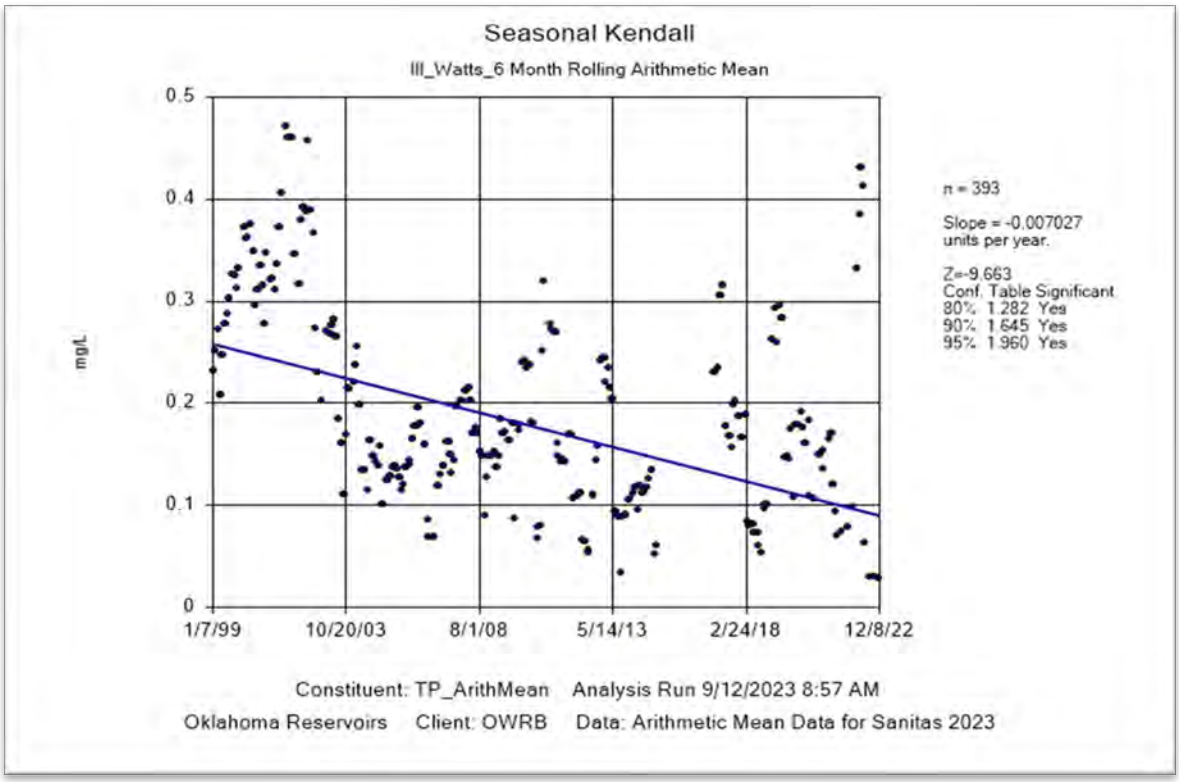


Figure 4. Trend for use assessment arithmetic means (1999-2022) on Illinois River near Watts.

Arkansas River at Moffett

Sample Record	Biological Collections	Station ID
November 1998 - Current	Gaging Data	220200010010-001AT

Stream Data

County	Sequoyah	Request Data By Email
Location	East of the Town of Moffett on US Highway 64	
Latitude/Longitude	35.39242903, -94.43267795	
Planning Watershed	Lower Arkansas (8-digit HUC - 11110104)	

Parameters

	Parameter (Descriptions)	n	Mean	Median	Min./Max	p25/p75	Comments
In-Situ	Water Temperature (°C)	79	19.2	20.1	1.7/32.6	12.7/26.3	
	Turbidity (NTU)	80	33	21	7/194	15/42	
	pH (units)	79	7.85	7.85	6.87/8.97	7.64/8.04	
	Dissolved Oxygen (mg/L)	78	9.48	9.09	5.35/16.48	7.67/10.54	
	Hardness (mg/L)	79	162	141	39/658	125/182	
Minerals	Total Dissolved Solids (mg/L)	107	357	341	<10/833	257/423	
	Specific Conductivity (uS/cm)	77	612	576	195/1333	482/737	
	Chloride (mg/L)	85	100	93	13/293	57/129	
	Sulfate (mg/L)	85	54	51	22/116	39/64	
Nutrients	Total Phosphorus (mg/L)	85	0.123	0.117	0.051/0.330	0.095/0.139	
	Total Nitrogen (mg/L)	84	0.96	0.92	0.45/2.82	0.71/1.12	
	Nitrate/Nitrite (mg/L)	43	0.26	0.22	<0.05/0.66	0.10/0.38	
	Chlorophyll A (mg/m^3)	44	13.0	10.2	<0.1/71.8	6.4/15.6	TSI=55.7
Bacteria	Enterococcus (cfu/100ml)(*-Geo. Mn.)	21	1089	<10	<10/12000	<10/20	
	E. Coli (cfu/100ml)(*-Geo. Mn.)	21	158	<10	<10/2035	<10/20	

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	Sulfates	Nitrates	Chlorides	Total Dissolved Solids	Bacteria	Bio. Fish	Bio. BMI	Sediment
Fish & Wildlife Propagation	S	S	S	S						U	S	S
Aesthetics												S
Agriculture					S		S	S				
Primary Body Contact Recreation									S			
Public & Private Water Supply				S		S			S			
Fish Consumption				S								

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

U = Assessment yielded undetermined supporting status

Arkansas River at Muskogee

Sample Record	Biological Collections	Station ID
November 1998 - Current	Gaging Data	120400010260-001AT

Stream Data

County	Muskogee	Request Data By Email
Location	East of the Town of Muskogee on US Highway 62	
Latitude/Longitude	35.77016066, -95.30031102	
Planning Watershed	Middle Arkansas (8-digit HUC - 11110102)	

Parameters

	Parameter (Descriptions)	n	Mean	Median	Min./Max	p25/p75	Comments
In-Situ	Water Temperature (°C)	111	18.0	18.6	1.9/32.4	11.2/24.8	
	Turbidity (NTU)	110	42	23	5/387	15/40	
	pH (units)	110	8.04	8.04	7.09/9.48	7.77/8.30	
	Dissolved Oxygen (mg/L)	115	8.99	8.95	4.42/14.88	7.48/10.59	
	Hardness (mg/L)	109	179	167	91/399	143/211	
Minerals	Total Dissolved Solids (mg/L)	169	500	407	<10/1580	301/647	
	Specific Conductivity (uS/cm)	110	859	765	191/2462	460/1083	
	Chloride (mg/L)	116	160	133	<10/713	77/196	
	Sulfate (mg/L)	117	73	65	28/202	45/88	
Nutrients	Total Phosphorus (mg/L)	117	0.165	0.146	0.053/0.705	0.117/0.177	
	Total Nitrogen (mg/L)	116	1.15	1.10	0.40/2.82	0.92/1.36	
	Nitrate/Nitrite (mg/L)	62	0.37	0.32	<0.05/0.88	0.20/0.51	
	Chlorophyll A (mg/m^3)	58	17.9	13.7	<0.1/90.0	7.9/25.1	TSI=58.9
Bacteria	Enterococcus (cfu/100ml)(*-Geo. Mn.)	20	5232	17	<10/75000	<10/200	
	E. Coli (cfu/100ml)(*-Geo. Mn.)	20	546	25	<10/5492	<10/65	

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	Sulfates	Nitrates	Chlorides	Total Dissolved Solids	Bacteria	Bio. Fish	Bio. BMI	Sediment
Fish & Wildlife Propagation	S	S	S	S						S	S	S
Aesthetics												S
Agriculture					S		S	S				
Primary Body Contact Recreation									S			
Public & Private Water Supply				S		S			S			
Fish Consumption				S								

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Notes

Barren Fork at Eldon

Sample Record	Biological Collections	Station ID
November 1998 - Current	Gaging Data	121700050010-001AT

Stream Data

County	Cherokee	Request Data By Email
Location	South of the Town of Eldon on State Highway 51	
Latitude/Longitude	35.92173377, -94.83726494	
Planning Watershed	Lower Arkansas (8-digit HUC - 11110103)	

Parameters

	Parameter (Descriptions)	n	Mean	Median	Min./Max	p25/p75	Comments
In-Situ	Water Temperature (°C)	145	17.3	17.8	3.1/29.9	11.3/22.9	
	Turbidity (NTU)	142	4	2	1/45	2/3	
	pH (units)	144	7.63	7.59	6.37/8.82	7.37/7.88	
	Dissolved Oxygen (mg/L)	148	9.67	9.80	4.40/14.53	8.19/11.05	
	Hardness (mg/L)	146	99	98	46/159	89/107	
Minerals	Total Dissolved Solids (mg/L)	164	128	124	13/545	110/137	
	Specific Conductivity (uS/cm)	145	200	199	20/713	178/215	
	Chloride (mg/L)	117	<10	<10	<10/44	<10/<10	
	Sulfate (mg/L)	117	<10	<10	<10/40	<10/<10	
Nutrients	Total Phosphorus (mg/L)	149	0.033	0.028	<0.010/0.217	0.022/0.034	
	Total Nitrogen (mg/L)	148	1.48	1.39	0.18/4.20	0.85/1.94	
	Nitrate/Nitrite (mg/L)	86	1.26	1.18	0.14/3.83	0.63/1.64	
	Chlorophyll A (mg/m^3)	89	1.4	1.1	<0.1/11.7	0.7/1.7	TSI=34.1
Bacteria	Enterococcus (cfu/100ml)(*-Geo. Mn.)	74	221	20	<10/3900	<10/80	
	E. Coli (cfu/100ml)(*-Geo. Mn.)	74	77	<10	<10/2420	<10/49	Mean>OWQS

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	Sulfates	Nitrates	Chlorides	Total Dissolved Solids	Bacteria	Bio. Fish	Bio. BMI	Sediment	Total Phosphorus
Fish & Wildlife Propagation	S	S	S	S						S	S	S	
Aesthetics												S	S
Agriculture					S		S	S					
Primary Body Contact Recreation									NS				
Public & Private Water Supply				S		S			S				
Fish Consumption				S									

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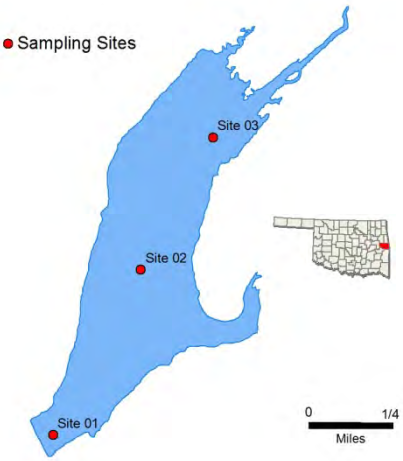
Notes

Brushy Creek

Sample Period	Times Visited	Sampling Sites
December 2014 – September 2015	4	3



General

Location	Sequoyah County
Impoundment	1964
Area	358 acres
Capacity	3,258 acre-feet
Purposes	Flood Control and Recreation

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	8 NTU	0% of values > OWQS of 25 NTU
	Average Secchi Disk Depth	79 cm	
	Water Clarity Rating	Good	
	Chlorophyll-a	13 mg/m3	
	Trophic State Index	56	Previous value = 53
	Trophic Class	Eutrophic	
Profile	Salinity	0.02 - 0.09 ppt	
	Specific Conductivity	52.3 – 179.6 µS/cm	
	pH	5.86 - 8.53 pH units	11 (11.6%) values < 6.5 units
	Oxidation-Reduction Potential	49 to 486.4 mV	
	Dissolved Oxygen	Up to 67% of water column < 2 mg/L in June	
Nutrients	Surface Total Nitrogen	0.42 mg/L to 0.89 mg/L	
	Surface Total Phosphorus	0.008 mg/L to 0.038 mg/L	
	Nitrogen to Phosphorus Ratio	21:1	Phosphorus limited

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
Fish & Wildlife Propagation	S	NS	NEI	S							
Aesthetics					S	*					
Agriculture							S	S	S		
Primary Body Contact Recreation										S	
Public & Private Water Supply											NS

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Notes

*Standards revision, true color is for permitting purposes only.

NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

Caney Creek at Barber

Sample Record	Biological Collections	Station ID
September 1999 – November 2012	Gaging Data	121700040010-001AT

Stream Data

County	Cherokee	Request Data by Email
Location	North of the Town of Barber off State Highway 100	
Latitude/Longitude	35.785043, -94.856285	
Planning Watershed	Lower Arkansas (8-digit HUC - 11110103)	

Parameters

	Parameter (Descriptions)	n	Mean	Median	Min./Max	p25/p75	Comments
In-Situ	Water Temperature (°C)	99	18.1	17.6	4.1/29.3	13.1/23.3	
	Turbidity (NTU)	100	4	2	0/103	1/3	
	pH (units)	97	7.77	7.76	6.46/9.06	7.56/8.02	
	Dissolved Oxygen (mg/L)	99	9.66	9.42	3.94/15.60	8.31/11.11	
	Hardness (mg/L)	99	109	109	64/174	98/120	
Minerals	Total Dissolved Solids (mg/L)	111	142	140	78/254	129/156	
	Specific Conductivity (uS/cm)	99	219	218	123/391	200/243	
	Chloride (mg/L)	90	<10	<10	<10/37	<10/<10	
	Sulfate (mg/L)	90	<10	<10	<10/33	<10/<10	
Nutrients	Total Phosphorus (mg/L)	105	0.060	0.037	<0.010/1.532	0.030/0.046	
	Total Nitrogen (mg/L)	104	1.12	1.02	0.16/7.04	0.68/1.37	
	Nitrate/Nitrite (mg/L)	51	0.85	0.85	0.06/2.89	0.48/1.06	
	Chlorophyll A (mg/m^3)	53	1.3	0.8	<0.1/12.1	0.5/1.2	TSI=32.9
Bacteria	Enterococcus (cfu/100ml)(*-Geo. Mn.)	46	94	20	<10/1408	<10/52	Mean>OWQS
	E. Coli (cfu/100ml)(*-Geo. Mn.)	46	123	15	<10/2382	<10/39	Mean>OWQS

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	Sulfates	Nitrates	Chloride	Total Dissolved Solids	Bacteria	Bio. Fish	Bio. BMI	Sediment
Fish & Wildlife Propagation	S	S	S	S						S	NS	S
Aesthetics												S
Agriculture					S		S	S				
Primary Body Contact Recreation									NS			
Public & Private Water Supply				S		S			S			
Fish Consumption				S								

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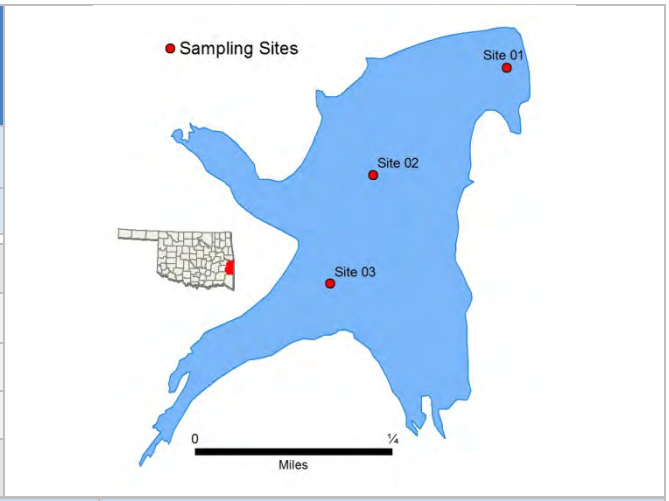
NS = Not Supporting
NEI = Not Enough Information

Notes

Cedar

Sample Period	Times Visited	Sampling Sites
November 2015 – Sept. 2016	4	5



General

Location	Le Flore County
Impoundment	1937
Area	78 acres
Capacity	1,000 acre-feet
Purposes	Recreation

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	7 NTU	100% of values < OWQS of 25 NTU
	Average Secchi Disk Depth	92 cm	
	Water Clarity Rating	Excellent	
	Chlorophyll-a	25.3 mg/m3	
	Trophic State Index	62	Previous Value=56
	Trophic Class	Hypereutrophic	
Profile	Salinity	0.01– 0.08 ppt	
	Specific Conductivity	31.7 – 170.4 µS/cm	
	pH	5.92 – 7.36 pH units	51.56% < 6.5
	Oxidation-Reduction Potential	-58.9 – 416.9 mV	
	Dissolved Oxygen	Up to 40% of water column < 2 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.56 mg/L to 0.98 mg/L	
	Surface Total Phosphorus	0.023 mg/L to 0.043 mg/L	
	Nitrogen to Phosphorus Ratio	24:1	Phosphorus limited

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
Fish & Wildlife Propagation	NEI	NS	NS	S							
Aesthetics					S	*					
Agriculture							*	*	S		
Primary Body Contact Recreation										S	
Public & Private Water Supply											

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

*Standards revision, true color is for permitting purposes only.

NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

Flint Creek at Flint

Sample Record	Biological Collections	Station ID
November 1998 - Current	Gaging Data	121700060010-001AT

Stream Data

County	Delaware	Request Data By Email
Location	North of the Town of Flint on D0581 Rd	
Latitude/Longitude	36.1867733, -94.70680493	
Planning Watershed	Lower Arkansas (8-digit HUC - 11110103)	

Parameters

	Parameter (Descriptions)	n	Mean	Median	Min./Max	p25/p75	Comments
In-Situ	Water Temperature (°C)	143	17.0	16.5	2.5/28.7	11.2/22.9	
	Turbidity (NTU)	140	2	1	0/58	1/2	
	pH (units)	142	7.69	7.68	6.44/8.79	7.44/7.93	
	Dissolved Oxygen (mg/L)	146	9.50	9.28	4.97/14.94	8.04/10.75	
	Hardness (mg/L)	145	115	115	<10/218	104/125	
Minerals	Total Dissolved Solids (mg/L)	160	185	182	98/552	159/205	
	Specific Conductivity (uS/cm)	141	292	295	152/452	259/326	
	Chloride (mg/L)	118	14	13	<10/43	<10/18	
	Sulfate (mg/L)	118	17	15	<10/69	12/19	
Nutrients	Total Phosphorus (mg/L)	150	0.182	0.152	0.055/1.450	0.098/0.187	See Notes
	Total Nitrogen (mg/L)	149	2.92	2.79	0.92/7.93	2.26/3.52	
	Nitrate/Nitrite (mg/L)	87	2.51	2.43	0.80/4.83	1.75/3.18	
	Chlorophyll A (mg/m^3)	89	1.0	0.8	<0.1/4.2	0.5/1.2	TSI=30.3
Bacteria	Enterococcus (cfu/100ml)(*-Geo. Mn.)	65	555	52	<10/18000	15/109	Mean>OWQS
	E. Coli (cfu/100ml)(*-Geo. Mn.)	65	194	31	<10/4611	<10/74	Mean>OWQS

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	Sulfates	Nitrates	Chlorides	Total Dissolved Solids	Bacteria	Bio. Fish	Bio. BMI	Sediment	Total Phosphorus
Fish & Wildlife Propagation	S	S	S	S						S	S	S	
Aesthetics												S	NS
Agriculture					S		S	S					
Primary Body Contact Recreation									NS				
Public & Private Water Supply				S					S				
Fish Consumption				S									

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

100%(72 of 72) of rolling Geo. Mean exceed OWQS criterion of 0.037 ppm

Fourche-Maline Creek at Red Oak

Sample Record	Biological Collections	Station ID
November 1998 - Current	Gaging Data	220100040020-001AT

Stream Data

County	Latimer	Request Data By Email
Location	Southeast of the Town of Red Oak off US Highway 270	
Latitude/Longitude	34.91232472, -95.15608416	
Planning Watershed	Lower Arkansas (8-digit HUC - 11110105)	

Parameters

	Parameter (Descriptions)	n	Mean	Median	Min./Max	p25/p75	Comments
In-Situ	Water Temperature (°C)	157	17.4	18.8	1.0/31.6	10.4/24.0	
	Turbidity (NTU)	157	38	27	5/390	17/42	
	pH (units)	158	7.11	7.02	5.77/8.76	6.82/7.43	
	Dissolved Oxygen (mg/L)	162	6.12	6.19	0.84/15.69	3.15/8.74	
	Hardness (mg/L)	158	53	49	<10/212	34/63	
Minerals	Total Dissolved Solids (mg/L)	191	103	96	<10/719	69/125	
	Specific Conductivity (uS/cm)	156	159	138	11/1106	101/196	
	Chloride (mg/L)	120	<10	<10	<10/22	<10/10	
	Sulfate (mg/L)	120	23	22	<10/65	17/26	
Nutrients	Total Phosphorus (mg/L)	159	0.083	0.070	<0.010/0.867	0.049/0.092	
	Total Nitrogen (mg/L)	157	0.77	0.73	0.16/1.79	0.56/0.94	
	Nitrate/Nitrite (mg/L)	101	0.14	0.12	<0.05/0.97	<0.05/0.22	
	Chlorophyll A (mg/m^3)	42	6.3	2.5	0.3/34.0	1.2/8.1	TSI=48.6
Bacteria	Enterococcus (cfu/100ml)(*-Geo. Mn.)	33	460	80	<10/8000	52/200	Mean>OWQS
	E. Coli (cfu/100ml)(*-Geo. Mn.)	33	208	74	<10/1986	29/148	

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	Sulfates	Nitrates	Chlorides	Total Dissolved Solids	Bacteria	Bio. Fish	Bio. BMI	Sediment
Fish & Wildlife Propagation	S	S	NS	NS						S	NS	S
Aesthetics												S
Agriculture					S		S	S				
Primary Body Contact Recreation									NS			
Public & Private Water Supply				NEI		NEI			NEI			
Fish Consumption				S								

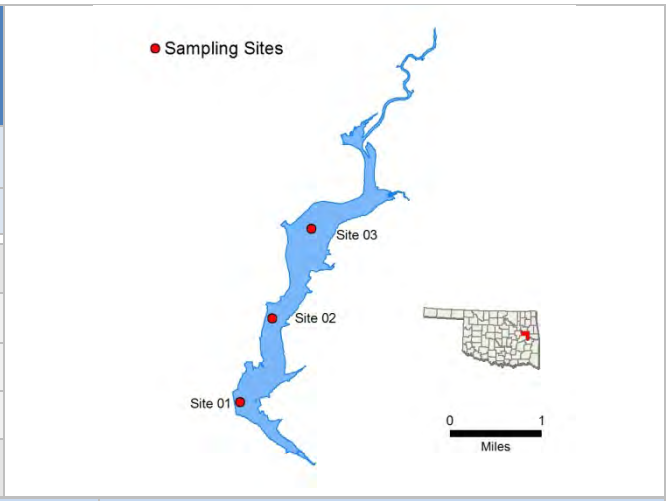
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

Fish & Wildlife Propagation not supporting for Lead

Greenleaf

Sample Period	Times Visited	Sampling Sites
February 2019 – August 2019	4	5



General

Location	Muskogee County
Impoundment	1939
Area	920 acres
Capacity	14,720 acre-feet
Purposes	Recreation

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	7 NTU	100% of values < OWQS of 25 NTU (n=9)
	Average Secchi Disk Depth	97 cm	
	Water Clarity Rating	Good	
	Chlorophyll-a	17.76 mg/m3	
	Trophic State Index	59	Previous value = 58
	Trophic Class	Eutrophic	
Profile	Salinity	0.0– 0.09 ppt	
	Specific Conductivity	0.80 – 162 µS/cm	
	pH	6.26 – 8.11 pH units	33% of recorded values <6.5
	Oxidation-Reduction Potential	48.6 – 4440.5 mV	
	Dissolved Oxygen	Up to 61% of water column < 2 mg/L in August	
Nutrients	Surface Total Nitrogen	0.36 mg/L to 0.77 mg/L	
	Surface Total Phosphorus	0.021 mg/L to 0.037 mg/L	
	Nitrogen to Phosphorus Ratio	18:1	Phosphorus limited

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
Fish & Wildlife Propagation	NS	S	NEI	S							
Aesthetics					S	*					
Agriculture							N/A	N/A	S		
Primary Body Contact Recreation										S	
Public & Private Water Supply											NS

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

*Standards revision, true color is for permitting purposes only.
* 50-70% range is undetermined for DO.

NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

Illinois River at Tahlequah

Sample Record	Biological Collections	Station ID
November 1998 - Current	Gaging Data	121700030010-001AT

Stream Data

County	Cherokee	Request Data By Email
Location	East of the Town of Tahlequah on US Highway 62	
Latitude/Longitude	35.92606447, -94.92380373	
Planning Watershed	Lower Arkansas (8-digit HUC - 11110103)	

Parameters

	Parameter (Descriptions)	n	Mean	Median	Min./Max	p25/p75	Comments
In-Situ	Water Temperature (°C)	144	17.6	17.3	0.8/31.7	11.0/24.0	
	Turbidity (NTU)	141	7	4	0/84	3/6	
	pH (units)	142	7.88	7.83	6.47/9.29	7.58/8.13	
	Dissolved Oxygen (mg/L)	147	10.06	10.05	4.66/15.88	8.01/11.97	
	Hardness (mg/L)	144	115	114	69/168	106/123	
Minerals	Total Dissolved Solids (mg/L)	163	170	170	30/565	149/186	
	Specific Conductivity (uS/cm)	144	268	271	66/713	240/293	
	Chloride (mg/L)	118	10	10	<10/24	<10/14	
	Sulfate (mg/L)	118	14	13	<10/48	11/16	
Nutrients	Total Phosphorus (mg/L)	151	0.080	0.066	<0.010/0.438	0.043/0.103	See Notes
	Total Nitrogen (mg/L)	150	1.77	1.71	0.38/3.76	1.19/2.26	
	Nitrate/Nitrite (mg/L)	88	1.53	1.46	0.24/3.61	0.93/1.98	
	Chlorophyll A (mg/m^3)	89	3.1	2.0	<0.1/46.4	1.5/3.1	TSI=41.8
Bacteria	Enterococcus (cfu/100ml)(*-Geo. Mn.)	64	151	20	<10/2500	<10/100	
	E. Coli (cfu/100ml)(*-Geo. Mn.)	64	61	<10	<10/884	<10/34	

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	Sulfates	Nitrates	Chlorides	Total Dssolved Solids	Bacteria	Bio. Fish	Bio. BMI	Sediment	Total Posphorus
Fish & Wildlife Propagation	S	S	S	S						S	S	S	
Aesthetics												S	NS
Agriculture					S		S	S					
Primary Body Contact Recreation									S				
Public & Private Water Supply				S		S			S				
Fish Consumption				S									

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes: *92.5%(74 of 80) of 3-month rolling Geo. Mean above OWQS criterion of 0.037 ppm*

Illinois River at Watts

Sample Record	Biological Collections	Station ID
November 1998 - Current	Gaging Data	121700030350-001AT

Stream Data

County	Adair	Request Data By Email
Location	North of the Town of Watts on US Highway 59	
Latitude/Longitude	36.12994064, -94.57151225	
Planning Watershed	Lower Arkansas (8-digit HUC - 11110103)	

Parameters

	Parameter (Descriptions)	n	Mean	Median	Min./Max	p25/p75	Comments
In-Situ	Water Temperature (°C)	145	17.2	16.5	2.0/31.5	10.6/24.0	
	Turbidity (NTU)	141	10	7	1/95	4/12	
	pH (units)	144	7.90	7.92	6.51/9.03	7.72/8.12	
	Dissolved Oxygen (mg/L)	147	10.55	10.22	4.51/18.88	8.70/11.77	
	Hardness (mg/L)	146	127	127	<10/220	116/136	
Minerals	Total Dissolved Solids (mg/L)	164	195	196	95/566	171/215	
	Specific Conductivity (uS/cm)	145	307	310	149/713	273/339	
	Chloride (mg/L)	117	13	13	<10/28	<10/16	
	Sulfate (mg/L)	117	16	15	<10/97	12/19	
Nutrients	Total Phosphorus (mg/L)	150	0.141	0.091	<0.010/1.153	0.057/0.164	See Notes
	Total Nitrogen (mg/L)	149	2.52	2.47	0.84/5.06	2.08/2.87	
	Nitrate/Nitrite (mg/L)	88	2.20	2.20	0.72/3.96	1.71/2.52	
	Chlorophyll A (mg/m^3)	89	3.0	2.3	<0.1/15.3	1.4/3.4	TSI=41.3
Bacteria	Enterococcus (cfu/100ml)(*-Geo. Mn.)	65	559	20	<10/15531	<10/100	Mean>OWQS
	E. Coli (cfu/100ml)(*-Geo. Mn.)	65	368	20	<10/12997	<10/63	Mean>OWQS

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	Sulfates	Nitrates	Chlorides	Total Dissolved Solids	Bacteria	Bio. Fish	Bio. BMI	Sediment	Total Posphorus
Fish & Wildlife Propagation	S	S	S	S						S	S	S	
Aesthetics												S	NS
Agriculture					S		S	S					
Primary Body Contact Recreation									NS				
Public & Private Water Supply				S		S			S				
Fish Consumption				S									

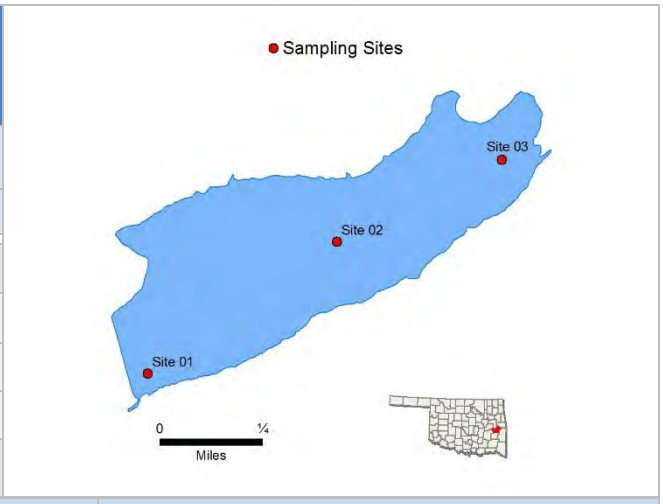
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

91.6%(76of 83) of rolling Geo. Mean exceed OWQS criterion of 0.037 ppm

John Wells

Sample Period	Times Visited	Sampling Sites
November 2016 – August 2017	4	5



General

Location	Haskell County
Impoundment	1936
Area	194 acres
Capacity	1,352 acre-feet
Purposes	Water Supply, Recreation

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	4 NTU	100% of values < OWQS of 25 NTU (n=10)
	Average Secchi Disk Depth	146 cm	
	Water Clarity Rating	Excellent	
	Chlorophyll	5.2 mg/L	
	Trophic State Index	47	Previous value = 45
	Trophic Class	Mesotrophic	
Profile	Salinity	0.03 – 0.08 ppt	
	Specific Conductivity	75.2 – 165.2 µS/cm	
	pH	6.39 – 8.74 pH units	4.8% of values < 6.50 pH
	Oxidation-Reduction Potential	95.2 – 546.3 mV	
	Dissolved Oxygen	Up to 50% of water column < 2.0 mg/L in July	
Nutrients	Surface Total Nitrogen	0.42 mg/L to 0.55 mg/L	
	Surface Total Phosphorus	0.014 mg/L to 0.018 mg/L	
	Nitrogen to Phosphorus Ratio	31:1	Phosphorus limited

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a
Fish & Wildlife Propagation	S	S	S	S							
Aesthetics					S	*					
Agriculture							*	*	S		
Primary Body Contact Recreation										S	
Public & Private Water Supply				S							

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes: Standards revision, true color is for permitting purposes only.

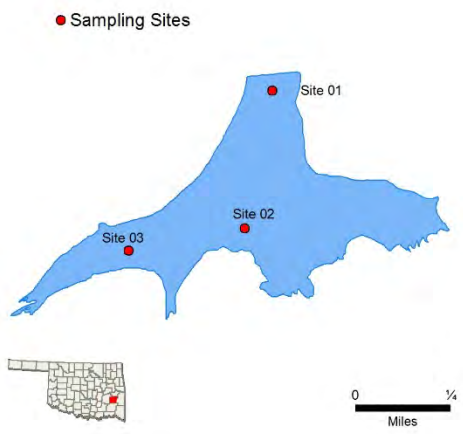
NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

Sampling and Assessment by the **Oklahoma Water Resources Board** – 3800 Classen Blvd, Oklahoma City, OK, 73118 – 405.530.8800 – http://www.owrb.ok.gov

Bathy map available: http://www.owrb.ok.gov/maps/PMG/owrbdata_Bathy.html

Lloyd Church (Wilburton)

Sample Period	Times Visited	Sampling Sites
December 2018 – August 2019	4	3



General

Location	Latimer County
Impoundment	1964
Area	160 acres
Capacity	3,060 acre-feet
Purposes	Water Supply, Recreation, Flood Control

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	10 NTU	100% of values < 25 NTU (n=12)
	Average Secchi Depth	99 cm	
	Water Clarity Rating	Excellent	
	Chlorophyll-a	5.3 mg/m3	
	Trophic State Index	47	Previous value = 46
	Trophic Class	Mesotrophic	
Profile	Salinity	0.02 – 0.04 ppt	
	Specific Conductivity	42.6 – 82.6 µS/cm	
	pH	6.05 – 7.48 pH units	40% of values <6.5 pH units
	Oxidation-Reduction Potential	76.1 -596.8 mV	
	Dissolved Oxygen	Up to 53% of water column < 2 mg/L in September	
Nutrients	Surface Total Nitrogen	0.27 mg/L to 0.44 mg/L	
	Surface Total Phosphorus	0.013 mg/L to 0.029 mg/L	
	Nitrogen to Phosphorus Ratio	17:1	Phosphorus limited

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
Fish & Wildlife Propagation	NS	NS	NEI	S							
Aesthetics					S	*					
Agriculture							S	S	S		
Primary Body Contact Recreation										S	
Public & Private Water Supply											

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

* Standards revision, true color is for permitting purposes only

NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

Sampling and Assessment by the Oklahoma Water Resources Board – 3800 Classen Blvd, Oklahoma City, OK, 73118 – 405.530.8800 – http://www.owrb.ok.gov

Bathy map available: http://www.owrb.ok.gov/maps/PMG/owrbdata_Bathy.html

Lee Creek at Short

Sample Record	Biological Collections	Station ID
January 2003 - Current	Gaging Data	220200050010-001AT

Stream Data

County	Sequoyah	Request Data by Email
Location	West of the Town of Short on State Highway 101	
Latitude/Longitude	35.56589868, -94.53152717	
Planning Watershed	Lower Arkansas (8-digit HUC - 11110104)	

Parameters

	Parameter (Descriptions)	n	Mean	Median	Min./Max	p25/p75	Comments
In-Situ	Water Temperature (°C)	164	17.2	16.2	0.2/32.3	10.0/24.7	
	Turbidity (NTU)	164	9	5	1/124	4/9	
	pH (units)	164	7.60	7.58	6.31/8.70	7.36/7.84	
	Dissolved Oxygen (mg/L)	164	9.41	9.10	5.23/14.60	7.75/11.14	
	Hardness (mg/L)	162	46	42	<10/130	35/54	
Minerals	Total Dissolved Solids (mg/L)	167	61	60	<10/173	48/69	
	Specific Conductivity (uS/cm)	163	96	94	<10/266	77/107	
	Chloride (mg/L)	101	<10	<10	<10/11	<10/<10	
	Sulfate (mg/L)	101	<10	<10	<10/49	<10/<10	
Nutrients	Total Phosphorus (mg/L)	166	0.013	<0.010	<0.010/0.149	<0.010/0.016	
	Total Nitrogen (mg/L)	166	0.27	0.22	<0.10/1.67	0.13/0.33	
	Nitrate/Nitrite (mg/L)	144	0.12	0.06	<0.05/1.62	<0.05/0.14	
	Chlorophyll A (mg/m^3)	135	2.2	0.8	<0.1/92.0	0.4/1.6	TSI=38.3
Bacteria	Enterococcus (cfu/100ml)(*-Geo. Mn.)	52	437	<10	<10/7100	<10/53	
	E. Coli (cfu/100ml)(*-Geo. Mn.)	52	125	<10	<10/2359	<10/35	

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	Sulfates	Nitrates	Chlorides	Total Dissolved Solids	Bacteria	Bio. Fish	Bio. BMI	Sediment	Total Phosphorus
Fish & Wildlife Propagation	S	S	S	NS						S	S	S	
Aesthetics												NEI	NEI
Agriculture					S		S	S					
Primary Body Contact Recreation									S				
Public & Private Water Supply				S									
Fish Consumption				S									

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes: *Fish & Wildlife Propagation not supporting for Lead*

Little Lee Creek at Nicut

Sample Record	Biological Collections	Station ID
February 2008 - Current	Gaging Data	220200050040-001AT

Stream Data

County	Sequoyah	Request Data by Email
Location	West of the Town of Short on State Highway 101	
Latitude/Longitude	35.573236, -94.556816	
Planning Watershed	Lower Arkansas (8-digit HUC - 11110104)	

Parameters

	Parameter (Descriptions)	n	Mean	Median	Min./Max	p25/p75	Comments
In-Situ	Water Temperature (°C)	119	16.7	16.0	0.3/31.4	9.8/23.3	
	Turbidity (NTU)	121	8	3	0/223	2/5	
	pH (units)	120	7.61	7.57	6.30/8.56	7.43/7.85	
	Dissolved Oxygen (mg/L)	120	9.82	9.69	5.01/14.47	8.22/11.82	
	Hardness (mg/L)	118	64	61	36/140	53/71	
Minerals	Total Dissolved Solids (mg/L)	126	86	84	48/204	72/98	
	Specific Conductivity (uS/cm)	118	141	136	69/314	115/154	
	Chloride (mg/L)	61	<10	<10	<10/<10	<10/<10	
	Sulfate (mg/L)	61	<10	<10	<10/15	<10/<10	
Nutrients	Total Phosphorus (mg/L)	120	0.013	<0.010	<0.010/0.259	<0.010/<0.010	
	Total Nitrogen (mg/L)	120	0.22	0.17	<0.10/1.41	<0.10/0.25	
	Nitrate/Nitrite (mg/L)	120	0.10	<0.05	<0.05/0.96	<0.05/0.11	
	Chlorophyll A (mg/m^3)	98	0.8	0.6	<0.1/6.4	0.3/0.9	TSI=28.8
Bacteria	Enterococcus (cfu/100ml)(*-Geo. Mn.)	14	218	<10	<10/2420	<10/16	
	E. Coli (cfu/100ml)(*-Geo. Mn.)	14	531	<10	<10/6488	<10/33	

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	Sulfates	Nitrates	Chlorides	Total Dissolved Solids	Bacteria	Bio. Fish	Bio. BMI	Sediment	Phosphorus
Fish & Wildlife Propagation	S	S	S	S						S	S	S	
Aesthetics												NEI	NEI
Agriculture					S		S	S					
Primary Body Contact Recreation									NEI				
Public & Private Water Supply				S		S			S				
Fish Consumption				S									

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

New Spiro

Sample Period	Times Visited	Sampling Sites
November 2017 – July 2018	4	5

General

Location	Le Flore County
Impoundment	1960
Area	254 acres
Capacity	2,160 acre-feet
Purposes	Water Supply, Recreation

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	14 NTU	8% of values > OWQS of 25 NTU (n=12)
	Average Secchi Disk Depth	54 cm	
	Water Clarity Rating	Good	
	Chlorophyll-a	37.37 mg/m3	
	Trophic State Index	66	Previous value = 48
	Trophic Class	Hypereutrophic	
Profile	Salinity	0.05 – 0.09 ppt	
	Specific Conductivity	85.9 – 199.7 µS/cm	
	pH	5.91 – 7.84 pH units	39% < 6.5 pH & 8% > 9.0 pH
	Oxidation-Reduction Potential	29.8 – 577.3 mV	
	Dissolved Oxygen	Up to 47% of water column < 2.0 mg/L in July	Occurred at site 1
Nutrients	Surface Total Nitrogen	1.035 mg/L to 2.21 mg/L	
	Surface Total Phosphorus	0.068 mg/L to 0.229 mg/L	
	Nitrogen to Phosphorus Ratio	12:1	Phosphorus limited

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a
Fish & Wildlife Propagation	S	S	NS	S							
Aesthetics					NEI	*					
Agriculture							S	S	S		
Primary Body Contact Recreation										S	
Public & Private Water Supply											NS

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

The lake is listed in the WQS as a NLW indicating that the Aesthetics beneficial use is considered threatened by nutrients until studies can be conducted to confirm non-support status

*Standards revision, true color is for permitting purposes only

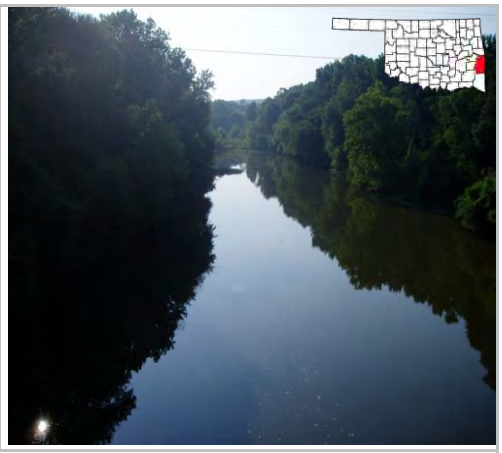
NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

Sampling and Assessment by the Oklahoma Water Resources Board – 3800 Classen Blvd, Oklahoma City, OK, 73118 – 405.530.8800 – http://www.owrb.ok.gov

Bathy map available: http://www.owrb.ok.gov/maps/PMG/owrbdata_Bathy.html

Poteau River at Heavener

Sample Record	Biological Collections	Station ID
November 1998 – December 2012	Gaging Data	220100020010-001AT



Stream Data

County	Le Flore	Request Data By Email
Location	South of the Town of Heavener on US Highway 59	
Latitude/Longitude	34.85833476, -94.62923436	
Planning Watershed	Lower Arkansas (8-digit HUC - 11110105)	

Parameters

	Parameter (Descriptions)	n	Mean	Median	Min./Max	p25/p75	Comments
In-Situ	Water Temperature (°C)	117	19.1	19.8	1.8/35.9	12.2/26.3	
	Turbidity (NTU)	118	22	16	0/152	10/24	
	pH (units)	117	7.28	7.25	5.96/8.97	6.92/7.64	
	Dissolved Oxygen (mg/L)	120	8.21	7.88	3.77/16.00	6.58/9.77	
	Hardness (mg/L)	117	49	36	<10/188	22/63	
Minerals	Total Dissolved Solids (mg/L)	137	88	65	<10/311	39/117	
	Specific Conductivity (uS/cm)	117	136	101	<10/486	57/183	
	Chloride (mg/L)	76	<10	<10	<10/53	<10/<10	
	Sulfate (mg/L)	76	36	21	<10/146	16/40	
Nutrients	Total Phosphorus (mg/L)	112	0.075	0.054	<0.010/0.430	0.038/0.083	
	Total Nitrogen (mg/L)	110	0.66	0.62	0.17/1.62	0.46/0.76	
	Nitrate/Nitrite (mg/L)	55	0.16	0.10	<0.05/0.74	<0.05/0.23	
	Chlorophyll A (mg/m^3)	13	9.5	9.4	1.8/29.7	3.4/13.0	TSI=52.7
Bacteria	Enterococcus (cfu/100ml)(*-Geo. Mn.)	28	65	20	<10/400	<10/80	Mean>OWQS
	E. Coli (cfu/100ml)(*-Geo. Mn.)	28	58	31	<10/393	18/51	

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	Sulfates	Nitrates	Chlorides	Total Dissolved Solids	Bacteria	Bio. Fish	Bio. BMI	Sediment
Fish & Wildlife Propagation	S	S	S	S						S	NEI	S
Aesthetics												S
Agriculture					S		S	S				
Primary Body Contact Recreation									NS			
Public & Private Water Supply				NEI		NEI			NEI			
Fish Consumption				S								

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

Poteau River at Pocola

Sample Record	Biological Collections	Station ID
November 1998 - Current	Gaging Data	220100010010-001AT

Stream Data

County	Le Flore	Request Data By Email
Location	West of the Town of Pocola on E1220 Rd	
Latitude/Longitude	35.23864842, -94.52021262	
Planning Watershed	Lower Arkansas (8-digit HUC -11110105)	

Parameters

	Parameter (Descriptions)	n	Mean	Median	Min./Max	p25/p75	Comments
In-Situ	Water Temperature (°C)	164	18.5	19.0	2.9/34.6	11.7/25.8	
	Turbidity (NTU)	166	74	51	11/476	35/86	13% of values>OWQS
	pH (units)	166	7.27	7.22	5.39/8.99	6.97/7.61	
	Dissolved Oxygen (mg/L)	167	8.13	7.87	3.31/15.94	6.28/9.76	
	Hardness (mg/L)	169	48	46	<10/197	33/57	
Minerals	Total Dissolved Solids (mg/L)	188	95	88	<10/675	56/116	
	Specific Conductivity (uS/cm)	165	141	128	<10/530	84/178	
	Chloride (mg/L)	104	<10	<10	<10/33	<10/<10	
	Sulfate (mg/L)	104	36	34	<10/88	25/45	
Nutrients	Total Phosphorus (mg/L)	172	0.128	0.112	0.017/0.416	0.078/0.152	
	Total Nitrogen (mg/L)	169	1.07	0.92	0.17/6.45	0.77/1.21	
	Nitrate/Nitrite (mg/L)	110	0.32	0.20	<0.05/1.87	0.10/0.40	
	Chlorophyll A (mg/m^3)	85	16.6	14.6	1.9/77.3	8.6/19.3	TSI=58.1
Bacteria	Enterococcus (cfu/100ml)(*-Geo. Mn.)	38	142	31	<10/2420	20/59	
	E. Coli (cfu/100ml)(*-Geo. Mn.)	38	101	23	<10/2420	<10/49	

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	Sulfates	Nitrates	Chlorides	Total Dissolved Solids	Bacteria	Bio. Fish	Bio. BMI	Sediment
Fish & Wildlife Propagation	NS	S	S	NS						S	S	S
Aesthetics												S
Agriculture					S		S	S				
Primary Body Contact Recreation									S			
Public & Private Water Supply				NEI		NEI			NEI			
Fish Consumption				NS								

S = Fully Supporting
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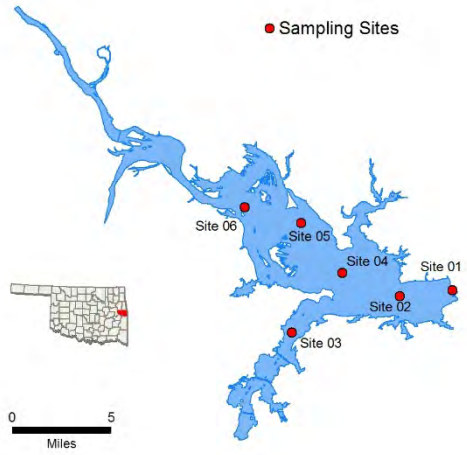
NEI = Not Enough Information

Notes

Fish & Wildlife Propagation not supporting for Lead
Fish Consumption not supporting for Lead

Robert S. Kerr

Sample Period	Times Visited	Sampling Sites
November 2015 – September 2016	4	6



General

Location	Sequoyah County
Impoundment	1970
Area	43,800 acres
Capacity	525,700 acre feet
Purposes	Navigation, Hydropower, and Recreation

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	28NTU	42% of values > 25 NTU
	Average Secchi Depth	36 cm	
	Water Clarity Rating	Fair	
	Chlorophyll-a	17.9 mg/m3	
	Trophic State Index	59	Previous value = 56
	Trophic Class	Eutrophic	
Profile	Salinity	0.19– 0.44 ppt	
	Specific Conductivity	402.6 – 888.8 µS/cm	
	pH	7.66 – 8.26 pH units	Neutral to slightly alkaline
	Oxidation-Reduction Potential	-9.2.8 to 356.1 mV	
	Dissolved Oxygen	All data are above screening level of 2.0 mg/L	
Nutrients	Surface Total Nitrogen	0.61mg/L to 0.98 mg/L	
	Surface Total Phosphorus	0.062 mg/L to 0.172 mg/L	
	Nitrogen to Phosphorus Ratio	6:1	Possibly co- limited

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
Fish & Wildlife Propagation	NS	S	S	NEI							
Aesthetics					S	*					
Agriculture							S	S	S		
Primary Body Contact Recreation										NEI	
Public & Private Water Supply				NEI							

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

*Standards revision, true color is for permitting purposes only

NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

Sager Creek at West Siloam Springs

Sample Record	Biological Collections	Station ID
November 1998 – December 2012	Gaging Data	121700060080-001AT

Stream Data

County	Delaware	Request Data By Email
Location	West of the Town of West Siloam Springs off US Highway 412	
Latitude/Longitude	36.20164298, -94.60538182	
Planning Watershed	Lower Arkansas (8-digit HUC - 11110103)	

Parameters

	Parameter (Descriptions)	n	Mean	Median	Min./Max	p25/p75	Comments
In-Situ	Water Temperature (°C)	109	17.4	17.2	5.9/29.2	12.7/22.0	
	Turbidity (NTU)	107	3	1	1/55	1/2	
	pH (units)	108	7.71	7.72	6.59/8.65	7.47/7.97	
	Dissolved Oxygen (mg/L)	113	9.09	8.76	4.66/15.35	8.05/10.19	21% of values<OWQS and 13% of values<alt OWQS
	Hardness (mg/L)	108	132	134	<10/198	120/146	
Minerals	Total Dissolved Solids (mg/L)	129	269	269	<10/657	222/310	
	Specific Conductivity (uS/cm)	109	425	427	164/713	359/494	
	Chloride (mg/L)	100	36	34	<10/95	23/47	
	Sulfate (mg/L)	100	25	21	<10/64	16/29	
Nutrients	Total Phosphorus (mg/L)	114	1.117	1.040	0.012/3.965	0.649/1.485	
	Total Nitrogen (mg/L)	113	7.44	7.18	2.32/17.53	4.92/9.01	
	Nitrate/Nitrite (mg/L)	51	6.48	5.67	2.01/17.50	3.78/8.54	
	Chlorophyll A (mg/m^3)	54	1.6	0.7	<0.1/8.3	0.4/2.4	TSI=35.5
Bacteria	Enterococcus (cfu/100ml)(*-Geo. Mn.)	56	512	109	<10/9700	39/425	Mean>OWQS
	E. Coli (cfu/100ml)(*-Geo. Mn.)	56	217	31	<10/4360	<10/98	

Beneficial Uses

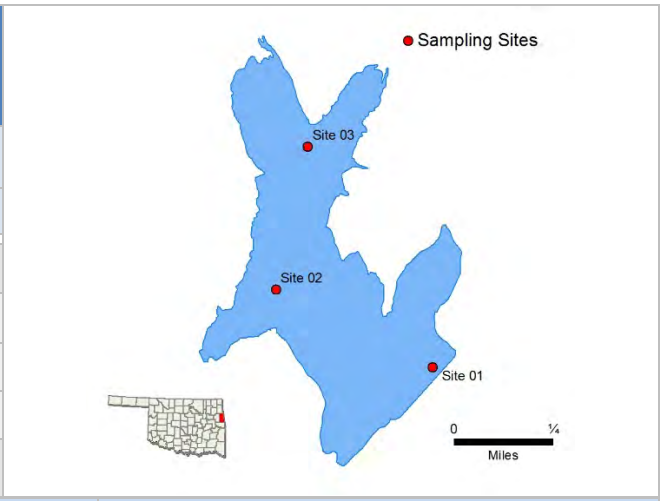
Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	Sulfates	Nitrates	Chlorides	Total Dissolved Solids	Bacteria	Bio. Fish	Bio. BMI	Sediment
Fish & Wildlife Propagation	S	S	NS	S						S	S	S
Aesthetics												NEI
Agriculture					S		S	S				
Primary Body Contact Recreation									NS			
Public & Private Water Supply				S		S			S			
Fish Consumption				S								

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

Stilwell City

Sample Period	Times Visited	Sampling Sites
December 2015 – October 2016	3	5



General

Location	Adair County
Impoundment	1965
Area	188 acres
Capacity	3,110 acre-feet
Purposes	Water Supply, Recreation, Flood Control

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	14 NTU	33% of values > OWQS of 25 NTU
	Average Secchi Disk Depth	69 cm	100% of values < OWQS of 70
	Water Clarity Rating	Average	
	Chlorophyll-a	9.6mg/m3	
	Trophic State Index	53	Previous value = 54
	Trophic Class	Eutrophic	
Profile	Salinity	0.06 – 0.12 ppt	
	Specific Conductivity	117.3 – 249.5 µS/cm	
	pH	6.74 – 8.03 pH units	
	Oxidation-Reduction Potential	64 – 459 mV	
	Dissolved Oxygen	Up to 54% of water column < 2 mg/L in October	Occurred at site 1, the dam
Nutrients	Surface Total Nitrogen	0.63 mg/L to 1.24 mg/L	
	Surface Total Phosphorus	0.027 mg/L to 0.281 mg/L	
	Nitrogen to Phosphorus Ratio	7:1	Possibly co- limited

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
Fish & Wildlife Propagation	NS	S	NS	S							
Aesthetics					S	S					
Agriculture							S	S	S		
Primary Body Contact Recreation										S	
Public & Private Water Supply											

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes *Standards revision, true color is for permitting purposes only

NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

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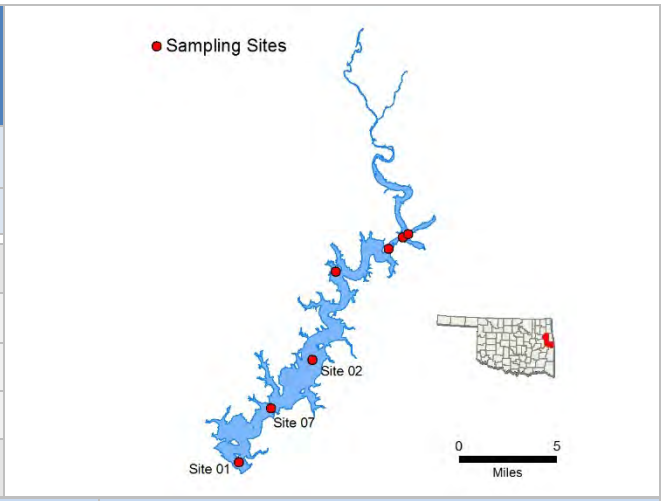
Bathy map available: http://www.owrb.ok.gov/maps/PMG/owrbdata_Bathy.html

Tenkiller (1,2,7)

Sample Period	Times Visited	Sampling Sites
October 2016 – July 2017	4	7



General

Location	Sequoyah County
Impoundment	1953
Area	12,900 acres
Capacity	654,100 acre-feet
Purposes	Flood Control, Hydropower

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	3 NTU	100% of values < OWQS of 25 NTU
	Average Secchi Disk Depth	215 cm	
	Water Clarity Rating	Excellent	
	Chlorophyll-a	7.77 mg/m3	
	Trophic State Index	51	Previous value = 56
	Trophic Class	Eutrophic	
Profile	Salinity	0.08 – 0.12 ppt	
	Specific Conductivity	165.1 – 254.9 µS/cm	
	pH	6.48– 8.71 pH units	
	Oxidation-Reduction Potential	68.9-465.5 mV	
	Dissolved Oxygen	Up to 79% of water column < 2 mg/L	
Nutrients	Surface Total Nitrogen	0.25 mg/L to 0.99 mg/L	
	Surface Total Phosphorus	0.010 mg/L to 0.021 mg/L	
	Nitrogen to Phosphorus Ratio	31:1	Possibly co-limited for this sample year

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
Fish & Wildlife Propagation	S	S	NS	NEI							
Aesthetics					NEI	*					
Agriculture							N/A	N/A	S		
Primary Body Contact Recreation										S	
Public & Private Water Supply				NEI							

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NS = Not Supporting
NEI = Not Enough Information

Notes

*The lake is listed in the WQS as a NLW indicating that the Aesthetics beneficial use is considered threatened by nutrients until studies can be conducted to confirm non-support status.
**N/A – parameters not collected in current sample year.*

NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

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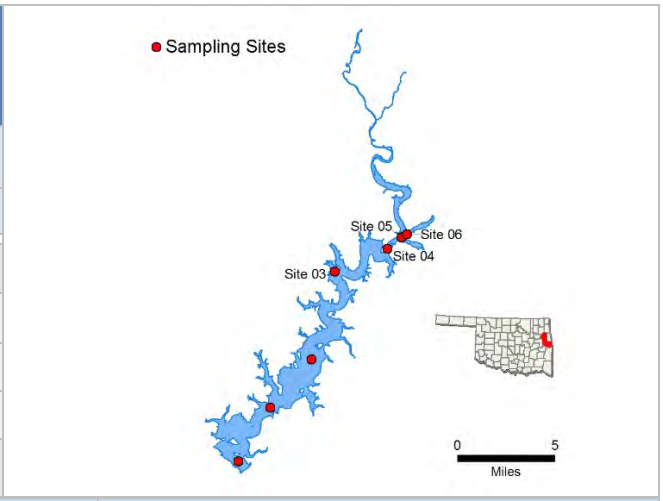
Tenkiller, Illinois River Arm (3-6)

Sample Period	Times Visited	Sampling Sites
October 2016 – July 2017	4	7



General

Location	Sequoyah County
Impoundment	1953
Area	12,900 acres
Capacity	654,100 acre-feet
Purposes	Flood Control, Hydropower

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	28 NTU	19% of values > OWQS of 25 NTU
	Average Secchi Disk Depth	66 cm	
	Water Clarity Rating	Average	
	Chlorophyll-a	21.7 mg/m3	
	Trophic State Index	61	Previous value = 59
	Trophic Class	Hypereutrophic	
Profile	Salinity	0.07 – 0.15 ppt	
	Specific Conductivity	154.4 – 316 µS/cm	
	pH	6.81 – 8.9 pH units	
	Oxidation-Reduction Potential	98.2-422.3 mV	
	Dissolved Oxygen	Up to 70% of water column < 2 mg/L at site 3.	
Nutrients	Surface Total Nitrogen	0.33 mg/L to 2.49 mg/L	
	Surface Total Phosphorus	0.022 mg/L to 0.232 mg/L	
	Nitrogen to Phosphorus Ratio	14:1	Possibly co- limited for this sample year

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
Fish & Wildlife Propagation	S	S	NEI	NEI							
Aesthetics					NEI	*					
Agriculture							S	S	S		
Primary Body Contact Recreation										S	
Public & Private Water Supply				NEI							NS

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

*The lake is listed in the WQS as a NLW indicating that the Aesthetics beneficial use is considered threatened by nutrients until studies can be conducted to confirm non-support status.

NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

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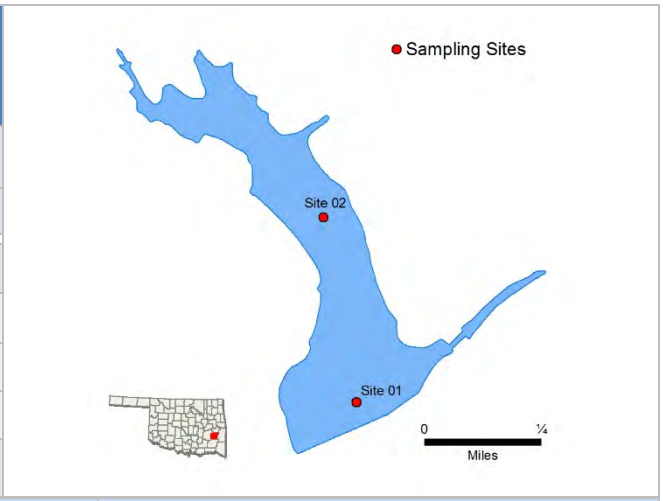
Wayne Wallace

Sample Period	Times Visited	Sampling Sites
November 2016 – August 2017	4	5



General

Location	Latimer County
Impoundment	1969
Area	94 acres
Capacity	1,746 acre feet
Purposes	Flood Control and Recreation

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	6 NTU	100% of values < OWQS of 25 NTU (n=6)
	Average Secchi Disk Depth	90 cm	
	Water Clarity Rating	Good	
	Chlorophyll-a	13.75 mg/m3	
	Trophic State Index	56	Previous value = 63
	Trophic Class	Eutrophic	
Profile	Salinity	0.02 – 0.04 ppt	
Profile	Specific Conductivity	53.1 – 83.1 µS/cm	
Profile	pH	5.94 – 7.61 pH units	9.8% of recorded values are < 6.5 pH units
Profile	Oxidation-Reduction Potential	231.9 – 573.3 mV	
Profile	Dissolved Oxygen	Up to 40% of water column < 2 mg/L in August	
Nutrients	Surface Total Nitrogen	0.38 mg/L to 0.64 mg/L	
Nutrients	Surface Total Phosphorus	0.017 mg/L to 0.031 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	20:1	Phosphorus limited

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
Fish & Wildlife Propagation	S	NS	NS	S							
Aesthetics					S	*					
Agriculture							S	S	S		
Primary Body Contact Recreation										S	
Public & Private Water Supply											

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NS = Not Supporting
NEI = Not Enough Information

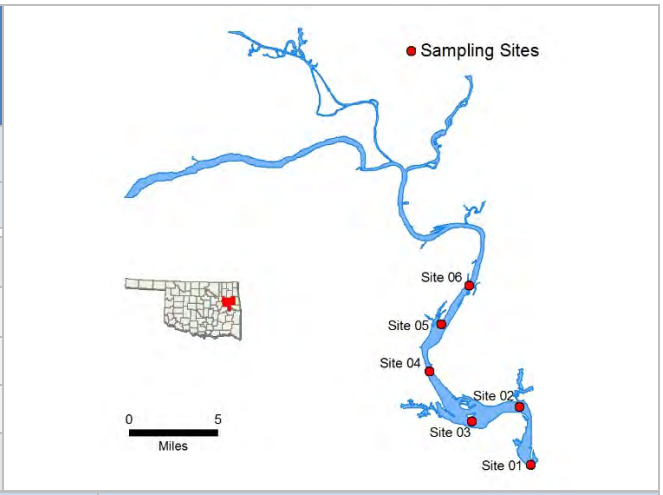
Notes

Slightly acidic conditions are common in this part of the state, due to relatively low soil pH and lack of soluble bedrock. Due to these conditions it is likely that the low pH values may be due to natural causes; therefore the Water Board is looking at the applicability of developing site-specific criteria for waters in the southeastern portion of the state. * Standards revision, true color is for permitting purposes only.

NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

Webbers Falls

Sample Period	Times Visited	Sampling Sites
February 2019	1**	6



General

Location	Muskogee County	Click map for site data
Impoundment	1965	
Area	11,600 acres	
Capacity	170,100 acre-feet	
Purposes	Navigation, Hydropower	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	16 NTU	0% of values > OWQS of 25 NTU
	Average Secchi Disk Depth	56.2 cm	
	Water Clarity Rating	Poor	
	Chlorophyll-a	21.22 mg/m3	
	Trophic State Index	61	Previous value = 52
	Trophic Class	Hypereutrophic	
Profile	Salinity	0.26 – 0.49 ppt	
	Specific Conductivity	528.1 – 997.3 µS/cm	
	pH	8.07 – 8.20 pH units	
	Oxidation-Reduction Potential	395.5 – 409.0 mV	
	Dissolved Oxygen	All data are above screening level of 2.0 mg/L	
Nutrients	Surface Total Nitrogen	1.25 mg/L to 1.48 mg/L	
	Surface Total Phosphorus	0.144 mg/L to 0.154 mg/L	
	Nitrogen to Phosphorus Ratio	10:1	Possibly co-limited

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a
Fish & Wildlife Propagation	NS	S	S	S							
Aesthetics					S	*					
Agriculture							S	S	S		
Primary Body Contact Recreation										NS	
Public & Private Water Supply											

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

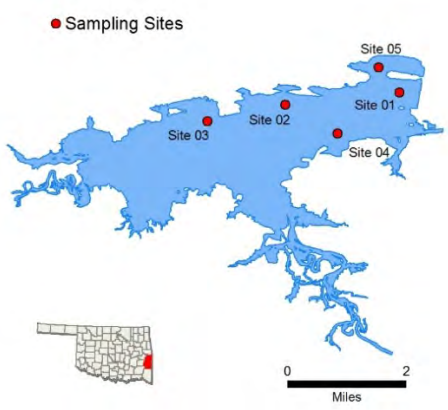
Notes

*Standards revision, true color is for permitting purposes only.
**Only one visit in SY19 due to extreme flooding

NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

Wister

Sample Period	Times Visited	Sampling Sites
November 2017 – July 2018	4	5



General

Location	LeFlore County
Impoundment	1949
Area	7,333 acres
Capacity	62,360 acre feet
Purposes	Flood Control, Water Supply, Low flow Regulation, and Conservation

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	24 NTU	25% of values > OWQS 25 NTU
	Average Secchi Disk Depth	45 cm	
	Water Clarity Rating	Fair	
	Chlorophyll-a	22.13 mg/m3	
	Trophic State Index	61	Previous value = 62
	Trophic Class	Hypereutrophic	
Profile	Salinity	0.04 – 0.07 ppt	
	Specific Conductivity	66.6 – 158.7 µS/cm	
	pH	6.00 – 7.80 pH units	2 % of Values < 6.5 pH units
	Oxidation-Reduction Potential	26.9 to 557.3 mV	
	Dissolved Oxygen	Up to 62% of water column < 2 mg/L in July	
Nutrients	Surface Total Nitrogen	0.585 mg/L to 0.97 mg/L	
	Surface Total Phosphorus	0.042 mg/L to 0.108 mg/L	
	Nitrogen to Phosphorus Ratio	10:1	Phosphorus limited

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a
Fish & Wildlife Propagation	NS	NS	NEI	S							
Aesthetics					NEI*	*					
Agriculture							S	S	S		
Primary Body Contact Recreation										S	
Public & Private Water Supply											NS

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

*Standards revision, true color is for permitting purposes only.
*Currently, the lake is listed as a Nutrient Limited Watershed (NLW) in the Oklahoma Water Quality Standards (WQS). This listing means that the lake is considered threatened from nutrients until a more intensive study can confirm the Aesthetics beneficial use non-support status.

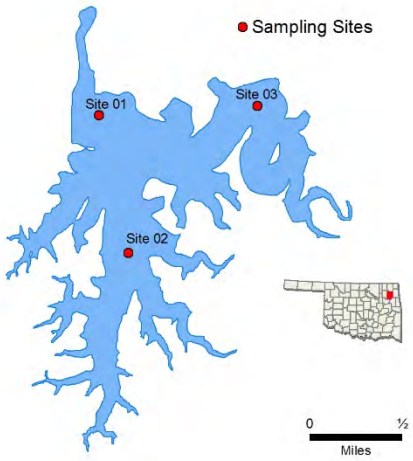
NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

Sampling and Assessment by the Oklahoma Water Resources Board – 3800 Classen Blvd, Oklahoma City, OK, 73118 – 405.530.8800 – http://www.owrb.ok.gov

Bathy map available: http://www.owrb.ok.gov/maps/PMG/owrbdata_Bathy.html

W.R. Holway

Sample Period	Times Visited	Sampling Sites
November 2015 – August 2016	4	5



General

Location	Mayes County
Impoundment	1968
Area	712 acres
Capacity	48,000 acre-feet
Purposes	Water Supply, Hydropower, Recreation

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	2 NTU	100% of Values < OWQS of 25
	Average Secchi Disk Depth	147 cm	
	Water Clarity Rating	Excellent	
	Chlorophyll-a	18.9 mg/m3	
	Trophic State Index	59	Previous Value= 56
	Trophic Class	Eutrophic	
Profile	Salinity	0.09 – 0.22 ppt	
	Specific Conductivity	201.8 – 451.2 µS/cm	
	pH	6.66 – 9.00 pH units	
	Oxidation-Reduction Potential	128.5 to 514 mV	
	Dissolved Oxygen	Up to 48% of water column < 2 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.41 mg/L to 0.59mg/L	
	Surface Total Phosphorus	0.042 mg/L to 0.067 mg/L	
	Nitrogen to Phosphorus Ratio	9:1	Phosphorus limited

Beneficial Uses

Click to learn more about Beneficial Uses	Turbidity	pH	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
Fish & Wildlife Propagation	S	S	NS	S							
Aesthetics					S	*					
Agriculture							S	S	S		
Primary Body Contact Recreation										S	
Public & Private Water Supply											

S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

*Standards revision, true color is for permitting purposes only

NTU = nephelometric turbidity units
µS/cm = microsiemens per centimeter
E. coli = Escherichia coli
OWQS = Oklahoma Water Quality Standards
mV = millivolts
Chlor-a = Chlorophyll-a
mg/L = milligrams per liter
µS/cm = microsiemens/cm
ppt = parts per thousand
En = Enterococci

Oklahoma 2022 Integrated Report
Appendix B

Legend

Legend for Attainment	
Code	**Description**
F	Fully Supporting
N	Not Supporting
I	Insufficient Information
X	Not Assessed

USE ID	Description
124	Aesthetic
125	Agriculture
129	Emergency Water Supply
130	Cool Water Aquatic Community
131	Habitat Limited Aquatic Community
132	Trout Fishery
133	Warm Water Aquatic Community
134	Hydropower
135	Indus. & Muni. Process/Cooling Water
136	Navigation
137	Primary Body Contact Recreation
138	Public and Private Water Supply
139	Secondary Body Contact Recreation
1003	Fish Consumption
1004	Outstanding Resource
1005	Sensitive Water Supply
1006	High Quality Water

Category	Description
1	Attaining the Water Quality Standard and no use is threatened
2	Attaining some of the designated uses; no use is threatened; and insufficient or no data or information is available to determine if the remaining uses are attained or threatened
3	Insufficient or no data and information to determine if any designated use is attained
4 **4a** **4b** **4c**	Impaired or threatened for one or more designated uses but does not require the development of a TMDL • TMDL has been completed • Other pollution control requirements are reasonable expected to result in the attainment of the water quality standard in the near future • Impairment is not caused by a pollutant
5	The water quality standard is not attained. The waterbody is impaired or threatened for one or more designated uses by a pollutant(s), and requires a TMDL

ID	Description
91	Ammonia (Unionized) -Toxin
96	Arsenic
104	Barium
127	Cadmium
138	Chloride
153	Chlorpyrifos
154	Chromium (total)
163	Copper
187	Diazinon
198	Dieldrin
215	Enterococcus
217	Escherichia coli
230	Fishes Bioassessments
267	Lead
302	Nitrates
317	Oil and Grease
322	Oxygen, Dissolved
372	Selenium
375	Silver
385	Sulfates
398	Total Coliform
399	Total Dissolved Solids
400	Total Fecal Coliform
413	Turbidity
423	Zinc
441	pH
462	Total Phosphorus

ID	Description
2	Acid Mine Drainage
33	Discharges from Biosolids (SLUDGE) Storage, Application or Disposal
62	Industrial Point Source Discharge
68	Land Application of Wastewater Biosolids (Non-agricultural)
70	Leaking Underground Storage Tanks
82	Mine Tailings
84	Municipal (Urbanized High Density Area)
85	Municipal Point Source Discharges
92	On-site Treatment Systems (Septic Systems and Similar Decencentralized Systems)
100	Runoff from Permitted Confined Animal Feeding Operations (CAFOs)
102	Petroleum/natural Gas Activities (Legacy)
119	Silviculture Harvesting
124	Spills from Trucks or Trains
127	Surface Mining
140	Source Unknown
155	Natural Sources
156	Agriculture
157	Habitat Modification - other than Hydromodification

TMDL Development Priority Schedule

TMDL Priority	Proposed Initiation of TMDL Development*
1	2024
2	2025-2027
3	2028-2030
4	2031-2033

*Dates are only estimates and subject to change

Waterbody ID	HUC 8	Waterbody Name	Size	Unit	Cause	TMDL Priority	Unconfirmed Potential Sources
OK121600010050_00	11070209	Fort Gibson Lake	12464	Acres	DISSOLVED OXYGEN	2	46, 108, 133, 136, 140
OK121600010060_00	11070209	Ranger Creek	7.94	Miles	PH	2	140
OK121600010080_00	11070209	Pecan Creek	9.19	Miles	BENTHIC MACROINVERTEBRATES BIOASSESSMENTS	2	140
OK121600010280_00	11070209	Neosho River	14.26	Miles	BENTHIC MACROINVERTEBRATES BIOASSESSMENTS, DISSOLVED OXYGEN	2	46, 56, 62, 85, 87, 92, 108, 133, 136, 140
OK121600010290_00	11070209	Spring Creek	39.70	Miles	BENTHIC MACROINVERTEBRATES BIOASSESSMENTS	2	140
OK121600010430_00	11070209	Chouteau Creek	22.25	Miles	AMMONIA, UN-IONIZED, DISSOLVED OXYGEN, PH	2	46, 59, 87, 92, 108, 111, 133, 136, 140
OK121600020020_00	11070209	Hudson Lake, Lower	5802	Acres	DISSOLVED OXYGEN	2	140
OK121600020170_00	11070209	Neosho River	10.89	Miles	LEAD, DISSOLVED OXYGEN	3	46, 56, 62, 82, 85, 87, 92, 108, 133, 136,
OK121600030020_00	11070209	Grand Lake O' the Cherokees, Lower	10051	Acres	DISSOLVED OXYGEN, LEAD	2	82, 140
OK121600050020_00	11070209	Spavinaw Lake	1584	Acres	CHLOROPHYLL-A, DISSOLVED OXYGEN	1	4, 46, 59, 92, 108, 133, 136, 140, 146
OK121600050070_00	11070209	Eucha Lake (Upper Spavinaw)	2860	Acres	CHLOROPHYLL-A, DISSOLVED OXYGEN	1	4, 46, 59, 92, 108, 133, 136, 140, 146
OK121600060060_10	11070209	Big Cabin Creek	4.16	Miles	SULFATE	3	49, 140
OK121600060080_00	11070209	Little Cabin Creek	32.31	Miles	PH, DISSOLVED OXYGEN	4	140
OK121600060200_00	11070209	Bull Creek	10.83	Miles	SULFATE, DISSOLVED OXYGEN, TOTAL DISSOLVED SOLIDS (TDS), CHLORIDE	4	4, 59, 62, 84, 85, 92, 140
OK121600060220_00	11070209	Big Cabin Creek	11.58	Miles	TOTAL DISSOLVED SOLIDS (TDS), SULFATE	4	49, 97, 102, 140
OK121600060240_00	11070209	Pawpaw Creek	18.40	Miles	DISSOLVED OXYGEN	4	46, 59, 87, 92, 108, 111, 133, 136, 140, 156
OK121610000050_10	11070209	Pryor Creek	4.97	Miles	PH, DISSOLVED OXYGEN	4	8, 46, 59, 85, 87, 92, 102, 108, 111, 128, 133, 136, 140
OK121610000090_00	11070209	Pryor Creek	2.35	Miles	DISSOLVED OXYGEN	4	84, 85, 92, 140, 156
OK121610000090_10	11070209	Pryor Creek	12.12	Miles	DISSOLVED OXYGEN, FISH BIOASSESSMENTS	4	46, 49, 59, 87, 92, 102, 108, 111, 136, 140
OK121600020050_00	11070209	WR Holway Reservoir (ChimneyRock Lake)	712	Acres	DISSOLVED OXYGEN	2	140
OK121600020200_00	11070209	Summerfield Creek	10.38	Miles	BENTHIC MACROINVERTEBRATES BIOASSESSMENTS	3	140
OK120400010070_00	11110102	Webbers Falls Lake	11600	Acres	TURBIDITY	3	140
OK120400010120_00	11110102	Greenleaf Creek	15.31	Miles	BENTHIC MACROINVERTEBRATES BIOASSESSMENTS	3	140
OK120400010130_00	11110102	Greenleaf Lake	920	Acres	MERCURY, CHLOROPHYLL-A	3	140
OK120400010280_00	11110102	Bayou Manard	14.02	Miles	BENTHIC MACROINVERTEBRATES BIOASSESSMENTS	3	39, 140
OK120400010425_00	11110102	Arkansas River, Unnamed Trib of	2.23	Miles	FISH BIOASSESSMENTS, BENTHIC MACROINVERTEBRATES BIOASSESSMENTS	3	140
OK120400020010_00	11110102	Dirty Creek	44.18	Miles	DISSOLVED OXYGEN	3	46, 59, 87, 92, 108, 111, 133, 136, 140
OK120400020030_00	11110102	Dirty Creek, South Fork	15.55	Miles	SULFATE, DISSOLVED OXYGEN, BENTHIC MACROINVERTEBRATES BIOASSESSMENTS	3	39, 46, 49, 62, 85, 87, 92, 108, 111, 133, 136, 140
OK120400020110_00	11110102	Dirty Creek, Georges Fork	10.05	Miles	DISSOLVED OXYGEN	4	39, 46, 87, 92, 108, 111, 133, 136, 140
OK120400020160_00	11110102	Butler Creek	10.34	Miles	DISSOLVED OXYGEN	4	46, 59, 87, 92, 108, 111, 133, 136, 140
OK120400020240_00	11110102	Shady Grove Creek	10.80	Miles	PH, SULFATE, TOTAL DISSOLVED SOLIDS (TDS), DISSOLVED OXYGEN	4	8, 49, 102, 140
OK120400010470_00	11110102	Coody Creek, Unnamed Trib of	1.28	Miles	BENTHIC MACROINVERTEBRATES BIOASSESSMENTS	3	140
OK121700010010_00	11110103	Illinois River	9.47	Miles	DISSOLVED OXYGEN	1	140
OK121700010020_00	11110103	Deep Branch	8.71	Miles	DISSOLVED OXYGEN	1	39, 140
OK121700020020_00	11110103	Tenkiller Ferry Lake	8442	Acres	DISSOLVED OXYGEN, MERCURY, PHOSPHORUS, TOTAL	1	140
OK121700020110_00	11110103	Chicken Creek	3.54	Miles	FISH BIOASSESSMENTS	1	46, 59, 87, 92, 108, 111, 133, 136, 140
OK121700020180_00	11110103	Elk Creek	8.46	Miles	DISSOLVED OXYGEN	1	140
OK121700020220_00	11110103	Tenkiller Ferry Lake, Illinois River Arm	5032	Acres	CHLOROPHYLL-A, MERCURY, PHOSPHORUS, TOTAL	1	4, 59, 108, 136, 140, 146
OK121700020270_00	11110103	Park Hill Branch	6.86	Miles	BENTHIC MACROINVERTEBRATES BIOASSESSMENTS	3	46, 49, 59, 72, 87, 92, 102, 108, 111, 136, 140
OK121700030010_00	11110103	Illinois River	7.68	Miles	ENTEROCOCCUS, PHOSPHORUS, TOTAL	1	4, 46, 59, 85, 92, 100, 108, 133, 136, 140, 146
OK121700030030_00	11110103	Stick Ross Creek (Ross Branch)	4.54	Miles	BENTHIC MACROINVERTEBRATES BIOASSESSMENTS	1	140
OK121700030040_00	11110103	Tahlequah Creek (Town Branch)	6.21	Miles	ESCHERICHIA COLI (E. COLI)	1	46, 92, 108, 133, 136, 140
OK121700030080_00	11110103	Illinois River	31.68	Miles	ENTEROCOCCUS, PHOSPHORUS, TOTAL	1	4, 46, 59, 85, 92, 100, 108, 133, 136, 140, 146
OK121700030090_00	11110103	Pumpkin Hollow Creek	9.27	Miles	DISSOLVED OXYGEN	1	140
OK121700030110_00	11110103	Cedar Hollow Creek	3.60	Miles	BENTHIC MACROINVERTEBRATES BIOASSESSMENTS, FISH BIOASSESSMENTS	1	39, 140
OK121700030280_00	11110103	Illinois River	15.65	Miles	PHOSPHORUS, TOTAL, ESCHERICHIA COLI (E. COLI), TURBIDITY, ENTEROCOCCUS	1	4, 46, 59, 85, 92, 100, 108, 133, 136, 140, 146
OK121700030290_00	11110103	Flint Creek	1.60	Miles	PHOSPHORUS, TOTAL, DISSOLVED OXYGEN	1	4, 46, 59, 92, 108, 133, 136, 140, 146
OK121700030350_00	11110103	Illinois River	5.18	Miles	PHOSPHORUS, TOTAL, ENTEROCOCCUS, ESCHERICHIA COLI (E. COLI)	1	4, 34, 46, 59, 85, 92, 100, 108, 133, 136, 140, 146
OK121700040010_00	11110103	Caney Creek	20.92	Miles	ESCHERICHIA COLI (E. COLI), ENTEROCOCCUS, BENTHIC MACROINVERTEBRATES BIOASSI	3	46, 59, 85, 92, 100, 108, 136, 140

OK121700050010_00	11110103	Illinois River, Baron Fork	25.15	Miles	PHOSPHORUS, TOTAL	3	4, 46, 59, 85, 92, 100, 108, 133, 136, 140, 146
OK121700050070_00	11110103	Walltrip Branch	6.90	Miles	BENTHIC MACROINVERTEBRATES BIOASSESSMENTS	3	140
OK121700050090_00	11110103	Tyner Creek	15.92	Miles	DISSOLVED OXYGEN	3	140
OK121700060010_00	11110103	Flint Creek	7.75	Miles	PHOSPHORUS, TOTAL	1	4, 46, 59, 85, 92, 100, 108, 140, 146
OK121700060080_00	11110103	Sager Creek	4.15	Miles	SEDIMENTATION/SILTATION, BENTHIC MACROINVERTEBRATES BIOASSESSMENTS, ENTE	1	4, 46, 59, 85, 92, 108, 133, 136, 140, 146
OK121700030020_00	11110103	Tahlequah Creek	1.84	Miles	ENTEROCOCCUS, ESCHERICHIA COLI (E. COLI)	1	140
OK220200010010_00	11110104	Arkansas River	20.59	Miles	BENTHIC MACROINVERTEBRATES BIOASSESSMENTS, ENTEROCOCCUS	3	46, 59, 92, 108, 136, 140
OK220200020020_00	11110104	Robert S. Kerr Lake	43380	Acres	TURBIDITY	3	140
OK220200030040_00	11110104	Brushy Creek Lake	358	Acres	CHLOROPHYLL-A	2	140
OK220200030120_00	11110104	Stilwell City Lake	188	Acres	DISSOLVED OXYGEN, TURBIDITY, MERCURY	2	46, 108, 133, 136, 140
OK220200040010_10	11110104	Sans Bois Creek	10.76	Miles	SULFATE	4	140
OK220200050010_00	11110104	Lee Creek	1.87	Miles	LEAD, ENTEROCOCCUS	3	46, 92, 108, 133, 136, 140, 146
OK220100010010_00	11110105	Poteau River	23.89	Miles	ENTEROCOCCUS	3	46, 59, 85, 92, 100, 108, 136, 140
OK220100010010_10	11110105	Poteau River	1.55	Miles	ENTEROCOCCUS	4	46, 59, 85, 92, 100, 108, 136, 140
OK220100010010_40	11110105	Poteau River	21.35	Miles	LEAD, SELENIUM, COPPER, SILVER, CADMIUM	3	140
OK220100010050_00	11110105	New Spiro Lake	254	Acres	DISSOLVED OXYGEN, CHLOROPHYLL-A, PH	3	46, 92, 108, 133, 136, 140
OK220100010160_00	11110105	Sugarloaf Creek	15.00	Miles	DISSOLVED OXYGEN, PH	3	140
OK220100010265_00	11110105	Rock Creek Tributary!	2.01	Miles	FISH BIOASSESSMENTS	4	46, 49, 59, 87, 92, 102, 108, 111, 136, 140
OK220100020010_10	11110105	Poteau River	27.04	Miles	ENTEROCOCCUS, ESCHERICHIA COLI (E. COLI), PH	3	46, 59, 85, 92, 100, 108, 136, 140
OK220100020020_00	11110105	Wister Lake	7333	Acres	PHOSPHORUS, TOTAL, TURBIDITY, MERCURY, PH, CHLOROPHYLL-A	2	140
OK220100020030_00	11110105	Poteau River, Black Fork	1.96	Miles	PH	2	140
OK220100020040_00	11110105	Poteau River, Black Fork	28.60	Miles	PH	2	140
OK220100020060_00	11110105	Cedar Lake	78	Acres	PH, DISSOLVED OXYGEN, MERCURY	2	46, 92, 108, 133, 136, 140
OK220100020080_00	11110105	Big Creek	12.57	Miles	PH, BENTHIC MACROINVERTEBRATES BIOASSESSMENTS	2	39, 46, 62, 69, 85, 87, 92, 108, 111, 133, 136, 140
OK220100040020_00	11110105	Fourche Maline Creek	36.94	Miles	DISSOLVED OXYGEN, PH	2	46, 62, 69, 85, 87, 92, 108, 111, 133, 136, 140
OK220100040030_00	11110105	Holson Creek	17.38	Miles	PH	4	140
OK220100040050_00	11110105	Red Oak Creek	10.95	Miles	PH, DISSOLVED OXYGEN	2	46, 85, 92, 108, 133, 136, 140
OK220100040080_00	11110105	Bandy Creek	12.44	Miles	FISH BIOASSESSMENTS	2	46, 49, 59, 87, 92, 102, 108, 111, 136, 140
OK220100040100_00	11110105	Lloyd Church Lake (Wilburton City)	160	Acres	PH, MERCURY, TURBIDITY	2	140
OK220100040140_00	11110105	Carlton Lake	52	Acres	MERCURY	2	140
OK220100040150_00	11110105	Wayne Wallace Lake	94	Acres	MERCURY, DISSOLVED OXYGEN, PH	2	46, 92, 108, 133, 136, 140

Oklahoma Water Resources Board

Program Updates

WATER Division staff are currently working on several initiatives in support of the Oklahoma Comprehensive Water Plan efforts. Staff are working on a water quality trends analysis to determine if water quality is getting better, staying the same, or declining. This is a statewide analysis and includes both surface water and groundwater.

Additionally, staff are conducting bathymetric surveys to collect data and generate bathymetric maps that can be utilized in several water management activities. Obtaining accurate storage volumes for lakes is an integral tool for water resources management. One such activity is the determination of reliable yield for our municipal reservoirs where no such information currently exists. This effort started recently and should be ongoing for years to come.

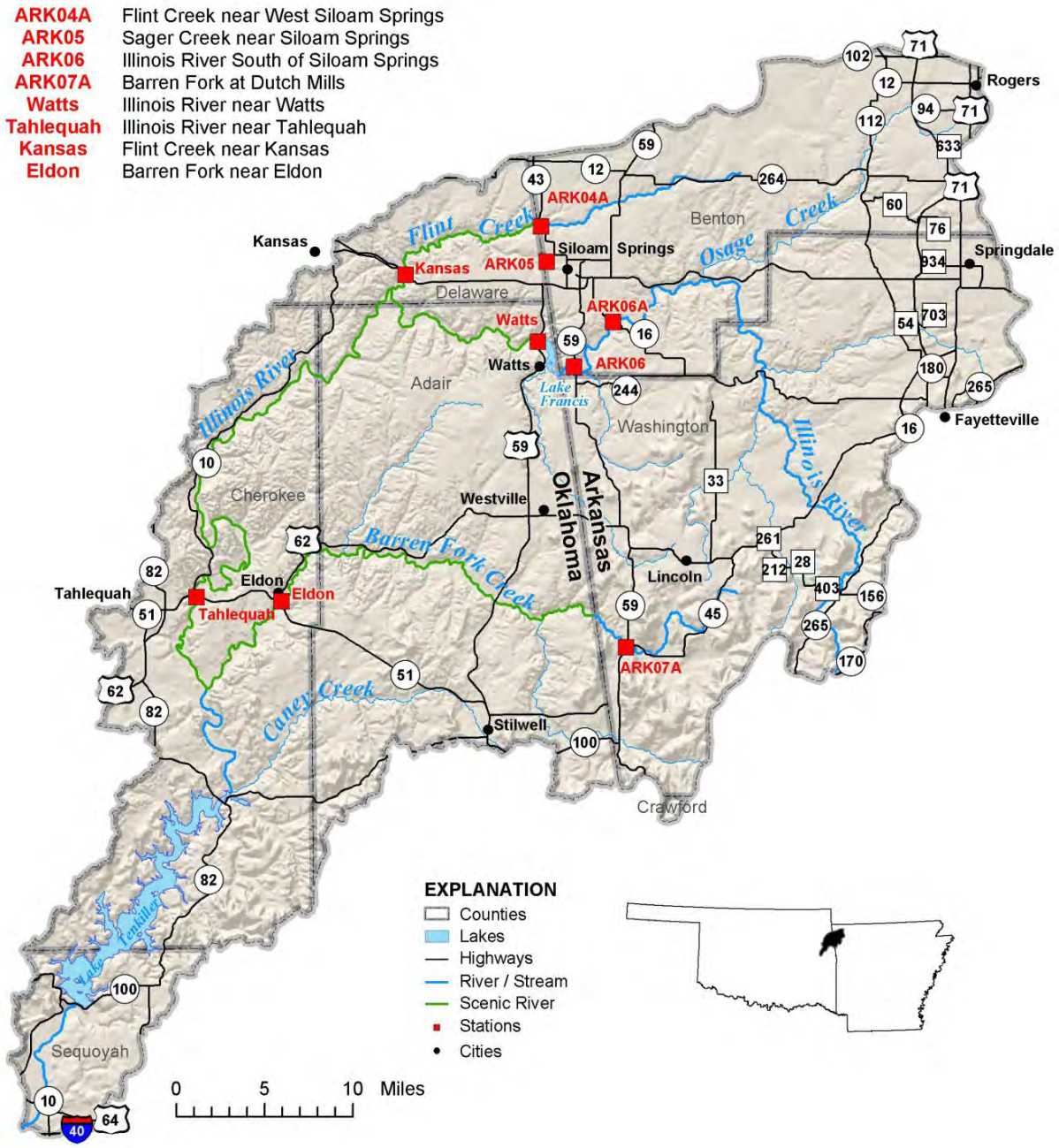
Lastly, monitoring staff continue to develop and expand our real-time automated monitoring networks. The availability of this data to the public and other interested parties should further enhance our water management efforts. In recent months, access to the OWRB's discrete and continuous data has been made publicly available on our website. Continuous data includes stream stage/discharge and water well level, while discrete data includes physical, chemical, and biological information for lakes, streams, and groundwater.
For more information, please visit our website at:
https://oklahoma.gov/owrb/maps-and-data/monitoring-data.html

Completed TMDL's
In the Arkansas-Oklahoma Compact Area:
Provided by the
Oklahoma Department of Environmental Quality

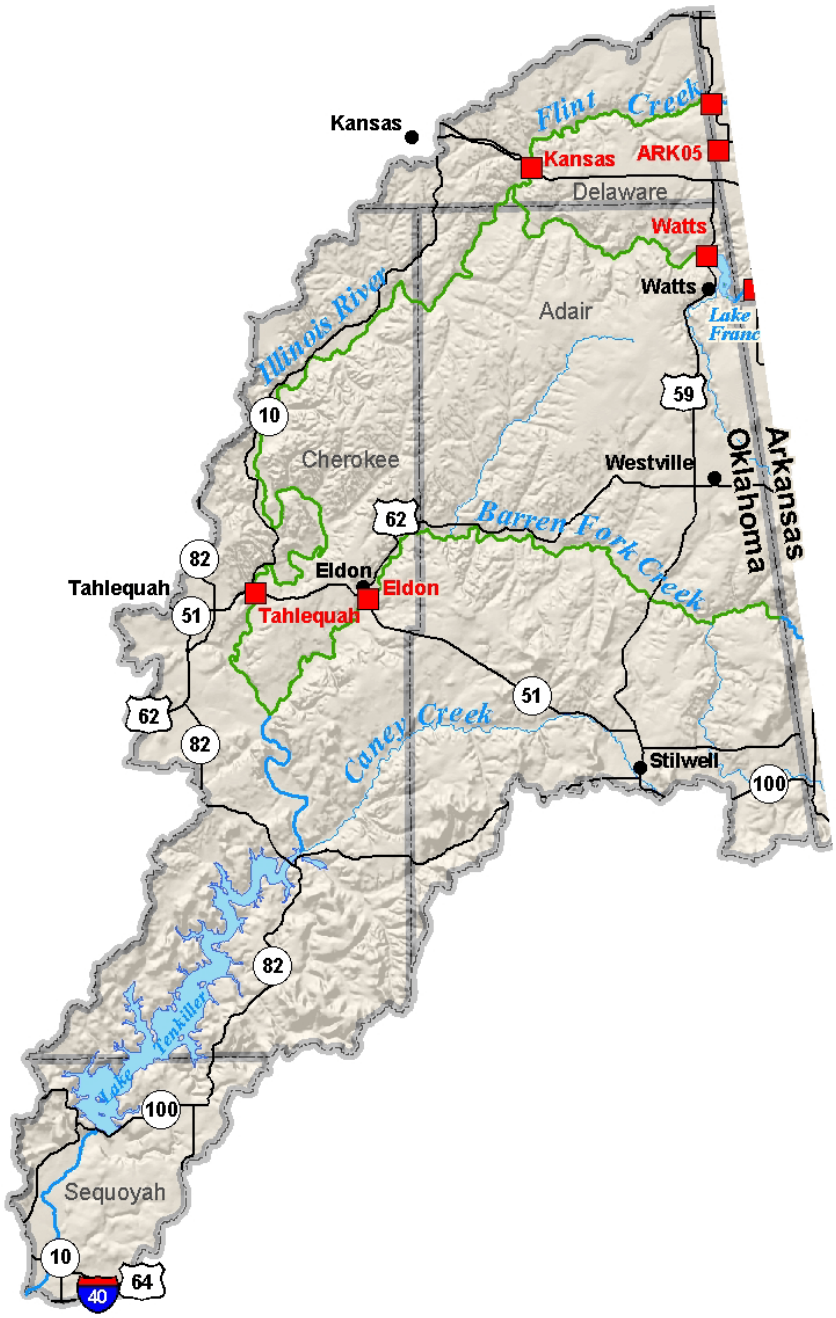
Completed TMDL's Provided By
THE Oklahoma Dept. of
Environmental Quality

Waterbody ID	HUC8	Waterbody Name	Cause	TMDL ID	TMDL Completion Date
OK121600010010_00	11070209	Neosho River	Enterococcus	42581	9/27/2012
OK121600010060_00	11070209	Ranger Creek	Enterococcus	34847	7/28/2008
OK121600010100_00	11070209	Fourteenmile Creek	Enterococcus	34848	7/28/2008
OK121600010430_00	11070209	Chouteau Creek	Enterococcus	42582	9/27/2012
OK121600010430_00	11070209	Chouteau Creek	Escherichia coli	42582	9/27/2012
OK121600010440_00	11070209	Crutchfield Branch	Escherichia coli	34849	7/28/2008
OK121600010440_00	11070209	Crutchfield Branch	Enterococcus	34849	7/28/2008
OK121600020030_10	11070209	Saline Creek	Enterococcus	58701	5/13/2014
OK121600020070_00	11070209	Little Saline Creek	Enterococcus	58702	5/13/2014
OK121600050020_00	11070209	Spavinaw Lake	Phosphorus	38670	6/9/2010
OK121600050070_00	11070209	Eucha Lake	Phosphorus	38667	6/9/2010
OK121600050150_00	11070209	Spavinaw Creek	Enterococcus	58705	5/13/2014
OK121600050160_00	11070209	Beaty Creek	Enterococcus	58707	5/13/2014
OK121600050180_00	11070209	Cloud Creek	Enterococcus	58708	5/13/2014
OK121600060080_00	11070209	Little Cabin Creek	Escherichia coli	50980	10/1/2012
OK121600060080_00	11070209	Little Cabin Creek	Enterococcus	50980	10/1/2012
OK121610000050_10	11070209	Pryor Creek	Escherichia coli	58709	5/13/2014
OK121610000050_10	11070209	Pryor Creek	Enterococcus	58709	5/13/2014
OK121610000090_00	11070209	Pryor Creek	Turbidity	58709	5/13/2014
OK120400010260_00	11110102	Arkansas River	Enterococcus	42530	9/27/2012
OK120400010400_00	11110102	Coody Creek	Enterococcus	42532	9/27/2012
OK120400010400_00	11110102	Coody Creek	Escherichia coli	42532	9/27/2012
OK120400020010_00	11110102	Dirty Creek	Enterococcus	42533	9/27/2012
OK120400020010_00	11110102	Dirty Creek	Turbidity	42533	9/27/2012
OK120400020030_00	11110102	Dirty Creek, South Fork	Enterococcus	42535	9/27/2012
OK120400020110_00	11110102	Dirty Creek, Georges Fork	Enterococcus	42536	9/27/2012
OK120400020160_00	11110102	Butler Creek	Turbidity	42538	9/27/2012
OK120400020160_00	11110102	Butler Creek	Escherichia coli	42538	9/27/2012
OK120400020160_00	11110102	Butler Creek	Enterococcus	42538	9/27/2012
OK120400020190_00	11110102	Elk Creek	Enterococcus	42537	9/27/2012
OK120400020240_00	11110102	Shady Grove Creek	Enterococcus	42539	9/27/2012
OK220200030010_20	11110104	Sallisaw Creek	Enterococcus	58780	5/13/2014
OK220200040010_10	11110104	Sans Bois Creek	Enterococcus	58782	5/13/2014
OK220200040010_40	11110104	Sans Bois Creek	Enterococcus	35635	10/20/2008
OK220200040010_40	11110104	Sans Bois Creek	Escherichia coli	35635	10/20/2008
OK220200040050_00	11110104	Sans Bois Creek, Mountain Fork	Escherichia coli	35626	10/20/2008
OK220100010010_00	11110105	Poteau River	Turbidity	58800	5/13/2014
OK220100010010_40	11110105	Poteau River	Turbidity	58820	5/13/2014
OK220100030010_00	11110105	Brazil Creek	Enterococcus	58760	5/13/2014
OK220100040020_00	11110105	Fourche Maline Creek	Enterococcus	35634	10/28/2008

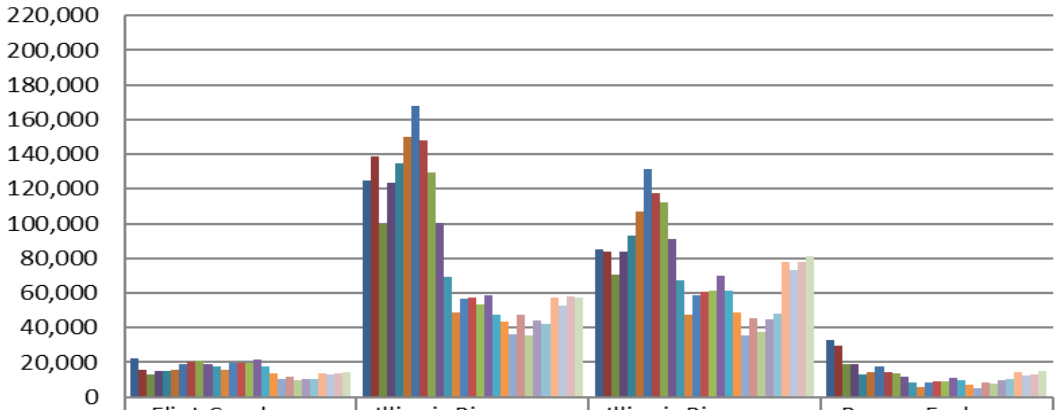
Water Quality Monitoring Report for the Illinois River Basin
Arkansas – Oklahoma Compact



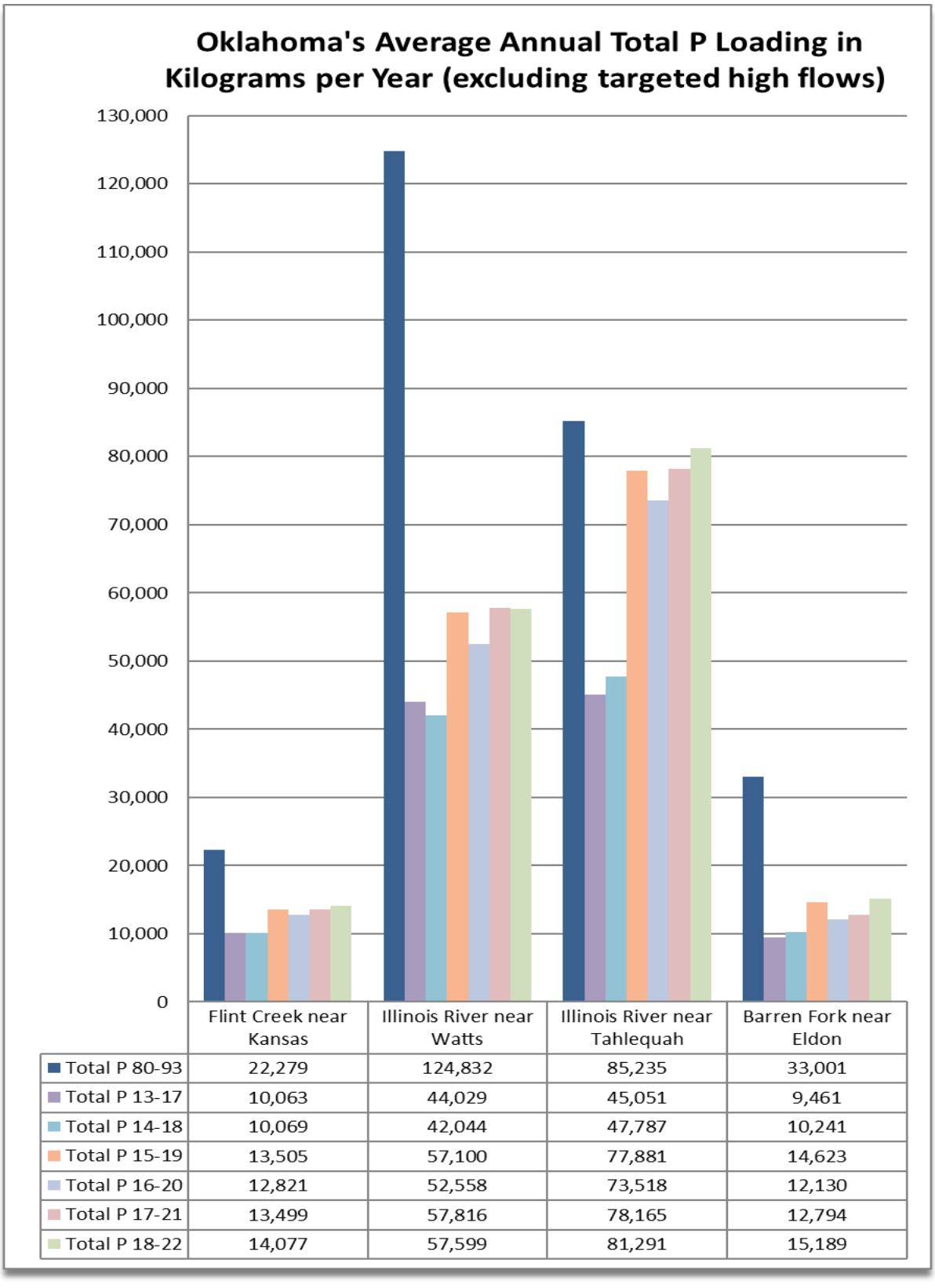
CY 2022


Kansas
Flint Creek
Kansas
ARK05
Delaware
Watts
Watts
Adair
Illinois River
Lake Frank
59
10
Cherokee
Westville
Oklahoma
Arkansas
62
Barren Fork Creek
82
Tahlequah
Eldon
Eldon
Tahlequah
51
62
82
51
Caney Creek
Stilwell
100
82
Lake Tenkiller
100
Sequoyah
10
40
64

Oklahoma's Average Annual Total P Loading in Kilograms per Year (excluding targeted high flows)



	Flint Creek near Kansas	Illinois River near Watts	Illinois River near Tahlequah	Barren Fork near Eldon
Total P 80-93	22,279	124,832	85,235	33,001
Total P 93-97	15,727	138,508	83,799	29,482
Total P 94-98	12,986	99,898	70,546	19,163
Total P 95-99	14,974	123,581	83,632	19,257
Total P 96-00	15,100	134,986	92,876	13,163
Total P 97-01	15,989	149,927	106,797	14,548
Total P 98-02	19,224	167,987	131,491	17,603
Total P 99-03	20,579	148,151	117,524	14,059
Total P 00-04	20,963	129,533	112,341	13,685
Total P 01-05	19,098	100,347	91,325	11,465
Total P 02-06	17,415	69,482	67,345	8,500
Total P 03-07	15,977	48,448	47,216	5,716
Total P 04-08	19,356	56,951	58,605	8,574
Total P 05-09	19,586	57,272	60,830	9,197
Total P 06-10	19,818	53,127	61,131	9,335
Total P 07-11	21,700	58,493	70,259	11,159
Total P 08-12	17,473	47,682	61,180	9,837
Total P 09-13	13,543	43,412	48,513	7,054
Total P 10-14	10,154	35,998	35,578	5,357
Total P 11-15	11,382	47,254	45,505	8,711
Total P 12-16	9,516	35,758	37,303	7,831
Total P 13-17	10,063	44,029	45,051	9,461
Total P 14-18	10,069	42,044	47,787	10,241
Total P 15-19	13,505	57,100	77,881	14,623
Total P 16-20	12,821	52,558	73,518	12,130
Total P 17-21	13,499	57,816	78,165	12,794
Total P 18-22	14,077	57,599	81,291	15,189



	Flint Creek near Kansas	Illinois River near Watts	Illinois River near Tahlequah	Barren Fork near Eldon
Total P 80-93	22,279	124,832	85,235	33,001
Total P 13-17	10,063	44,029	45,051	9,461
Total P 14-18	10,069	42,044	47,787	10,241
Total P 15-19	13,505	57,100	77,881	14,623
Total P 16-20	12,821	52,558	73,518	12,130
Total P 17-21	13,499	57,816	78,165	12,794
Total P 18-22	14,077	57,599	81,291	15,189

Illinois River at Watts

Illinois River at Watts				Loadings	
Year	Flow (cfs)	Total P (mg/L)	Ortho P (mg/L)	Total P kg/year	Ortho P kg/year
1980	173	0.423		65,279	
1981	260	0.190		44,119	
1982	591				
1983	352				
1984	706				
1985	947				
1986	879				
1987	815				
1988	531				
1989	558	0.210	0.150	104,653	74,752
1990	1,127	0.181	0.118	182,432	118,266
1991	724	0.162	0.090	104,534	58,194
1992	760	0.161	0.127	109,571	86,299
1993	1,163	0.277	0.176	287,317	182,313
1994	674	0.168	0.128	101,127	77,049
1995	783	0.143	0.130	100,233	90,909
1996	693	0.188	0.192	116,542	118,628
1997	573	0.163	0.120	83,415	61,410
1998	713	0.138	0.120	87,876	76,414
1999	793	0.250	0.145	177,057	102,693
2000	648	0.309	0.227	178,827	131,371
2001	649	0.346	0.233	200,549	135,052
2002	619	0.316	0.173	174,694	95,639
2003	347	0.155	0.176	48,035	54,543
2004	688	0.104		63,903	
2005	459	0.106		43,453	
2006	349	0.116		36,156	
2007	464	0.106		43,926	
2008	1177	0.068		71,480	
2009	915	0.069		56,386	
2010	587	0.057		29,882	
2011	1101	0.081		79,648	
2012	336	0.052		15,594	
2013	642	0.082		46,994	
2014	448	0.056		22,412	
2015	1364	0.061		74,303	
2016	434	0.065		25,189	
2017	918	0.064		52,481	
2018	715	0.066		42,126	
2019	1511	0.071		95,806	
2020	1116	0.050		49,832	
2021	964	0.051		43,912	
2022	1057	0.057		53,791	
Average	728	0.143	0.154	93,283	99,917

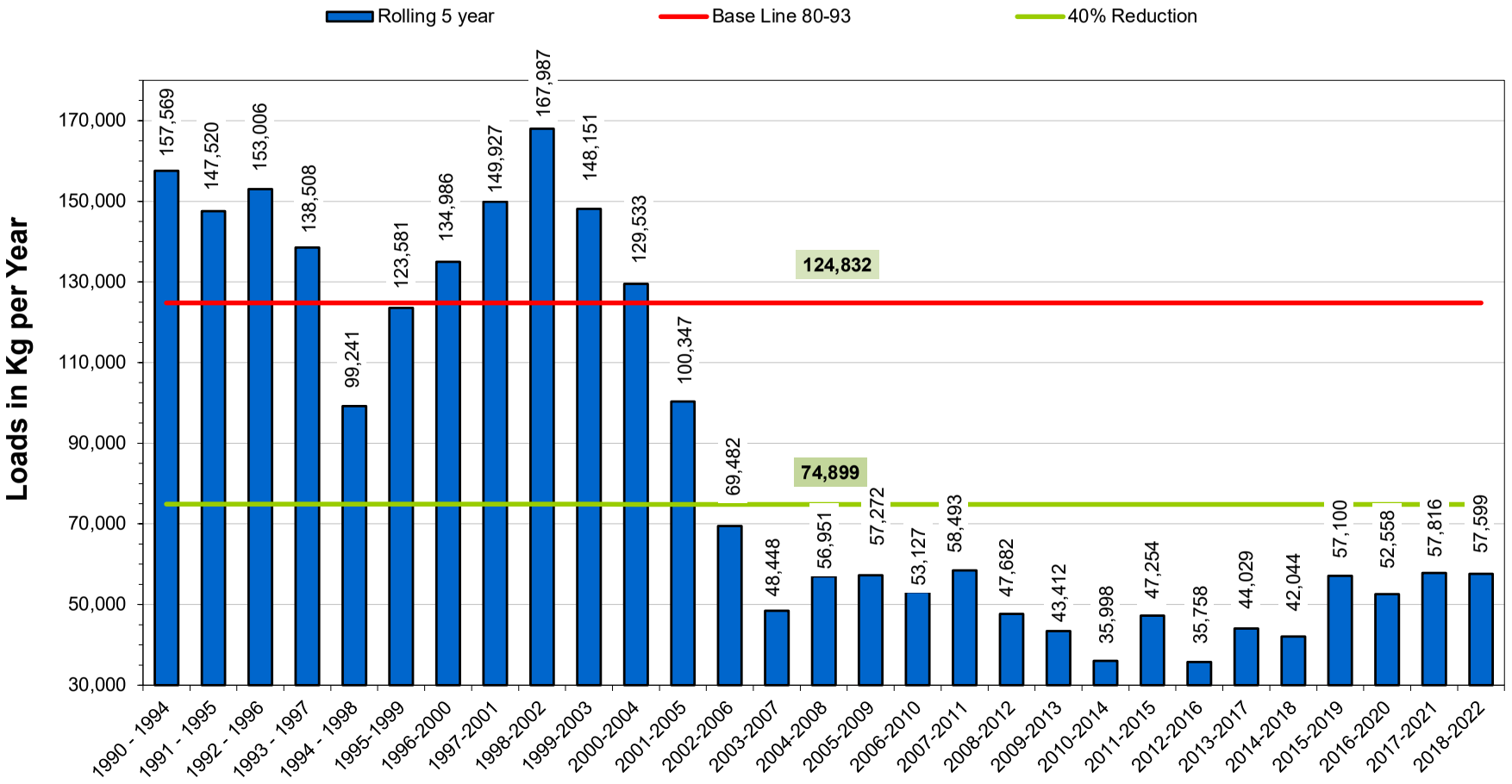
Illinois River at Watts				
Year	Pt (mg/l)	Flow (cfs)	Pt (kg/yr)	% Decrease
1980-1993	0.204	685	124,832	0.0%
1990-1994	0.198	890	157,569	-26.2%
1991-1995	0.201	821	147,520	-18.2%
1992-1996	0.210	815	153,006	-22.6%
1993-1997	0.200	777	138,508	-11.0%
1994-1998	0.162	687	99,241	20.5%
1995-1999	0.195	711	123,581	1.0%
1996-2000	0.221	684	134,986	-8.1%
1997-2001	0.249	675	149,927	-20.1%
1998-2008	0.275	684	167,987	-34.6%
1999-2003	0.271	611	148,151	-18.7%
2000-2004	0.246	590	129,533	-3.8%
2001-2005	0.203	552	100,347	19.6%
2002-2006	0.158	492	69,482	44.3%
2003-2007	0.118	461	48,448	61.2%
2004-2008	0.102	627	56,951	54.4%
2005-2009	0.095	673	57,272	54.1%
2006-2010	0.085	698	53,127	57.4%
2007-2011	0.077	849	58,493	53.1%
2008-2012	0.065	823	47,682	61.8%
2009-2013	0.068	716	43,412	65.2%
2010-2014	0.065	623	35,998	71.2%
2011-2015	0.068	778	47,254	62.1%
2012-2016	0.062	690	38,292	69.3%
2013-2017	0.065	761	44,029	64.7%
2014-2018	0.061	776	42,044	66.3%
2015-2019	0.065	988	57,100	54.3%
2016-2020	0.063	939	52,558	57.9%
2017-2021	0.062	1045	57,816	53.7%
2018-2022	0.060	1072	57,599	53.9%

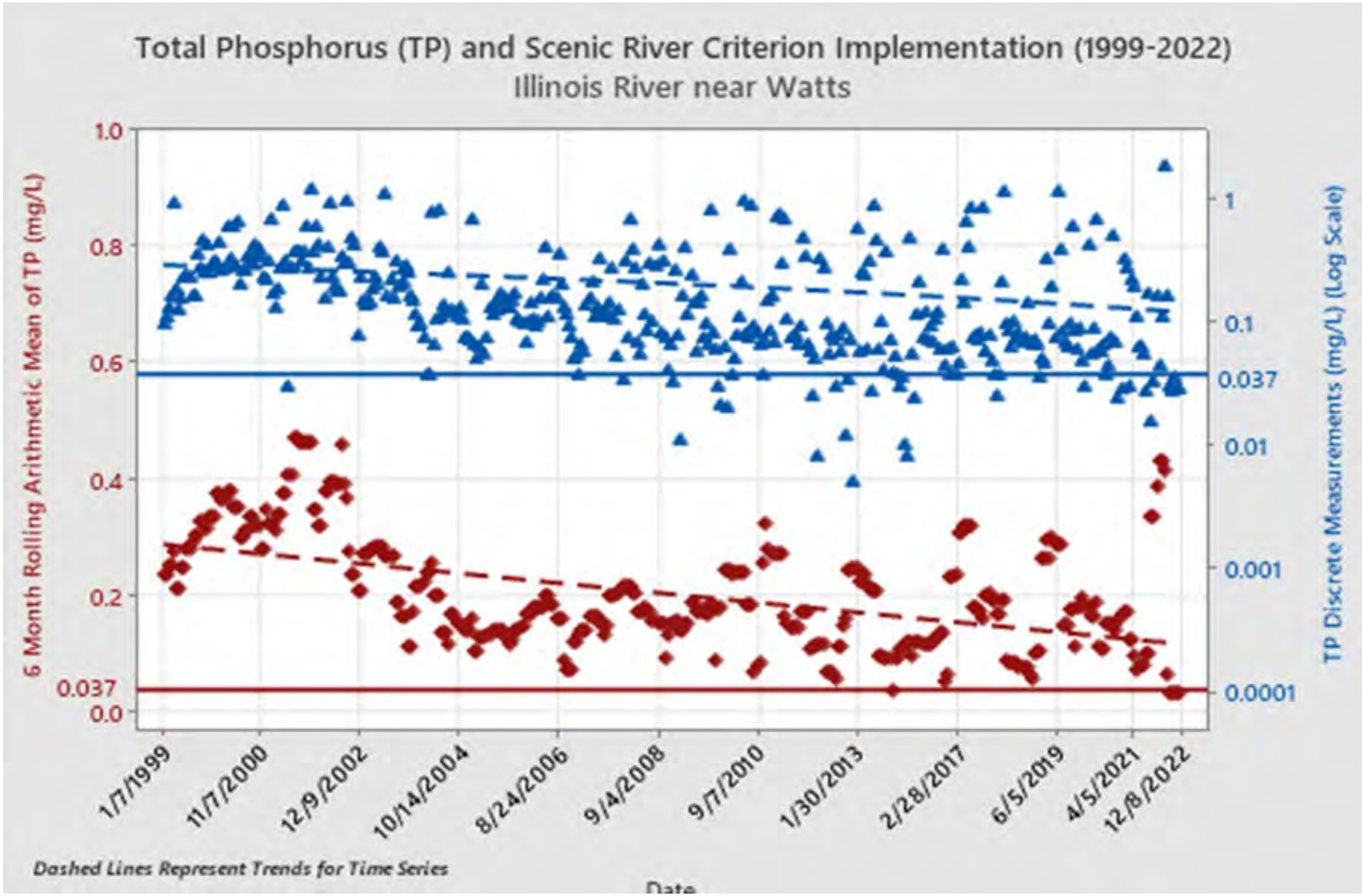
NOTES : Flow & Water quality data provided by USGS Oklahoma District

* WQ data from 1999 to the present also includes data routinely collected by the OWRB

* Values represent data that is routinely collected and excludes targeted high flow events.

Illinois River near Watts (excluding targeted high flows)




Total Phosphorus (TP) and Scenic River Criterion Implementation (1999-2022)
Illinois River near Watts
6 Month Rolling Arithmetic Mean of TP (mg/L)
TP Discrete Measurements (mg/L) (Log Scale)
1.0
0.8
0.6
0.4
0.2
0.037
0.0
1
0.1
0.037
0.01
0.001
0.0001
1/7/1999
11/7/2000
12/9/2002
10/14/2004
8/24/2006
9/4/2008
9/7/2010
1/30/2013
2/28/2017
6/5/2019
4/5/2021
12/8/2022
Dashed Lines Represent Trends for Time Series
Date

Illinois River near Tahlequah

Illinois River Near Tahlequah — **Loadings**

Year	Flow (cfs)	Total P (mg/L)	Ortho P (mg/L)	Total P kg/year	Ortho P kg/year
1980	249				
1981	384				
1982	812				
1983	537				
1984	1,157				
1985	1,651				
1986	1,452				
1987	1,218				
1988	820				
1989	808				
1990	1,695	0.098	0.078	147,579	117,307
1991	1,094	0.079	0.044	76,796	43,285
1992	1,207	0.080	0.058	86,205	62,858
1993	1,751	0.099	0.086	154,647	133,796
1994	1,071	0.084	0.068	80,223	64,768
1995	1,123	0.080	0.071	80,229	71,454
1996	938	0.085	0.092	71,207	76,792
1997	812	0.069	0.066	49,797	47,621
1998	1,044	0.081	0.075	75,524	69,930
1999	1,143	0.121	0.093	123,518	94,936
2000	1,083	0.136	0.111	131,543	107,362
2001	1,033	0.158	0.123	145,766	113,476
2002	851	0.211	0.151	160,366	114,764
2003	478	0.100	0.109	42,690	46,532
2004	1,157	0.075		77,499	
2005	712	0.060		38,148	
2006	426	0.074		28,154	
2007	736	0.066		43,383	
2008	1,839	0.062		101,829	
2009	1,407	0.072		90,475	
2010	819.8	0.050		36,608	
2011	1,540.8	0.058		79,813	
2012	491.8	0.038		16,689	
2013	946.1	0.043		36,331	
2014	659.4	0.038		22,378	
2015	2,174.6	0.041		79,628	
2016	700.6	0.050		31,286	
2017	1,219.7	0.050		54,465	
2018	987.2	0.054		47,610	
2019	2,308.0	0.100		206,129	
2020	1,670.3	0.047		70,112	
2021	1,362.4	0.030		36,502	
2022	1,577.6	0.040		56,359	
Average	1,096	0.077	0.087	74,999	85,609

Illinois River near Tahlequah

Year	Pt (mg/l)	Flow (cfs)	Pt (kg/yr)	% Decrease
1980-1993	0.090	1060	85,235	0.0%
1990-1994	0.088	1364	107,341	-25.9%
1991-1995	0.085	1249	94,704	-11.1%
1992-1996	0.086	1218	93,495	-9.7%
1993-1997	0.082	1139	83,799	1.7%
1994-1998	0.079	998	70,546	17.2%
1995-1999	0.093	1012	83,632	1.9%
1996-2000	0.104	1004	92,876	-9.0%
1997-2001	0.117	1023	106,797	-25.3%
1998-2008	0.143	1031	131,491	-54.3%
1999-2003	0.143	918	117,524	-37.9%
2000-2004	0.137	920	112,341	-31.8%
2001-2005	0.121	846	91,325	-7.1%
2002-2006	0.104	725	67,345	21.0%
2003-2007	0.075	702	47,216	44.6%
2004-2008	0.067	974	58,605	31.2%
2005-2009	0.067	1024	60,830	28.6%
2006-2010	0.065	1046	61,131	28.3%
2007-2011	0.062	1269	70,259	17.6%
2008-2012	0.056	1220	61,180	28.2%
2009-2013	0.052	1041	48,513	43.1%
2010-2014	0.046	1105	36,735	56.9%
2011-2015	0.045	1163	46,721	45.2%
2012-2016	0.042	994	37,303	56.2%
2013-2017	0.044	1140	45,051	47.1%
2014-2018	0.047	1148	47,787	43.9%
2015-2019	0.059	1478	77,881	8.6%
2016-2020	0.060	1377	73,518	13.7%
2017-2021	0.058	1510	78,165	8.3%
2018-2022	0.058	1581	81,291	4.6%

NOTES : Flow & Water quality data provided by USGS Oklahoma District

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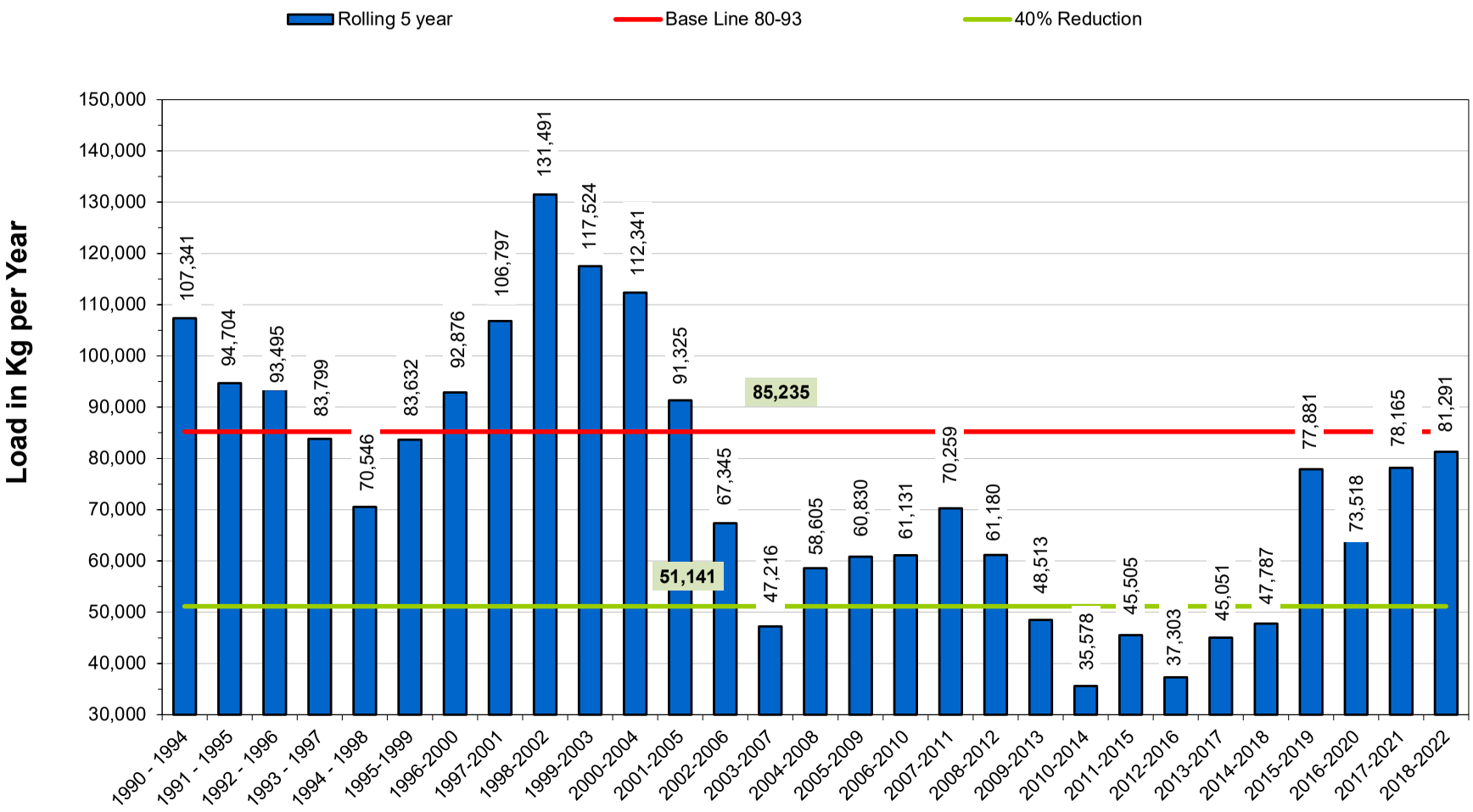
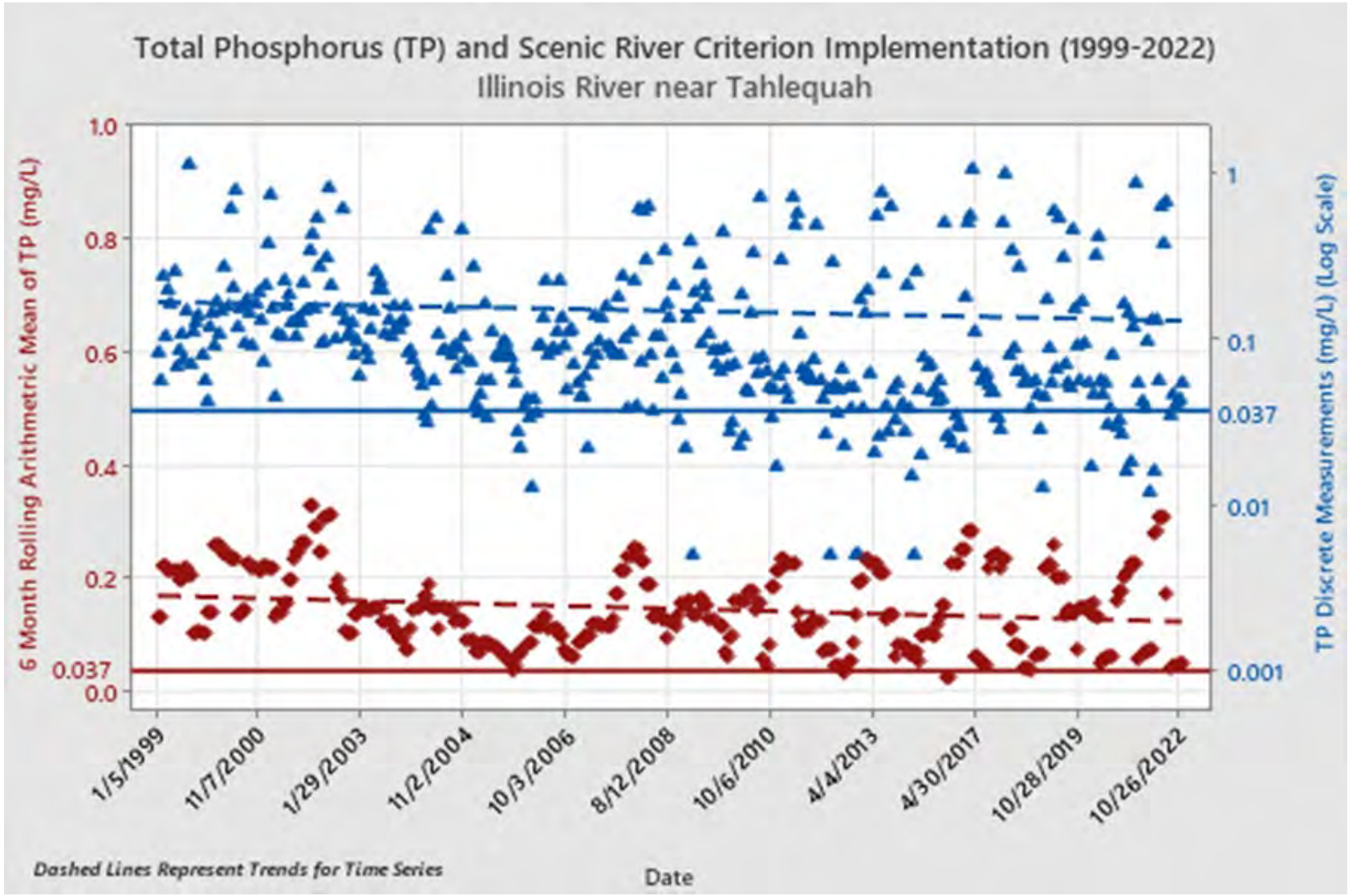
Illinois River near Tahlequah (excluding targeted high flows)

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Illinois River near Tahlequah
6 Month Rolling Arithmetic Mean of TP (mg/L)
TP Discrete Measurements (mg/L) (Log Scale)
1.0
0.8
0.6
0.4
0.2
0.037
0.0
1
0.1
0.037
0.01
0.001
1/5/1999
11/7/2000
1/29/2003
11/2/2004
10/3/2006
8/12/2008
10/6/2010
4/4/2013
4/30/2017
10/28/2019
10/26/2022
Dashed Lines Represent Trends for Time Series
Date

Flint Creek near Kansas

Flint Creek Near Kansas				Loadings	
Year	Flow (cfs)	Total P (mg/L)	Ortho P (mg/L)	Total P kg/year	Ortho P kg/year
1980	32	0.189		5,454	
1981	57	0.178		9,077	
1982	69	0.186		11,537	
1983	49	0.284		12,415	
1984	143	0.240		30,532	
1985	237	0.224		47,591	
1986	183	0.223		36,430	
1987	141	0.157		19,840	
1988	97	0.265		22,946	
1989	90	0.557		44,981	
1990		0.114		0	
1991		0.120	0.100	0	
1992		0.118	0.113	0	
1993	182	0.156	0.134	25,359	21,869
1994	136	0.127	0.116	15,418	14,032
1995	140	0.185	0.130	23,207	16,308
1996	76	0.152	0.147	10,294	9,955
1997	95.7	0.117	0.115	9,964	9,829
1998	96.5	0.127	0.122	10,945	10,514
1999	137	0.186	0.151	22,758	18,476
2000	132	0.178	0.182	20,984	21,456
2001	101	0.164	0.129	14,793	11,636
2002	82	0.310	0.180	22,675	13,166
2003	49.8	0.316	0.189	14,055	8,406
2004	149.0	0.165		21,957	
2005	91.8	0.168		13,774	
2006	36.8	0.226		7,428	
2007	70.3	0.240		15,068	
2008	218.0	0.157		30,567	
2009	141.6	0.187		23,649	
2010	91.7	0.171		14,004	
2011	137.8	0.152		18,707	
2012	48.1	0.107		4,598	
2013	121.2	0.093		10,070	
2014	72.4	0.096		6,206	
2015	253.8	0.070		15,864	
2016	82.7	0.092		6,796	
2017	130.1	0.085		9,877	
2018	115.2	0.097		9,978	
2019	289.9	0.090		23,299	
2021	190.7	0.082		13,962	
2021	143.3	0.074		9,468	
2022	191.1	0.068		11,603	
Average	123	0.170	0.139	18,566	15,223

Flint Creek near Kansas				
Year	Pt (mg/l)	Flow (cfs)	Pt (kg/yr)	% Decrease
1980-1993	0.214	117	22,279	0.0%
1990-1994	0.132	159	18,758	15.8%
1991-1995	0.142	153	19,386	13.0%
1992-1996	0.146	134	17,369	22.0%
1993-1997	0.140	126	15,727	29.4%
1994-1998	0.133	109	12,986	41.7%
1995-1999	0.154	109	14,974	32.8%
1996-2000	0.157	107	15,100	32.2%
1997-2001	0.159	112	15,989	28.2%
1998-2008	0.196	110	19,224	13.7%
1999-2003	0.230	100	20,579	7.6%
2000-2004	0.228	103	20,963	5.9%
2001-2005	0.226	95	19,098	14.3%
2002-2006	0.238	82	17,415	21.8%
2003-2007	0.225	80	15,977	28.3%
2004-2008	0.191	113	19,356	13.1%
2005-2009	0.196	112	19,586	12.1%
2006-2010	0.199	112	19,818	11.0%
2007-2011	0.184	132	21,700	2.6%
2008-2012	0.154	127	17,473	21.6%
2009-2013	0.140	108	13,543	39.2%
2010-2014	0.121	94	10,154	54.4%
2011-2015	0.101	127	11,382	48.9%
2012-2016	0.090	118	9,516	57.3%
2013-2017	0.085	132	10,063	54.8%
2014-2018	0.086	131	10,069	54.8%
2015-2019	0.087	174	13,505	39.4%
2016-2020	0.089	162	12,821	42.5%
2017-2021	0.087	174	13,499	39.4%
2018-2022	0.085	186	14,077	36.8%

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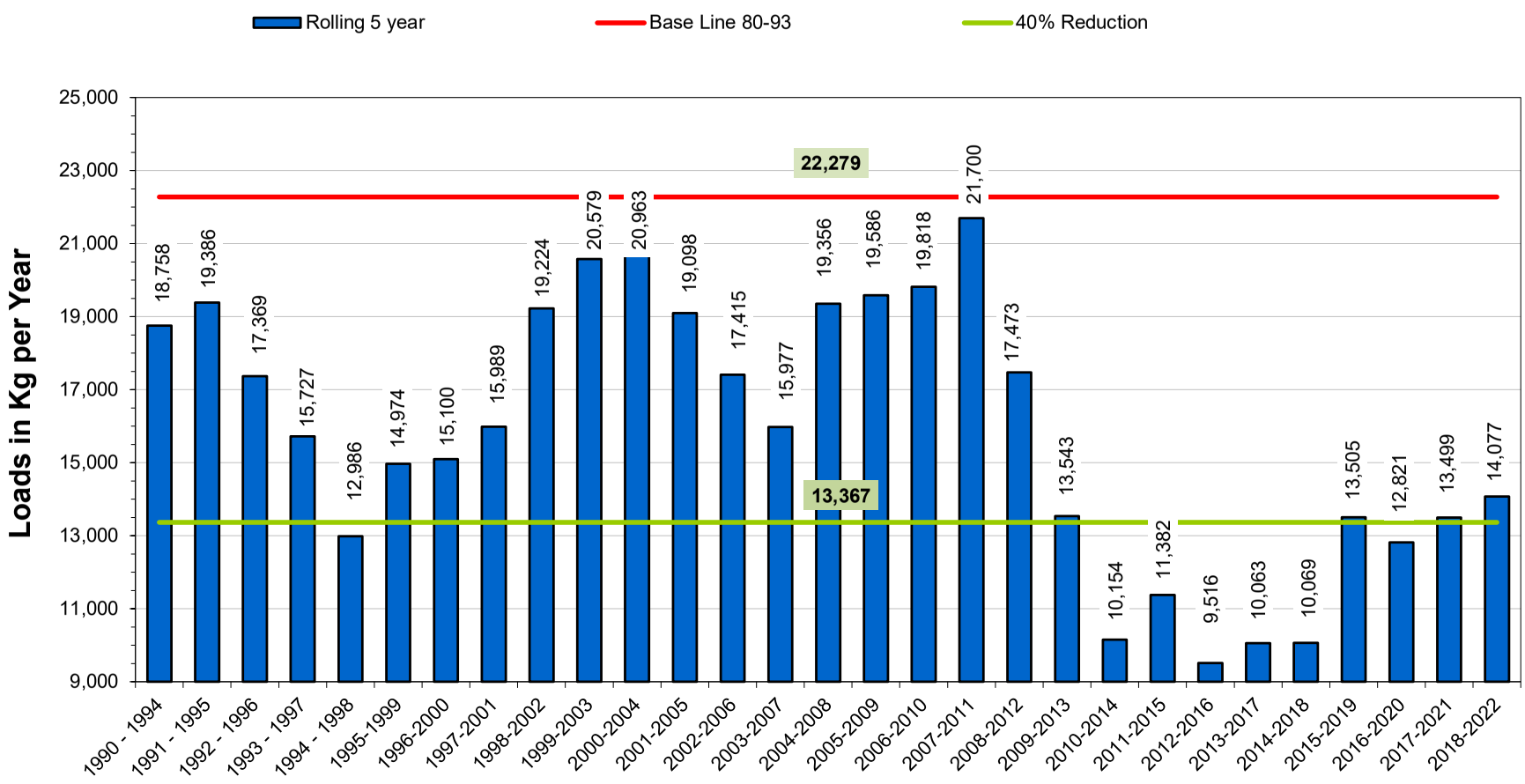
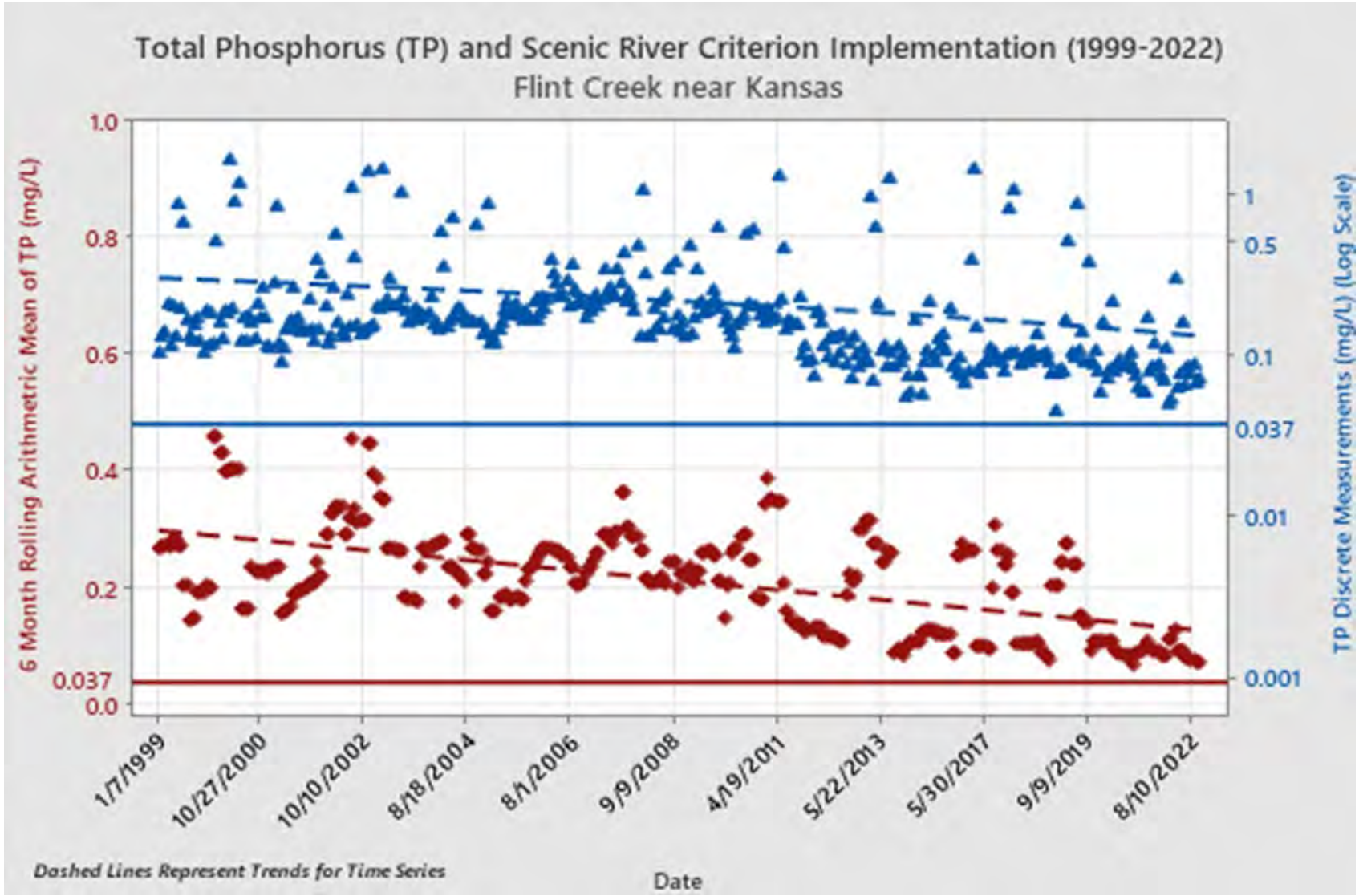
Flint Creek near Kansas (excluding targeted high flows)

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Flint Creek near Kansas
6 Month Rolling Arithmetic Mean of TP (mg/L)
TP Discrete Measurements (mg/L) (Log Scale)
1.0
0.8
0.6
0.4
0.2
0.037
0.0
1
0.5
0.1
0.037
0.01
0.001
1/7/1999
10/27/2000
10/10/2002
8/18/2004
8/1/2006
9/9/2008
4/19/2011
5/22/2013
5/30/2017
9/9/2019
8/10/2022
Dashed Lines Represent Trends for Time Series
Date

Barren Fork at Eldon

Barren Fork at Eldon				Loadings	
Year	Flow (cfs)	Total P (mg/L)	Ortho P (mg/L)	Total P kg/year	Ortho P kg/year
1980	77				
1981	201				
1982	296				
1983	184				
1984	364				
1985	593				
1986	536				
1987	491				
1988	269				
1989	320				
1990	666				
1991	451	0.060	0.065	24,145	26,157
1992	440	0.095	0.056	37,315	21,996
1993	700	0.108	0.060	67,234	37,526
1994	328	0.037	0.023	10,878	6,694
1995	422	0.263	0.046	98,819	17,317
1996	432	0.025	0.033	9,645	12,861
1997	332	0.023	0.021	6,671	6,138
1998	409	0.033	0.028	12,054	10,228
1999	361	0.048	0.028	15,476	9,027
2000	376	0.043	0.045	14,440	15,111
2001	343	0.064	0.042	19,605	12,866
2002	262	0.088	0.053	20,591	12,402
2003	145	0.025	0.022	3,237	2,849
2004	403	0.029		10,438	
2005	228	0.027		5,498	
2006	169	0.027		4,075	
2007	254	0.026		5,898	
2008	559	0.045		22,466	
2009	460	0.033		13,557	
2010	225	0.027		5,426	
2011	471	0.028		11,783	
2012	130	0.019		2,201	
2013	219	0.026		5,083	
2014	184	0.024		3,938	
2015	872	0.040		31,154	
2016	214	0.033		6,309	
2017	320	0.028		8,013	
2018	318	0.029		8,225	
2019	761	0.038		25,816	
2020	549	0.031		15,194	
2021	392	0.025		8,747	
2022	479	0.051		21,816	
Average	377	0.047	0.040	15,741	13,511

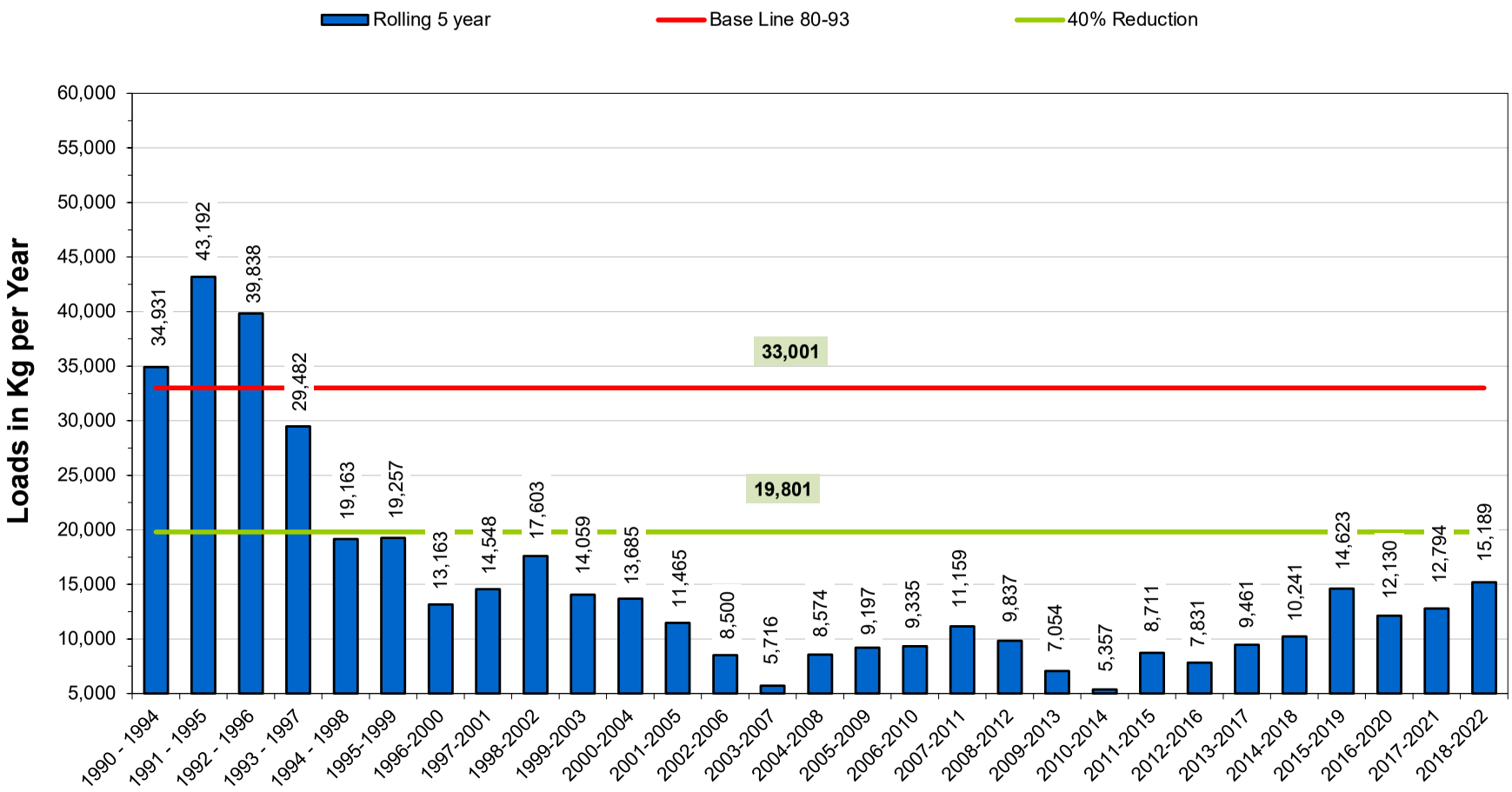
Barren Fork at Eldon				
Year	Pt (mg/l)	Flow (cfs)	Pt (kg/yr)	% Decrease
1980-1993	0.093	399	33,001	0.0%
1990-1994	0.076	517	34,931	-5.8%
1991-1995	0.103	468	43,192	-30.9%
1992-1996	0.096	464	39,838	-20.7%
1993-1997	0.075	443	29,482	10.7%
1994-1998	0.056	384	19,163	41.9%
1995-1999	0.055	391	19,257	41.6%
1996-2000	0.039	382	13,163	60.1%
1997-2001	0.045	364	14,548	55.9%
1998-2008	0.056	350	17,603	46.7%
1999-2003	0.053	297	14,059	57.4%
2000-2004	0.050	306	13,685	58.5%
2001-2005	0.046	276	11,465	65.3%
2002-2006	0.039	241	8,500	74.2%
2003-2007	0.027	240	5,716	82.7%
2004-2008	0.030	323	8,574	74.0%
2005-2009	0.031	334	9,197	72.1%
2006-2010	0.031	333	9,335	71.7%
2007-2011	0.032	394	11,159	66.2%
2008-2012	0.030	369	9,837	70.2%
2009-2013	0.026	350	7,054	78.6%
2010-2015	0.025	350	5,400	83.6%
2011-2015	0.026	375	8,711	73.6%
2012-2016	0.027	323	7,831	76.3%
2013-2017	0.029	362	9,461	71.3%
2014-2018	0.030	382	10,241	69.0%
2015-2019	0.033	497	14,623	55.7%
2016-2020	0.031	432	12,130	63.2%
2017-2021	0.031	468	12,794	61.2%
2018-2022	0.034	500	15,189	54.0%

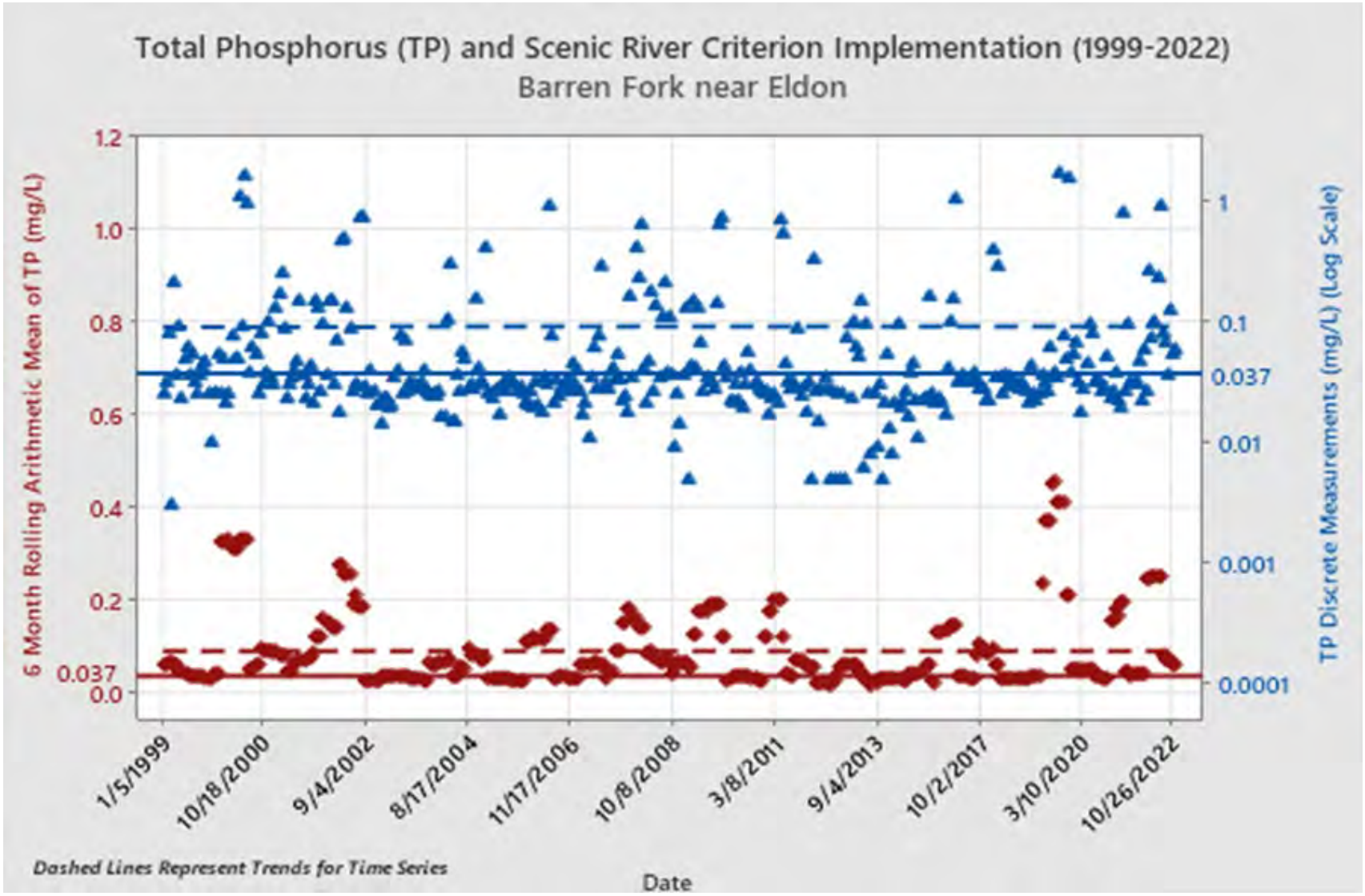
NOTES : Flow & Water quality data provided by USGS Oklahoma District

* WQ data from 1999 to the present also includes data routinely collected by the OWRB

* Values represent data that is routinely collected and excludes targeted high flow events.

Barren Fork at Eldon (excluding targeted high flows)




Total Phosphorus (TP) and Scenic River Criterion Implementation (1999-2022)
Barren Fork near Eldon
6 Month Rolling Arithmetic Mean of TP (mg/L)
TP Discrete Measurements (mg/L) (Log Scale)
1.2
1.0
0.8
0.6
0.4
0.2
0.037
0.0
1
0.1
0.037
0.01
0.001
0.0001
1/5/1999
10/18/2000
9/4/2002
8/17/2004
11/17/2006
10/8/2008
3/8/2011
9/4/2013
10/2/2017
3/10/2020
10/26/2022
Dashed Lines Represent Trends for Time Series
Date

Funding for Cities and Districts In the Illinois River Basin Provided by the OWRB's Financial Assistance Program

FUNDING PROVIDED BY OWRB'S FINANCIAL ASSISTANCE PROGRAM

Loan/Grant #	Community	County	Closed Amount	Approved Date	App Type
FAP-83-0033-G	Cherry Tree Rural Water District	Adair	$10,000.00	1/10/1984	Emergency
FAP-85-0129-G	Watts Public Works Authority	Adair	$10,000.00	2/12/1985	Emergency
FAP-85-0155-G	Adair County RWS & SWMD #2	Adair	$100,000.00	6/11/1985	Emergency
FAP-88-0053-G	Watts Public Works Authority	Adair	$85,000.00	7/16/1990	Emergency
FAP-89-0062-G	Adair County Rural Water District #5	Adair	$50,000.00	9/10/1991	Emergency
FAP-93-0073-L	Stilwell Area Development Authority	Adair	$1,000,000.00	12/12/1995	FA Loan
FAP-97-0125-R	Watts Public Works Authority	Adair	$149,750.00	2/10/1998	REAP
FAP-97-0124-R	Adair County Rural Water District #5	Adair	$75,000.00	6/8/1999	REAP
ORF-98-0010-CW	Stilwell Area Development Authority	Adair	$4,000,000.00	8/10/1999	CWSRF
FAP-99-0080-R	Watts Public Works Authority	Adair	$99,800.00	11/16/1999	REAP
FAP-00-0058-R	Adair County Rural Water District #5	Adair	$99,500.00	7/10/2001	REAP
ORF-99-0020-CW	Westville Utility Authority	Adair	$430,400.00	12/11/2001	CWSRF
FAP-01-0013-L	Stilwell Area Development Authority	Adair	$2,760,000.00	3/12/2002	FA Loan
FAP-00-0071-R	Adair County Rural Water District #6	Adair	$146,875.00	4/9/2002	REAP
FAP-03-0019-R	Westville Utility Authority	Adair	$99,969.00	6/14/2005	REAP
FAP-05-0013-G	Westville Utility Authority	Adair	$100,000.00	10/11/2005	Emergency
FAP-06-0015-R	Adair County RWS & SWMD #2	Adair	$99,999.00	3/11/2008	REAP
FAP-12-0006-L	Westville Utility Authority	Adair	$1,350,000.00	3/13/2012	FA Loan
FAP-05-0051-R	Westville Utility Authority	Adair	$0.00	7/16/2013	REAP
ORF-20-0013-CW	Westville Utility Authority	Adair	$37,575.00	8/20/2019	CWSRF
FAP-18-0027-R	Westville Utility Authority	Adair	$0.00	8/18/2020	REAP
ORF-21-0005-CW	Westville Utility Authority	Adair	$109,395.26	8/18/2020	CWSRF
FAP-83-0019-G	Burnt Cabin Rural Water District Incorporated	Cherokee	$24,000.00	11/2/1983	Emergency
FAP-83-0021-G	Cherokee County Rural Water District #8 -- Briggs	Cherokee	$53,000.00	1/10/1984	Emergency
FAP-83-0044-G	Town of Hulbert	Cherokee	$100,000.00	1/10/1984	Emergency
FAP-90-0055-G	Cherokee County Rural Water District #10	Cherokee	$27,000.00	3/12/1991	Emergency
FAP-91-0057-G	Cherokee County Rural Water District #7	Cherokee	$23,180.00	9/10/1991	Emergency
FAP-91-0058-G	Cherokee County Rural Water District #8 -- Briggs	Cherokee	$23,180.00	9/10/1991	Emergency
FAP-85-0152-G	Cherokee County Rural Water District #9	Cherokee	$13,465.00	10/16/1991	Emergency
FAP-91-0120-G	Hulbert Public Works Authority	Cherokee	$25,000.00	9/15/1992	Emergency
FAP-95-0060-G	Cherokee County Rural Water District #13	Cherokee	$100,000.00	1/9/1996	Emergency
FAP-95-0031-L	Cherokee County Rural Water District #13	Cherokee	$170,000.00	1/9/1996	FA Loan
FAP-97-0126-R	Cherokee County Rural Water District #9	Cherokee	$99,900.00	1/13/1998	REAP

FAP-98-0011-R	Burnt Cabin Rural Water District Incorporated	Cherokee	$65,427.00	6/9/1998	REAP
FAP-98-0081-R	Cherokee County Rural Water District #14	Cherokee	$54,000.00	2/10/1999	REAP
FAP-98-0052-G	Cherokee County Rural Water District #3	Cherokee	$45,000.00	2/10/1999	Emergency
FAP-99-0082-R	Hulbert Public Works Authority	Cherokee	$79,350.00	11/16/1999	REAP
FAP-97-0110-R	Cherokee County Rural Water District #1	Cherokee	$100,000.00	12/14/1999	REAP
FAP-97-0098-R	Cherokee County Rural Water District #13	Cherokee	$80,000.00	3/14/2000	REAP
FAP-99-0072-R	Cherokee County Rural Water District #9	Cherokee	$69,900.00	11/14/2000	REAP
FAP-98-0029-L	Cherokee County Rural Water District #1	Cherokee	$380,000.00	12/12/2000	FA Loan
FAP-00-0007-L	Cherokee County Rural Water District #13	Cherokee	$1,810,000.00	6/11/2002	FA Loan
FAP-02-0001-L	Cherokee County Rural Water District #8 -- Briggs	Cherokee	$285,000.00	6/11/2002	FA Loan
FAP-01-0066-R	Hulbert Public Works Authority	Cherokee	$99,000.00	7/9/2002	REAP
FAP-02-0004-L	Cherokee County Rural Water District #2	Cherokee	$645,000.00	8/13/2002	FA Loan
FAP-02-0026-R	Cherokee County Rural Water District #13	Cherokee	$135,000.00	6/8/2004	REAP
FAP-06-0011-R	Cherokee County Rural Water District #8 -- Briggs	Cherokee	$99,999.00	6/12/2007	REAP
FAP-08-0033-R	Cherokee County Rural Water District #7	Cherokee	$39,069.00	12/9/2008	REAP
FAP-08-0005-R	Cherokee County Rural Water District #12	Cherokee	$70,000.00	6/9/2009	REAP
FAP-09-0011-G	Hulbert Public Works Authority	Cherokee	$75,000.00	11/10/2009	Emergency
ORF-09-0040-DW	Tahlequah Public Works Authority	Cherokee	$16,320,000.00	12/8/2009	DWSRF
FAP-09-0034-R	Cherokee County Rural Water District #8 -- Briggs	Cherokee	$34,914.00	4/13/2010	REAP
ORF-11-0002-DW	Cherokee County Rural Water District #3	Cherokee	$3,110,000.00	7/12/2011	DWSRF
ORF-11-0010-DW	Tahlequah Public Works Authority	Cherokee	$1,680,000.00	12/13/2011	DWSRF
FAP-12-0010-L	Cherokee County Rural Water District #13	Cherokee	$1,600,000.00	3/13/2012	FA Loan
FAP-12-0002-D	Cherokee County Rural Water District #3	Cherokee	$26,870.00	9/18/2012	Drought
ORF-18-0017-DW	Tahlequah Public Works Authority	Cherokee	$8,200,000.00	12/6/2018	DWSRF
ORF-19-0014-CW	Tahlequah Public Works Authority	Cherokee	$6,750,000.00	12/5/2019	CWSRF
ORF-19-0002-DW	Cherokee County Rural Water District #11	Cherokee	$1,575,000.00	2/16/2021	DWSRF

ORF-19-0002-DW	Cherokee County Rural Water District #11	Cherokee	$1,575,000.00	2/16/2021	DWSRF
FAP-21-0017-R	Cherokee County Rural Water District #7	Cherokee	$0.00	2/16/2021	REAP
FAP-21-0008-G	Cherokee County Rural Water District #13	Cherokee	$0.00	4/20/2021	Emergency
ORF-21-0021-DW	Cherokee County Rural Water District #1	Cherokee	$100,000.00	6/15/2021	DWSRF
FAP-83-0027-G	Town of Drumright	Creek	$100,000.00	1/10/1984	Emergency
FAP-83-0075-G	City of Oilton	Creek	$28,420.00	4/10/1984	Emergency
FAP-85-0131-G	Town of Drumright	Creek	$76,000.00	5/14/1985	Emergency
FAP-85-0127-G	Creek County RWS & SWMD #79-1	Creek	$100,000.00	10/8/1985	Emergency
FAP-85-0208-G	Creek County Rural Water District #9	Creek	$90,800.00	8/12/1986	Emergency
FAP-85-0181-G	Shamrock Public Works Authority	Creek	$60,000.00	3/16/1987	Emergency
FAP-87-0148-L	Sapulpa Municipal Authority	Creek	$7,250,000.00	9/14/1988	FA Loan
FAP-90-0057-G	Kiefer Public Works Authority	Creek	$11,000.00	8/14/1990	Emergency
FAP-90-0097-G	Creek County Rural Water District #10	Creek	$40,000.00	12/8/1992	Emergency
FAP-93-0047-L	Creek County Rural Water District #1	Creek	$2,255,000.00	1/11/1994	FA Loan
ORF-94-0008-CW	Kiefer Public Works Authority	Creek	$320,000.00	9/12/1995	CWSRF
FAP-96-0132-R	Town of Depew	Creek	$59,000.00	1/14/1997	REAP
FAP-96-0186-R	Town of Mounds	Creek	$55,200.00	4/8/1997	REAP
FAP-97-0108-R	Keystone Development Authority	Creek	$79,000.00	1/12/1999	REAP
FAP-98-0094-R	Depew Public Works Authority	Creek	$79,000.00	11/16/1999	REAP
ORF-99-0002-DW	Creek County Rural Water District #7	Creek	$615,000.00	2/8/2000	DWSRF
FAP-98-0093-R	Depew Public Works Authority	Creek	$38,000.00	3/14/2000	REAP
FAP-00-0007-G	Creek County Rural Water District #11	Creek	$100,000.00	6/13/2000	Emergency
FAP-99-0001-L	Creek County Rural Water District #2	Creek	$1,345,000.00	10/10/2000	FA Loan
FAP-00-0062-R	Kiefer Public Works Authority	Creek	$150,000.00	4/10/2001	REAP
FAP-03-0035-R	Olive Public School	Creek	$50,000.00	12/13/2005	REAP
ORF-08-0004-DW	Creek County Rural Water District #7	Creek	$3,230,000.00	8/12/2008	DWSRF
FAP-08-0023-R	Kellyville Public Works Authority	Creek	$99,990.00	7/14/2009	REAP
FAP-09-0013-R	City of Oilton	Creek	$78,400.00	7/13/2010	REAP
FAP-11-0023-R	Slick Public Works Authority	Creek	$81,825.00	7/17/2012	REAP
FAP-11-0015-R	Depew Public Works Authority	Creek	$0.00	7/16/2013	REAP
ORF-13-0012-CW	Oilton Public Works Authority	Creek	$2,850,000.00	8/20/2013	CWSRF
ORF-14-0006-CW	Kiefer Public Works Authority	Creek	$320,000.00	12/17/2013	CWSRF
FAP-16-0003-G	Depew Public Works Authority	Creek	$0.00	9/20/2016	Emergency
ORF-18-0020-CW	Sapulpa Municipal Authority	Creek	$7,850,000.00	5/15/2018	CWSRF
ORF-21-0030-CW	Bristow Municipal Authority	Creek	$9,100,000.00	10/20/2020	CWSRF
ORF-21-0030-CWA	Bristow Municipal Authority	Creek	$2,575,000.00	6/21/2022	CWSRF
FAP-83-0080-G	Cherokee Housing Authority	Delaware	$64,000.00	1/10/1984	Emergency

FAP-83-0012-G	Town of Kansas	Delaware	$92,516.00	3/13/1984	Emergency
FAP-84-0015-G	Town of Colcord	Delaware	$95,816.00	4/10/1984	Emergency
FAP-84-0059-G	West Siloam Springs	Delaware	$100,000.00	6/10/1986	Emergency
FAP-85-0229-G	Delaware County Rural Water District #1	Delaware	$63,000.00	9/8/1987	Emergency
FAP-86-0002-G	Kansas Public Works Authority	Delaware	$65,000.00	1/12/1988	Emergency
FAP-90-0086-G	Delaware County Rural Water District #3	Delaware	$34,300.00	5/6/1991	Emergency
FAP-92-0019-G	Delaware County RWSG & SWMD #6	Delaware	$75,000.00	4/12/1994	Emergency
FAP-92-0079-G	Delaware County Rural Water District #7	Delaware	$25,000.00	7/12/1994	Emergency
FAP-94-0013-G	West Siloam Springs	Delaware	$18,315.00	7/12/1994	Emergency
FAP-96-0028-G	Delaware County RWSG & SWMD #9	Delaware	$100,000.00	8/13/1996	Emergency
FAP-96-0009-L	Delaware County RWSG & SWMD #9	Delaware	$635,000.00	8/13/1996	FA Loan
FAP-95-0053-G	Delaware County RWSG & SWMD #6	Delaware	$100,000.00	10/8/1996	Emergency
FAP-97-0068-R	Delaware County RWSG & SWMD #9	Delaware	$10,000.00	5/13/1997	REAP
FAP-96-0020-G	Delaware County Rural Water District #1	Delaware	$85,000.00	7/8/1997	Emergency
FAP-97-0008-L	Delaware County Rural Water District #1	Delaware	$360,000.00	7/8/1997	FA Loan
FAP-97-0044-L	Grand Lake Public Works Authority	Delaware	$655,000.00	12/9/1997	FA Loan
FAP-97-0040-R	Kansas Public Works Authority	Delaware	$139,270.00	3/10/1998	REAP
FAP-98-0017-G	Moseley School District 34	Delaware	$46,750.00	6/9/1998	Emergency
FAP-97-0107-R	Colcord Public Works Authority	Delaware	$94,800.00	1/12/1999	REAP
FAP-99-0005-R	Grand Lake Public Works Authority	Delaware	$94,000.00	4/13/1999	REAP
FAP-97-0097-R	Kansas Public Works Authority	Delaware	$109,500.00	11/16/1999	REAP
FAP-98-0044-R	West Siloam Springs	Delaware	$96,350.00	3/14/2000	REAP
ORF-99-0011-CW	Jay Utilities Authority	Delaware	$3,766,000.00	8/8/2000	CWSRF
FAP-00-0010-L	Grand Lake Public Works Authority	Delaware	$575,000.00	3/13/2001	FA Loan
ORF-99-0022-CW	Grand Lake Public Works Authority	Delaware	$2,700,000.00	3/13/2001	CWSRF
FAP-97-0047-R	Delaware County Rural Water District #1	Delaware	$50,000.00	11/13/2001	REAP
FAP-01-0008-L	West Siloam Springs Municipal Authority	Delaware	$275,000.00	11/13/2001	FA Loan
FAP-97-0009-R	Bernice Public Works Authority	Delaware	$99,500.00	12/11/2001	REAP
FAP-01-0016-L	Grand Lake Public Works Authority	Delaware	$335,000.00	2/12/2002	FA Loan
ORF-99-0004-DW	Delaware County RWSG & SWMD #10	Delaware	$4,865,193.00	4/9/2002	DWSRF
FAP-02-0003-R	Kansas Public Works Authority	Delaware	$67,000.00	11/12/2002	REAP
ORF-02-0020-CW	Grand Lake Public Works Authority	Delaware	$800,000.00	4/8/2003	CWSRF
ORF-02-0003-CW	Grove Municipal Services Authority	Delaware	$7,500,000.00	6/10/2003	CWSRF
ORF-07-0004-DW	Jay Utilities Authority	Delaware	$2,470,000.00	2/12/2008	DWSRF

FAP-07-0034-R	Delaware County RWSG & SWMD #10	Delaware	$98,653.20	5/14/2008	REAP
ORF-07-0008-CW	Grove Municipal Services Authority	Delaware	$1,900,000.00	7/14/2009	CWSRF
ORF-09-0004-CW	Grand Lake Public Works Authority	Delaware	$992,500.00	9/8/2009	CWSRF
FAP-09-0001-L	Grand Lake Public Works Authority	Delaware	$1,990,000.00	9/8/2009	FA Loan
FAP-09-0013-G	Delaware County RWSG & SWMD #10	Delaware	$19,125.00	1/12/2010	Emergency
FAP-04-0025-R	Delaware County RWSG & SWMD #11	Delaware	$99,990.00	2/8/2011	REAP
ORF-11-0007-DW	Delaware County Rural Water District #1	Delaware	$260,000.00	10/17/2011	DWSRF
FAP-12-0016-L	Grand Lake Public Works Authority	Delaware	$1,000,000.00	7/17/2012	FA Loan
ORF-11-0003-DW	Grand Lake Public Works Authority	Delaware	$5,500,000.00	7/17/2012	DWSRF
ORF-13-0007-DW	Grove Municipal Services Authority	Delaware	$8,765,000.00	3/19/2013	DWSRF
FAP-08-0004-R	Oaks Public Works Authority	Delaware	$0.00	6/18/2013	REAP
ORF-14-0003-DW	Delaware County RWSG & SWMD #11	Delaware	$950,000.00	4/15/2014	DWSRF
FAP-13-0014-R	Colcord Public Works Authority	Delaware	$0.00	7/15/2014	REAP
FAP-17-0006-L	Delaware County Rural Water District #3	Delaware	$1,040,000.00	1/17/2017	FA Loan
ORF-16-0004-DW	South Delaware County Regional Water Authority	Delaware	$3,000,000.00	4/18/2017	DWSRF
ORF-17-0018-CW	Grand Lake Public Works Authority	Delaware	$1,825,182.60	6/20/2017	CWSRF
FAP-18-0003-L	Grand Lake Public Works Authority	Delaware	$1,390,000.00	11/1/2017	FA Loan
ORF-17-0007-DW	Grand Lake Public Works Authority	Delaware	$700,000.00	2/20/2018	DWSRF
ORF-18-0007-DW	Jay Utilities Authority	Delaware	$1,031,000.00	5/15/2018	DWSRF
ORF-21-0027-CW	Grove Municipal Services Authority	Delaware	$5,350,000.00	9/15/2020	CWSRF
FAP-83-0003-G	Town of Boynton	Muskogee	$27,695.00	8/12/1983	Emergency
FAP-83-0091-G	Town of Taft	Muskogee	$86,620.00	1/10/1984	Emergency
FAP-83-0041-G	Muskogee County Rural Water District #7	Muskogee	$90,000.00	4/10/1984	Emergency
FAP-84-0020-G	Town of Warner	Muskogee	$100,000.00	5/8/1984	Emergency
FAP-86-0059-G	Muskogee County Rural Water District #3	Muskogee	$50,000.00	12/13/1988	Emergency
FAP-88-0040-L	Porum Public Works Authority	Muskogee	$730,000.00	1/10/1989	FA Loan
FAP-89-0016-L	Warner Utilities Authority	Muskogee	$240,000.00	2/13/1990	FA Loan
FAP-90-0019-G	Oktaha Public Works Authority	Muskogee	$19,700.00	4/10/1990	Emergency
FAP-90-0100-G	Braggs Public Works Authority	Muskogee	$70,000.00	2/12/1991	Emergency
FAP-91-0040-G	Muskogee County Rural Water Management District #12	Muskogee	$45,000.00	9/10/1991	Emergency
ORF-90-0004-CW	Muskogee Municipal Authority	Muskogee	$11,553,000.00	2/11/1992	CWSRF
FAP-93-0005-L	Fort Gibson Utilities Authority	Muskogee	$820,000.00	3/9/1993	FA Loan
ORF-93-0001-L	Muskogee Municipal Authority	Muskogee	$3,670,000.00	3/9/1993	FA Loan
ORF-93-0001-CW	Muskogee Municipal Authority	Muskogee	$2,141,969.36	3/9/1993	CWSRF

FAP-91-0047-G	Boynton Public Works Authority	Muskogee	$50,000.00	2/8/1994	Emergency
FAP-92-0038-G	Muskogee County Rural Water District #6	Muskogee	$25,000.00	4/12/1994	Emergency
ORF-94-0011-CW	Muskogee Municipal Authority	Muskogee	$2,479,230.64	7/12/1994	CWSRF
ORF-94-0011-L	Muskogee Municipal Authority	Muskogee	$4,390,000.00	7/12/1994	FA Loan
FAP-94-0042-L	Porum Public Works Authority	Muskogee	$350,000.00	11/1/1994	FA Loan
FAP-96-0077-R	Town of Braggs	Muskogee	$36,995.00	1/14/1997	REAP
ORF-96-0017-CW	Muskogee Municipal Authority	Muskogee	$14,112,000.00	2/11/1997	CWSRF
FAP-97-0021-R	East Central Oklahoma Water Authority	Muskogee	$59,700.00	3/11/1997	REAP
FAP-96-0051-L	Warner Utilities Authority	Muskogee	$435,000.00	4/8/1997	FA Loan
FAP-97-0064-R	Muskogee County Rural Water District #3	Muskogee	$65,800.00	5/13/1997	REAP
FAP-95-0064-L	Muskogee County Rural Water District #1	Muskogee	$430,000.00	8/12/1997	FA Loan
FAP-96-0045-G	East Central Oklahoma Water Authority	Muskogee	$97,750.00	4/14/1998	Emergency
ORF-97-0011-CW	Fort Gibson Utilities Authority	Muskogee	$445,100.00	5/12/1998	CWSRF
ORF-98-0004-L	Muskogee Municipal Authority	Muskogee	$5,850,000.00	6/9/1998	FA Loan
ORF-98-0004-CW	Muskogee Municipal Authority	Muskogee	$3,480,000.00	6/9/1998	CWSRF
FAP-98-0049-G	Town of Council Hill	Muskogee	$100,000.00	3/9/1999	Emergency
ORF-99-0007-CW	Muskogee Municipal Authority	Muskogee	$1,970,765.66	6/8/1999	CWSRF
ORF-99-0007-L	Muskogee Municipal Authority	Muskogee	$3,335,000.00	6/8/1999	FA Loan
ORF-96-0022-CW	Warner Utilities Authority	Muskogee	$258,000.00	8/10/1999	CWSRF
ORF-99-0015-CW	Haskell Public Works Authority	Muskogee	$320,000.00	12/14/1999	CWSRF
ORF-99-0017-CW	Fort Gibson Utilities Authority	Muskogee	$710,000.00	3/14/2000	CWSRF
FAP-98-0014-R	Muskogee County Rural Water District #3	Muskogee	$91,992.00	6/13/2000	REAP
FAP-00-0006-G	Warner Utilities Authority	Muskogee	$45,000.00	6/13/2000	Emergency
FAP-00-0060-R	Muskogee County Rural Water District #11	Muskogee	$150,000.00	12/12/2000	REAP
FAP-00-0032-G	Boynton Public Works Authority	Muskogee	$81,591.00	1/9/2001	Emergency
FAP-01-0075-R	Muskogee County Rural Water District #14	Muskogee	$150,000.00	8/31/2001	REAP
FAP-02-0001-G	Muskogee County Rural Water District #3	Muskogee	$91,035.00	3/12/2002	Emergency
FAP-02-0058-R	Muskogee County Rural Water District #10	Muskogee	$99,999.00	4/8/2003	REAP
FAP-02-0011-L	Muskogee County Rural Water District #5	Muskogee	$1,390,000.00	5/13/2003	FA Loan
FAP-03-0005-L	Muskogee Municipal Authority	Muskogee	$4,575,000.00	6/10/2003	FA Loan
FAP-02-0011-G	Muskogee County Rural Water District #5	Muskogee	$100,000.00	6/8/2004	Emergency
FAP-04-0064-R	Town of Taft	Muskogee	$99,557.68	1/11/2005	REAP

ORF-08-0007-DW	Muskogee Municipal Authority	Muskogee	$30,410,000.00	7/8/2008	DWSRF
ORF-09-0020-CW	Muskogee Municipal Authority	Muskogee	$1,435,000.00	8/11/2009	CWSRF
FAP-10-0001-G	Town of Boynton	Muskogee	$13,607.53	3/9/2010	Emergency
FAP-05-0023-R	Muskogee County Rural Water District #3	Muskogee	$99,999.00	6/8/2010	REAP
ORF-11-0004-CW	Fort Gibson Utilities Authority	Muskogee	$980,000.00	4/12/2011	CWSRF
ORF-11-0008-CW	Muskogee Municipal Authority	Muskogee	$12,775,000.00	8/9/2011	CWSRF
ORF-14-0012-CW	Muskogee Municipal Authority	Muskogee	$7,300,000.00	12/17/2013	CWSRF
FAP-14-0012-R	Porum Public Works Authority	Muskogee	$0.00	12/16/2014	REAP
ORF-17-0008-CW	Porum Public Works Authority	Muskogee	$780,000.00	9/20/2016	CWSRF
ORF-17-0014-CW	Muskogee Municipal Authority	Muskogee	$110,000.00	2/21/2017	CWSRF
ORF-17-0019-CW	Muskogee Municipal Authority	Muskogee	$27,360,000.00	4/18/2017	CWSRF
FAP-17-0008-L	Muskogee County Rural Water District #3	Muskogee	$1,595,000.00	5/16/2017	FA Loan
ORF-18-0016-CW	Porum Public Works Authority	Muskogee	$496,117.00	11/1/2017	CWSRF
ORF-18-0016-CW	Porum Public Works Authority	Muskogee	$496,117.00	11/1/2017	CWSRF
FAP-17-0047-R	East Central Oklahoma Water Authority	Muskogee	$0.00	8/21/2018	REAP
ORF-18-0012-DW	Muskogee Municipal Authority	Muskogee	$17,640,000.00	10/16/2018	DWSRF
ORF-18-0012-DW	Muskogee Municipal Authority	Muskogee	$17,640,000.00	10/16/2018	DWSRF
FAP-19-0012-R	Porum Public Works Authority	Muskogee	$0.00	6/18/2019	REAP
FAP-19-0009-G	East Central Oklahoma Water Authority	Muskogee	$0.00	8/20/2019	Emergency
ORF-20-0015-DW	East Central Oklahoma Water Authority	Muskogee	$1,000,000.00	8/20/2019	DWSRF
ORF-20-0015-DW	East Central Oklahoma Water Authority	Muskogee	$1,000,000.00	8/20/2019	DWSRF
ORF-20-0011-CW	East Central Oklahoma Water Authority	Muskogee	$36,130.00	12/5/2019	CWSRF
FAP-20-0008-R	Taft Public Works Authority	Muskogee	$0.00	5/19/2020	REAP
FAP-21-0001-G	East Central Oklahoma Water Authority	Muskogee	$0.00	9/15/2020	Emergency
FAP-21-0002-G	Boynton Public Works Authority	Muskogee	$0.00	10/20/2020	Emergency
ORF-21-0016-CW	East Central Oklahoma Water Authority	Muskogee	$439,500.00	5/18/2021	CWSRF
ORF-21-0016-CW	East Central Oklahoma Water Authority	Muskogee	$439,500.00	5/18/2021	CWSRF
FAP-17-0008-L	Muskogee County Rural Water District #3	Muskogee	$1,595,000.00	6/16/2021	Interest Earning
FAP-83-0024-G	Sequoyah County RWS & SWMD #4	Sequoyah	$86,000.00	1/10/1984	Emergency
FAP-83-0008-G	Town of Marble City	Sequoyah	$100,000.00	2/14/1984	Emergency
FAP-84-0043-G	Town of Muldrow	Sequoyah	$77,200.00	4/10/1984	Emergency
FAP-84-0067-G	Sequoyah County Rural Water District #3	Sequoyah	$18,000.00	8/14/1984	Emergency

FAP-84-0090-G	Town of Gans	Sequoyah	$100,000.00	5/14/1985	Emergency
FAP-89-0071-G	Utility Service Authority	Sequoyah	$20,097.00	1/9/1990	Emergency
FAP-86-0050-G	Sequoyah County Rural Water District #5	Sequoyah	$75,000.00	5/8/1990	Emergency
FAP-91-0069-G	Sequoyah County RWSG & SWMD #7	Sequoyah	$30,000.00	12/8/1992	Emergency
FAP-95-0001-G	Roland Utility Authority	Sequoyah	$75,000.00	5/14/1996	Emergency
FAP-95-0053-L	Roland Utility Authority	Sequoyah	$4,890,000.00	4/8/1997	FA Loan
FAP-98-0013-R	Sequoyah County Rural Water District #5	Sequoyah	$99,883.00	1/12/1999	REAP
FAP-99-0081-R	Vian	Sequoyah	$59,500.00	11/16/1999	REAP
FAP-99-0083-R	Sequoyah County Rural Water District #8	Sequoyah	$138,500.00	2/8/2000	REAP
ORF-98-0017-CW	Vian Public Works Authority	Sequoyah	$1,100,000.00	2/8/2000	CWSRF
FAP-01-0005-R	Gore Public Works Authority	Sequoyah	$60,000.00	11/13/2001	REAP
FAP-02-0025-G	Sequoyah County Rural Water District #5	Sequoyah	$49,384.91	11/12/2002	Emergency
FAP-97-0089-R	Vian Public Works Authority	Sequoyah	$150,000.00	6/10/2003	REAP
FAP-02-0064-R	Town of Gans	Sequoyah	$110,000.00	4/16/2006	REAP
FAP-07-0006-G	Vian Public Works Authority	Sequoyah	$75,000.00	1/8/2008	Emergency
ORF-08-0003-CW	Roland Utility Authority	Sequoyah	$3,855,000.00	6/10/2008	CWSRF
ORF-09-0034-DW	Sallisaw Municipal Authority	Sequoyah	$5,360,000.00	11/10/2009	DWSRF
FAP-10-0004-R	Vian Public Works Authority	Sequoyah	$99,999.00	2/8/2011	REAP
FAP-01-0067-R	Sequoyah County Rural Water District #5	Sequoyah	$80,000.00	7/12/2011	REAP
ORF-11-0007-CW	Muldrow Public Works Authority	Sequoyah	$3,705,000.00	9/13/2011	CWSRF
FAP-12-0001-L	Roland Utility Authority	Sequoyah	$3,360,000.00	2/13/2012	FA Loan
ORF-11-0006-CW	Vian Public Works Authority	Sequoyah	$1,655,000.00	2/13/2012	CWSRF
FAP-03-0003-R	Sequoyah County RWS & SWMD #4	Sequoyah	$99,950.00	3/13/2012	REAP
ORF-16-0003-DW	Gore Public Works Authority	Sequoyah	$885,000.00	10/12/2016	DWSRF
ORF-20-0019-CW	Roland Utility Authority	Sequoyah	$740,000.00	10/15/2019	CWSRF
ORF-20-0021-DW	Roland Utility Authority	Sequoyah	$2,359,000.00	1/21/2020	DWSRF

Permits for Water Rights in the Illinois River Watershed Issued by the OWRB's Water Rights Administration Division in CY 2022

		Permits Issues within the Illinois River Basin for Calendar Year 2021													
				Diversion Point Legal											
Permit #	LAST NAME	FIRST NAME	1/4	1/4	1/4	SECT	TWP	RNG	WATER TYPE	COUNTY	STREAM SYSYTEM	DATE FILED	DATE ISSUED	PURPOSE	AMT (af/yr)
20210011	Keen	Garlin	SW	NE	SE	5	17N	24EI	Surface	Adair		9/27/2021	3/1/2022	Agriculture	5.5

PERMITS FOR WATER RIGHTS ISSUED BY OWRB' S WATER RIGHTS ADMINISTRATION DIVISION

OKLAHOMA CONSERVATION COMMISSION

Program Activities in the Arkansas/Oklahoma Compact Commission Area for the period of October 2022 through September 2023

For over thirty years the Oklahoma Conservation Commission (OCC) has monitored water quality, implemented best management practices, and provided water quality education in the Arkansas/Oklahoma Compact Commission area. Resource protection in the area continues to be a priority which challenges the OCC and partners to bring funding, partnerships, and solutions to the area. Some of the OCC ongoing activities are summarized below.

1) Illinois River Riparian Protection

a) Although the OCC no longer participates in the Conservation Reserve Enhancement Program (CREP), the Farm Services Agency continues landowner payments for easements protecting acres of riparian area in the Illinois River watershed. CREP provides these incentives to farmers and ranchers to remove streamside pasture or cropland from production activities for ten to fifteen years. The annual rental payment they receive for the ten/fifteen-year period is based on the average area rental rate for marginal pastureland.

b) To support the CREP program and enroll landowners who were not CREP eligible, the OCC created long term easements with landowners to exclude their riparian property from production, further lessening the amount of pollution entering the river. Beginning in 2007, OCC began enrolling landowners in 10–15 year agreements and ultimately enrolled 51 landowners and 2,182 acres. Some of those agreements have since been closed, either by reaching the agreement end date or due to enrollment in additional easement programs. Currently 20 participants remain enrolled with 1,093 acres that are protected at an annual cost of $66,601.50.

c) With EPA funding OCC, contracted a study in the Tyner Creek watershed of the Illinois River watershed to determine which would better benefit the area: streambank stabilization or riparian easements. Easements proved to be the better use of funding. OCC originally partnered with the Oklahoma Scenic Rivers Commission (OSRC) in 2007 when OSRC, now part of the Grand River Dam Authority (GRDA), enrolled 414.59 acres in 30-year riparian protection easements. Many of these landowners were ineligible for CREP because they had previously enrolled in 3-5 year riparian protection agreements with local conservation districts as part of a 2000-2005 OCC project. For the 2007 program, OSRC utilized EPA 319 funding from OCC plus funding from the poultry industry to fund this $665,916.70 worth of agreements, the majority of which will be in place until 2037. In partnership with the GRDA the OCC has made an additional $3,600,000 available for long-term riparian easement protection along the Illinois River and in the Grand Lake Watershed, with $500,000 of those dollars added in 2022 to focus on new enrollments in the Illinois River Watershed. These riparian exclusions are funded primarily with U.S. EPA §319 dollars. GRDA also received support from the Oklahoma Office of Secretary of Environment for an additional $584,183 to add to this program. Currently, 1,621.97 acres are enrolled in this program in the Illinois River watershed, with an additional 450.96 acres enrolled in the Grand Lake Watershed. This is an increase from last year's enrollment of 31.79 acres in the Grand Lake Watershed. GRDA is currently enrolling $500,000 worth of agreements in the Illinois River Watershed. Between the two programs, Oklahoma currently has 2,714.97 acres enrolled in long-term riparian protection agreements (Figures 1 and 2).

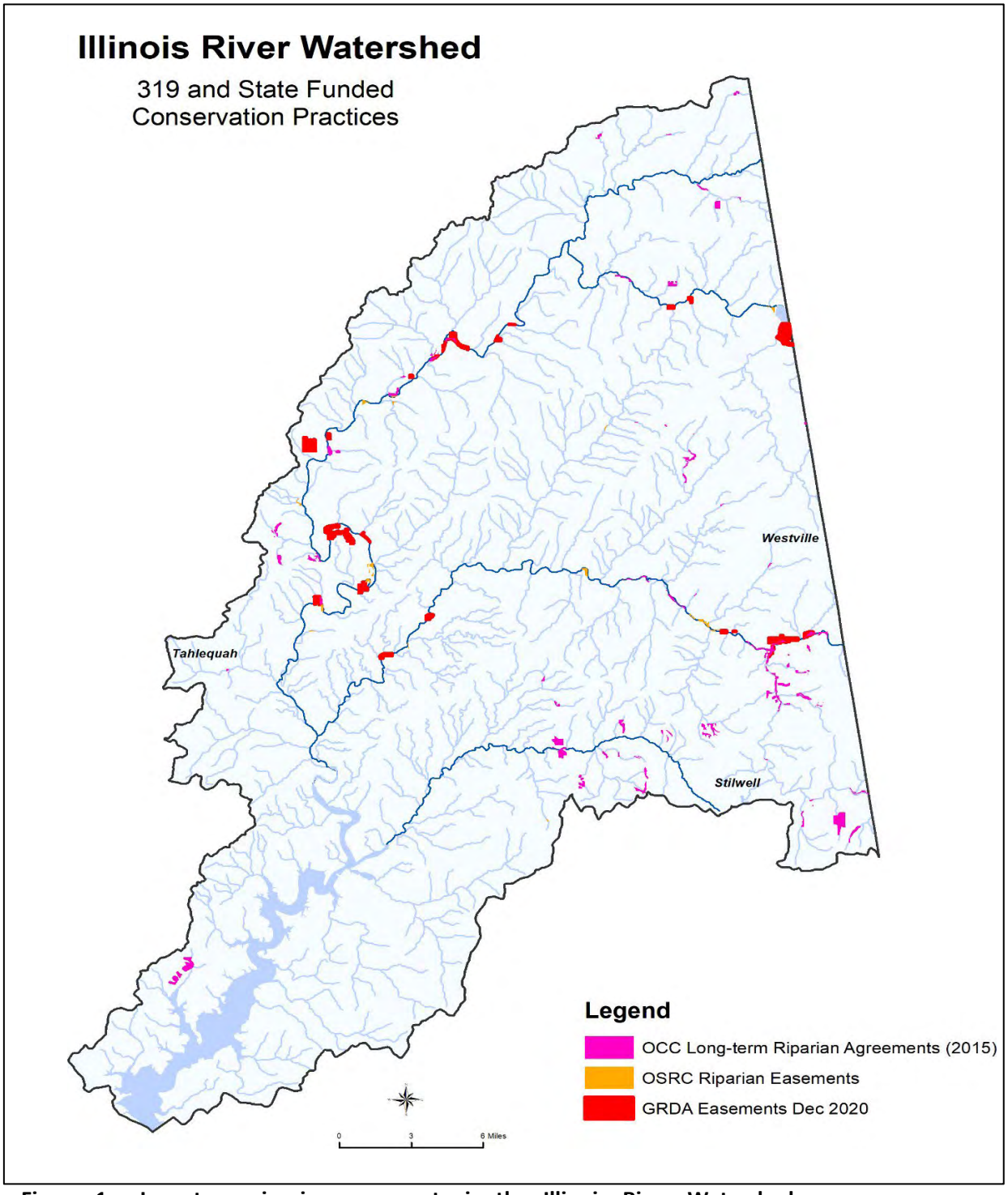


Figure 1. Long-term riparian easements in the Illinois River Watershed.

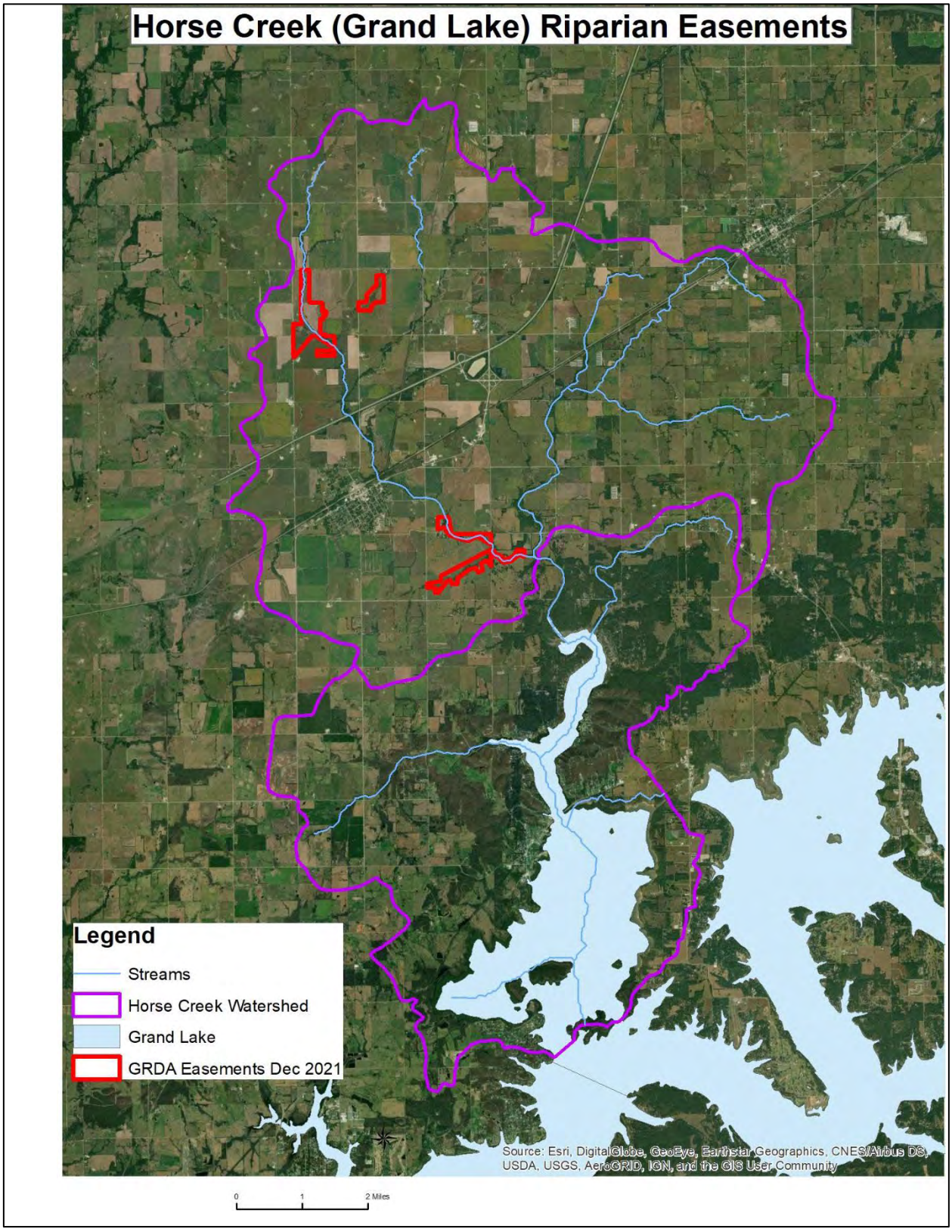
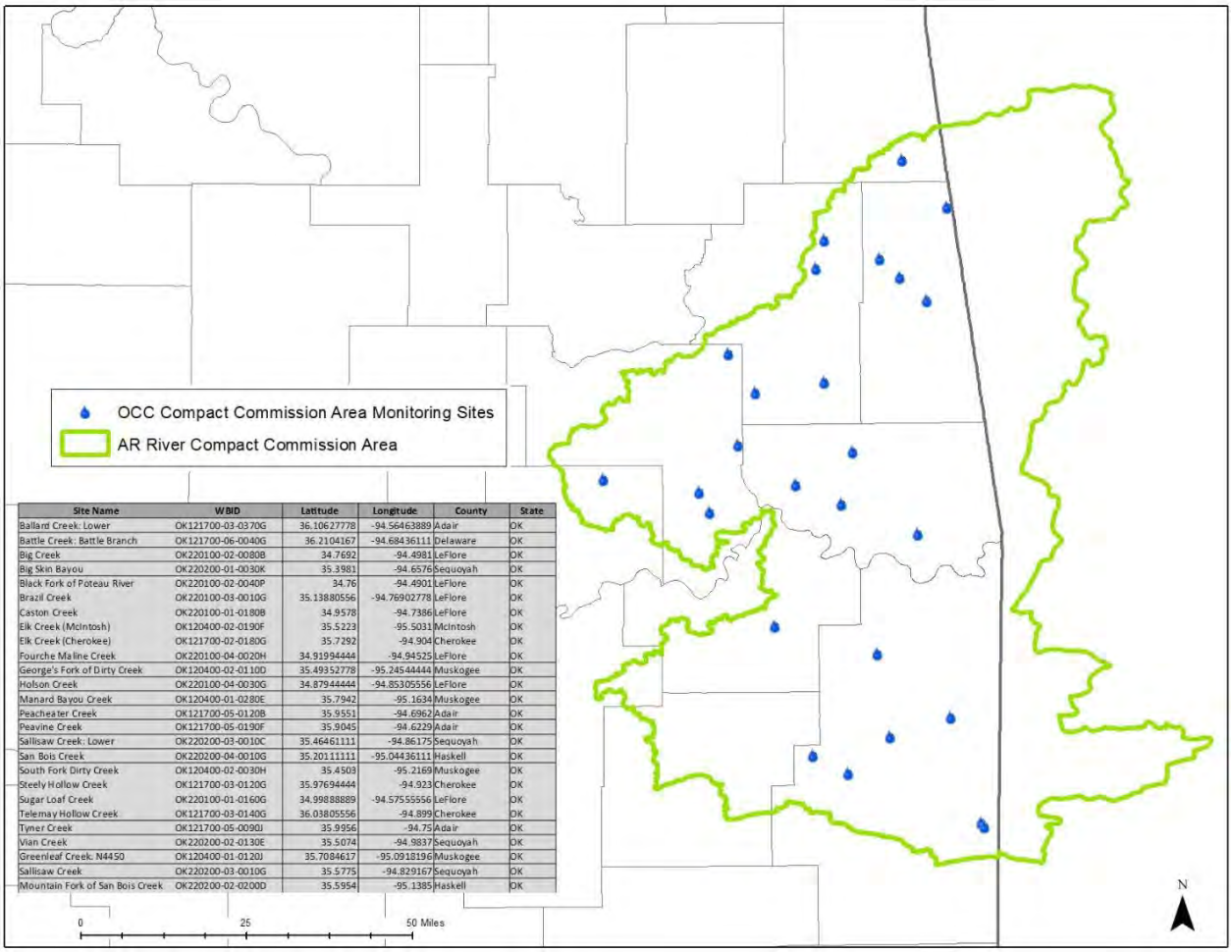


Figure 2. Long-term Easements in the Grand Lake Watershed.

2) Rotating Basin Monitoring Program

OCC currently monitors 26 sites in the compact commission area through the Rotating Basin Monitoring Program (RBMP) including eight sites in the Illinois River Watershed, seven sites in the Poteau River Watershed, six sites in the Robert S. Kerr Watershed, and five sites in the Dirty/Greenleaf Creeks Watershed (Figure 3). Through the RBMP, fish community surveys were completed in the summer of 2023 with assessment of those data pending. Macroinvertebrate collections were made at all sites in the summer of 2023, with additional collections scheduled for the winter of 2024, summer of 2024, and winter of 2025. Water quality monitoring is occurring on roughly pre-scheduled five-week intervals from May 2023 through April 2025. All RBMP sites are selected to represent Hydrologic Units (HUC 11) within planning basins to characterize water quality conditions and relate those conditions to manageable land units. Previous reports will be available at: https://conservation.ok.gov/wq-statewide-rotating-basin- monitoring-program/ under Group 3. Summaries of these monitoring stations from this previous monitoring cycle are included in this report following Figure 3. OCC will continue to evaluate monitoring results and needs in all planning basins and adjust monitoring efforts accordingly.



Site Name	WBID	Latitude	Longitude	County	State
Ballard Creek: Lower	OK121700-03-0370G	36.10627778	-94.56463889	Adair	OK
Battle Creek: Battle Branch	OK121700-06-0040G	36.2104167	-94.68436111	Delaware	OK
Big Creek	OK220100-02-0080B	34.7692	-94.4981	LeFlore	OK
Big Skin Bayou	OK220200-01-0030K	35.3981	-94.6576	Sequoyah	OK
Black Fork of Poteau River	OK220100-02-0040P	34.76	-94.4901	LeFlore	OK
Brazil Creek	OK220100-03-0010G	35.13880556	-94.76902778	LeFlore	OK
Caston Creek	OK220100-01-0180B	34.9578	-94.7386	LeFlore	OK
Elk Creek (McIntosh)	OK120400-02-0190F	35.5223	-95.5031	McIntosh	OK
Elk Creek (Cherokee)	OK121700-02-0180G	35.7292	-94.904	Cherokee	OK
Fourche Maline Creek	OK220100-04-0020H	34.91994444	-94.94525	LeFlore	OK
George's Fork of Dirty Creek	OK120400-02-0110D	35.49352778	-95.24544444	Muskogee	OK
Holson Creek	OK220100-04-0030G	34.87944444	-94.85305556	LeFlore	OK
Manard Bayou Creek	OK120400-01-0280E	35.7942	-95.1634	Muskogee	OK
Peacheater Creek	OK121700-05-0120B	35.9551	-94.6962	Adair	OK
Peavine Creek	OK121700-05-0190F	35.9045	-94.6229	Adair	OK
Sallisaw Creek: Lower	OK220200-03-0010C	35.46461111	-94.86175	Sequoyah	OK
San Bois Creek	OK220200-04-0010G	35.20111111	-95.04436111	Haskell	OK
South Fork Dirty Creek	OK120400-02-0030H	35.4503	-95.2169	Muskogee	OK
Steely Hollow Creek	OK121700-03-0120G	35.97694444	-94.923	Cherokee	OK
Sugar Loaf Creek	OK220100-01-0160G	34.99888889	-94.57555556	LeFlore	OK
Telemay Hollow Creek	OK121700-03-0140G	36.03805556	-94.899	Cherokee	OK
Tyner Creek	OK121700-05-0090J	35.9956	-94.75	Adair	OK
Vian Creek	OK220200-02-0130E	35.5074	-94.9837	Sequoyah	OK
Greenleaf Creek: N4450	OK120400-01-0120J	35.7084617	-95.0918196	Muskogee	OK
Sallisaw Creek	OK220200-03-0010G	35.5775	-94.829167	Sequoyah	OK
Mountain Fork of San Bois Creek	OK220200-02-0200D	35.5954	-95.1385	Haskell	OK

Figure 3. OCC Rotating Basin Monitoring Program Sites in the Compact Commission Area

Ballard Creek

Stream Summary

This leaflet provides an overview of the water quality of Ballard Creek. The data presented were collected between 2018 and 2020.

To evaluate the water quality in streams, Oklahoma Conservation Commission (OCC) collects biological (fish and bugs), chemical (nutrients, salts, and turbidity) and physical (habitat) data in streams across Oklahoma. Each of these measurements are compared to scores from nearby high-quality streams.

Water Chemistry	Fish	Bugs	Habitat	Final	Grade
0.69	**0.86**	**0.76**	**1**	**0.83**	**B**

Each measurement score ranges from 0 (worst) to 1 (best). The water chemistry score is an average of nutrients, salts, pH, oxygen and turbidity measurements. The stream's final grade is an average of all measurements.

A stream's score is affected by activities in the upstream area that drains to the creek, or watershed. OCC interprets monitoring data in order to identify **voluntary** best-management practice (BMP) recommendations for the watershed that can help improve water quality:

- Ballard Creek is not on the 303(d) list of impaired waterbodies for any measurement.
- In our assessment, the bug assemblage was fair, which may be a result of high nutrients, salts and turbidity.
- Turbidity is impacted by sediment introduced to the stream from the watershed.
- Nutrients often enter streams attached to sediment but may also result from over-application of fertilizer and/or high densities of livestock in the watershed.
- BMPs that reduce erosion (e.g., cover crops) and catch sediment before entering the stream (e.g., riparian plantings) can help improve turbidity, nutrients, and potentially bug communities. Alternative water supplies, riparian fencing and nutrient management planning can all also improve nutrients in streams.

For more information about OCC's stream monitoring program visit the OCC website
To learn more about voluntary BMP opportunities contact your local conservation district.

Battle Creek

Stream Summary

This leaflet provides an overview of the water quality of Battle Creek. The data presented were collected between 2018 and 2020.

To evaluate the water quality in streams, Oklahoma Conservation Commission (OCC) collects biological (fish and bugs), chemical (nutrients, salts, and turbidity) and physical (habitat) data in streams across Oklahoma. Each of these measurements are compared to scores from nearby high-quality streams.

Water Chemistry	Fish	Bugs	Habitat	Final	Grade
0.81	**0.98**	**0.9**	**1**	**0.92**	**A**

Each measurement score ranges from 0 (worst) to 1 (best). The water chemistry score is an average of nutrients, salts, pH, oxygen and turbidity measurements. The stream's final grade is an average of all measurements.

A stream's score is affected by activities in the upstream area that drains to the creek, or watershed. OCC interprets monitoring data in order to identify **voluntary** best-management practice (BMP) recommendations for the watershed that can help improve water quality:

- Battle Creek is not on the 303(d) list of impaired waterbodies for any measurement.
- In our assessment, both fish and bug assemblages were in good condition, but nutrient concentrations were high.
- Nutrients may result from over-application of fertilizer and/or high densities of livestock in the watershed.
- Alternative water supplies, riparian planting, and riparian fencing, as well as nutrient management planning can all improve nutrients in streams.

For more information about OCC's stream monitoring program visit the OCC website
To learn more about voluntary BMP opportunities contact your local conservation district.

Big Creek

Stream Summary

This leaflet provides an overview of the water quality of Big Creek. The data presented were collected between 2018 and 2020.

To evaluate the water quality in streams, Oklahoma Conservation Commission (OCC) collects biological (fish and bugs), chemical (nutrients, salts, and turbidity) and physical (habitat) data in streams across Oklahoma. Each of these measurements are compared to scores from nearby high-quality streams.

Water Chemistry	Fish	Bugs	Habitat	Final	Grade
0.94	**0.96**	**0.88**	**1**	**0.95**	**A**

Each measurement score ranges from 0 (worst) to 1 (best). The water chemistry score is an average of nutrients, salts, pH, oxygen and turbidity measurements. The stream's final grade is an average of all measurements.

A stream's score is affected by activities in the upstream area that drains to the creek, or watershed. OCC interprets monitoring data in order to identify **voluntary** best-management practice (BMP) recommendations for the watershed that can help improve water quality:

- Big Creek is on the 303(d) list of impaired waterbodies for bugs and pH.
- In our assessment, both fish and bug assemblages were in good condition, and were supported by good habitat and generally good water chemistry.
- Current bug community data indicates that the impairment may be improving, but more samples are needed to remove Big Creek from the impaired waterbody list.
- Low pH may be associated with acid rain from upwind industrial exhaust or drainage from upstream industrial or mining activities. However, in the Arkansas Valley some streams have naturally low pH as a result of regional geology.

For more information about OCC's stream monitoring program visit the OCC website
To learn more about voluntary BMP opportunities contact your local conservation district.

Big Skin Bayou

Stream Summary

This leaflet provides an overview of the water quality of Big Skin Bayou. The data presented were collected between 2018 and 2020.

To evaluate the water quality in streams, Oklahoma Conservation Commission (OCC) collects biological (fish and bugs), chemical (nutrients, salts, and turbidity) and physical (habitat) data in streams across Oklahoma. Each of these measurements are compared to scores from nearby high-quality streams.

Water Chemistry	Fish	Bugs	Habitat	Final	Grade
1	**1**	**0.88**	**1**	**0.97**	**A**

Each measurement score ranges from 0 (worst) to 1 (best). The water chemistry score is an average of nutrients, salts, pH, oxygen and turbidity measurements. The stream's final grade is an average of all measurements.

A stream's score is affected by activities in the upstream area that drains to the creek, or watershed. OCC interprets monitoring data in order to identify **voluntary** best-management practice (BMP) recommendations for the watershed that can help improve water quality:

- Big Skin Bayou is not on the 303(d) list of impaired waterbodies for any measurement.
- In our assessment, both fish and bug assemblages were in good condition, and were supported by good habitat and good water chemistry.

For more information about OCC's stream monitoring program visit the OCC website
To learn more about voluntary BMP opportunities contact your local conservation district.

Black Fork of the Poteau

Stream Summary

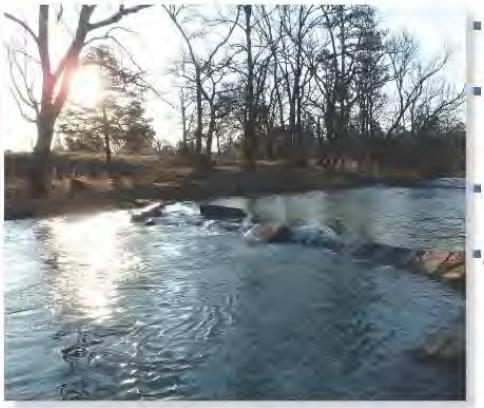
This leaflet provides an overview of the water quality of Black Fork of the Poteau River. The data presented were collected between 2018 and 2020.

To evaluate the water quality in streams, Oklahoma Conservation Commission (OCC) collects biological (fish and bugs), chemical (nutrients, salts, and turbidity) and physical (habitat) data in streams across Oklahoma. Each of these measurements are compared to scores from nearby high-quality streams.

Water Chemistry	Fish	Bugs	Habitat	Final	Grade
0.94	**0.95**	**0.92**	**1**	**0.95**	**A**

Each measurement score ranges from 0 (worst) to 1 (best). The water chemistry score is an average of nutrients, salts, pH, oxygen and turbidity measurements. The stream's final grade is an average of all measurements.

A stream's score is affected by activities in the upstream area that drains to the creek, or watershed. OCC interprets monitoring data in order to identify **voluntary** best-management practice (BMP) recommendations for the watershed that can help improve water quality:



- Black Fork of the Poteau River is on the 303(d) list of impaired water bodies for pH.
- In our assessment, the fish and bug assemblages were in good condition, which was supported by good habitat and water chemistry.
- In the Arkansas Valley, some streams have naturally low pH as a result of regional geology.
- Alternatively, low pH may be associated with acid rain from upwind industrial exhaust or drainage from upstream industrial or mining activities.

For more information about OCC's stream monitoring program visit the OCC website
To learn more about voluntary BMP opportunities contact your local conservation district.

Brazil Creek

Stream Summary

This leaflet provides an overview of the water quality of Brazil Creek. The data presented were collected between 2018 and 2020.

To evaluate the water quality in streams, Oklahoma Conservation Commission (OCC) collects biological (fish and bugs), chemical (nutrients, salts, and turbidity) and physical (habitat) data in streams across Oklahoma. Each of these measurements are compared to scores from nearby high-quality streams.

Water Chemistry	Fish	Bugs	Habitat	Final	Grade
0.94	**1**	**0.98**	**1**	**0.98**	**A**

Each measurement score ranges from 0 (worst) to 1 (best). The water chemistry score is an average of nutrients, salts, pH, oxygen and turbidity measurements. The stream's final grade is an average of all measurements.

A stream's score is affected by activities in the upstream area that drains to the creek, or watershed. OCC interprets monitoring data in order to identify **voluntary** best-management practice (BMP) recommendations for the watershed that can help improve water quality:

- Brazil Creek is not on the 303(d) list of impaired water bodies for any measurement.
- In our assessment, the fish and bug assemblages were in good condition, which were supported by good habitat and water chemistry.

For more information about OCC's stream monitoring program visit the OCC website
To learn more about voluntary BMP opportunities contact your local conservation district.

Caston Creek

Stream Summary

This leaflet provides an overview of the water quality of Caston Creek. The data presented were collected between 2018 and 2020.

To evaluate the water quality in streams, Oklahoma Conservation Commission (OCC) collects biological (fish and bugs), chemical (nutrients, salts, and turbidity) and physical (habitat) data in streams across Oklahoma. Each of these measurements are compared to scores from nearby high-quality streams.

Water Chemistry	Fish	Bugs	Habitat	Final	Grade
0.94	**1**	**1**	**1**	**0.98**	**A**

Each measurement score ranges from 0 (worst) to 1 (best). The water chemistry score is an average of nutrients, salts, pH, oxygen and turbidity measurements. The stream's final grade is an average of all measurements.

A stream's score is affected by activities in the upstream area that drains to the creek, or watershed. OCC interprets monitoring data in order to identify **voluntary** best-management practice (BMP) recommendations for the watershed that can help improve water quality:

- Caston Creek is not on the 303(d) list of impaired water bodies for any measurement.
- In our assessment, fish and bug assemblages were in good condition, which was supported by good habitat and good water quality.

For more information about OCC's stream monitoring program visit the OCC website
To learn more about voluntary BMP opportunities contact your local conservation district.

Elk Creek

Stream Summary

This leaflet provides an overview of the water quality of Elk Creek. The data presented were collected between 2018 and 2020.

To evaluate the water quality in streams, Oklahoma Conservation Commission (OCC) collects biological (fish and bugs), chemical (nutrients, salts, and turbidity) and physical (habitat) data in streams across Oklahoma. Each of these measurements are compared to scores from nearby high-quality streams.

Water Chemistry	Fish	Bugs	Habitat	Final	Grade
0.88	**0.77**	**0.78**	**1**	**0.86**	**B**

Each measurement score ranges from 0 (worst) to 1 (best). The water chemistry score is an average of nutrients, salts, pH, oxygen and turbidity measurements. The stream's final grade is an average of all measurements.

A stream's score is affected by activities in the upstream area that drains to the creek, or watershed. OCC interprets monitoring data in order to identify **voluntary** best-management practice (BMP) recommendations for the watershed that can help improve water quality:

- Elk Creek is on the 303(d) list of impaired water bodies for dissolved oxygen (DO).
- In our assessment, the fish and bug assemblages were fair, which may be a result of excess nutrients and low DO.
- DO impairments are often a result of excess nutrients in the stream and may result in the death of aquatic organisms.
- Nutrients may result from over-application of fertilizer and/or high densities of livestock in the watershed.
- Alternative water supplies, riparian planting, riparian fencing and nutrient management planning can all improve nutrients, DO and potentially biological communities.

For more information about OCC's stream monitoring program visit the OCC website
To learn more about voluntary BMP opportunities contact your local conservation district.

Elk Creek

Stream Summary

This leaflet provides an overview of the water quality of Elk Creek. The data presented were collected between 2018 and 2020.

To evaluate the water quality in streams, Oklahoma Conservation Commission (OCC) collects biological (fish and bugs), chemical (nutrients, salts, and turbidity) and physical (habitat) data in streams across Oklahoma. Each of these measurements are compared to scores from nearby high-quality streams.

Water Chemistry	Fish	Bugs	Habitat	Final	Grade
0.56	**1**	**0.74**	**0.7**	**0.75**	**C**

Each measurement score ranges from 0 (worst) to 1 (best). The water chemistry score is an average of nutrients, salts, pH, oxygen and turbidity measurements. The stream's final grade is an average of all measurements.

A stream's score is affected by activities in the upstream area that drains to the creek, or watershed. OCC interprets monitoring data in order to identify **voluntary** best-management practice (BMP) recommendations for the watershed that can help improve water quality:

- Elk Creek is not on the 303(d) list of impaired water bodies for any measurement.
- In our assessment, the bug assemblage was fair, which may be a result of marginal habitat, as well as degraded water quality. Nutrients and salts were elevated and pH was low.
- Nutrients may result from over-application of fertilizer and/or high densities of livestock in the watershed.
- Alternative water supplies, riparian planting, riparian fencing and nutrient management planning can all also improve nutrients in streams, and potentially bug communities.
- Low pH may be associated with acid rain from upwind industrial exhaust or drainage from upstream industrial or mining activities.

For more information about OCC's stream monitoring program visit the OCC website
To learn more about voluntary BMP opportunities contact your local conservation district.

Fourche Maline Creek

Stream Summary

This leaflet provides an overview of the water quality of Fourche Maline Creek. The data presented were collected between 2018 and 2020.

To evaluate the water quality in streams, Oklahoma Conservation Commission (OCC) collects biological (fish and bugs), chemical (nutrients, salts, and turbidity) and physical (habitat) data in streams across Oklahoma. Each of these measurements are compared to scores from nearby high-quality streams.

Water Chemistry	Fish	Bugs	Habitat	Final	Grade
0.75	**1**	**0.88**	**0.9**	**0.88**	**B**

Each measurement score ranges from 0 (worst) to 1 (best). The water chemistry score is an average of nutrients, salts, pH, oxygen and turbidity measurements. The stream's final grade is an average of all measurements.

A stream's score is affected by activities in the upstream area that drains to the creek, or watershed. OCC interprets monitoring data in order to identify **voluntary** best-management practice (BMP) recommendations for the watershed that can help improve water quality:

- Fourche Maline Creek is on the 303(d) list of impaired water bodies for dissolved oxygen (DO) and pH.
- In our assessment, the fish and bug assemblages were good, despite high nutrients and low DO values.
- DO impairments are often a result of excess nutrients in the stream and may result in the death of aquatic organisms.
- Nutrients may result from over-application of fertilizer and/or high densities of livestock in the watershed.
- Alternative water supplies, riparian planting, riparian fencing and nutrient management planning can all improve nutrients and DO.
- Low pH may be associated with acid rain from upwind industrial exhaust or drainage from upstream industrial or mining activities.

For more information about OCC's stream monitoring program visit the OCC website
To learn more about voluntary BMP opportunities contact your local conservation district.

George's Fork of Dirty Creek

Stream Summary

This leaflet provides an overview of the water quality of George's Fork of Dirty Creek. The data presented were collected between 2018 and 2020.

To evaluate the water quality in streams, Oklahoma Conservation Commission (OCC) collects biological (fish and bugs), chemical (nutrients, salts, and turbidity) and physical (habitat) data in streams across Oklahoma. Each of these measurements are compared to scores from nearby high-quality streams.

Water Chemistry	Fish	Bugs	Habitat	Final	Grade
0.75	**1**	**0.83**	**0.7**	**0.82**	**B**

Each measurement score ranges from 0 (worst) to 1 (best). The water chemistry score is an average of nutrients, salts, pH, oxygen and turbidity measurements. The stream's final grade is an average of all measurements.

A stream's score is affected by activities in the upstream area that drains to the creek, or watershed. OCC interprets monitoring data in order to identify **voluntary** best-management practice (BMP) recommendations for the watershed that can help improve water quality:

- George's Fork is on the 303(d) list of impaired waterbodies for dissolved oxygen (DO).
- In our assessment, fish and bug assemblages were both good, despite fair habitat and low DO levels.
- DO impairments are often a result of excess nutrients in the stream and may result in the death of aquatic organisms.
- Nutrients may enter streams as a result of over-application of fertilizer and/or high densities of livestock in the watershed.
- Alternative water supplies, riparian plantings, riparian fencing and nutrient management planning can all improve nutrients in streams, and potentially DO levels.

For more information about OCC's stream monitoring program visit the OCC website
To learn more about voluntary BMP opportunities contact your local conservation district.

Greenleaf Creek

Stream Summary

This leaflet provides an overview of the water quality of Greenleaf Creek. The data presented were collected between 2018 and 2020.

To evaluate the water quality in streams, Oklahoma Conservation Commission (OCC) collects biological (fish and bugs), chemical (nutrients, salts, and turbidity) and physical (habitat) data in streams across Oklahoma. Each of these measurements are compared to scores from nearby high-quality streams.

Water Chemistry	Fish	Bugs	Habitat	Final	Grade
0.94	**0.94**	**0.74**	**1**	**0.9**	**A**

Each measurement score ranges from 0 (worst) to 1 (best). The water chemistry score is an average of nutrients, salts, pH, oxygen and turbidity measurements. The stream's final grade is an average of all measurements.

A stream's score is affected by activities in the upstream area that drains to the creek, or watershed. OCC interprets monitoring data in order to identify **voluntary** best-management practice (BMP) recommendations for the watershed that can help improve water quality:

- Greenleaf Creek is on the 303(d) list of impaired water bodies for bugs
- In our assessment, bug assemblages were fair.
- Fair bug scores, along with good water chemistry and habitat, indicate previous impairments may be improving, but more samples are needed to remove Greenleaf Creek from the impaired water body list.

For more information about OCC's stream monitoring program visit the OCC website
To learn more about voluntary BMP opportunities contact your local conservation district.

Holson Creek

Stream Summary

This leaflet provides an overview of the water quality of Holson Creek. The data presented were collected between 2018 and 2020.

To evaluate the water quality in streams, Oklahoma Conservation Commission (OCC) collects biological (fish and bugs), chemical (nutrients, salts, and turbidity) and physical (habitat) data in streams across Oklahoma. Each of these measurements are compared to scores from nearby high-quality streams.

Water Chemistry	Fish	Bugs	Habitat	Final	Grade
0.88	**1**	**0.65**	**1**	**0.88**	**B**

Each measurement score ranges from 0 (worst) to 1 (best). The water chemistry score is an average of nutrients, salts, pH, oxygen and turbidity measurements. The stream's final grade is an average of all measurements.

A stream's score is affected by activities in the upstream area that drains to the creek, or watershed. OCC interprets monitoring data in order to identify **voluntary** best-management practice (BMP) recommendations for the watershed that can help improve water quality:

- Holson Creek is on the 303(d) list of impaired water bodies for pH.
- In our assessment, the bug assemblage was fair which may be impacted by low pH and high turbidity.
- Turbidity is impacted by sediment introduced to the stream from the watershed.
- BMPs that reduce erosion (e.g., cover crops), or catch sediment before entering the stream (e.g., riparian plantings) can help improve instream turbidity and potentially bug communities.
- Low pH may be associated with acid rain from upwind industrial exhaust or drainage from upstream industrial or mining activities.

For more information about OCC's stream monitoring program visit the OCC website
To learn more about voluntary BMP opportunities contact your local conservation district.

Manard Bayou

Stream Summary

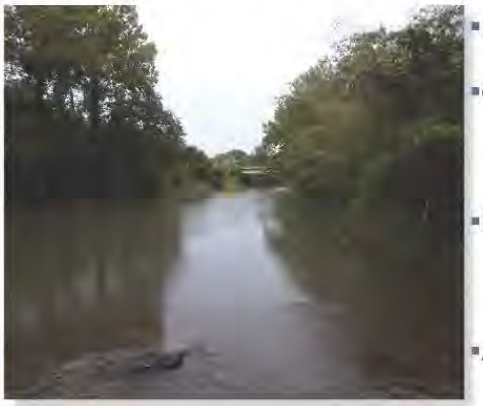
This leaflet provides an overview of the water quality of Manard Bayou The data presented were collected between 2018 and 2020.

To evaluate the water quality in streams, Oklahoma Conservation Commission (OCC) collects biological (fish and bugs), chemical (nutrients, salts, and turbidity) and physical (habitat) data in streams across Oklahoma. Each of these measurements are compared to scores from nearby high-quality streams.

Water Chemistry	Fish	Bugs	Habitat	Final	Grade
0.75	**1**	**0.87**	**0.9**	**0.88**	**B**

Each measurement score ranges from 0 (worst) to 1 (best). The water chemistry score is an average of nutrients, salts, pH, oxygen and turbidity measurements. The stream's final grade is an average of all measurements.

A stream's score is affected by activities in the upstream area that drains to the creek, or watershed. OCC interprets monitoring data in order to identify **voluntary** best-management practice (BMP) recommendations for the watershed that can help improve water quality:



- Manard Bayou is on the 303(d) list of impaired water bodies for bugs.
- Current bug community data indicates that the impairment may be improving, but more samples are needed to remove Manard Bayou from the impaired waterbody list.
- In our assessment nutrient concentrations were elevated, which may result from over-application of fertilizer and/or high densities of livestock in the watershed.
- Alternative water supplies, riparian planting, and riparian fencing, as well as nutrient management planning can all improve nutrients in streams.

For more information about OCC's stream monitoring program visit the OCC website
To learn more about voluntary BMP opportunities contact your local conservation district.

Peacheater Creek

Stream Summary

This leaflet provides an overview of the water quality of Peacheater Creek. The data presented were collected between 2018 and 2020.

To evaluate the water quality in streams, Oklahoma Conservation Commission (OCC) collects biological (fish and bugs), chemical (nutrients, salts, and turbidity) and physical (habitat) data in streams across Oklahoma. Each of these measurements are compared to scores from nearby high-quality streams.

Water Chemistry	Fish	Bugs	Habitat	Final	Grade
1	**0.98**	**0.77**	**1**	**0.94**	**A**

Each measurement score ranges from 0 (worst) to 1 (best). The water chemistry score is an average of nutrients, salts, pH, oxygen and turbidity measurements. The stream's final grade is an average of all measurements.

A stream's score is affected by activities in the upstream area that drains to the creek, or watershed. OCC interprets monitoring data in order to identify **voluntary** best-management practice (BMP) recommendations for the watershed that can help improve water quality:

- Peacheater Creek is not on the 303(d) list of impaired water bodies for any measurement
- In our assessment the fish assemblage was good and the bug assemblage was fair. Water quality and habitat were both good.

For more information about OCC's stream monitoring program visit the OCC website
To learn more about voluntary BMP opportunities contact your local conservation district.

Peavine Creek

Stream Summary

This leaflet provides an overview of the water quality of Peavine Creek. The data presented were collected between 2018 and 2020.

To evaluate the water quality in streams, Oklahoma Conservation Commission (OCC) collects biological (fish and bugs), chemical (nutrients, salts, and turbidity) and physical (habitat) data in streams across Oklahoma. Each of these measurements are compared to scores from nearby high-quality streams.

Water Chemistry	Fish	Bugs	Habitat	Final	Grade
0.94	**0.92**	**0.82**	**1**	**0.92**	**A**

Each measurement score ranges from 0 (worst) to 1 (best). The water chemistry score is an average of nutrients, salts, pH, oxygen and turbidity measurements. The stream's final grade is an average of all measurements.

A stream's score is affected by activities in the upstream area that drains to the creek, or watershed. OCC interprets monitoring data in order to identify **voluntary** best-management practice (BMP) recommendations for the watershed that can help improve water quality:

- Peavine Creek is not on the 303(d) list of impaired water bodies for any measurement
- In our assessment the fish and bug assemblages were both good, which were supported by good water quality and habitat.

For more information about OCC's stream monitoring program visit the OCC website
To learn more about voluntary BMP opportunities contact your local conservation district.

Sallisaw Creek

Stream Summary

This leaflet provides an overview of the water quality of Sallisaw Creek. The data presented were collected between 2018 and 2020.

To evaluate the water quality in streams, Oklahoma Conservation Commission (OCC) collects biological (fish and bugs), chemical (nutrients, salts, and turbidity) and physical (habitat) data in streams across Oklahoma. Each of these measurements are compared to scores from nearby high-quality streams.

Water Chemistry	Fish	Bugs	Habitat	Final	Grade
0.88	**0.8**	**0.94**	**1**	**0.9**	**A**

Each measurement score ranges from 0 (worst) to 1 (best). The water chemistry score is an average of nutrients, salts, pH, oxygen and turbidity measurements. The stream's final grade is an average of all measurements.

A stream's score is affected by activities in the upstream area that drains to the creek, or watershed. OCC interprets monitoring data in order to identify **voluntary** best-management practice (BMP) recommendations for the watershed that can help improve water quality:

- The portion of Sallisaw Creek that OCC monitors is not on the 303(d) list of impaired water bodies for any measurement
- In our assessment both fish and bug assemblages were good, which was supported by good habitat and good water chemistry.

For more information about OCC's stream monitoring program visit the OCC website
To learn more about voluntary BMP opportunities contact your local conservation district.

San Bois Creek

Stream Summary

This leaflet provides an overview of the water quality of San Bois Creek. The data presented were collected between 2018 and 2020.

To evaluate the water quality in streams, Oklahoma Conservation Commission (OCC) collects biological (fish and bugs), chemical (nutrients, salts, and turbidity) and physical (habitat) data in streams across Oklahoma. Each of these measurements are compared to scores from nearby high-quality streams.

Water Chemistry	Fish	Bugs	Habitat	Final	Grade
0.62	**0.93**	**1**	**1**	**0.89**	**B**

Each measurement score ranges from 0 (worst) to 1 (best). The water chemistry score is an average of nutrients, salts, pH, oxygen and turbidity measurements. The stream's final grade is an average of all measurements.

A stream's score is affected by activities in the upstream area that drains to the creek, or watershed. OCC interprets monitoring data in order to identify **voluntary** best-management practice (BMP) recommendations for the watershed that can help improve water quality:

- San Bois Creek is on the 303(d) list of impaired water bodies for sulfate.
- In our assessment both fish and bug assemblages were good, despite fair water chemistry.
- Nutrient and turbidity concentrations were elevated and dissolved oxygen (DO) was low.
- Turbidity is impacted by sediment introduced to the stream from the watershed.
- Nutrients often enter streams attached to sediment but may also result from over-application of fertilizer and/or high densities of livestock in the watershed.
- Low DO is often a result of excess nutrients in the stream and may result in the death of aquatic organisms.
- BMPs that reduce erosion (e.g., cover crops) and catch sediment before entering the stream (e.g., riparian plantings) can help improve turbidity, nutrients, and potentially DO. Alternative water supplies, riparian fencing and nutrient management planning can all also improve nutrients in streams.

For more information about OCC's stream monitoring program visit the OCC website
To learn more about voluntary BMP opportunities contact your local conservation district.

South Fork Dirty Creek

Stream Summary

This leaflet provides an overview of the water quality of South Fork Dirty Creek. The data presented were collected between 2018 and 2020.

To evaluate the water quality in streams, Oklahoma Conservation Commission (OCC) collects biological (fish and bugs), chemical (nutrients, salts, and turbidity) and physical (habitat) data in streams across Oklahoma. Each of these measurements are compared to scores from nearby high-quality streams.

Water Chemistry	Fish	Bugs	Habitat	Final	Grade
0.81	**0.93**	**0.87**	**0.8**	**0.85**	**B**

Each measurement score ranges from 0 (worst) to 1 (best). The water chemistry score is an average of nutrients, salts, pH, oxygen and turbidity measurements. The stream's final grade is an average of all measurements.

A stream's score is affected by activities in the upstream area that drains to the creek, or watershed. OCC interprets monitoring data in order to identify **voluntary** best-management practice (BMP) recommendations for the watershed that can help improve water quality:

- South Fork Dirty Creek is on the 303(d) list of impaired water bodies for bugs, dissolved oxygen (DO) and salts (sulfate).
- Current bug community data indicates that the impairment may be improving, but more samples are needed to remove South Fork Dirty Creek from the impaired waterbody list.
- In our assessment, DO remained low, which is often caused by elevated nutrients, and may result in the death of aquatic organisms.
- Nutrients may enter streams as a result of over-application of fertilizer and/or high densities of livestock in the watershed.
- Alternative water supplies, riparian plantings, riparian fencing and nutrient management planning can all improve nutrients in streams, and potentially DO levels.

For more information about OCC's stream monitoring program visit the OCC website
To learn more about voluntary BMP opportunities contact your local conservation district.

Steely Hollow Creek

Stream Summary

This leaflet provides an overview of the water quality of Steely Hollow Creek. The data presented were collected between 2018 and 2020.

To evaluate the water quality in streams, Oklahoma Conservation Commission (OCC) collects biological (fish and bugs), chemical (nutrients, salts, and turbidity) and physical (habitat) data in streams across Oklahoma. Each of these measurements are compared to scores from nearby high-quality streams.

Water Chemistry	Fish	Bugs	Habitat	Final	Grade
1	**0.92**	**0.94**	**1**	**0.97**	**A**

Each measurement score ranges from 0 (worst) to 1 (best). The water chemistry score is an average of nutrients, salts, pH, oxygen and turbidity measurements. The stream's final grade is an average of all measurements.

A stream's score is affected by activities in the upstream area that drains to the creek, or watershed. OCC interprets monitoring data in order to identify **voluntary** best-management practice (BMP) recommendations for the watershed that can help improve water quality:

- Steely Hollow Creek is not on the 303(d) list of impaired waterbodies for any measurement.
- In our assessment, both fish and bug assemblages were in good condition, and were supported by good habitat and good water chemistry.

For more information about OCC's stream monitoring program visit the OCC website
To learn more about voluntary BMP opportunities contact your local conservation district.

Sugar Loaf Creek

Stream Summary

This leaflet provides an overview of the water quality of Sugar Loaf Creek. The data presented were collected between 2018 and 2020.

To evaluate the water quality in streams, Oklahoma Conservation Commission (OCC) collects biological (fish and bugs), chemical (nutrients, salts, and turbidity) and physical (habitat) data in streams across Oklahoma. Each of these measurements are compared to scores from nearby high-quality streams.

Water Chemistry	Fish	Bugs	Habitat	Final	Grade
0.88	**1**	**1**	**0.9**	**0.94**	**A**

Each measurement score ranges from 0 (worst) to 1 (best). The water chemistry score is an average of nutrients, salts, pH, oxygen and turbidity measurements. The stream's final grade is an average of all measurements.

A stream's score is affected by activities in the upstream area that drains to the creek, or watershed. OCC interprets monitoring data in order to identify **voluntary** best-management practice (BMP) recommendations for the watershed that can help improve water quality:

- Sugar Loaf Creek is on the 303(d) list of impaired waterbodies for dissolved oxygen (DO) and pH.
- In our assessment, both fish and bug assemblages were in good condition, and were supported by good habitat and generally good water chemistry, though nutrient concentrations were somewhat elevated and DO was low.
- DO impairments are often a result of excess nutrients in the stream and may result in the death of aquatic organisms.
- Nutrients may enter streams as a result of over-application of fertilizer and/or high densities of livestock in the watershed.
- Alternative water supplies, riparian plantings, riparian fencing and nutrient management planning can all improve nutrients in streams, and potentially DO levels.
- Low pH may be associated with acid rain from upwind industrial exhaust or drainage from upstream industrial or mining activities.

For more information about OCC's stream monitoring program visit the OCC website
To learn more about voluntary BMP opportunities contact your local conservation district.

Telemay Hollow Creek

Stream Summary

This leaflet provides an overview of the water quality of Telemay Hollow Creek. The data presented were collected between 2018 and 2020.

To evaluate the water quality in streams, Oklahoma Conservation Commission (OCC) collects biological (fish and bugs), chemical (nutrients, salts, and turbidity) and physical (habitat) data in streams across Oklahoma. Each of these measurements are compared to scores from nearby high-quality streams.

Water Chemistry	Fish	Bugs	Habitat	Final	Grade
0.81	**0.59**	**0.58**	**0.9**	**0.72**	**C**

Each measurement score ranges from 0 (worst) to 1 (best). The water chemistry score is an average of nutrients, salts, pH, oxygen and turbidity measurements. The stream's final grade is an average of all measurements.

A stream's score is affected by activities in the upstream area that drains to the creek, or watershed. OCC interprets monitoring data in order to identify **voluntary** best-management practice (BMP) recommendations for the watershed that can help improve water quality:

- Telemay Hollow is not on the 303(d) list of impaired water bodies for any metric.
- In our assessment, the fish and bug assemblages were poor despite good habitat and good water chemistry. The vast majority of the watershed is minimally altered by human activities.
- Though turbidity and salt concentrations were slightly elevated, it is possible that the poor biotic communities resulted from the relatively small size of the stream.
- Small streams often support different biotic communities than larger streams.

For more information about OCC's stream monitoring program visit the OCC website
To learn more about voluntary BMP opportunities contact your local conservation district.

Tyner Creek

Stream Summary

This leaflet provides an overview of the water quality of Tyner Creek. The data presented were collected between 2018 and 2020.

To evaluate the water quality in streams, Oklahoma Conservation Commission (OCC) collects biological (fish and bugs), chemical (nutrients, salts, and turbidity) and physical (habitat) data in streams across Oklahoma. Each of these measurements are compared to scores from nearby high-quality streams.

Water Chemistry	Fish	Bugs	Habitat	Final	Grade
1	**0.92**	**0.79**	**1**	**0.93**	**A**

Each measurement score ranges from 0 (worst) to 1 (best). The water chemistry score is an average of nutrients, salts, pH, oxygen and turbidity measurements. The stream's final grade is an average of all measurements.

A stream's score is affected by activities in the upstream area that drains to the creek, or watershed. OCC interprets monitoring data in order to identify **voluntary** best-management practice (BMP) recommendations for the watershed that can help improve water quality:

- Tyner Creek is on the 303(d) list of impaired water bodies for dissolved oxygen (DO).
- In our assessment, the fish assemblage was good and the bug assemblage was fair. Tyner creek had good water chemistry and good habitat.
- DO impairments are often a result of excess nutrients in the stream and may result in the death of aquatic organisms.
- Nutrients may enter streams as a result of over-application of fertilizer and/or high densities of livestock in the watershed.
- Alternative water supplies, riparian plantings, riparian fencing and nutrient management planning can all improve nutrients in streams, and potentially DO levels.

For more information about OCC's stream monitoring program visit the OCC website
To learn more about voluntary BMP opportunities contact your local conservation district.

Vian Creek

Stream Summary

This leaflet provides an overview of the water quality of Vian Creek. The data presented were collected between 2018 and 2020.

To evaluate the water quality in streams, Oklahoma Conservation Commission (OCC) collects biological (fish and bugs), chemical (nutrients, salts, and turbidity) and physical (habitat) data in streams across Oklahoma. Each of these measurements are compared to scores from nearby high-quality streams.

Water Chemistry	Fish	Bugs	Habitat	Final	Grade
1	**0.8**	**0.87**	**1**	**0.92**	**A**

Each measurement score ranges from 0 (worst) to 1 (best). The water chemistry score is an average of nutrients, salts, pH, oxygen and turbidity measurements. The stream's final grade is an average of all measurements.

A stream's score is affected by activities in the upstream area that drains to the creek, or watershed. OCC interprets monitoring data in order to identify **voluntary** best-management practice (BMP) recommendations for the watershed that can help improve water quality:

- Vian Creek is not on the 303(d) list of impaired waterbodies for any measurement.
- In our assessment, both fish and bug assemblages were in good condition, and were supported by good habitat and good water chemistry.

For more information about OCC's stream monitoring program visit the OCC website
To learn more about voluntary BMP opportunities contact your local conservation district.

Battle Creek

Stream Summary

This leaflet provides an overview of the water quality of Battle Creek. The data presented were collected between 2018 and 2020.

To evaluate the water quality in streams, Oklahoma Conservation Commission (OCC) collects biological (fish and bugs), chemical (nutrients, salts, and turbidity) and physical (habitat) data in streams across Oklahoma. Each of these measurements are compared to scores from nearby high-quality streams.

Water Chemistry	Fish	Bugs	Habitat	Final	Grade
0.81	**0.98**	**0.9**	**1**	**0.92**	**A**

Each measurement score ranges from 0 (worst) to 1 (best). The water chemistry score is an average of nutrients, salts, pH, oxygen and turbidity measurements. The stream's final grade is an average of all measurements.

A stream's score is affected by activities in the upstream area that drains to the creek, or watershed. OCC interprets monitoring data in order to identify **voluntary** best-management practice (BMP) recommendations for the watershed that can help improve water quality:

- Battle Creek is not on the 303(d) list of impaired waterbodies for any measurement.
- In our assessment, both fish and bug assemblages were in good condition, but nutrient concentrations were high.
- Nutrients may result from over-application of fertilizer and/or high densities of livestock in the watershed.
- Alternative water supplies, riparian planting, and riparian fencing, as well as nutrient management planning can all improve nutrients in streams.

For more information about OCC's stream monitoring program visit the OCC website
To learn more about voluntary BMP opportunities contact your local conservation district.

3) Blue Thumb Monitoring and Education

The OCC's Blue Thumb program supports volunteer scientists who monitor streams in the Compact Commission area. We currently support active monitoring at two stream sites in the Illinois River Watershed and two sites in the Poteau River Watershed. Volunteers collect observational and chemical data approximately monthly. Macroinvertebrate collections are completed twice a year. Habitat assessments and fish collections are completed once every four to five years. The biological data (macroinvertebrates and fish) are submitted to the State of Oklahoma Integrated Report. The chemical data are used for education and screening purposes. Summaries of data reports written by volunteers about sites in the Compact Commission area can be found by clicking on monitoring sites on the interactive map at https://www.bluethumbok.com/volunteer-written-data-interpretations.html.

For several years, Blue Thumb has partnered with the Grand River Dam Authority (GRDA) to offer Riverology 101, a workshop for teachers focusing on the Illinois River and Grand Lake watersheds. In 2023, the workshop was updated to Riverology 201 to engage teachers who had already participated in a Riverology 101 workshop, as well as teachers new to the program. Riverology 201 was held in July of 2023.

Early in 2020, Blue Thumb began a partnership with the Illinois River Watershed Partnership (IRWP) to support monitoring and facilitate educational events in the Oklahoma portion of the Illinois River watershed. The sampling locations include 12 sites on tributaries to the Illinois River that were selected by the IRWP to be analogous to monitoring stations previously sampled on the Arkansas side of the state line. At each site in the Oklahoma portion of the watershed, Blue Thumb and IRWP staff complete a macroinvertebrate collection with onsite identification to order, water quality sampling and a rapid habitat assessment. Monitoring occurs three times a year. In 2022, IRWP monitored in the Arkansas portion of the watershed. In 2023, IRWP and BT are working together to monitor in the Oklahoma portion of the watershed.

Riverology 201 Workshop, July 2023

IRWP monitoring effort, April 2023

Finally, in partnership with the Oklahoma Association of Conservation Districts and Friends of Blue Thumb and the OCC Soil Health Program, Blue Thumb is assisting conservation districts in supporting sustainable landscaping in suburban and urban areas. The Yard by Yard Program includes Cherokee County, Delaware County and LeFlore County Conservation Districts in the Compact Commission area. More information about Yard by Yard can be found at: https://www.okconservation.org/yardbyyard and https://youtu.be/kuGgIS03GoI, as well as on Facebook under Yard by Yard: Community Resiliency Project.

4) Oklahoma/Arkansas Memorandum of Agreement

In November 2018, Oklahoma and Arkansas officials signed an agreement to continue working toward water quality improvement in the Illinois River Watershed, focusing on data and information sharing, monitoring and assessment, and implementation of strategies to continue nutrient reductions in the watershed. The OCC has been participating in agency coordination meetings to recruit stakeholders, agree upon a strategy and more fully develop a schedule to move this agreement forward. States continue to work on this agreement, with steps being taken to update watershed planning on both sides of the state line.

An important component of this agreement is to cooperate with Arkansas and the Cherokee Nation to develop a watershed implementation plan (WIP) for the watershed.

One component of this WIP is for the states to update their NPS WBPs for the watershed. To support this update, Oklahoma has contracted with Texas A&M University, developers of the Soil and Water Assessment Tool (SWAT) model, to develop a SWAT model for the watershed. This SWAT model will be housed in the Hydrologic and Water Quality System (HAWQs) online water quality system to support updates, transparency, data sharing, and use of the ultimate tool. Texas A&M will complete a hydrologically and chemically calibrated SWAT model for the Illinois River which utilizes the same sub-basin and calibration points utilized in the EPA Hydrological Simulation Program- Fortran (HSPF) model. The WIP subcommittee have agreed to a timeline to follow up model development in Arkansas and Oklahoma with public meetings beginning in Fall of 2022 to finalize updates to the WBPs. Public meetings supported by the Cherokee Nation, Arkansas Department of Agriculture Division of Natural Resources, Oklahoma Conservation Commission and partners were held in 2023 and included a stakeholder discussion of best management practices for both urban and rural environments, as well as modeler reviews of Oklahoma and Arkansas SWAT preliminary results.

5. Hydrologic and Water Quality Systems (HAWQS) Modeling for Oklahoma

HAWQS is a web-based, interactive water quantity and quality model that was originally developed for EPA by Texas A&M. HAWQS is currently available nationwide, calibrated to the HUC 8 watershed level (https://www.epa.gov/waterdata/hawqs-hydrologic-and-water-quality-system and https://hawqs.tamu.edu/#/). However, since many efforts in watershed and project planning are done at the smaller HUC 12 watershed scale, Texas A&M has been working with partnering states to further develop HAWQS to that finer topographic scale. Therefore, also in partnership with OSU and Texas A&M, the OCC is developing a statewide HAWQS model for Oklahoma, calibrated hydrologically and chemically to the HUC12 level, statewide. Therefore, in addition to the Illinois River Watershed SWAT model, baseline SWAT models will be available for all HUC 12 watersheds in the compact commission area. Anticipated completion of this product is October 2023.

In the compact commission area and in addition to the baseline SWAT model for the Illinois River described earlier which will tie into the EPA model, this effort will also produce a baseline SWAT model for the Wister watershed that will tie into a lake model developed for the Poteau Valley Improvement Authority. These efforts will assist with further developments of the Wister Lake Watershed Based Plan.

The OK HAWQS system will be updated to include simplified simulations of conservation practice installation scenarios. This automation should help ensure that the use of SWAT to predict load reductions resulting from theoretical conservation practice installations will be standardized.

The added benefit of the HAWQs system is that the model is stored in the cloud and freely accessible online. Updated climate, soils, land use, and even water quality data is

automatically linked to the baseline models developed through the system. These data updates, sharing and online storage will make it much simpler to update and re-use historically developed watershed models to evaluate changes over time in watersheds and will support additional watershed plan development statewide.

6) Neighborhood Solutions to Natural Resource Concerns Regional Conservation Partnership Program (RCPP): Neighbors Helping Neighbors Project

The OCC, GRDA, Cherokee Nation, and poultry integrators are partnering with the Natural Resources Conservation Service (NRCS) to help address some challenges created by the recent evolutions of the poultry industry in eastern Oklahoma. OCC and GRDA received an RCPP grant from NRCS to work with poultry growers and their neighbors to design and install conservation practice systems and other solutions to noise, dust, odor, and water quality concerns voiced by neighbors of poultry producers. This program is active along the entire eastern border of Oklahoma (Figure 3) and includes most of the compact commission area in Oklahoma. This program is supported by at least $2,010,000 in funding from the NRCS, OCC (state and EPA CWA §319 funding), GRDA, the Cherokee Nation, and poultry integrators (Simmons, Tysons, and Okay Foods). The intent of the program is to convene small working groups of growers and their neighbors to identify, clarify, and prioritize challenges of living next door to a large animal production operation. Experts from NRCS, OCC, GRDA, Cooperative Extension, the Oklahoma Water Resources Board, Oklahoma Department of Agriculture, Food and Forestry, county commissioners, and other available specialties and programs will then consider the challenges and recommend potential solutions to be funded using a combination of available state and federal resources. Virtual meetings were held in Fall of 2021 and site visits for potential cooperators began in 2022. The program had initial signups for enrollment in Fall of 2023. Contracts and conservation planning are currently underway on at least one demonstration farm in LeFlore County which will feature rainwater harvesting to reduce rural water peak demand, improved mortality management, and field borders and buffers. More information about the Neighbors Project can be found at: https://conservation.ok.gov/neighbors-helping-neighbors/.

7) Poultry Litter Transfer Program

The OCC also renewed a poultry litter transfer program in fall of 2021 to support litter transfer from poultry producing watersheds along the eastern Oklahoma border into non-nutrient limited watersheds further west in Oklahoma. This program focuses at least $300,000 in state funding to reduce water quality impacts in high priority watersheds in eastern Oklahoma including portions of the compact commission area. To date, 4,747 tons of litter have been moved through the program, utilizing $36,739 worth of program funding. Litter has been moved primarily from Leflore and Delaware counties, into non-nutrient impaired watersheds in Ottawa, Johnston, and Muskogee counties.

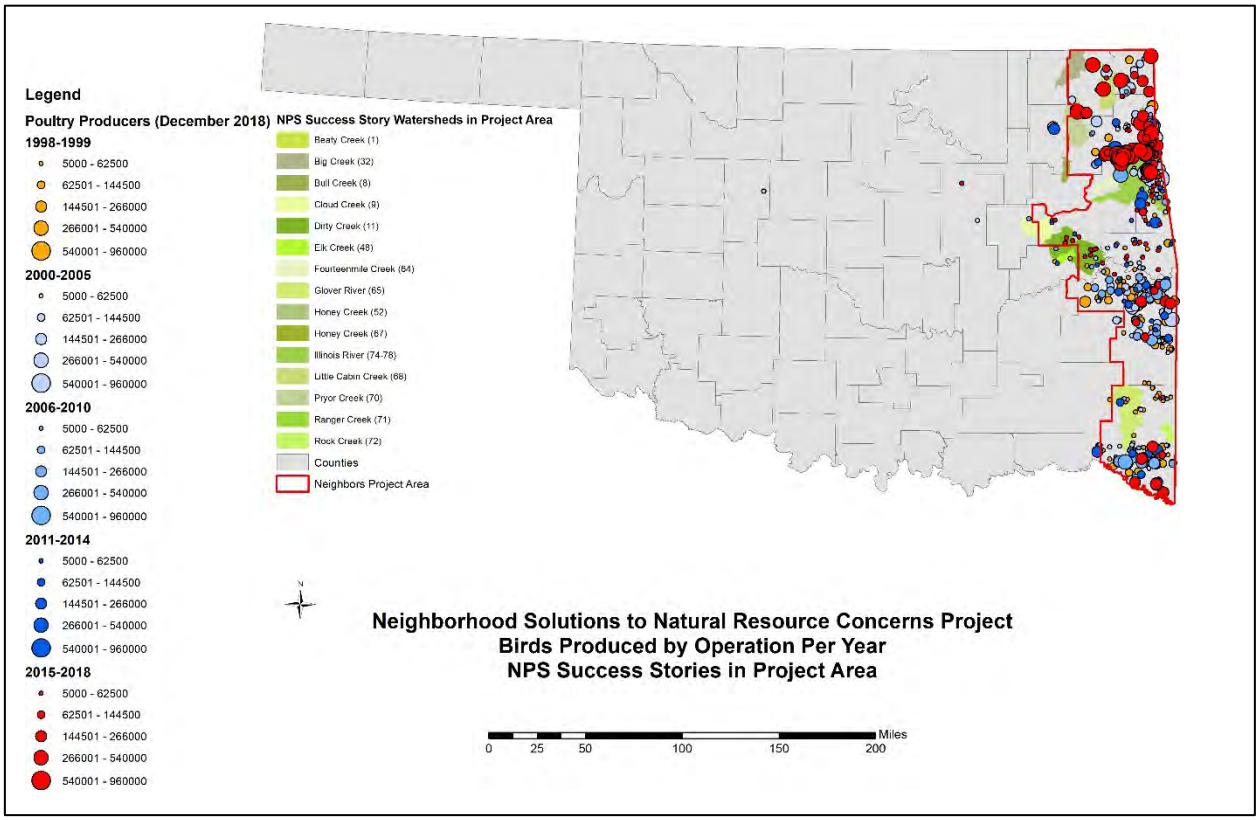


Figure 4. Neighbors Helping Neighbors Project Area.

8) Soil Health Education Program

The OCC partners with NRCS, the Nature Conservancy, the Oklahoma Association of Conservation Districts, the Noble Research Institute, tribes, state and federal agencies, universities, and others to encourage landowners to adopt management strategies to improve soil health. These programs include field days and seminars on grazing management, plant ID, cover crops, and water infiltration; soil health monitoring and assessments associated with various management strategies using a mobile application (WORMS); conservation planning and mentoring to support landowners adopting soil health practices; and conservation practice installation to support soil health.

Recent soil health activities in the Compact Commission area include:

- Soil Health Education for Kids at the Latimer County Fair in Wilburton, OK;
- Producer consultations to design/support soil health conservation practice adoption including soil health assessment and conservation planning in LeFlore county;
- Soil Health Field Day in Cherokee County to focus on Oklahoma Association of Conservation District's Conservation and Agriculture Reach Everybody (CARE) project Champion. (https://www.okconservation.org/care);
- Plant Identification Field day with the Muskogee-Creek Nation to focus on value of non-grass species for livestock forage and soil health improvement

- Presentation at Association of Conservation Districts Area V Meeting;
- Soil Health Presentation at the Green Country Kiko Goat Association Meeting and Sale in Sallisaw, OK and
- OCC's soil health team completed the first two of four economic case studies on the benefits of soil health (https://conservation.ok.gov/wp-content/uploads/2021/10/Herriman-Case-Study_FINAL_072222_WEB-Version-1.pdf and https://conservation.ok.gov/wp-content/uploads/2021/10/Nault-Case-Study_OCC_AFT_Final_072622_WEB-VERSION_updated-MG-number.pdf).

9) Locally-Led Cost-Share Program

Since 1998, the OCC has supported conservation districts and local landowners' efforts to restore, conserve and protect natural resources through the Locally-Led Cost-Share Program (LLCP). The program provides an annual allocation to the nine conservation districts in the compact commission area to support conservation practice installation. Eligible producers are enrolled in the program based on priorities and conservation practice focuses established by the local conservation district. Conservation planning is generally designed and completed by the NRCS, and once practices have been complete and certified as complying with NRCS or other appropriate standards, the conservation district reimburses the cooperator for a portion of the cost of installation (generally between 50 – 75% of actual costs). Conservation Districts, the OCC, and landowners have installed at least $5,725,743 worth of conservation practices since 1998 with $3,152,210 funded by districts and the OCC and $2,573,533 funded by landowners in the Compact Commission area. These conservation practices include brush management, cover crops, fencing, grade stabilization structures, grassed waterways, heavy use protection, herbaceous weed control, nutrient management, channel obstruction removal, pasture and hayland planting, pest management, livestock watering pipeline, ponds and pond cleanouts, livestock watering facilities and livestock wells.

Between September 2022 and August 2023, landowners installed $1,711,929 worth of conservation practices in the compact area funded with $1,169,828 of OCC/district funds and $542,101 landowner funds. These installations included 245 acres of brush management, 213 acres of cover crop, 19,084 linear feet of fencing, 18 heavy use protection areas, 378 acres of herbaceous weed control, 70 acres of pasture and hayland planting, nine pasture taps, 1,241 linear feet of pipeline, ten ponds, 153 pond cleanouts, 16 pumping plants, 28 watering facilities, and 19 livestock wells.

Figure 5. Examples of conservation practices installed in the compact commission area in 2022-2023 include cross fencing (upper left), pond (upper right), livestock watering and heavy use area (lower left), and brush control (lower right).

10) Upstream Flood Control Structure Program

The OCC partners with conservation districts, NRCS, and others to maintain 2,107 upstream flood control dams constructed across Oklahoma through the USDA NRCS Watershed and Flood Prevention Operations Program. This program saves an estimated $96 million in damages associated with flooding by protecting 2,756 county and highway bridges, flood reduction for 41,744 farms and ranches, trapping 19 million tons of sediment, and creating or enhancing 90,979 acres of wetlands each year. Forty-two of these structures were constructed as multipurpose structures, which provide municipal and rural waters supplies and recreation areas.

Fifty-five of these structures are in the compact commission area, including 7 high hazard, 5 significant hazard, and 43 low hazard structures constructed along Sallisaw, Fourche Maline, Caston, and Scraper Hollow creeks (Figure 5). OCC assisted the Adair, Sequoyah, Latimer, and LeFlore county conservation districts throughout 2022 and 2023 with administrative, technical and land rights issues for both rehabilitation and operation and maintenance. Six structures in the compact commission area (Sallisaw 33 and

Sequoyah 36, Fourche Maline 7m, Caston Mountain 1 and 2, and Scraper Hollow 2 are currently in the planning phases for rehabilitation projects.

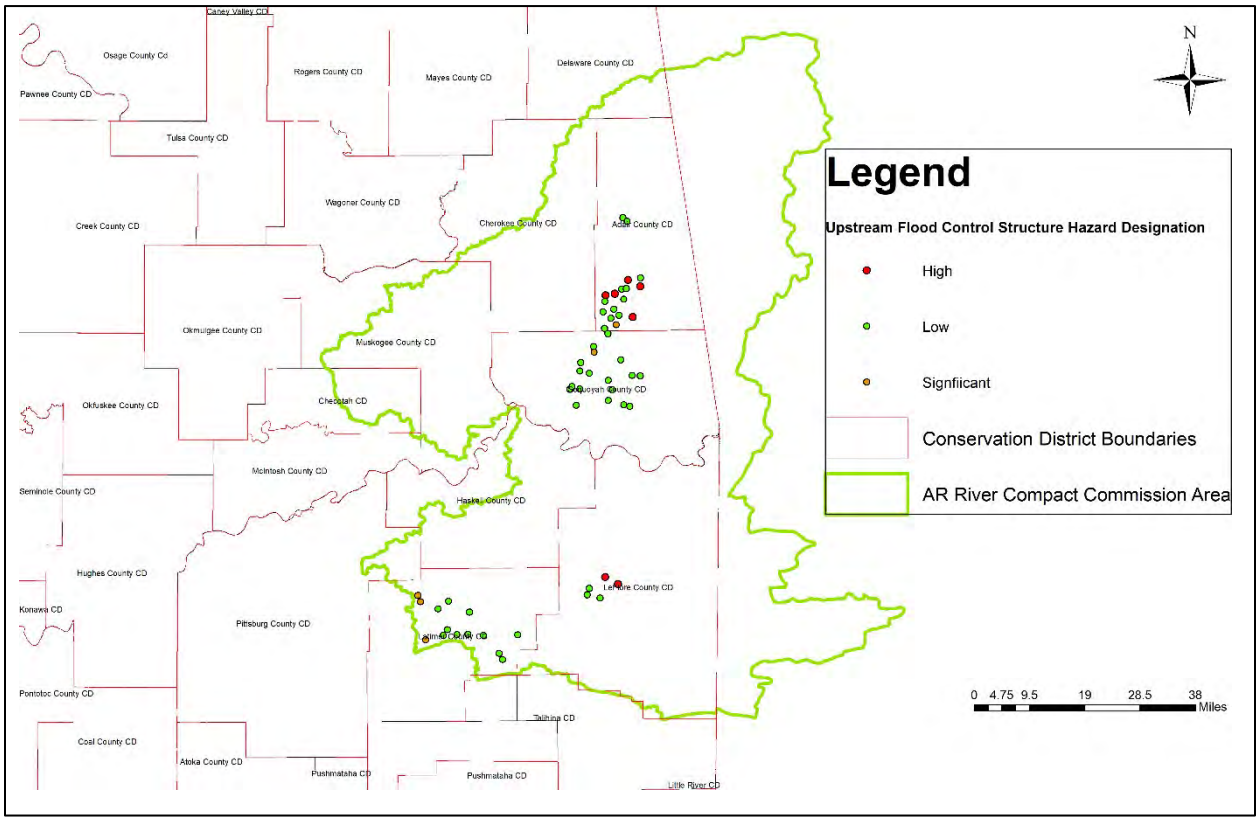


Figure 6. OCC/ Conservation District Maintained Upstream Flood Control Structures in Compact Commission Area.

11) OCC Land Management Program

The OCC Land Management Division is dedicated to assisting landowners across Oklahoma with resource concerns that have an impact on the soil, water, and safety. Division work is focused in three major areas including land restoration, unpaved roads, and conservation and nutrient management planning. This division has roots in OCC's Abandoned Mine Land Program, and the purpose of the land management program is to reclaim abandoned mine lands in Oklahoma by contracting with private entities to perform reclamation work. The Division has completed reclamation work on 63 projects in the Compact Commission Area, which total 2,128 acres of reclaimed land primarily in McIntosh, Sequoyah, Latimer, LeFlore, and Haskell counties. (Figure 7).

The division also manages the State's Unpaved Roads Program. The goal of the unpaved roads program is to fund safe, efficient, and environmentally sound projects for the maintenance of unpaved roads that have been identified as potential contributors to sediment runoff in Oklahoma streams and to provide training on techniques to maintain these roads to minimize negative impacts on air and water quality.

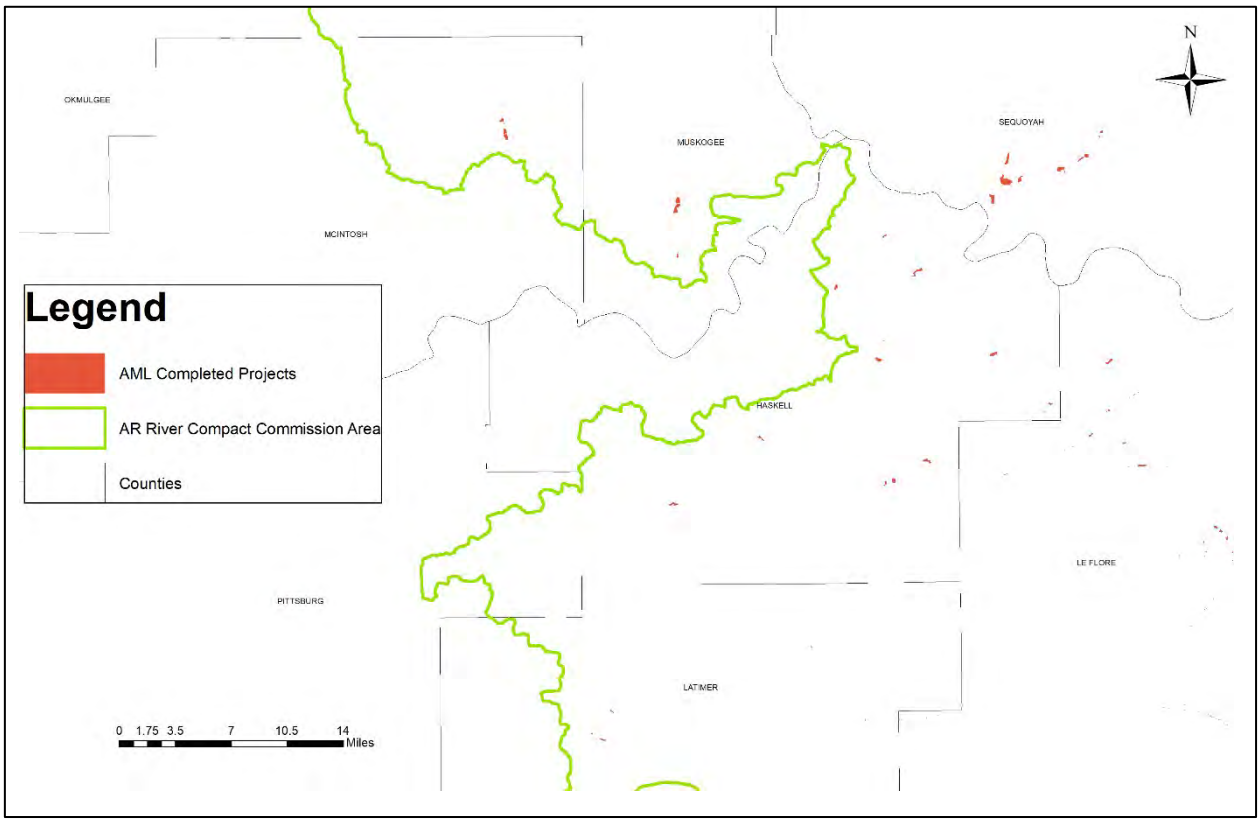


Figure 7. Abandoned mine land projects completed in the compact commission area.

The division assists landowners and conservation districts by providing conservation and nutrient management assistance to all 84 conservation districts to address private landowner concerns related to natural resource concerns. OCC has employed eight new planners (5 conservation planners; 3 nutrient management planners) to provide service to Oklahoma's landowners. These staff develop conservation plans that fund conservation practices through the State Cost-Share Program and provide nutrient management plans to poultry growers. There is one nutrient management planner and one conservation planner (Areas III & V) working with the districts in the Compact Commission Area.

The division is also working to inventory and assess abandoned hardrock (or non-coal) mines across the state in order to prioritize reclamation work. Inventories have been completed in all of the Compact Commission counties. Finally, the Division continues to oversee post construction activities such as vegetation establishment and site monitoring on abandoned coal mine projects including

12) <u>New Spiro Lake and Unpaved Roads Program</u>

OCC has been supporting the town of Spiro since at least 2015 with water quality monitoring in their lake and watershed. The intent of this monitoring is to support long- term efforts to improve and protect water quality in New Spiro Lake. In addition to developing a WBP for the watershed, the OCC plans to complete a prioritization assessment of unpaved roads in the watershed along with a demonstration project to address a significant long-term erosive site on the lakeside road.

The state legislature allocated $400,000 in 2022 to begin a pilot grant program to assist county commissioners with unpaved roads erosion problems. Administered by the Land Management Division, a workshop in September 2022 offered training for county commissioners in Lincoln County about alternative approaches to eroding areas. Additional workshops were held in 2023, and site in Lincoln, Pawnee, Canadian, Pottawatomie, Pontotoc, Logan, Cherokee, and Choctaw counties were repaired through cost-share grants to local county commissioners. The program provided $447, 563 in funds toward $1,076,228 worth of projects in 2022 and 2023. The Oklahoma legislature awarded an additional $600,000 worth of funds to total $1 million for the program, statewide in state FY 24. In addition, OCC will utilize additional funds complete a training and demonstration project in the New Spiro Watershed with LeFlore County Commissioners in 2024.