

EXECUTIVE SUMMARY

It is the intent of this Oklahoma Water Resources Board (OWRB) report to advance concepts and principles of the Oklahoma Comprehensive Water Plan (OCWP). Maintained by the OWRB and updated every 10 years, the OCWP serves as Oklahoma's official long-term water planning strategy. Recognizing the essential connection between science and effective public policy, the OCWP incorporates a broad range of water resource development and protection strategies substantiated by hard data and supported by Oklahoma citizens. Consistent with a primary OCWP initiative, this and other OWRB technical studies provide invaluable data crucial to the ongoing management of Oklahoma's water supplies, as well as the future use and protection of the state's water resources. Oklahoma's decision-makers rely on this information to address specific water supply concerns related to quality and infrastructure.

The Beneficial Use Monitoring Program (BUMP) exists because of the vital economic and social importance of Oklahoma's lakes, streams, wetlands, and aquifer systems, and their need for protection and management. The data contained in this report is scientifically defensible and has been collected and analyzed following procedures outlined in Use Support Assessment Protocols (USAP), developed by OWRB with input and concurrence of Oklahoma's other environmental agencies. USAPs establish a consistent method to determine if beneficial uses assigned for individual waters through Oklahoma Water Quality Standards (WQS) are being supported. The OWRB has incorporated the USAP into Oklahoma Administrative Code (OAC) 785:46 to ensure consistent determinations for impairments are made by all agencies conducting monitoring activities. If the BUMP report indicates that a designated beneficial use is impaired, threatened, or otherwise compromised, measures must be taken to mitigate or restore water quality.

To synchronize Oklahoma's water quality monitoring efforts, the State Legislature appropriated funds in 1998 to create the Beneficial Use Monitoring Program (BUMP) under the direction of the Oklahoma Water Resources Board, who promulgates the WQS and WQS Implementation Rules. BUMP brings the OWRB's overall water quality management program full circle, from the promulgation of WQS, to permitting and enforcement of permits stemming from WQS-established criteria, to nonpoint source controls, all agency water quality management activities are intended to work in concert to restore, protect, and maintain designated beneficial uses.

The specific objectives of BUMP are to detect and quantify water quality trends, document and quantify impairments of assigned beneficial uses, and identify pollution problems before they become a pollution crisis. This report interprets current Oklahoma lake data collected as part of the comprehensive, long-term program. As the program has matured, the BUMP report has become one of the most important annually published documents in Oklahoma.

Beneficial Use Monitoring Program Components

Monitoring Rivers & Streams - The OWRB is currently monitoring approximately 84 stations on an 8-week rotation. Fixed station monitoring is based largely upon the 84 planning basins as outlined in the Oklahoma Comprehensive Water Plan (OCWP). In general, at least one sample station is located at the

terminal end of each of the planning basins. The OWRB also conducts on-going special studies as well as 25-30 probabilistic monitoring stations annually.

Fixed Station Load Monitoring – The OWRB is currently working with several partners including the US Geological Survey (USGS), US Army Corps of Engineers (USACE), Grand River Dam Authority (GRDA) and National Weather Service to conduct flow monitoring on all our fixed station sites that are not part of the State of Oklahoma/USGS Cooperative Gaging Network. This cooperative effort will allow for loadings to be calculated, trends to be assessed statewide and provide much needed data for the Use Support Assessment process.

Fixed Station Lakes Monitoring — The OWRB conducts sampling on lakes and reservoirs across the State of Oklahoma through a fixed station monitoring approach. This design allows the state's objectives to be met, as well as ensure various sized waterbodies are represented adequately. All lakes 50 surface acres or larger are monitored by OWRB and encompasses 206 individual water bodies. The population is divided into two categories; lakes larger than 500 surface acres and lakes less than 500 surface acres. Sampling is conducted on a quarterly basis, following the hydrologic year, which runs October through September. Over a five-year timeframe, large lakes are sampled twice in non-consecutive years, while smaller lakes are sampled once. During that timeframe, the goal is to sample each lake at least once. Each year, OWRB samples between 35-40 lakes, depending on size. Many of these smaller lakes are municipal water supplies and have not historically been sampled through BUMP.

Many of the 68 large lakes are managed by federal partners including the United States Army Corps of Engineers (USACE) and the Bureau of Reclamation (BOR). The OWRB works with these partner agencies for inclusion of additional information when possible on waterbodies under their management. Data collected consists primarily of water chemistry, nutrients, and chlorophyll-a information. In general, a minimum of three to five stations per reservoir are sampled, depending on the reservoir's size. Stations are located such that they represent the lacustrine, transitional, and riverine zones of the lake. On many larger reservoirs, additional sites are monitored to include major arms of the reservoir, as appropriate. Water quality parameters have been added to the lakes sampling effort over the years to enhance BUMP's ability to make use support determinations.

Groundwater Monitoring (GMAP) – This program was made possible as result of the increase in funding received from the Oklahoma Legislature for water quality/quantity monitoring based on recommendations of the 2012 Update of the Oklahoma Comprehensive Water Plan. The program prioritizes efforts on Oklahoma's 22 major groundwater aquifers, with the baseline phase completed at the conclusion of 2017 and long-term trend monitoring scheduled to begin in 2019. The baseline period focused on 4-6 aquifers per year, beginning in 2013, and assessed concentrations of nutrients, metals and major ion species. Sample size was predicated upon and proportional to the surface area of the aquifer with a general goal of 30 wells per aquifer. Some of the state's larger aquifers exceeded the goal and some of the smaller aquifers were represented by fewer wells (Table 1). At the conclusion of the baseline sampling period there were 695 wells sampled from major aquifers in the statewide groundwater quality network, with an additional 31 wells in minor aquifers. In addition, the OWRB's annual groundwater level measurement program nearly doubled in capacity from around 530 to 900 wells and has been spatially redistributed. Also, over the 5-year baseline period, the OWRB installed 33

continuous water level recorders to obtain daily or hourly measurements that are more sensitive to detecting seasonal changes (brought on by drought or variable climate conditions) than can be obtained by annual measurements.

Table 1. Sample Networks Based on Aquifer Areal Extent

Areal Extent Category	Sample Site Well Density	Sample Sizes Generated
> 5000 km²	1 well per 150 km² (6 Aquifers)	37 – 89
3001 – 5000 km ²	1 well per 100 km ² (5 aquifers)	33 – 48
1501 – 3000 km ²	1 well per 75 km² (6 aquifers)	25 – 33
751 – 1500 km²	1 well per 50 km² (2 aquifers)	16 – 19
≤ 750 km²	2 aquifers	6 – 10

Intensive Investigations — Historically, occurred in the early years of the program, but no work of this nature has occurred in the last several years. Work was discontinued to address other monitoring needs as the costs to operate the program have continued to increase since program inception.

Program History/Overview

Sampling of numerous lakes, streams, and rivers across the state was initiated in the summer and fall of 1998. Lake sampling in connection with BUMP began in July of 1998. Sampling of streams and rivers began in earnest in November of the same year. The two sampling programs, one for lakes and one for streams, had separate starting dates for a number of reasons. First, the OWRB had been conducting a lake-sampling program during summer months since 1990 as part of the Federal Clean Lakes Program. This historical lake sampling program was funded through federal dollars with the express purpose of determining lake trophic status. Federal dollars to fund this trophic state assessment of our state's lakes were discontinued in 1994. At that time, the OWRB searched for other funding sources and by working with the Secretary of the Environment and Oklahoma Conservation Commission, was able to obtain a one-time federal Clean Water Act (CWA) 319 nonpoint source grant to continue the lake trophic state assessment program. The OWRB subsequently initiated a quarterly lake sampling program in the spring of 1998 and was able to roll the existing lake program into BUMP.

Products of Sampling Efforts

Comprehensive statewide datasets on rivers, streams, and lakes for accurately assessing beneficial use impairments had not existed since 1993. With the implementation of monitoring on a large scale in October of 1998, this was no longer the case. With the availability of data, it is the desire of the OWRB to provide the legislature and professional water managers with a comprehensive and up-to-date document for their review and approval. It is essential for Oklahoma to quantify impacts in a comprehensive and scientific manner and look for trends in water quality to identify waters that are not

meeting their assigned beneficial uses. As a state, we must manage our water resources effectively and direct money to areas with the highest need of protection or remediation to ensure the continuance of good water quality and sufficient quantity to meet our needs well into future. OWRB staff looks forward to conducting the Beneficial Use Monitoring Program to provide the state with the information it needs to make informed decisions that allowing for the effective management our precious water resources.

Every two years, the OWRB analyzes BUMP data to identify if the waters of the state are meeting their assigned beneficial uses. If a lake, stream, or river segment is not meeting its beneficial use, it is submitted for inclusion in the EPA's Integrated Report (303(d) and 305(b)). The latest EPA approved 303(d) list of impaired waters, along with information about the Integrated Report process can be found on the Oklahoma Department of Environmental Quality's website referenced above.

INTRODUCTION

Protecting and improving the water quality of Oklahoma's lakes is vital to the state. Quality of life and economic benefits are both directly connected to maintaining healthy lake ecosystems. Oklahoma has over 200 manmade lakes ranging in size from 50 to over 100,000 surface acres and the beneficial uses of these lakes include, *Public and Private Water Supply, Fish and Wildlife Propagation, Recreation, Hydropower*, and *Irrigation* (OAC 785:45).

Lakes in Oklahoma also generate millions of dollars for state and local economies each year through recreation activities. Information from the U.S. Army Corps of Engineers provides a snapshot of the recreational and economic benefits of Oklahoma's lakes. In fiscal year 2016 there were over 11 million visitors to USACE recreational resources in Oklahoma and of these there were 3.7 million anglers, 3.5 million boaters, 1.7 million swimmers, and 0.5 million skiers (USACE 2016a). 2016 economic data reported that there was \$377 million in visitor spending and 3,379 jobs within 30 miles of a USACE lake (USACE 2016a). At Eufaula Lake alone (Oklahoma's largest lake at 105,500 surface acres), there were a total of 2.2 million visitors with 1 million boaters, 800,000 anglers, 600,000 swimmers, and 100,000 water skiers (USACE 2016b). The economic benefit of Eufaula is reported as nearly \$93 million in visitor spending and 778 jobs within 30 miles of the lake (USACE 2016b). Similarly, at Canton Lake (7,900 surface acres), a much smaller lake located in western Oklahoma, only about 250,000 visitors came to the lake with 101,000 sightseers, 56,000 anglers, 39,000 swimmers, and 19,000 water skiers (USACE 2016c). This recreational activity resulted in \$5.7 million in visitor spending and 58 jobs within 30 miles of the lake (USACE 2016c). It is clear that lakes in Oklahoma of all sizes are cherished recreational resources and important contributors to the local and state economy.

Oklahoma works to protect and manage its water resources through a number of initiatives, with the Water Quality Standards (WQS) serving as the cornerstone of the state's water quality management programs. The OWRB is designated by state statute as the agency responsible for promulgating water quality standards and developing or assisting the other environmental agencies with implementation

¹ https://www.deq.ok.gov/water-quality-division/watershed-planning/integrated-report/

frameworks. The WQS are located in OAC 785:45 and consist of three components: beneficial uses, criteria to protect beneficial uses, and the Antidegradation Policy. All state agencies work to implement Oklahoma's Water Quality Standards within the scope of their jurisdiction through the development of an implementation plan specific for their agency. This process, called WQS Implementation, allows the WQS to be utilized by other state agencies in the performance of their regulatory (statutory) responsibilities to manage water quality or to facilitate best management practice initiatives.

The Beneficial Use Monitoring Program (BUMP), utilizes assessment protocols to evaluate beneficial use condition, primarily the Use Assessment Protocols (USAP) (OAC 785: Chapter 46, subchapter 15). These protocols facilitate state agencies in directing their time and money to the areas in most need of protection or remediation. The USAP may also be coupled with a trend monitoring system to detect threatened waters before they become seriously impaired. Data collection efforts connected with protocol development and/or implementation also serve a vital purpose in refining numerical criteria currently included in the WQS and in developing numerical and narrative criteria for future WQS documents. It is essential that our waters attain their beneficial uses and that WQS implementation protocols are effective. Please see Appendix A for the applicable Oklahoma Administrative Code (OAC) 785:46 related to the USAP.

This report summarizes the annual results of the BUMP. All sampling activities described and conducted as part of this program were consistent with the Oklahoma USAP. It is also important to note that they are consistent with Environmental Protection Agency (EPA) reporting requirements for the "Integrated Water Quality Monitoring and Assessment Report" [305(b) Report and 303(d) list], CWA §319 Nonpoint Source (NPS) Assessment.

Historical Background and Problem Definition

Historically, the State of Oklahoma had numerous monitoring programs conducted by several state and federal agencies. Each agency conducted monitoring with some degree of integration and coordination with other state, municipal, or federal programs. Most water quality monitoring programs in Oklahoma are designed to collect information for one specific purpose (i.e., development of Total Maximum Daily Loads, the WQS process, lake trophic status determination, determining water quality impacts from point source dischargers, stream flow measurements, documenting success of best management practices, etc.). As such, information is specific to each programs data quality objectives (DQOs) and is often limited to a small geographic area.

This document describes sampling activities OWRB conducted for lakes and current ongoing efforts for lakes across Oklahoma as part of a comprehensive, long-term, statewide Beneficial Use Monitoring Program (BUMP). The goal of the BUMP is to detect and quantify water quality trends, document and quantify impairments of assigned beneficial uses, and identify pollution problems before they become a pollution crisis.

LAKES MONITORING PROGRAM

Results from the BUMP sampling effort should be viewed as a means to make relative comparisons between lakes and to determine beneficial use impairments based on USAP, detailed in Oklahoma Administrative Code (OAC) 785:46-15-5. Currently, the parameters that are analyzed to determine whether or not there is beneficial use impairment or threat include turbidity, chlorophyll-a, dissolved oxygen, metals, chloride, sulfates, biological collections, total dissolved solids, and pH values. A brief discussion on lake monitoring procedures and methods is provided below with data results following. Lakes with relatively poor water quality are identified, but that does not necessarily mean that these lakes have beneficial use impairments. Due to the nature of their watershed and basin morphometry, lakes may manifest a range of water quality conditions. For example, Broken Bow Lake and Great Salt Plains display very different water quality conditions and this is expected because these two lakes exhibit great differences in basin morphometry and substrate material and are located in totally different parts of the state. Soil types such as clays have a very small particle size such that the clay particulates are constantly re-suspended in the lake water column and never settle out, which is evident in some lakes across the state. In addition, the shallow nature of many of our lakes contributes to the lake bottom sediments being re-suspended in the water column due to wind action. Because so many factors affect the water quality of any given lake, comparing lakes from various parts of the state should only be viewed as a relative comparison. Lake trophic status is important from a water quality perspective because it is an indicator of potential nutrient impacts to a lake. In general, the higher the trophic state index (TSI) of a lake, the more nutrient loading into the system is occurring and the more productive the lake. One outcome of historical trophic assessment activity on Oklahoma's lakes was the prioritization of lakes most in need of remediation. This prioritization has led to a variety of in-lake restoration activities and implementation of best management practices in the lake watershed.

For the 2018-2019 sampling season, statewide monitoring identified lakes that had potential beneficial use impairments or threats through the BUMP program. Numeric nutrient criteria for lakes have yet to be promulgated into the WQS, so there is not currently an assessment tool to truly determine which lakes are not supporting their beneficial uses due solely to excess nutrients. The OWRB has previously identified 21 lakes that are listed in the WQS as Nutrient Limited Watersheds (NLWs). An NLW is defined in the WQS as "a watershed of a waterbody with a designated beneficial use which is adversely affected by excess nutrients as determined by Carlson's TSI (chlorophyll-a) of 62 or greater." If a lake is identified as having a TSI ≥62 based on chlorophyll-a, and the minimum data requirements are met (n=10 on lakes with <250 surface acres; n=20 on lakes with >250 surface acres), it is recommended for listing as an NLW through the WQS setting process. More intensive work on these lakes is required before a definitive assessment of nutrient impairment or non-support can be made. The OWRB recommends a Nutrient Impairment Study (NIS) be performed on identified NLW lakes.

Materials & Methods for Lake Sampling

Data was collected quarterly on 40 lakes across the state from the fall of 2018 through summer of 2019. Sampling all lake sites once per quarter during the sample year was done to ensure seasonality was represented. The number of sampling stations per lake varied depending on lake size and morphology.

In general, 3-5 stations were chosen per lake in order to be representative of the riverine, transitional and lacustrine zones of the waterbody (**Figure 1**).

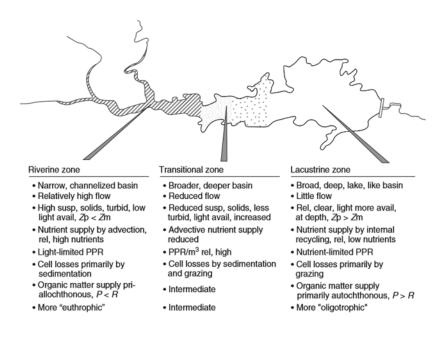


Figure 1. Reservoir water quality zone map with descriptors.

Data for water quality indicators (**Table 2**) was collected following OWRB standard operating procedures (SOPs) for the water quality samples (OWRB, 2018a). Several variables (pH, dissolved oxygen, water temperature, and specific conductance) were monitored *in-situ* utilizing a YSI multi-parameter sonde. In accordance with manufacturer's specifications and/or published SOP's, all parameters (excluding water temperature which is factory calibrated) were calibrated weekly and verified daily with appropriate standards. Measurements were recorded at each sampling station on the lake in the form of a vertical profile. Vertical profiles were recorded in 1-meter increments from the lake surface to the lake bottom, with additional readings at 0.5 m below the surface and 0.2 m above the lake bottom. During periods with anoxic conditions (dissolved oxygen < 2.0 mg/L) an additional reading was taken 0.5 m above the first depth with measured anoxia in order to narrow down the point of transition.

Data for all other indicators were amassed from water quality samples collected at the lake. Water quality samples were collected via surface grab with water collected from 0.5 m below the lake surface. The sample was collected by completely submerging the bottle, allowing it to fill to the top, and capping the bottle underwater. Each collection included two bottles for general chemistry analyses (one ice preserved and one sulfuric acid preserved), and one bottle for field chemistry and sestonic chlorophyll-a analyses (ice preserved and kept dark). A Van Dorn sampler was used to collect at depth samples near the lake bottom, just above the sediment-water interface. Replicate samples for all parameters were collected at the dam site for Quality Assurance (QA) purposes. The Oklahoma Department of Environmental Quality State Environmental Laboratory (ODEQ-SEL) analyzed samples for the general chemistry parameters listed in **Table 2** in accordance with the ODEQ's Quality Assurance Program Plan

(ODEQ, 2019) and Data Quality Manual (ODEQ, 2018). OWRB personnel measured hardness and alkalinity using Hach titration protocols, and nephelometric turbidity using a Hach Portable turbidimeter. Additionally, as part of the field parameters, secchi disk depth (in centimeters) was recorded at all locations as a measure of water clarity.

Table 2. Water Quality Parameters Included in Study

In-situ Parameters							
Dissolved Oxygen (DO)	% DO Saturation	рН					
Water Temperature	Specific Conductance	Salinity					
Oxidation-Reduction Potential (ORP)	Total Dissolved Solids						
Fic	eld Parameters						
Nephelometric Turbidity	Total Alkalinity	Total Hardness					
Secchi Disk Depth	Habitat						
General (Chemistry Parameters						
Total Kjeldahl Nitrogen	Total Phosphorus	Chlorides					
Dissolved Orthophosphorus	Nitrate Nitrogen	Nitrite Nitrogen					
Ammonia	Sulfates	Total Dissolved Solids					
Biolo	ogical Parameters						
Chlorophyll-a	Zooplankton	Phytoplankton					

Samples for algal chlorophyll-a, as a measure of algal biomass, were collected at all sample sites and processed in accordance with standard procedures outlined (OWRB, 2018b). All chlorophyll-a samples were analyzed by the ODEQ-SEL under the previously mentioned QAPP (ODEQ, 2007). Additionally, phytoplankton and zooplankton samples were also collected on a quarterly basis for taxonomic identification and these collections took place at the dam site. Phytoplankton samples were collected as a surface grab sample, while zooplankton were collected as a tow using a Wisconsin-style plankton net. The length of the tow was specific to each lake, representing the entire depth of the water column. All samples were collected and processed in accordance with standard procedures (OWRB 2013).

Sample Lake Locations

Lakes sampled by the BUMP Lakes staff in 2018-2019 are shown in **Figure 2**. Lake locations are identified on the map and are shaded in different colors based on their calculated TSI values. A total of 40 lakes were sampled during the 2018-2019 sampling year.

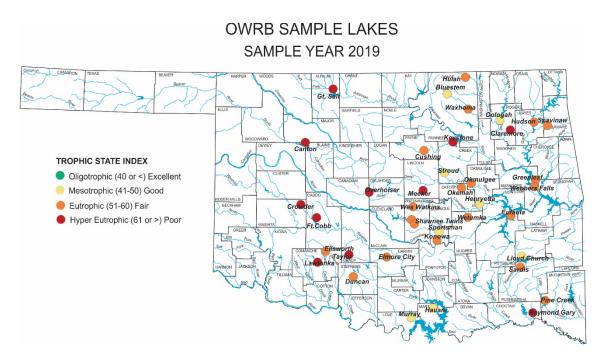


Figure 2. Lakes sampled by the Beneficial Use Monitoring Program in 2018-2019

Lake Data Analysis Protocols

The method of assessing lakes based on their biological response to nutrients is trophic state classification, which indicates the amount of biological activity sustained in a waterbody at a particular time. Lakes that have high nutrient concentrations and productive plant growth are described as eutrophic; whereas, low nutrient concentrations and low plant growth lakes are characterized as oligotrophic (Water on the Web, 2004). Lakes that exhibit moderate levels of nutrients and plant growth are termed mesotrophic. There are numerous methods available for determining the trophic status of lakes. The majority of the trophic state models rely on a mathematical calculation to generate a single numerical value that is then categorized in an assessment hierarchy. Most indices use one or more variables in the determination of trophic status with varying degrees of applicability to systems. Carlson (1977) developed the most commonly used chlorophyll biomass based trophic status index (TSI) to classify and describe lakes. The Carlson chlorophyll TSI metric (Equation 1) has long been used by OWRB to determine lake trophic status.

Equation 1. Carlson's TSI calculation based on chlorophyll-a biomass

$$TSI = 9.81 x ln(chlorophyll - a) + 30.6$$

In 1998, 1999, and 2000, TSI was calculated using chlorophyll-concentrations from the growing season (spring and summer only). Beginning in sample year 2001, an annualized trophic assessment was made as it was determined to be a more accurate reflection of trophic conditions for each waterbody. In order to make beneficial use determinations, minimum data requirements must be met as listed in OAC 785:46-15-3. Lakes greater than 250 surface acres require a minimum of 20 samples, for lakes with less than 250 surface acres, 10, at minimum, are required. In 2001-2002, sites were added for chlorophyll-a and turbidity collections on lakes greater than 250 surface acres to meet the minimum annual data

requirements. Although data can be aggregated and historical values used, there was a concern in using data collected in the summer only as this would bias the data. An analysis of the limnological data collected on lakes is performed to determine the trophic state of each lake monitored. Chlorophyll-a concentrations for each lake sample site are determined and all values are averaged for each lake for all four sampling quarters. This annual chlorophyll-a value is then used in Carlson's TSI equation to determine trophic status of the lake. Through use of this technique the presence of localized trophic condition is minimized (i.e. the effects of a single elevated chlorophyll-a value are minimized in the calculation of the TSI). The derived TSI represents an accurate assessment of the water quality as a whole, and individual isolated areas that may be impacted due to eutrophication will be minimized in the reported TSI. A list of lake trophic state categories and corresponding TSI numerical values are displayed in Table 3. There are other descriptive terms and subset categories for trophic status, like dystrophic; however, Carlson's TSI has four major categories and these will be used to describe lake trophic status. Further discussion is included in each of the lake summaries as necessary.

Table 3. Lake Trophic State Categories

Trophic State	Carlson TSI Value	Trophic Description
Oligotrophic	<u>≤</u> 40	Low primary productivity and/or low nutrient levels
Mesotrophic	41-50	Moderate primary productivity with moderate nutrient levels
Eutrophic	51-60	High primary productivity and nutrient rich
Hypereutrophic	<u>></u> 60	Excessive primary productivity and excessive nutrients

Lake Monitoring Results & Discussion

Lake-wide annual average of the chlorophyll-a values were calculated for each lake and used in the final calculation of the TSI. A summary table is included (**Table 4**) to present the number of lakes and appropriate surface acre size for each of the four trophic categories in 2018-2019 as well as the percentages of the total.

Table 4. Summary of Lake Trophic Status Results

Trophic State	Number of Lakes	% of Total Lakes	Surface Area (Acres)	% of Total Surface Acres
Oligotrophic	0	0	0	0
Mesotrophic	8	20	37,360	26
Eutrophic	20	50	48,406	34
Hypereutrophic	12	30	55,680	39
Totals	40	100	141,446	100

As shown in **Table 4**, twelve lakes were hypereutrophic, twenty were eutrophic, eight were mesotrophic, and none were oligotrophic. Of the total 141,446 surface acres sampled, 55,680 were classified hypereutrophic, 48,406 were classified as eutrophic, 37,360 were classified as mesotrophic and zero acres were classified as oligotrophic. TSI results, county, surface area, and volume for lakes sampled in 2018-2019 are listed in **Table 5**.

Table 5. List of Lakes Sampled in Sample Year 2018-2019

Lakes	County	Surface Acres	Capacity (acre-ft)	TSI	Carlson's Trophic Status	Threats or Impairments
Bluestem	Osage	803	17,000	46	Mesotrophic	Turbidity
Canton	Blaine	8,045	111,310	65	Hypereutrophic	Turbidity
Claremore	Rogers	411	7,900	66	Hypereutrophic	Chlor-a
Crowder	Washita	181	2,094	71	Hypereutrophic	Turbidity, Chlor-a
Duncan	Stephens	199	7,200	53	Eutrophic	
Ellsworth	Comanche	5,295	95,200	51	Eutrophic	Turbidity, Chlor-a
Elmore City	Garvin	69	1,554	55	Eutrophic	Dissolved Oxygen
Fort Cobb	Caddo	3,822	80,010	66	Hypereutrophic	Chlor-a
Great Salt Plains	Alfalfa	8,292	31,240	74	Hypereutrophic	Turbidity
Greenleaf	Muskogee	704	14,720	59	Eutrophic	Turbidity, Chlor-a
Hauani	Marshall	218	3,000	44	Mesotrophic	Turbidity
Henryetta	Okmulgee	505	6,600	48	Mesotrophic	Turbidity, Metals
Hudson (1-4)		0.050	200 200	59	Eutrophic	
Hudson (5-8)	Mayes	9,850	200,300	60	Eutrophic	
Hulah	Osage	3,078	31,160	58	Eutrophic	Turbidity
Humphreys	Stephens	780	14,041	59	Eutrophic	Chlor-a
Keystone (1,2)				57	Eutrophic	Turbidity
Keystone (10-12)				66	Hypereutrophic	Turbidity
Keystone (3-5)	Tulsa	23,696	557,600	58	Eutrophic	Turbidity
Keystone (6-9)				63	Hypereutrophic	Turbidity
Konawa	Seminole	1,321	23,000	58	Eutrophic	
Lawtonka	Comanche	2,368	56,574	62	Hypereutrophic	Chlor-a
Lloyd Church	Latimer	171	3,060	47	Mesotrophic	Turbidity, pH
McMurtry	Noble	1,193	19,733	51	Eutrophic	Turbidity
Meeker	Lincoln	233	1,818	64	Hypereutrophic	Turbidity
Murray	Love	5,458	153,250	41	Mesotrophic	Dissolved Oxygen
Okemah	Okfuskee	704	13,100	52	Eutrophic	
Okmulgee	Okmulgee	629	14,170	53	Eutrophic	
Oologah	Rogers	29,262	553,400	45	Mesotrophic	Turbidity, Dissolved Oxygen
Overholser	Oklahoma	1,548	15,000	67	Hypereutrophic	Turbidity, Sulfates
Pine Creek	McCurtain	4,729	53,750	52	Eutrophic	pH, Dissolved Oxygen
Raymond Gary	Choctaw	273	1,681	62	Hypereutrophic	
RC Longmire	Garvin	919	13,162	58	Eutrophic	
Sardis	Pushmataha	14,556	274,330	52	Eutrophic	Turbidity, pH

Shawnee Twin #1	Pottowatomie	907	22,600	52	Eutrophic	Turbidity
Shawnee Twin #2	Pottowatomie	474	11,400	57	Eutrophic	Turbidity
Spavinaw	Mayes	1,580	38,000	59	Eutrophic	Dissolved Oxygen, Chlor-a
Sportsman	Seminole	365	5,349	44	Mesotrophic	Turbidity
Stroud	Creek	578	8,800	50	Mesotrophic	
Taylor	Grady	195	1,877	69	Hypereutrophic	Turbidity
Waxhoma	Osage	114	2,100	52	Eutrophic	
Webbers Falls	Muskogee	6,616	170,100	61	Hypereutrophic	Turbidity, Enterro/E.Coli
Wes Watkins	Pottowatomie	1,132	14,065	58	Eutrophic	
Wetumka	Hughes	173	1,839	55	Eutrophic	Enterro/E.Coli

The beneficial use support determinations for the lakes sampled were determined following guidelines outlined in the USAP promulgated into OAC 785-46: Subchapter 15². The OWRB has worked diligently to follow the guidelines outlined in the USAP. Recommendations in this report should be consistent with recommendations for the state's 303(d) list. Although certain inconsistencies do exist, every effort has been taken to assure compatibility between the BUMP Report and the currently approved 303(d) list.

Results of Lakes Sampling Efforts

For the 2018-2019 sample year, OWRB staff collected data from 40 lakes on a quarterly basis, beginning in October of 2018 and concluding the following September. Results of the sampling efforts are summarized below.

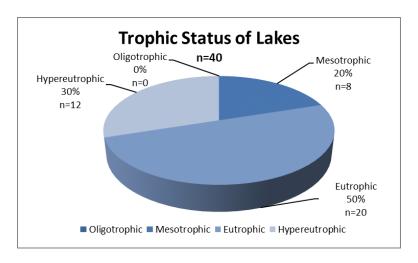


Figure 3. Trophic Status of Lakes for Sample Year 2018-1019

Figure 3. Trophic Status of Lakes for Sample Year 2018-1019 shows 30% of lakes sampled were determined to have serious water quality nutrient concerns based upon their classification as

² http://www.owrb.ok.gov/rules/pdf/current/Ch46.pdf

hypereutrophic. Lakes classified as hypereutrophic have the potential for beneficial use impairments due to low dissolved oxygen concentrations, taste and odor problems, nutrient inputs, excessive productivity, and general lake aesthetics. Hypereutrophic waters are adversely affected primarily by excessive nutrients and primary productivity and should be monitored intensively in the future to document the presence or absence of beneficial use impairments. Thirty-four percent of lakes sampled were classified as eutrophic, characterized by high primary productivity and nutrient rich conditions. A eutrophic lake also has the potential for beneficial use impairments, though less than hypereutrophic waters. 50% of lakes sampled were classified as Eutrophic. Mesotrophic waters have a smaller potential for beneficial use impairments and overall are representative of good water quality with low to moderate levels of nutrients, and productivity. Of the lakes sampled, 20% were classified as Mesotrophic. Oligotrophic waters have overly low levels of primary productivity and usually low concentrations of nutrient constituents. In Oklahoma, oligotrophic waters are either exceptionally clear with little nutrient inputs and genuinely good water quality conditions, or quite turbid with poor water clarity due to the absence of sufficient ambient light, inhibiting lake productivity. For sample year 2019, no lakes were classified as oligotrophic. Based on the results for trophic state index calculations, 80% of the waters sampled were exhibiting high to excessive levels of primary productivity and nutrient rich conditions, characteristic of eutrophic and hypereutrophic waterbodies.

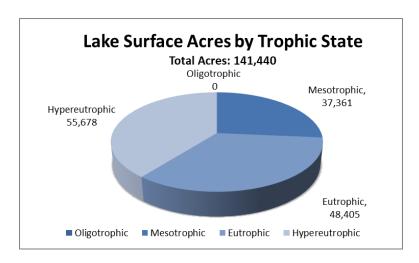


Figure 4. Lake Surface Acres by Trophic Status for Lakes Sampled in 2018-2019

The distribution changes somewhat when accounting for lake surface acres. Results in **Figure 4** and **Figure 5** differ slightly from than **Figure 3**, indicating more large lakes were classified as eutrophic than those designated as mesotrophic and hypereutrophic. Lake trophic status, when broken out by lake surface acres, finds 34% of all surface acres sampled were eutrophic, 27% mesotrophic, 39% hypereutrophic, and 0% oligotrophic. In general, larger lakes in the state have more extensive watersheds and are generally deeper than smaller lakes, which increases the likelihood of beneficial use impairments being present since such a larger surface area is available.

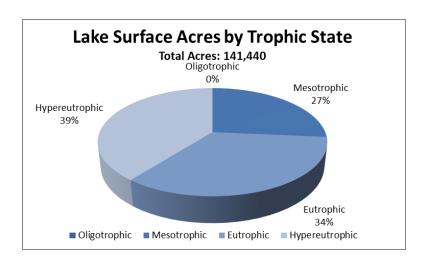


Figure 5. Lake Surface Acres % by Trophic Status for Lakes Sampled in 2018-2019

During stratification, larger/deeper lakes have a greater portion of water column that becomes anoxic for longer periods of time and can increases the potential for nutrient release from sediments. Many lakes in Oklahoma are experiencing adverse environmental impacts. However, with the available data, it is not possible to adequately assess if lakes are meeting their assigned beneficial uses as they relate to nutrients. At this time, 21 lakes are currently identified by the OWRB as Nutrient-Limited Watersheds (NLW) in WQS. Efforts should be taken to definitively determine if NLW waters are meeting their designated uses through initiation of a nutrient impairment study to determine the presence or absence of nutrient impairments in our NLW lakes. NLW are lakes with a TSI ≥ 62 based on Carlson's classification system using chlorophyll-a as the trophic state indicator.

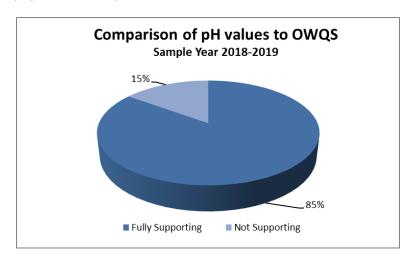


Figure 6. Comparison of pH values to OWQS for Sample Year 2018-2019

pH was collected as an in-situ parameter in the profile data using a multi-parameter sonde. All recorded pH values were compared to WQS for pH between 6.5 to 9 units, listed in OAC 785:45-5³. 34 of the 40

-

³ http://www.owrb.ok.gov/rules/pdf/current/Ch45.pdf

lakes (85%) sampled in the 2018-2019 sample year were supporting the Fish & Wildlife Propagation (FWP) beneficial use based on their pH values (**Figure 6**).

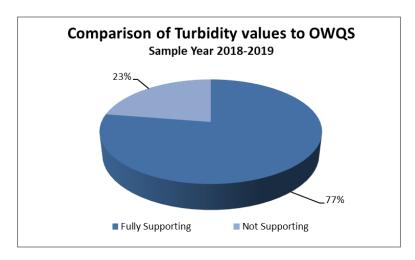


Figure 7. Comparison of Turbidity Values to OWQS for Sample Year 2018-2019

Turbidity, reported in Nephelometric turbidity units (NTU), was measured via HACH turbidimeter for all sampled sites to identify lakes exceeding 25 NTU, as described in WQS. Of the 40 lakes sampled, 9 (23%) were not supporting their FWP beneficial use, while the remaining 31 (77%) were fully supporting based on turbidity values (**Figure 7**).

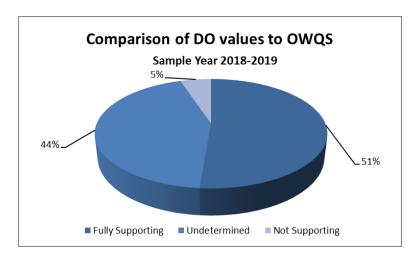


Figure 8. Comparison of Dissolved Oxygen Values to OWQS for Sample Year 2018-2019

Levels of dissolved oxygen (D.O.) were analyzed from vertical profile data to determine if anoxic conditions were present and if lakes were meeting the FWP beneficial use. The USAP lists D.O. violations as values below 2.0 mg/L in more than 70% of the entire water column, undetermined if between 50% and 70% and fully supporting if 50% or less of the water column is below 2.0 mg/L D.O.. Of the 40 lakes sampled, 51% of lakes were supporting the FWP beneficial use based on anoxic conditions, primarily in the summer season (**Figure 8**).

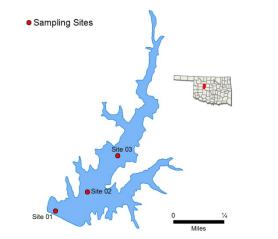
Bacteria samples were not collected during the recreation season of May through September for the current sample year.

When OWRB began collecting water quality data on a quarterly basis in 1998, datasets greatly improved the amount of information available to resource managers. Lakes identified as hypereutrophic should be sampled more frequently than quarterly, especially during warmer months. Lakes listed as NLW's should also be sampled more intensively to confirm if a water quality threat or impairment is present. Minimum data requirements as listed in USAP were closely followed to make beneficial use determinations. All impairments are listed in the Integrated Water Quality Report (EPA's 303(d)) that is updated every two years.



American Horse

	Sample Period	d	Visited	Sampling Sites
October 2007 - July 2008			4	5
	Location	Blaine Cou	nty	Click map for site data
5	Impoundment	1966		
	Area	100 acres		
	Capacity	2,200 acre-	feet	
	Purposes	Recreation		



				_										
		Parameter (Description	ns)	Result					Notes/0	Commen	ıts			
		Average Turbidity		13 nep	helometi	ric turbidi	ty units (NTU)	Lake-wi	de avera	ge			
		Average True Color		54 uni	ts				25% of	values >	OWQS	of 70		
	itu	Average Secchi Disk D	epth	118 cn	n									
	In Situ	Water Clarity Rating		good										
		Trophic State Index		38					Previou	s value =	49			
က		Trophic Class		oligotr	oligotrophic									
Parameters		Salinity		0.07 -	0.13 ppt									
ram		Specific Conductivity		151.5	151.5 - 274.7 μS/cm									
Ра	Profile	рН		7.01 -	7.01 - 8.08 pH units									
	ፈ	Oxidation-Reduction P	otential	-4 to 5	-4 to 551 mV									
		Dissolved Oxygen		Up to	60% of w	ater colu	mn < 2 r	mg/L in						
	Ŋ	Surface Total Nitrogen		0.38 m	0.38 mg/L to 1.07 mg/L									
	Nutrients	Surface Total Phospho	rus	0.018	0.018 mg/L to 0.053 mg/L									
	Z	Nitrogen to Phosphoru	s Ratio	19:1				Phosphorus limited						
		Click to learn more ab Beneficial Uses□	oout_	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
ses	Fish	n & Wildlife Propagation		S	S	NEI	NEI							
ڪ ٽ	Aes	sthetics						S	*					
ficia	Agr	iculture								S	S	S		
Beneficial Uses	Prin	mary Body Contact Recr	eation										S	
m	Pub	olic & Private Water Supp	oly											
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	Notes Notes	*Stand	lards rev	rision, tru	ue color i	s for pe	rmitting	purposes	only.			

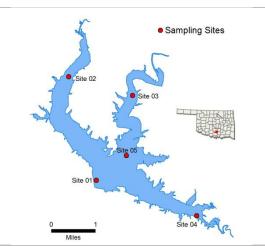
Arbuckle

Sample Period

oumpie i criou			Times visited	1	Camping Oiles		
October 2015-July 2016			4	5			
	Location	Murray	County	Click map for site data			
ਰ	Impoundment	1967					
7							

Times Visited Sampling Sites

	Location	Murray County	Click map for site data					
,	Impoundment	1967						
	Area	2,350 acres						
	Capacity	72,400 acre-feet						
	Purposes	Water Supply, Flood Cor and Recreation	ntrol, Fish and Wildlife,					



		Parameter (<u>Descriptions</u>)		Result					Notes/0	Commen	its			
		Average Turbidity		4 NTU					0% of v	/alues >	OWQS of	f 25 NTU		
		Average Secchi Disk Depth		108 cm										
	Situ	Water Clarity Rating		Excelle	nt									
	<u>=</u>	Chlorophyll-a		14.4 m	ıg/m3									
		Trophic State Index		57					Previous value = 57					
S		Trophic Class		Eutroph	Eutrophic									
Parameters		Salinity		0.11-0.2	28 ppt									
ıran	a)	Specific Conductivity		229.1-5	29.1-566.2 μS/cm									
g.	Profile	pH		6.82-8.3	6.82-8.36 pH units					to slightl	y alkaline)		
	□	Oxidation-Reduction Potential		-60-466	-60-466.5 mV									
		Dissolved Oxygen		Up to 71% of water column < 2.0 mg/L in Summer										
	S.	Surface Total Nitrogen	0.46 mg/L to 0.63 mg/L											
	Nutrients	Surface Total Phosphorus		0.018 m	0.018 mg/L to 0.029 mg/L									
	Ž	Nitrogen to Phosphorus Ratio		22:1	22:1					Phosphorus limited				
		Click to learn more about Beneficial Uses		Turbidity	Hď	Dissolved	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E.coli	Chlor-a
ses	Fish	n & Wildlife Propagation		S	S	NS	NEI							
a □	Aes	sthetics						S	*					
fici	Agr	iculture								*	*	S		
Beneficial Uses	Prir	Primary Body Contact Recreation											S	
M	Pub	olic & Private Water Supply					NEI							
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information				*Standards revision, true color is for permitting purposes only.									

mg/L = milligrams per liter

 $\mu \tilde{S}/cm = microsiemens/cm$

ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

mV = millivolts

Chlor-a = Chlorophyll-a

NTU = nephelometric turbidity units

μS/cm = microsiemens per centimeter E. coli = Escherichia coli

Arcadia

Capacity

Purposes

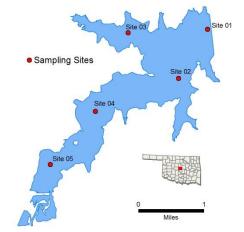
NTU = nephelometric turbidity units

 μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

	Sample Period	d	Times Visited	Sampling Sites
De	ecember 2014 - Aug	ust 2015	4	5
	Location	Oklahoma	County	Click map for site data
<u></u>	Impoundment	1986		
eneral	Area	1,820 acres	5	
Ψ				

Water Supply, Flood Control, Recreation

27,520 acre-feet



	Pur	poses water Supply	/, Flood Control, Recreation										
		Parameter (<u>Descriptions</u>)	Result					Notes/Comments					
		Average Turbidity	7 NTU					0% of values > OWQS of 25 NTU					
	_	Average Secchi Disk Depth	119 cm	l									
	In Situ	Water Clarity Rating	Good										
	_	Chlorophyll-a	25 mg/	m3									
		Trophic State Index	62					Previou	s TSI =	59			
S		Trophic Class	Hypere	Hypereutrophic									
Parameters		Salinity	0.18 –	0.24 ppt									
aran	a	Specific Conductivity	375.2 – 497.4 μS/cm										
<u>a</u>	Profile	рН	7.04 – 9.00 pH units					Neutral	to slight	ly alkalin	е		
	₫	Oxidation-Reduction Potential		371.6mV									
		Dissolved Oxygen	Up to 47% of water column < 2 mg/L in Summer										
	ıts	Surface Total Nitrogen	0.72 m	g/L to 1.0)1 mg/L								
	Nutrients	Surface Total Phosphorus	0.030 r	0.030 mg/L to 0.141 mg/L									
	Ž	Nitrogen to Phosphorus Ratio	16:1	16:1				Phosphorus limited					
		Click to learn more about Beneficial Uses	Turbidity	H _Q	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
ses	Fish	h & Wildlife Propagation	NS	S	S	S							
Š	Aes	sthetics					S	S					
Beneficial Uses	Agr	iculture							S	S	S		
enef	Prin	mary Body Contact Recreation										S	
m	Pub	olic & Private Water Supply											NS
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	*Stanc	lards rev	vision, tru	ue color i	s for pe	rmitting	purpose	s only.			

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

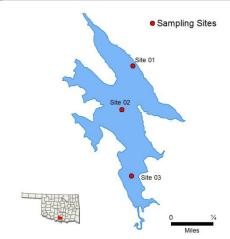
mV = millivoltsChlor-a = Chlorophyll-a

Ardmore City

	Sample Period	d	Visited	Sampling Sites
(October 2006 - Augu	st 2007	4	5
	Location	Carter Cou	nty	Click map for site data
<u>a</u>	Impoundment	1910		
Genera	Area	142 acres		
ပ္	Capacity	600 acre-fe	et	

Recreation

Times

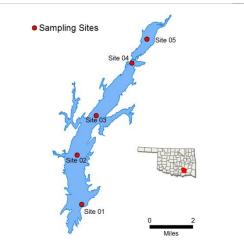


	Result					Notos/	`	40				
	10 NTII					NOTES/C	Commen	its				
	10 NTU					100% of values < OWQS of 25 NTU						
Average True Color	25 units					100% o	f values	< OWQS	S of 70			
Average Secchi Disk Depth	106 cm											
Water Clarity Rating	excellen	t										
Trophic State Index	52											
Trophic Class	eutrophic											
Salinity	0.13 – 0.18 ppt											
Specific Conductivity	278.6 – 365 μS/cm											
pH	7.16 - 8.	85 pH u	nits			Neutral	to slightl	y alkalin	e			
Oxidation-Reduction Potential	48 to 43	6 mV										
DISSOIVED DXVDED	Up to 63% of water column < 2 mg/L in August											
Surface Total Nitrogen	0.32 mg	/L to 0.6	2 mg/L									
Surface Total Phosphorus	0.009 m	g/L to 0.	035 mg/L	-								
Nitrogen to Phosphorus Ratio	22:1					Phosph	orus limi	ted				
Click to learn more about Beneficial Uses	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
h & Wildlife Propagation	S	S	NEI	S								
sthetics					S	*						
riculture							S	S	S			
mary Body Contact Recreation										S		
blic & Private Water Supply												
S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	*Standards revision, true color is for permitting purposes only.											
r	Trophic State Index Trophic Class Salinity Specific Conductivity pH Oxidation-Reduction Potential Dissolved Oxygen Surface Total Nitrogen Surface Total Phosphorus Nitrogen to Phosphorus Ratio Click to learn more about Beneficial Uses a Wildlife Propagation othetics iculture mary Body Contact Recreation olic & Private Water Supply a Fully Supporting S = Not Supporting S = Not Supporting S = Not Supporting S = Not Enough Information OWQS = O	Trophic State Index Trophic Class eutrophi Salinity 0.13 – 0 Specific Conductivity pH 7.16 - 8. Oxidation-Reduction Potential Dissolved Oxygen Surface Total Nitrogen Surface Total Phosphorus Nitrogen to Phosphorus Ratio Click to learn more about Beneficial Uses a Wildlife Propagation sthetics iculture mary Body Contact Recreation plic & Private Water Supply s = Fully Supporting S = Not Supporting S = Not Supporting S = Not Supporting S = Not Enough Information Solutions OWQS = Oklahometric turbidity units OWQS = Oklahometric turbidity units	Trophic State Index Trophic Class Eutrophic Salinity Dissolved Oxygen Surface Total Nitrogen Surface Total Phosphorus Nitrogen to Phosphorus Ratio Click to learn more about Beneficial Uses A Wildlife Propagation Surface Surface Recreation Surface Total Recreation Surface Total Recreation Surface Total Phosphorus Ratio Click to learn more about Beneficial Uses Table Surface Supply Table Supporting Surface Recreation Surface Total Phosphorus Ratio Click to learn more about Beneficial Uses Table Surface Supply Table Supporting Surface Supply Table Surface Supply Table Surface Sur	Trophic State Index Trophic Class eutrophic Salinity 0.13 – 0.18 ppt 278.6 – 365 µS/cm PH 7.16 - 8.85 pH units Oxidation-Reduction Potential Dissolved Oxygen Up to 63% of water column August Surface Total Nitrogen Surface Total Phosphorus Nitrogen to Phosphorus Ratio Click to learn more about Beneficial Uses Me Wildlife Propagation Surface Total Recreation Surfac	Trophic State Index Trophic Class eutrophic Salinity 0.13 – 0.18 ppt Specific Conductivity pH 7.16 - 8.85 pH units Oxidation-Reduction Potential Dissolved Oxygen Up to 63% of water column < 2 mg August Surface Total Nitrogen Surface Total Phosphorus Nitrogen to Phosphorus Ratio Click to learn more about Beneficial Uses A Wildlife Propagation S Wildlife Propagation S Wildlife Propagation S S NEI S S NEI S S Private Water Supply Fully Supporting S Not Supporting	Trophic State Index 52 Trophic Class eutrophic Salinity 0.13 – 0.18 ppt Specific Conductivity 278.6 – 365 μS/cm pH 7.16 - 8.85 pH units Oxidation-Reduction Potential 48 to 436 mV Up to 63% of water column < 2 mg/L in August Surface Total Nitrogen 0.32 mg/L to 0.62 mg/L Surface Total Phosphorus 0.009 mg/L to 0.035 mg/L Nitrogen to Phosphorus Ratio 22:1 Click to learn more about Beneficial Uses a Wildlife Propagation S S NEI S Sthetics s iculture mary Body Contact Recreation Sic & Private Water Supply = Fully Supporting S = Not Supporting S = Not Supporting S = Not Supporting S = Not Enough Information Oxidation-Reductivity 278.6 – 365 μS/cm 7.16 - 8.85 pH units 0.029 mg/L to 0.62 mg/L S mg/L S mg/L S mg/L **Standards revision, true color is for perchelometric turbidity units OWQS = Oklahoma Water Quality Standards mg/L	Trophic State Index Trophic Class eutrophic Salinity 0.13 – 0.18 ppt Specific Conductivity 278.6 – 365 µS/cm pH 7.16 - 8.85 pH units Neutral Oxidation-Reduction Potential Up to 63% of water column < 2 mg/L in August Surface Total Nitrogen 0.32 mg/L to 0.62 mg/L Surface Total Phosphorus 0.009 mg/L to 0.035 mg/L Nitrogen to Phosphorus Ratio Click to learn more about Beneficial Uses A Wildlife Propagation S S NEI S A Wildlife Propagation S S NEI S	Trophic State Index Trophic Class eutrophic Salinity 0.13 – 0.18 ppt Specific Conductivity pH 7.16 - 8.85 pH units Neutral to slightl Oxidation-Reduction Potential 48 to 436 mV Dissolved Oxygen Up to 63% of water column < 2 mg/L in August Surface Total Nitrogen 0.32 mg/L to 0.62 mg/L Surface Total Phosphorus 0.009 mg/L to 0.035 mg/L Nitrogen to Phosphorus Ratio 22:1 Phosphorus limit Click to learn more about Beneficial Uses A Wildlife Propagation S S NEI S iculture S nary Body Contact Recreation S S NEI S Fully Supporting S = Not	Trophic State Index 52 Trophic Class eutrophic Salinity 0.13 – 0.18 ppt Specific Conductivity 278.6 – 365 µS/cm pH 7.16 - 8.85 pH units Neutral to slightly alkalin Oxidation-Reduction Potential 48 to 436 mV Dissolved Oxygen Up to 63% of water column < 2 mg/L in August Surface Total Nitrogen 0.32 mg/L to 0.62 mg/L Surface Total Phosphorus 0.009 mg/L to 0.035 mg/L Nitrogen to Phosphorus Ratio 22:1 Phosphorus limited Click to learn more about Beneficial Uses A Wildlife Propagation S S NEI S A Wildlife Propagation S S NEI S Interior I	Trophic State Index 52 Trophic Class eutrophic Salinity 0.13 – 0.18 ppt Specific Conductivity pH 7.16 - 8.85 pH units Neutral to slightly alkaline Oxidation-Reduction Potential 48 to 436 mV Dissolved Oxygen Up to 63% of water column < 2 mg/L in August Surface Total Nitrogen 0.32 mg/L to 0.62 mg/L Surface Total Phosphorus 0.009 mg/L to 0.035 mg/L Nitrogen to Phosphorus Ratio 22:1 Phosphorus limited Click to learn more about Beneficial Uses A Wildlife Propagation S S NEI S A Wildlife Propagation S S NEI S S S S S S S S S S S S S S S	Trophic State Index 52 Trophic Class eutrophic Salinity 0.13 – 0.18 ppt Specific Conductivity 278.6 – 365 µS/cm PH 7.16 - 8.85 pH units Neutral to slightly alkaline Oxidation-Reduction Potential 48 to 436 mV Up to 63% of water column < 2 mg/L in August Surface Total Nitrogen 0.32 mg/L to 0.62 mg/L Nitrogen to Phosphorus Nitrogen to Phosphorus Ratio 22:1 Phosphorus limited Click to learn more about Beneficial Uses 18 Wildlife Propagation S S NEI S 18 Wildlife Propagation S S NEI S 19 Phosphorus Imited S S S S S S S S S S S S S S S S S S S	

Chlor-a = Chlorophyll-a

E. coli = Escherichia coli

A	Atoka										
	Sample Period	d	Times Visited	Sampling Sites							
No	ovember 2016 – Aug	ust 2017	3	5							
	Location	Atoka Cour	nty	Click map for site data							
<u>a</u>	Impoundment	1964									
General	Area	5,700 acres	es								
Ö	Capacity	125,000 ac	cre-feet								
	Purposes	Water Supp	oply, Recreation								



	Pui	rposes	Water Supply,	Recreati	on							Miles			
		Parameter (Des	criptions)	Result					Notes/0	Commen	its				
		Average Turbidit	у	60 NTL	J				73% of values > OWQS of 25 NTU						
		Average Secchi	Disk Depth	38 cm											
	Situ	Water Clarity Ra	ting	Poor											
	<u>=</u>	Chlorophyll-a		10.47	mg/m3										
		Trophic State Inc	dex	54					Previou	s Value :	= 52				
ည		Trophic Class		Eutrophic											
Parameters		Salinity		0.03 – 0.04 ppt											
aran	ω	Specific Conduc	tivity	62.1 –	115.3 µS	/cm									
<u>a</u>	Profile	рН		6.32 –	7.74 pH :	units			Neutral	to slightl	y alkalin	Э			
	□	Oxidation-Reduc	tion Potential	219 to 585.5 mV											
		Dissolved Oxyge	en	Up to 37% of water column <2 mg/L in Summer											
	Ŋ	Surface Total Nit	trogen	0.41 m	g/L to 1.2	28 mg/L									
	Nutrients	Surface Total Ph	osphorus	0.040 n	ng/L to 0	.160 mg/L									
	Z	Nitrogen to Phos	9:1				Phosph	orus lim	ited						
		Click to learn m Beneficial Uses	ore about	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fisl	h & Wildlife Propag	gation	NS	S	S	S								
Beneficial Uses	Aes	sthetics						S	*						
ficia	Agr	riculture								N/A	N/A	S			
ene	Prir	mary Body Contac	t Recreation										S		
m	Puk	blic & Private Wate	r Supply												
	٨	S = Fully Supporting NS = Not Supporting NEI = Not Enough Inf	formation State	*Standards revision, true color is for permitting purposes only.											

 μ S/cm = microsiemens/cm

En = Enterococci

Chlor-a = Chlorophyll-a

 μ S/cm = microsiemens per centimeter mV = millivolts

E. coli = Escherichia coli

Bell Cow

Sample Period

 μ S/cm = microsiemens per centimeter

E. coli = Escherichia coli

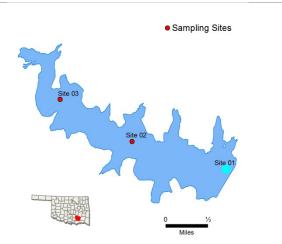
mV = millivolts

Chlor-a = Chlorophyll-a

	•		Visited				
	November 2016 - Augu	ıst 2017	4	3			
Location Lincoln Cou			unty	Click map for site data			
5	Impoundment	1990					
	Area	1,153 acres	res				
	Capacity	15,613 acre	re-feet				
	Purposes	Water Supp	oly, Flood Co	ontrol, Recreation			

Times

Sampling Sites



	Fui	poses	water Suppry,	riood Co	Jillioi, Re	creation									
		Parameter (Des	scriptions)	Result					Notes/Comments						
		Average Turbidi	ty	14 NTU	J				8% of values > OWQS of 25 NTU						
		Average Secchi	Disk Depth	67 cm											
	itu	Water Clarity Ra	ating	Averag	е										
	In Situ	Chlorophyll-a		19.16 r	ng/m3										
		Trophic State In	dex	60					Previou	Previous Value = 61					
က		Trophic Class		Eutropl	Eutrophic										
Parameters		Salinity		0.14 - 0.19 ppt											
ram		Specific Conduc	tivity	293.2 -	- 384.9 µ	S/cm									
Pa	Profile	рН	7.03 - 8	3.55 pH u	nits			Neutral	to slightl	y alkalin	e				
	ቯ	Oxidation-Reduc	ction Potential	41 to 4	28.8 mV										
		Dissolved Oxyge	en		Up to 46% of water column < 2 mg/L in Summer										
	S	Surface Total Ni	itrogen	0.85 m	g/L to 1.0)4 mg/L									
	Nutrients	Surface Total Ph	nosphorus	0.024 r	ng/L to 0	.046 mg/L	-								
	N	Nitrogen to Phos	sphorus Ratio	29:1					Phosph	orus limi	ted				
		Click to learn m Beneficial Uses		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fish	h & Wildlife Propa	gation	NS	S	NEI	S								
Beneficial Uses	Aes	sthetics						S	*						
ficia	Agr	iculture								N/A	N/A	S			
ene	Prin	mary Body Contac	t Recreation										S		
ď	Pub	olic & Private Wate	er Supply												
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough In	formation sp	*Stand	lards rev	vision, tru	ie color i	s for pe	rmitting	purposes	only.				
NTU	l = ne _l	phelometric turbidity	units OWQS	S = Oklaho	ma Water	Quality Sta	andards	mg/L	= milligram	s per liter	ppi	t = parts pe		d	

 μ S/cm = microsiemens/cm

En = Enterococci

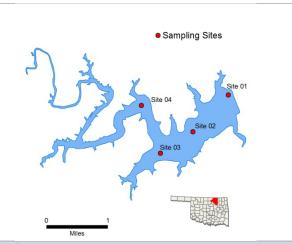
Birch

NTU = nephelometric turbidity units

μS/cm = microsiemens per centimeter E. coli = Escherichia coli

Sample Period	Times Visited	Sampling Sites
November 2015-August 2016	4	4

Location	Osage County
Impoundment	1977
Area	1,137 acres
Capacity	19,200 acre-feet
Purposes	Water Supply, Recreation, Flood Control, Water Quality Control and Fish and Wildlife



		Parameter (<u>Descriptions</u>)		Result					Notes/	Commen	its				
		Average Turbidity		8 NTU					100% (100% of values < OWQS of 25 NTU					
		Average Secchi Disk Depth		62 cm											
	itu	Water Clarity Rating		Good											
	In Situ	Chlorophyll-a		17.8 mg	g/m3										
		Trophic State Index		59					Previou	s value =	: 49				
S.		Trophic Class	Eutrophic												
Parameters		Salinity		0.08 – 0).12 ppt										
ran	a.	Specific Conductivity		182.5 –	249.4 µS	S/cm									
P	Profile	рН		6.17 – 8.43 pH units											
	4	Oxidation-Reduction Potential		26.8 to 375.7 mV											
		Dissolved Oxygen		Up to 57% of water column < 2.0 mg/L in summer											
	ts	Surface Total Nitrogen		0.68 mg	g/L to 0.8	1 mg/L									
	Nutrients	Surface Total Phosphorus		0.018 m	ng/L to 0.	026 mg/L	-								
	Ž	Nitrogen to Phosphorus Ratio		35:1				Phosph	orus limi	ted					
		Click to learn more about Beneficial Uses□		Turbidity	Hd	Dissolved Oxygen	Metals	ISI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a	
ses	Fish	n & Wildlife Propagation		NS	S	NS	S								
<u></u>	Aes	sthetics						S	*						
ficia	Agr	iculture								S	S	S			
Beneficial Uses	Prin	mary Body Contact Recreation											S		
m	Pub	olic & Private Water Supply													
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information		*Standards revision, true color is for per					rmitting	purposes	only.				

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

mV = millivoltsChlor-a = Chlorophyll-a

Bixhoma

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

ថ	Location	Wagoner (County	Click map for site data					
	Impoundment	1965	1965						
<u>ש</u>	Area	110 acres							
5 5	Capacity	3,130 acre-feet							
	Purposes	Water Sup	ply, Recreati	on					



		Parameter (Descriptions)	Result					Notes/Comments							
		Average Turbidity	4 NTU					0% of v	alues > 0	OWQS o	f 25 NTU				
		Average Secchi Disk Depth	146 cm	1											
	ij	Water Clarity Rating	Excelle	ent											
	In Situ	Chlorophyll-a	7 mg/n	13											
		Trophic State Index	50					Previou	s TSI = 4	45					
ပ်		Trophic Class	Mesotr	ophic											
Parameters		Salinity	0.02 -	0.11 ppt											
ıran	a)	Specific Conductivity	48.5 –	225 µS/c	m										
Pa	Profile	pН	5.85 –	8.31 pH	units			9.7% values < 6.5 pH units							
	ቯ	Oxidation-Reduction Potential	47.5 –	567.8 m\	/										
		Dissolved Oxygen	Up to 3 Septen	38% of wa nber	ater colum	nn < 2 mg	g/L in								
	ts	Surface Total Nitrogen	0.31 n	0.31 mg/L to 0.82 mg/L											
	Nutrients	Surface Total Phosphorus	0.005 r	ng/L to 0.	.038 mg/L	_									
	Ž	Nitrogen to Phosphorus Ratio	28:1					Phosphorus limited							
		Click to learn more about Beneficial Uses□	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
ses	Fish	n & Wildlife Propagation	S	NS	NS										
Beneficial Uses	Aes	sthetics					S	*							
ficia	Agr	iculture							S	S	S				
eue	Prin	mary Body Contact Recreation										S			
M	Pub	olic & Private Water Supply													
	N	s = Fully Supporting IS = Not Supporting IEI = Not Enough Information	*Stand	dards rev	ision, tru	ie color i	s for pe	rmitting	ourposes	s only.					

Bluestem Sample Period Times Visited Sampling Sites November 2018 – August 2019 4 4

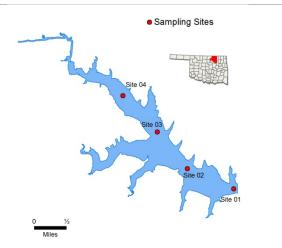
 μ S/cm = microsiemens per centimeter

E. coli = Escherichia coli

mV = millivolts

Chlor-a = Chlorophyll-a

IN	ovember 2018 – Aug	ust 2019	4	4					
	Location	Osage Cou	inty	Click map for site data					
<u>.</u>	Impoundment	1958							
D	Area	762 acres							
	Capacity	17,000 acre	cre-feet						
	Purposes	Water Supp	oly, Recreation	on					



	Pur	poses	water Supply,	Recreation				WIICS							
		Parameter (Des	scriptions)	Result					Notes/0	Commer	ıts				
		Average Turbidi	ty	20 NTL	J				14% of	values >	OWQS	of 25 NTL	J (n=14)		
		Average Secchi	Disk Depth	58 cm											
	itu	Water Clarity Ra	ating	Averag	е										
	In Situ	Chlorophyll-a		4.62 m	ng/m3										
		Trophic State In	dex	46					Previous value = 48						
ပ်		Trophic Class		Mesotro	ophic										
ete	Salinity Specific Conductivity 148.1 - 345.5 µS/cm														
ıram	a\	Specific Conduc	tivity	148.1 -	– 345.5 _L	ıS/cm									
Pa	Profile	рН		7.15 – 8	8.40 pH ı	units			Neutral	to slightl	y alkalin	е			
	ፚ	Oxidation-Reduc	ction Potential	92.5 –	480.9 m\	/									
		Dissolved Oxyge	en	Up to 67% of water column < 2.0 mg/L in August											
	S	Surface Total Ni	itrogen	0.42 m	g/L to 0.7	'2 mg/L									
	Nutrients	Surface Total Ph	nosphorus	0.023 n	0.023 mg/L to 0.080 mg/L										
	Ž	Nitrogen to Phos	sphorus Ratio	13:1					Phosphorus limited						
		Click to learn m Beneficial Uses	nore about	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True	Sulfates	Chlorides	Total Dissolved Solids	En terro.& E. coli	Chlor-a	
ses	Fisl	h & Wildlife Propa	gation	NS	S	NEI	*								
Beneficial Uses	Aes	sthetics						S	*						
ficia	Agr	riculture								N/A	N/A	S			
ene	Prir	mary Body Contac	t Recreation										S		
m	Puk	olic & Private Wate	er Supply												
	٨	S = Fully Supporting NS = Not Supporting NEI = Not Enough In				vision, tru		,	rmitting	purposes	only.				
NTU	l = ne	phelometric turbidity	units OWQS	S = Oklaho	ma Water	Quality Sta	andards	mg/L	= milligram	s per liter	pp	t = parts pe		d	

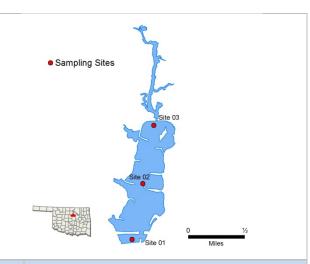
 μ S/cm = microsiemens/cm

En = Enterococci

Boomer

	Sample Period	J	Visited	Sampling Sites				
	October 2014 – July	2015	4	3				
	Location	Payne Cou	nty	Click map for site data				
5	Impoundment	1932						
	Area	260 acres						
	Capacity	3,200 acre-	re-feet					
	Purposes	Cooling Wa	ater and Rec	reation				

Times



		Parameter (<u>Descriptions</u>)	Result					Notes/Comments						
		Average Turbidity	15 NTU	J				0% of v	alues >	OWQS of	f 25 NTU			
		Average Secchi Disk Depth	37 cm											
	In Situ	Water Clarity Rating	Average	Э										
	<u>=</u>	Chlorophyll-a	31mg/n	n3										
		Trophic State Index	64					Previou	s value =	59				
S		Trophic Class	Hypere	eutrophic										
Parameters		Salinity	0.18 - 0).25 ppt										
ıran	a)	Specific Conductivity	377.2 –	516 µS/	cm									
g.	Profile	pH	7.03 -	8.53 pH ı	units			Neutra	l to slight	ily alkalin	ne			
	Ē	Oxidation-Reduction Potential	82.1 to	440.4 m	١V									
		Dissolved Oxygen	Up to 4 in Marc		ater colur	nn < 2.0	mg/L							
	Si	Surface Total Nitrogen	0.95 m	g/L to 1.	52 mg/L									
	Nutrients	Surface Total Phosphorus	0.041 n	ng/L to 0	.074 mg/	L								
	Ž	Nitrogen to Phosphorus Ratio	21:1					Phosphorus limited						
		Click to learn more about Beneficial Uses□	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a	
ses	Fish	h & Wildlife Propagation	NS	S	NS	*								
a U	Aes	sthetics					S	*						
Beneficial Uses	Agr	riculture							*	*	S			
ene	Prir	mary Body Contact Recreation										S	NS	
ш	Pub	olic & Private Water Supply												
	٨	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	*Standards revision, true color is for permitting purposes only.											

mg/L = milligrams per liter

 $\mu \tilde{S}/cm = microsiemens/cm$

ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

mV = millivolts

Chlor-a = Chlorophyll-a

NTU = nephelometric turbidity units

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

Broken Bow

Capacity

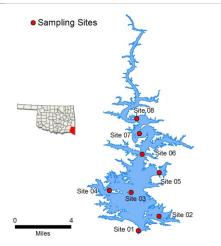
NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$

E. coli = Escherichia coli

	Sample Period	d	Times Visited	Sampling Sites				
(October 2015 – Augu	st 2016	4	8				
	Location	McCurtain	County	Click map for site data				
<u>a</u>	Impoundment	1970	1970					
neral	Area	14,200 acre	es					

918,070 acre-feet

Flood Control, Hydropower, Water Supply,



ppt = parts per thousand

En = Enterococci

	Pur	poses	Recreation				ter Suppr	у,		Miles		Site 01	to-					
		Parameter (Des	scriptions)		Result					Notes/0	Commer	nts						
		Average Turbidit	ty		2 NTU					0% of v	alues >	OWQS c	f 25 NTU					
		Average Secchi	Disk Depth		228 cm	1												
	jţ	Water Clarity Ra	iting		Excelle	ent												
	In Situ	Chlorophyll-a			5 mg/m	13												
		Trophic State Inc	dex		46					Previous	s value =	- 45						
ည		Trophic Class			Mesotr	ophic												
Parameters		Salinity			0.01 -	0.05 ppt												
aran	ω.	Specific Conduc	tivity		29.6 –	29.6 – 101.1 μS/cm												
<u> </u>	Profile	рН			5.49 –	5.49 – 8.05 pH units 7						78% of values < 6.5 pH units						
	<u>~</u>	Oxidation-Reduc	ction Potentia	al	180 – 4	191.6 mV	/											
		Dissolved Oxyge	en		Up to 7 the sur		ater colun	nn < 2.0 ı	mg/L in									
	ts	Surface Total Ni	trogen		0.13 m	ng/L to 0.	44 mg/L											
	Nutrients	Surface Total Ph	nosphorus		0.009 r	ng/L to 0	.022 mg/l	-										
	Ž	Nitrogen to Phos	sphorus Ratio)	25:1					Phosphorus limited								
		Click to learn m Beneficial Uses			Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a			
ses	Fish	h & Wildlife Propa	gation		S	NS*	NS	S										
SO I	Aes	sthetics							S	*								
icia	Agr	iculture									S	S	S					
Beneficial Uses	Prin	mary Body Contac	t Recreation											S				
Be	Pub	olic & Private Wate	er Supply															
	٨	S = Fully Supporting IS = Not Supporting IEI = Not Enough Int	formation	Notes						s part of the or is for p			vely low soi s only.	l pH and la	ack of			

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

OWQS = Oklahoma Water Quality Standards

mV = millivolts

Chlor-a = Chlorophyll-a

Brushy Creek

Capacity

Purposes

NTU = *nephelometric turbidity units*

E. coli = Escherichia coli

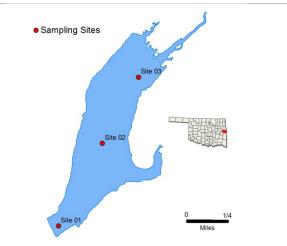
 μ S/cm = microsiemens per centimeter

	Sample Period	d	Times Visited	Sampling Sites				
De	ecember 2014 – Septer	nber 2015	4	3				
	Location	Sequoyah	County	Click map for site data				
<u>a</u>	Impoundment	1964						
eneral	Area	358 acres						
(4)								

Flood Control and Recreation

3,258 acre-feet

Times



ppt = parts per thousand

En = Enterococci

		·												
		Parameter (<u>Descriptions</u>)	Result					Notes/0	Commer	nts				
		Average Turbidity	8 NTU					0% of v	alues >	OWQS c	of 25 NTU			
		Average Secchi Disk Depth	79 cm											
	jţ	Water Clarity Rating	Good											
	In Situ	Chlorophyll-a	13 mg/	m3										
		Trophic State Index	56					Previou	s value =	= 53				
ဖ		Trophic Class	Eutrop	hic										
Parameters		Salinity	0.02 - 0).09 ppt										
ran	4	Specific Conductivity	52.3 –	179.6 µS	S/cm									
Ъ	Profile	pH	5.86 -	8.53 pH	units			11 (11.6%) values < 6.5 units						
	₫.	Oxidation-Reduction Potential	49 to 4	186.4 mV	,									
		Dissolved Oxygen	Up to June	67% of w	ater colu	mn < 2 r	ng/L in							
	ts	Surface Total Nitrogen	0.42 mg/L to 0.89 mg/L											
	Nutrients	Surface Total Phosphorus	0.008 mg/L to 0.038 mg/L											
	Ž	Nitrogen to Phosphorus Ratio	21:1					Phosphorus limited						
		Click to learn more about Beneficial Uses□	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fish	h & Wildlife Propagation	S	NS	NEI	S								
<u> </u>	Aes	sthetics					S	*						
ficia	Agr	iculture							S	S	S			
Beneficial Uses	Prir	mary Body Contact Recreation										S		
m	Pub	olic & Private Water Supply											NS	
	٨	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	*Stando	ırds revis	ion, true o	color is fo	r permitt	ing purpos	es only.					

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

OWQS = Oklahoma Water Quality Standards

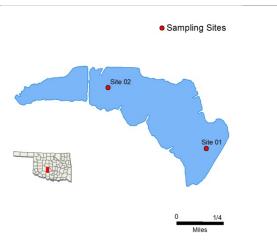
mV = millivolts

Chlor-a = Chlorophyll-a

Burtschi

	Sample Period	d	Times Visited	Sampling Sites				
N	ovember 2005 - Aug	ust 2006	4	5				
	Location	Grady Coul	nty	Click map for site data				
5	Impoundment	1958						
	Area	180 acres						
,	Capacity	2,140 acre-	feet					
	Purposes	Recreation						

Times



	ı uı	rposes Recreation												
		Parameter (<u>Descriptions</u>)	Result					Notes/0	Commen	its				
		Average Turbidity	11 NTU	J				100% o	f values	< OWQS	of 25 NT	Ū		
		Average True Color	18 unit	S				100% o	f values	< OWQ	S of 70			
	In Situ	Average Secchi Disk Depth	72 cm											
	드	Water Clarity Rating	good											
		Trophic State Index	63											
S		Trophic Class	hypertr	ophic										
Parameters		Salinity	0.53 -	0.67 ppt										
aran	ω	Specific Conductivity	1011 –	1273 µS	/cm									
<u>a</u>	Profile	рН	7.19 –	10.74 pH	units			16% of	values w	ere > 9 p	oH units			
		Oxidation-Reduction Potential	42 - 42											
		Dissolved Oxygen Up to 38% of water column < 2 mg/L in August												
	ts	Surface Total Nitrogen	0.92 n	ng/L to 1.8	82 mg/L									
	Nutrients	Surface Total Phosphorus	0.027 r	ng/L to 0.	.109 mg/l	_								
	Ž	Nitrogen to Phosphorus Ratio	24:1	24:1					Phosphorus limited					
		Click to learn more about Beneficial Uses□	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fisl	h & Wildlife Propagation	S	S	S									
	Aes	sthetics					S	S						
Beneficial Uses	Agr	riculture							S	S	S			
ene	Prir	Primary Body Contact Recreation									S			
<u> </u>	Puk	olic & Private Water Supply												
	٨	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	*Stand	ards revis	ion, true (color is fo	r permitt	ing purpos	es only.					

mg/L = milligrams per liter μ S/cm = microsiemens/cm

ppt = parts per thousand En = Enterococci

Canton

 μ S/cm = microsiemens per centimeter

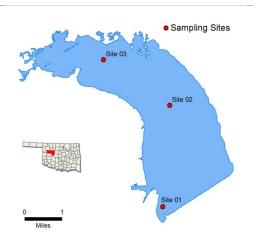
E. coli = Escherichia coli

mV = millivolts

Chlor-a = Chlorophyll-a

	Sample Period	J	Visited	Sampling Sites					
	October 2018 - July	2019	4	3					
	Location	Blaine Cou	nty	Click map for site data					
,	Impoundment	1948							
	Area	7,910 acres	7,910 acres						
	Capacity	111,310 ac	cre-feet						
	Purposes	Flood Cont	rol, Water Sເ	upply, Irrigation					

Times



			1 lood Control,		-1.1.27	J									
		Parameter (Des	scriptions)	Result					Notes/0	Commen	ts				
		Average Turbidi	ty	19 NTL	J				25% of values > OWQS of 25 NTU (n=12)						
		Average Secchi	Disk Depth	71 cm											
	<u>ii</u>	Water Clarity Ra	ating	Poor											
	In Situ	Chlorophyll-a		32.09 ו	mg/m3										
		Trophic State In	dex	65					Previou	s value =	56				
ဖွ		Trophic Class		Hypereutrophic											
Parameters		Salinity		0.65 – 0	0.96 ppt										
ram		Specific Conduc	tivity	1321 – 1886 µS/cm											
Pa	Profile	pН		7.13 – 8.38 pH units					Neutral	to slightl	y alkalin	——— Э			
	ğ	Oxidation-Reduc	ction Potential	-236.2 – 436.4 mV											
		Dissolved Oxyge	en	74% of recorded values below 2 mg/L during July											
	ι	Surface Total Ni	trogen	0.81 mg/L to 1.39 mg/L											
	Nutrients	Surface Total Ph	nosphorus	0.047 mg/L to 0.095 mg/L											
	Ž	Nitrogen to Phos	sphorus Ratio	16:1					Phosph	orus limi	ted				
		<u>Click to learn more about</u> <u>Beneficial Uses</u> □		Turbidity	Hď	Dissolved Oxygen	Metals	ISI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a	
Beneficial Uses	Fisl	h & Wildlife Propa	gation	NS	S	S	S								
a □	Aes	sthetics						S	*						
fici	Agr	riculture								S	S	S			
eue	Prir	mary Body Contac	t Recreation										S		
Ш	Puk	blic & Private Wate	er Supply												
	٨	S = Fully Supporting NS = Not Supporting NEI = Not Enough In		*Stando	ards revis	ion, true c	olor is fo	r permitt	ting purpos	ses only.					

 μ S/cm = microsiemens/cm

En = Enterococci

Carl Albert

 μ S/cm = microsiemens per centimeter

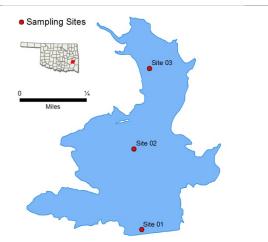
E. coli = Escherichia coli

mV = millivolts

Chlor-a = Chlorophyll-a

	Sample Period	1	Visited	Sampling Sites						
I	November 2016 - Augu	st 2017	4	5						
	Location	Latimer Co	ounty	Click map for site data						
5	Impoundment	1964								
	Area	183 acres								
	Capacity	2,739 acre-feet								
	Purposes	Water Supply, Flood Control, and Recreation								

Times



	PU	irposes	water Supply,	Flood Co	ontrol, an	a Recrea	tion								
		Parameter (Des	criptions)	Result					Notes/0	commen	ıts				
		Average Turbidit	у	5 NTU					All values < 25 NTU						
		Average Secchi	Disk Depth	125 cm	1										
	Situ	Water Clarity Ra	ting	Excelle	ent										
	드	Chlorophyll-a		4.25 m	ng/m3										
		Trophic State Inc	dex	45					Previou	s value =	= 41				
હ		Trophic Class		Mesotrophic											
nete		Salinity		0.02 - 0	0.06 ppt										
Parameters	ø	Specific Conduct	tivity	40.9 - 136 µS/cm											
	Profile	pН		5.99 - 7.49 pH units					16% of	values «	<6.5 units	S			
	□	Oxidation-Reduc	tion Potential	86.5 to 594 mV											
		Dissolved Oxyge	en	Up to 61% of water column < 2 mg/L in August					Occurre	ed at site	1, the d	am			
	S	Surface Total Nit	trogen	0.32 mg/L to 0.45 mg/L											
	Nutrients	Surface Total Ph	osphorus	0.014 mg/L to 0.023 mg/L											
	Z	Nitrogen to Phos	phorus Ratio	22:1					Phosph	orus limi	ted				
		Click to learn more about Beneficial Uses□			Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fis	sh & Wildlife Propag	gation	S	NS	NEI	S								
Beneficial Uses	Ae	esthetics						S	*						
icia	Αg	griculture								S	S	S			
enef	Pr	Primary Body Contact Recreation											S		
ä	Pι	ublic & Private Wate	er Supply												
		S = Fully Supporting NS = Not Supporting NEI = Not Enough Info	ormation September 1	*Stando	ards revis	ion, true c	olor is fo	r permit	ting purpos	es only.	'				

 μ S/cm = microsiemens/cm

En = Enterococci

Carl Blackwell

Purposes

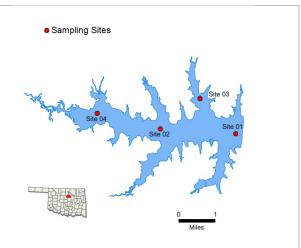
NTU = nephelometric turbidity units μ S/cm = microsiemens per centimeter

E. coli = Escherichia coli

	Sample Period	9	Visited	Sampling Sites
De	cember 2015 – Septer	mber 2016	4	5
	Location	Payne Cou	nty	Click map for site data
<u>n</u>	Impoundment	1937		
neral	Area	3,370 acres	3	
Ge	Capacity	61,500 acre	e-feet	

Water Supply and Recreation

Times



		Parameter (Descriptions)	Result	t				Notes/0	Commer	nts				
		Average Turbidity	25 NTI	J				63% of	values >	25 NTU				
		Average Secchi Disk Depth	39 cm											
	Ę	Water Clarity Rating	Averag	ge										
	In Situ	Chlorophyll-a	15.4 m	ıg/m3										
		Trophic State Index	57					Previous value = 61						
ည		Trophic Class	Eutrop	hic										
Parameters		Salinity	0.18 -	0.19 ppt										
ıran	a)	Specific Conductivity	367.5	– 398.5 µ	ıS/cm									
T	Profile	рН	7.72 –	8.45 pH ι	units			Neutral to slightly alkaline						
	Ē	Oxidation-Reduction Potential	193 – 3	393.3 mV										
		Dissolved Oxygen						All read	dings > 2	2.0 mg/L				
	Si	Surface Total Nitrogen	0.84 n	ng/L to 09	2 mg/L									
	Nutrients	Surface Total Phosphorus	0.036	mg/L to 0.	.056 mg/l	_								
	N	Nitrogen to Phosphorus Ratio	22:1					Phosphorus limited						
		Click to learn more about Beneficial Uses□	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fish	h & Wildlife Propagation	NS	S	NEI	S								
ت ت	Aes	sthetics					S	*						
ficia	Agr	iculture							S	S	S			
Beneficial Uses	Prin	mary Body Contact Recreation										S		
a a	Pub	olic & Private Water Supply											NS	
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	*Stand	*Standards revision, true color is for permitting purposes only.										

 $mg/L = milligrams per liter \ \mu S/cm = microsiemens/cm$

ppt = parts per thousand En = Enterococci

OWQS = Oklahoma Water Quality Standards

mV = millivoltsChlor-a = Chlorophyll-a

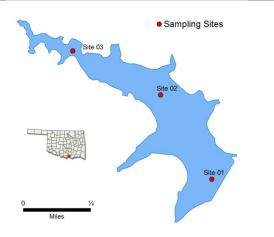
Carter

 μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

mV = millivolts

Chlor-a = Chlorophyll-a

	Sample Period	t	Times Visited	Sampling Sites				
	November 2007 - Augu	st 2008	4	5				
	Location	Marshall Co	ounty	Click map for site data				
;	Impoundment	1960						
	Area	108 acres						
,	Capacity	990 acre-feet						
	Purposes	Water Supply and Recreation						



	Pur	poses	water Supply	and Rec	reation											
		Parameter (Desc	criptions)	Result					Notes/Comments							
		Average Turbidity	/	7 neph	elometri	turbidity	units (N	ITU)	All values < 25 NTU							
		Average True Col	lor	25 units	S				All Values < OWQS of 70							
	itu	Average Secchi D	Disk Depth	121 cm	1											
	In Situ	Water Clarity Rati	ing	exceller	nt											
		Trophic State Inde	ex	40					Previous	s value =	: 40					
ပ		Trophic Class		oligotrophic												
Parameters		Salinity		0.10 - C												
ran	_	Specific Conducti	ivity	212 – 325 µS/cm												
Ра	Profile	рН		6.98 –	8.33 pH	units			Neutral	to slightl	y alkalin	e				
	ሷ	Oxidation-Reduct	tion Potential	60 to 557 mV												
		Dissolved Oxyger	n	Up to 44% of water column < 2 mg/L in August					Occurre	ed at site	1, the c	lam				
	Nutrients	Surface Total Nitr	rogen	0.41 m	g/L to 0.	54 mg/L										
		Surface Total Pho	osphorus	0.011 mg/L to 0.018 mg/L												
	Ž	Nitrogen to Phosp	37:1					Phospho	orus limit	red						
		Click to learn mo Beneficial Uses□	ore about	Turbidity	표	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
ses	Fish	h & Wildlife Propag	ation	S	S	NEI	S									
Beneficial Uses	Aes	sthetics						S	*							
ficia	Agr	riculture								S	S	S				
ene	Prir	mary Body Contact	Recreation										S			
m	Pub	olic & Private Water	Supply													
	٨	S = Fully Supporting IS = Not Supporting IEI = Not Enough Info	*Standa	ırds revis	ion, true c	olor is fo	r permitt	ting purpos	es only.							
		phelometric turbidity u							= milligram			t = parts pe		d		

 μ S/cm = microsiemens/cm

En = Enterococci

C	Cedar											
	Sample Period	d	Times Visited	Sampling Sites								
Ν	lovember 2015 – Se	pt. 2016	4	5								
	Location	Le Flore C	ounty	Click map for site data								
_	Impoundment	1937										

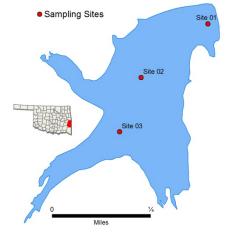
78 acres

1,000 acre-feet

Area

Capacity

E. coli = Escherichia coli



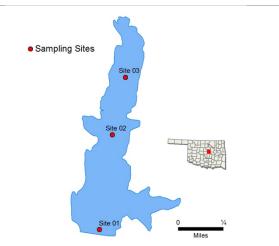
	Pur	poses	Recreation			N	Miles									
		Parameter (Des	criptions)	Result					Notes/0	Commen	its					
		Average Turbidit	ty	7 NTU					100% of values < OWQS of 25 NTU							
		Average Secchi	Disk Depth	92 cm												
	In Situ	Water Clarity Ra	iting	Excelle	nt											
	<u>=</u>	Chlorophyll-a		25.3 m	g/m3											
		Trophic State Inc	dex	62					Previou	s Value=	- 56					
S		Trophic Class		Hypere	utrophic											
Parameters		Salinity		0.01-0).08 ppt											
aran	συ	Specific Conduc	tivity	31.7 –	170.4 µS											
Ğ	Profile	рН	5.92 –	7.36 pH	units			51.56%	< 6.5							
	₫	Oxidation-Reduc	ction Potential	-58.9 –												
		Dissolved Oxyge	en	Up to 40% of water column < 2 mg/L in summer												
	ts	Surface Total Ni	trogen	0.56 m	g/L to 0.	98 mg/L										
	Nutrients	Surface Total Ph	0.023 n	ng/L to 0	.043 mg/l	_										
	Ž	Nitrogen to Phos	24:1					Phosph	orus limi	ted						
		Click to learn m		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
ses	Fish	n & Wildlife Propa	gation	NEI	NS	NS	S									
Ë E	Aes	sthetics						S	*							
eneficial Uses	Agr	iculture								*	*	S				
ene	Prin	mary Body Contac	t Recreation										S			
Ď	Pub	olic & Private Wate	er Supply													
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Inf	formation september 1	*Stando	ards revis	ion, true o	color is foi	r permitt	ing purpos	es only.						
μS/c	m = n	phelometric turbidity nicrosiemens per ce Escherichia coli	ntimeter mV = m										d			

Chlor-a = Chlorophyll-a

Chandler

	Sample Period	d	Times Visited	Sampling Sites			
ı	November 2016 – Augu	ıst 2017	4	5			
	Location	Lincoln Cou	unty	Click map for site data			
5	Impoundment	1960					
	Area	129 acres					
	Capacity	2,778 acre-	cre-feet				
	Purposes	Water Supp	oly and Reci	reation			

Times



	Purposes Water Supp			and Rec	reation							М	iles			
		Parameter (Descrip	otions)	Result					Notes/0	Commer	its					
		Average Turbidity		21 NTU	l				33% of	values >	25 NTU					
		Average Secchi Dis	k Depth	49 cm												
	Situ	Water Clarity Rating	J	Average	е											
	<u>=</u>	Chlorophyll-a		24.97	mg/m3											
		Trophic State Index		62					Previous	s value =	60					
ន		Trophic Class		Eutroph	nic											
Parameters		Salinity		0.14 - 0	0.20 ppt											
aran	o)	Specific Conductivit	у	303.9 -	- 448.7 μ	S/cm										
<u> </u>	Profile	рН		6.73 –	8.83 pH เ	units			Neutral	to slight	y alkalin	е				
	ā	Oxidation-Reduction	n Potential	50.4 to	420.8 m	١V										
		Dissolved Oxygen		Up to 5 August	Up to 54% of water column < 2 mg/L in August				At Site	3						
	ts	Surface Total Nitrog	jen	0.88 m	g/L to 1.0	08 mg/L										
	Nutrients	Surface Total Phosp	ohorus	0.023 r	ng/L to 0	.062 mg/l	L									
	ž	Nitrogen to Phospho	orus Ratio	24:1					Phosphorus limited							
		Click to learn more Beneficial Uses□	about_	Turbidity	듄	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
Beneficial Uses	Fish	h & Wildlife Propagation	on	NS	S	NEI	S									
<u></u>	Aes	sthetics						S	*							
ficia	Agr	iculture								S	S	S				
ene	Prir	mary Body Contact Re	ecreation										S			
m	Pub	olic & Private Water S	upply											NS		
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information *Standards revision, true color is for permi						r permitt	ting purpos	es only.							

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

mV = millivolts

Chlor-a = Chlorophyll-a

NTU = *nephelometric turbidity units*

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

Chickasha

Capacity

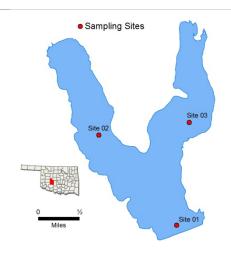
Purposes

	Sample Period	1	Visited	Sampling Sites
(October 2015 – Augu	st 2016	4	3
	Location	Caddo Cou	nty	Click map for site data
<u>ত</u>	Impoundment	1958		
<u>o</u>	Area	820 acres		

Water Supply, Recreation

41,080 acre-feet

Times



ppt = parts per thousand

En = Enterococci

		Parameter (Descriptions)		Result						Notes/Comments						
		Average Turbidity		13 NTU	l				17% of	values >	OWQS	of 25 NTL	J			
		Average Secchi Disk Depth		35 cm												
	In Situ	Water Clarity Rating		Fair												
	드	Chlorophyll-a		54.6 mg	g/m3											
		Trophic State Index		70					Previou	s Value=	=63					
S		Trophic Class		Hypere	utrophic											
Parameters		Salinity		1.28 – 1	1.37 ppt											
arar	a	Specific Conductivity		2493 –	2635.5 µ	S/cm										
ğ	Profile	рН		7.82 – 8	3.48 pH ι	units			Neutral to slightly alkaline							
	₾	Oxidation-Reduction Potential		263.6 to	494.9 n	nV										
		Dissolved Oxygen							All valu	ies recor	ded abo	ve 2.0 mg	/L			
	ts	Surface Total Nitrogen		1.58 m	1.58 mg/L to 1.71 mg/L											
	Nutrients	Surface Total Phosphorus		0.042 m	ng/L to 0.	.060 mg/L	-									
	Ž	Nitrogen to Phosphorus Ratio		34:1					Phosphorus limited							
		Click to learn more about Beneficial Uses□		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
ses	Fish	n & Wildlife Propagation		S	S	S	S									
ا ت	Aes	ethetics						NEI	S							
fici	Agri	iculture								S	S	S				
Beneficial Uses	Prin	mary Body Contact Recreation											S			
a	Pub	olic & Private Water Supply														
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	The lake is currently listed in the Oklahoma Watershed (NLW). This listing means that the laintensive study can confirm the Aesthetics benefit					ke is consi	dered thre	eatened fr			nore			

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

OWQS = Oklahoma Water Quality Standards

mV = millivolts

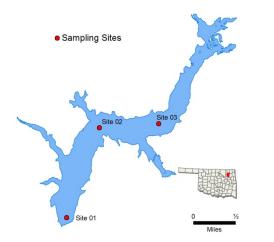
Chlor-a = Chlorophyll-a

NTU = *nephelometric turbidity units*

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

Claremore **Times** Sampling Sites **Sample Period Visited** 3 October 2018 - July 2019 4 Location Rogers County Click map for site data Impoundment 1930 General Area 470 acres Capacity 7,900 acre-feet **Purposes** Water Supply, Recreation



		P	Trato. Cup	۲.۶	, rtooroat													
		Parameter (Des	scriptions)		Result					Notes/0	Commer	nts						
		Average Turbidi	ty		14 NTL	J				8% of v	alues > 0	OWQS o	f 25 NTU	(n=12)				
		Average Secchi	Disk Depth		55 cm													
	iţ	Water Clarity Ra	ating		Good													
	In Situ	Chlorophyll-a			38.25 n	ng/m3												
		Trophic State In	dex		66					Previou	s value =	= 63						
က်		Trophic Class			Hypere	utrophic												
Parameters		Salinity			0.08-0).11 ppt												
ıran	o)	Specific Conduc	tivity		181.9 –	- 238.9 µ	S/cm											
<u> </u>	Profile	рН			6.91 –	8.81 pH	units											
	Ē	Oxidation-Reduction Potential 38.6 – 481.9 mV																
		Dissolved Oxygo	en		Up to 3 July	Jp to 35% of water column < 2 mg/L in July				Occurr	ed at site	1, the c	lam					
	ts	Surface Total N	itrogen		0.86 m	ng/L to 1.2	20 mg/L											
	Nutrients	Surface Total Pl	nosphorus		0.046 n	ng/L to 0.	.121 mg/L	-										
	ž	Nitrogen to Pho	sphorus Ratio)	14:1					Phosphorus Limited								
		Click to learn m Beneficial Uses	nore about		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a			
ses	Fish	h & Wildlife Propa	gation		S	S	NEI	S										
ت ا	Aes	sthetics							NEI**	*								
ficia	Agr	iculture									S	S	S					
Beneficial Uses	Prir	mary Body Contac	t Recreation											S				
m	Pub	olic & Private Wate	er Supply												NS			
	٨	S = Fully Supporting IS = Not Supporting IEI = Not Enough In		Notes	**The lake is listed in the WQS as a I threatened by nutrients until studies ca								considere	ed				

NTU = *nephelometric turbidity units* μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivoltsChlor-a = Chlorophyll-a

mg/L = milligrams per liter μ S/cm = microsiemens/cm

Clear Creek

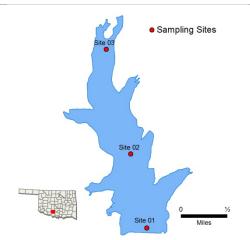
NTU = *nephelometric turbidity units*

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

Sample Period	d	Times Visited	Sampling Sites				
October 2015 – Sept	t. 2016	4	3				
Location	Stephens C	County	Click map for site data				
Impoundment	1948						
Area	722 acres						
Capacity	7,711 acre-	e-feet					
Durnagas	Motor Supr	alv Boorooti	00				

Times



	Purposes Water Supp			ly, Recreation											
		Parameter (Desc	eriptions)	R	esult					Notes/0	Commer	nts			
		Average Turbidity	,	7	NTU					100% o	f values	< OWQS	of 25 NT	U	
		Average Secchi D	Disk Depth	51	cm										
	Situ	Water Clarity Rati	ing	A	/erag	е									
	드	Chlorophyll-a		21	1.2 m	g/m3									
		Trophic State Inde	ex	61						Previou	s Value=	- 62			
กั		Trophic Class		H	ypere	eutrophic									
Parameters		Salinity		0.	29 –	0.42 ppt									
aran	Φ	Specific Conducti	vity	61	14.2 -	- 852.8 µ	S/cm								
g,	Profile	рН		7.	17 –	8.26 pH ւ	units								
	₫.	Oxidation-Reduction Potential -53 to 364 mV													
		Dissolved Oxyger	1		o to 4 ugust	5% of wa	iter colum	nn < 2 m(g/L in						
	ts	Surface Total Nitr	ogen	0.	90 m	g/L to 1.0	4 mg/L								
	Nutrients	Surface Total Pho	osphorus	0.	029 r	ng/L to 0.	.058 mg/L	-							
	Ž	Nitrogen to Phosp	horus Ratio	23	3:1					Phosphorus limited					
		Click to learn mo Beneficial Uses□	ore about		Turbidity	Hd.	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
ses	Fish	h & Wildlife Propaga	ation		S	S	S	S							
ت ت	Aes	sthetics							S	*					
ficia	Agr	iculture									NS	NS	NS		
Beneficial Uses	Prin	mary Body Contact	Recreation											S	
m	Pub	olic & Private Water	Supply												NS
	N	S = Fully Supporting IS = Not Supporting IEI = Not Enough Info	rmation	Notes	*Standards revision, true color is for permit					ting purpos	es only.				

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

mV = millivolts

Cleveland City

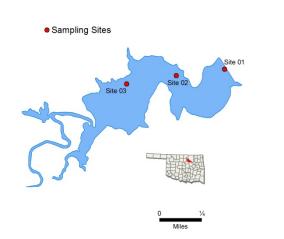
NTU = nephelometric turbidity units

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

	Sample Period	d	Times Visited	Sampling Sites			
С	ecember 2015 – Sep	ot. 2016	4	5			
	Location	Pawnee Co	ounty	Click map for site data			
<u></u>	Impoundment	1936					
	Area	159 acres					
ם פ	Capacity	2,200 acre-	re-feet				
	Purposes	Water Supp	oly, Recreation	on			

Times



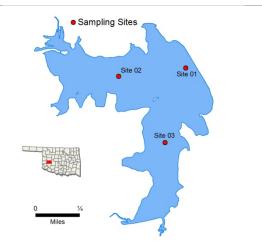
		'														
		Parameter (<u>Descriptions</u>)		Result					Notes/0	Commer	nts					
		Average Turbidity		14 NTU	J				100% o	f values	<owqs< td=""><td>of 25 NT</td><td>J</td><td></td></owqs<>	of 25 NT	J			
		Average Secchi Disk Depth		49 cm												
	캺	Water Clarity Rating		Average	e											
	In Situ	Chlorophyll-a		14.9 m	g/m3											
		Trophic State Index		57					Previou	s Value=	=56					
S		Trophic Class		Eutroph	nic											
Parameters		Salinity		0.08 – 0	0.16 ppt											
arar	a	Specific Conductivity		178.3 –	328.9 µ	S/cm										
<u>a</u>	Profile	рH		7.09 – 7	7.79 pH ເ	units										
		Oxidation-Reduction Potential		192.1 to	o 459.4 n	nV										
		Dissolved Oxygen							All val	ues reco	rded abo	ve 2.0 mg	ı/L			
	S.	Surface Total Nitrogen 0.97 mg/L to 1.33 mg/L														
	Nutrients	Surface Total Phosphorus		0.054 n	ng/L to 0.	.066 mg/L	-									
	Z	Nitrogen to Phosphorus Ratio		19:1	9:1					Phosphorus limited						
		Click to learn more about Beneficial Uses□		Turbidity	Hď	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
ses	Fisl	h & Wildlife Propagation		NS	S	S	S									
Beneficial Uses	Aes	sthetics						S	S							
ficia	Agr	riculture								S	S	S				
ene	Prir	mary Body Contact Recreation											S			
m	Puk	olic & Private Water Supply														
	٨	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	ırds revis	ion, true c	color is fo	r permitt	ing purpos	es only.								

OWQS = Oklahoma Water Quality Standards

mV = millivoltsChlor-a = Chlorophyll-a $mg/L = milligrams per liter \ \mu S/cm = microsiemens/cm$

Clinton

	Sample Period	t	l imes Visited	Sampling Sites			
	October 2009 – July	2010	4	5			
	Location	Washita Co	ounty	Click map for site data			
<u>.</u>	Impoundment	1931					
gener	Area	335 acres					
5	Capacity	3,980 acre-	re-feet				
	Purposes	Water Supp	oly, Recreation	on			



		Parameter (<u>Descriptions</u>)	R	esult					Notes/	Commen	its					
		Average Turbidity	1	8 NTL	J				27% of	values >	OWQS	of 25 NTL	J			
		Average True Color														
	itu	Average Secchi Disk Depth	5	7 cm												
	In Situ	Water Clarity Rating	а	verag	е											
		Trophic State Index	6	5					Previou	s = 66						
ত		Trophic Class	h	ypere	utrophic											
Parameters		Salinity	0	.27 –	0.31 ppt											
arar	Ф	Specific Conductivity	5	35.2 -	- 604.5 µ	S/cm										
ğ	Profile	рН	7	.52 –	8.23 pH ι	units			Slightly	/ alkaline						
	₫	Oxidation-Reduction Potential	-2	21 – 4	26 mV											
		Dissolved Oxygen		Up to 43% of water column < 2 mg/L in the summer.												
	ts	Surface Total Nitrogen	0	.79 m	g/L to 1.3	8 mg/L										
	Nutrients	Surface Total Phosphorus	0	.057 n	ng/L to 0.	104 mg/L	-									
	N	Nitrogen to Phosphorus Ratio	1	6:1					Phosphorus limited							
		Click to learn more about						TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
Beneficial Uses	Fish	a & Wildlife Propagation		NS	S	S	S									
<u>a</u>	Aes	thetics						NEI*	*							
fici	Agri	iculture								S	S	S				
ene	Prin	nary Body Contact Recreation														
m	Pub	olic & Private Water Supply												NS		
	N	= Fully Supporting S = Not Supporting El = Not Enough Information	tł	*The lake is listed in the WQS as a NL¹ threatened by nutrients until studies car *Standards revision, true color only for p				an be cond	ducted to d	onfirm noi			considered	I		

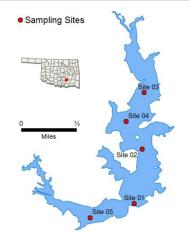
NTU = nephelometric turbidity units

mg/L = milligrams per liter $<math>\mu S/cm = microsiemens/cm$

ppt = parts per thousand En = Enterococci

Coalgate City

	Sample Perio	d	Times Visited	Sampling Sites			
Dec	cember 2014 – Septe	ember 2015	4	3			
	Location	Coal County		Click map for site data			
ਕ੍ਰ	Impoundment	1965					
General	Area	352 acres					
စ္	Capacity	3,437 acre-fe	e-feet				
	Purposes	Water Suppl	y, Recreation	on and Flood Control			



	Pur	rposes	Water Supply	, Recreati	on and F	lood Con	trol									
		Parameter (Des	scriptions)	Result					Notes/0	Commer	ıts					
		Average Turbidit	ty	34 NTL	J				75% of	values >	owqs	of 25 NTU	ı			
		Average Secchi	Disk Depth	38 cm												
	Situ	Water Clarity Ra	ating	Poor												
	<u>=</u>	Chlorophyll-a		11 mg/ı	m3											
		Trophic State Inc	dex	54					Previous value = 47							
ည		Trophic Class		Eutroph	nic											
Parameters		Salinity		0.04 – 0	0.06 ppt											
ıran	a	Specific Conduc	tivity	92.7 –	136.6 µS	/cm										
g.	Profile	рН		6.64– 7	Neutral	to slight	ly alkalin	e								
	7	Oxidation-Reduc	ction Potential	133.7 to 422.9 mV												
		Dissolved Oxyge	en	Up to 5 June	0% of wa	ater colum	nn < 2 m(g/L in								
	S.	Surface Total Ni	trogen	0.65 mg	g/L to 1.0	9 mg/L										
	Nutrients	Surface Total Ph	nosphorus	0.030 n	0.030 mg/L to 0.087 mg/L											
	Ž	Nitrogen to Phos	16:1					Phosphorus limited								
		Click to learn m Beneficial Uses	nore about	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
ses	Fis	h & Wildlife Propa	gation	NS	S	NS	NS									
) 	Aes	sthetics						S	*							
ficia	Agı	riculture								S	S	S				
Beneficial Uses	Prir	mary Body Contac	t Recreation										S			
m	Pul	blic & Private Wate	er Supply													
	^	S = Fully Supporting NS = Not Supporting NEI = Not Enough Int		*Standa	rds revision	on, true col	lor is for p	ermitting	purposes o	nly.						

 μ S/cm = microsiemens/cm

En = Enterococci

mV = millivolts

Chlor-a = Chlorophyll-a

 μ S/cm = microsiemens per centimeter

E. coli = Escherichia coli

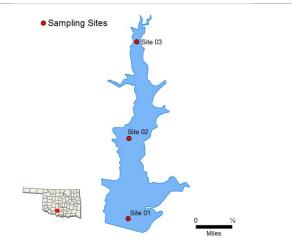
Comanche		
Sample Period	Times Visited	Sampling Sites
December 2010 – August 2011	4	5

 μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

mV = millivolts

Chlor-a = Chlorophyll-a

L	December 2010 – Augu	ıst 2011	4	5					
	Location	Stephens C	County	Click map for site data					
5	Impoundment	1960							
5	Area	184 acres							
5	Capacity	2,500 acre-feet							
	Purposes	Water Supp	Vater Supply and Recreation						

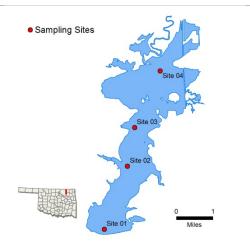


En = Enterococci

 μ S/cm = microsiemens/cm

	Pur	poses	water Supply a	y and Recreation					·							
		Parameter (Desc	criptions)	Result					Notes/0	Commer	ıts					
		Average Turbidity	y	12 NTU	J				100% o	f values	< OWQS	of 25 NT	U			
		Average Secchi [Disk Depth	86					Did not	collect fo	or true co	olor				
	itu	Water Clarity Rat	ting	Good												
	In Situ	Chlorophyll-a		8 mg/m	13											
		Trophic State Ind	lex	50					Previous value = 58							
ည		Trophic Class		Mesotro	phic											
Parameters		Salinity		0.14 - 0	0.2 ppt											
ıran	a \	Specific Conduct	ivity	284.8 –	398.1 μ	S/cm										
P	Profile	рН		6.9 – 8.89 pH units					Neutral	to slight	ly alkalin	e				
	₫.	Oxidation-Reduct	tion Potential	-47 to 427 mV												
		Dissolved Oxyger	n	50% o		olumn < :	2.0 mg/L	. in								
	ts	Surface Total Niti	rogen	0.49 m	g/L to 0.	72 mg/L										
	Nutrients	Surface Total Pho	osphorus	0.015 n	ng/L to 0	.031 mg/l	L									
	Ž	Nitrogen to Phosp	28:1					Phosphorus limited								
		Click to learn more about Beneficial Uses□		Turbidity	Hd.	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a		
ses	Fish	h & Wildlife Propag	ation	S	S	NEI	S									
Beneficial Uses	Aes	sthetics						S	*							
fici	Agr	riculture								*	*	S				
ene	Prir	mary Body Contact	Recreation										S			
B	Pub	olic & Private Water	r Supply													
	٨	S = Fully Supporting NS = Not Supporting NEI = Not Enough Info	ormation S	*Standards revision, true color is for permitting purposes only.												
		phelometric turbidity		S = Oklahoma Water Quality Standards mg/L = milligrams per liter ppt = parts per thousand								d				

C	opan							
	Sample Period	d	Times Visited	Sampling Sites				
1	November 2014 – Augu	ust 2015	4	5				
	Location	Washingtor	County	Click map for site data				
<u>ia</u>	Impoundment	1983						
General	Area	4,850 acres	3					
Ö	Capacity	43,400 acre	re-feet					
	Purposes		rol, Water Su	upply, Water Quality				



	Pur	poses Control, Fish													
		Parameter (<u>Descriptions</u>)		Result					Notes/0	Commen	its				
		Average Turbidity		117 NT	U				100% o	f values	> 25 NTl	J			
		Average Secchi Disk Depth		14 cm											
	Situ	Water Clarity Rating		Poor											
	<u>=</u>	Chlorophyll-a		10 mg/ı	m3										
		Trophic State Index		53					Previous value = 58						
ร		Trophic Class		Eutroph	nic										
Parameters		Salinity		0.09 - 0	0.15 ppt										
aran	a)	Specific Conductivity		183.3 –	· 321 µS/	cm									
9,	Profile	pH		7.13 – 7.99 pH units					Neutral to slightly alkaline						
	₫	Oxidation-Reduction Potential		40.4 to 523.4 mV											
		Dissolved Oxygen		Up to 4 August		ater colum	nn < 2 m(g/L in							
	Si	Surface Total Nitrogen		0.52 m	g/L to 1.2	26 mg/L									
	Nutrients	Surface Total Phosphorus		0.049 mg/L to 0.202 mg/L											
	ž	Nitrogen to Phosphorus Ratio		7:1					Possibly co-limited						
		Click to learn more about Beneficial Uses□		Turbidity	표	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fish	h & Wildlife Propagation		NS	S	S	S								
ت ت	Aes	sthetics						S	*						
ficia	Agr	iculture								S	S	S			
Beneficial Uses	Prin	mary Body Contact Recreation											S		
m	Pub	olic & Private Water Supply												NS	
	N	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information			ards revis	ion, true o	color is fo	r permitt	ing purpos	es only.					

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

mV = millivolts

Chlor-a = Chlorophyll-a

NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$

E. coli = Escherichia coli

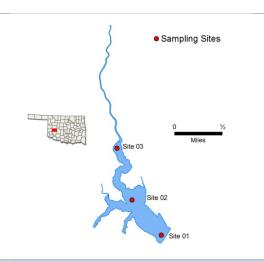
C	rowder			
	Sample Period	t	Times Visited	Sampling Sites
	October 2018 - July	2019	17	3
	Location	Washita Co	ounty	Click map for site data
<u>ia</u>	Impoundment	1959		
General	Area	158 acres		
စ်	Capacity	2,094 acre-	feet	

Flood Control, Recreation

Purposes

NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$

E. coli = Escherichia coli



		Parameter (Descriptions)	Result					Notes/0	Commen	its		Notes/Comments						
		Average Turbidity	29 NTL	J				33% of	values >	OWQS (of 25 NTU	l						
		Average Secchi Disk Depth	57 cm															
	<u> </u>	Water Clarity Rating	Averag	e														
	In Situ	Chlorophyll-a	59.5 m	g/m3														
		Trophic State Index	71					Previous value =67										
ပ်		Trophic Class	Hypere	utrophic														
Parameters		Salinity	0.23-0	.81 ppt														
ran	a)	Specific Conductivity	481.8 -	· 1598 μS	S/cm													
P	Profile	рН	7.06–8	.42 pH u	nits			Neutral to slightly alkaline										
	፵	Oxidation-Reduction Potential	-250.8	– 458.2 n	ηV													
		Dissolved Oxygen	Up to 6 July	7% of wa	iter colum	nn < 2 mg	g/L in											
	ts	Surface Total Nitrogen	0.98 mg/L to 3.29 mg/L															
	Nutrients	Surface Total Phosphorus	0.072	mg/L to 0	.284 mg/	L												
	Ž	Nitrogen to Phosphorus Ratio	14:1					Phosphorus Limited										
		Click to learn more about Beneficial Uses□	Turbidity	된	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a					
ses	Fish	n & Wildlife Propagation	NS	S	NEI	S												
Beneficial Uses	Aes	sthetics					NEI*	S										
ficia	Agr	iculture							S	S	S							
eue	Prin	mary Body Contact Recreation										S						
a	Pub	olic & Private Water Supply											NS					
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	*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															

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

mV = millivolts

Cushing Municipal

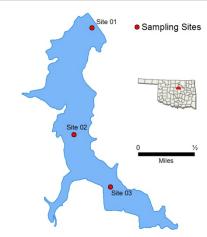
 μ S/cm = microsiemens per centimeter

E. coli = Escherichia coli

mV = millivolts

Chlor-a = Chlorophyll-a

	Sample Period	d	Visited	Sampling Sites				
	October 2016 - July	2017	4	5				
	Location	Payne Cou	nty	Click map for site data				
<u></u>	Impoundment	1950						
	Area	591 acres						
	Capacity	3,304 acre-	feet					
	Purposes	Water Supp	upply, Recreation					



	Pui	rposes	water Supp	y, Recreation													
		Parameter (Des	scriptions)		Result					Notes/0	Commer	nts					
		Average Turbidit	ty		59 NTU	J				75% of	values >	owqs	of 25 NTL	J			
		Average Secchi	Disk Depth		29 cm												
	턡	Water Clarity Ra	ating		Poor												
	In situ	Chlorophyll-a			11.05 ו	mg/m3											
		Trophic State Inc	dex		54					Previous value = 50							
ည		Trophic Class			Eutroph	nic											
Parameters		Salinity			0.11 – 0	0.21 ppt											
ıran		Specific Conduc	ctivity		244 – 4	40.9 µS/	'cm										
Pa	Profile	pН			7.31– 8.33 pH units					Neutral	to slight	y alkalin	е				
	₽	Oxidation-Reduc	ction Potential		229 to 436.1 mV												
		Dissolved Oxyge	en		Up to 9% of water column < 2 mg/L in July												
	Ŋ	Surface Total Ni	itrogen		0.65 mg	g/L to 1.6	62 mg/L										
	Nutrients	Surface Total Ph	nosphorus		0.084 n	ng/L to 0	.257 mg/l	<u></u>									
	Ž	Nitrogen to Phos	sphorus Ratio		6:1					Possibly co- limited							
		Click to learn m			Turbidity	Hd.	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
ses	Fis	h & Wildlife Propa	gation		NS	S	S	S									
Beneficial Uses	Aes	sthetics							S	*							
ficia	Agı	riculture									S	S	S				
ene	Primary Body Contact Recreation													S			
a	Pul	blic & Private Wate	er Supply														
	1	S = Fully Supporting NS = Not Supporting NEI = Not Enough Int		Notes	*Standards revision, true color is for permitting purposes only.												
		ephelometric turbidity			= Oklahoi	ma Water	Quality St	andards		= milligram			t = parts pe		d		

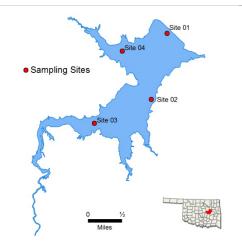
 μ S/cm = microsiemens/cm

Dripping Springs

 μ S/cm = microsiemens per centimeter mV = millivolts

E. coli = Escherichia coli

	Sample Perio	od	Times Visited	Sampling Sites				
(October 2016 – Augu	ust 2017	4	5				
	Location	Okmulgee C	ounty	Click map for site data				
<u>a</u>	Impoundment	1950						
neral	Area	1,150 acres						
Ge	Capacity	16,200 acre-f	-feet					
	Purposes	Water Supply	ly, Recreation and Flood Control					



		p0303	Water Supply, 10	ny, recordation and ricod control											
		Parameter (Des	scriptions)	Result					Notes/	Commen	its				
		Average Turbidi	ty	14 NTL	J				13% of	values <	OWQS	of 25 NTU			
		Average Secchi	Disk Depth	90 cm											
	itu	Water Clarity Ra	ating	Good											
	In Situ	Chlorophyll-a		5.1 mg	/m3										
		Trophic State In	dex	47					Previou	s value =	: 50				
က်		Trophic Class		Mesotro	ophic										
Parameters		Salinity		0.04 – 0	0.07 ppt										
ram		Specific Conduc	ctivity		147 µS/cı	m									
Ра	Profile	pН	<u> </u>	6.39– 7.88 pH units					Only 4.	5 % of va	lues bel	ow 6.5			
	P	Oxidation-Redu	ction Potential	61 to 488.2 mV					-						
		Dissolved Oxyg	en	Up to 6 June	0% of wa	nn < 2.0 r	ng/L in								
	S	Surface Total N	itrogen	0.36 mg	g/L to 0.8	9 mg/L									
	Nutrients	Surface Total Pl	hosphorus	0.016 n	ng/L to 0.	.069 mg/L	_								
	Nut	Nitrogen to Pho	sphorus Ratio	19:1					Phosph	orus limi	ted				
		Click to learn n Beneficial Uses	Turbidity	된	Dissolved Oxygen	Metals	ISI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
ses	Fish	h & Wildlife Propa	gation	NS	S	S	S								
Beneficial Uses		sthetics	·					S	*						
icia	Agr	iculture								N/A	N/A	S			
enef	Prin	mary Body Contac	ct Recreation										S		
m	Pub	olic & Private Wate	er Supply												
	Ν	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information			*Standards revision, true color is for permitting purposes only.										
		phelometric turbidity	units OWQS =	S = Oklahoma Water Quality Standards											

Chlor-a = Chlorophyll-a

 μ S/cm = microsiemens/cm

Duncan

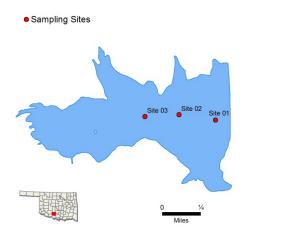
 μ S/cm = microsiemens per centimeter

E. coli = Escherichia coli

mV = millivolts

Chlor-a = Chlorophyll-a

Sample Period	t	Times Visited	Sampling Sites				
October 2013 – July	2014	4	5				
Location	Stephens	County	Click map for site data				
Impoundment	1937						
Area	500 acres						
Capacity	7,200 acre-	7,200 acre-feet					
Purposes	Water Supp	oly, Recreation	on				



Purposes Water Supply, Recreation Parameter (Descriptions) Result																
		Parameter (Des	criptions)	Result					Notes/0	Commen	nts					
		Average Turbidit	у	11 NTU	J				100% o	f values	< OWQS	S of 25 NT	U (n=11)			
		Average Secchi	Disk Depth	97 cm												
	Situ	Water Clarity Ra	ting	Good												
	<u>=</u>	Chlorophyll-a		9.40 m	g/m3											
		Trophic State Inc	dex	53					Previou	s value =	= 60					
ည		Trophic Class		Eutropl	nic											
Parameters		Salinity		0.17 –	0.21 ppt											
ıran	o)	Specific Conduct	tivity	353.8 -	- 433.8 μ	S/cm										
<u> </u>	Profile	рН		7.10– 8	3.41 pH u	nits			Slightly	Alkaline						
	ā	Oxidation-Reduc	tion Potential	-34.4 –	423.10 r	nV										
		Dissolved Oxyge	en	Up to 2 July	5% of wa	ater colum	nn < 2 m	g/L in	Occurred at site 1, the dam							
	S	Surface Total Nit	trogen	0.51 m	g/L to 0.8											
	Nutrients	Surface Total Ph	osphorus	0.020 mg/L to 0.042 mg/L												
	Ž	Nitrogen to Phos	phorus Ratio	23:1					Phosph	orus limi	ted					
		Click to learn m Beneficial Uses	<u>ore about</u>	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
ses	Fish	h & Wildlife Propaç	gation	S	S	S	S									
Beneficial Uses	Aes	sthetics						S	*							
ficia	Agr	riculture								S	S	S				
eue	Prir	Primary Body Contact Recreation											S			
m	Pub	olic & Private Wate	er Supply													
	٨	S = Fully Supporting IS = Not Supporting IEI = Not Enough Inf	formation sign	*Stando	ards revis	ion, true c	olor is fo	r permit	ting purpos	es only.						
		phelometric turbidity		= Oklaho	ma Water	Quality Sta	andards		= milligram			t = parts pe		d		

 μ S/cm = microsiemens/cm

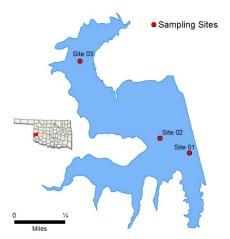
Elk City

NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$

E. coli = Escherichia coli

	Sample Period	d	Times Visited	Sampling Sites
Ν	ovember 2005 - Aug	ust 2006	4	5
	Location	Beckham C	County	Click map for site data
General	Impoundment	1970		
	Area	240 acres		
	Capacity	2,583 acre-	feet	

Times



ppt = parts per thousand En = Enterococci

	Pur	poses	Flood Control,	Recreat	ion				Miles		1	2				
		Parameter (Des	scriptions)	Result					Notes/0	Commer	ıts					
		Average Turbidit	ty	15 NTU	J				100% o	f values	< OWQS	of 25 NT	U			
		Average True Co	olor	26 units	S				100% o	f values	< OWQ	S of 70				
	In Situ	Average Secchi	Disk Depth	56 cm												
	드	Water Clarity Ra	nting	Fair to	poor											
		Trophic State Inc	dex	59												
Ñ		Trophic Class		eutroph	nic											
Parameters		Salinity		0.30-0).39 ppt											
aran	συ	Specific Conduc	tivity	593.3 -	- 749.9 μ	S/cm										
9,	Profile	рН		7.70– 8.49 pH units						to slightl	y alkalin	е				
	₫	Oxidation-Reduc	ction Potential	374 - 4	_											
		Dissolved Oxyge	en	Up to 2 May	2% of wa	iter colum	n < 2 mg	g/L in								
	ts	Surface Total Ni	trogen	0.74 m	ng/L to 1.0											
	Nutrients	Surface Total Ph	nosphorus	0.037 n	ng/L to 0.	.067 mg/L										
	Ž	Nitrogen to Phos	sphorus Ratio	17:1					Possibly	/ co-limit	ed					
		Click to learn m Beneficial Uses	nore about	Turbidity	퓑	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
ses	Fish & Wildlife Propagation			NS	S	S	S									
<u></u>	Aes	sthetics						NEI	*							
Beneficial Uses	Agr	iculture								S	S	S				
eue	Prin	mary Body Contac	t Recreation										S			
m	Pub	olic & Private Wate	er Supply													
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Int	formation spon	threaten	ed by nutr	ients until	studies ca	n be cond	ing that the ducted to co ourposes or	onfirm no		ial use is co status.	onsidered			

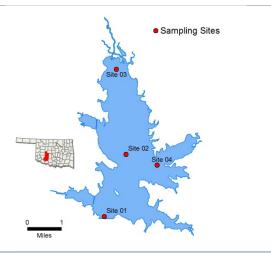
mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

OWQS = Oklahoma Water Quality Standards

mV = millivolts

Ellsworth Times **Sample Period** Sampling Sites Visited October 2018 - July 2019 4 5 Location Comanche County Click map for site data 1962 Impoundment General Area 5,600 acres Capacity 95,200 acre-feet



	Pur	poses	Water Supply,	ply, Recreation						Miles							
		Parameter (Des	scriptions)	Result					Notes/0	Commen	its						
		Average Turbidit	ty	49 NTU					63% of	values >	OWQS (of 25 NTU	l (n=20)				
		Average Secchi	Disk Depth	41 cm													
	In Situ	Water Clarity Ra	iting	Poor													
	<u>=</u>	Chlorophyll-a		7.87 m	ıg/m3												
		Trophic State Inc	dex	51					Previous	s value =	60						
ত		Trophic Class		Eutroph	nic												
Parameters		Salinity		0.11 – 0).32 ppt												
ıran	ø)	Specific Conduc	tivity	241.2 – 661 μS/cm													
<u> </u>	Profile	рН		7.4 – 8.	36 pH ur	nits			Neutral to slightly alkaline								
	₫	Oxidation-Reduc	ction Potential	85.6 to	455 mV												
		Dissolved Oxyge	en	Up to 39% of water column <2 mg/L in July													
	ts	Surface Total Ni	trogen	0.69 mg	g/L to 1.7	'3 mg/L											
	Nutrients	Surface Total Ph	nosphorus	0.090 m	0.090 mg/L to 0.398 mg/L												
	Ž	Nitrogen to Phos	sphorus Ratio	7:1					Possibly	y co - lim	ited						
		Click to learn m Beneficial Uses	nore about	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a			
Beneficial Uses	Fish	n & Wildlife Propa	gation	NS	S	S	S										
a C	Aes	sthetics						S	N/A								
fici	Agr	iculture								N/A	N/A	S					
ene	Prin	nary Body Contac	t Recreation										S				
m	Pub	olic & Private Wate	er Supply											NS			
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Int	formation september 1	*Standards revision, true color is for per					ing purpos	es only							

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

mV = millivolts

Chlor-a = Chlorophyll-a

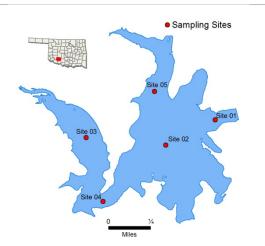
NTU = *nephelometric turbidity units*

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

Elmer Thomas

	Sample Period	k	Visited	Sampling Sites				
C	October 2015 – Augu	st 2016	4	5				
	Location	Comanche	County	Click map for site data				
<u></u>	Impoundment							
General	Area	334 acres						
ပ္	Capacity	12,000 acre-feet						
	Purposes	Recreation						



	Pur	poses	Recreation	Result						Nation (O - manufacture)							
		Parameter (Desc	riptions)	Result					Notes/0	Commen	its						
		Average Turbidity		2 NTU					100% o	f values	< OWQ	S of 25 NT	U				
		Average Secchi D	isk Depth	209 cm	1												
	itu	Water Clarity Rati	ng	Excelle	nt												
	In Situ	Chlorophyll-a		5.1 m	g/m3												
		Trophic State Inde	эх	47					Previous Value=39								
હ		Trophic Class		Mesotre	ophic												
Parameters		Salinity		0.05 -	0.11 ppt												
ıran	a)	Specific Conducti	vity	106 – 2	226.2 μS/	cm											
<u> </u>	Profile	рН		6.15 – 7.96 pH units						values <	6.5 pH	units					
	₫.	Oxidation-Reduct	ion Potential	36.7 to	575.8 m	V											
		Dissolved Oxyger	ı	Up to 7 July	4% of wa	ater colum	nn < 2 m	g/L in									
	ts	Surface Total Nitr	ogen	0.58 m	g/L to 0.6	2 mg/L											
	Nutrients	Surface Total Pho	sphorus	0.008 n	ng/L to 0	.016 mg/L	_										
	Ž	Nitrogen to Phosp	horus Ratio	49:1					Phosphorus limited								
		Click to learn mo Beneficial Uses□	re about	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a			
ses	Fish	h & Wildlife Propaga	ation	S	S	NS	S										
<u> </u>	Aes	sthetics						S	S								
fici	Agr	iculture								S	S	S					
Beneficial Uses	Prin	mary Body Contact	Recreation										S				
m	Pub	olic & Private Water	Supply														
	Λ	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information			*Standards revision, true color is for permitt					mitting purposes only							
μS/c	m = n	phelometric turbidity unicrosiemens per cent	timeter $mV = m$			Quality Sta	andards		/L = milligrams per liter								

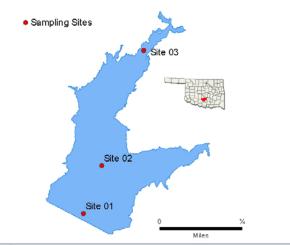
E. coli = Escherichia coli

Elmore City Times **Sample Period** Sampling Sites Visited 4 3 October 2018 - August 2019 Location **Garvin County** Click map for site data Impoundment 1966 General Area 69 acres

1,554 acre-feet

Capacity

Purposes



	Pur	poses		Miles											
		Parameter (Descriptions)	Resu	lt				Notes/0	Commer	nts					
		Average Turbidity	24 N	ΓU				42% of	values >	owqs	of 25 NTL	J			
		Average Secchi Disk Depth	49 cn	1											
	In Situ	Water Clarity Rating	Excel	lent											
	드	Chlorophyll-a	12.20	mg/m3											
		Trophic State Index	55					Previou	s Value=	=					
ည		Trophic Class	Eutro	phic											
Parameters		Salinity	0.07	- 0.12 ppt											
ıran	a \	Specific Conductivity	140 –	· 258.7 μS	/cm										
Pa	Profile	рН	6.88	- 8.32 pH	units			10% of	values <	6.5 pH	units				
	₫.	Oxidation-Reduction Potentia	24 to	410.8 mV											
		Dissolved Oxygen		Up to 52% of water column < 2 mg/L in August											
	S	Surface Total Nitrogen	0.81 ו	mg/L to 1.2	25 mg/L										
	Nutrients	Surface Total Phosphorus	0.050	0.050 mg/L to 0.101 mg/L											
	Ž	Nitrogen to Phosphorus Ratio	14:1	14:1					Phosphorus limited						
		Click to learn more about Beneficial Uses□	Turbidity	H _d	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
ses	Fish	h & Wildlife Propagation	S	S	NS	S									
Beneficial Uses	Aes	sthetics					S	S							
ficia	Agr	riculture							S	S	S				
enei	Prin	mary Body Contact Recreation										S			
m	Pub	olic & Private Water Supply													
	٨	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	*Stan	dards revis	sion, true o	color is fo	r permit	ting purpos	es only						
NTU	l = ne	phelometric turbidity units OW	QS = Oklal	noma Water	Quality St	andards	mg/L	= milligram	s per liter	pp	t = parts pe		d		

 μ S/cm = microsiemens/cm

En = Enterococci

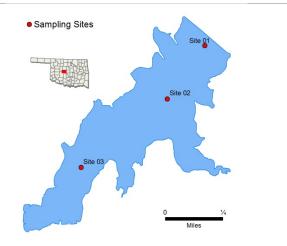
mV = millivolts

Chlor-a = Chlorophyll-a

 μ S/cm = microsiemens per centimeter

E. coli = Escherichia coli

Ε	El Reno													
	Sample Period	d	Times Visited	Sampling Sites										
D	ecember 2011 - Aug	ust 2012	4	3										
	Location	Canadian	County	Click map for site data										
<u>a</u>	Impoundment	1937												
General	Area	170 acres												
တိ	Capacity	709 acre-fe	et											
Purposes Flood Control, Recreation														



	Fui	poses	Flood Control,	Necieali	OH												
		Parameter (Des	scriptions)	Result					Notes/0	Commen	its						
		Average Turbidi	ty	36 NTL	J				50% of	values >	OWQS	of 25 NTL	J (n=12)				
		Average Secchi	Disk Depth	25 cm													
	Situ	Water Clarity Ra	ating	Poor													
	밀	Chlorophyll-a		20 mg	/m3												
		Trophic State In	dex	78													
က်		Trophic Class		Hypere	utrophic												
Parameters		Salinity		0.55 – 0	0.81 ppt												
ram		Specific Conduc	tivity	1108 –	1617 µS	/cm											
Ра	Profile	pН		7.70 – 9			Slightly	alkaline									
	4	Oxidation-Reduc	ction Potential	225 to	544 mV												
		Dissolved Oxyge	en	All data	All data are above screening level of 2.0 mg/L												
	Si	Surface Total Ni	trogen	1.33 m	g/L to 2.6												
	Nutrients	Surface Total Ph	nosphorus	0.149 n	ng/L to 0	.441 mg/L	-										
	Ž	Nitrogen to Phos	sphorus Ratio	7:1					Possibly co-limited								
		Click to learn m Beneficial Uses		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a			
ses	Fish	h & Wildlife Propa	gation	NS	S	S	S										
Š	Aes	sthetics						NEI	*								
ficia	Agr	riculture								S	S	S					
Beneficial Uses	Prin	mary Body Contac	t Recreation										S				
m	Pub	olic & Private Wate	er Supply														
S = Fully Supporting NS = Not Supporting NEI = Not Enough Information **Standards revision, true co * Based on the TSI and chloro											ded to be	considered	and NLW	<i>'</i> .			
μS/c	m = r	phelometric turbidity microsiemens per ce	entimeter $mV = m$	= Oklahoma Water Quality Standards mg/L = milligra iillivolts μS/cm = micro = Chlorophyll-a								ot = parts pe n = Enteroco		d			

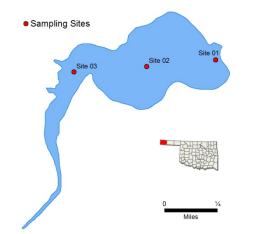
Chlor-a = Chlorophyll-a

E. coli = Escherichia coli

Carl Etling

	Sample Period	d	Times Visited	Sampling Sites
C	October 2012 – Augu	st 2013	4	3
	Location	Cimarron C	County	Click map for site data
<u>a</u>	Impoundment	1958		
General	Area	159 acres		
g	Capacity	1717 acre-	feet	

Times



	Pur	poses	Recreation										Willes				
		Parameter (Des	scriptions)		Result					Notes/	Commen	ıts					
		Average Turbidi	ty		37 NTL	J				25% of	values >	OWQS	of 25 NTL	J			
		Average Secchi	Disk Depth		26 cm												
	Ē	Water Clarity Ra	iting		fair												
	In Situ	Chlorophyll-a			45 mg/ı	m3											
		Trophic State In	dex		68					Previou	ıs value =	= 72					
S		Trophic Class			Hypere	utrophic											
Parameters		Salinity			0.12 – 0	0.25 ppt											
aran	a	Specific Conduc	tivity		259 – 5	517 μS/cr	n										
ď	Profile	pН			6.22 – 8.49 pH units						ecorded	values <	6.5 pH ur	nits			
		Oxidation-Reduc	ction Potentia	ı	-168 —	194 mV											
		Dissolved Oxyge	en		Up to 3	3% < 2m	g/L in Au	gust									
	ts	Surface Total Ni	trogen		1.33 mg/L to 2.33 mg/L												
	Nutrients	Surface Total Ph	nosphorus		0.074 n	ng/L to 0.	18 mg/L										
	Z	Nitrogen to Phos	sphorus Ratio)	18:1					Phosph	orus limi	ted					
		Click to learn m Beneficial Uses			Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
ses	Fish & Wildlife Propagation				NS	NS	S	S									
Š	Aes	sthetics							NEI	*							
ficia	Agr	riculture									NS	NS	NS				
Beneficial Uses	Prir	mary Body Contac											S				
m	Puk	olic & Private Wate															
	٨	S = Fully Supporting IS = Not Supporting IEI = Not Enough In	formation	*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 μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivoltsChlor-a = Chlorophyll-a

mg/L = milligrams per liter μ S/cm = microsiemens/cm

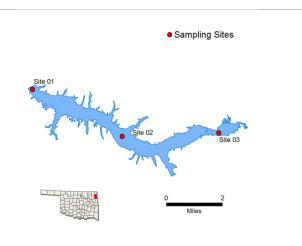
Eucha

Sample Period

			Visited							
	October 2014 – July	2015	4	3						
	Location	Delaware C	County	Click map for site data						
5	Impoundment	1952								
	Area	2,860 acres	2,860 acres							
	Capacity	79,600 acre	e-feet							
	Purposes	Water Supr	oly Recreation	on						

Times

Sampling Sites



	Pur	poses	er Supply,	Recreation	on											
		Parameter (Description	ons)	Result					Notes/0	Commen	its					
		Average Turbidity		3 NTU					100% o	f values	< OWQS	S of 25 NT	U			
		Average Secchi Disk [Depth	104 cm												
	itu	Water Clarity Rating		Excelle	nt											
	In Situ	Chlorophyll-a		21 mg/	m3											
		Trophic State Index		60					Previou	s value =	= 55					
હ		Trophic Class		Eutroph	nic											
Parameters		Salinity		0.07 – 0).14 ppt											
aran	ø.	Specific Conductivity		148.2 –	298.5 μ	S/cm										
٣	Profile	рН		6.62 – 9	9.12 pH ι	units			Neutral to moderately alkaline							
	₫	Oxidation-Reduction F	Potential	1.6 to 5	14.6 mV											
		Dissolved Oxygen		Up to 8	2% of wa	iter colum	nn < 2 m	g/L in								
	ts	Surface Total Nitrogen	1	0.72 mg	g/L to 2.9	4 mg/L										
	Nutrients	Surface Total Phospho	orus	0.005 m	ng/L to 0.	059 mg/L	-									
	Ž	Nitrogen to Phosphoru	us Ratio	68:1					Phosphorus limited							
		Click to learn more al Beneficial Uses□	<u>bout</u>	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
ses	Fish	n & Wildlife Propagation		S	S	NS	S									
Beneficial Uses	Aes	sthetics						NEI	*							
fici	Agr	iculture								S	S	S				
ene	Prin	mary Body Contact Recr	reation										S			
Ď	Pub	olic & Private Water Sup											NS			
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Informati	Notes	Standard	ds (WQS)	and is con	sidered n	utrient thr		,	the Okla	homa Wate	er Quality			

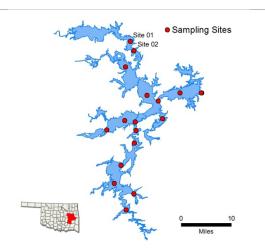
NTU = *nephelometric turbidity units* μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards

mg/L = milligrams per liter μ S/cm = microsiemens/cm

Eufaula, Deep Fork Arm (1-2)

Sample Period	t	Times Visited	Sampling Sites				
October 2016 – July	2017	4	17				
Location	Haskell Co	unty	Click map for site data				
Impoundment	1964						
Area	105,000 acres						
Capacity	2,314,600 acre-feet						
Purposes			ntrol, Hydropower,				
	October 2016 – July Location Impoundment Area Capacity	Impoundment 1964 Area 105,000 ac Capacity 2,314,600 a Water Supplements Water Supplements	Sample Period Visited October 2016 – July 2017 4 Location Haskell County Impoundment 1964 Area 105,000 acres Capacity 2,314,600 acre-feet Water Supply Flood Co				



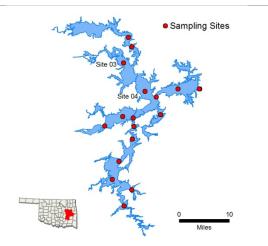
		Parameter (Descriptions)	Result					Notes/	ommor	ite								
											(OF NITI							
		Average Turbidity	32 NTU	J				63% of	values >	OWQS	of 25 NTC	J						
		Average Secchi Disk Depth	33 cm															
	In Situ	Water Clarity Rating	Poor															
	Ξ	Chlorophyll-a	7.15 m	ng/m3														
		Trophic State Index	50					Previou	comments Values > OWQS of 25 NTU So value = 51 To slightly alkaline Values > Output Value = 51 To slightly alkaline Value = 51 To slightly alkaline Value = 51 To slightly alkaline N/A N/A S NEI N/A N/A S NEI NIUMANIA S NEI N									
S		Trophic Class	Mesotr	ophic														
Parameters		Salinity	0.09 -	0.21 ppt														
arar	Φ	Specific Conductivity	185.7 -	- 445.6 μ	S/cm													
٣	Profile	pH	7.05 –	8.32 pH ι	units			Neutral	to slightl	y alkalin	е							
	Ē	Oxidation-Reduction Potential	349.2 – 490.6 mV															
		Dissolved Oxygen	Up to 5 August		ater colun	nn <2 mg	/L in											
	S	Surface Total Nitrogen	0.49 m	g/L to 0.8	34 mg/L													
	Nutrients	Surface Total Phosphorus	0.063 n	ng/L to 0.	.111 mg/l	-												
	Ž	Nitrogen to Phosphorus Ratio	7:1					Possibl	y co-limit	ed								
		Click to learn more about Beneficial Uses□	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a					
ses	Fisl	h & Wildlife Propagation	NS	S	NEI	NEI												
	Aes	sthetics					S	*										
Beneficial Uses	Agr	riculture							N/A	N/A	S							
ene	Prir	mary Body Contact Recreation										NEI						
m	Pul	blic & Private Water Supply																
	٨	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	*Standards revision, true color is for permitting purposes only.															

NTU = nephelometric turbidity units $\mu S/cm =$ microsiemens per centimeter E. coli = Escherichia coli coli = Escher

OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a mg/L = milligrams per liter μS/cm = microsiemens/cm

Eufaula, N. Canadian Arm (3-4)

	Sample Period	d	Times Visited	Sampling Sites				
	October 2016 – July	2017	4	17				
	Location	Haskell Co	unty	Click map for site data				
<u>la</u>	Impoundment	1964						
General	Area	105,000 acres						
တီ	Capacity	2,314,600 acre-feet						
	Purposes	Water Supp Sediment C	oply, Flood Control, Hydropower, Control					



		Sec	diment Con	trol															
		Parameter (Description	ions)	Result					Notes/	Commer	its								
		Average Turbidity		26 NTU	J				38% of	values >	OWQS	of 25 NTL	J						
		Average Secchi Disk	Depth	57 cm															
	itu	Water Clarity Rating		Averag	е														
	In Situ	Chlorophyll-a		14.85	mg/m3														
		Trophic State Index		57					Previou	s value =	= 53								
ဖွ		Trophic Class		Eutropl	nic														
Parameters		Salinity		0.17 –	0.28 ppt														
ram	_	Specific Conductivity		358.3 -	- 577.2 μ	S/cm													
Ра	Profile	pH		7.87 – 8.36 pH units						to slightl	y alkalin	e							
	4	Oxidation-Reduction	Potential	336.4 -	- 494.4 m	١V													
		Dissolved Oxygen		Up to 4 August		ater colum	nn < 2.0 r	ng/L in											
	(A)	Surface Total Nitroge	n	0.58 m	g/L to 1.3	31 mg/L													
	Nutrients	Surface Total Phosph	norus	0.055 r	ng/L to 0	.133 mg/L	_												
	Ž	Nitrogen to Phosphor	us Ratio	9:1					Phosph	orus Lim	ited								
	Click to learn more about Beneficial Uses Hd. QXXXO Hd. QXXXO Hd. QXXXI Beneficial Uses Hd. QXXXI Beneficial Uses Hd. QXXXI Beneficial Uses Hd. QXXXII Beneficial Uses Hd. QXXXII Beneficial Uses								True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a					
ses	Fish	h & Wildlife Propagation	n	NS	S	NEI	NEI												
) -	Aes	sthetics						S	N/A										
ficia	Agr	riculture								N/A	N/A	S							
Beneficial Uses	Prin	mary Body Contact Rec	reation										NEI						
m	Pub	olic & Private Water Su	pply																
S = Fully Supporting NS = Not Supporting NEI = Not Enough Information *Standards revision, true color is for permitting purposes only.																			
NTL		phelometric turbidity units		= Oklaho	ma Water	Quality Sta	andards	mg/L	= milligram	s per liter	pp	t = parts pe	er thousan	d					

NTU = nephelometric turbidity units OWQS = Oklal $\mu S/cm = microsiemens per centimeter$ mV = millivolts

OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a $mg/L = milligrams per liter \mu S/cm = microsiemens/cm$

Eufaula (5-7)

 μ S/cm = microsiemens per centimeter

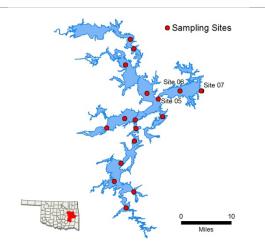
E. coli = Escherichia coli

mV = millivolts

Chlor-a = Chlorophyll-a

Sample Period	d	Visited	Sampling Sites					
October 2016 – July	2017	4	17					
Location	Haskell Co	unty	Click map for site data					
Impoundment	1964							
Area	105,000 acres							
Capacity	2,314,600 acre-feet							
Purposes	Water Supp		ontrol, Hydropower,					

Times

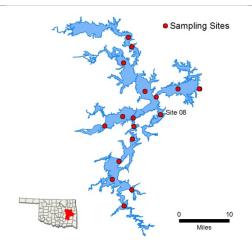


	Fui	poses	Sediment Cont	rol															
		Parameter (Des	scriptions)	Result					Notes/0	Commen	ıts								
		Average Turbidi	ty	6 NTU					0% of v	alues >	OWQS o	f 25 NTU							
		Average Secchi	Disk Depth	114 cm	ı														
		Water Clarity Ra	ating	Excelle	nt														
		Chlorophyll-a		6.26 m	ng/m3														
		Trophic State In	dex	49					Previous value = 48										
ည		Trophic Class		Mesotr	ophic														
Parameters		Salinity		0.18 –	0.25 ppt														
ran	_	Specific Conduc	tivity	371.3 – 515 μS/cm															
Ъа	Profile	рН		6.91 –	8.61 pH ι	units			Neutral	to slightl	y alkalin	e							
	ሷ	Oxidation-Reduc	ction Potential	158.9 – 513.3 mV															
		Dissolved Oxyge	en	Up to 4 August		ater colum	nn < 2.0 r	ng/L in											
	S	Surface Total Ni	itrogen	0.48 m	g/L to 0.6	7 mg/L													
	Nutrients	Surface Total Ph	nosphorus	0.027 r	ng/L to 0	.052 mg/L	_												
	Ž	Nitrogen to Phos	sphorus Ratio	13:1					Phosphorus limited										
		Click to learn m Beneficial Uses		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a					
ses	Fish	h & Wildlife Propa	gation	S	S	NEI	NEI												
Beneficial Uses	Aes	sthetics						S	*										
ficia	Agr	riculture								N/A	N/A	S							
ene	Prin	mary Body Contac	t Recreation										NEI						
ă	Pub	olic & Private Wate	er Supply																
	٨	S = Fully Supporting IS = Not Supporting IEI = Not Enough Init		*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																		

 μ S/cm = microsiemens/cm

Eufaula, Longtown Creek Arm (8)

	Sample Period	d	Times Visited	Sampling Sites						
	October 2016 – July	2017	4	17						
	Location	Haskell Co	unty	Click map for site data						
ᇛ	Impoundment	1964								
General	Area	105,000 ac	105,000 acres							
စ္	Capacity	2,314,600 acre-feet								
	Purposes	Water Supp Control	pply, Flood Control, Hydropower, Sediment							



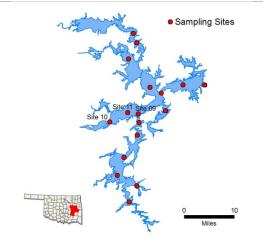
		Control																
		Parameter (<u>Descriptions</u>)	Result					Notes/	Commer	its								
		Average Turbidity	8 NTU					0% of \	alues >	OWQS o	f 25 NTU							
		Average Secchi Disk Depth	87 cm															
	Ē	Water Clarity Rating	Good															
	In Situ	Chlorophyll-a	16.76 r	mg/m3														
		Trophic State Index	58					Previou										
ဖွ		Trophic Class	Eutropl	hic														
Parameters		Salinity	0.16 -	0.25 ppt														
ıran	a ,	Specific Conductivity	336.1 -	- 512 μS/	'cm													
Ра	Profile	рН	6.99 – 8.44 pH units						to slightl	y alkalin	e							
	<u></u>	Oxidation-Reduction Potential	207.1 -	- 427.1 m	١V													
		Dissolved Oxygen	Up to 5 August		r column	<2 mg/L	in											
	ဟ	Surface Total Nitrogen	0.43 m	g/L to 0.6	64 mg/L													
	Nutrients	Surface Total Phosphorus	0.026 r	mg/L to 0	.048 mg/L	-												
	Ž	Nitrogen to Phosphorus Ratio	15:1					Phosph	orus limi	ted								
		<u>Click to learn more about</u> <u>Beneficial Uses</u> □	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a					
ses	Fisl	h & Wildlife Propagation	NS	S	NEI	NEI												
ے ت	Aes	sthetics					S	*										
ficia	Agr	riculture							N/A	N/A	S							
Beneficial Uses	Prir	mary Body Contact Recreation										NEI						
m	Puk	olic & Private Water Supply																
S = Fully Supporting NS = Not Supporting NEI = Not Enough Information *Standards revision, true color is for permitting purposes only.																		
NTL				ma Water	Quality St	andards	mg/L	= milligram	s per liter	pp	t = parts pe	er thousan	d					

NTU = nephelometric turbidity units DWQS = Oklal $\mu S/cm = microsiemens per centimeter$ E. coli = Escherichia coli Chlor-a = Chlor

OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a $mg/L = milligrams per liter \mu S/cm = microsiemens/cm$

Eufaula, Canadian River Arm (9-11)

	Sample Period	d	Times Visited	Sampling Sites					
	October 2016 – July	2017	4	17					
	Location	Haskell Co	unty	Click map for site data					
<u>ख</u>	Impoundment	1964							
General	Area	105,000 ac	105,000 acres						
စ္	Capacity	2,314,600 a	acre-feet						
	Purposes	Water Supp Control	oly, Flood Co	ntrol, Hydropower, Sediment					



	ı uı	Control													
		Parameter (<u>Descriptions</u>)	Result					Notes/0	Commen	ıts					
		Average Turbidity	24 NTU	J				33% of	values >	OWQS	of 25 NTL	l			
		Average Secchi Disk Depth	52 cm												
	In Situ	Water Clarity Rating	Fair												
	<u>=</u>	Chlorophyll-a	5.87 m	g/m3											
		Trophic State Index	48					Previou	s value =	= 53					
ည		Trophic Class	Mesotr	ophic											
Parameters		Salinity	0.17 –	0.45 ppt											
aran	ω	Specific Conductivity	349.5	– 908.2 µ	S/cm										
٣	Profile	рН	7.19 –	8.39 pH ւ		Neutral	to slightl	y alkalin	Э						
	₫.	Oxidation-Reduction Potential		- 416.9 m											
		Dissolved Oxygen	Up to 4	2% of wagust	iter colun	nn < 2.0 r	ng/L in								
	ts	Surface Total Nitrogen	0.44 m	g/L to 1.0	8 mg/L										
	Nutrients	Surface Total Phosphorus	0.031 r	ng/L to 0.	.097 mg/l	-									
	Ž	Nitrogen to Phosphorus Ratio	12:1					Phosph	orus limi	ted					
		Click to learn more about Beneficial Uses□	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a		
ses	Fish	h & Wildlife Propagation	NS	S	NEI	NEI									
a U	Aes	sthetics					S	*							
fici	Agr	riculture							N/A	N/A	S				
Beneficial Uses	Prin	mary Body Contact Recreation										NEI			
<u> </u>	Pub	olic & Private Water Supply													
	N	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	*Standa	irds revisio	n, true col	or is for pe	ermitting p	ourposes o	nly.						

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

mV = millivolts

Chlor-a = Chlorophyll-a

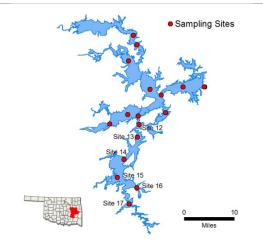
NTU = *nephelometric turbidity units*

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

Eufaula, Gaines Creek Arm (12-17)

	Sample Period	d	Times Visited	Sampling Sites					
	October 2016 – July	2017	4	17					
	Location	Haskell Co	unty	Click map for site data					
ल	Impoundment	1964	1964						
General	Area	105,000 ac	res						
9 9	Capacity	2,314,600 a	acre-feet						
	Purposes	Water Supp Control	oly, Flood Co	ontrol, Hydropower, Sediment					



	Fui	Control																	
		Parameter (Descriptions)	Result					Notes/	Commen	ıts								
		Average Turbidity		31 NTU	J				46% of	values >	OWQS	of 25 NTU	Ì						
		Average Secchi Disk Der	oth	48 cm															
	itu	Water Clarity Rating		Fair															
	In Situ	Chlorophyll-a		13.75 r	mg/m3														
		Trophic State Index		56					Previou	s value =	= 49								
ပ်		Trophic Class		Eutrop	hic														
Parameters		Salinity		0.04 -	0.34 ppt														
ıran	a)	Specific Conductivity		87.6 –	692.1 µS	/cm													
<u> </u>	Profile	рН		6.5 – 8	.21 pH ur	nits													
	Ē	Oxidation-Reduction Pote	ential	192 – 4	147.1 mV														
		Dissolved Oxygen		Up to 5		ater colun	nn < 2.0 r	ng/L in											
	Ŋ	Surface Total Nitrogen		0.37 m	g/L to 0.7	7 mg/L													
	Nutrients	Surface Total Phosphoru	s	0.029 r	mg/L to 0	.107 mg/l	_												
	N	Nitrogen to Phosphorus I	Ratio	9:1					Phosph	orus limi	ted								
		Click to learn more abou Beneficial Uses□	<u>ıt</u>	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a					
ses	Fish	h & Wildlife Propagation		NS	S	NS	NEI												
<u>ء</u> ا	Aes	sthetics						S	N/A										
Beneficial Uses	Agr	riculture								N/A	N/A	S							
ene	Prin	mary Body Contact Recrea	tion										NEI						
m	Pub	olic & Private Water Supply																	
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	Notes	*Standa	ırds revisio	on, true col	or is for pe	ermitting p	ourposes o	nly.									
NTU	l = ne _l	phelometric turbidity units	OWQS	S = Oklaho	ma Water	Quality St	andards	mg/L	= milligram	s per liter	pp	t = parts pe	r thousan	d					

 μ S/cm = microsiemens/cm

En = Enterococci

 μ S/cm = microsiemens per centimeter

E. coli = Escherichia coli

mV = millivolts

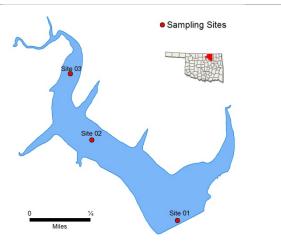
Fairfax

NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$

E. coli = Escherichia coli

	Sample Period	d	Times Visited	Sampling Sites					
N	ovember 2015 – Aug	ust 2016	4	5					
	Location	Osage Co	unty	Click map for site data					
3	Impoundment	1936							
	Area	111 acres	111 acres						
	Capacity	1,795 acre-	feet						
	Durnaga	Motor Cupr	alv Boorootie	an a					

Times



	Pur	poses	Water Suppl	y, Recr	eatio	on															
		Parameter (Description	riptions)	Res	ult					Notes/0	Commer	ıts									
		Average Turbidity		8 N	TU					100% o	f values	< OWQS	of 25 NT	U							
		Average Secchi D	isk Depth	71 (cm																
	Situ	Water Clarity Ratio	ng	goo	d																
	드	Chlorophyll-a		12.9	9 m	g/m3															
		Trophic State Inde	ex	56						Previou	s Value=	= 55									
S		Trophic Class		Eut	roph	nic															
Parameters		Salinity		0.13	3– 0	.18 ppt															
aran	ω	Specific Conductiv	vity	273	.2–	376.20 μ	S/cm														
٣	Profile	рН		6.98	5 – 8	3.13 pH ι	units			Neutral to slightly alkaline											
	₫.	Oxidation-Reducti	on Potential			285 mV															
		Dissolved Oxygen	1	Up			iter colum	nn < 2 m(g/L in												
	ts	Surface Total Nitro	ogen	0.70) mg	g/L to 0.9	2 mg/L														
	Nutrients	Surface Total Pho	sphorus	0.02	20 m	ng/L to 0.	034 mg/L	-													
	Ž	Nitrogen to Phosp	horus Ratio	30:	1					Phosph	orus limi	ted			& E. coli Chlor-a						
		Click to learn mode Beneficial Uses	re about	Turbidity		Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a						
ses	Fish	n & Wildlife Propaga	ation	S		S	S	S													
<u></u>	Aes	sthetics							S	*											
Beneficial Uses	Agr	iculture									S	S	S								
ene	Prin	mary Body Contact I	Recreation											S							
m	Pub	olic & Private Water	Supply												NS						
	N	S = Fully Supporting IS = Not Supporting IEI = Not Enough Infor	rmation	*Sta	ndaı	rds revisio	n, true col	or is for pe	ermitting p	ourposes o	nly.										

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

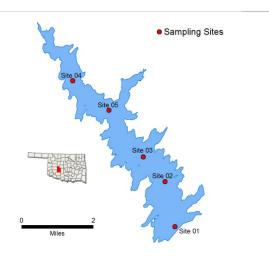
mV = millivolts

Fort Cobb

NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$

E. coli = Escherichia coli

	Sample Period	d	Visited	Sampling Sites					
	October 2018 - July	2019	4	6					
	Location	Caddo Cou	nty	Click map for site data					
5	Impoundment	1959							
	Area	4,100 acres	acres						
Ś	Capacity	80,010 acre	0,010 acre-feet						
	Purposes	Flood Cont Recreation	rol, Water Su	upply, Fish & Wildlife,					



ppt = parts per thousand En = Enterococci

		Recreation (Pagarintiana)	Beeu	14			Notes/Comments								
		Parameter (<u>Descriptions</u>)	Resu												
		Average Turbidity	16 NT	Ū				15% of	values >	OWQS	of 25 NTU	(n=20)			
		Average Secchi Disk Depth	93 cm	1											
	In Situ	Water Clarity Rating	Good												
	드	Chlorophyll-a	38.02	mg/m3											
		Trophic State Index	66					Previou	s value =	= 71					
S		Trophic Class	Нуреі	eutrophic											
Parameters		Salinity	0.12-	0.29 ppt											
arar	υ	Specific Conductivity	259 –	600 μS/c	m										
<u>a</u>	Profile	рН	7.01–	8.77 pH (units			Neutral to slightly alkaline							
	₫.	Oxidation-Reduction Potential	-244.7	7 – 414.1 r	nV										
		Dissolved Oxygen	Up to July	64% of wa	ater colun	nn < 2.0	mg/L in								
	ts	Surface Total Nitrogen	1.23 mg/L to 2.54 mg/L												
	Nutrients	Surface Total Phosphorus	0.200	mg/L to 0	.189 mg/l	-									
	Ž	Nitrogen to Phosphorus Ratio	4:1					Phosph	orus limi	ted					
		Click to learn more about Beneficial Uses□	Turbidity	된	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
ses	Fish	n & Wildlife Propagation	S	S	S	S									
<u></u>	Aes	ethetics					NEI	N/A							
ficia	Agr	iculture							N/A	N/A	S				
Beneficial Uses	Prin	nary Body Contact Recreation										S			
m	Pub	olic & Private Water Supply											NS		
	N	is = Fully Supporting IS = Not Supporting IEI = Not Enough Information	*The later threater t	ake is listed ened by nuti lards revisio	rients until	studies ca	an be con	ducted to c	onfirm no			onsidered			

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

OWQS = Oklahoma Water Quality Standards

mV = millivolts

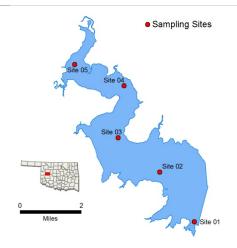
Sample Period Times Visited Sampling Sites

NTU = nephelometric turbidity units

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

(October 2015 – Augu	st 2016	4	5					
	Location	Custer Cou	nty	Click map for site data					
ธ	Impoundment	1961							
	Area	8,800 acres							
	Capacity	256,220 acre-feet							
	Purposes	Recreation							



ppt = parts per thousand

En = Enterococci

		Parameter (Descriptions)	Result					Notes/0	Commen	ıts								
		Average Turbidity	11 NTU	J				100% o	f values	< OWQS	of 25 NT	U						
		Average Secchi Disk Depth	88 cm															
	itu	Water Clarity Rating	Good															
	In-Situ	Chlorophyll-a	11.8 m	g/m3														
		Trophic State Index	55					Previou	ıs Value=	: 54								
က်		Trophic Class	Eutropl	nic														
Parameters		Salinity	1.15– 1	.28 ppt														
ıran	a)	Specific Conductivity	2257.6	-2482.1	μS/cm													
g.	Profile	рН	7.5 – 8	.26 pH ur	nits													
	₫.	Oxidation-Reduction Potential	-41 to 4	146.2 mV														
		Dissolved Oxygen	Up to 3 July	8% of wa	iter colun	nn < 2 mg	g/L in											
	ts	Surface Total Nitrogen	0.90 m	g/L to 1.1	5 mg/L													
	Nutrients	Surface Total Phosphorus	0.019 n	ng/L to 0.	.085 mg/l	_												
	Ž	Nitrogen to Phosphorus Ratio	21:1					Phosph	orus limi	ted								
		Click to learn more about Beneficial Uses□	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a					
Beneficial Uses	Fish	n & Wildlife Propagation	NS	S	S	NEI												
a U	Aes	sthetics					S	*										
fici	Agri	iculture							S	S	S							
ene	Prin	mary Body Contact Recreation										NEI						
m	Pub	olic & Private Water Supply				NEI												
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	*Standa	rds revisio	n, true col	or is for pe	ermitting p	ourposes o	nly.									

mg/L = milligrams per liter

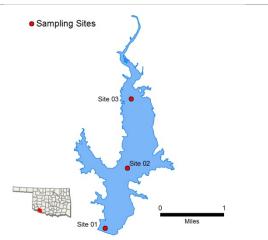
 μ S/cm = microsiemens/cm

OWQS = Oklahoma Water Quality Standards

mV = millivolts

Frederick

	Sample Perio	od	Times Visited	Sampling Sites				
De	cember 2014 - Sept	ember 2015	4	3				
al	Location	Tillman Count	ty	Click map for site data				
	Impoundment	1974						
General	Area	925 acres						
ဗီ	Capacity	9,526 acre-fee	et					



	Pur	poses	Water Supply, Re	ecreation	and Floo	od Contro	l												
		Parameter (Des	scriptions)	Result					Notes/0	Commer	nts								
		Average Turbidit	ty	64 NTL	J				70% of	values >	owqs	of 25 NTL	J						
		Average Secchi	Disk Depth	25 cm															
	Situ	Water Clarity Ra	ıting	Poor															
	드	Chlorophyll-a		7 mg/m	13														
		Trophic State Inc	dex	50					Previous Value= 55										
စ်		Trophic Class		Mesotro	ophic														
Parameters		Salinity		0.09-0).36 ppt														
ıran	a	Specific Conduc	tivity	194.7 –	-740.4 μ	S/cm													
g	Profile	рН		7.02 – 8.38 pH units						to slightl	ly alkalin	e							
	₫.	Oxidation-Reduc	ction Potential	77.8 –	410.3 m\	/													
		Dissolved Oxyge	en	Up to 5 June	5% of wa	ater colun	nn < 2 m	g/L in											
	Ŋ	Surface Total Ni	trogen	0.72 mg	g/L to 1.6	7 mg/L													
	Nutrients	Surface Total Ph	nosphorus	0.041 n	ng/L to 0	.157 mg/l	_												
	Ž	Nitrogen to Phos	sphorus Ratio	10:1					Phosph	orus limi	ted								
		Click to learn m	nore about	Turbidity	H _d	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a					
ses	Fish	h & Wildlife Propa	gation	NS	S	S	S												
Beneficial Uses	Aes	sthetics						S	*										
ficia	Agr	iculture								S	S	S							
ene	Prin	mary Body Contac	t Recreation										S						
m	Pub	olic & Private Wate	er Supply																
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Int	formation Section	*Standa	rds revisio	on, true col	or is for p	ermitting p	ourposes or	nly.									
	NTU = nephelometric turbidity units OWQS = Oklahoma Water Quality Standards mg/L = milligrams per liter ppt = parts per thousand																		

 μ S/cm = microsiemens/cm

En = Enterococci

mV = millivolts

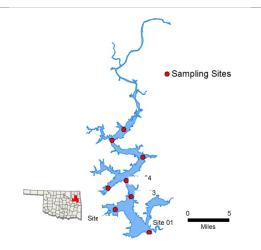
Chlor-a = Chlorophyll-a

 μ S/cm = microsiemens per centimeter

E. coli = Escherichia coli

Ft. Gibson, Lower (1-4)

	Sample Period	t	Visited	Sampling Sites						
	October 2014 – June	e 2015	4	8						
	Location	Cherokee (County	Click map for site data						
<u></u>	Impoundment	1953								
ב ב ב	Area	14,900 acre	900 acres							
פֿל	Capacity	355,200 ac	re-feet							
	Purposes	Hydropowe	er and Flood	Control						



		Parameter (Descriptions)	Result					Notes/0	Commer	nts									
		Average Turbidity	7 NTU								of 25 NT	11							
		Average Secchi Disk Depth	76 cm					100700	i values	\ OW\QC	7 01 20 141	<u> </u>							
	_																		
	In Situ	Water Clarity Rating	Good																
	드	Chlorophyll-a	22 mg/	m3															
		Trophic State Index	60					Previou	s value =	= 60									
SIC		Trophic Class	Eutroph	nic															
Parameters		Salinity	0.11 –	0.18 ppt															
arai	a	Specific Conductivity	231 – 3	373.3 µS/	cm														
<u>a</u>	Profile	рН	7.17 –	8.48 pH ւ	ınits														
	₫.	Oxidation-Reduction Potential	133.8 t	o 473.8 n	ηV														
		Dissolved Oxygen	Up to 3	8% wate	r column	< 2 mg/L	in June												
	ts	Surface Total Nitrogen	0.64 m	g/L to 1.2	8 mg/L														
	Nutrients	Surface Total Phosphorus	0.070 n	ng/L to 0.	141 mg/l	_													
	Ž	Nitrogen to Phosphorus Ratio	9:1					Phosph	orus Lim	ited									
		Click to learn more about Beneficial Uses□	Turbidity	된	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a						
Beneficial Uses	Fish	n & Wildlife Propagation	S	S	NS	NEI													
<u></u>	Aes	sthetics					NEI	*											
ficia	Agr	iculture							S	S	S								
ene	Prin	nary Body Contact Recreation										NEI							
m	Pub	olic & Private Water Supply				NEI													
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	Watersh intensive	ned (NLW)	. This listir n confirm t	ng means	that the la	ke is consi	dered thre	eatened fr	s a Nutrien om nutrien Standards	ts until a n							

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

mV = millivolts

Chlor-a = Chlorophyll-a

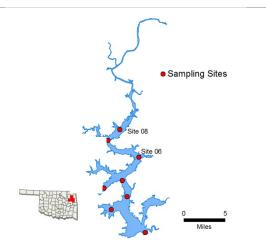
NTU = *nephelometric turbidity units*

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

Ft. Gibson, Upper (5-8)

	Sample Period	t	Times Visited	Sampling Sites				
	October 2014 – June	e 2015	4	8				
	Location	Cherokee (County	Click map for site data				
<u>ia</u>	Impoundment	1953						
neral	Area	14,900 acres						
Ge	Capacity	355,200 ac	re-feet					
	Purposes	Hydropower and Flood Control						



		Parameter (Descriptions)	Result					Notes/	Commer	nts				
		Average Turbidity	9 NTU					100% c	f values	< OWQS	of 25 NT	·U		
		Average Secchi Disk Depth	51 cm											
	뎙	Water Clarity Rating	Good											
	In Situ	Chlorophyll-a	23 mg/	m3										
		Trophic State Index	60					Previou	s value =	= 61				
ည		Trophic Class	Eutropl	nic										
Parameters		Salinity	0.11-0).19 ppt										
ıram	4	Specific Conductivity	235.6 -	- 387.8 µ	S/cm									
P _B	Profile	pH	7.15 –	8.4 pH ur	nits			Neutral	to slight	y alkaline	е			
		Oxidation-Reduction Potential	220.9	to 393 m	V									
		Dissolved Oxygen	Up to 3 June	88% of wa	iter colun	nn < 2 mg	g/L in	All data for this sample year above screening level of 2 mg/L						
	Nutrients	Surface Total Nitrogen	0.68 m	g/L to 1.2	.8 mg/L									
		Surface Total Phosphorus	0.081 n	ng/L to 0	.138 mg/l	-								
	Ž	Nitrogen to Phosphorus Ratio	9:1					Phosph	orus lim	ited				
		Click to learn more about Beneficial Uses□	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fis	h & Wildlife Propagation	S	S	NS	NEI								
) -	Aes	sthetics					NEI	*						
ficia	Agı	riculture							S	S	S			
Beneficial Uses	Prir	mary Body Contact Recreation										NEI		
m	Pul	blic & Private Water Supply				NEI								
	^	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	Watersh	ned (NLW)	. This listing	ng means	that the la		dered thre	eatened fr	s a Nutrien om nutrien		nore	

NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$ mV = millivolts E. coli = Escherichia coli Chlor-a = Chlor

OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a mg/L = milligrams per liter $\mu S/cm = microsiemens/cm$

Ft. Supply

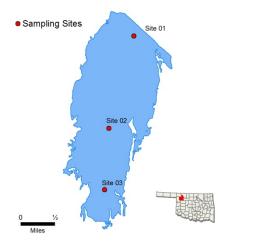
NTU = *nephelometric turbidity units*

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

	Sample Period	t	Times Visited	Sampling Sites				
(October 2015 - Augus	st 2016	4	3				
	Location	Woodward	County	Click map for site data				
<u>छ</u>	Impoundment	1942						
General	Area	1,820 acres						
5	Capacity	13,900 acre-feet						
	Purposes	Flood Cont	ation Purposes					

Times



ppt = parts per thousand En = Enterococci

		pooco	1 lood contro	, OO11001	valion i a											
		Parameter (Des	scriptions)	Resul	t				Notes/0	Commer	nts					
		Average Turbidi	ty	53 NT	U				100% o	f values	> OWQ	S of 25 NT	U			
		Average Secchi	Disk Depth	19 cm												
	jįt	Water Clarity Ra	ating	Fair to	Poor											
	In-Situ	Chlorophyll-a		36.2 m	ng/m3											
		Trophic State In	dex	66					Previous	s value =	= 60					
SIS		Trophic Class		Hyper	eutrophic											
Parameters		Salinity		0.69 -	0.81 ppt											
arar	Φ	Specific Conduc	ctivity	1377.4	1 – 1607.3	β µS/cm										
Ğ	Profile	рН		8.27 –	8.56 pH	units										
	_	Oxidation-Redu	ction Potential	316.7	to 387.4 r	mV										
		Dissolved Oxygo	en						All dat	a are ab	ove scre	ening leve	l of 2.0 n	ng/L		
	Si	Surface Total N	itrogen	1.35 m	1.35 mg/L to 1.46 mg/L											
	Nutrients	Surface Total Pl	hosphorus	0.095	mg/L to 0	.133 mg/L	_									
	Ž	Nitrogen to Phos	sphorus Ratio	13:1	13:1					Phosphorus limited						
		Click to learn m		Turbidity	표	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a		
ses	Fish	h & Wildlife Propa	gation	NS	S	S	S									
Beneficial Uses	Aes	sthetics						NEI	*							
ficia	Agr	riculture								S	S	S				
eue	Prir	mary Body Contac	ct Recreation										S			
m	Pub	olic & Private Wate	er Supply											NS		
	٨	S = Fully Supporting IS = Not Supporting IEI = Not Enough In	formation	threate	ned by nut	in the WQ rients until on, true col	studies ca	an be con	ducted to c	onfirm no		cial use is co status.	onsidered			

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

OWQS = Oklahoma Water Quality Standards

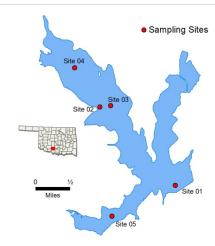
mV = millivolts

Fuqua											
	Sample Period	d	Times Visited	Sampling Sites							
C	October 2015 – Augu	st 2016	4	5							
	Location	Stephens C	County	Click map for site data							
eral	Impoundment	1953									
Jer	Area	1,500 acres	3	_							

21,100 acre-feet

Capacity

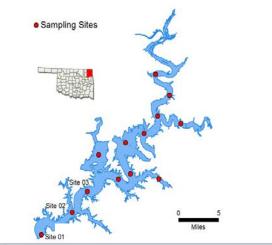
E. coli = Escherichia coli



	Pur	poses	Water Supply,	Recreati	on and F	lood Con	trol			-	Site 05				
		Parameter (Des	criptions)	Result					Notes/0	ommer	ıts				
		Average Turbidit	ty	12 NTL	J				100% of values < OWQS of 25 NTU						
		Average Secchi	Disk Depth	47 cm											
	In-Situ	Water Clarity Ra	iting	Averag	е										
	흐	Chlorophyll-a		11.7 mg	g/m3										
		Trophic State Inc	dex	55					Previou	s Value=	= 52				
ည		Trophic Class		Eutroph	nic										
Parameters		Salinity		0.27-0	.33 ppt										
ıran	a	Specific Conduc	tivity	569.8-	569.8- 674.8 μS/cm										
g.	Profile	рН		7.33 – 8	7.33 – 8.42 pH units										
	ሷ	Oxidation-Reduc	ction Potential	-3 to 44	-3 to 440.1 mV										
		Dissolved Oxyge	en	Up to 4 summe		ater colum	nn < 2 mg	g/L in							
	Nutrients	Surface Total Ni	trogen	0.50 mg	0.50 mg/L to 0.91 mg/L										
		Surface Total Ph	nosphorus	0.022 n	ng/L to 0	.046 mg/L	-								
	Ž	Nitrogen to Phos	sphorus Ratio	20:1					Phosph	orus limi	ted				
		Click to learn m Beneficial Uses		Turbidity	Hď	Dissolved Oxygen	Metals	ISI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fish	h & Wildlife Propa	gation	NS	S	S	S								
eneficial Uses	Aes	sthetics						S	*						
ficia	Agr	iculture								S	S	S			
ene	Prin	mary Body Contac	t Recreation										S		
Ď	Pub	olic & Private Wate	er Supply												
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Int	formation specific	*Standa	rds revisio	on, true col	or is for pe	ermitting p	ourposes or	nly.					
μS/c	m = n	phelometric turbidity nicrosiemens per ce Escherichia coli	ntimeter mV = m	= Oklahoma Water Quality Standards $mg/L = milligrams \ per \ liter$ $ppt = parts \ per \ thousand$ $\mu S/cm = microsiemens/cm$ $En = Enterococci$							d				

Grand, Lower Lake (1-3)

	Sample Period	d	Visited	Sampling Sites				
	October 2014 – July	2015	4	13				
	Location	Mayes Co	unty	Click map for site data				
ਰ	Impoundment	1940						
<u>D</u>	Area	1,820 acres						
5	Capacity	13,900 acr	e-feet					
	Purposes	Flood Cont	rol, Hydropo	wer				



	1 41	p0303	1 lood Control,	Пуслоро	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				Sit	e 01						
		Parameter (Des	scriptions)	Result					Notes/0	Commer	nts					
		Average Turbidi	ty	3 NTU					100% c	f values	< OWQS	of 25 NT	U (n=12)			
		Average Secchi	Disk Depth	191 cm	1											
	itu	Water Clarity Ra	ating	Excelle	ent											
	In Situ	Chlorophyll-a		6 mg/m	13											
		Trophic State In	dex	48					Previous	s value =	= 56					
ပ်		Trophic Class		Mesotrophic												
Parameters		Salinity		0.10 -	0.17 ppt											
ram		Specific Conduc	ctivity	218.3 -	218.3 – 351.1 μS/cm											
Ра	Profile	pН		6.84 –	6.84 – 8.26 pH units					to slight	ly alkalin	e				
	ڇ	Oxidation-Redu	ction Potential	54.9 to 481.7 mV												
		Dissolved Oxygo	en	Up to 7 July	'0% of wa	ater colum	nn < 2.0 r	ng/L in								
	ဟ	Surface Total N	itrogen	0.74 m	ng/L to 1.9	96 mg/L										
	Nutrients	Surface Total Pl	hosphorus	0.060 r	0.060 mg/L to 0.168 mg/L											
	Ž	Nitrogen to Phos	sphorus Ratio	14:1					Phosph	orus limi	ted					
		Click to learn n Beneficial Uses		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a		
ses	Fish	h & Wildlife Propa	gation	S	S	NS	NEI									
a C	Aes	sthetics						S	*							
Beneficial Uses	Agr	iculture								*	*	S				
ene	Prin	mary Body Contac	t Recreation										NEI			
m	Pub	olic & Private Wate	er Supply													
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough In		*Standa	ırds revisio	n, true col	or is for pe	ermitting p	ourposes o	nly.						
NTU	l = ne _l	phelometric turbidity	units OWQS	= Oklaho	ma Water	Quality Sta	andards	mg/L	= milligram	s per liter	pp	t = parts pe		d		

 μ S/cm = microsiemens/cm

En = Enterococci

 μ S/cm = microsiemens per centimeter

E. coli = Escherichia coli

mV = millivolts

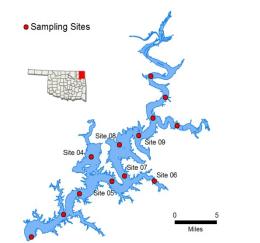
Grand, Mid Lake (4-9)

Sample Period

	Sample i eno	.	Visited	Sampling Sites						
	October 2014 – July	2015	4	13						
	Location	Mayes Co	unty	Click map for site data						
5	Impoundment	1940	1940							
	Area	1,820 acres	0 acres							
	Capacity	13,900 acr	cre-feet							
	Purposes	Flood Cont	rol, Hydropo	wer						

Times

Sampling Sites



En = Enterococci

		Parameter (<u>Descriptions</u>)	Result					Notes/0	Commen	ıts					
		Average Turbidity	8 NTU					5% of values > OWQS of 25 NTU							
		Average Secchi Disk Depth	97 cm												
	itu	Water Clarity Rating	Excelle	ent											
	In Situ	Chlorophyll-a	16 mg/	m3											
		Trophic State Index	58	58					s value =	- 54					
ဖ		Trophic Class	Eutropl	hic											
Parameters		Salinity	0.10 -	0.10 – 0.26 ppt											
ram		Specific Conductivity	219.6 -	- 542.5 µ	ıS/cm										
Ра	Profile	pH	6.84 –	8.77 pH	units										
	Ţ	Oxidation-Reduction Potential	21.6 to	458 mV											
		Dissolved Oxygen	Up to 5 July	55% of wa	ater colun	nn < 2.0 ı	mg/L in								
	S	Surface Total Nitrogen	0.75 m	ng/L to 2.	44 mg/L										
	Nutrients	Surface Total Phosphorus	0.015 r	ng/L to 0	.150 mg/l	-									
	N	Nitrogen to Phosphorus Ratio	16:1	6:1					orus limi	ted					
		Click to learn more about Beneficial Uses□	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a		
ses	Fish	h & Wildlife Propagation	S	S	NS	NEI									
<u></u>	Aes	sthetics					S	*							
fici	Agr	iculture							*	*	S				
Beneficial Uses	Prin	mary Body Contact Recreation										NEI			
m	Pub	olic & Private Water Supply				NEI									
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	*Standa	Standards revision, true color is for permitting p				ourposes o	nly.						
NTU	l = nej	phelometric turbidity units OWQS	= Oklaho	ma Water	Quality St	andards	mg/L	= milligram	s per liter	ppi	t = parts pe		d		

 μ S/cm = microsiemens/cm

mV = millivolts

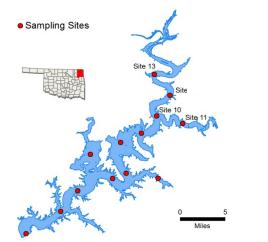
Chlor-a = Chlorophyll-a

 μ S/cm = microsiemens per centimeter

E. coli = Escherichia coli

Grand, Upper Lake (10-13)

	Sample Period	d	Visited	Sampling Sites				
	October 2014 – July	2015	4	13				
	Location	Mayes Co	Mayes County Click map					
<u>a</u>	Impoundment	1940						
General	Area	1,820 acres						
ဗ္	Capacity	13,900 acre-feet						
	Purposes	Flood Control, Hydropower						



		urposes Flood Col	11.01, 11	iyaropo	****											
		Parameter (<u>Descriptions</u>)		Result					Notes/Comments							
		Average Turbidity	:	24 NTU	ı				30% of	values >	OWQS	of 25 NTL	l (n=16)			
		Average Secchi Disk Depth		50 cm												
	it	Water Clarity Rating		Averag	е											
	In Situ	Chlorophyll-a		18.9 mg	g/m3											
		Trophic State Index		59					Previou	s value =	- 56					
ည		Trophic Class		Eutroph	nic											
Parameters		Salinity		0.11 – (0.17 ppt											
ran		Specific Conductivity		237.2 – 368.5 μS/cm												
a B	Profile	pH		7.48 – 8.68 pH units												
	ፈ	Oxidation-Reduction Potent	ial :	252 to 4	453.7 mV	/										
		Dissolved Oxygen				sample ye vel of 2 m		elow								
	ဟ	Surface Total Nitrogen		1.22 m	g/L to 2.	55 mg/L										
	Nutrients	Surface Total Phosphorus		0.049 n	0.049 mg/L to 0.203 mg/L											
	Ž	Nitrogen to Phosphorus Ra	tio	13:1					Phosphorus limited							
		Click to learn more about Beneficial Uses□		Turbidity	된	Dissolved Oxygen	Metals	ISI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a		
ses	Fis	ish & Wildlife Propagation		NS	S	S	NEI									
a C	Αe	esthetics						S	*							
fici	Αç	griculture								*	*	S				
Beneficial Uses	Pr	rimary Body Contact Recreatio	n										NEI			
m	Pι	ublic & Private Water Supply					NEI									
		S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	Notes	*Standa	rds revisio	n, true col	or is for pe	ermitting p	ourposes o	nly.						

 μ S/cm = microsiemens/cm

En = Enterococci

mV = millivolts

Chlor-a = Chlorophyll-a

 μ S/cm = microsiemens per centimeter

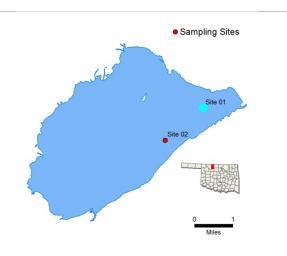
E. coli = Escherichia coli

Great Salt Plains

NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$

E. coli = Escherichia coli

	Sample Period	d	Visited	Sampling Sites				
	October 2018 – July	2019	4	5				
	Location	Alfalfa Cou	ınty	Click map for site data				
5	Impoundment	1941						
	Area	8,690 acres	8,690 acres					
	Capacity	31,240 acr	240 acre-feet					
	Purposes	Flood Con	trol, Conserv	ration				



		Parameter (Descriptions)	Result					Notes/Comments							
		Average Turbidity	105 NT	Ū				100% c	of values	> OWQS	of 25 NT	U (n=7)			
		Average Secchi Disk Depth	15 cm												
	<u>클</u>	Water Clarity Rating	Poor												
	In Situ	Chlorophyll-a	84.87 n	ng/m3											
		Trophic State Index	74					Previous value = 76							
ည		Trophic Class	Hypere	utrophic											
Parameters		Salinity	1.66– 3	3.04 ppt											
ıran	ø)	Specific Conductivity	3204.8	- 5611.1	0 μS/cm	l									
<u> </u>	Profile	рН	8.09 – 8.56 pH units						to slightl	y alkalin	e				
	ਾ	Oxidation-Reduction Potential	114.9 –	- 446.1 m	ıV										
		Dissolved Oxygen						Not stratified at any sampling event							
	Ŋ	Surface Total Nitrogen	1.23 m	ng/L to 2.	54 mg/L										
	Nutrients	Surface Total Phosphorus	0.200 n	ng/L to 1.	.89 mg/L										
	Z	Nitrogen to Phosphorus Ratio	4:1					possibly co-limited							
		Click to learn more about Beneficial Uses□	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
ses	Fish	h & Wildlife Propagation	NS	S	S	S									
<u> </u>	Aes	sthetics					NEI	*	N/A	N/A					
fici	Agr	riculture													
Beneficial Uses	Prir	mary Body Contact Recreation										NS			
a	Pub	olic & Private Water Supply													
	٨	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	*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.												

OWQS = Oklahoma Water Quality Standards

mV = millivolts

Chlor-a = Chlorophyll-a

 $mg/L = milligrams per liter \ \mu S/cm = microsiemens/cm$

Greenleaf

Purposes

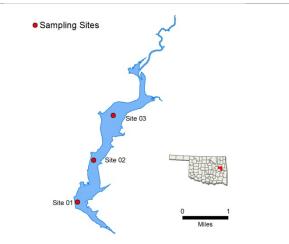
Sample Period

	Sample Period	d	Visited	Sampling Sites				
F	ebruary 2019 – Augu	ıst 2019	4	5				
	Location	Muskogee	County	Click map for site data				
3	Impoundment	1939						
	Area	920 acres						
Ś	Capacity	14,720 acr	720 acre-feet					

Recreation

Times

Sampling Sites



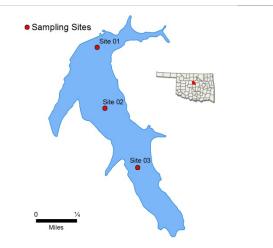
		poooo	rtooroation	•											
		Parameter (Des	scriptions)		Result					Notes/	Commer	nts			
		Average Turbidi	ty		7 NTU					100% c	of values	< OWQS	of 25 NT	U (n=9)	
		Average Secchi	Disk Depth		97 cm										
	itu	Water Clarity Ra	ating		Good										
	In Situ	Chlorophyll-a			17.76 n	ng/m3									
		Trophic State In	dex		59					Previou	s value =	= 58			
ည		Trophic Class			Eutroph	nic									
Parameters		Salinity			0.0-0.0	09 ppt									
ıran	o)	Specific Conduc	ctivity		0.80 -	162 µS/c	m								
<u> </u>	Profile	рН			6.26 – 8	8.11 pH ւ	units			33% of	recorded	d values	<6.5		
	Ē	Oxidation-Redu	ction Potentia	al	48.6 – 4	4440.5 m	١V								
		Dissolved Oxygo	en		Up to 6 August		ater colum	nn < 2 m	g/L in						
	Si	Surface Total N	itrogen		0.36 mg/L to 0.77 mg/L										
	Nutrients	Surface Total Pl	hosphorus		0.021 n	ng/L to 0	.037 mg/L	-							
	Ž	Nitrogen to Pho	sphorus Ratio)	18:1					Phosphorus limited					
		Click to learn n Beneficial Uses			Turbidity	된	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
ses	Fish	h & Wildlife Propa	gation		NS	S	NEI	S							
Beneficial Uses	Aes	sthetics							S	*					
fici	Agr	riculture									N/A	N/A	S		
eue	Prin	mary Body Contac	ct Recreation											S	
m	Pub	olic & Private Wate	er Supply												NS
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information						n, true colo undetermi		r permitting purposes only. r DO.						

NTU = nephelometric turbidity units μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivoltsChlor-a = Chlorophyll-a

mg/L = milligrams per liter μ S/cm = microsiemens/cm

Guthrie Times Sample Period Sampling Sites Visited 5 November 2015 - August 2016 4 Location Logan County Click map for site data Impoundment 1919 General Area 274 acres Capacity 3,875 acre-feet



	Pur	poses	Water Sup	ply,	Recreat	ion					Miles						
		Parameter (Des	criptions)		Result					Notes/0	Commer	nts					
		Average Turbidit	ty		14 NTU	l				100% o	f values	< OWQS	of 25 NT	U			
		Average Secchi	Disk Depth		47 cm												
	In Situ	Water Clarity Ra	iting		Average	е											
	므	Chlorophyll-a			60.6 mg	g/m3											
		Trophic State Inc	dex		71					Previous Value= 61							
ည		Trophic Class			Hypere	utrophic											
Parameters		Salinity			0.28-0	.32 ppt											
ıram	a	Specific Conduc	tivity		566 – 6	58 µS/cr	n										
Pa	Profile	рН			7.83 – 8	3.61 pH ι	units			Neutral	to slightl	ly alkalin	е				
	4	Oxidation-Reduc	ction Potentia	al	73.4 – 2	294.1 m\	/										
	Dissolved Oxygen				Up to 25% of water column < 2 mg/L in summer												
	ts	Surface Total Ni	trogen		0.99 mg/L to 1.81 mg/L												
	Nutrients	Surface Total Ph	nosphorus		0.048mg/L to 0.107 mg/L												
	N	Nitrogen to Phos	sphorus Ratio)	18:1					Phosphorus limited							
		Click to learn m	ore about		Turbidity	된	Dissolved Oxygen	Metals	ISI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
ses	Fish	n & Wildlife Propa	gation		NS	S	S	S									
Š	Aes	sthetics								S							
ficia	Agr	iculture									S	S	S				
Beneficial Uses	Primary Body Contact Recreation												NS				
ă	Public & Private Water Supply														NS		
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information *S					*Standards revision, true color is for permitting pu					nly.						

E. coli = Escherichia coli

Chlor-a = Chlorophyll-a

Sampling and Assessment by the Oklahoma Water Passaurees Board 2000 Classes Blvd Oklahoma City OK 72119 405 520 0000 http://www.new.com/phys/lea-

OWQS = Oklahoma Water Quality Standards

mV = millivolts

NTU = *nephelometric turbidity units*

 μ S/cm = microsiemens per centimeter

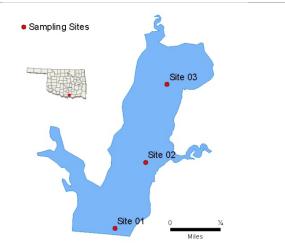
mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

Hauani											
	Sample Period	d	Times Visited	Sampling Sites							
	October 2018 – Augus	st 2019	4	5							
	Location	Marshall Co	ounty	Click map for site data							
<u>ख</u>	Impoundment	1980									
General	Area	270 acres									
ဗီ	Capacity	3,000 acre-	feet								
	Purposes										



	ı uı	poses									Mile	ss.			
		Parameter (<u>Descriptions</u>)	Result					Notes/	Commer	nts					
		Average Turbidity	9 NTU					100% c	of values	< OWQS	of 25 NT	U (n=9)			
		Average Secchi Disk Depth	107 cm	1											
	텵	Water Clarity Rating	Excelle	ent											
	In Situ	Chlorophyll-a	3.74 m	g/m3											
		Trophic State Index	44					Previou	s value =	=					
စ်		Trophic Class	Mesotr	ophic											
Parameters		Salinity	0.10 - 0).16 ppt											
arar	a)	Specific Conductivity	217.5 -	- 329.2 µ	S/cm										
ď	Profile	рН	6.82 –	8.46 pH ւ	units			Neutral	to slight	y alkalin	е				
	_	Oxidation-Reduction Potential	8.9 to 4	122.6 mV											
		Dissolved Oxygen	Up to 4 August	8% of wa	iter colun	nn < 2 m(g/L in								
	ts	Surface Total Nitrogen	0.50 m	g/L to 0.9	6mg/L										
	Nutrients	Surface Total Phosphorus	0.016 r	mg/L to 0	.053 mg/l	_									
	ž	Nitrogen to Phosphorus Ratio	22:1					Phosphorus limited							
		Click to learn more about Beneficial Uses□	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
ses	Fisl	h & Wildlife Propagation	NS	S	S	S									
<u>≅</u>	Aes	sthetics					NEI	N/A							
fici	Agr	riculture							N/A	N/A	S				
Beneficial Uses	Prir	mary Body Contact Recreation										S			
m	Puk	blic & Private Water Supply				S									
	٨	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	Standar study ca	ds (WQS)	. This mea the Aesth	ns that the	e lake is c	onsidered	threatene	d from nu	ahoma Wat trients until s revision, t	a more in	itensive		

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

mV = millivolts

Chlor-a = Chlorophyll-a

NTU = *nephelometric turbidity units*

 μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

Healdton

Capacity

NTU = nephelometric turbidity units

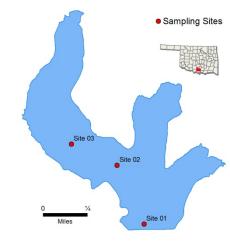
E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

	Sample Period	0	Visited	Sampling Sites			
No	ovember 2005 – Aug	ust 2006	4	5			
	Location	Carter Cou	ınty	Click map for site data			
eral	Impoundment	1979					
ner	Area	370 acres					

3,766 acre-feet

Times



	Pur	rposes	Water Supp	ly,	Recreation						Miles		Site 01		
		Parameter (Des	scriptions)		Result					Notes/0	Commer	nts			
		Average Turbidi	ty		29 NTU	l				100% o	f values	> OWQS	of 25 NT	Ū	
		Average Secchi	Disk Depth		31 cm										
	<u>it</u>	Water Clarity Ra	ating		Poor										
	In Situ	Chlorophyll-a			14.8 mg	g/m3									
		Trophic State In	dex		57					Previous Value= 49					
ဖွ		Trophic Class			Eutroph	nic									
Parameters		Salinity			0.07-0	.13 ppt									
ram	<u> </u>	Specific Conduc	tivity		143.8 –	278.4 μ	S/cm								
Ра	Profile	pН									to slight	ly alkalin	e		
	4	Oxidation-Reduc	ction Potentia	ı	23.7 – 415.3 mV										
		Dissolved Oxyge		Up to 40% of water column < 2 mg/L in August											
	ts	Surface Total Ni	itrogen		0.39 mg/L to 0.72 mg/L										
	Nutrients	Surface Total Ph	nosphorus		0.040 mg/L to 0.063 mg/L										
	N	Nitrogen to Phos	sphorus Ratio		11:1					Phosphorus limited					
		Click to learn m Beneficial Uses	nore about		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
ses	Fisl	h & Wildlife Propa	gation		NS	S	S	NEI							
Beneficial Uses	Aes	Aesthetics							S	*					
ficia	Agriculture										S	S	S		
ene	Primary Body Contact Recreation													S	
m	Public & Private Water Supply							NEI							
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information				*Standar	rds revisio	on, true col	or is for pe	ermitting	ourposes or	nly.				

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

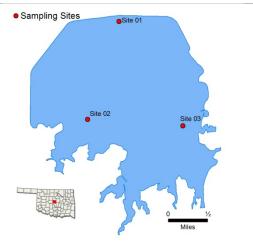
mV = millivolts

Chlor-a = Chlorophyll-a

Hefner

	Sample Period	d	Times Visited	Sampling Sites				
(October 2015 – Augu	st 2016	4	3				
	Location	Oklahoma	County	Click map for site data				
,	Impoundment	1947						
	Area	2,500 acre	2,500 acres					
	Capacity	75,000 acr	e-feet					
	Purposes	Water Supp	oly, Recreati	ion				

Times



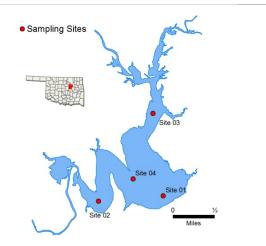
	ı uı	rposes water Supply,	Reciea	ecreation											
		Parameter (<u>Descriptions</u>)	Result					Notes/0	Commen	its					
		Average Turbidity	8 NTU					100% o	f values	< OWQS	of 25 NT	U			
		Average Secchi Disk Depth	59 cm												
	In-Situ	Water Clarity Rating	Averag	е											
	흐	Chlorophyll-a	52.5 m	g/m3											
		Trophic State Index	69					Previou	s Value=	: 62					
S		Trophic Class	Hypere	utrophic											
Parameters		Salinity	0.46-0).52 ppt											
aran	υ O	Specific Conductivity	931.7 -	- 1053.7	uS/cm										
<u>a</u>	Profile	рН	7.5 – 8	.59 pH ur	nits			Neutral	to slightl	y alkaline	Э				
		Oxidation-Reduction Potential		o 388.3 n											
		Dissolved Oxygen	Up to 47% of water column < 2 mg/L in summer												
	ts S	Surface Total Nitrogen	1.03 m	g/L to 1.2	4 mg/L										
	Nutrients	Surface Total Phosphorus	0.133m	0.133mg/L to 0.233 mg/L											
	Ž	Nitrogen to Phosphorus Ratio	6:1					Possibly co- limited							
		<u>Click to learn more about</u> <u>Beneficial Uses</u> □	Turbidity	듄	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
ses	Fisl	h & Wildlife Propagation	S	S	S	S									
	Aes	sthetics					S	*							
ficia	Agr	riculture							S	S	S				
Beneficial Uses	Prir	mary Body Contact Recreation										S			
<u> </u>	Public & Private Water Supply														
	٨	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	*Standa	rds revisio	n, true col	or is for pe	ermitting p	ourposes or	nly.						

NTU = *nephelometric turbidity units* μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivoltsChlor-a = Chlorophyll-a

mg/L = milligrams per liter μ S/cm = microsiemens/cm

Heyburn Times **Sample Period** Sampling Sites Visited November 2015 - August 2016 4 Location Creek County Click map for site data 1950 Impoundment General Area 880 acres Capacity 7,105 acre-feet



Purposes Flood Control and Conservation											N	Miles		
		Parameter (Des	scriptions)	Result					Notes/0	Commer	nts			
		Average Turbidit	ty	32 NTL	J				88% of	values >	→ 25 NTU			
		Average Secchi	Disk Depth	31 cm										
	itu	Water Clarity Ra	ating	Poor										
	In-Situ	Chlorophyll-a		14.6 m	g/m3									
		Trophic State Inc	dex	57					Previou	s value =	= 48			
ည		Trophic Class		Eutroph	nic									
Parameters		Salinity		0.10 -	0.16 ppt									
ran	a .	Specific Conduc	tivity	209 – 3	329.9 µS/	cm								
Ра	Profile	рН		7.22 –	7.99 pH เ	units								
	Ā	Oxidation-Reduc	ction Potential	147.6 t	o 355 m\	/								
		Dissolved Oxyge	en	Up to summe		ater colu	mn < 2 r	ng/L in						
	ts	Surface Total Ni	trogen	0.62 mg/L to 0.81 mg/L										
	Nutrients	Surface Total Ph	nosphorus	0.033 mg/L to 0.064 mg/L										
	Ž	Nitrogen to Phos	sphorus Ratio	16:1					Phospho	orus limit	ted			
		Click to learn m		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
ses	Fish	h & Wildlife Propa	gation	NS	S	NS	S							
Š	Aes	sthetics						S	*					
ficia	Agr	riculture								S	S	S		
Beneficial Uses	Prin	mary Body Contac	t Recreation										S	
m	Pub	olic & Private Wate	er Supply											
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Intel	formation § 50	*Standards revision, true color is for perm				ermitting p	ourposes o	nly.				
	NTU = nephelometric turbidity units OWQS = Oklahoma Water Quality Standards mg/L = milligrams per liter ppt = parts per thousand											d		

 μ S/cm = microsiemens/cm

En = Enterococci

mV = millivolts

Chlor-a = Chlorophyll-a

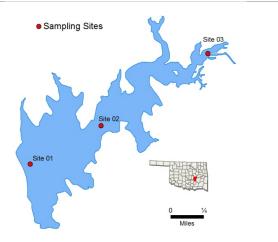
 μ S/cm = microsiemens per centimeter

E. coli = Escherichia coli

Holdenville

Sample Period	d	Times Visited	Sampling Sites
October 2012 - Augu	st 2013	4	3
Location	Hughes Co	unty	Click map for site data
	Dctober 2012 - Augu	Sample Period October 2012 - August 2013 Location Hughes Co	October 2012 - August 2013 4

	Location	Hughes Co	unty	Click map for site data					
3	Impoundment	1931							
	Area	550 acres							
Ś	Capacity	11,000 acre	cre-feet						
	Purposes	Water Supp	oly, Recreation	on					



	Pur	rposes water 5	uppiy,	Recreati	on									
		Parameter (<u>Descriptions</u>)		Result					Notes/0	Commer	nts			
		Average Turbidity		17 NTL	J				27% of	values >	owqs	of 25 NTL	J (n=11)	
		Average Secchi Disk Dept	h	48 cm										
	ij	Water Clarity Rating		Fair										
	In Situ	Chlorophyll-a		17 mg/	m3									
		Trophic State Index		58					Previou	s value =	= 60			
ည		Trophic Class		Eutroph	nic									
Parameters		Salinity		0.14 –	0.19 ppt									
ıran	ø.	Specific Conductivity		294 – 3	98 μS/cr	n								
<u> </u>	Profile	pH		6.51 –	8.37 pH ւ	units								
	Ē	Oxidation-Reduction Poter	ntial	-19 to 3	351 mV									
		Dissolved Oxygen		Up to 7 August		ater colum	nn < 2 m	g/L in						
	Si	Surface Total Nitrogen		0.72 mg/L to 1.37 mg/L										
	Nutrients	Surface Total Phosphorus		0.005 n	ng/L to 0	.036 mg/L	_							
	Ž	Nitrogen to Phosphorus R	atio	88:1					Phosphorus limited					
		Click to learn more about Beneficial Uses□	-	Turbidity	H _d	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
ses	Fisl	h & Wildlife Propagation		NS	S	NS	S							
Beneficial Uses	Aes	sthetics						S	*					
ficia	Agr	riculture								S	S	S		
ene	Prir	mary Body Contact Recreati	on										S	
m	Puk	olic & Private Water Supply												NS
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information *Standards revis						or is for pe	ermitting	ourposes of	nly.				

NTU = nephelometric turbidity units μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a $mg/L = milligrams per liter \mu S/cm = microsiemens/cm$

Hominy Municipal

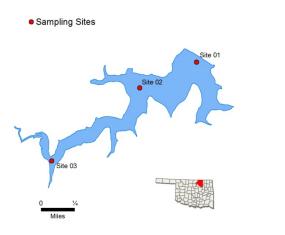
 μ S/cm = microsiemens per centimeter

E. coli = Escherichia coli

mV = millivolts

Chlor-a = Chlorophyll-a

	Sample Period	d	Visited	Sampling Sites					
Ν	ovember 2006 - Aug	ust 2007	3	3					
	Location	Osage Co	unty	Click map for site data					
च	Impoundment	1940							
	Area	165 acres							
בֿ פֿ	Capacity	5,000 acre-feet							
	Purposes	Water Supp	oly, Recreation	on					



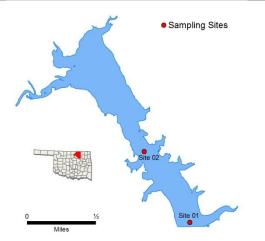
	i ui	rposes Water Supply,	Recreati	OH									
		Parameter (<u>Descriptions</u>)	Result					Notes/0	Commer	ıts			
		Average Turbidity	9 NTU					100% o	f values	< OWQS	of 25 NT	J	
		Average True Color	35 units	S				100% o	f values	< OWQS	S of 70		
	Situ	Average Secchi Disk Depth	101 cm	ı									
	드	Water Clarity Rating	excelle	nt									
		Trophic State Index	56										
<u>s</u>		Trophic Class	eutroph	nic									
Parameters		Salinity	0.10-0).14 ppt									
ıran	a)	Specific Conductivity	224 – 297.7 μS/cm										
g	Profile	pH	7.12 – 8	8.66 pH :	units			Neutral	to slight	y alkalin	е		
	<u>~</u>	Oxidation-Reduction Potential	-22 - 430 mV										
		Dissolved Oxygen	Up to 6 August		ater colum	nn < 2 m	g/L in	Occurr	ed at site	s 1 and	2		
	S	Surface Total Nitrogen	0.45 m	0.45 mg/L to 0.98 mg/L									
	Nutrients	Surface Total Phosphorus	0.010 n	0.010 mg/L to 0.028 mg/L									
	Ž	Nitrogen to Phosphorus Ratio	34:1					Phosph	orus limi	ted			
		Click to learn more about Beneficial Uses□	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
ses	Fis	sh & Wildlife Propagation	S	S	NS	S							
Beneficial Uses	Aes	sthetics					S	*					
ficia	Agı	riculture							S	S	S		
ene	Prir	mary Body Contact Recreation										S	
m	Pul	blic & Private Water Supply				S							
	^	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	*Standa	rds revision	on, true col	or is for po	ermitting	purposes o	nly.				

 μ S/cm = microsiemens/cm

En = Enterococci

Hudson (Bartlesville)

	Sample Period	d	Visited	Sampling Sites
	October 2016 – July	2017	4	3
	Location	Osage Cou	inty	Click map for site data
5	Impoundment	1949		
5	Area	268 acres		
5	Capacity	2,776 acre	-feet	
	Purposes	Water Supp	oly, Recreati	ion



	ı uı	iposes	water Suppry,	, Recreation											
	Parameter (<u>Descriptions</u>) Result										its				
		Average Turbidit	ty	15 NTU	J				13% of	values >	OWQS	of 25 NTU			
		Average Secchi	Disk Depth	58 cm											
	멾	Water Clarity Ra	ating	Averag	je										
	In Situ	Chlorophyll-a		7.06 m	ıg/m3										
		Trophic State Inc	dex	50					Previou	s value =	= 51				
က်		Trophic Class		Mesotr	ophic										
Parameters		Salinity		0.05 –	0.07 ppt										
ram	a ,	Specific Conduc	tivity	108.7 -	- 148.6 μ	S/cm									
Ра	Profile	pН		6.69 –	8.51 pH ւ	units									
	Oxidation-Reduction Potential 108.7 – 496.8 mV														
		Dissolved Oxyge	en	Up to 6	64% of wa	ater colun	nn < 2.0 r	mg/L in							
	Nutrients	Surface Total Ni	trogen	0.57 m	0.57 mg/L to 1.03 mg/L										
		Surface Total Ph	nosphorus	0.029 r	0.029 mg/L to 0.074 mg/L										
	Ž	Nitrogen to Phos	sphorus Ratio	15:1					Phosph	orus limi	ted				
		Click to learn m Beneficial Uses	nore about	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a	
ses	Fis	h & Wildlife Propa	gation	S	S	S	S								
Š	Aes	sthetics						S	*						
ficia	Agı	riculture								N/A	N/A	S			
Beneficial Uses	Prii	mary Body Contac	t Recreation										NEI		
m	Public & Private Water Supply														
	1	S = Fully Supporting NS = Not Supporting NEI = Not Enough In		*Standa	ırds revisio	on, true col	or is for pe	ermitting p	ourposes o	nly.					
	l J = ne	ephelometric turbidity	units OWQS	= Oklaho	oma Water	· Quality St	tandards		= milligran			t = parts pe		nd	

 $\mu \hat{S}/cm = microsiemens/cm$

En = Enterococci

mV = millivolts

Chlor-a = Chlorophyll-a

 μ S/cm = microsiemens per centimeter

E. coli = Escherichia coli

Hudson, Lower (1-4)

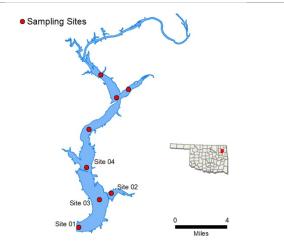
 μ S/cm = microsiemens per centimeter

E. coli = Escherichia coli

mV = millivolts

Chlor-a = Chlorophyll-a

	Sample Period	d	Visited	Sampling Sites					
	October 2018 - July	2019	4	8					
	Location	Mayes Cou	inty	Click map for site data					
<u></u>	Impoundment	1964							
	Area	10,900 acre	,900 acres						
5	Capacity	200,300 ac	00 acre-feet						
	Purposes	Flood Cont	rol, Hydropo	wer					



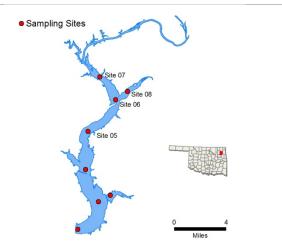
	Fui	poses	Flood Control,	i, Hydropowei							ıv	11103			
		Parameter (Des	scriptions)	Result					Notes/0	Commen	its				
		Average Turbidi	ty	10 NTU	J				100% c	f values«	< OWQS	of 25 NTU	J (n=15)		
		Average Secchi	Disk Depth	81 cm											
	itu	Water Clarity Ra	ating	Good											
	In Situ	Chlorophyll-a		18 mg/	/m3										
		Trophic State In	dex	59					Previous value = 60						
ပ်		Trophic Class		Eutropl	hic										
Parameters		Salinity		0.11 – 0.17 ppt											
ram		Specific Conduc	ctivity	164.7 –290.6 μS/cm											
Pa	Profile	pН		7.14 –	8.53 pH ι	units			Neutral	to slightl	y alkaline	e			
	<u>P</u>	Oxidation-Reduc	ction Potential		507.8mV										
		Dissolved Oxyge	en	Up to 1	2% of wa	ater colum	nn < 2.0 r	ng/L in							
	nts	Surface Total Ni	itrogen		g/L to 1.8	24 ma/l									
	Nutrients	Surface Total Ph	nosphorus	0.045 mg/L to 0.184 mg/L											
	Ž	Nitrogen to Phos	sphorus Ratio	10:1					Phosphorus limited						
		Click to learn m Beneficial Uses		Turbidity	Hd	Dissolved Oxygen	Metals	ISI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a	
ses	Fish	h & Wildlife Propa	gation	S	S	S	NEI								
Beneficial Uses	Aes	sthetics						S	*						
icia	Agr	ciculture								N/A	N/A	S			
ene	Prin	mary Body Contac	t Recreation										NEI		
m	Pub	olic & Private Wate				NEI									
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough In		*Standa	ırds revisio	on, true col	or is for pe	ermitting p	ourposes of	nly.					
NTU	NTU = nephelometric turbidity units OWQS = Oklahoma Water Quality Standards mg/L = milligrams per liter ppt = parts per thousand														

 μ S/cm = microsiemens/cm

En = Enterococci

Hudson, Upper (5-8)

	Sample Period	d	Visited	Sampling Sites				
	October 2018 - July	2019	4	8				
	Location	Mayes Cou	inty	Click map for site data				
5	Impoundment	1964						
	Area	10,900 acre	acres					
	Capacity	200,300 ac	acre-feet					
	Purposes	Flood Cont	rol, Hydropo	wer				



	Pur	poses	Flood Control,	Hyaropo	wer							M	liles			
		Parameter (Des	scriptions)	Result					Notes/0	Commer	ıts					
		Average Turbidi	ty	10 NTL	J				1000%	of values	s < OWC	S of 25 N	TU (n=16	3)		
		Average Secchi	Disk Depth	67 cm												
	itu	Water Clarity Ra	ating	Good												
	In Situ	Chlorophyll-a		19 mg	/m3											
		Trophic State In	dex	60					Previou	s value =	= 63					
ပ်		Trophic Class		Eutroph	nic											
Parameters		Salinity		0.11 –	0.17 ppt											
ram		Specific Conduc	tivity	236.6 -	- 353.10	µS/cm										
Ра	Profile	pН	<u> </u>	7.09 – 8.60 pH units					Neutral	to slightl	y alkalin	e				
	چّ	Oxidation-Reduc	ction Potential	301.5 -	- 485 mV	,										
		Dissolved Oxyge	en	Up to 1 in July	00% of v	vater colu	mn > 2.0	mg/L								
	w	Surface Total Ni	trogen	0.80 mg	g/L to 1.5	59 mg/L										
	Nutrients	Surface Total Ph	nosphorus	0.058 n	ng/L to 0	.159 mg/L	_									
	Ž	Nitrogen to Phos	11:1					Phosph	orus limi	ted						
		Click to learn m Beneficial Uses	nore about	Turbidity	Hď	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a		
ses	Fish	h & Wildlife Propa	gation	S	S	NEI	NEI									
Beneficial Uses	Aes	sthetics						S	*							
icia	Agr	riculture								N/A	N/A	S				
ene	Prir	mary Body Contac	t Recreation										NEI			
m	Pub	olic & Private Wate	er Supply				NEI									
	٨	S = Fully Supporting IS = Not Supporting IEI = Not Enough Ini	formation §	*Standa	rds revisio	on, true col	or is for pe	ermitting	ourposes o	nly.						
NTU	NTU = nephelometric turbidity units OWQS = Oklahoma Water Quality Standards mg/L = milligrams per liter ppt = parts per thousand															

 μ S/cm = microsiemens/cm

En = Enterococci

mV = millivolts

Chlor-a = Chlorophyll-a

 μ S/cm = microsiemens per centimeter

E. coli = Escherichia coli

Hugo

 μ S/cm = microsiemens per centimeter

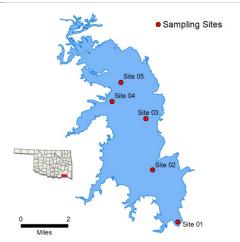
E. coli = Escherichia coli

mV = millivolts

Chlor-a = Chlorophyll-a

Sample Period	d	Times Visited	Sampling Sites				
November 2016 - Augu	ıst 2017	4	5				
Location	Choctaw C	County	Click map for site data				
Impoundment	1974						
Area	13,250 acre	es					
Capacity	157,600 acre-feet						
Purposes	Flood Control, Water Supply, Water Quality Control, Fish and Wildlife, and Recreation						

Times



	Pur	poses	Control, Fish a	nd Wildli	fe, and R	ecreation	<u> </u>		wiies							
		Parameter (Des	criptions)	Result					Notes/0	Commen	its					
		Average Turbidit	ty	36 NTL	J				88% of	values >	OWQS	of 25 NTU	l			
		Average Secchi	Disk Depth	37 cm												
	itu	Water Clarity Ra	ting	Poor												
	In Situ	Chlorophyll-a		14.35 n	ng/m3											
		Trophic State Inc	dex	57					Previous value = 61							
ပ		Trophic Class		Eutroph	nic											
Parameters		Salinity		0.02 -	134.9 pp	t										
ram		Specific Conduc	tivity	54.3 – 142.2 µS/cm												
Ра	Profile	pН		6.3 – 8.3 pH units					Only 5.	3% value	s < 6.5 p	H units				
	4	Oxidation-Reduc	ction Potential	181.8 to	o 548.5 n	nV										
		Dissolved Oxyge	en	Up to 5 August		ater colum	nn < 2 mg	g/L in								
	ဟ	Surface Total Ni	trogen	0.4 mg/	L to 0.76	mg/L										
	Nutrients	Surface Total Ph	nosphorus	0.047 n	0.047 mg/L to 0.082mg/L											
	Ž	Nitrogen to Phos	sphorus Ratio	9:1					Phosph	orus limi	ted					
		Click to learn m		Turbidity	된	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
ses	Fish	h & Wildlife Propa	gation	NS	NS	S	S									
Beneficial Uses	Aes	sthetics						S	*							
ficia	Agr	riculture								N/A	N/A	S				
ene	Prir	mary Body Contac	t Recreation										S			
ă	Pub	Public & Private Water Supply					S									
	٨	S = Fully Supporting NS = Not Supporting NEI = Not Enough Inf	formation specific	*Standa	rds revisio	n, true col	or is for pe	ermitting p	ourposes o	nly.						
	NTU = nephelometric turbidity units OWQS = Oklahoma Water Quality Standards mg/L = milligrams per liter ppt = parts per thousand															

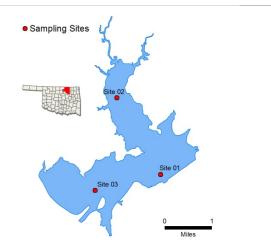
 μ S/cm = microsiemens/cm

En = Enterococci

Hulah

	Sample Period	1	Visited	Sampling Sites						
1	November 2018 – Augu	ıst 2019	4	5						
	Location	Osage Co	unty	Click map for site data						
3	Impoundment	1951								
	Area	3,570 acres								
, ,	Capacity	31,160 acre-feet								
	Purposes	Flood Control, Water Supply, Low-flow Regulation, and Conservation								

Times



		poses	Regulation, an	nd Conservation												
		Parameter (Desc	criptions)	Result					Notes/	Commen	nts					
		Average Turbidity	у	44 NTL	J				78% of	values >	- OWQS	of 25 NTU	l (n=9)			
		Average Secchi I	Disk Depth	26 cm												
	itu	Water Clarity Rat	ting	Poor												
	In Situ	Chlorophyll-a		16.77 n	ng/m3											
		Trophic State Inc	lex	58					Previou	ıs value =	= 54					
ည		Trophic Class		Eutroph	nic											
Parameters		Salinity		0.12 - 0).20 ppt											
ıran	o,	Specific Conduct	ivity	258.3 –	· 418.8 μ	S/cm										
٩	Profile	рН		7.29 – 8	3.43 pH ι	units			Neutral to slightly alkaline							
	亙	Oxidation-Reduc	tion Potential	177.7 to	o 427.10	mV										
		Dissolved Oxyge	n	Up to 3 August	5% of wa	iter colun	าท < 2 moุ	g/L in								
	ts	Surface Total Nit	rogen	0.44 mg	g/L to 1.3	3 mg/L										
	Nutrients	Surface Total Ph	osphorus	0.050 n	0.050 mg/L to 0.153 mg/L											
	Ž	Nitrogen to Phos	phorus Ratio	10:1					Phosphorus limited							
		Click to learn mo	ore about	Turbidity	표	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
ses	Fish	n & Wildlife Propag	gation	NS	S	S	S									
<u>ه</u>	Aes	sthetics						NEI	N/A							
fici	Agr	iculture								N/A	N/A	S				
Beneficial Uses	Prir	mary Body Contact	Recreation										S			
m	Pub	olic & Private Wate	r Supply				S									
	٨	S = Fully Supporting IS = Not Supporting IEI = Not Enough Info	ormation	Currently, this lake is listed as a Nutrient Limited Watershed (NLW) in the Oklahoma Water Quality Standards (WQS). This means that the lake is considered threatened from nutrients until a more intensive study can confirm the Aesthetics beneficial use non-support status.*Standards revision, true color is for permitting purposes only.							tensive					

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

mV = millivolts

Chlor-a = Chlorophyll-a

NTU = *nephelometric turbidity units*

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

Humphreys

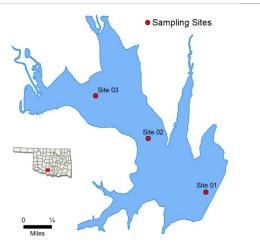
NEI = *Not Enough Information*

NTU = *nephelometric turbidity units*

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

	Sample Period	t	Visited	Sampling Sites				
	October 2018 – July	2019	4	3				
	Location	Stephens C	County	Click map for site data				
<u></u>	Impoundment	1958						
General	Area	882 acres						
9	Capacity	14,041 acre-feet						
	Purposes	Water Supp	oly, Flood Co	ntrol, Recreation				



		Parameter (<u>Descriptions</u>)	Result					Notes/0	Commer	nts					
		Average Turbidity	7 NTU					100% c	f values	< OWQ	of 25 NT	U (n=12))		
		Average Secchi Disk Depth	115 cm												
	Ē	Water Clarity Rating	Excelle	nt											
	In Situ	Chlorophyll-a	17.39 n	ng/m3											
		Trophic State Index	59					Previou	s value :	= 62					
હ		Trophic Class	Eutroph	nic											
Parameters		Salinity	0.26 –	0.33 ppt											
ıran	ø.	Specific Conductivity	542.9 –	- 680.5 μ	S/cm										
<u>a</u>	Profile	pH	7.23 –	8.36pH u	nits			Neutral to slightly alkaline							
	₫	Oxidation-Reduction Potential	-74.10	- 4442.4	mV										
		Dissolved Oxygen	Up to 5 July	3% of wa	ater colum	nn < 2.0 ı	mg/L in								
	ts	Surface Total Nitrogen	0.70 mg/L to 1.01 mg/L												
	Nutrients	Surface Total Phosphorus	0.020 n	ng/L to 0	.061 mg/L	-									
	Ž	Nitrogen to Phosphorus Ratio	24:1					Phosphorus limited							
		Click to learn more about Beneficial Uses□	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a		
ses	Fish	h & Wildlife Propagation	S	S	S	S									
Š	Aes	sthetics					NEI	*							
ficia	Agr	iculture							N/A	N/A	S				
Beneficial Uses	Prin	mary Body Contact Recreation										S			
	Pub	olic & Private Water Supply											NS		
	٨	S = Fully Supporting IS = Not Supporting IS = Not Supporting	*Standards revision, true color is for permitting p reviewed to determine the need to be considered								TSI this lake	e will be fu	ırther		

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

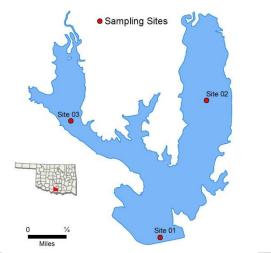
mV = millivolts

Chlor-a = Chlorophyll-a

Jean Neustadt

Sample Period	Times Visited	Sampling Sites
December 2016 – September 2017	4	5

	2017			
	Location	Carter Cou	nty	
<u>v</u>	Impoundment	1969		
dener	Area	462 acres		
	Capacity	6,106 acre-	feet	
	Purposes	Recreation		

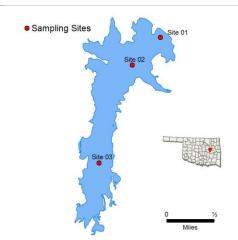


		Parameter (Descriptions)	Result					Notes/Comments							
		Average Turbidity	16 NTL	J				17% of	values >	- OWQS	of 25 NTU	J (n=12)			
		Average Secchi Disk Depth	48 cm												
	In Situ	Water Clarity Rating	Averag	е											
	드	Chlorophyll-a	14.23	mg/m3											
		Trophic State Index	57					Previou	ıs value =	= 61					
<u>s</u>		Trophic Class	Eutroph	nic											
Parameters		Salinity	0.10-0).14 ppt											
aran	ø	Specific Conductivity	220.8 –	- 328.9 µ	S/cm										
<u> </u>	Profile	рН	6.95 –	8.58 pH ւ	units										
	₫	Oxidation-Reduction Potential		56.8 mV											
		Dissolved Oxygen	Up to 5 June	4% of wa	iter colun	nn < 2 m(g/L in	Occurr	ed at site	1, the d	am				
	ts	Surface Total Nitrogen	0.60 m	g/L to 1.1	4 mg/L										
	Nutrients	Surface Total Phosphorus	0.024m	0.024mg/L to 0.087 mg/L											
	Ž	Nitrogen to Phosphorus Ratio	20:1				Phosphorus limited								
		Click to learn more about Beneficial Uses	Turbidity	듄	Dissolved Oxygen	Metals	ISI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
ses	Fish	h & Wildlife Propagation	S	S	NEI	S									
Š	Aes	sthetics					S	*							
ficia	Agr	riculture							N/A	N/A	S				
Beneficial Uses	Prin	mary Body Contact Recreation										S			
m	Pub	olic & Private Water Supply													
	٨	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	*Standards revision, true color is for permitting purposes only. *50-70% range is undetermined for DO.												

NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$ E. coli = Escherichia coli OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a $mg/L = milligrams per liter \mu S/cm = microsiemens/cm$

Jim Hall (Henryetta)

	Sample Period	d	Visited	Sampling Sites					
0	ctober 2018 – Septem	ber 2019	4	5					
	Location	Okmulgee	County						
<u>ख</u>	Impoundment	1928							
General	Area	450 acres							
ပ္ပံ	Capacity	6 600 acre-feet							



	Pur	poses	Water Supply	and Recreation						5		Miles	3			
		Parameter (Des	scriptions)	Result					Notes/	Commer	its					
		Average Turbidi	ty	65 NTL	J				100% (of values	> OWQS	of 25 NT	U (n=9)			
		Average Secchi	Disk Depth	22 cm												
	In Situ	Water Clarity Ra	ating	Poor												
	드	Chlorophyll-a		5.93 m	g/m3											
		Trophic State In	dex	48					Previous value = 44							
ຍ		Trophic Class		Mesotro	ophic											
Parameters		Salinity		0.04 - 0).05 ppt											
aran	a)	Specific Conduc	tivity	76.9 –1	13.9 µS/	cm										
<u>"</u>	Profile	рН		6.32 – 7.45 pH units					9.8%	of record	ed value	s <6.5				
	₫	Oxidation-Reduc	ction Potential	252 to 502.3 mV												
		Dissolved Oxyge	en	Up to 7 Septem	17% of wante	mn < 2 m	g/L in									
	ts	Surface Total Ni	itrogen	0.72 m	g/L to 1.0											
	Nutrients	Surface Total Ph	nosphorus	0.092 mg/L to 0.125 mg/L												
	ž	Nitrogen to Phos	sphorus Ratio	9:1					Phosphorus limited							
		Click to learn m Beneficial Uses	nore about	Turbidity	퓑	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
ses	Fish	n & Wildlife Propa	gation	NS	S	S	NS									
Š	Aes	sthetics						S	*							
Beneficial Uses	Agr	iculture								N/A	N/A	S				
ene	Prin	mary Body Contac	t Recreation										S			
m	Pub	olic & Private Wate	er Supply				NS									
	٨	S = Fully Supporting IS = Not Supporting IEI = Not Enough In							exceeded. permitting			are fully				

NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$ E. coli = Escherichia coli OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a $mg/L = milligrams per liter \mu S/cm = microsiemens/cm$

John Wells

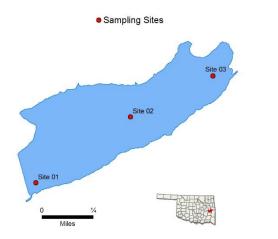
 μ S/cm = microsiemens per centimeter

E. coli = Escherichia coli

mV = millivolts

Chlor-a = Chlorophyll-a

	Sample Period	t	Times Visited	Sampling Sites				
No	ovember 2016 – Aug	ust 2017	4	5				
	Location	Haskell County						
<u>'a</u>	Impoundment	1936						
Genera	Area	194 acres						
စီ	Capacity	1,352 acre	-feet					



	Pur	rposes	Water Sup	ply,	Recreat	ion					Miles		92-0	651 ST-65-65	
		Parameter (Des	scriptions)		Result	esult				Notes/0	Commer	its			
		Average Turbidit	ty		4 NTU					100% o	f values	< OWQ9	of 25 NT	U (n=10)	
		Average Secchi	Disk Depth		146 cm										
	Situ	Water Clarity Ra	iting		Excelle	nt									
	드	Chlorophyll			5.2 mg/	′L									
		Trophic State Inc	dex		47					Previous	s value =	: 45			
હ		Trophic Class			Mesotrophic										
Parameters		Salinity			0.03 -	0.08 ppt									
ıran	Profile	Specific Conduc	tivity		75.2 –	75.2 – 165.2 µS/cm									
g.		рН			6.39 –	6.39 – 8.74 pH units			4.8% of	values <	< 6.50 p⊦	1			
	ā	Oxidation-Reduc	ction Potentia	al	95.2 –	95.2 – 546.3 mV									
		Dissolved Oxyge	en		Up to 5 July	to 50% of water column < 2.0 mg/L in									
	ts	Surface Total Ni	trogen		0.42 m	.42 mg/L to 0.55 mg/L									
	Nutrients	Surface Total Ph	nosphorus		0.014 mg/L to 0.018 mg/L										
	Nitrogen to Phosphorus Ratio				31:1			Phosph	orus limi	ted					
		Click to learn m Beneficial Uses	nore about		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a
ses	Fish	h & Wildlife Propa	gation		S	S	S	S							
Š	Aes	sthetics							S	*					
Beneficial Uses	Agr	riculture									*	*	S		
ene	Prir	mary Body Contac	t Recreation											S	
m	Pub	olic & Private Wate	er Supply					S							
	٨	S = Fully Supporting VS = Not Supporting VEI = Not Enough Int	formation	Notes	Standar	ds revision	n, true colo	r is for pe	rmitting pu	urposes on	ly.				

 μ S/cm = microsiemens/cm

En = Enterococci

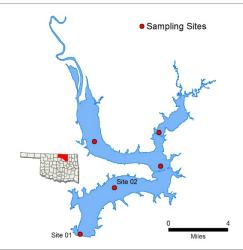
Kaw (Lower)

NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$

E. coli = Escherichia coli

Sample Period	d	Times Visited	Sampling Sites
October 2014 – July	2015	4	5
_ocation	Osage Cou	inty	

	Location	Osage County						
3	Impoundment	1976						
	Area	17,040 acres						
5	Capacity	428,600 acre-feet						
	Purposes	Flood Control, Water Supply, Water Quality Control, and Conservation						



		Parameter (<u>Descriptions</u>)	Result					Notes/0	Commer	nts				
		Average Turbidity	9 NTU					100% o	f values	< 25 NTl	J			
		Average Secchi Disk Depth	106 cm	1										
	ijţ	Water Clarity Rating	Good											
	In Situ	Chlorophyll-a	4 mg/n	า3										
		Trophic State Index	45					Previou	s value =	= 52				
S		Trophic Class	Mesotr	Mesotrophic										
Parameters		Salinity	0.23 -	.23 – 0.60 ppt										
aran	υ	Specific Conductivity	484.7 -	84.7 – 1189.9 μS/cm										
ď	Profile	рН	6.92 –	5.92 – 8.23 pH units				Neutral	to slightl	y alkaline	Э			
	₫.	Oxidation-Reduction Potential	120 to	120 to 442.4 mV Up to 68% of water column < 2 mg/L in										
		Dissolved Oxygen	Up to 6 July	88% of wa	iter colun	nn < 2 m(g/L in							
	ıts	Surface Total Nitrogen	0.82 m	82 mg/L to 1.69 mg/L										
	Nutrients	Surface Total Phosphorus	0.142 n	0.142 mg/L to 0.245 mg/L										
	ž	Nitrogen to Phosphorus Ratio	7:1	7:1				Possibly co-limited						
		Click to learn more about Beneficial Uses□	Turbidity	듄	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fish	n & Wildlife Propagation	NS											
a ∩	Aes	sthetics					S	*						
ficia	Agr	iculture							S	S	S			
Beneficial Uses	Prin	mary Body Contact Recreation										NEI		
M	Pub	olic & Private Water Supply				NEI								
	N	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	Standar	tandards revision, true color is for permitting pu					ly.					

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

mV = millivolts

Chlor-a = Chlorophyll-a

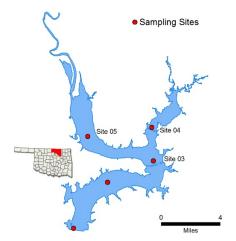
Kaw (Upper)

NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$

E. coli = Escherichia coli

Sample Period	d	Times Visited	Sampling Sites
October 2014 – July	2015	4	5
Location	Osage Cou	intv	

						_			
	Location	Osage Cou	Osage County						
5	Impoundment	poundment 1976							
	Area	17,040 acres							
	Capacity	428,600 ac	re-feet						
	Purposes		rol, Water Su d Conservati		Quality				



ppt = parts per thousand En = Enterococci

		Control, and C												
		Parameter (<u>Descriptions</u>)	Result					Notes/0	Commer	nts				
		Average Turbidity	42 NTU	J				18% of	18% of values > 25 NTU					
		Average Secchi Disk Depth	53 cm											
	itu	Water Clarity Rating	Fair											
	In Situ	Chlorophyll-a	16.5 m	g/m3										
		Trophic State Index	58					Previou	s value :	= 60				
<u>ت</u>		Trophic Class	Eutroph	Eutrophic										
Parameters		Salinity	0.22 -	2.22 – 0.76 ppt										
arar	ω	Specific Conductivity	465.4 -	465.4 – 1495.4 μS/cm										
٣	Profile	рН	7.20 –	8.49 pH ւ	units			Neutral	to slight	y alkaline	Э			
	₫	Oxidation-Reduction Potential	149.9 t	149.9 to 417.6 mV Up to 40% of water column < 2 mg/L in										
		Dissolved Oxygen	Up to 4 July	0% of wa	ater colun	nn < 2 mg	g/L in							
	ts	Surface Total Nitrogen	0.73 m	73 mg/L to 2.76 mg/L										
	Nutrients	Surface Total Phosphorus	0.127 n	0.127 mg/L to 0.455 mg/L										
	Ž	Nitrogen to Phosphorus Ratio	6:1				Possibly co- limited							
		Click to learn more about Beneficial Uses□	Turbidity	モ	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
Beneficial Uses	Fish	n & Wildlife Propagation	NS	S	NEI	NEI								
<u></u>	Aes	ethetics		S				*						
ficia	Agr	iculture							S	S	S			
eue	Prin	mary Body Contact Recreation										NEI		
M	Pub	olic & Private Water Supply				NEI								
	N	S = Fully Supporting US = Not Supporting UEI = Not Enough Information	Standar	ds revisior	n, true colo	or is for pe	rmitting pu	urposes on	ly.					

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

OWQS = Oklahoma Water Quality Standards

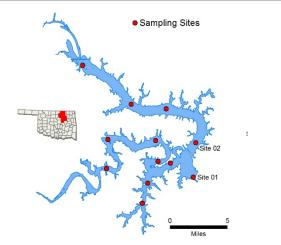
mV = millivolts

Chlor-a = Chlorophyll-a

Keystone (1-2)

Sample Period	d	Times Visited	Sampling Sites
October 2018 – July	2019	4	12
Lasatian	Tules Cour	4	

	October 2016 – July	2019	4	12
	Location	Tulsa Cour	nty	
5	Impoundment	1964		
	Area	23,610 acr	es	
	Capacity	557,600 ad	cre-feet	
	Purposes		rol, Water Su Fish & Wild	upply, Hydropower, life
	Donomotor (Doo	- windia na l	Daguile	



		Navigation, Fi							_				
		Parameter (<u>Descriptions</u>)	Resu	lt				Notes/0	Commer	nts			
		Average Turbidity	75 N	Ū				50% of	values >	OWQS	of 25 NTL	J (n=8)	
		Average Secchi Disk Depth	42 cn	1									
	In Situ	Water Clarity Rating	Avera	ige									
	드	Chlorophyll-a	14.56	mg/m3									
		Trophic State Index	57					Previous	s value =	= 54			
ည		Trophic Class	Eutro	Eutrophic									
Parameters		Salinity	0.25	0.25 – 1.78 ppt									
aran	a)	Specific Conductivity	517.5	517.5 – 3372.2 μS/cm									
<u> </u>	Profile	pH	7.43	7.43 – 8.59 pH units				Neutral	to slight	ly alkaline	Э		
	Ē	Oxidation-Reduction Potential	189.9	– 476.5 r	nV								
		Dissolved Oxygen	Up to July	19% of wa	ater colun	nn < 2.0 r	mg/L in						
	ts	Surface Total Nitrogen	1.02	mg/L to 2.1	0 mg/L								
	Nutrients	Surface Total Phosphorus	0.120	0.120mg/L to 0.390 mg/L									
	Z	Nitrogen to Phosphorus Ratio	6:1	6:1				Possibly co-limited					
		Click to learn more about Beneficial Uses□	Turbidity	Æ	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a
Beneficial Uses	Fish	n & Wildlife Propagation	NS										
<u></u>	Aes	ethetics		S				N/A					
ficia	Agr	iculture							S	S	S		
ene	Prin	mary Body Contact Recreation										NEI	
Ď	Pub	olic & Private Water Supply				NEI							
	N	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	*Stand	dards revisio	on, true col	or is for pe	ermitting p	ourposes of	nly				

Chlor-a = Chlorophyll-a

mV = millivolts

OWQS = Oklahoma Water Quality Standards

NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$

E. coli = Escherichia coli

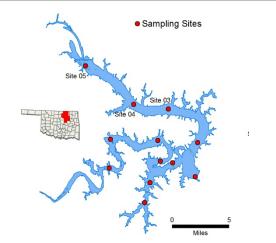
Keystone, Arkansas River Arm (3-5)

	Sample Period	d	Times Visited	Sampling Sites					
October 2018 – July 2019			4	12					
	Location	Tulsa County							
a	Impoundment	1964							
General	Area	23,610 acres							
ဗီ	Capacity	557,600 ad	cre-feet						
	Purnoses	Flood Control, Water Supply, Hydropower,							

NTU = *nephelometric turbidity units*

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter



	Pur	rposes	rish & Wildlife													
		Parameter (Des	scriptions)	Result					Notes/Co	mments						
		Average Turbidit	ty	94 NTI	J				92% of va	lues > O	WQS of	25 NTU (n=12)			
		Average Secchi	Disk Depth	20 cm												
	Situ	Water Clarity Ra	ıting	Poor												
	<u>=</u>	Chlorophyll-a		17.17 r	mg/m3											
		Trophic State Inc	dex	58					Previous \	/alue = 6	4					
SIS		Trophic Class		Eutrop	hic											
Parameters		Salinity		0.28 -	0.71 ppt											
arar	a a	Specific Conduc	tivity	567.1 -	- 1413.5	µS/cm										
ď	Profile	рН		7.5 – 8	.61 pH ur	nits			Neutral to slightly alkaline							
		Oxidation-Reduc	ction Potential	244.5 -	- 421 mV											
		Dissolved Oxyge	en													
	ts	Surface Total Ni	trogen	0.93 m	g/L to 2.1	9 mg/L										
	Nutrients	Surface Total Ph	nosphorus	0.100	mg/L to 0).450 mg/l	<u>L</u>									
	Nut	Nitrogen to Phos	sphorus Ratio	6:1	6:1					Possibly co-limited						
		Click to learn m		Turbidity	Hd	Dissolved Oxygen	Metals	ISI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a		
ses	Fisl	h & Wildlife Propa	gation	NS	S	S	NEI									
Beneficial Uses	Aes	sthetics						S	*							
fici	Agr	riculture								S	S	S				
ene	Prir	mary Body Contac	t Recreation										NEI			
<u>m</u>	Puk	olic & Private Wate	er Supply				NEI									
	٨	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information			Standards revision, true color is for permitting purposes only											

OWQS = Oklahoma Water Quality Standards

mV = millivolts

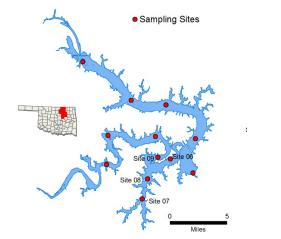
Chlor-a = Chlorophyll-a

 $mg/L = milligrams per liter \ \mu S/cm = microsiemens/cm$

Keystone, Lower Cimarron River Arm (6-9)

Sample Period	d	Visited	Sampling Sites				
October 2018 – July	2019	4	12				
Location	Tulsa Cour	nty					

	Location	Tulsa County						
5	Impoundment	1964						
D	Area	23,610 acres						
	Capacity	557,600 acre-	feet					
	Purposes	Flood Control, Navigation, Fis	Water Supply, Hydropower, sh & Wildlife					
	Parameter (Des	ecrintions)	Posult					



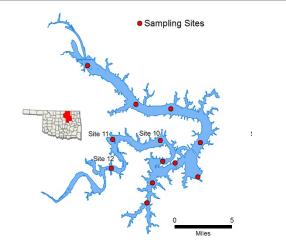
	ı uı	hoses	Navigation,	Wild	life							Mile	s					
		Parameter (Des	scriptions)	Re	sult					Notes/Co	mments	;						
		Average Turbidi	ty	25	NTU	J				13% of va	lues > C)WQS o	f 25 NTU	(n=16)				
		Average Secchi	Disk Depth	52	cm													
	ņ	Water Clarity Ra	ıting	Av	erag	е												
	In Stu	Chlorophyll-a		27.	6 m	ıg/m3												
		Trophic State In	dex	63						Previous v	/alue = 6	50						
ည		Trophic Class		Ну	Hypereutrophic													
Parameters		Salinity		0.4	1 – 2	2.32 ppt												
ıran	a)	Specific Conduc	tivity	840	6.4 –	4347.9	µS/cm											
g B	Profile	рН		7.2	8 – 8	3.56 pH u	units			Neutral to slightly alkaline								
	₫.	Oxidation-Reduc	ction Potentia	159	9.9 –	437.4 m	١V											
		Dissolved Oxyge	en		Up to 23% of water column < 2.0 mg/L in July													
	S	Surface Total Ni	trogen	0.8	1 mg	g/L to 1.9	8 mg/L											
	Nutrients	Surface Total Ph	nosphorus	0.1	00 r	mg/L to 0).290 mg/	L										
	N	Nitrogen to Phos	Nitrogen to Phosphorus Ratio				7:1					Possibly co-limited						
		Click to learn m Beneficial Uses			i ul bidity	된	Dissolved Oxygen	Metals	ISI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a			
Beneficial Uses	Fish	n & Wildlife Propa	gation	N	S	S	NEI	NEI										
	Aes	sthetics							S	*								
fici	Agr	iculture									S	S	S					
ene	Prin	mary Body Contac	t Recreation											NEI				
m	Pub	olic & Private Wate	er Supply					NEI										
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information				* Standards revision, true color is for permitting purposes only													

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

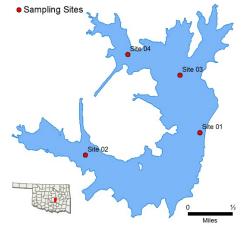
	Location	Tulsa County
5	Impoundment	1964
	Area	23,610 acres
5	Capacity	557,600 acre-feet
	Purposes	Flood Control, Water Supply, Hydropower, Navigation, Fish & Wildlife



		Navigation, Fi												
		Parameter (<u>Descriptions</u>)	Result					Notes/Co	mments	•				
		Average Turbidity	49 NTL	J				50% of va	alues > C)WQS o	f 25 NTU	(n=10)		
		Average Secchi Disk Depth	32 cm											
	itu	Water Clarity Rating	Poor											
	In Situ	Chlorophyll-a	37.17 r	ng/m3										
		Trophic State Index	66					Previous value = 67						
S		Trophic Class	Hypere	utrophic										
Parameters		Salinity	0.81 –	3.07 ppt										
arar	Φ	Specific Conductivity	1625.5	- 5697.2	μS/cm									
<u>a</u>	Profile	рН	7.49 –	8.66 pH ւ	units			Neutral to slightly alkaline						
	₫	Oxidation-Reduction Potential	185.7 –	- 439.6 m	١V									
		Dissolved Oxygen	Up to 3 July	4% of wa	iter colum	nn < 2.0 m	g/L in							
	Nutrients	Surface Total Nitrogen	0.81 m	g/L to 2.0	3 mg/L									
		Surface Total Phosphorus	0.140	mg/L to 0	.250 mg/	L								
	Z	Nitrogen to Phosphorus Ratio	8:1	8:1					Possibly co-limited					
		Click to learn more about Beneficial Uses□	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a	
Beneficial Uses	Fish	n & Wildlife Propagation	NS	S	*	NEI								
<u></u>	Aes	sthetics					S	*						
ficia	Agr	iculture							S	S	S			
ene	Prin	mary Body Contact Recreation										NEI		
m	Pub	olic & Private Water Supply				NEI								
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	* Standards revision, true color is for permitting purposes only											

Konawa

	Sample Period		Visited	Sampling Sites				
No	vember 2018 – Septer	nber 2019	4	3				
	Location	Seminole C	County					
<u>a</u>	Impoundment	1968						
neral	Area	1,350 acres	S					



	Ğ	Cap	oacity	23,000 acre-fe	et							3	~ 1			
		Pur	poses	Cooling Water									0	Miles		
			Parameter (Des	scriptions)	Result					Notes/	Commer	nts				
			Average Turbidi	ty	6 NTU					100% of values < OWQS of 25 NTU (n=9)						
			Average Secchi	Disk Depth	104 cm											
		Situ	Water Clarity Ra	ating	Excellent											
		드	Chlorophyll-a		17 mg/m3											
	Parameters		Trophic State In	dex	58					Previou	ıs value =	= 59				
			Trophic Class		Eutrop	hic										
	nete	Ø	Salinity		0.28 –	0.36 ppt										
	aran		Specific Conduc	tivity	579.8 -	- 732.1 μS	S/cm									
	<u>a</u>	Profile	рН	6.86 – 8.55 pH units					Neutra	to slightl	ly alkaline)				
		₫	Oxidation-Reduc	ction Potential	-101.1 to 501.2 mV											
			Dissolved Oxyge	en	Up to 40% of water column < 2.0 mg/L in September											
		Ñ	Surface Total Ni	itrogen	0.73 mg/L to 1.05 mg/L											
		Nutrients	Surface Total Ph	nosphorus	0.025 r	mg/L to 0.	057 mg/l	-								
		Ž	Nitrogen to Phos	sphorus Ratio	22:1					Phosph	norus limi	ted				
			Click to learn m	ore about	iţ		ved	10			S	des	ved		, a	

	Click to learn more about Beneficial Uses□	Turbidity	五	Dissolved Oxygen	Metals	ISI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a
SUC	Fish & Wildlife Propagation	S	S	S	*							
⊃ =	Aesthetics					S	N/A					
ב	Agriculture							S	S	S		
1) 1)	Primary Body Contact Recreation										S	
Ď	Public & Private Water Supply											

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

* Standards revision, true color is for permitting purposes only

NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$ E. coli = Escherichia coli $OWQS = Oklahoma\ Water\ Quality\ Standards\ mV = millivolts\ Chlor-a =\ Chlorophyll-a$

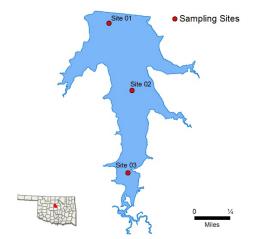
 $mg/L = milligrams per liter \mu S/cm = microsiemens/cm$

Langston

	Sample Period	d	Times Visited	Sampling Sites						
1	November 2015 – Augu	ıst 2016	4	5						
	Location	Logan Cou	nty							
ਰ	Impoundment	1966								
D D	Area	304 acres								
ם פ	Capacity	5,792 acre-feet								

Times

Water Supply, Flood Control, and Recreation



Purposes Water Supply, Flood Control, and Recreation											2 (
		Parameter (Description	ons)	Result					Notes/0	Commen	ıts					
		Average Turbidity		6 NTU					100% o	f values	< 25 NTl	J				
		Average Secchi Disk I	Depth	104 cm												
	situ	Water Clarity Rating		Excelle	nt											
	In-Situ	Chlorophyll-a		5.6 mg/	/m3											
		Trophic State Index		48					Previous value = 45							
S.		Trophic Class		Mesotro	ophic											
Parameters		Salinity		0.18 – 0	0.19 ppt											
aran	Φ	Specific Conductivity		372.2 –	- 393.7 μ	S/cm										
٣	Profile	рН		7.91 – 8	3.42 pH ι	units										
	₫.	Oxidation-Reduction F	Potential		o 336.3 n											
		Dissolved Oxygen		Up to 2 summe		ater colum	nn < 2 mg	g/L in								
	ts	Surface Total Nitroger	า	0.47 mg	g/L to 0.5	64 mg/L										
	Nutrients	Surface Total Phosph	orus	0.010 n	ng/L to 0.	.019 mg/L	-									
	ž	Nitrogen to Phosphore	us Ratio	38:1	38:1					Phosphorus limited						
		Click to learn more a. Beneficial Uses□	<u>bout</u>	Turbidity	Hd.	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
ses	Fish	h & Wildlife Propagation		S	S	S	S									
<u></u>	Aes	sthetics						S	S							
Beneficial Uses	Agr	iculture								S	S	S				
eue	Prin	mary Body Contact Rec	reation										S			
m	Pub	olic & Private Water Sup	pply													
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Informati	Notes	* Standa	* Standards revision, true color is for permitting purposes only											

NTU = *nephelometric turbidity units* μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivoltsChlor-a = Chlorophyll-a

mg/L = milligrams per liter μ S/cm = microsiemens/cm

Lawtonka

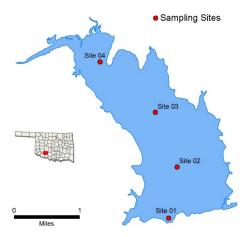
NTU = *nephelometric turbidity units*

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

Sample Period	Times Visited	Sampling Sites
October 2018 – July 2019	4	5

	•	
	Location	Comanche County
5	Impoundment	1905
	Area	2,398 acres
	Capacity	56,574 acre-feet
	Purposes	Water Supply, Recreation



	ı uı	poses	water oupp	, y,	rtcorcati	011										
		Parameter (Des	scriptions)		Result					Notes/0	Commer	nts				
		Average Turbidi	ity		10 NTU	I				100% o	f values	<owqs< td=""><td>of 25 NT</td><td>U</td><td></td></owqs<>	of 25 NT	U		
		Average Secchi	Disk Depth		94 cm											
	itu	Water Clarity Ra	ating		Excelle	nt										
	In-Situ	Chlorophyll-a			25.82 m	ng/m3										
		Trophic State In	idex		62					Previou	Previous Value= 62					
ည		Trophic Class			Hypere	utrophic										
Parameters		Salinity			0.14– 0.17 ppt											
aran	ω	Specific Conduc	ctivity		296.4 –	360.6 µ	S/cm									
g,	Profile	рН			7.3 – 8.	37 pH ur	nits			Neutral to slightly alkaline						
	₫	Oxidation-Redu	ction Potentia	ıl	5.1 – 48	31.8 mV										
		Dissolved Oxyg	en		Up to 4 July	Up to 49% of water column < 2 mg/L in July										
	ts	Surface Total N	itrogen		0.57 mg	0.57 mg/L to 0.90 mg/L										
	Nutrients	Surface Total P	hosphorus		0.021 m	ng/L to 0	.054 mg/l	L								
	ž	Nitrogen to Pho	sphorus Ratio)	20:1					Phosphorus limited						
		Click to learn n Beneficial Uses			Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fish	h & Wildlife Propa	gation		S	S	NEI	S								
ت ت	Aes	sthetics							S	*						
ficia	Agr	riculture									S	S	S			
Beneficial Uses	Prin	mary Body Contac	ct Recreation											S		
Ď	Pub	olic & Private Wat	er Supply												NS	
	٨	S = Fully Supporting VS = Not Supporting VEI = Not Enough In	1	Notes	* Standa	ards revisi	on, true co	olor is for p	ermitting	purposes of	only					

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

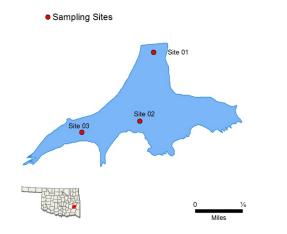
OWQS = Oklahoma Water Quality Standards

mV = millivolts

Chlor-a = Chlorophyll-a

Lloyd Church (Wilburton)

	Sample Period	d	Visited	Sampling Sites					
De	ecember 2018 – Aug	ust 2019	4	3					
	Location	Latimer Co	unty						
General	Impoundment	1964							
	Area	160 acres							
	Capacity	3,060 acre-feet							
	Purposes	Water Supr	pply, Recreation, Flood Control						



Purposes Water Supply, Recreation, Flood Control														
		Parameter (Descri	riptions)	Resu	lt				Notes/0	Commer	nts			
		Average Turbidity		10 N	ΓU				100% o	f values	< 25 NT	J (n=12)		
		Average Secchi De	epth	99 cn	1									
	Situ	Water Clarity Ratin	ng	Exce	lent									
	n S	Chlorophyll-a		5.3 m	g/m3									
		Trophic State Inde	х	47	47					s value :	= 46			
ည		Trophic Class		Meso	trophic									
Parameters		Salinity		0.02	- 0.04 ppt									
ıran	ω.	Specific Conductiv	rity	42.6	-82.6 µS/	/cm								
<u> </u>	Profile	рН		6.05	- 7.48 pH	units			40% of values <6.5 pH units					
	₫	Oxidation-Reduction	on Potential	76.1	596.8 mV									
		Dissolved Oxygen			Up to 53% of water column < 2 mg/L in September									
	ts	Surface Total Nitro	gen	0.27	mg/L to 0.4	14 mg/L								
	Nutrients	Surface Total Phos	sphorus	0.013	mg/L to 0	.029 mg/L	_							
	ž	Nitrogen to Phosph	horus Ratio	17:1					Phosphorus limited					
		Click to learn mor Beneficial Uses□	re about	Turbidity	Hď	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
ses	Fish	h & Wildlife Propaga	tion	NS	NS	NEI	S							
ت ت	Aes	sthetics						S	*					
Beneficial Uses	Agr	riculture								S	S	S		
eue	Prin	mary Body Contact F	Recreation										S	
a	Pub	olic & Private Water	Supply											
	Ν	S = Fully Supporting NS = Not Supporting NEI = Not Enough Infort	mation	* Stan	* Standards revision, true color is for permitting purposes only									

NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$ E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a $mg/L = milligrams per liter \mu S/cm = microsiemens/cm$

Liberty

	Sample Period	d	Times Visited	Sampling Sites					
No	ovember 2015 – Aug	ust 2016	4	3					
	Location	Logan Cou							
General	Impoundment	1948							
	Area	167 acres							
တိ	Capacity	2,740 acre-feet							
	Purposes	Water Supply, Recreation							



		Parameter (Descriptions)		Result					Notes/0	Commer	nts				
		Average Turbidity		12 NTU	J				100% o	f values	< OWQS	S of 25 NT	U		
		Average Secchi Disk Depth		52 cm											
	itu	Water Clarity Rating		Average	е										
	In Situ	Chlorophyll-a		57.3 mg	g/m3										
		Trophic State Index		70					Previous Value= 67						
ည		Trophic Class		Hypere	utrophic										
Parameters		Salinity		0.27 – 0	0.31 ppt										
ıran	a	Specific Conductivity		567.7 –	-640.1 μ	S/cm									
<u> </u>	Profile	рН		7.57 – 8	3.65 pH ı	units			Neutral to slightly alkaline						
	₫	Oxidation-Reduction Potential		-11.8 -	307.9 m\	/									
		Dissolved Oxygen		Up to 4 August		ater colun	nn < 2 m	g/L in							
	ts	Surface Total Nitrogen		0.78 mg	g/L to 1.4	19mg/L									
	Nutrients	Surface Total Phosphorus		0.054 r	mg/L to C).080 mg/	′L								
	ž	Nitrogen to Phosphorus Ratio		17:1					Phosphorus limited						
		Click to learn more about Beneficial Uses□		Turbidity	된	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fish	n & Wildlife Propagation		S	S	S	S								
<u> </u>	Aes	ethetics						S	S						
ficia	Agr	iculture								S	S	S			
Beneficial Uses	Prin	mary Body Contact Recreation											NS		
M	Pub	olic & Private Water Supply												NS	
	N	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	Notes	* Standa	ards revisi	on, true co	olor is for p	ermitting	purposes o	only					

NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$ E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a $mg/L = milligrams per liter \mu S/cm = microsiemens/cm$

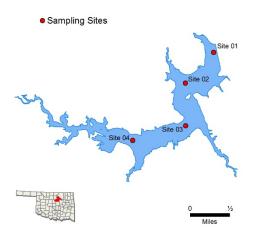
Lone Chimney

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

	Sample Period	d	Visited	Sampling Sites
С	ecember 2015 – Se	pt. 2016	4	5
	Location	Pawnee Co	ounty	

	Location	Pawnee County
3	Impoundment	1984
	Area	550 acres
5	Capacity	6,200 acre-feet
	Purposes	Water Supply, Recreation and Flood Control



		poses	Water Cup	, y,	rtoorcan	on and i	1000 0011	itioi							
		Parameter (Des	scriptions)		Result					Notes/0	Commen	its			
		Average Turbidi	ty		10 NTL	J				100% o	f values	< OWQS	S of 25 NT	U	
		Average Secchi	Disk Depth		78 cm										
	jţc	Water Clarity Ra	ating		Good										
	In-Situ	Chlorophyll-a			10.7 mg	g/m3									
		Trophic State In	dex		54					Previous Value=52					
က်		Trophic Class			Eutroph	nic									
Parameters		Salinity			0.13-0	.20 ppt									
ram		Specific Conduc	ctivity		276.1 –	· 405.4 μ	S/cm								
Ра	Profile	pН			6.89 – 7	7.97 pH ı	units								
	ሷ	Oxidation-Redu	ction Potentia	ıl	35.4 -	434 mV									
-		Dissolved Oxygo	en			Up to 57% of water column < 2 mg/L in summer									
	Ŋ	Surface Total N	itrogen		0.82 mg	g/L to 1.0	08 mg/L								
	Nutrients	Surface Total Pl	hosphorus		0.030 n	ng/L to 0	.043 mg/l	L							
	Ž	Nitrogen to Phos	sphorus Ratio)	26:1					Phosph	orus limi	ted			
		Click to learn m			Turbidity	표	Dissolved Oxygen	Metals	ISI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
ses	Fish	h & Wildlife Propa	gation		NS	S	NEI								
Beneficial Uses	Aes	sthetics							S	S					
fici	Agr	riculture									S	S	S		
ene	Prir	mary Body Contac	ct Recreation											S	
Ď	Pub	olic & Private Wate	er Supply												
	٨	S = Fully Supporting IS = Not Supporting IEI = Not Enough In		Notes	* Standards revision, true color is for permitting purposes only										
		phelometric turbidity			= Oklahoi	ma Water	Quality St	andards		= milligram			t = parts pe		d

 μ S/cm = microsiemens/cm

En = Enterococci

mV = millivolts

Chlor-a = Chlorophyll-a

Lugert-Altus

Capacity

Purposes

NTU = *nephelometric turbidity units*

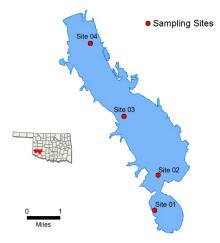
E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

	Sample Period	d	Visited	Sampling Sites				
(October 2015 - Augu	st 2016	2	4				
	Location	Greer County						
eral	Impoundment	1947						
ner	Area	6,260 acres	3					

132,830 acre-feet

Water Supply, Flood Control, Irrigation



ppt = parts per thousand En = Enterococci

		p0000	Water Capp	.,	1 1000 00	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	gation								
		Parameter (Des	scriptions)		Result					Notes/0	Commer	nts			
		Average Turbidi	ty		10 NTU					0% of v	alues >C	DWQS of	25 NTU		
		Average Secchi	Depth		53 cm										
	텵	Water Clarity Ra	ating		Average	Э									
	In-Situ	Chlorophyll-a			18.7 mg	g/m3									
		Trophic State In	dex		59					Previou	s Value=	= 51			
S		Trophic Class			Eutroph	nic									
Parameters		Salinity			1.04 – 1	1.04 – 1.40 ppt									
arar	a a	Specific Conduc	tivity		2023.6	-2685.9	μS/cm								
ă	Profile	pН			7.77 – 8	3.27 pH u	ınits								
	_	Oxidation-Reduc	ction Potentia	I	214.7 –	528.8 m	V								
		Dissolved Oxyge	en							All read	dings abo	ove 2.0 n	ng/L		
	ts.	Surface Total Ni	trogen		0.78mg	/L to 0.97	7 mg/L								
	Nutrients	Surface Total Ph	nosphorus		0.038 m	ng/L to 0.	074 mg/L	-							
	Z	Nitrogen to Phos	sphorus Ratio)	18:1					Phosphorus limited					
		Click to learn m Beneficial Uses			Turbidity	Hď	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
ses	Fisl	h & Wildlife Propa	gation		NS	S	S								
 	Aes	sthetics							S	*					
ficia	Agr	riculture									S	S	S		
Beneficial Uses	Prir	mary Body Contac	t Recreation											NEI	
m	Puk	olic & Private Wate	er Supply												
	٨	S = Fully Supporting IS = Not Supporting IEI = Not Enough Ini	Notes	* Standards revision, true color is for permitting purposes only											

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

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

OWQS = Oklahoma Water Quality Standards

mV = millivoltsChlor-a = Chlorophyll-a

McAlester

General

Capacity

Purposes

NTU = *nephelometric turbidity units*

 μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

Sample Period

		Violeda						
October 2014 – July	2015	4	3					
Location	Pittsburg County							
Impoundment	1930							
Area	1,521 acres	3						

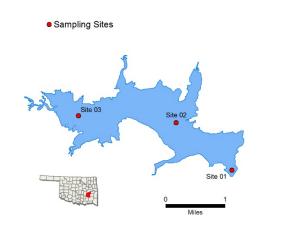
Water Supply and Recreation

13,398 acre feet

Times

Visited

Sampling Sites



		Parameter (<u>Descriptions</u>)	Result					Notes/Comments						
		Average Turbidity	110 NT	U				100% of values > OWQS of 25 NTU						
		Average Secchi Disk Depth	9 cm											
	jţ	Water Clarity Rating	Poor											
	In Situ	Chlorophyll-a	6 mg/m	า3										
		Trophic State Index	48					Previous value = 54						
ည		Trophic Class	Mesotre	ophic										
Parameters		Salinity	0.03 -	0.07 ppt										
aran	Φ	Specific Conductivity	74.1 –	154.3 µS	/cm									
ď	Profile	рН	6.52 –	7.91 pH ւ	units									
	₫	Oxidation-Reduction Potential	60.7 to	504 mV										
		Dissolved Oxygen	Up to 5 July	0% of wa	ater colun	nn < 2.0 r	mg/L in							
	ts	Surface Total Nitrogen	0.79 m	g/L to 1.1	2 mg/L									
	Nutrients	Surface Total Phosphorus	0.068 n	ng/L to 0.	.110 mg/l	-								
	Ž	Nitrogen to Phosphorus Ratio	10:1					Phosphorus limited						
		Click to learn more about Beneficial Uses□	Turbidity	듄	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a	
ses	Fish	n & Wildlife Propagation	NS	S	S	S								
Beneficial Uses	Aes	sthetics					S	*						
ficia	Agr	iculture							S	S	S			
ene	Prin	mary Body Contact Recreation										S		
m	Pub	olic & Private Water Supply												
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	* Standa	ards revisio	on, true co	lor is for p	ermitting _l	ourposes o	nly					

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

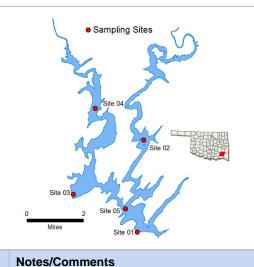
OWQS = Oklahoma Water Quality Standards

mV = millivoltsChlor-a = Chlorophyll-a

McGee Creek

	Sample Period		Times Visited	Sampling Sites
De	ecember 2014 – Septer	nber 2015	4	5
	Lasation	Atales Caus	. t	

	Location	Atoka County								
5	Impoundment	1987								
ם ס	Area	3,810 acres								
	Capacity	113,930 acre-feet								
	Purposes	Water Supply, Recreation, Water Quality Control, Flood Control, Fish & Wildlife								
	Parameter (Des	criptions) Result								



		Parameter (<u>Descriptions</u>)	Kesuit					Notes/Comments							
		Average Turbidity	6 NTU					10% of	10% of values < OWQS of 25 NTU (n=20)						
		Average Secchi Disk Depth	96 cm												
	In Situ	Water Clarity Rating	Excelle	ent											
	드	Chlorophyll-a	7 mg/n	n3											
		Trophic State Index	50					Previous value = 49							
S		Trophic Class	Mesotr	ophic											
Parameters		Salinity	0.02 -	0.07 ppt											
aran	ω	Specific Conductivity	48 – 14	16.1 µS/c	m										
<u> </u>	Profile	рН	6.04 –	7.71 pH ւ	units			39% of values < 6.5 pH units							
	Δ.	Oxidation-Reduction Potential	29.7 to	519.3 m	V										
		Dissolved Oxygen	Up to 7 August	'6% of wa	ater colun	nn < 2.0 ı	ng/L in	Occurre	Occurred at site 1, the dam						
	ts	Surface Total Nitrogen	0.36 m	g/L to 0.7											
	Nutrients	Surface Total Phosphorus	0.005 r	ng/L to 0	.033 mg/l	_									
	ž	Nitrogen to Phosphorus Ratio	31:1					Phosphorus limited							
		Click to learn more about Beneficial Uses□	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a		
Uses	Fish	h & Wildlife Propagation	S	NS*	NS	NEI									
SO I	Aes	sthetics					S	*							
icia	Agr	iculture							S	S	S				
Beneficial	Prin	mary Body Contact Recreation										S			
a	Pub	olic & Private Water Supply	*****			NEI									
	S	S = Fully Supporting									vely low soil s may be du				

NTU = nephelometric turbidity units μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

NS = Not Supporting

NEI = *Not Enough Information*

 $OWQS = Oklahoma\ Water\ Quality\ Standards\ mV = millivolts\ Chlor-a =\ Chlorophyll-a$

mg/L = milligrams per liter $<math>\mu S/cm = microsiemens/cm$

causes; therefore the Water Board is looking at the applicability of developing site-specific criteria for

ppt = parts per thousand En = Enterococci

waters in the southeastern portion of the state

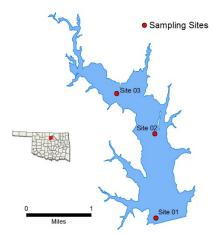
** Standards revision, true color is for permitting purposes only

McMurtry

 μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

	Sample Period		Times Visited	Sampling Sites							
	October 2018 – July	2019	4	3							
00101	Location	Noble Cour	Noble County								
	Impoundment	1971									
	Area	1,155 acres									
	Capacity	19,733 acre feet									
	Purposes	Water Supply, Flood Control, and Recreation									

Times



	Pu	rposes	Water Supply,	Flood Co	Flood Control, and Recreation											
		Parameter (Des	scriptions)	Result					Notes/Comments							
		Average Turbidi	ty	18 NTU					17% of values > OWQS of 25 NTU (n=12)							
		Average Secchi	Disk Depth	52 cm												
	텵	Water Clarity Ra	ating	Average	е											
	In Situ	Chlorophyll-a		8.08 m	g/m3											
		Trophic State In	dex	51					Previous value = 49							
ည		Trophic Class		Eutroph	Eutrophic											
Parameters		Salinity		0.14 – 0	0.24 ppt											
ıran	a)	Specific Conduc	tivity	295.4 –	491.3 µ	S/cm										
<u> </u>	Profile	pН		7.251 –	8.36 pH	units			Neutral to slightly alkaline							
	ਾ	Oxidation-Reduc	ction Potential	51.8 to	4442 mV	/										
		Dissolved Oxyge	en	Up to 6 July	6% of wa	ater colum	nn < 2.0 r	mg/L in								
	S.	Surface Total Ni	trogen	0.50 mg	g/L to 0.6	66 mg/L										
	Nutrients	Surface Total Pr	nosphorus	0.019 n	ng/L to 0.	.045 mg/L	-									
	Ž	Nitrogen to Phos	sphorus Ratio	21:1					Phosphorus limited							
		Click to learn m Beneficial Uses	nore about	Turbidity	돐	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a		
ses	Fis	h & Wildlife Propa	gation	NS	S	NEI	S									
Beneficial Uses	Ae	sthetics						S	*							
ficia	Ag	riculture								S	S	S				
ene	Pri	mary Body Contac	t Recreation										S			
m	Pul	blic & Private Wate	er Supply													
	1	S = Fully Supporting NS = Not Supporting NEI = Not Enough Ini		*Standa	rds revisio	n, true col	or is for pe	ermitting p	ourposes o	nly						
NTU	J = ne	ephelometric turbidity	units OWQS	i = Oklahoi	ma Water	Quality Sta	andards	mg/L =	= milligram	s per liter	pp	t = parts pe		d		

 μ S/cm = microsiemens/cm

En = Enterococci

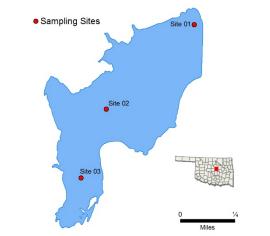
mV = millivolts Chlor-a = Chlorophyll-a

Sample Period Sample Period November 2018 – September 2019 Location Lincoln County

INC	Welliber 2010 – Septen	11061 2019	4	3								
5	Location	Lincoln Cou	Lincoln County									
	Impoundment	1970										
5	Area	250 acres										
5	Capacity	1,818 acre-feet										
	Purposes	Water Supply, Recreation, Flood Control										

NTU = *nephelometric turbidity units*

 μ S/cm = microsiemens per centimeter E. coli = Escherichia coli



		poses	vvaler Suppry,	rtooroati	011, 1 1000	2 00111101			Miles						
		Parameter (Des	scriptions)	Result					Notes/0	commer	ıts				
		Average Turbidi	ty	93 NTL	l				100% of values > OWQS of 25 NTU (n=12)						
		Average Secchi	Disk Depth	21 cm											
	In Situ	Water Clarity Ra	ating	Poor											
	미	Chlorophyll-a		28.64 n	ng/m3										
		Trophic State In	dex	64					Previous value = 50						
હ		Trophic Class		Hypere	Hypereutrophic										
Parameters		Salinity		0.07 – 0	0.10 ppt										
ıran	ø.	Specific Conduc	ctivity	144.0 –	203.7 µ	S/cm									
<u> </u>	Profile	pН		7.06 – 8	3.38 pH u	units			Neutral	to slightl	y alkaline	Э			
	₫	Oxidation-Redu	ction Potential	153.2 –	470.8 m	١V									
		Dissolved Oxygo	en	All data mg/L	are abo	ve screer	ning level	of 2.0							
	ts	Surface Total Ni	itrogen	0.455 n	ng/L to 1.	.40 mg/L									
	Nutrients	Surface Total Pl	hosphorus	0.045 n	ng/L to 0.	.143 mg/l	_								
	Z	Nitrogen to Phos	sphorus Ratio	11:1					Phosphorus limited, possibly co-limited						
		Click to learn n Beneficial Uses	nore about_ □	Turbidity	五	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a	
ses	Fish	n & Wildlife Propa	gation	NS	S	S	*								
Beneficial Uses	Aes	sthetics						S	*						
ficia	Agr	iculture								S	S	S			
ene	Prin	mary Body Contac	ct Recreation										S		
m	Pub	olic & Private Wate	er Supply												
AITI	N	S = Fully Supporting IS = Not Supporting IEI = Not Enough In	formation	*Standa	rds revisio	on, true col	or is for pe	ermitting p	ourposes or	nly					

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

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

mV = millivoltsChlor-a = Chlorophyll-a

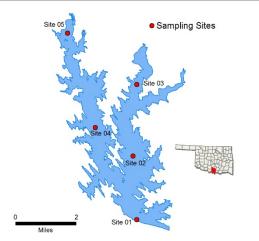
Murray Times Sample Period **Sampling Sites** Visited October 2018 - August 2019 4 5 Location Love County Impoundment 1937 General Area 5,728 acres

153,250 acre-feet

Capacity

NTU = *nephelometric turbidity units*

 μ S/cm = microsiemens per centimeter E. coli = Escherichia coli



	Pur	poses	Recreation							Miles		Site 01						
		Parameter (Des	scriptions)		Result					Notes/0	Commen	ıts						
		Average Turbidi	ty		7 NTU					5% of v	alues >	OWQS o	f 25 NTU	(n=20)				
		Average Secchi	Disk Depth		153 cm													
	In Situ	Water Clarity Ra	ating		Excelle	nt												
	드	Chlorophyll-a			2.90 mg	g/m3												
		Trophic State Inc	dex		41					Previous value = 39								
S		Trophic Class			Mesotro	phic												
Parameters		Salinity			0.11 – 0).17 ppt												
aran	a	Specific Conduc	tivity		233.0 – 348.4 μS/cm													
<u>a</u>	Profile	рН			7.05 – 8.34 pH units						Neutral to slightly alkaline							
	_	Oxidation-Reduc	ction Potentia		39.7 to 415.8 mV													
		Dissolved Oxyge	en		Up to 6 August	7% of wa	iter colum	nn < 2.0 r	ng/L in									
	ts	Surface Total Ni	trogen		0.275 m	ng/L to 0.	.635 mg/L	-										
	Nutrients	Surface Total Ph	nosphorus		0.010 m	ng/L to 0.	.049 mg/L	-										
	ž	Nitrogen to Phos	sphorus Ratio		22:1					Phosphorus limited								
		Click to learn m	nore about		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a			
ses	Fish	n & Wildlife Propa	gation		S	S	NS	*										
ت ت	Aes	sthetics							S	*								
ficia	Agriculture										S	S	S					
Beneficial Uses	Prin	Primary Body Contact Recreation												S				
a	Pub	Public & Private Water Supply																
	Ν	E = Fully Supporting IS = Not Supporting IEI = Not Enough Int	formation	Notes	*Standards revision, true color is for permitting purposes only													

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

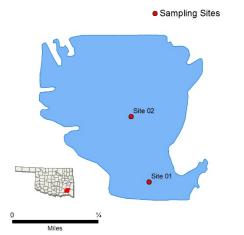
En = Enterococci

OWQS = Oklahoma Water Quality Standards

mV = millivoltsChlor-a = Chlorophyll-a

Nanih Waiya

Sample Period	t	Times Visited	Sampling Sites					
December 2007 – July	y 2008	4	5					
Location	Pushmatah	a County						
Impoundment	1958							
Area	131 acres							
Capacity	1,064 acre	feet						
Purposes	Recreation							



	i ui	poses	Recreation							Miles							
		Parameter (Des	scriptions)		Result					Notes/0	Commer	nts					
		Average Turbidi	ty		9 nephe	elometric	turbidity	units (NT	U)	All value	es < 25 N	NTU					
		Average True C	olor		45 units	3				25% of	values >	OWQS	of 70				
	In Situ	Average Secchi	Disk Depth		98 cm												
	<u>=</u>	Water Clarity Ra	ating		average)											
		Trophic State In	dex		45					Previous value = 45							
กั		Trophic Class			mesotro	ophic											
Parameters		Salinity			0.0 – 0.	10 ppt											
aran	υ	Specific Conduc	tivity		63 – 26	2 μS/cm											
<u>a</u>	Profile	рН			6.31 – 8	3.22 pH ι	units			4 values (6.5%) <6.5 pH units							
	₫.	Oxidation-Reduc	ction Potential		5 to 576												
		Dissolved Oxyge	en		Up to 42% of water column < 2 mg/L in August						Occurred at site 1						
	ts	Surface Total Ni	itrogen		0.32 mg	g/L to 0.7	'0 mg/L										
	Nutrients	Surface Total Ph	nosphorus		0.018 m	ng/L to 0.	.032 mg/L	-									
	ž	Nitrogen to Phos	sphorus Ratio		18:1					Phosphorus limited							
		Click to learn m Beneficial Uses	nore about		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
ses	Fish	n & Wildlife Propa	gation		S	S	S	S									
<u></u>	Aes	sthetics							S	*							
Beneficial Uses	Agr	iculture									S	S	S				
ene	Prin	mary Body Contac	t Recreation											S			
a	Pub	olic & Private Wate	er Supply														
	N	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information			*Standards revision, true color is for permitting purposes only												

NTU = nephelometric turbidity units μ S/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

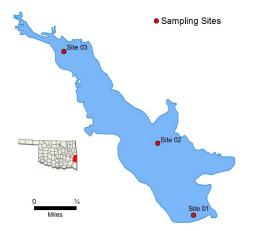
New Spiro

Sample Period

	•		Visited	J 3 1 1 1						
	October 2005 – July	2006	4	5						
	Location	Le Flore Co	ounty							
3	Impoundment	1960								
	Area	254 acres	254 acres							
	Capacity	2,160 acre-	feet							
	Purposes	Water Supr	oly Recreation	on						

Times

Sampling Sites



	Pur	poses	vvater Supp	ıу,	Recreati	on												
		Parameter (Des	scriptions)		Result					Notes/0	Commen	ıts						
		Average Turbidit	ty		18 NTL	J				8% of v	alues >C	WQS of	25 NTU					
		Average True Co	olor		26 units	6				100% o	f values	< OWQS	S of 70					
	Situ	Average Secchi	Disk Depth		47 cm													
	ln S	Water Clarity Ra	iting		good													
		Trophic State Inc	dex		68													
ပ်		Trophic Class			hypere	utrophic												
Parameters		Salinity			0.04 – 0	0.09 ppt												
aran	a)	Specific Conduc	tivity		106.8 –	- 155.4 μ	S/cm											
<u> </u>	Profile	рН			7.09 –	9 – 9.24 pH units					values >	9.0 pH ι	units					
	₫	Oxidation-Reduc	ction Potentia	I	121 - 4													
		Dissolved Oxyge	en		Up to 3 August	3% of wa	nn < 2 m(g/L in	Occurre	d at site	2							
	ts	Surface Total Ni		0.98 mg/L to 1.68 mg/L														
	Nutrients	Surface Total Ph	nosphorus		0.076 n	0.076 mg/L to 0.170 mg/L												
	Ž	Nitrogen to Phos	Nitrogen to Phosphorus Ratio				11:1					Phosphorus limited						
		Click to learn m			Turbidity	Hd.	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a			
ses	Fish	h & Wildlife Propa	gation		S	S	NS	S										
Beneficial Uses	Aes	sthetics							NEI	*								
ficia	Agr	iculture									S	S	S					
ene	Prin	Primary Body Contact Recreation												S				
a	Pub	Public & Private Water Supply													NS			
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Int	formation	Notes	threaten	ed by nutr	ients until	studies ca	an be cond	ting that the ducted to courposes or	onfirm noi		cial use is o status	considered				

NTU = *nephelometric turbidity units* μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards

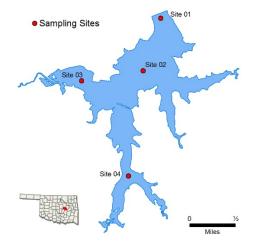
mg/L = milligrams per liter μ S/cm = microsiemens/cm

Okeman		
Sample Period	Times Visited	Sampling Sites
November 2018 – September 2019	3	4

	Location	Okfuskee County							
5	Impoundment	1962							
D	Area	13,100 acre-feet							
5	Capacity	Water Supply, Recreation							
	Purposes	761 acres							

NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$

E. coli = Escherichia coli



		Parameter (Descriptions)	Result					Notes/0	Commer	nts					
		Average Turbidity	13 NTL	l				13% of	values >	> OWQS	of 25 NTL	J (n=15)			
		Average Secchi Disk Depth	82 cm												
	itu	Water Clarity Rating	Good												
	In Situ	Chlorophyll-a	8.42 m	g/m3											
		Trophic State Index	52					Previous value = 54							
က်		Trophic Class	Eutroph	nic											
Parameters		Salinity	0.07 – 0	0.10 ppt											
ran	a	Specific Conductivity	150.6 -	208.8 μ	S/cm										
Ба	Profile	pН	6.76 – 8	3.14 pH ι	units			Neutral to slightly alkaline							
	ቯ	Oxidation-Reduction Potential	61.5 – 4	493.9 mV	/										
		Dissolved Oxygen	Up to 4 Septem		ater colum	nn < 2 m(g/L in								
	ts	Surface Total Nitrogen	0.49 mg	g/L to 0.9	5 mg/L										
	Nutrients	Surface Total Phosphorus	0.015 n	ng/L to 0.	.058 mg/L	-									
	Z	Nitrogen to Phosphorus Ratio	21:1					Phosphorus limited							
		Click to learn more about Beneficial Uses□	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
ses	Fish	n & Wildlife Propagation	S	S	NEI	S									
Beneficial Uses	Aes	ethetics					S	*							
ficia	Agr	iculture							S	S	S				
eue	Prin	nary Body Contact Recreation										S			
m	Pub	olic & Private Water Supply													
	Ν	= Fully Supporting S = Not Supporting EI = Not Enough Information	*Standards revision, true color is for permitting purposes only												

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

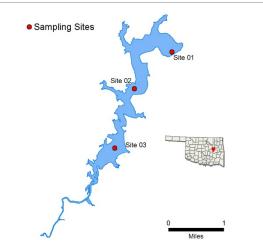
ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

mV = millivolts

0	Okmulgee												
	Sample Period	d	Times Visited	Sampling Sites									
F	ebruary 2019 – Augu	ıst 2019	3	3									
	Location	Okmulgee County											
<u>a</u>	Impoundment	1928	1928										
General	Area	668 acres											
ပ္ပ	Capacity	14.170 acre	e-feet										



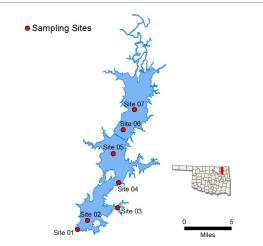
	Pur	poses	Water Supply,			\sim			Mil	es							
		Parameter (Des	scriptions)	Result					Notes/0	Commer	nts						
		Average Turbidit	ty	11 NTU	J				100% o	f values	< OWQS	of 25 NT	Ū				
		Average Secchi	Disk Depth	72.56													
	In-Situ	Water Clarity Ra	nting	Excelle	ent												
	<u>-</u>	Chlorophyll-a		9.59 m	g/m3												
		Trophic State Inc	dex	53					Previous Value= 49								
စ်		Trophic Class		Eutroph	nic												
Parameters		Salinity		0.04 -	0.12 ppt												
ıran	a)	Specific Conduc	tivity	83.1 – 249.5 μS/cm													
G	Profile	pН		6.26 – 8.14 pH units					Neutral	to slight	y alkaline	9					
	Ē	Oxidation-Reduc	ction Potential	-0.20 – 401.9 mV													
-		Dissolved Oxyge	en	Up to 7 June	'1% of wa	nn < 2 m(g/L in										
	ts	Surface Total Ni	trogen	0.495 n	ng/L to 0	.65 mg/L											
	Nutrients	Surface Total Ph	nosphorus	0.018 n	ng/L to 0	.040 mg/l	<u>_</u>										
	Z	Nitrogen to Phos	20:1					Phosphorus limited									
		Click to learn m	nore about	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a			
ses	Fish	n & Wildlife Propa	gation	S	NS	S											
<u> </u>	Aes	thetics						S	*								
ficia	Agri	iculture								*	*	S					
Beneficial Uses	Prin	nary Body Contac	t Recreation										NEI				
a	Pub	Public & Private Water Supply					NEI										
	Ν	= Fully Supporting S = Not Supporting El = Not Enough Int	formation september 1	*Standa	rds revisio	on, true col	or is for pe	ermitting p	ourposes o	nly							

NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$ E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivoltsChlor-a = Chlorophyll-a

mg/L = milligrams per liter μ S/cm = microsiemens/cm

0	Oologah												
	Sample Period	d	Times Visited	Sampling Sites									
	October 2018 – July	2019	4	7									
	Location	Rogers Co	unty										
<u>'a</u>	Impoundment	1963											
General	Area	29,460 acre	es										
ဖွဲ	Capacity	553,400 ac	re feet										



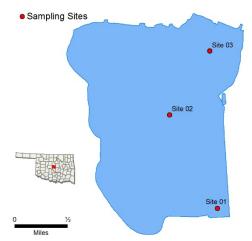
	Pur	poses	Water Supply,	Flood Co	ontrol, an	d Navigat	tion			Site 01		0	5 Miles		
		Parameter (Des	scriptions)	Result					Notes/0	Commen	its				
		Average Turbidi	ty	26 NTL	J				43% of	values >	· OWQS	of 25 NTL	J (n=27)		
		Average Secchi	Disk Depth	47.5 cm	า										
	jţţ	Water Clarity Ra	ating	Fair											
	In Situ	Chlorophyll-a		4.36 m	g/m3										
		Trophic State In	dex	45					Previous value = 54						
ပ်		Trophic Class		Mesotro	ophic										
Parameters		Salinity		0.11 – 0	0.22 ppt										
ıran	a	Specific Conduc	tivity	226.0 – 445.7 μS/cm											
Ъ	Profile	рН		7.13 – 8.16 pH units					Neutral	to slightl	y alkaline	Э			
	4	Oxidation-Reduc	ction Potential	189.8 to 474.9 mV											
		Dissolved Oxyge	en	Up to 7 August	o to 7% of water column < 2 mg/L in ugust										
	Si	Surface Total Ni	trogen	0.49 mg	g/L to 1.1	5 mg/L									
	Nutrients	Surface Total Ph	nosphorus	0.043 n	0.043 mg/L to 0.152 mg/L										
	Z	Nitrogen to Phos	sphorus Ratio	8:1	3:1				Phosphorus limited						
		Click to learn m		Turbidity	F.	Dissolved Oxygen	Metals	ISI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fish	h & Wildlife Propa	gation	NS	S	NS	S								
Š	Aes	sthetics						S	*						
Beneficial Uses	Agr	iculture								S	S	S			
ene	Prin	mary Body Contac	t Recreation										S		
m	Pub	olic & Private Wate	er Supply												
	Λ	S = Fully Supporting IS = Not Supporting IEI = Not Enough In		*Standa	rds revisio	on, true colo	or is for pe	ermitting p	ourposes or	nly					

NTU = nephelometric turbidity units μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a mg/L = milligrams per liter $\mu S/cm = microsiemens/cm$

Overholser		
Sample Period	Times Visited	Sampling Sites

	October 2018 – July	2019	4	3			
	Location	Oklahoma	County				
5	Impoundment	1919					
	Area	1,500 acre	S				
	Capacity	15,000 acr	cre-feet				
Purposes Water Supp			oly, Recreation	on			



		P 0 0 0 0	Traitor Gapp	٠.,		oduon				Miles						
		Parameter (Des	scriptions)		Result					Notes/0	Commen	ts				
		Average Turbidi	ty		18 NTU					33% of	values >	OWQS	of 25 NTU	(n=12)		
		Average Secchi	Disk Depth		49.1 cm	ı										
	itu	Water Clarity Ra	ating		Poor											
	In Situ	Chlorophyll-a			38.95 m	ng/m3										
		Trophic State In	dex		67					Previou	s value =	: 68				
ပ		Trophic Class			Hypere	utrophic										
Parameters		Salinity			0.40 – 0).50 ppt										
aran	συ	Specific Conduc	tivity		811.9 –	1010.4 բ	uS/cm									
<u> </u>	Profile	рН			8.41 – 8	41 – 8.75 pH units					alkaline					
	₫	Oxidation-Reduc	ction Potentia	ıl	189.5 –	89.5 – 425.0 mV										
		Dissolved Oxyge	en		All data of 2.0 m		re above	screenin	g level	Not stra	tified dur	ing any	sampling i	interval		
	ts	Surface Total Ni	itrogen		1.095 m	095 mg/L to 1.635 mg/L										
	Nutrients	Surface Total Ph	nosphorus		0.057 m	0.057 mg/L to 0.233 mg/L										
	Z	Nitrogen to Phos	sphorus Ratio)	9:1	9:1					y co- limit	ted				
		Click to learn m Beneficial Uses			Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fish	n & Wildlife Propa	gation		NS	S	S	S								
ے ا	Aes	thetics							NEI	*						
ficia	Agr	iculture									NS	S	S			
Beneficial Uses	Prin	nary Body Contac	t Recreation											S		
m	Pub	olic & Private Wate	er Supply													
	Ν	= Fully Supporting S = Not Supporting El = Not Enough In		Notes	threaten	ed by nutr	ients until s	studies ca	in be cond	ing that the ducted to courposes or	onfirm nor		ial use is co status	onsidered		

NTU = nephelometric turbidity units $\mu S/cm =$ microsiemens per centimeter mV = millivolts $E.\ coli =$ $Escherichia\ coli$ Chlor-a = Chlor

OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a $mg/L = milligrams per liter \mu S/cm = microsiemens/cm$

Ozzie Cobb

NTU = *nephelometric turbidity units*

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

	Sample Period	d	Times Visited	Sampling Sites
1	November 2016 – Augu	ıst 2017	4	5
Location Pushmata			a County	
	Impoundment	1958		

'	November 2010 – Augu	131 20 17	4	3					
	Location	Pushmataha County							
ם פ	Impoundment	1958							
	Area	116 acres							
	Capacity	833 acre feet							
	Purposes	Recreation	ation						



	Pur	rposes Recreation									Miles	3			
		Parameter (<u>Descriptions</u>)	Result					Notes/0	Commer	nts					
		Average Turbidity	17 NTU	J				25% of	25% of values > 25 NTU (n=12)						
		Average Secchi Disk Depth	59 cm												
	jţ	Water Clarity Rating	averag	е											
	In Situ	Chlorophyll	14.51 r	ng/L											
		Trophic State Index	57					Previou	s value :	= 59					
ည		Trophic Class	Eutrop	hic											
Parameters		Salinity	0.02 -	0.05 ppt											
aran	ω	Specific Conductivity	45.6 –	292.1 μS	/cm										
٣	Profile	рН	5.91 –	91 – 7.37 pH units					values <	6.5					
	Ē	Oxidation-Reduction Potential		09.8 to 566.8 mV											
		Dissolved Oxygen	Up to 7 August		ater colum	nn < 2 m(g/L in	Occurre	ed at site	1					
	ts	Surface Total Nitrogen	0.69 m	g/L to 0.9	7 mg/L										
	Nutrients	Surface Total Phosphorus	0.039 r	0.039 mg/L to 0.071 mg/L											
	ž	Nitrogen to Phosphorus Ratio	15:1	15:1				Phosphorus limited							
		Click to learn more about Beneficial Uses□	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a		
ses	Fish	h & Wildlife Propagation	S	NS	S	S									
<u></u>	Aes	sthetics					NEI	*							
Beneficial Uses	Agr	riculture							S	S	S				
ene	Prin	mary Body Contact Recreation										S			
m	Pub	olic & Private Water Supply													
	Ν	S = Fully Supporting S = Not Supporting NEI = Not Enough Information	soluble causes;	bedrock. E therefore	Because of the Water	f these cor Board is I	nditions it ooking at	is likely tha the applica	nt the low bility of d	pH values eveloping	ely low soil may be du site-specifi the OWQS	ie to natui ic criteria f	ral		

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

mV = millivolts

Pauls Valley City

Purposes

NTU = *nephelometric turbidity units*

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

	Sample Period	d	Visited	Sampling Sites				
1	November 2014 – Augu	ıst 2015	4	3				
a	Location	Garvin County						
	Impoundment	1954						
Genera	Area	750 acres						
ъ	Capacity	8.730 acre feet						

Water Supply and Recreation



		Parameter (Descriptions)	Result					Notes/0	Commer	nts				
		Average Turbidity	32 NTU	J				50% of	values >	25 NTU				
		Average Secchi Disk Depth	31 cm											
	<u>;</u>	Water Clarity Rating	Fair											
	In Situ	Chlorophyll-a	11 mg/	m3										
		Trophic State Index	54					Previou	Previous value = 44					
ဖ		Trophic Class	Eutroph	utrophic										
Parameters		Salinity	0.07-0).16 ppt										
ıran	a)	Specific Conductivity	156.2 -	56.2 –333 μS/cm										
Pa	Profile	pН	6.98 –	.98 – 8.22 pH units					to slight	y alkaline	9			
	<u>~</u>	Oxidation-Reduction Potential	60.3 to	60.3 to 412 mV										
		Dissolved Oxygen	Up to 4 August		ater colum	nn < 2 mg	g/L in							
	t S	Surface Total Nitrogen	0.36 m	g/L to 1.0	5 mg/L									
	Nutrients	Surface Total Phosphorus	0.005 n	0.005 mg/L to 0.073 mg/L										
	Z	Nitrogen to Phosphorus Ratio	20:1	20:1				Phosph	Phosphorus limited					
		Click to learn more about Beneficial Uses□	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fish	h & Wildlife Propagation	NS	S	S	S								
Beneficial Uses	Aes	sthetics					S	*						
fici	Agr	riculture							S	S	S			
ene	Prin	mary Body Contact Recreation										S		
m	Pub	olic & Private Water Supply												
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	*Standa	rds revisio	n, true col	or is for pe	ermitting p	ourposes o	nly					

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

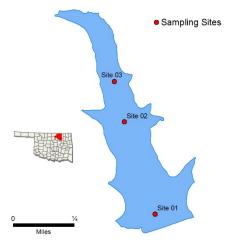
OWQS = Oklahoma Water Quality Standards

mV = millivolts

Pawhuska

Sample Period	Times Visited	Sampling Sites
October 2016 – July 2017	4	5

	October 2010 daily	2017	7	3				
	Location	Osage County						
<u></u>	Impoundment	1936 96 acres						
	Area							
	Capacity	3,600 acre	feet					
	Purposes	Water Supp	oly and Recr	eation				



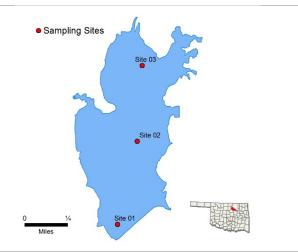
		Parameter (Descriptions)		Result					Notes/0	Commer	nts				
		Average Turbidity		5 nephe	elometric	turbidity	units (N7	Ū)	All valu	es < 25 N	NTU				
		Average Secchi Disk Depth		135 cm											
		Water Clarity Rating		exceller	nt										
		Chlorophyll		4.18 mg	g/L										
		Trophic State Index		45						Previous value = 41					
S		Trophic Class		mesotro	ophic										
Parameters		Salinity		0.21 – 0).27 ppt										
aran	συ	Specific Conductivity		433 – 5	49.6 μS/c	cm									
<u> </u>	Profile	рН		7.14 – 8	3.42 pH u	units			Neutral	to slightl	y alkalin	е			
	₫	Oxidation-Reduction Potential		-17.6 to	17.6 to 524 mV										
		Dissolved Oxygen		Up to 6- July	4% of wa	iter colun	nn < 2 m	g/L in	Occurre	ed at site	1				
	Si	Surface Total Nitrogen		0.31 mg	31 mg/L to 0.69 mg/L										
	Nutrients	Surface Total Phosphorus		0.010 m	0.010 mg/L to 0.028 mg/L										
	N	Nitrogen to Phosphorus Ratio		29:1	29:1				Phosphorus limited						
		Click to learn more about Beneficial Uses□		Turbidity	Hd	Dissolved Oxygen	Metals	ISI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fish	n & Wildlife Propagation		S	S	NEI	S								
	Aes	ethetics						S	*						
ficia	Agr	iculture								NS	S	S			
Beneficial Uses	Prin	mary Body Contact Recreation											S		
m	Pub	olic & Private Water Supply													
	Λ	E = Fully Supporting IS = Not Supporting IEI = Not Enough Information	Notes	*Standar	ds revisio	n, true col	or is for pe	ermitting p	ourposes o	nly					

NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$ E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a $mg/L = milligrams per liter \mu S/cm = microsiemens/cm$

Pawnee Sample Period November 2016 – July 2017 Times Visited Sampling Sites 5

November 2016 – July 2017			4	5				
	Location	Pawnee Co	ounty					
<u></u>	Impoundment	1932						
ב ב ב	Area	257 acres						
, ק	Capacity	3,855 acre	-feet					
	Purposes	Water Supp	oly, Recreation	on				



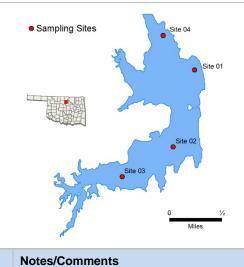
		Parameter (<u>Descriptions</u>)	R	Result					Notes/0	Commer	nts			
		Average Turbidity	1	5 NTL	J				8% of v	alues >	OWQS o	of 25 NTU		
		Average Secchi Disk Depth	5	2 cm										
	itu	Water Clarity Rating	а	verage	Э									
	In Situ	Chlorophyll	2	0.01 n	ng/L									
		Trophic State Index	6	0					Previou	s = 59				
ပ်		Trophic Class	е	utrophic										
Parameters		Salinity	0).13 – (0.17 ppt									
ram		Specific Conductivity	2	75.7 –	75.7 – 350 µS/cm									
Ра	Profile	pH	7	.24 – 8	8.51 pH	units			Neutral to slightly alkaline					
	Ŗ	Oxidation-Reduction Potential	1	70.9 -	432.1 m	V								
		Dissolved Oxygen		Up to 24% of water column < 2 mg/L in October					At site 3	3				
	ts	Surface Total Nitrogen	0	.92 m	ıg/L to 1.:	36 mg/L								
	Nutrients	Surface Total Phosphorus	0	.041 n	ng/L to 0.	.065 mg/l	-							
	Ž	Nitrogen to Phosphorus Ratio	2	22:1				Phosph	orus limi	ted				
		Click to learn more about Beneficial Uses□		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
ses	Fish	h & Wildlife Propagation		NS	S	S	S							
٦	Aes	sthetics						S	*					
ficia	Agr	riculture								S	S	S		
Beneficial Uses	Prin	mary Body Contact Recreation											S	
m	Pub	olic & Private Water Supply												NS
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	*	Standa	*Standards revision, true color is for permitting purposes only									

NTU = nephelometric turbidity units μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a mg/L = milligrams per liter $<math>\mu S/cm = microsiemens/cm$

Perry Sample Period

	Sample Period	t	Times Visited	Sampling Sites
	October 2014 – July	2015	4	5
	Location	Noble Cour	nty	
ल	Impoundment	1937		
nera	Area	614 acres		



ā	Imp	oundment	1937				
General	Are	a	614 acres				
တီ	Cap	acity	6,892 acre-feet				
	Pur	poses	Water Supply, Recreation and Flood Control				
		Parameter (Des	criptions)	Result			
		Average Turbidit	ty	56 NTU			
		Average Secchi	Dick Denth	22 cm			

		Talameter (Becomparence)							110100/						
		Average Turbidity		56 NTU					58% of values > 25 NTU						
		Average Secchi Disk Depth	2	22 cm											
	jţţ	Water Clarity Rating	ı	Fair											
	In Situ	Chlorophyll-a	(6 mg/m	3										
		Trophic State Index	4	49					Previou	Previous value = 48					
ပ်		Trophic Class	ı	Mesotro	phic										
Parameters		Salinity	(0.14– 0	.25 ppt										
ram		Specific Conductivity	2	296.1 –	510 μS/	cm									
Ра	Profile	рН	-	7.27 – 8	3.37 pH	units			Neutral	to slightl	ly alkaline	e			
	Ţ	Oxidation-Reduction Potential		110.3 - mV	392.6										
		Dissolved Oxygen	Ţ		3% of wa	ter colun	nn < 2 m	g/L in							
	Si	Surface Total Nitrogen	(0.61 m	g/L to 1.0	34 mg/L									
	Nutrients	Surface Total Phosphorus	(0.035 m	ng/L to 0.	.186 mg/l	-								
	Ž	Nitrogen to Phosphorus Ratio	,	11:1					Phosph	orus limi	ted				
		Click to learn more about Beneficial Uses□		Turbidity	Hd	Dissolved Oxygen	Metals	ISI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fish	h & Wildlife Propagation		NS	S	S	S								
Ö	Aes	sthetics						S	*						
ficia	Agr	iculture								S	S	S			
Beneficial Uses	Prin	mary Body Contact Recreation											S		
m	Pub	olic & Private Water Supply													
	N	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	4000	*Standar	ds revisio	n, true col	or is for pe	ermitting p	ourposes o	nly					

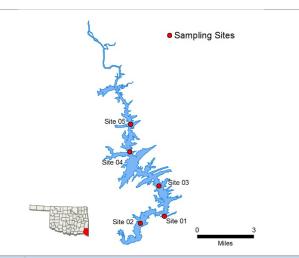
NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$ E. coli = Escherichia coli OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a

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

Pine Creek

	Sample Period	d	Times Visited	Sampling Sites
ı	November 2018 – Augu	ıst 2019	4	5
	Location	McCurtain (County	

	Location	McCurtain	McCurtain County							
3	Impoundment	1969	1969							
5	Area	3,750 acres								
5	Capacity	53,750 acre	e-feet							
	Purposes		oly, Flood Co sh and Wildlif							



		Parameter (Descriptions)		Result					Notes/0	Commer	nts			
		Average Turbidity		23 NTU	J				5% of \	/alues >	OWQS o	f 25 (n=2	0)	
		Average Secchi Disk Depth		75.7 cm	า									
	In-Situ	Water Clarity Rating		Average	е									
	흐	Chlorophyll-a		9.0 mg/	/m3									
		Trophic State Index		52					Previou	s value =	= 62			
S		Trophic Class		Hypere	utrophic									
Parameters		Salinity		0.01 – 0	.01 – 0.06 ppt									
ıran	o o	Specific Conductivity		25.6 – 1	123.9 µS/	/cm								
_ ₽	Profile	pН		5.71 – 8	5.71 – 8.13 pH units					values <	6.5 pH u	ınits		
	<u>~</u>	Oxidation-Reduction Potential		45.1 to	557.9 m\	/								
		Dissolved Oxygen		Up to 7 August	6% of wa	iter colun	nn < 2 m	g/L in						
	ts	Surface Total Nitrogen		0.28 mg	g/L to 0.6	7 mg/L								
	Nutrients	Surface Total Phosphorus		0.026 m	ng/L to 0.	042 mg/l	_							
	Z	Nitrogen to Phosphorus Ratio		15:1	15:1					orus limi	ted			
		Click to learn more about Beneficial Uses□		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
ses	Fish	n & Wildlife Propagation		S	NS	NS	S							
	Aes	sthetics						S	*					
ficia	Agr	iculture								S	S	S		
Beneficial Uses	Prin	mary Body Contact Recreation											S	
Ď	Pub	olic & Private Water Supply												
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	Notes	soluble therefore	bedrock. De the Wate	Due to thes er Board is	se conditions looking a	ns it is like t the appli	ely that the cability of o	low pH v	alues may g site-spec	low soil place to be due to critic criteria ing purpos	natural ca for water	auses;

NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$ E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivoltsChlor-a = Chlorophyll-a

mg/L = milligrams per liter ppt = parts per thousand $\mu S/cm = microsiemens/cm$ En = Enterococci

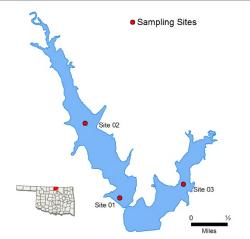
Ponca

NTU = *nephelometric turbidity units*

 μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

	Sample Period		Times Visited	Sampling Sites			
ı	November 2015 – Augu	ıst 2016	4	5			
	Location	Kay County	/				
5	Impoundment	1935					
	Area	805 acres					
	Capacity	14,440 acre	e feet				
	Purposes	Water Supply and Recreation					

Times



	Fui	rposes	water Supply	and Red	Recreation				Miles						
		Parameter (Des	scriptions)	Resul	1				Notes/0	Commer	nts				
		Average Turbidi	ty	8 NTU					100% c	f values	< OWQS	of 25 NT	Ū		
		Average Secchi	Disk Depth	71 cm											
	ij	Water Clarity Ra	ating	Good											
	In-Situ	Chlorophyll-a		20 mg	/m3										
		Trophic State In	dex	60	60					s value :	= 56				
<u>s</u>		Trophic Class		Eutrop	hic										
Parameters		Salinity		0.14 -	0.20 ppt										
aran	ω	Specific Conduc	tivity	297.2	-414 μS	/cm									
ď	Profile	pН		6.89 –	8.36 pH ւ	units									
		Oxidation-Redu	ction Potential	19.5 to	9.5 to 305 mV										
		Dissolved Oxyge	en		Up to 58% of water column < 2.0 mg/L in summer										
	ts	Surface Total N	itrogen	0.66 m	ıg/L to 0.9	3 mg/L									
	Nutrients	Surface Total Pl	nosphorus	0.028	0.028 mg/L to 0.045 mg/L										
	ž	Nitrogen to Pho	sphorus Ratio	25:1	25:1					orus limi	ited				
		Click to learn n Beneficial Uses	nore about	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a	
ses	Fisl	h & Wildlife Propa	gation	S	S	NS	S								
<u>=</u>	Aes	sthetics						S	*						
ficia	Agr	riculture								S	S	S			
Beneficial Uses	Prir	mary Body Contac	t Recreation										S		
m	Pul	blic & Private Wate	er Supply											NS	
	٨	S = Fully Supporting NS = Not Supporting NEI = Not Enough In		*Standa	*Standards revision, true color is for permitting purposes only										

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

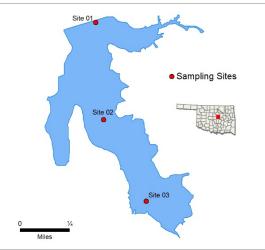
OWQS = Oklahoma Water Quality Standards

mV = millivolts Chlor-a = Chlorophyll-a

Prague	City
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Sample Period	d	Times Visited	Sampling Sites
November 2007 – Augu	ust 2008	4	5
Location	Lincoln Cou	intv	

	torombol 2007 7 tage	.0. 2000	•	J .				
	Location	Lincoln Cou	unty					
<u></u>	Impoundment	84						
	Area	225 acres						
	Capacity	2,415 acre feet						
	Purposes	Water Supp	oly and Recr	eation				



		Parameter (Descriptions)	Resul						Commer	nts				
		Average Turbidity	12 nep	helometri	c turbidity	/ units (N	ITU)	All value	es < 25 l	NTU				
		Average True Color	46 uni	s				10% of	values >	OWQS	of 70			
	In Situ	Average Secchi Disk Depth	74 cm											
	드	Water Clarity Rating	good											
		Trophic State Index	48					Previou	s value =	= 52				
હ		Trophic Class	mesot	ophic										
Parameters		Salinity	0.0 - 0).20 ppt										
ıran	o o	Specific Conductivity	112 –	362 µS/cr	n									
<u> </u>	Profile	pН	6.78 –	8.65 pH ւ	units			Neutral	to slight	y alkalin	TU OWQS of 70 52 v alkaline 1, 4 & 5			
	<u>~</u>	Oxidation-Reduction Potential	-51 to	543 mV						NTU OWQS of 70 = 52 Solids S				
		Dissolved Oxygen	57 - 63 Augus	3% of wate t	er column	< 2 mg/	Lin	Occurre	ed at site	s 1, 4 &	5			
	ts	Surface Total Nitrogen	0.51 m	ıg/L to 1.1	7 mg/L									
	Nutrients	Surface Total Phosphorus	0.024	mg/L to 0.	.057 mg/L	-								
	Ž	Nitrogen to Phosphorus Ratio	25:1	25:1					orus limi	ted				
		Click to learn more about Beneficial Uses□	Turbidity	Hd	Dissolved Oxygen	Metals	ISI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fish	n & Wildlife Propagation	S	S	NEI	S								
a □	Aes	ethetics					S	*						
ficia	Agr	iculture							S	S	S			
Beneficial Uses	Prin	mary Body Contact Recreation										S		
m	Pub	olic & Private Water Supply												
	Ν	S = Fully Supporting S = Not Supporting IEI = Not Enough Information	*Standa	*Standards revision, true color is for permitting				ourposes or	nly					

OWQS = Oklahoma Water Quality Standards

mV = millivolts

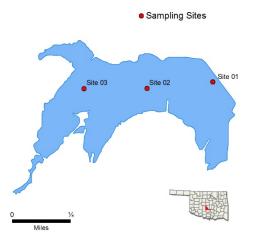
Purcell

Capacity

	Sample Period	a	Visited	Sampling Sites				
1	November 2007 – Augu	ıst 2008	4	5				
	Location	McClain Co	ounty					
<u></u>	Impoundment	1930						
enera	Area	150 acres						
Ф								

2,600 acre feet

Times



	Pur	poses	Water Supp	ly a	and Recr	eation				Miles	1/4		- W						
		Parameter (Des	scriptions)		Result					Notes/0	Commer	nts							
		Average Turbidi	ty		14 nepł	nelometri	c turbidity	/ units (N	TU)	All value	es < 25 l	NTU							
		Average True C	olor		25 units	3				All value	es < OW	QS of 70)						
	In Situ	Average Secchi	Disk Depth		57 cm														
	드	Water Clarity Ra	ating		good														
		Trophic State In	dex		51					Previou	s value =	= 50							
ည		Trophic Class			eutroph	ic													
Parameters		Salinity			0.19 – 0	0.23 ppt													
ıran	ω.	Specific Conduc	tivity		374 – 4	62.8 µS/	cm												
9,	Profile	рН			7.17 – 8	3.37 pH u	units			Neutral	to slightl	ly alkalin	е						
	₫	Oxidation-Reduc	ction Potentia	I	18 to 6	45 mV													
		Dissolved Oxyge	en		Up to 5 August		ater colum	nn < 2 mg	g/L in	Occurre	ed at site	1 & 2							
	ts	Surface Total Ni		0.60 mg	g/L to 0.8	3 mg/L													
	Nutrients	Surface Total Ph	nosphorus		0.018 mg/L to 0.041 mg/L														
	Ž	Nitrogen to Phos	sphorus Ratio		24:1	24:1					orus limi	ted							
		Click to learn m Beneficial Uses	nore about		Turbidity	五	Dissolved Oxygen	Metals	ISI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a				
ses	Fish	h & Wildlife Propa	gation		S	S	NEI	S											
ے ت	Aes	sthetics							S	*									
ficia	Agr	iculture									S	S	S						
Beneficial Uses	Prin	mary Body Contac	t Recreation											NEI					
m	Pub	olic & Private Wate	er Supply																
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough In	formation	Notes	*Standards revision, true color is for permitting purposes only														

NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$ E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivoltsChlor-a = Chlorophyll-a

mg/L = milligrams per liter μ S/cm = microsiemens/cm

Raymond Gary

Capacity

Purposes

NTU = *nephelometric turbidity units*

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

	Sample Period	d	Visited	Sampling Sites			
1	November 2018 – Augu	ıst 2019	4	3			
اع	Location	Choctaw C	ounty				
	Impoundment	1956					
neral	Area	263 acres					

1,681 acre-feet

Recreation



		Parameter (<u>Descriptions</u>)		Result					Notes/0	Comme	nts				
		Average Turbidity		13 NTU					0% of v	alues >	OWQS o	f 25 NTU	(n=11)		
		Average Secchi Disk Depth		51.4 cm	1										
	Ē	Water Clarity Rating		Average	9										
	In Situ	Chlorophyll-a		23.44 m	ng/m3										
		Trophic State Index		62					Previou	s value :	= 55				
S		Trophic Class		Hypere	Hypereutrophic										
Parameters		Salinity		0.03 – 0).12 ppt										
arar	Ø	Specific Conductivity		58.7 – 2	254.8 µS/	/cm					walue = 55 Lotal Dissolved Solids So				
<u>a</u>	Profile	pH		6.44 – 7	7.54 pH u	ınits			9.3% of	3% of values < 6.5 (n=43)					
	_	Oxidation-Reduction Potential		173.2 to	499.9 m	ηV									
		Dissolved Oxygen		100% o	f water c	olumn < 2	2 mg/L in	June							
	ts.	Surface Total Nitrogen		0.33 mg	g/L to 0.8	95 mg/L									
	Nutrients	Surface Total Phosphorus		0.032 mg/L to 0.069 mg/L											
	Ž	Nitrogen to Phosphorus Ratio		13:1					Phosph	orus lim	ited				
		Click to learn more about Beneficial Uses		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fish	h & Wildlife Propagation		S	S	NEI	S								
 	Aes	sthetics						S	*						
ficia	Agr	riculture								S	S	S			
Beneficial Uses	Prir	mary Body Contact Recreation											NEI		
m	Pub	olic & Private Water Supply													
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information			*Standar	ds revisio	n, true col	or is for pe	ermitting p	ourposes o	nly					

OWQS = Oklahoma Water Quality Standards

mV = millivolts

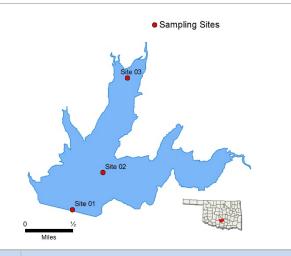
Chlor-a = Chlorophyll-a

 $mg/L = milligrams per liter \ \mu S/cm = microsiemens/cm$

R.C. Longmire

	Sample Period	d	Visited	Sampling Sites
1	November 2018 – Augu	ıst 2019	4	3
	Location	Garvin Cou	inty	
	Impoundment	1989		

			·								
	Location	Garvin Cou	Garvin County								
5	Impoundment	1989									
D	Area	935 acres	935 acres								
	Capacity	13,162 acre	e feet								
	Purposes	Navigation	er, and Recreation								



		Parameter (<u>Descriptions</u>)		Result					Notes/Comments					
		Average Turbidity		10 NTU	l				0% of v	alues >	OWQS o	f 25 NTU	(n=12)	
		Average Secchi Disk Depth	(65.9 cm	1									
	Situ	Water Clarity Rating	ı	Fair										
	드	Chlorophyll-a		15.7 m	g/m3									
		Trophic State Index	į	58					Previou	s value =	= 58			
S		Trophic Class	ı	Eutroph	nic									
Parameters		Salinity	(D.11 – ().16 ppt									
aran	ω.	Specific Conductivity	2	242.8 –	380.9 µ	S/cm								
<u> </u>	Profile	рН	(6.85 – 8	3.75 pH u	ınits								
	₫	Oxidation-Reduction Potential		54.5 to	464.8 m\	/								
		Dissolved Oxygen		Up to 5 June	6% of wa	iter colun	nn < 2 m(g/L in						
	ts	Surface Total Nitrogen	(ე.78 m	g/L to 1.1	55 mg/L								
	Nutrients	Surface Total Phosphorus	(0.027 n	ng/L to 0.	050 mg/l	-							
	Ž	Nitrogen to Phosphorus Ratio	2	24:1					Phosph	orus limi	ted			
		Click to learn more about Beneficial Uses□		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
ses	Fish	n & Wildlife Propagation		S	S	NEI	S							
) E	Aes	sthetics						S	*					
ficia	Agr	iculture								S	S	S		
Beneficial Uses	Prin	mary Body Contact Recreation											S	
m	Pub	olic & Private Water Supply												
	Λ	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	2000	*Standa	andards revision, true color is for permitting purposes only									

Rocky (Hobart)

Sample Period

NTU = *nephelometric turbidity units*

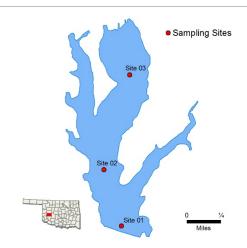
E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

			visited						
ı	March 2017 - Septemb	er 2017	3	3					
5	Location	Washita County							
	Impoundment	1933							
	Area	347 acres							
5	Capacity	4,210 acre-feet							
	Purposes	Water Supp	er Supply, Recreation						

Times

Sampling Sites



		Parameter (<u>Descriptions</u>)		Result					Notes/0	Commer	ıts				
		Average Turbidity		43 NTU	l				67% of	values >	OWQS (of 25 NTL	J (n=9)		
		Average Secchi Disk Depth		27 cm											
	jţ	Water Clarity Rating		Poor											
	In Situ	Chlorophyll-a		82.39 n	ng/m3						alues > OWQS of 25 NTU (n=9) value = 68 rus limited rus limited Solids Soli				
		Trophic State Index		74					Previou	s value =	= 68				
ည		Trophic Class		Hypere	utrophic										
Parameters		Salinity		0.19 – 0	0.44 ppt										
ıran	a)	Specific Conductivity		406.8 –	897.7 µ	S/cm									
G	Profile	pH		7.74 – 8	3.74 pH u	units									
	Ē	Oxidation-Reduction Potential		250.2 to	o 449.6 n	nV									
		Dissolved Oxygen		All data mg/L	are abov	ve screer	ning level	of 2.0							
	ts	Surface Total Nitrogen		1.11 mg	g/L to 1.8	66 mg/L									
	Nutrients	Surface Total Phosphorus		0109 m	g/L to 0.2	247 mg/L									
	Z	Nitrogen to Phosphorus Ratio		9:1					Phosph	orus limi	ted				
		Click to learn more about Beneficial Uses□		Turbidity	五	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a	
ses	Fish	a & Wildlife Propagation		NS	S	S									
Š	Aes	thetics						NEI	*						
ficie	Agr	iculture								S	S	S			
Beneficial Uses	Prin	nary Body Contact Recreation											S		
Ber	Pub	olic & Private Water Supply					S							NS	
	Ν	= Fully Supporting S = Not Supporting El = 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.											

OWQS = Oklahoma Water Quality Standards

mV = millivolts

Chlor-a = Chlorophyll-a

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

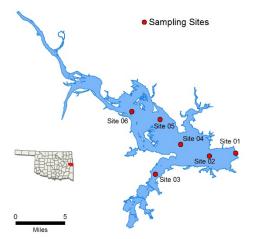
ppt = parts per thousand

En = Enterococci

Robert S. Kerr

Sample Period	d	Times Visited	Sampling Sites
vember 2015 – Septer	mber 2016	4	6
Location	Sequoyah	County	
	vember 2015 – Septer	Sample Period vember 2015 – September 2016 Location Sequoyah	Visited vember 2015 – September 2016 4

			·							
	Location	Sequoyah	Sequoyah County							
ਰ	Impoundment	1970								
ב ב ב	Area	43,800 acre	3,800 acres							
ם פ	Capacity	525,700 ac	re feet							
	Purposes	Navigation, Hydropower, and Recreation								



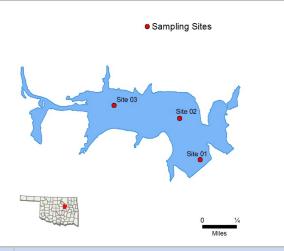
	ı uı	poses	ivavigation,	119	diopowe	i, and ix	ccication			Willes					
		Parameter (Des	scriptions)		Result					Notes/0	Commer	nts			
		Average Turbidi	ty		28NTU					42% of	values >	25 NTU			
		Average Secchi	Depth		36 cm										
	In-Situ	Water Clarity Ra	ating		Fair										
	<u>-</u>	Chlorophyll-a			17.9 mg	g/m3									
		Trophic State In	dex		59					Previou	s value =	= 56			
ည		Trophic Class			Eutrophic										
Parameters		Salinity			0.19- 0.44 ppt										
aran	Φ	Specific Conduc	tivity		402.6 – 888.8 μS/cm										
ď	Profile	рН			7.66 – 8.26 pH units					Neutral	to slightl	y alkalin	Э		
	₫.	Oxidation-Reduc	ction Potential		-9.2.8 to 356.1 mV										
		Dissolved Oxyge	en		All data are above screening level of 2.0 mg/L										
	ts	Surface Total Ni	trogen		0.61mg/L to 0.98 mg/L										
	Nutrients	Surface Total Ph	nosphorus		0.062 mg/L to 0.172 mg/L										
	ž	Nitrogen to Phos		6:1					Possibly co- limited						
		Click to learn m Beneficial Uses	nore about		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
ses	Fish	n & Wildlife Propa	gation		NS	S	S	NEI							
ے ا	Aes	sthetics							S	*					
ficia	Agr	iculture									S	S	S		
Beneficial Uses	Prin	mary Body Contac	t Recreation											NEI	
a	Pub	olic & Private Wate	er Supply					NEI							
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Ini	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 $mg/L = milligrams per liter \mu S/cm = microsiemens/cm$

S	Sahoma									
	Sample Period	d	Times Visited	Sampling Sites						
	November 201	5	4 5							
	Location	Creek County								
<u>ia</u>	Impoundment	1947								
neral	Area	312 acres								

4,850 acre-feet



	Pur	poses	Water Supply,	Recreati	on				Miles					
		Parameter (Des	scriptions)	Result					Notes/0	commen	ıts			
		Average Turbidi	ty	96NTU					100% o	fvalues	< OWQS	of 25 NT	U	
		Average Secchi	Depth	85 cm					100% of values < OWQS of 70					
	In Situ	Water Clarity Ra	ating	Good										
	드	Chlorophyll-a		5.2 mg/	/m3									
		Trophic State In	dex	47					Previous value = 51					
Ñ		Trophic Class		Mesotro	Mesotrophic									
Parameters		Salinity		0.08 – 0.08 ppt										
ıran	o)	Specific Conduc	tivity	170.9 - 174.6 µS/cm										
<u> </u>	Profile	pН	7.36–7.69 pH units					Neutral to slightly alkaline						
	Ē	Oxidation-Reduc	ction Potential	149.8 – 212.9 mV										
		Dissolved Oxyge	en	All data mg/L	are abov	ve screen	ing level	of 2.0						
	Ŋ	Surface Total Ni	trogen	0.79 mg/L to 0.82 mg/L										
	Nutrients	Surface Total Ph	nosphorus	0.020 mg/L to 0.027 mg/L										
	Ž	Nitrogen to Phos	sphorus Ratio	36:1				Phosphorus limited						
		Click to learn m Beneficial Uses	nore about	Turbidity	표	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
ses	Fish	n & Wildlife Propa	gation	NS	S	NS	S							
ے ا	Aes	sthetics						S	*					
Beneficial Uses	Agr	iculture								S	S	S		
ene	Prin	mary Body Contac	t Recreation										S	
m	Pub	olic & Private Wate	er Supply											
	Λ	S = Fully Supporting IS = Not Supporting IEI = Not Enough In		*Standards revision, true color is for permitting purposes only										

NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$ E. coli = Escherichia coli

Capacity

OWQS = Oklahoma Water Quality Standards mV = millivoltsChlor-a = Chlorophyll-a

mg/L = milligrams per liter μ S/cm = microsiemens/cm

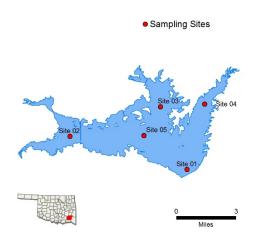
Sardis

NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$

E. coli = Escherichia coli

Sample Period	Times Visited	Sampling Sites
November 2018 – August 2019	4	5

		·
	Location	Pushmataha County
<u>.</u>	Impoundment	1970
D	Area	13,610 acres
	Capacity	274,330 acre feet
	Purposes	Flood Control, Waters Supply, Fish and Wildlife, and Recreation



		and Recreati												
		Parameter (<u>Descriptions</u>)		Result					Notes/0	Commer	nts			
		Average Turbidity		21 NTU					22% of	values >	18 NTU			
		Average Secchi Disk Depth		51.8 cm)									
	itu	Water Clarity Rating		Average	9									
	In-Situ	Chlorophyll-a		8.86 mg	g/m3									
		Trophic State Index		62					Previou	s value =	= 52			
ည		Trophic Class		Hypereutrophic										
Parameters		Salinity		0.02 – 0	.02 – 0.03 ppt									
aran	Φ	Specific Conductivity		40.6 – 73.4 μS/cm										
ď	Profile	рН		5.88 – 7.69 pH units					Only 27.9% of values < 6.5 pH units					
	₫	Oxidation-Reduction Potential		255.1 to	550.7 m	ηV								
		Dissolved Oxygen		Up to 3° August	7% of wa	iter colun	nn < 2 mg	J/L in						
	ts	Surface Total Nitrogen		0.34 mg	g/L to 0.5	35 mg/L								
	Nutrients	Surface Total Phosphorus		0.028 m	ng/L to 0.	051 mg/l	L							
	Ž	Nitrogen to Phosphorus Ratio		12:1					Phosphorus limited					
		Click to learn more about Beneficial Uses□		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
ses	Fish	n & Wildlife Propagation		NS	NS	NEI	S							
) E	Aes	ethetics						S	*					
ficia	Agr	iculture								S	S	S		
Beneficial Uses	Prin	nary Body Contact Recreation											S	
m	Pub	olic & Private Water Supply												
	Ν	i = Fully Supporting IS = Not Supporting IEI = Not Enough Information	*Standards revision, true color is for permitting purposes only											

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

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

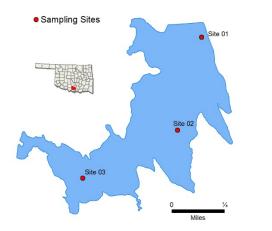
mV = millivolts

Scott King (Rock Creek)

NTU = *nephelometric turbidity units*

 μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

	Sample Period		Visited	Sampling Sites				
	October 2008 – July	2009	4	5				
	Location	Carter Cou						
<u></u>	Impoundment	1979						
General	Area	248 acres						
5	Capacity	3,588 acre-feet						
	Purposes	Recreation						



		poses	Recreation											
		Parameter (Des	scriptions)	Result					Notes/0	Commer	nts			
		Average Turbidi	ty	9 NTU					100% of values < OWQS of 25 NTU (n=12)					
		Average True C	olor						Did not collect for true color					
	itu	Average Secchi	Disk Depth	80 cm										
	In Situ	Water Clarity Ra	ating	Good										
		Trophic State In	dex	51					Previou	s value =	= 48			
ည		Trophic Class		Eutroph	nic									
Parameters		Salinity		0.10 – 0.15 ppt										
ıran	o)	Specific Conduc	ctivity	278.8 -	· 307 μS/	cm								
<u> </u>	Profile	pН		6.96 –	3.53 pH u	ınits								
	₫.	Oxidation-Redu	ction Potential	-10 to 4	61 mV									
		Dissolved Oxygo	en	Up to 50% of water column < 2.0 mg/L in July										
	ts	Surface Total Ni	itrogen	0.55 mg	0.55 mg/L to 0.80 mg/L									
	Nutrients	Surface Total Pl	hosphorus	0.009 mg/L to 0.026 mg/L										
	ž	Nitrogen to Pho	39:1					Phosphorus limited						
		Click to learn m Beneficial Uses	nore about	Turbidity	듄	Dissolved Oxygen	Metals	ISI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a
ses	Fish	n & Wildlife Propa	gation	S	S	NEI	S							
Beneficial Uses	Aes	sthetics						S	*					
ficia	Agr	iculture								S	S	S		
eue	Prin	mary Body Contac	ct Recreation										S	
m	Pub	olic & Private Wate	er Supply											
S = Fully Supporting NS = Not Supporting NEI = Not Enough Information *Standards revision, true color is for permitting purposes only														

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

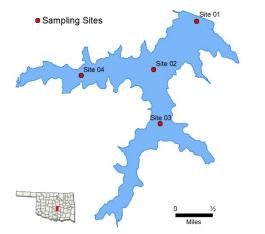
OWQS = Oklahoma Water Quality Standards

mV = millivolts

Shawnee Twin No. 1

	Sample Perio	d	Visited	Sampling Sites			
Nov	vember 2018 – Septe	ember 2019	4	4			
	Location	Pottawatomi	e County				
<u>a</u>	Impoundment	1935					
General	Area	1,336 acres					
	Capacity	22.600 acre	-feet				

Motor Cumply Boorgation



	Pur	Purposes Water Supp		y, R	ecreation	on						٢	Miles		
		Parameter (Des	criptions)		Result					Notes/0	Commer	nts			
		Average Turbidit	ty		12 NTU					100% o	f values	< OWQ	S of 25 N7	ГU	
		Average Secchi	Disk Depth		74.2 cm	ı									
	In-Situ	Water Clarity Ra	ting		Good										
	흐	Chlorophyll-a		1	8.93 mg	g/m3									
		Trophic State Inc	dex		52					Previou	s Value :	= 47			
<u>s</u>		Trophic Class		ı	Eutrophic										
Parameters		Salinity			0.09 – 0.13 ppt										
aran	a)	Specific Conduc	tivity		195.2 – 277.1 μS/cm										
9,	Profile	рН			7.10 – 8.27 pH units					Neutral to slightly alkaline					
	□	Oxidation-Reduc	tion Potential	4	45.1 to 468.0 mV										
		Dissolved Oxyge	en		Up to 30 Septem		iter colum	nn < 2 m(g/L in						
	र	Surface Total Ni	trogen		0.375 m	ng/L to 0.	765 mg/L	-							
	Nutrients	Surface Total Ph	nosphorus		0.012 mg/L to 0.026 mg/L										
	ž	Nitrogen to Phosphorus Ratio			31:1					Phosphorus limited					
		Click to learn m	ore about		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
ses	Fish	h & Wildlife Propa	gation		NS	S	NEI	S							
<u></u>	Aes	sthetics							S	*					
fici	Agr	ciculture									S	S	S		
Beneficial Uses	Prin	mary Body Contac	t Recreation											S	
8	Pub	olic & Private Wate	er Supply												
	٨	S = Fully Supporting IS = Not Supporting IEI = Not Enough Inf	formation	Notes	*Standards revision, true color is for permitting purposes only										

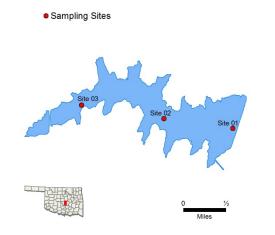
NTU = nephelometric turbidity units μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a mg/L = milligrams per liter μS/cm = microsiemens/cm

Shawnee Twin No. 2

Sample Period	Times Visited	Sampling Sites
November 2018 – September 2019	4	3

	Location	Pottawatomie County								
<u></u>	Impoundment	1960								
	Area	1,100 acres								
	Capacity	11,400 acre feet								
	Purposes	Waters Supply and Recreation								



		Parameter (Descriptions)	R	esult					Notes/Comments					
		Average Turbidity	1	1 NTL	J				100% o	f values	< OWC	S of 25 N	TU	
		Average Secchi Disk Depth	7.	2.7 cn	n									
	퍉	Water Clarity Rating	G	Good										
	In-Situ	Chlorophyll-a	1	5.01 n	ng/m3									
		Trophic State Index	5	7					Previous value = 48					
ပ		Trophic Class	E	utroph	nic									
Parameters		Salinity	0	.09 –	0.15 ppt									
ıran	a)	Specific Conductivity	1	95.9 –	- 313.5 µ	S/cm								
Pa	Profile	рН	6	6.92 – 8.31 pH units					Neutral	to slight	ly alkalin	е		
	ቯ	Oxidation-Reduction Potential	5	55.1 to 438.4 mV										
		Dissolved Oxygen	U S	lp to 3 Septem	p to 35% of water column < 2 mg/L in eptember									
	ts	Surface Total Nitrogen	0	0.505 mg/L to 0.84 mg/L										
	Nutrients	Surface Total Phosphorus	0	0.012 mg/L to 0.032 mg/L										
	N	Nitrogen to Phosphorus Ratio	3	35:1					Phosphorus limited					
		Click to learn more about Beneficial Uses□		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
ses	Fish	h & Wildlife Propagation		NS	S	NEI	S							
Beneficial Uses	Aes	sthetics						S	*					
ficia	Agr	iculture								S	S	S		
ene	Prin	mary Body Contact Recreation											NEI	
m	Pub	olic & Private Water Supply												
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	*5	Standa	rds revisio	n, true col	or is for pe	ermitting p	ourposes o	nly				

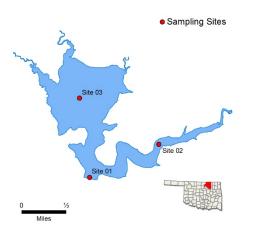
NTU = nephelometric turbidity units μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a $mg/L = milligrams per liter \mu S/cm = microsiemens/cm$

Shell

	Sample Period		Times Visited	Sampling Sites				
	October 2012 – Augus	st 2013	4	3				
	Location	Osage Cou	nty					
5	Impoundment	1922						
	Area	573 acres						
	Capacity	9,500 acre-feet						
	Purposes	Water Supply, Recreation						

Times



	Fui	poses v	water Supply,	Recieati	ecreation										
		Parameter (Descri	i <u>ptions</u>)	Result					Notes/0	Commer	ıts				
		Average Turbidity		8 NTU					100% o	f values	< OWQS	of 25 NT	U (n=12)		
		Average Secchi Di	sk Depth	73 cm											
	ijţ	Water Clarity Ratin	ng	Good											
	In Situ	Chlorophyll-a		10 mg/	m3										
		Trophic State Index	x	54					Previous value = 55						
ည		Trophic Class		Eutrophic											
Parameters		Salinity		0.10 -	0.16 ppt										
aran	ω	Specific Conductiv	ity	204 – 3	34 µS/cr	n									
٣	Profile	рН		6.59 –	6.59 – 8.39 pH units										
	₫.	Oxidation-Reduction	on Potential		-96 to 223 mV Up to 59% of water column < 2.0 mg/L in										
		Dissolved Oxygen		Up to 5 August		iter colum	nn < 2.0 r	ng/L in							
	ts	Surface Total Nitro	gen	0.89 m	0.89 mg/L to 1.21 mg/L										
	Nutrients	Surface Total Phos	sphorus	0.005 n	0.005 mg/L to 0.036 mg/L										
	Z	Nitrogen to Phosph	norus Ratio	66:1	66:1					Phosphorus limited					
		Click to learn more Beneficial Uses□	e about	Turbidity	五	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a	
ses	Fish	h & Wildlife Propagat	tion	S	S	S	NEI								
ے ا	Aes	sthetics						S	*						
ficia	Agr	riculture								S	S	S			
Beneficial Uses	Prin	mary Body Contact R	Recreation										S		
M	Pub	olic & Private Water	Supply				NEI								
	N	S = Fully Supporting IS = Not Supporting IEI = Not Enough Infor	mation Votes	*Standa	rds revisio	n, true col	or is for pe	ermitting p	ourposes o	nly					

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

mV = millivolts Chlor-a = Chlorophyll-a

NTU = *nephelometric turbidity units*

 μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

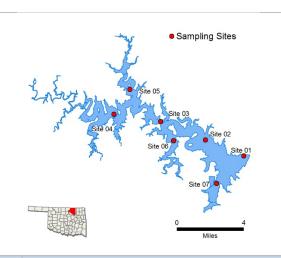
Skiatook

NTU = *nephelometric turbidity units*

 μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

Sample Period		Visited	Sampling Sites
October 2016 – July	2017	3	7
Location	Osage Cou	nty	
Impoundment	1984		

ובו קו מו	Location	Osage County						
	Impoundment	1984						
	Area	10,190 acres						
ם ס	Capacity	322,700 acre-feet						
	Purposes	Flood Control, Water Supply, Water Quality Control, Recreation and Fish & Wildlife						



		Parameter (<u>Descriptions</u>)					Notes/0	Notes/Comments						
		Average Turbidity	6 NTU					0% of v	alues > 0	OWQS o	f 25 NTU	(n=28)		
		Average Secchi Disk Depth	115 cm	า										
	In Situ	Water Clarity Rating	Excelle	ent										
	므	Chlorophyll-a	6.96 m	ng/m3										
		Trophic State Index	50					Previou	Previous value = 51					
ត		Trophic Class	Mesotr	ophic										
Parameters		Salinity	0.12 -	0.14 ppt										
ıran	a)	Specific Conductivity	207.2 -	– 287.1 µ	S/cm									
<u> </u>	Profile	рН	6.75 –	8.15 pH ι	units									
	₫	Oxidation-Reduction Potential	20.7 to	20.7 to 459.3 mV										
		Dissolved Oxygen	Up to 6	Jp to 67% of water column < 2.0 mg/L in August					3					
	ts	Surface Total Nitrogen	0.34 m	0.34 mg/L to 0.58 mg/L										
	Nutrients	Surface Total Phosphorus	0.010 ı	0.010 mg/L to 0.036 mg/L										
	ž	Nitrogen to Phosphorus Ratio	20:1	20:1					Phosphorus limited					
		Click to learn more about Beneficial Uses□	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a	
ses	Fish	h & Wildlife Propagation	S	S	NEI	S								
ے ت	Aes	sthetics					S	*						
ficie	Agr	iculture							S	S	S			
Beneficial Uses	Prin	mary Body Contact Recreation										S		
m	Pub	olic & Private Water Supply				S								
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information		Standards revision, true color is for permitting p 50-70% range is undetermined for DO.					nly					

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

mV = millivoltsChlor-a = Chlorophyll-a

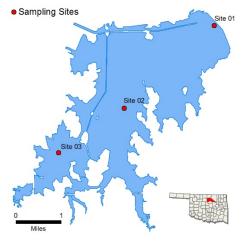
Sooner

Capacity

	Sample Period	d	Visited	Sampling Sites				
	October 2014 - July	2015	4	3				
ral	Location	Pawnee Co	Pawnee County					
	Impoundment	1972						
ner	Area	5,400 acres						

149,000 acre-feet

Times



	Pur	poses	Cooling Water		esult				Miles	_1	A		经国际	
		Parameter (Des	scriptions)	Result					Notes/0	ommen	its			
		Average Turbidi	ty	3 NTU					100% o	f values	< OWQ	S of 25 N	ΓU	
		Average Secchi	Disk Depth	194 cm										
	itu	Water Clarity Ra	ating	Excelle	nt									
	In Situ	Chlorophyll-a		3 mg/m	3									
		Trophic State In	dex	43					Previous value = 41					
ည		Trophic Class		Mesotro	ophic									
Parameters		Salinity		1.22 – 1	1.28 ppt									
ıran	a)	Specific Conduc	tivity	2372.70	0 – 2475	μS/cm								
g.	Profile	рН		7.44 – 8	7.44 – 8.41 pH units				Neutral to slightly alkaline					
	ቯ	Oxidation-Reduc	ction Potential	174.7 to	174.7 to 434.9 mV									
		Dissolved Oxyge	en	Up to 2 July	0% of wa	ater colum	n < 2.0 r	ng/L in						
	Š	Surface Total Ni	trogen	0.49 mg	0.49 mg/L to 0.69 mg/L									
	Nutrients	Surface Total Ph	nosphorus	0.007 mg/L to 0.023 mg/L										
	Z	Nitrogen to Phos	sphorus Ratio	46:1					Phosphorus limited					
		Click to learn m Beneficial Uses	nore about	Turbidity	摄	Dissolved Oxygen	Metals	ISI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
ses	Fish	n & Wildlife Propa	gation	S	S	NEI	S							
Š	Aes	sthetics						S	*					
Beneficial Uses	Agr	iculture								S	S	S		
ene	Prin	nary Body Contac	t Recreation										S	
m	Pub	olic & Private Wate	er Supply											
	Ν	= Fully Supporting IS = Not Supporting IEI = Not Enough In	formation septon	*Standa	rds revisio	n, true colo	or is for pe	ermitting p	ourposes or	nly				

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

Spavinaw

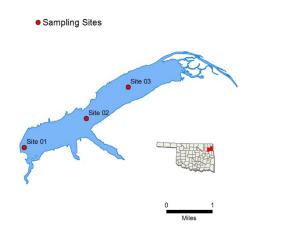
NTU = *nephelometric turbidity units*

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

	Sample Period		Times Visited	Sampling Sites				
	October 2018 – July	2019	4	3				
	Location	Mayes Cou	County					
,	Impoundment	1924						
	Area	1,584 acres						
	Capacity	38,000 acre	0 acre-feet					
	Purposes	Water Supply, Recreation, Fish & Wildlife						

Times



		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Γ.,												
		Parameter (<u>Descriptions</u>)		Result					Notes/0	Commer	nts				
		Average Turbidity		5 NTU					100% of values < OWQS of 25 NTU (n=12)						
		Average Secchi Disk Depth		112.5 c	m										
	it	Water Clarity Rating		Good											
	In Situ	Chlorophyll-a		18.60 n	ng/m3										
		Trophic State Index		59					Previous value = 62						
ပ်		Trophic Class		Eutroph	nic										
Parameters		Salinity		0.07 – 0	0.13 ppt										
ıran	ø)	Specific Conductivity		146.2 –	- 277.0 μS	S/cm									
<u> </u>	Profile	pH		6.82 – 8	6.82 – 8.88 pH units										
	₫	Oxidation-Reduction Potent	al	-19.6 to	-19.6 to 535.8 mV										
		Dissolved Oxygen		Up to 5 July	Jp to 54% of water column < 2.0 mg/L in July										
	ts	Surface Total Nitrogen		0.56 mg	0.56 mg/L to 1.63 mg/L										
	Nutrients	Surface Total Phosphorus		0.016 n	ng/L to 0.	041 mg/L	-								
	Ž	Nitrogen to Phosphorus Rat	io	32:1					Phosphorus limited						
		Click to learn more about Beneficial Uses□		Turbidity	五	Dissolved	Metals	ISI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a	
ses	Fish	h & Wildlife Propagation		S	S	NS	*								
ž	Aes	sthetics						NEI*	*						
ficia	Agr	iculture								S	S	S			
Beneficial Uses	Prin	mary Body Contact Recreation	1										S		
m	Pub	olic & Private Water Supply												NS	
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	Notes	*Current	ly, the lake	e is listed a	as a Nutrie	nt Limited	purposes of Watershe ke is consi	ed (NLW)		ahoma Wa	ter Quality	,	

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

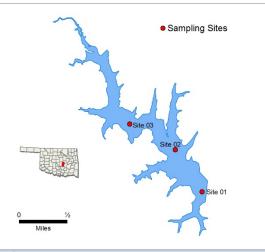
OWQS = Oklahoma Water Quality Standards

mV = millivolts

Sportsman

	Sample Period	d	Times Visited	Sampling Sites
No	ovember 2018 – Septer	mber 2019	4	5
	Location	Seminole C	County	

140	Welliber 2010 Gepten	11001 2010	7	3					
	Location	Seminole County							
ਰ	Impoundment	1958							
ב ש	Area	354 acres							
ם פ	Capacity	5,349 acre	feet						
	Purposes	Waters Sup	Waters Supply and Recreation						
	5		- L						



		Parameter (Descriptions)	Result					Notes/0	Commer	nts				
		Average Turbidity	13 NTL	J				8% of v	alues > (OWQS o	f 25 NTU	(n=12)		
		Average Secchi Disk Depth	90.8 cn	n										
	In Situ	Water Clarity Rating	Good											
	드	Chlorophyll-a	3.74 m	g/m3										
		Trophic State Index	44					Previou	s value :	= 47				
ည		Trophic Class	Mesotro	ophic										
Parameters		Salinity	0.09 -	0.28 ppt										
ıran	o)	Specific Conductivity	187.0 –	- 582.6 μ	S/cm									
g.	Profile	pH	6.52 – 8	8.35 pH ւ	units			Neutral	to slight	ly alkaline	е			
	Ē	Oxidation-Reduction Potential	96.9 to 489.1 mV											
		Dissolved Oxygen	Up to 5 Septem		iter colum	nn < 2 mg	g/L in							
	S	Surface Total Nitrogen	0.37 m	g/L to 0.6	75 mg/L									
	Nutrients	Surface Total Phosphorus	0.013 n	0.013 mg/L to 0.037 mg/L										
	N	Nitrogen to Phosphorus Ratio	23:1					Phosphorus limited						
		Click to learn more about Beneficial Uses□	Turbidity	Ha	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fish	h & Wildlife Propagation	NS	S	NEI	S								
<u></u>	Aes	sthetics					S	*						
fici	Agr	riculture							S	S	S			
Beneficial Uses	Prin	mary Body Contact Recreation										S		
<u> </u>	Pub	olic & Private Water Supply												
	Λ	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	*Standa	rds revisio	n, true col	or is for pe	ermitting p	ourposes or	nly					

NTU = nephelometric turbidity units µS/cm = microsiemens per centimeter E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a $mg/L = milligrams per liter \mu S/cm = microsiemens/cm$

Stanley Draper

Capacity

	Sample Period	d	Times Visited	Sampling Sites
(October 2015 – Augu	st 2016	4	5
	Location	Cleveland (County	
<u>a</u>	Impoundment	1962		
neral	Area	2,900 acres	3	

100,000 acre-feet



	Pur	poses	Water Supply,	, Recreation					Miles			Site 01			
		Parameter (Des	scriptions)	Result					Notes/0	Commer	ıts				
		Average Turbidit	ty	8 NTU					100% o	f values	< OWQ	S of 25 N	ГU		
		Average Secchi	Disk Depth	104 cm											
	Situ	Water Clarity Ra	ating	Excelle	nt										
	In Situ	Chlorophyll-a		2.7 mg/	′m3										
		Trophic State Inc	dex	40					Previous value = 36						
S		Trophic Class		Oligotro	phic										
Parameters		Salinity		0.05 – 0	0.06 ppt										
ıran	a	Specific Conduc	ctivity	108.7 –	132.7 µ										
Pa	Profile	рН		6.81 – 8	3.34 pH ι	ınits									
	Oxidation-Reduction Potential 176.1 – 463.7 mV														
		Dissolved Oxyge	en	Up to 6 August		iter colum	n < 2 m	g/L in							
	ts	Surface Total Ni	itrogen	0.26 mg/L to 0.55 mg/L											
	Nutrients	Surface Total Ph	hosphorus	0.010 m	0.010 mg/L to 0.015 mg/L										
	Ž	Nitrogen to Phos	sphorus Ratio	31:1					Phosphorus limited						
		Click to learn m		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fisl	n & Wildlife Propa	gation	NS	S	S	S								
<u> </u>	Aesthetics						S	*							
Beneficial Uses	Agr	iculture								S	S	S			
ene	Primary Body Contact Recreation												S		
m	Public & Private Water Supply														
N/T/	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information *Standards revision, true color is for permitting						ermitting p	urposes or	nly						

NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$ E. coli = Escherichia coli OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a $mg/L = milligrams per liter \mu S/cm = microsiemens/cm$

Stilwell City

Capacity

 μ S/cm = microsiemens per centimeter

E. coli = Escherichia coli

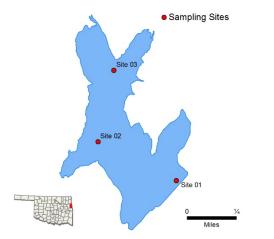
mV = millivolts

Chlor-a = Chlorophyll-a

	Sample Period	J	Visited	Sampling Sites					
De	cember 2015 – Octo	ber 2016	3	5					
	Location	Adair Coun	ty						
ਕ੍ਰ	Impoundment	1965							
eneral	Area	188 acres							
Ф									

3,110 acre-feet

Times



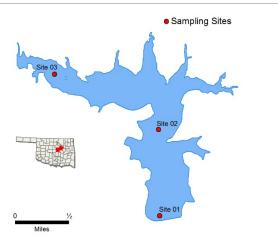
olitu	Average Turbidit		Result				Recreation, Flood Control											
oltu								Notes/C	ommen	its		Notes/Comments						
SILU	Averege Coochi	ty	14 NTL	J				33% of	values >	OWQS	of 25 NTU	I						
<u> </u>	Average Seconi	Disk Depth	69 cm					100% o	values	< OWQS	S of 70							
,,	Water Clarity Ra	ating	Averag	е														
É	Chlorophyll-a		9.6mg/ı	m3														
	Trophic State Inc	dex	53					Previous value = 54										
	Trophic Class		Eutroph	nic														
	Salinity		0.06 - 0	0.12 ppt														
1)	Specific Conduc	tivity	117.3 –	- 249.5 μ	S/cm													
	рН		6.74 –	8.03 pH	units													
ב	Oxidation-Reduc	ction Potential	64 – 45	64 – 459 mV														
	Dissolved Oxyge	en		Up to 54% of water column < 2 mg/L in October				Occurred at site 1, the dam										
2	Surface Total Ni	trogen	0.63 mg/L to 1.24 mg/L															
	Surface Total Ph	nosphorus	0.027 n	0.027 mg/L to 0.281 mg/L														
	Nitrogen to Phos	sphorus Ratio	7:1						Possibly co- limited									
	Click to learn m	nore about	Turbidity	Hď	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a					
ish	& Wildlife Propa	gation	NS	S	NS	S												
est	thetics						S	S										
gri	culture								S	S	S							
Prim	nary Body Contac	t Recreation										S						
Pub	lic & Private Wate																	
N	S = Not Supporting	formation spot	*Standards revision, true color is for permitting purposes only															
r Pr	sships ships	Salinity Specific Conduct pH Oxidation-Reduct Dissolved Oxyge Surface Total Ni Surface Total Ph Nitrogen to Phose Click to learn many Beneficial Uses sh & Wildlife Propates esthetics griculture many Body Contact ublic & Private Wate S = Fully Supporting NS = Not Supporting NEI = Not Enough Inc.	Salinity Specific Conductivity pH Oxidation-Reduction Potential Dissolved Oxygen Surface Total Nitrogen Surface Total Phosphorus Nitrogen to Phosphorus Ratio Click to learn more about Beneficial Uses sh & Wildlife Propagation esthetics griculture rimary Body Contact Recreation ublic & Private Water Supply S = Fully Supporting NS = Not Supporting NEI = Not Enough Information pephelometric turbidity units OWQS	Salinity Specific Conductivity pH 6.74 - Oxidation-Reduction Potential Dissolved Oxygen Surface Total Nitrogen Surface Total Phosphorus Nitrogen to Phosphorus Ratio Click to learn more about Beneficial Uses sh & Wildlife Propagation esthetics griculture rimary Body Contact Recreation ublic & Private Water Supply S = Fully Supporting NS = Not Supporting NS = Not Supporting NEI = Not Enough Information	Salinity Specific Conductivity pH 6.74 - 8.03 pH Oxidation-Reduction Potential Dissolved Oxygen Surface Total Nitrogen Surface Total Phosphorus Nitrogen to Phosphorus Ratio Click to learn more about Beneficial Uses sh & Wildlife Propagation Path Beneficial Uses Signiculture Imary Body Contact Recreation Subject Surface Recreation Surface Total Phosphorus Ratio T:1 Surface Total Phosphorus NS Surface Total Phosphorus Surface Total Phosphorus NS Surface Total Ph	Salinity Specific Conductivity Dissolved Oxygen Surface Total Nitrogen Surface Total Phosphorus Nitrogen to Phosphorus Ratio Click to learn more about Beneficial Uses Sh & Wildlife Propagation Surface Water Supply Sh = Not Supporting NEI = Not Enough Information 117.3 - 249.5 µS/cm 6.74 - 8.03 pH units 64 - 459 mV Up to 54% of water colum October 0.63 mg/L to 1.24 mg/L 7:1 Dissolved Oxygen October 0.63 mg/L to 0.281 mg/L 7:1 Surface Total Phosphorus Ratio NS NS NS Sh & Wildlife Propagation NS NS *Standards revision, true column *Standards revision, tru	Salinity Specific Conductivity 117.3 – 249.5 µS/cm pH 6.74 – 8.03 pH units Oxidation-Reduction Potential Oxidation-Reduction Potential Dissolved Oxygen Up to 54% of water column < 2 mg October Surface Total Nitrogen Surface Total Phosphorus 0.027 mg/L to 0.281 mg/L Nitrogen to Phosphorus Ratio Click to learn more about Beneficial Uses Sh & Wildlife Propagation NS S S S S S S S S S S S S	Salinity Specific Conductivity pH 6.74 - 8.03 pH units Oxidation-Reduction Potential Oxidation-Reduction Potential Oxidation-Reduction Potential Oxidation-Reduction Potential Oxidation-Reduction Potential 64 - 459 mV Up to 54% of water column < 2 mg/L in October Surface Total Nitrogen O.63 mg/L to 1.24 mg/L Surface Total Phosphorus O.027 mg/L to 0.281 mg/L Nitrogen to Phosphorus Ratio 7:1 Click to learn more about Beneficial Uses Sh & Wildlife Propagation NS S S S S S S S S S S S S	Salinity 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 Occurre October Surface Total Nitrogen Surface Total Phosphorus Nitrogen to Phosphorus Ratio Click to learn more about Beneficial Uses Sh & Wildlife Propagation Sh & Wildlife Propagation Sesthetics S S Griculture Imary Body Contact Recreation Jublic & Private Water Supply *Standards revision, true color is for permitting purposes or NE = Not Supporting NE = Not Supporting NE = Not Supporting NE = Not Enough Information	Salinity Specific Conductivity pH 6.74 - 8.03 pH units Oxidation-Reduction Potential Dissolved Oxygen Occurred at site Surface Total Nitrogen Surface Total Phosphorus Nitrogen to Phosphorus Ratio Click to learn more about Beneficial Uses State Sh & Wildlife Propagation Sesthetics Simary Body Contact Recreation Jubic & Private Water Supply *Standards revision, true color is for permitting purposes only *Standards revision, true color is for permitting purposes only *Standards revision, true color is for permitting purposes only *Standards revision, true color is for permitting purposes only *Standards revision, true color is for permitting purposes only *Standards revision, true color is for permitting purposes only *Standards revision, true color is for permitting purposes only *Standards revision, true color is for permitting purposes only *Standards revision, true color is for permitting purposes only **Standards revision, true color is for permitting purposes only **Standards revision, true color is for permitting purposes only **Standards revision, true color is for permitting purposes only **Standards revision, true color is for permitting purposes only **Standards revision, true color is for permitting purposes only **Standards revision, true color is for permitting purposes only **Standards revision, true color is for permitting purposes only	Salinity Specific Conductivity 117.3 – 249.5 µS/cm pH 6.74 – 8.03 pH units Oxidation-Reduction Potential Oxidation-Reduction Potential Dissolved Oxygen Up to 54% of water column < 2 mg/L in October October Surface Total Nitrogen Surface Total Phosphorus 0.027 mg/L to 0.281 mg/L Nitrogen to Phosphorus Ratio 7:1 Possibly co- limited Click to learn more about Beneficial Uses Remedical Uses Signature Signature	Salinity Specific Conductivity 117.3 – 249.5 µS/cm pH 6.74 – 8.03 pH units Oxidation-Reduction Potential Dissolved Oxygen Up to 54% of water column < 2 mg/L in October Occurred at site 1, the dam Occurred at sit	Salinity 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 Occurred at site 1, the dam Surface Total Nitrogen Surface Total Phosphorus 0.027 mg/L to 0.281 mg/L Nitrogen to Phosphorus Ratio 7:1 Possibly co- limited Click to learn more about Beneficial Uses: Sh & Wildlife Propagation NS S S S S S S S S S S S S					

 μ S/cm = microsiemens/cm

En = Enterococci

Stroud

	Sample Period	t	Times Visited	Sampling Sites					
	October 2018 – July	2019	4	3					
	Location	Creek Cou	nty						
ਰ	Impoundment	1968							
	Area	600 acres							
ם ס	Capacity	8,800 acre-feet							
	Purposes	Water Supply, Recreation, Flood Control							



				y, Recreation, Flood Control				Miles						
		Parameter (Des	scriptions)	Result					Notes/0	Commen	nts			
		Average Turbidit	ty	12 NTU	J				8% of v	alues >	OWQS c	of 25 NTU	(n=12)	
		Average Secchi	Disk Depth	74.8 cn	n									
	Situ	Water Clarity Ra	ating	Good										
	드	Chlorophyll-a		7.10 m	g/m3									
		Trophic State Inc	dex	50					Previou	s value =	= 45			
S		Trophic Class		Mesotro	ophic									
Parameters		Salinity		0.09 –	0.1 ppt									
aran	ω	Specific Conduc	tivity	180.9 –	- 213.9 μ	S/cm								
ď.	Profile	рН		7.03 – 8	8.34 pH ı	units			Neutral	to slightl	y alkalin	е		
	₫.	Oxidation-Reduc	ction Potential	84.0 – 485.7 mV										
		Dissolved Oxyge	en	Up to 53% of water column < 2 mg/L in July										
	ts	Surface Total Ni	trogen	0.47 mg/L to 0.79 mg/L										
	Nutrients	Surface Total Ph	nosphorus	0.014 mg/L to 0.044 mg/L										
	N	Nitrogen to Phos	sphorus Ratio	26:1	26:1				Phosph	orus limi	ted			
		Click to learn m		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
Ses	Fish	n & Wildlife Propa	gation	S	S	S	S							
<u> </u>	Aes	sthetics						S	*					
	Agriculture									S	S	S		
Beneticial Uses	Prin	mary Body Contac	t Recreation										S	
מ	Pub	olic & Private Wate	er Supply											
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Int		*Standards revision, true color is for permitting purposes only										

E. coli = Escherichia coli

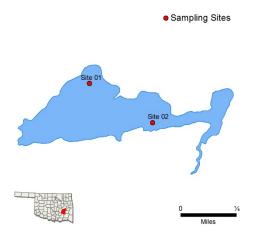
Talawanda No. 1

Purposes

Sample Period	d	Times Visited	Sampling Sites
December 2015 – Sep	t. 2016	4	5
Location	Pittsburg C	ounty	
Impoundment	1902		
Area	91 acres		
Capacity	12,000 acre	e feet	
	December 2015 – Sep Location Impoundment Area	Impoundment 1902 Area 91 acres	December 2015 – Sept. 2016 4 Location Pittsburg County Impoundment 1902 Area 91 acres

Waters Supply and Recreation

Times



		P0000	Tracoro oup	۰,۲	y and reordation											
		Parameter (Des	scriptions)		Result					Notes/0	Commer	nts				
		Average Turbidi	ty		4 NTU					100% o	f Values	< OWQ	6 of 25 NT	Ū		
		Average Secchi	Disk Depth		120 cm											
	itu	Water Clarity Ra	ating		Excelle	nt										
	In-Situ	Chlorophyll-a			5.8 mg/	′m3										
		Trophic State In	dex		48					Previou	s value =	= 47				
ည		Trophic Class			Mesotro	ophic										
Parameters		Salinity			0.03 – 0	0.08 ppt										
ıran	a	Specific Conduc	ctivity		65.1 – 1	178 µS/cı	m									
<u> </u>	Profile	рН			6.51 – 7	7.69 pH u	units			10.53% of values < 6.5 pH units						
	Ē	Oxidation-Redu	ction Potentia	al	172.6 to	373.5 n	nV									
		Dissolved Oxygo	en		Up to 4 summe		ater colun	nn < 2 mg	g/L in							
	ts	Surface Total N	itrogen		0.47 mg	g/L to 0.5	i8 mg/L									
	Nutrients	Surface Total Pl	hosphorus		0.017 m	ng/L to 0.	.021 mg/l	_								
	Z	Nitrogen to Phos	sphorus Ratio)	28:1	28:1					Phosphorus limited					
		Click to learn m Beneficial Uses	nore about		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fish	n & Wildlife Propa	gation		S	NS	NEI	S								
ت ت	Aes	sthetics							S	*						
ficia	Agr	iculture									S	S	S			
Beneficial Uses	Prin	mary Body Contac	t Recreation											S		
m	Pub	olic & Private Wate	er Supply													
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough In		Notes	*Standards revision, true color is for permitting purposes only											

NTU = *nephelometric turbidity units* μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivoltsChlor-a = Chlorophyll-a

mg/L = milligrams per liter μ S/cm = microsiemens/cm

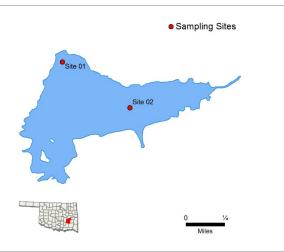
Talawanda No. 2

NTU = *nephelometric turbidity units*

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

	Sample Period	d	Visited	Sampling Sites						
	December 2015 - Sep	t. 2016	4	5						
	Location	Pittsburg C	ounty							
5	Impoundment	1924								
	Area	195 acres								
, c	Capacity	2,750 acre	,750 acre feet							
	Purposes	Waters Sur	oply and Rec	reation						



		Parameter (Descriptions)	Result					Notes/0	Commer	its				
		Average Turbidity	4 NTU					100% o	f Values	< OWQS	6 of 25 NT	ГU		
		Average Secchi Disk Depth	136 cm											
	In-Situ	Water Clarity Rating	Excelle	nt										
	<u>-</u>	Chlorophyll-a	2.6 mg/	/m3										
		Trophic State Index	40					Previou	s value =	= 44				
ပ်		Trophic Class	Mesotre	ophic										
Parameters		Salinity	0.04 -	0.07 ppt										
ıran	a)	Specific Conductivity	83.6 -	156.8 µS	S/cm									
Pa	Profile	pH	6.30 –	7.7 pH ur	nits			6.82% of values < 6.5 pH units						
	ቯ	Oxidation-Reduction Potential	192.9 t	o 451 mV	/									
		Dissolved Oxygen	Up to 5 summe		iter colum	nn < 2 mg	g/L in							
	ts	Surface Total Nitrogen	0.30 m	g/L to 0.3	3 mg/L									
	Nutrients	Surface Total Phosphorus	0.010 n	ng/L to 0.	.013 mg/L	-								
	Ž	Nitrogen to Phosphorus Ratio	30:1					Phosphorus limited						
		Click to learn more about Beneficial Uses□	Turbidity	摄	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fish	n & Wildlife Propagation	S	NS	NEI	S								
<u></u>	Aes	ethetics					S	*						
ficia	Agr	iculture							S	S	S			
Beneficial Uses	Prin	mary Body Contact Recreation										S		
m	Pub	olic & Private Water Supply												
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	*Standards revision, true color is for permitting purposes only											

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

mV = millivolts

Taylor

Sample Period

NTU = nephelometric turbidity units

E. coli = Escherichia coli

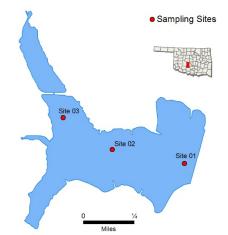
 μ S/cm = microsiemens per centimeter

	October 2018 – July	2019	4	3
	Location	Grady Cou	nty	
5	Impoundment	1960		
	Area	227 acres		
	Capacity	1,877 acre	feet	

Times

Visited

Sampling Sites



	Purposes		Waters Supply, Flood Control, and Recreation							0_	Miles	4			
Parameters		Parameter (Descriptions)		Result					Notes/Comments						
		Average Turbidity		13 NTU					100% of values < OWQS of 25 NTU (n=12)						
		Average Secchi Disk Depth		52.4 cm											
	In Situ	Water Clarity Rating		Average											
	S u	Chlorophyll-a		51.32 mg/m3											
		Trophic State Index		69					Previous value = 68						
		Trophic Class		Hypereutrophic											
		Salinity		0.21 – 0.30 ppt											
	o.	Specific Conductivity		432.9 – 620.8 μS/cm											
	Profile	pH		7.49 – 8.97 pH units											
		Oxidation-Reduction Potential		31.7 to 444.6 mV											
		Dissolved Oxygen		Up to 15% of water column <2 mg/L in July											
	Nutrients	Surface Total Ni	1.315 mg/L to 1.935 mg/L												
		Surface Total Phosphorus		0.078 mg/L to 0.181 mg/L											
		Nitrogen to Phosphorus Ratio		14:1					Phosphorus limited,						
Beneficial Uses		Click to learn m Beneficial Uses	nore about	Turbidity	Hď	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a	
	Fish & Wildlife Propagation			NS	S	S	*								
	Aesthetics							NEI	*						
	Agriculture									S	S	S			
	Primary Body Contact Recreation												S		
	Public & Private Water Supply														
	٨	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information			**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.										

OWQS = Oklahoma Water Quality Standards

mV = millivolts

Chlor-a = Chlorophyll-a

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

Tecumseh

Capacity

S = Fully Supporting NS = Not Supporting

NTU = *nephelometric turbidity units*

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

NEI = *Not Enough Information*

Notes

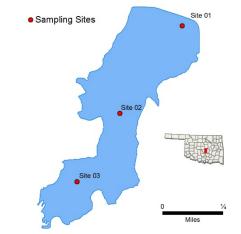
mV = millivolts

Chlor-a = Chlorophyll-a

Sample Period	t l	Times Visited	Sampling Sites			
October 2007 – July	2008	4	5			
Location	Pottawatomie County					
Impoundment	1934					
Δrea	127 acres					

1,118 acre feet

Times



	Pur	poses	Waters Supply				<u> </u>			Mil	es				
		Parameter (Des	criptions)	Result					Notes/Comments						
		Average Turbidit	ty	132 nep	helomet	ric turbidi	ty units (NTU)	All values > 25 NTU						
		Average True Co	olor	244 uni	ts				All values > OWQS of 70						
	Situ	Average Secchi	Disk Depth	11 cm											
	드	Water Clarity Ra	iting	poor											
		Trophic State Inc	dex	49					Previous value = 57						
SIS		Trophic Class		mesotro	nesotrophic										
Parameters		Salinity		0.00 – 0	0.00 – 0.10 ppt										
aran	υ O	Specific Conduc	tivity	105.6 –	105.6 – 141 µS/cm										
<u>a</u>	Profile	рН		7.08 – 7	7.08 – 7.60 pH units					Neutral					
	₾	Oxidation-Reduc	ction Potential	337 to 5	537 mV										
		Dissolved Oxyge	en						D.O. alv	vays > 5	.0 mg/L				
	S.	Surface Total Ni	trogen	1.01 mg/L to 1.55 mg/L											
	Nutrients	Surface Total Pr	nosphorus	0.066 mg/L to 0.131 mg/L											
	Ž	Nitrogen to Phos	sphorus Ratio	12:1					Phosphorus limited						
		Click to learn m Beneficial Uses		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fish & Wildlife Propagation				S	S	S								
Beneficial Uses	Aesthetics							S	*						
fici	Agr	riculture								S	S	S			
Sene	_	mary Body Contac											S		
	Puk	olic & Private Wate	er Supply												

OWQS = Oklahoma Water Quality Standards

*Standards revision, true color is for permitting purposes only

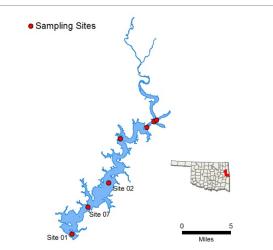
mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

Tenkiller (1,2,7)

	Sample Period	d	Visited	Sampling Sites				
	October 2016 – July	2017	4	7				
	Location	Sequoyah	County					
3	Impoundment	1953						
	Area	12,900 acres						
5	Capacity	654,100 acre-feet						
	Purposes	Flood Cont	rol, Hydropo	wer				



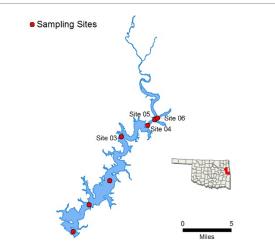
		Parameter (<u>Descriptions</u>)		Result					Notes/0	Commer	nts				
		Average Turbidity		3 NTU					100% c	of values	< OWQS	of 25 NT	Ū		
		Average Secchi Disk Depth		215 cm											
	jţ	Water Clarity Rating		Excelle	nt										
	In Situ	Chlorophyll-a		7.77 m	g/m3										
		Trophic State Index		51					Previous value = 56						
ร		Trophic Class		Eutroph	nic										
Parameters		Salinity		0.08 – 0).12 ppt										
arar	a	Specific Conductivity		165.1 –	254.9 μ	S/cm									
ğ	Profile	рН		6.48–8	.71 pH u	nits									
	₫.	Oxidation-Reduction Potential		68.9-46	5.5 mV										
		Dissolved Oxygen		Up to 7	9% of wa	ter colun	nn < 2 m	g/L							
	ts	Surface Total Nitrogen		0.25 mg	25 mg/L to 0.99 mg/L										
	Nutrients	Surface Total Phosphorus		0.010 m	ng/L to 0.	021 mg/l	<u>_</u>								
	Ž	Nitrogen to Phosphorus Ratio		31:1					Possibly co-limited for this sample year						
		Click to learn more about Beneficial Uses		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fish	n & Wildlife Propagation		S	S	NS	NEI								
ت ت	Aes	sthetics						NEI	*						
ficia	Agri	iculture								N/A	N/A	S			
Beneficial Uses	Prin	mary Body Contact Recreation											S		
m	Pub	olic & Private Water Supply					NEI								
	N	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	NOIGS	threaten	ed by nutr	ients until	S as a NL studies ca cted in cur	an be cond	ducted to c	e Aesthetic onfirm no	cs benefic n-support	ial use is c status.	onsidered		

NTU = nephelometric turbidity units μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a $mg/L = milligrams per liter \ \mu S/cm = microsiemens/cm$

Tenkiller, Illinois River Arm (3-6)

	Sample Period	t	Times Visited	Sampling Sites				
	October 2016 – July	2017	4	7				
	Location	Sequoyah	County					
<u>ल</u>	Impoundment	1953						
General	Area	12,900 acre	res					
5	Capacity	654,100 acre-feet						
	Purposes	Flood Cont	ntrol, Hydropower					



		Parameter (<u>Descriptions</u>)	R	esult					Notes/0	Commer	nts				
		Average Turbidity	2	8 NTU					19% of values > OWQS of 25 NTU						
		Average Secchi Disk Depth	6	6 cm											
	itu	Water Clarity Rating	Α	verage	Э										
	In Situ	Chlorophyll-a	2	1.7 m	g/m3										
		Trophic State Index	6	1					Previous value = 59						
હ		Trophic Class	Н	lypere	utrophic										
Parameters		Salinity	0	.07 – 0).15 ppt										
ıran	as a	Specific Conductivity	1	54.4 – 316 μS/cm											
g.	Profile	pH	6	.81 –	81 - 8.9 pH units										
	፵	Oxidation-Reduction Potential	9	8.2-42	2.3 mV										
		Dissolved Oxygen		lp to 70 ite 3.	0% of wa	iter colun	nn < 2 m	g/L at							
	ts.	Surface Total Nitrogen	0	.33 mg	g/L to 2.4	9 mg/L									
	Nutrients	Surface Total Phosphorus	0	0.022 mg/L to 0.232 mg/L											
	Ž	Nitrogen to Phosphorus Ratio	1-	14:1						Possibly co- limited for this sample year					
		Click to learn more about Beneficial Uses□		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fish	h & Wildlife Propagation		S	S	NEI	NEI								
<u></u>	Aes	sthetics						NEI	*						
ficia	Agr	iculture								S	S	S			
Beneficial Uses	Prir	mary Body Contact Recreation											S		
m	Pub	olic & Private Water Supply					NEI							NS	
	٨	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	*7	The lake	e is listed ed by nutr	in the WQ ients until	S as a NL studies ca	W indicat an be cond	ing that the ducted to c	Aesthetion	cs benefic n-support	ial use is co	onsidered		

NTU = nephelometric turbidity units μ S/cm = microsiemens per centimeter

OWQS = Oklahoma Water Quality Standards mV = millivoltsChlor-a = Chlorophyll-a

mg/L = milligrams per liter μ S/cm = microsiemens/cm

Texoma (1-2)

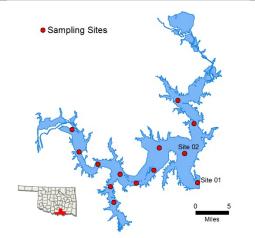
NTU = *nephelometric turbidity units*

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

	Sample Period		Times Visited	Sampling Sites
	December 2015 - Sep	t. 2016	4	13
	Location	Bryan Cour	nty	
5	Impoundment	1944		

	Location	Bryan County					
ਰ	Impoundment	1944					
	Area	88,000 acres					
ם פ	Capacity	2,643,000 acre-feet					
	Purposes	Flood Control, Waters Supply, Hydropower, Low-flow Regulation, and Recreation					
	D(D	- via (i- v-) D v-l(



		poses	Low-flow R	egu	ılation, ar	nd Recre	ation									
		Parameter (Des	scriptions)		Result					Notes/0	Commen	nts				
		Average Turbidit	ty		4 NTU					100% c	f values	< OWQS	of 25 NT	U		
		Average Secchi	Disk Depth		117 cm	l										
	In-Situ	Water Clarity Ra	iting		Excelle	nt										
	<u>-</u>	Chlorophyll-a			6.8 mg/	/m3										
		Trophic State Inc	dex		49					Previous value = 53						
စ်		Trophic Class			Mesotro	ophic										
Parameters		Salinity			0.59 – 1.40 ppt											
aran	συ	Specific Conduc	tivity		1202.3	– 2715.1	μS/cm									
ď	Profile	рН			7.11 – 8	8.43 pH ι	units									
	_	Oxidation-Reduc	ction Potentia	al		341.3 m										
		Dissolved Oxyge	en		Up to 4 summe		iter colum	nn < 2.0 r	ng/L in							
	ts	Surface Total Ni	trogen		0.54 mg	g/L to 0.7	1 mg/L									
	Nutrients	Surface Total Ph	nosphorus		0.033 n	ng/L to 0.	043 mg/L	_								
	Z	Nitrogen to Phos	sphorus Ratio)	17:1					Phosphorus limited						
		Click to learn m Beneficial Uses	oore about		Turbidity	돐	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a	
ses	Fish	n & Wildlife Propa	gation		S	S	NEI	NEI								
Beneficial Uses	Aes	sthetics							S	*						
ficie	Agr	iculture									S	S	S			
ene	Prin	mary Body Contac	t Recreation											NEI		
m	Pub	olic & Private Wate	er Supply					NEI								
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Int	formation	Notes	*Standa	rds revisio	n, true col	or is for pe	ermitting p	urposes o	nly					

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

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

mV = millivolts Chlor-a = Chlorophyll-a

Texoma Lower Washita River Arm (3-4)

Sample Period

 μ S/cm = microsiemens per centimeter E. coli = Escherichia coli mV = millivolts

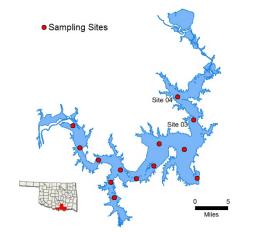
Chlor-a = Chlorophyll-a

	December 2015 - Sep	t. 2016	4	13
	Location	Bryan Cour	nty	
<u></u>	Impoundment	1944		
General	Area	88,000 acre	es	
ပ္	Capacity	2,643,000 a	acre-feet	
	D	Flood Cont	rol, Waters S	Supply, Hydropower, Low-

Times

Visited

Sampling Sites



Parameter (Descriptions) Result Average Turbidity Average Secchi Disk Depth Average Secchi Disk Depth Water Clarity Rating Chlorophyll-a Trophic State Index Trophic Class Eutrophic Salinity Specific Conductivity By Specific Conductivity Dissolved Oxygen Surface Total Phosphorus O.031 mg/L to 0.041 mg/L Nitrogen to Phosphorus Ratio Previous value = 56 Result Notes/Comments 100% of values < OWQS of 25 N Did not collect for true color Did not collect for true color Did not collect for true color Previous value = 56 Value Specific Conductivity Dissolved Oxygen Up to 41% of water column < 2.0 mg/L in summer Surface Total Phosphorus O.031 mg/L to 0.041 mg/L Nitrogen to Phosphorus Ratio Value Click to learn more about By Specific Spec	ITU									
Average Secchi Disk Depth 96 cm Did not collect for true color Water Clarity Rating Good Chlorophyll-a 9mg/m3 Trophic State Index 5 Previous value = 56 Trophic Class Eutrophic Salinity 0.31 – 0.73 ppt Specific Conductivity 639.9 – 1453.7 µS/cm pH 7.48 – 8.48 pH units Oxidation-Reduction Potential 54.9 to 274.9mV Dissolved Oxygen Up to 41% of water column < 2.0 mg/L in summer Surface Total Nitrogen 0.54 mg/L to 0.71 mg/L Nitrogen to Phosphorus Ratio 17:1 Phosphorus limited	ITU									
Water Clarity Rating Good Chlorophyll-a 9mg/m3 Trophic State Index 5 Previous value = 56 Trophic Class Eutrophic Salinity 0.31 – 0.73 ppt Specific Conductivity 639.9 – 1453.7 μS/cm pH 7.48 – 8.48 pH units Oxidation-Reduction Potential 54.9 to 274.9mV Dissolved Oxygen Up to 41% of water column < 2.0 mg/L in summer Surface Total Nitrogen 0.54 mg/L to 0.71 mg/L Surface Total Phosphorus 0.031 mg/L to 0.041 mg/L Nitrogen to Phosphorus Ratio 17:1 Phosphorus limited										
Trophic State Index 5 Previous value = 56										
Trophic State Index 5 Previous value = 56										
Trophic Class Eutrophic Salinity Salinity Specific Conductivity										
Salinity Specific Conductivity Specific Conductivity 639.9 – 1453.7 μS/cm PH Oxidation-Reduction Potential Dissolved Oxygen Surface Total Nitrogen Surface Total Phosphorus Ox031 mg/L to 0.041 mg/L Nitrogen to Phosphorus Ratio Nitrogen to Phosphorus Ratio Ox14 mg/L Ox31 – 0.73 ppt 639.9 – 1453.7 μS/cm 7.48 – 8.48 pH units Oxidation-Reduction Potential Surface Total Nitrogen Oxidation-Reduction Potential Surface Total Nitrogen Oxidation-Reduction Potential Oxidation-Reduction Potential Surface Total Nitrogen Oxidation-Reduction Potential Oxidation-Reducti										
Oxidation-Reduction Potential Dissolved Oxygen Surface Total Nitrogen Surface Total Phosphorus Oxidation-Reduction Potential Up to 41% of water column < 2.0 mg/L in summer Surface Total Nitrogen O.54 mg/L to 0.71 mg/L Surface Total Phosphorus O.031 mg/L to 0.041 mg/L Nitrogen to Phosphorus Ratio 17:1 Phosphorus limited										
Oxidation-Reduction Potential Dissolved Oxygen Surface Total Nitrogen Surface Total Phosphorus Oxidation-Reduction Potential Oxidation-Reduction Potential 54.9 to 274.9mV Up to 41% of water column < 2.0 mg/L in summer Surface Total Nitrogen O.54 mg/L to 0.71 mg/L Surface Total Phosphorus O.031 mg/L to 0.041 mg/L Nitrogen to Phosphorus Ratio 17:1 Phosphorus limited										
Oxidation-Reduction Potential Dissolved Oxygen Surface Total Nitrogen Surface Total Phosphorus Oxidation-Reduction Potential Oxidation-Reduction Potential 54.9 to 274.9mV Up to 41% of water column < 2.0 mg/L in summer Surface Total Nitrogen O.54 mg/L to 0.71 mg/L Surface Total Phosphorus O.031 mg/L to 0.041 mg/L Nitrogen to Phosphorus Ratio 17:1 Phosphorus limited										
Dissolved Oxygen Up to 41% of water column < 2.0 mg/L in summer Surface Total Nitrogen O.54 mg/L to 0.71 mg/L Surface Total Phosphorus O.031 mg/L to 0.041 mg/L Nitrogen to Phosphorus Ratio 17:1 Phosphorus limited										
Surface Total Nitrogen Surface Total Phosphorus O.54 mg/L to 0.71 mg/L Surface Total Phosphorus O.031 mg/L to 0.041 mg/L Nitrogen to Phosphorus Ratio 17:1 Phosphorus limited										
Surface Total Phosphorus 0.031 mg/L to 0.041 mg/L Nitrogen to Phosphorus Ratio 17:1 Phosphorus limited										
- Nitrogen to Priosphorus Ratio 17.1	0.54 mg/L to 0.71 mg/L									
- Nitrogen to Priosphorus Ratio 17.1										
Click to learn more about Sulfates Color Solor										
	En & Chlor-a									
Fish & Wildlife Propagation S S NS NEI										
Aesthetics S *										
Fish & Wildlife Propagation S S NS NEI Aesthetics S * Agriculture S Primary Body Contact Recreation										
Primary Body Contact Recreation	NEI									
Public & Private Water Supply NEI										
S = Fully Supporting NS = Not Supporting NEI = Not Enough Information *Standards revision, true color is for permitting purposes only	*Standards revision, true color is for permitting purposes only									

 μ S/cm = microsiemens/cm

Texoma Lower Red River Arm (5-11)

 μ S/cm = microsiemens per centimeter

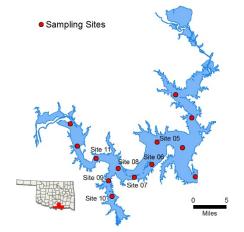
E. coli = Escherichia coli

mV = millivolts

Chlor-a = Chlorophyll-a

Sample Period		Times Visited	Sampling Sites
December 2015 - Sep	t. 2016	4	13
Location	Bryan Cour	atv.	

	Location	Bryan County				
ธ	Impoundment	1944				
	Area	88,000 acres				
Ď	Capacity	2,643,000 acre-feet				
	Purposes	Flood Control, Waters Supply, Hydropower, Low-flow Regulation, and Recreation				
	D(D	- viv (i - vi -)				



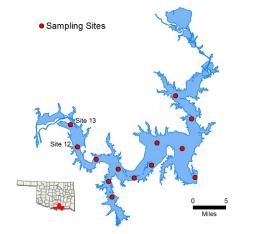
	Pι	urposes	Flood Control, Low-flow Regu				er,		Miles						
Average Secchi Disk Depth 67 cm Water Clarity Rating Good Chlorophyll-a 11 mg/m3 Trophic State Index 54 Previous value = 60 Trophic Class Eutrophic Salinity 0.29 – 1.72 ppt Specific Conductivity 586.9 – 3298.3 μS/cm pH 7.41 – 8.57 pH units Oxidation-Reduction Potential 110.4 to 397.6 mV Dissolved Oxygen Up to 22% of water column < 2.0 mg/L in summer Surface Total Nitrogen 0.53 mg/L to 0.98 mg/L Nitrogen to Phosphorus Ratio 15:1 Phosphorus limited		Parameter (Des	scriptions)	Result					Notes/	Commer	nts				
Water Clarity Rating Good Chlorophyll-a 11 mg/m3 Trophic State Index 54 Previous value = 60 Trophic Class Eutrophic Salinity 0.29 – 1.72 ppt Specific Conductivity 586.9 – 3298.3 μS/cm pH 7.41 – 8.57 pH units Oxidation-Reduction Potential 110.4 to 397.6 mV Dissolved Oxygen Up to 22% of water column < 2.0 mg/L in summer Surface Total Nitrogen 0.53 mg/L to 0.98 mg/L Surface Total Phosphorus Ratio 15:1 Phosphorus limited Click to learn more about Beneficial Uses: Value		Average Turbidit	ty	14 NTU	J				21% of	Values >	- OWQS	of 25 NTU	J		
Trophic State Index 54		Average Secchi	Disk Depth	67 cm											
Trophic State Index 54	ji Zi	Water Clarity Ra	iting	Good											
Trophic Class Eutrophic Salinity Specific Conductivity Specific Conductivity 586.9 – 3298.3 µS/cm pH 7.41 – 8.57 pH units Oxidation-Reduction Potential 110.4 to 397.6 mV Dissolved Oxygen Up to 22% of water column < 2.0 mg/L in summer Surface Total Nitrogen Surface Total Phosphorus O.030 mg/L to 0.98 mg/L Nitrogen to Phosphorus Ratio Click to learn more about Beneficial Uses Click to learn more about Beneficial Uses	흐	Chlorophyll-a		11 mg/	/m3										
Salinity Specific Conductivity Specific Con		Trophic State Inc	dex	54					Previous value = 60						
Oxidation-Reduction Potential 110.4 to 397.6 mV Dissolved Oxygen Up to 22% of water column < 2.0 mg/L in summer Surface Total Nitrogen 0.53 mg/L to 0.98 mg/L Surface Total Phosphorus 0.030 mg/L to 0.079 mg/L Nitrogen to Phosphorus Ratio 15:1 Phosphorus limited Click to learn more about Beneficial Uses 1 FL		Trophic Class	Eutrop	hic											
Oxidation-Reduction Potential 110.4 to 397.6 mV Dissolved Oxygen Up to 22% of water column < 2.0 mg/L in summer Surface Total Nitrogen 0.53 mg/L to 0.98 mg/L Surface Total Phosphorus 0.030 mg/L to 0.079 mg/L Nitrogen to Phosphorus Ratio 15:1 Phosphorus limited Click to learn more about Beneficial Uses Click to learn more about Beneficial Uses The Column is a series of the phosphorus limited The Column is a series of the phosphorus limited The Column is a series of the phosphorus limited Surface Total Nitrogen 0.030 mg/L to 0.079 mg/L Nitrogen to Phosphorus Ratio 15:1 Phosphorus limited		Salinity		0.29 –	1.72 ppt										
Oxidation-Reduction Potential 110.4 to 397.6 mV Dissolved Oxygen Up to 22% of water column < 2.0 mg/L in summer Surface Total Nitrogen 0.53 mg/L to 0.98 mg/L Surface Total Phosphorus 0.030 mg/L to 0.079 mg/L Nitrogen to Phosphorus Ratio 15:1 Phosphorus limited Click to learn more about Beneficial Uses Click to learn more about Beneficial Uses The Column is a series of the phosphorus limited The Column is a series of the phosphorus limited The Column is a series of the phosphorus limited Surface Total Nitrogen 0.030 mg/L to 0.079 mg/L Nitrogen to Phosphorus Ratio 15:1 Phosphorus limited	_O	Specific Conduc	tivity	586.9 -	- 3298.3	μS/cm									
Oxidation-Reduction Potential Dissolved Oxygen Up to 22% of water column < 2.0 mg/L in summer Surface Total Nitrogen Surface Total Phosphorus 0.030 mg/L to 0.079 mg/L Nitrogen to Phosphorus Ratio Click to learn more about Beneficial Uses Table 15.1 Phosphorus limited Click to learn more about Beneficial Uses Table 15.1 Phosphorus limited	J.	pН		7.41 –	7.41 – 8.57 pH units										
Surface Total Nitrogen Surface Total Phosphorus O.030 mg/L to 0.079 mg/L Nitrogen to Phosphorus Ratio Click to learn more about Beneficial Uses Ha Paging No.000 mg/L to 0.079 mg/L Phosphorus limited Click to learn more about Beneficial Uses Republication of the property of the	4	Oxidation-Reduc	ction Potential	110.4 t	to 397.6 r	nV									
Surface Total Phosphorus O.030 mg/L to 0.079 mg/L Nitrogen to Phosphorus Ratio Click to learn more about Beneficial Uses Hd. Phosphorus limited Phosphorus limited Surface Total Phosphorus O.030 mg/L to 0.079 mg/L Phosphorus limited Surface Total Phosphorus O.030 mg/L to 0.079 mg/L Phosphorus limited		Dissolved Oxyge	en			ater colun	nn < 2.0 ı	mg/L in							
Click to learn more about Beneficial Uses And Dissolved And Dissolved And Dissolved And Dissolved Beneficial Uses	S	Surface Total Nit	trogen	0.53 m	0.53 mg/L to 0.98 mg/L										
Click to learn more about Beneficial Uses Hd Autogen to Filospholds inflited Click to learn more about Beneficial Uses Autogen to Filospholds inflited	trient	Surface Total Ph	nosphorus	0.030 mg/L to 0.079 mg/L											
	Z	Nitrogen to Phos	sphorus Ratio	15:1					Phosphorus limited						
Fish & Wildlife Propagation S S NEI NEI				Turbidity	Hd	Dissolved Oxygen	Metals	ISI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a	
	Fi	ish & Wildlife Propag	gation	S	S	NEI	NEI								
Aesthetics S *	Αe	esthetics						S	*						
Agriculture S S S	Αç	griculture								S	S	S			
Fish & Wildlife Propagation S S NEI NEI S * Aesthetics S * Agriculture S S S S S Primary Body Contact Recreation NE	Pr	rimary Body Contac	t Recreation										NEI		
Public & Private Water Supply NEI	Pι	ublic & Private Wate	er Supply				NEI								
S = Fully Supporting NS = Not Supporting NEI = Not Enough Information *Standards revision, true color is for permitting purposes only		NS = Not Supporting	formation Solution	*Standa	ards revisio	on, true col	or is for pe	ermitting p	ourposes o	nly					

 μ S/cm = microsiemens/cm

Texoma Upper Red River Arm (12-13)

Sample Period	l	Times Visited	Sampling Sites
December 2015 - Sep	ot. 2016	4	13
Lasatian	Davis Cour		

	Location	Bryan County								
5	Impoundment	1944								
	Area	88,000 acres								
	Capacity	2,643,000 acre-feet								
	Purposes		trol, Waters Supply, Hydropower, Regulation, and Recreation							
	Dovernator (Dec	awindia na l	Daguit							



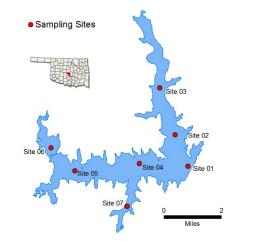
	Pur	rposes		oud Control, Waters Supply, Hydropower, ow-flow Regulation, and Recreation											
		Parameter (Des	scriptions)	Result					Notes/0	Commen	ıts				
		Average Turbidit	ty	46 NTL	J				50% of	values >	owqs	of 25 NTL	J		
		Average Secchi	Disk Depth	27 cm											
	In-Situ	Water Clarity Ra	ating	Fair to	Poor										
	흐	Chlorophyll-a		13.6 m	g/m3										
		Trophic State Inc	dex	56					Previous value = 69						
SIS		Trophic Class		Eutroph	nic										
Parameters		Salinity		0.43 -	1.84 ppt										
arar	Φ	Specific Conduc	tivity	872.2 –	- 3534.3	uS/cm									
<u>a</u>	Profile	pН		7.79 – 8	8.50 pH ι	units									
		Oxidation-Reduc	ction Potential	276.9tc	374.2 m	ıV									
		Dissolved Oxyge		All valu	es above	screeni	ng level of	f 2 mg/L							
	ts	Surface Total Ni	trogen	0.0.66	mg/L to 1	.79 mg/L									
	Nutrients	Surface Total Ph	nosphorus	0.040 n	ng/L to 0.	.167 mg/L	-								
	ž	Nitrogen to Phos	sphorus Ratio	11:1					Phosphorus limited						
		Click to learn m		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a	
ses	Fish	h & Wildlife Propa	gation	NS	S	S	NEI								
a C	Aes	sthetics						S*	*						
¥ici	Agr	riculture								S	S	S			
Beneficial Uses	Prir	mary Body Contac	t Recreation										NEI		
ш	Pub	olic & Private Wate	er Supply				NEI								
	٨	S = Fully Supporting NS = Not Supporting NEI = Not Enough Intellement	formation sep	*Standa	rds revisio	n, true col	or is for pe	ermitting p	ourposes o	nly					

NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$ E. coli = Escherichia coli OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a $mg/L = milligrams per liter \mu S/cm = microsiemens/cm$

Thunderbird

Sample Period	d	Times Visited	Sampling Sites
October 2014 – July	2015	4	7
Location	Cleveland (

	Location	Cleveland County
5	Impoundment	1965
ם ט	Area	6,070 acres
5	Capacity	119,600 acre-feet
	Purposes	Flood Control, Water Supply, Recreation, Fish & Wildlife



	Wildlife															
		Parameter (<u>Descriptions</u>)	Res	ılt				Notes/0	Commer	nts						
		Average Turbidity	14 N	TU				4% of v	alues >	OWQS (of 25 NTU					
		Average Secchi Disk Depth	59 c	n												
	iţ	Water Clarity Rating	Aver	age												
	In Situ	Chlorophyll-a	21 m	g/m3												
		Trophic State Index	61					Previou	s value =	= 56						
S		Trophic Class	Нуре	reutrophic												
Parameters		Salinity	0.13	– 0.26 ppt												
ıran	o.	Specific Conductivity	281.	5 – 530 µS	/cm											
<u> </u>	Profile	рН	7.14	– 8.68 pH	units			Neutral to slightly alkaline								
	₫.	Oxidation-Reduction Potential	90.2	to 454 mV												
		Dissolved Oxygen	Up to July	67% of w	ater colum	nn < 2 m	g/L in	Occurr	ed at site	es 1, the	dam					
	ts	Surface Total Nitrogen 0.80 mg/L to 1.27 mg/L														
	Nutrients	Surface Total Phosphorus	0.01	3 mg/L to 0).064 mg/L	-										
	Z	Nitrogen to Phosphorus Ratio	23:1	23:1					orus limi	ted						
		Click to learn more about Beneficial Uses□	Turbidity	Hd	Dissolved Oxygen	Metals	ISI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a			
ses	Fish	h & Wildlife Propagation	NS	S	NS	S										
SO I	Aes	sthetics					NEI*	S								
Beneficial Uses	Agr	iculture							S	S	S					
ene	Prir	mary Body Contact Recreation										S				
m	Pub	olic & Private Water Supply											NS			
		S = Fully Supporting IS = Not Supporting		lake is listed). This listing												

study can confirm the Aesthetics beneficial use non-support status.

NTU = nephelometric turbidity units μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

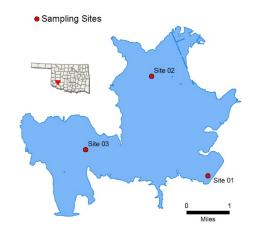
NEI = Not Enough Information

OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a $mg/L = milligrams per liter \mu S/cm = microsiemens/cm$

Tom Steed

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

	Location	Kiowa County								
3	Impoundment	1975								
	Area	6,400 acres								
Ś	Capacity	88,970 acre-feet								
	Purposes	Flood Control, Water Supply, Recreation, Fish & Wildlife								



	Wildlife													
	Parameter (<u>Descriptions</u>) Result								Notes/0	Commen	ıts			
		Average Turbidity		35 NTL	J				67% of	values >	owqs	of 25 NT	J	
		Average Secchi Disk Dep	th	27 cm										
	Situ	Water Clarity Rating		poor										
	므	Chlorophyll-a		10 mg/i	m3									
		Trophic State Index		53	53					s value =	= 58			
ည		Trophic Class	Eutroph	nic										
Parameters		Salinity		0.22 - 0	0.64 ppt									
aran	o)	Specific Conductivity		456.4 -	· 1281 µS	S/cm								
9,	Profile	pH		7.62 – 8	3.53 pH	units								
	₫	Oxidation-Reduction Pote	ntial	299 to	449 mV									
		Dissolved Oxygen							All data level of		sample y	ear belov	v the scre	ening
	ts	Surface Total Nitrogen		0.79 mg	g/L to 1.3	35 mg/L								
	Nutrients	Surface Total Phosphorus	3	0.070 n	ng/L to 0	.202 mg/L	-							
	Ž	Nitrogen to Phosphorus R	atio	8:1					Phosph	orus limi	ted			
		Click to learn more abou Beneficial Uses□	<u>t</u>	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
ses	Fish	h & Wildlife Propagation		NS	S	S	S							
Beneficial Uses	Aes	sthetics						NEI	*					
ficia	Agr	riculture								S	S	S		
eue	Prir	mary Body Contact Recreat	ion										S	
a	Pub	olic & Private Water Supply												NS
	٨	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	Notes	*Standa	rds revisio	on, true col	or is for pe	ermitting p	ourposes o	nly				

NTU = nephelometric turbidity units μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a $mg/L = milligrams per liter \mu S/cm = microsiemens/cm$

Vanderwork

Sample Period	Times Visited	Sampling Sites
October 2007 – July 2008	4	5

October 2007 – July		2000	7	3			
	Location	Washita Co	ounty				
5	Impoundment	1968					
	Area	135 acres					
5	Capacity	1,578 acre-					
	Purposes	Recreation					



	Pui	poses	Recreation							Miles						
		Parameter (Des	scriptions)		Result					Notes/0	Commen	nts				
		Average Turbidit	ty		9 nephe	elometric	turbidity	units (NT	Ū)	All value	es < 25 N	NTU				
		Average True Co	olor		17 units	3				All value	es < OW	QS of 70)			
		Average Secchi	Disk Depth		59 cm											
		Water Clarity Ra	iting		good											
		Trophic State Inc	dex		64					Previous value = 60						
S		Trophic Class			hypere	utrophic										
Parameters		Salinity			0.83 - 1.01 ppt											
aran	Specific Conductivity				1568 – 1896 μS/cm											
<u> </u>	rofij	pH Oxidation Reduction Retartial			7.2 – 8.18 pH units				Neutral to slightly alkaline							
	₫.	Oxidation-Reduc	ction Potentia	l		-116 to 530 mV										
		Dissolved Oxyge	en		Up to 5	Jp to 50% of water column < 2 mg/L in une					d at site	1				
	ts	Surface Total Ni	trogen		0.87 mg	0.87 mg/L to 1.75 mg/L										
	Nutrients	Surface Total Ph	nosphorus		0.041 mg/L to 0.100 mg/L											
	ž	Nitrogen to Phos	sphorus Ratio		18:1				Phosphorus limited							
		Click to learn m Beneficial Uses	nore about		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fish	h & Wildlife Propa	gation		S	S	NEI	S								
Beneficial Uses	Aes	sthetics							NEI	*						
fici	Agr	riculture									S	S	S			
ene	Prir	mary Body Contac	t Recreation											S		
m	Pub	olic & Private Wate	er Supply													
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information The lake is listed as a Nutrie (WQS). This listing means to study can confirm the Aesth				at the lak	e is consi	dered three	atened fro								

NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$ E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a $mg/L = milligrams per liter \mu S/cm = microsiemens/cm$

Vincent

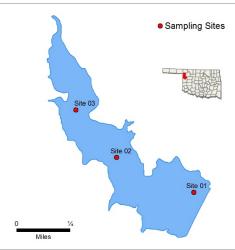
NTU = *nephelometric turbidity units*

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

	Sample Period	d	Visited	Sampling Sites					
	November 2010 – July	y 2011	4	5					
	Location	Ellis County	у						
5	Impoundment	1961							
	Area	160 acres							
5	Capacity	2,579 acre feet							
	Purposes	Recreation							

Times



ppt = parts per thousand En = Enterococci

			-											
		Parameter (<u>Descriptions</u>)	ı	Result					Notes/0	Commen	nts			
		Average Turbidity		14 NTU	I				100% o	f Values	< OWQ	S of 25 NT	Ū	
		Average Secchi Disk Depth	(63 cm										
	itu	Water Clarity Rating	(Good										
	In-Situ	Chlorophyll-a	1	8 mg/m	3									
		Trophic State Index		51					Previous value = 46					
S.		Trophic Class	ı	Eutroph	nic									
Parameters		Salinity		0.43 – (0.48 ppt									
aran	Φ	Specific Conductivity	1	833.1 -	928 µS/c	cm								
٣	Profile	pН		7.14 – 8	3.19 pH	units			Neutral to slightly alkaline					
	Ē	Oxidation-Reduction Potential	١.	-50 to 490 mV										
		Dissolved Oxygen	Ī	Up to 4	5 % < 2 r	mg/L in s	ummer							
	Si	Surface Total Nitrogen		0.27 mg	g/L to 0.5	55 mg/L								
	Nutrients	Surface Total Phosphorus	(0.015 mg/L to 0.028 mg/L										
	Ž	Nitrogen to Phosphorus Ratio	2	21:1					Phosphorus limited					
		Click to learn more about Beneficial Uses□		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
ses	Fish	h & Wildlife Propagation		S	S	NEI	S							
<u> </u>	Aes	sthetics						S	*					
ficia	Agr	riculture								S	S	S		
Beneficial Uses	Prin	mary Body Contact Recreation											S	
m	Pub	olic & Private Water Supply												
	Λ	S = Fully Supporting US = Not Supporting UE = Not Enough Information	,	*Standaı	rds revisio	on, true col	or is for pe	ermitting p	ourposes o	nly.				

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

OWQS = Oklahoma Water Quality Standards

mV = millivolts

Dave Boyer (Walters)

Purposes

NS = *Not Supporting*

NTU = *nephelometric turbidity units*

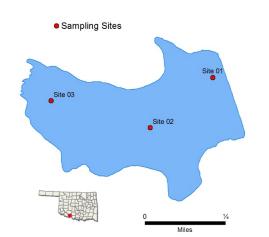
E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

NEI = Not Enough Information

	Sample Period	d	Visited	Sampling Sites				
De	cember 2016 – Septer	nber 2017	4	5				
	Location	Cotton Cou	nty					
<u>ख</u>	Impoundment	1936						
Genera	Area	148 acres						
ဗိ	Capacity	861 acre feet						

Water Supply, and Recreation



	Taipedee Water Eupp		ρ.,,	, and reordation				65							
		Parameter (Des	Result					Notes/	Commer	nts					
		Average Turbidi	ity		69 NTL	J				100% c	f values	> 25 NT	U		
		Average Secchi	Disk Depth		19 cm										
		Water Clarity Ra	ating		poor										
		Chlorophyll			10.42 n	ng/L									
		Trophic State In	ıdex		54					Previou	s value =	= 51			
S		Trophic Class			eutroph	nic									
Parameters		Salinity			0.14 – 0	0.15 ppt									
aran	Specific Conductivity				286.6 – 312.8 μS/cm										
<u> </u>	Profile	рН			7.62 – 8.2 pH units				Neutral to slightly alkaline						
	Ē	Oxidation-Redu	ction Potentia	ı	213.1 –	- 453.5 m	١V								
		Dissolved Oxyg	en						All valu	es > 2 m	g/L				
	Si	Surface Total N	itrogen		0.88 mg	g/L to 1.1	8 mg/L								
	Nutrients	Surface Total P		0.109 mg/L to 0.158 mg/L											
	Ž	Nitrogen to Pho	sphorus Ratio)	8:1				Phosphorus limited						
		Click to learn n Beneficial Uses			Turbidity	Hď	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a
ses	Fish	h & Wildlife Propa	gation		NS	S	S	S							
Š	Aes	sthetics							S	*					
icia	Agr	ciculture									S	S	S		
Beneficial Uses	Prir	mary Body Contac	ct Recreation											S	
m	Pub	olic & Private Wat	er Supply												NS
	S = Fully Supporting		es												

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

OWQS = Oklahoma Water Quality Standards

mV = millivolts

Chlor-a = Chlorophyll-a

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

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

Waurika

NEI = Not Enough Information

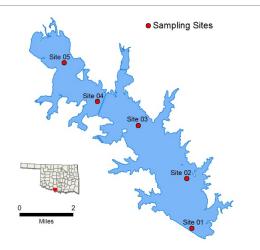
NTU = *nephelometric turbidity units*

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

	Sample Period	d	Times Visited	Sampling Sites
De	ecember 2014 – Aug	ust 2015	4	5
	Location	Jefferson C	county	

	Location	Jefferson County
5 <u> </u>	Impoundment	1977
D	Area	10,100 acres
	Capacity	203,100 acre feet
	Purposes	Flood Control, Irrigation, Water Supply, Water Quality Control, Fish and Wildlife, and



Quality Control, Fish and Wholine, and														
		Parameter (<u>Descriptions</u>)	Result					Notes/0	Commer	nts				
		Average Turbidity	20 NTL	J				25% of	values >	25 NTU				
		Average Secchi Disk Depth	53 cm											
	itu	Water Clarity Rating	Fair											
	In Situ	Chlorophyll-a	15 mg/ı	m3										
		Trophic State Index	57					Previous value = 61						
ည		Trophic Class	Eutroph	Eutrophic										
Parameters		Salinity	0.16 – 0	0.40 ppt										
aran	ø)	Specific Conductivity	329.7 –	· 821 μS/	cm									
<u> </u>	Profile	pH	6.85 – 8	6.85 – 8.45 pH units										
	₫	Oxidation-Reduction Potential	75.3 to	75.3 to 518 mV										
		Dissolved Oxygen	Up to 4 June	Jp to 43% of water column < 2.0 mg/L in June										
	ts	Surface Total Nitrogen	0.61 mg	0.61 mg/L to 1.24 mg/L										
	Nutrients	Surface Total Phosphorus	0.106 n	0.106 mg/L to 0.351 mg/L										
	Ž	Nitrogen to Phosphorus Ratio	5:1	5:1					Phosphorus limited					
		Click to learn more about Beneficial Uses□	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fish	n & Wildlife Propagation	NS	S	S	S								
Beneficial Uses	Aes	ethetics					*	S						
fici	Agr	iculture							S	S	S			
eue	Prin	mary Body Contact Recreation										NEI		
m	Pub	olic & Private Water Supply											NS	
	Ν	S = Fully Supporting IS = Not Supporting IS = Not Enough Information	*Standards revision, true color is for permitting purposes only.											

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

mV = millivolts

Waxhoma

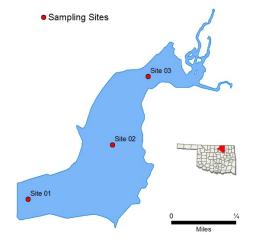
Area

Capacity

	Sample Period	d	Visited	Sampling Sites				
No	ovember 2018 – Aug	ust 2019	4	3				
	Location	Osage Cou	age County					
<u>la</u>	Impoundment	1955						

197 acres

2,100 acre-feet



	Pur	poses	Water Suppl	, Recre	ation							0	1/4 Miles		
		Parameter (Des	scriptions)	Resu	lt				Notes/0	Commer	nts				
		Average Turbidit	ty	12 N	ΓU				25% of	values >	OWQS	of 25 NTL	J (n=12)		
		Average Secchi	Disk Depth	111.6	6 cm										
	it	Water Clarity Ra	ating	Exce	llent										
	In Situ	Cholorophyll-a		8.95	mg/m3										
		Trophic State Inc	dex	52					Previou	s Value	= 49				
ည		Trophic Class		Eutro	Eutrophic										
Parameters		Salinity Specific Conductivity			0.03 – 0.06 ppt										
ıram	a	Specific Conductivity			60.3 – 136.5 μS/cm										
Pa	Profile	pH Oxidation-Reduction Potential			6.57 – 8.06 pH units					Neutral to slightly alkaline					
	_₽	Oxidation-Reduc	ction Potential	139.2	2 – 483.7 n	ıV									
		Dissolved Oxyge	en		Up to 69% of water column < 2 mg/L in August										
	ts	Surface Total Ni	trogen	0.49	mg/L to 0	.78 mg/L									
	Nutrients	Surface Total Ph	nosphorus	0.017	0.017 mg/L to 0.061 mg/L										
	Z	Nitrogen to Phos	sphorus Ratio	21:1	21:1				Phosphorus limited						
		Click to learn m Beneficial Uses	nore about	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fisl	h & Wildlife Propa	gation	S	S	NEI	S								
<u></u>	Aes	sthetics						S	*						
fici	Agr	riculture								S	S	S			
Beneficial Uses	Prir	mary Body Contac	t Recreation										S		
Ω	Puk	olic & Private Wate	er Supply												
	٨	S = Fully Supporting JS = Not Supporting JEI = Not Enough Intel JEI = Not E	formation	*Stan	dards revisio	on, true col	or is for pe	ermitting p	ourposes o	nly.					

NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$ E. coli = Escherichia coli

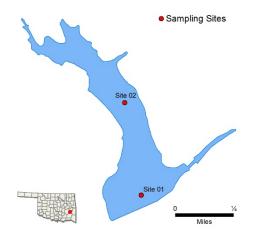
OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a $mg/L = milligrams per liter \mu S/cm = microsiemens/cm$

Wayne Wallace

Purposes

	Sample Period	d	Visited	Sampling Sites				
1	November 2016 – Augu	ıst 2017	4	5				
	Location	Latimer Co	unty					
<u>ख</u>	Impoundment	1969						
General	Area	94 acres						
စ္	Capacity	1,746 acre feet						

Flood Control and Recreation



	i ui	poses	Flood Conti	01 6	and Nech	callon										
		Parameter (Des	scriptions)		Result					Notes/0	Commer	nts				
		Average Turbidi	ty		6 NTU					100% d	f values	< OWQS	of 25 NT	U (n=6)		
		Average Secchi	Disk Depth		90 cm											
		Water Clarity Ra	ating		Good											
		Chlorophyll-a			13.75 n	ng/m3										
		Trophic State In	dex		56					Previou	s value =	= 63				
ည		Trophic Class			Eutroph	nic										
Parameters		Salinity			0.02 – 0	0.04 ppt										
aran	ø.	Specific Conduc	tivity		53.1 – 8	33.1 µS/c	m									
<u> </u>	Profile	рН			5.94 – 7	7.61 pH ເ	units			9.8% of	recorde	d values	are < 6.5	pH units		
		Oxidation-Reduc	ction Potentia	I	231.9 –	573.3 m	V									
		Dissolved Oxyge	en		Up to 4 August		iter colum	nn < 2 mg	g/L in							
	ts	Surface Total Ni	itrogen		0.38 mg	g/L to 0.6	4 mg/L									
	Nutrients	Surface Total Ph	nosphorus		0.017 m	ng/L to 0.	031 mg/L	-								
	Ž	Nitrogen to Phos)	20:1					Phosphorus limited							
		Click to learn m Beneficial Uses			Turbidity	된	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses		n & Wildlife Propa	gation		S	NS	NS	S								
<u></u>		sthetics							S	*						
fici	Agr	iculture									S	S	S			
Beneficial Uses	Prin	mary Body Contac	t Recreation											S		
a	Pub	olic & Private Wate	er Supply													
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough In		Notes	soluble therefore	bedrock. E e the Wate	Due to thes er Board is	e conditio looking a	ns it is like t the appli	rt of the sta ely that the cability of d evision, tru	low pH v	alues may g site-spec	be due to	natural ca for water	auses;	

NTU = nephelometric turbidity units μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a $mg/L = milligrams per liter \mu S/cm = microsiemens/cm$

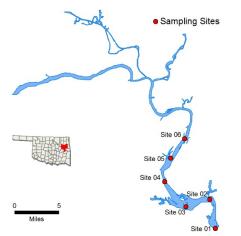
Webbers Falls

NTU = nephelometric turbidity units

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

	Sample Period		Times Visited	Sampling Sites				
	February 2019		1**	6				
	Location	Muskogee	County	Click map for site data				
של ה	Impoundment	1965						
	Area	11,600 acres						
,	Capacity	170,100 acre-feet						
	Purposes	Navigation,	Hydropowei					



	Pur	poses Navigation, H	yaropowe	r								Site 01		
		Parameter (<u>Descriptions</u>)	Result					Notes/	Commer	nts				
		Average Turbidity	16 NTU	J				0% of v	alues > 0	OWQS of	f 25 NTU			
		Average Secchi Disk Depth	56.2 cm	n										
	In-Situ	Water Clarity Rating	Poor											
	흐	Chlorophyll-a	21.22 r	ng/m3										
		Trophic State Index	61					Previou	ıs value =	= 52				
ည		Trophic Class	Hypere	utrophic										
Parameters		Salinity	0.26 -	0.49 ppt										
ıran	o)	Specific Conductivity	528.1 -	- 997.3 μ	S/cm									
<u> </u>	Profile	рН	8.07 –	8.20 pH ւ	ınits									
	₫	Oxidation-Reduction Potential	395.5 -	- 409.0 m	V									
		Dissolved Oxygen	All data mg/L	are abov	ve screer	ning level	of 2.0							
	ts	Surface Total Nitrogen	1.25 m	g/L to 1.4	8 mg/L									
	Nutrients	Surface Total Phosphorus	0.144 mg/L to 0.154 mg/L											
	ž	Nitrogen to Phosphorus Ratio	10:1					Possibly co-limited						
		Click to learn more about Beneficial Uses□	Turbidity	Hd.	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a	
Beneficial Uses	Fish	h & Wildlife Propagation	NS	S	S	S								
a U	Aes	sthetics					S	*						
fici	Agr	iculture							S	S	S			
ene	Prin	mary Body Contact Recreation										NS		
ш	Pub	olic & Private Water Supply												
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	*Standa **Only o	rds revisio ne visit in	n, true col SY19 due	or is for pe to extrem	ermitting p e flooding	ourposes o	nly.					

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

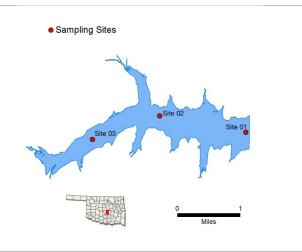
OWQS = Oklahoma Water Quality Standards

mV = millivolts

Wes Watkins

Sample Period	Times Visited	Sampling Sites
November 2018 – September 2019	3	3

_		
	Location	Pottawatomie County
5	Impoundment	1997
	Area	1,142 acres
	Capacity	14,065 acre-feet
	Purposes	Water Supply, Recreation, Flood Control



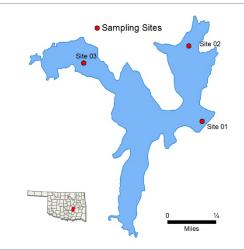
		Parameter (<u>Descriptions</u>)		Result					Notes/0	Commer	nts						
		Average Turbidity		101 NT	U				50% of	values >	OWQS	of 25 NTL	J				
		Average Secchi Disk Depth		40.4 cm	า												
	itu	Water Clarity Rating		Fair													
	In-Situ	Chlorophyll-a		16.46 n	ng/m3												
		Trophic State Index		58					Previou	s Value=	= 62						
က်		Trophic Class		Eutroph	nic												
Parameters		Salinity		0.06 – 0	0.14 ppt												
ıran	o)	Specific Conductivity		134.1 –	- 295.1 μ	S/cm											
<u> </u>	Profile	pH		6.82 – 8	3.55 pH u	units			Neutral	to slight	lue= 62 Solida						
	<u>~</u>	Oxidation-Reduction Potential		101.3 –	484.1 m	١V											
		Dissolved Oxygen		Up to 4 Septem		ater colun	nn < 2 mg	g/L in									
	ts	Surface Total Nitrogen	0.675 m	ng/L to 1.	.79 mg/L												
	Nutrients	Surface Total Phosphorus		0.031 m	ng/L to 0.	.216 mg/l	_				imited						
	N	Nitrogen to Phosphorus Ratio	16:1						Phosph	orus limi	ted						
		Click to learn more about Beneficial Uses□		Turbidity	H _d	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a			
ses	Fish	h & Wildlife Propagation		S	S	NEI	S										
	Aes	sthetics						S	*								
ficia	Agr	riculture								S	S	S					
Beneficial Uses	Prin	mary Body Contact Recreation											S				
m	Pub	olic & Private Water Supply															
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information			*Standa	rds revisio	on, true col	or is for pe	ermitting p	ourposes o	nly.							

NTU = nephelometric turbidity units $\mu S/cm = microsiemens per centimeter$ E. coli = Escherichia coli OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a $mg/L = milligrams per liter \mu S/cm = microsiemens/cm$

Wetumka

Sample Period	Times Visited	Sampling Sites
November 2018 – September 2019	4	3

٠.	Combon 2010 Copie	1 0
	Location	Hughes County
5	Impoundment	1939
	Area	169 acres
)	Capacity	1,839 acre-feet
	Purposes	Water Supply, Recreation



		Parameter (<u>Descriptions</u>)	Result					Notes/0	Commer	nts						
		Average Turbidity	16 NT	J				25% of	values >	OWQS	of 25 NTL	J				
		Average Secchi Disk Depth	64.2 cr	n												
	itu	Water Clarity Rating	Fair													
	In-Situ	Chlorophyll-a	12.31 ו	mg/m3												
		Trophic State Index	55					Previou	s Value=	= 53						
ဖ		Trophic Class	Eutrop	hic												
Parameters		Salinity	0.05 -	0.13 ppt												
ıran	a.	Specific Conductivity	101.4 -	– 283.2 µ	S/cm											
Pa	Profile	рН	6.64 –	7.82 pH ι	units			Neutral	al to slightly alkaline							
	ፈ	Oxidation-Reduction Potential	48.0 –	473.0 mV	/											
		Dissolved Oxygen	Up to 5	52% of wa nber	ater colum	nn < 2 m	g/L in									
	ts	Surface Total Nitrogen	0.525 ו	mg/L to 0.	.895 mg/L	-										
	Nutrients	Surface Total Phosphorus	0.025 ו	mg/L to 0.	.062 mg/L	-					3					
	Z	Nitrogen to Phosphorus Ratio	20:1	20:1					orus limi	ted						
		Click to learn more about Beneficial Uses□	Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a			
ses	Fish	n & Wildlife Propagation	S	S	NEI	S										
	Aes	ethetics					S	*								
ficia	Agr	iculture							S	S	S					
Beneficial Uses	Prin	mary Body Contact Recreation										NS				
m	Pub	olic & Private Water Supply														
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	*Standards revision, true color is for permitting purposes only.													

NTU = nephelometric turbidity units µS/cm = microsiemens per centimeter E. coli = Escherichia coli

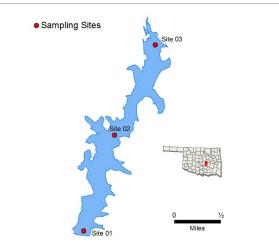
OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a mg/L = milligrams per liter μS/cm = microsiemens/cm

Wewoka Times **Sample Period** Sampling Sites Visited October 2014 - July 2015 4 5 Location Seminole County Impoundment 1925 General Area 371 acres Capacity 3,301 acre-feet

NTU = *nephelometric turbidity units*

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter



	Pur	poses	Water Sup	ply.	Recreat	ion				Site 01 Miles						
		Parameter (Des	criptions)		Result					Notes/0	Commer	nts				
		Average Turbidit	ty		18 NTL	J				17% of	values >	25 NTU				
		Average Secchi	Disk Depth		41 cm											
		Water Clarity Ra	iting		Fair											
		Chlorophyll-a			12 mg/ı	m3										
		Trophic State Inc	dex		55					Previou	s value =	= 55				
હ		Trophic Class			Eutroph	nic										
Parameters		Salinity			0.04 – 0	0.11 ppt										
ıran	a)	Specific Conduc	tivity		95.9 – 2	225.1 µS	S/cm									
<u> </u>	Profile	pН			6.64 –	7.91 pH	units									
	Ē	Oxidation-Reduc	ction Potentia	al	123.8 -	505 mV										
		Dissolved Oxyge	en		Up to 3 July	8% of wa	ater colum	n < 2.0 r	ng/L in							
	ts	Surface Total Ni	trogen		0.67 mg	g/L to 0.9	3 mg/L									
	Nutrients	Surface Total Ph	nosphorus		0.018 n	ng/L to 0	.079 mg/L	-								
	Ž	Nitrogen to Phos)	19:1					Phosphorus limited							
		Click to learn m	nore about		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a	
Beneficial Uses	Fish	h & Wildlife Propa	gation		NS	S	S	S								
	Aes	sthetics							S	*						
ficia	Agr	iculture									S	S	S			
ene	Prin	Primary Body Contact Recreation												S		
Ď	Pub	Public & Private Water Supply													NS	
	Λ	S = Fully Supporting IS = Not Supporting IEI = Not Enough Int	formation	Notes	*Standa	rds revisio	on, true col	or is for pe	ermitting p	ing purposes only.						

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

mV = millivolts

Wiley Post Memorial (Maysville)

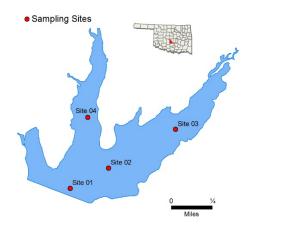
	Sample Period	t	Times Visited	Sampling Sites				
	October 2012 – Augus	st 2013	4	4				
al	Location	McClain County						
	Impoundment	1971						
General	Area	302 acres						
Ge	Capacity	2,086 acre feet						
	Purposes	Water Supp	ply, Flood Control, and Recreation					

 μ S/cm = microsiemens per centimeter

E. coli = Escherichia coli

mV = millivolts

Chlor-a = Chlorophyll-a



		urposes	water Suppry,															
		Parameter (Des	scriptions)	Result					Notes/0	Commen	ıts							
		Average Turbidi	ty	36 NTU	l				54% of	values >	25 NTU							
		Average Secchi	Disk Depth	27 cm														
	뎙	Water Clarity Ra	ating	Poor														
	In Situ	Chlorophyll-a		17 mg/i	m3													
		Trophic State In	dex	58					Previous value = 51									
ဟ		Trophic Class		Eutrophic														
Parameters		Salinity		0.16 – (.16 – 0.26 ppt													
am		Specific Conduc	ctivity		33 µS/cr	n												
Par	Profile	рН	,		3.58 pH (Neutral	to slightl	v alkalin	e.						
	F	Oxidation-Redu	ction Potential	86 to 32	•				Neutral to slightly alkaline									
		Dissolved Oxygo				ater colum	nn < 2 mg	g/L in	Occurre	ed at site	1							
	Н	Dissolved Oxygi		August					Occurre	u ai sile	4							
	ıts	Surface Total N	itrogen	0.85 mg	g/L to 1.6	2 mg/L												
	Nutrients	Surface Total Pl	hosphorus	0.074 n	ng/L to 0.	.176 mg/L	-											
	Z	Nitrogen to Pho	sphorus Ratio	12:1 Phosphorus limited														
		Click to learn n Beneficial Uses	nore about	Turbidity	된	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a				
ses	Fis	sh & Wildlife Propa	gation	NS	S	NEI	S											
Š	Ae	esthetics						S	*									
icia	Ag	griculture								S	S	S						
Beneficial Uses	Pri	rimary Body Contac	ct Recreation										S					
m	Pu	ublic & Private Wate	er Supply															
		S = Fully Supporting NS = Not Supporting NEI = Not Enough In		*Standa	rds revisio	n, true col	or is for pe	ermitting	ourposes or	nly								

 μ S/cm = microsiemens/cm

Wister

Sample Period

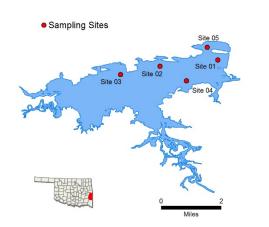
NTU = *nephelometric turbidity units*

μS/cm = microsiemens per centimeter E. coli = Escherichia coli

	Sample Period		Visited	Sampling Sites					
	November 2015 – Sep	t. 2016	4	5					
	Location	LeFlore Co	unty						
פופופו	Impoundment	1949							
	Area	7,333 acres							
	Capacity	62,360 acre feet							
	Durnoses	Flood Cont	ol, Water Supply, Low flow						

Times

Sampling Sites



	Pur	poses	nd Conservation												
	Parameter (<u>Descriptions</u>)			Result					Notes/Comments						
		Average Turbidit	22 NTU					30% of values < OWQS 25 NTU							
		Average Secchi	Disk Depth	44 cm											
	In-Situ	Water Clarity Ra	nting	Fair											
	9-u	Chlorophyll-a		24 mg/ı	m3										
		Trophic State Inc	dex	62					Previous value =60						
Sic		Trophic Class		Hypere	utrophic										
Parameters		Salinity	0.03 - 0	0.04 ppt											
arar	Profile	Specific Conduc	75.7 – 8	87 μS/cn	n										
<u>a</u>		рН	6.45 – 7	7.49 pH ւ	units			2 % of Values < 6.5 pH units							
	<u>Ф</u>	Oxidation-Reduc	23 to 332.2 mV												
		Dissolved Oxygen		All rea					All read	adings above 2 mg/L					
	Nutrients	Surface Total Ni	trogen	0.54 mg/L to 0.66 mg/L											
		Surface Total Ph	nosphorus	0.037 n	ng/L to 0.	062 mg/L	-								
		Nitrogen to Phos	sphorus Ratio	12:1					Phosphorus limited						
		Click to learn m Beneficial Uses		Turbidity	돐	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	En & E. coli	Chlor-a	
ses	Fish & Wildlife Propagation			NS	NS	NEI	S								
ت ت	Aesthetics							NEI*	*						
ficia	Agriculture									S	S	S			
Beneficial Uses	Primary Body Contact Recreation												S		
	Public & Private Water Supply													NS	
	Ν	S = Fully Supporting IS = Not Supporting IEI = Not Enough Inf	formation set of	*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.											

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

OWQS = Oklahoma Water Quality Standards

mV = millivolts

W.R. Holway

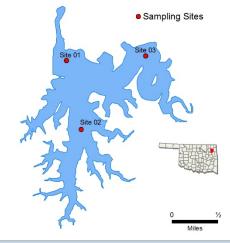
Capacity

Purposes

	Sample Period	d	Times Visited	Sampling Sites				
No	ovember 2015 – Aug	ust 2016	4	5				
	Location	Mayes Cou	ounty					
eral	Impoundment	1968						
Jer	Area	712 acres						

48,000 acre-feet

Water Supply, Hydropower, Recreation



	Trailor Supply, Try all operation, Tree leading													WIIICS		
		Parameter (<u>Descriptions</u>)			Result					Notes/0	tes/Comments					
		Average Turbidity			2 NTU					100% of Values < OWQS of 25						
		Average Secchi Disk Depth			147 cm											
	it	Water Clarity Rating			Excelle	nt										
	In-Situ	Chlorophyll-a			18.9 mg	g/m3										
		Trophic State In	dex		59					Previous Value= 56						
ပ်		Trophic Class			Eutrophic											
Parameters		Salinity			0.09 – 0	0.22 ppt										
ıran	4	Specific Conductivity			201.8 –	451.2 μ	S/cm									
<u> </u>	Profile	рН			6.66 – 9	9.00 pH u	units									
	<u> </u>	Oxidation-Reduction Potential			128.5 to	514 mV	1									
		Dissolved Oxyge		Up to 48 summe		iter colum	nn < 2 mg	g/L in								
	Nutrients	Surface Total Ni	itrogen	0.41 mg/L to 0.59mg/L												
		Surface Total Ph	hosphorus		0.042 mg/L to 0.067 mg/L											
		Nitrogen to Phos	sphorus Ratio)	9:1					Phosphorus limited						
		Click to learn m	nore about		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates	Chlorides	Total Dissolved Solids	Enterro. & E. coli	Chlor-a	
ses	Fish & Wildlife Propagation				S	S	NS	S								
<u></u>	Aesthetics								S	*						
ficia	Agriculture										S	S	S			
Beneficial Uses	Primary Body Contact Recreation												S			
	Public & Private Water Supply															
	٨	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information				*Standards revision, true color is for permitting purposes only										

NTU = nephelometric turbidity units μ S/cm = microsiemens per centimeter E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivolts Chlor-a = Chlorophyll-a $mg/L = milligrams per liter \mu S/cm = microsiemens/cm$

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APPENDIX A

Oklahoma's Use Support Assessment Protocols

Amendments effective as of 07/01/2013

TITLE 785. OKLAHOMA WATER RESOURCES BOARD

CHAPTER 46. IMPLEMENTATION OF OKLAHOMA'S WATER QUALITY STANDARDS

SUBCHAPTER 15. USE SUPPORT ASSESSMENT PROTOCOLS

http://www.owrb.ok.gov/util/rules/pdf_rul/current/Ch46.pdf#page=18