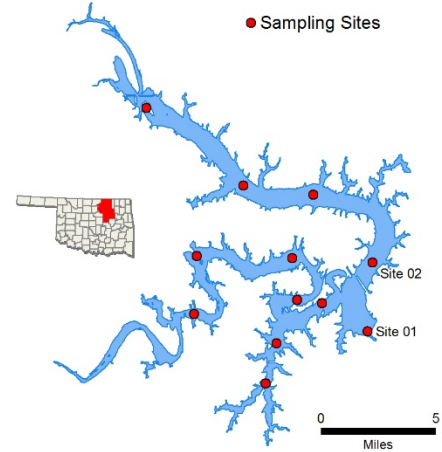


Keystone (1-2)

Sample Period	Times Visited	Sampling Sites
October 2018 – July 2019	4	12

General	Location	Tulsa County
	Impoundment	1964
	Area	23,610 acres
	Capacity	557,600 acre-feet
	Purposes	Flood Control, Water Supply, Hydropower, Navigation, Fish & Wildlife

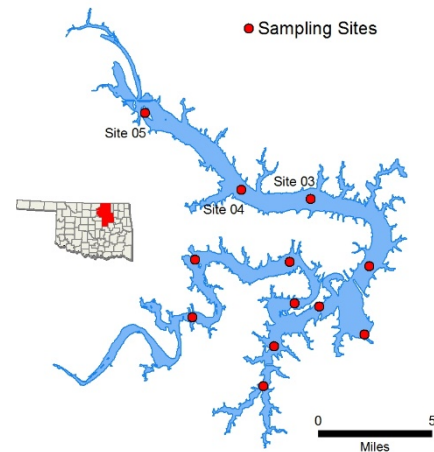


Parameters	In Situ	Parameter (<i>Descriptions</i>)	Result	Notes/Comments
		Average Turbidity	75 NTU	50% of values > OWQS of 25 NTU (n=8)
		Average Secchi Disk Depth	42 cm	
		Water Clarity Rating	Average	
		Chlorophyll-a	14.56 mg/m ³	
		Trophic State Index	57	Previous value = 54
	Trophic Class	Eutrophic		
	Profile	Salinity	0.25 – 1.78 ppt	
		Specific Conductivity	517.5 – 3372.2 μS/cm	
		pH	7.43 – 8.59 pH units	Neutral to slightly alkaline
		Oxidation-Reduction Potential	189.9 – 476.5 mV	
		Dissolved Oxygen	Up to 19% of water column < 2.0 mg/L in July	
	Nutrients	Surface Total Nitrogen	1.02 mg/L to 2.10 mg/L	
		Surface Total Phosphorus	0.120mg/L to 0.390 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	En & E. coli	Chlor-a
	Fish & Wildlife Propagation	NS	S	NEI	NEI							
	Aesthetics					S	N/A					
	Agriculture							S	S	S		
	Primary Body Contact Recreation										NEI	
	Public & Private Water Supply				NEI							
<i>S = Fully Supporting</i> <i>NS = Not Supporting</i> <i>NEI = Not Enough Information</i>		Notes *Standards revision, true color is for permitting purposes only										

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

Keystone, Arkansas River Arm (3-5)



Sample Period	Times Visited	Sampling Sites
October 2018 – July 2019	4	12

General	Location	Tulsa County
	Impoundment	1964
	Area	23,610 acres
	Capacity	557,600 acre-feet
	Purposes	Flood Control, Water Supply, Hydropower, Navigation, Fish & Wildlife

Parameters	In Situ	Parameter (<i>Descriptions</i>)	Result	Notes/Comments
		Average Turbidity	94 NTU	92% of values > OWQS of 25 NTU (n=12)
		Average Secchi Disk Depth	20 cm	
		Water Clarity Rating	Poor	
		Chlorophyll-a	17.17 mg/m ³	
		Trophic State Index	58	Previous value = 64
	Trophic Class	Eutrophic		
	Profile	Salinity	0.28 – 0.71 ppt	
		Specific Conductivity	567.1 – 1413.5 µS/cm	
		pH	7.5 – 8.61 pH units	Neutral to slightly alkaline
		Oxidation-Reduction Potential	244.5 – 421 mV	
		Dissolved Oxygen		
	Nutrients	Surface Total Nitrogen	0.93 mg/L to 2.19 mg/L	
		Surface Total Phosphorus	0.100 mg/L to 0.450 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	En & 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						

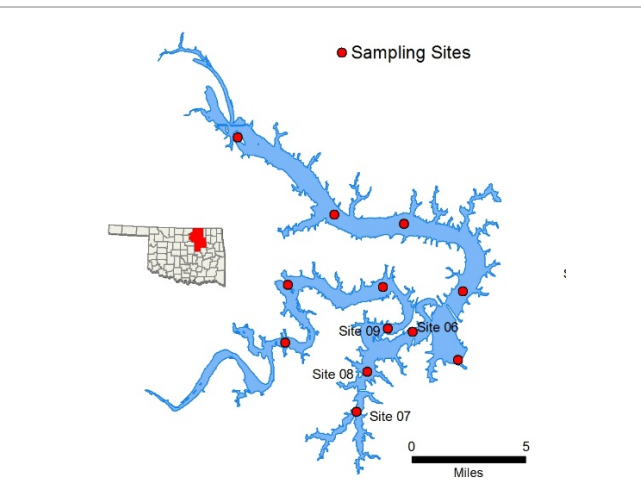
Notes	Standards revision, true color is for permitting purposes only
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NTU = nephelometric turbidity units OWQS = Oklahoma Water Quality Standards mg/L = milligrams per liter ppt = parts per thousand
 µS/cm = microsiemens per centimeter mV = millivolts µS/cm = microsiemens/cm En = Enterococci
 E. coli = Escherichia coli Chlor-a = Chlorophyll-a

Keystone, Lower Cimarron River Arm (6-9)

Sample Period	Times Visited	Sampling Sites
October 2018 – July 2019	4	12

General	Location	Tulsa County
	Impoundment	1964
	Area	23,610 acres
	Capacity	557,600 acre-feet
	Purposes	Flood Control, Water Supply, Hydropower, Navigation, Fish & Wildlife



Parameters	In Situ	Parameter (<i>Descriptions</i>)	Result	Notes/Comments
		Average Turbidity	25 NTU	13% of values > OWQS of 25 NTU (n=16)
		Average Secchi Disk Depth	52 cm	
		Water Clarity Rating	Average	
		Chlorophyll-a	27.6 mg/m ³	
		Trophic State Index	63	Previous value = 60
	Trophic Class	Hypereutrophic		
	Profile	Salinity	0.41 – 2.32 ppt	
		Specific Conductivity	846.4 – 4347.9 µS/cm	
		pH	7.28 – 8.56 pH units	Neutral to slightly alkaline
		Oxidation-Reduction Potential	159.9 – 437.4 mV	
		Dissolved Oxygen	Up to 23% of water column < 2.0 mg/L in July	
	Nutrients	Surface Total Nitrogen	0.81 mg/L to 1.98 mg/L	
		Surface Total Phosphorus	0.100 mg/L to 0.290 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	Enterococci & E. coli	Chlor-a
	Fish & Wildlife Propagation	NS	S	NEI	NEI							
	Aesthetics					S	*					
	Agriculture							S	S	S		
	Primary Body Contact Recreation										NEI	
	Public & Private Water Supply				NEI							
<i>S = Fully Supporting</i> <i>NS = Not Supporting</i> <i>NEI = Not Enough Information</i>		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

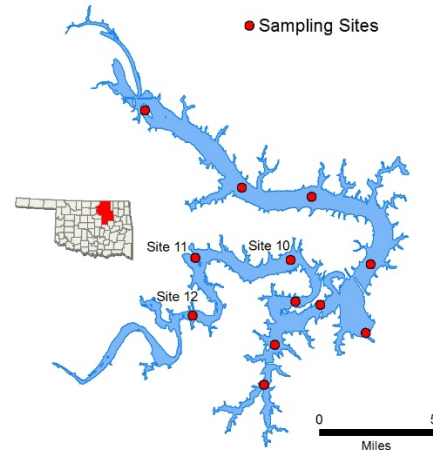
mg/L = milligrams per liter
 µS/cm = microsiemens/cm

ppt = parts per thousand
 En = Enterococci

Keystone, Upper Cimarron River Arm (10-12)

Sample Period	Times Visited	Sampling Sites
October 2018 – July 2019	4	12

General	Location	Tulsa County
	Impoundment	1964
	Area	23,610 acres
	Capacity	557,600 acre-feet
	Purposes	Flood Control, Water Supply, Hydropower, Navigation, Fish & Wildlife



Parameters	In Situ	Parameter (<i>Descriptions</i>)	Result	Notes/Comments
		Average Turbidity	49 NTU	50% of values > OWQS of 25 NTU (n=10)
		Average Secchi Disk Depth	32 cm	
		Water Clarity Rating	Poor	
		Chlorophyll-a	37.17 mg/m ³	
		Trophic State Index	66	Previous value = 67
	Trophic Class	Hypereutrophic		
	Profile	Salinity	0.81 – 3.07 ppt	
		Specific Conductivity	1625.5– 5697.2 µS/cm	
		pH	7.49 – 8.66 pH units	Neutral to slightly alkaline
		Oxidation-Reduction Potential	185.7 – 439.6 mV	
		Dissolved Oxygen	Up to 34% of water column < 2.0 mg/L in July	
	Nutrients	Surface Total Nitrogen	0.81 mg/L to 2.03 mg/L	
		Surface Total Phosphorus	0.140 mg/L to 0.250 mg/L	
		Nitrogen to Phosphorus Ratio	8:1	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	*	NEI							
	Aesthetics					S	*					
	Agriculture							S	S	S		
	Primary Body Contact Recreation										NEI	
	Public & Private Water Supply				NEI							
<i>S = Fully Supporting</i> <i>NS = Not Supporting</i> <i>NEI = Not Enough Information</i>		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