2007-2008 Oklahoma Lakes Report

Beneficial Use Monitoring Program

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EXECUTIVE SUMMARY

Beneficial Use Monitoring Program Goal:

The goal of the Beneficial Use Monitoring Program is to document beneficial use impairments, identify impairment sources (if possible), detect water quality trends, provide needed information for the WQS, and facilitate the prioritization of pollution control activities.

The Beneficial Use Monitoring Program exists as a result of the vital economic and social importance of Oklahoma's lakes, streams, wetlands, and aquifers and the associated need for their 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 Oklahoma Water Resources Board with input and concurrence of Oklahoma's other environmental agencies. Specifically, USAPs establish a consistent method to determine if beneficial uses assigned for individual waters through Oklahoma Water Quality Standards (WQS) are being supported. The legitimacy of data analyzed following protocols other than those outlined in the USAP (or the Oklahoma Continuing Planning Process (CPP) document where the USAP is silent) for use support determination is not appropriate. If the BUMP report indicates that a designated beneficial use is impaired, threatened, or otherwise compromised, measures must be taken to mitigate or restore the water quality.

The Oklahoma Water Resources Board (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 303(d) list. Issues regarding stream/lake segmenting additional data from non-BUMP sources and unique non-representative conditions all affect the impairment decision-making process

Traditionally, the State of Oklahoma has utilized numerous water monitoring programs conducted by individual state and federal agencies. In general, each environmental agency designs and implements its own program with only limited participation from with other state, municipal, or federal entities. These programs collect information for a specific purpose or project (e.g., development of Total Maximum Daily Loads, WQS process, lake trophic status determination, water quality impact assessments from non-point and point source pollution, stream flow measurement, assessment of best management practices, etc.). Therefore, the information is specific to each project's data quality objectives (DQOs) and is often limited to a very small geographic area.

To synchronize Oklahoma's monitoring efforts related to water quality, the State Legislature appropriated funds in 1998 to create the Beneficial Use Monitoring Program under the direction of the Oklahoma Water Resources Board, who promulgates the WQS and WQS Implementation Rule. The 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 non-point 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 the 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 one hundred thirty (130) stations on a monthly basis. These sites are segregated into two discrete types of monitoring activities. The first monitoring activity is focusing on fixed station monitoring on rivers and streams and the second monitoring activity focuses on a number of sample stations whose location rotate on an annual basis. The two monitoring components are explained below.
- Fixed Station Monitoring on Rivers & Streams--Fixed station monitoring is based largely upon the sixty-seven (67) United States Geological Survey 8-digit hydrologic unit code (HUC) basins present in Oklahoma. In general, at least one (1) sample station was located in all of the HUC watersheds with the exception of

some of the smaller HUC watersheds adjacent to the state line or in a HUC that does not contain a free flowing stream at some point during the year. After consultation with the other state environmental agencies and over time the OWRB has identified one hundred seventeen (117) fixed stations of which one hundred (100) are currently being monitored.

- Rotating Station Monitoring on Rivers & Streams--Over the life of the BUMP, rotational sampling has occurred on over two hundred twenty (220) stream segments. Sample stations and variables monitored are based upon Oklahoma's 303(d) list and input from other state environmental agencies on their monitoring needs. Variables monitored as part of this program component are specific for each stream segment monitored
- Fixed Station Load Monitoring--The OWRB is currently working with several partners including the USGS, US Army Corp of Engineers, Grand River Dam Authority, and National Weather Service to conduct flow monitoring on all of our fixed station sites that are not part of the 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--Quarterly sampling (approximately once every 90 days) of approximately
 40-45 lakes annually is currently occurring. In general, a minimum of three stations per reservoir, representing the lacustrine zone, transitional zone, and riverine zone, are designated for sampling at each lake, with
 additional sites sampled as needed. Additional water quality parameters and lake sites were added to the
 lake sampling program in 2001 to aid in making use support determinations.
- Fixed Station Groundwater Monitoring--Limited monitoring as part of this task has occurred in the program.
 Results of monitoring are presented in this report. OWRB staff has made recommendations in this report
 related to the scope and magnitude of groundwater monitoring activities that the state should pursue in the
 future. Any proposed groundwater monitoring efforts will be coordinated with the Oklahoma Department of
 Environmental Quality (ODEQ).
- Intensive Investigation Sampling Although no funding was made available for this element of the program, it is important that waters identified as impaired be restored. If routine monitoring identifies impairment, then an intensive study will be undertaken to document the source of the impairment and recommend restorative actions if possible. This task will not be conducted in year one or year two of the program, but thereafter, intensive investigations will be conducted as warranted. If water bodies are not identified for intensive study as part of this task, then monies will be reallocated to Tasks 1 and 3. Other entities (i.e., tribal or governmental units outside of Oklahoma) are involved as circumstances dictate or allow.

Program History/Overview

Sampling of the numerous lakes, streams, and rivers across this state was initiated in the summer and fall of 1998. Lake sampling in connection with the Beneficial Use Monitoring Program began in July of 1998. Sampling on numerous 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 has been conducting a lake-sampling program during the warmer 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. The trophic status of a reservoir can range from oligotrophic (low biological productivity) to hypereutrophic (excessive biological productivity). In general, the more productive a reservoir, the more water quality problems it is likely to experience. 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 through working with the Secretary of the Environment and the Oklahoma Conservation Commission, the Water Board was able to obtain a one time federal 319 non-point 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 the BUMP.

The OWRB has developed Use Support Assessment Protocols (USAP) for lakes and streams, which are essential if the state is to be consistent in identifying waters that are not meeting their assigned beneficial uses or are threatened. The Water Resources Board has incorporated the USAP into Oklahoma Administrative Code

(OAC) 785:46 to ensure that consistent determinations for impairments are made by the all of the monitoring agencies.

The state must follow consistent procedures for listing waters as impaired. Using the OWRB Use Support Assessment Protocols, it has been possible for OWRB staff to assess whether threats or impairments are present in our waterways. With continued funding, identification of impaired waters will be accomplished on additional waters.

Results of Lakes Sampling Efforts

Data was collected by the OWRB on a guarterly basis for 47 lakes in 2007-2008. For the current sample year, data was collected from the October of 2007 through August of 2008. The results of the sampling efforts are summarized below. As shown in Figure 1, 6% of lakes sampled were determined to have serious water quality nutrient concerns based upon their classification as hypereutrophic reservoirs. 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 impacted primarily by excessive nutrients and primary

Trophic Status of Lakes for Sample Year 2007-2008

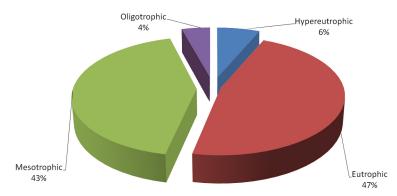


Figure 1. Trophic Status of Lakes Sampled in 2007-2008.

productivity and should be monitored intensively in the future to document the presence or absence of "beneficial use impairments." Forty-seven percent of the 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 the potential is less than for hypereutrophic waters. Mesotrophic waters have a small potential for beneficial use impairments and overall are representative of good water quality, low to moderate levels of nutrients, and productivity. Of the lakes sampled, 43% were classified as mesotrophic. Oligotrophic waters have very low levels of primary productivity and usually low concentrations of nutrient constituents. In Oklahoma, oligotrophic waters are either very clear waters with little nutrient inputs and genuinely good water quality conditions, or the waters are very turbid with poor water clarity with the absence of sufficient ambient light inhibiting lake productivity. Only two of the 47 lakes sampled were classified as oligotrophic. Based on the results for trophic state index calculations, 53% of the waters sampled were exhibiting high to excessive levels of primary productivity and nutrient rich conditions characteristic of eutrophic and hypereutrophic waterbodies.

The distribution changes somewhat when the lake surface acres for each reservoir are classified into the corresponding trophic status. Results in Figure 2 are different than Figure 1, indicating the lakes classified as eutrophic were larger in surface acres than the lakes classified as mesotrophic and hypereutrophic. When you look at lake trophic status broken out by the number of lake surface acres in each trophic state category, 64% of all surface acres sampled were eutrophic, 33% were mesotrophic, 3% were hypereutrophic, and 0% were oligotrophic. Two of the largest reservoirs sampled in 2007-2008 were classified as eutrophic (Oolagah and Texoma, which skewed the surface acres percentages heavily towards the eutrophic category. In general, the larger

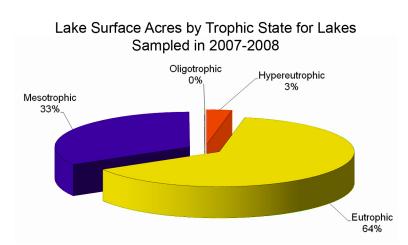


Figure 2. Lakes surface acres segregated by trophic state.

reservoirs in the state have more extensive watersheds and are generally deeper than smaller lakes, which increase the likelihood of beneficial use impairments being present since a larger surface area is available. During stratification, the larger/deeper reservoirs have a greater portion of the water column that becomes anoxic for long periods of time, which also increases the potential for nutrient release from sediments. It is obvious that many reservoirs 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 24 lakes have been identified by the OWRB as "Nutrient-Limited Watersheds" (NLW) in the WQS and efforts should be taken to definitively determine if NLW waters are meeting their uses through initiation of a Nutrient Impairment Study to definitively determine the presence or absence of nutrient impairments in our NLW lakes. NLW are lakes with a TSI ≥ 62, based on Carlson's trophic state classification system and using chlorophyll-a as the trophic state indicator. Lakes sampled as part of the BUMP, their trophic status, and potential threats or impairments are listed in Table 1.

Table 1. Lakes Sampled by the BUMP with Associated Use Attainment Status.

Lake Name	County	W.Q. Segment #	Last Year Sampled	FWP	PPWS	PBCR	AG	AES
American Horse	Blaine	520620	2007-08	D.O.				True Color
Arbuckle	Murray	310800	2007-08	D.O.				
Arcadia	Oklahoma	520710	2006-07		chlor-a			
Ardmore City	Carter	310800	2006-07	D.O.				
Atoka	Atoka	410400	2006-07	Turbidity				True Color
Bellcow	Lincoln	520700	2007-08	D.O., Turbidity				True Color
Birch	Osage	121300	2006-07	D.O.				True Color
Bixhoma	Wagoner	120410	2005-06	D.O.				
Bluestem	Osage	121300	2005-06	D.O., Turbidity				
Boomer	Payne	620900	2007-08	D.O., Turbidity		Ent.		True Color
Broken Bow	McCurtain	410210	2005-06	pH, D.O.				
Brushy Creek	Sequoyah	220200	2007-08	D.O.				
Burtschi∎	Grady	31082002	2005-06	рН				NLW
Canton	Blaine	720500	2005-06	Turbidity				
Carl Albert	Latimer	410310	2007-08	pH, D.O.				True Color
Carl Blackwell	Payne	620900	2007-08	D.O., Turbidity				True Color
Carter	Marshall	310800	2007-08					
Cedar (Mena)	LeFlore	410210 410300	2005-06	D.O., pH				
Chandler	Lincoln	520700	2007-08	D.O., Turbidity				True Color
Chickasha	Caddo	310830	2006-07	D.O.			Sulfates	NLW
Claremore	Rogers	121500	2005-06		chlor-a			NLW
Clear Creek	Stephens	310810	2006-07					
Cleveland City	Pawnee	621200	2006-07	D.O.				
Clinton	Washita	310830	2003-2004	Turbidity	chlor-a	Ent.		True Color, NLW
Coalgate City	Coal	410400	2006-07	D.O., Turbidity				
Comanche	Stephens	311300	2007-08					
Copan	Washington	121400	2007-08	Turbidity				True Color
Crowder	Washita	310830	2005-06		chlor-a			NLW
Cushing Municipal	Payne	620900	2006-07	Turbidity				True Color
Dave Boyer (Walters)	Cotton	311300	2007-08	Turbidity				True Color
Dripping Springs	Okmulgee	520700	2006-07	D.O., Turbidity				True Color
Duncan	Stephens	310810	2006-07					True Color

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Lake Name	County	W.Q. Segment #	Last Year Sampled	FWP	PPWS	PBCR	AG	AES
El Reno 	Canadian	520530	2006-07	Turbidity				True Color, NLW
Elk City	Beckham	311500	2005-06					NLW
Ellsworth	Comanche	311300	2006-07	D.O., Turbidity				True Color
Elmer Thomas	Comanche	311300	2006-07	pН				
Etling, Carl 	Cimarron	720900	2003-2004	Turbidity, pH				NLW
Eucha∙	Delaware	121600	2006-07	D.O.	chlor-a			NLW
Eufaula	Haskell	220600	2006-07	D.O., Turbidity				True Color
Fairfax City	Osage	621200	2006-07	D.O.				
Fort Cobb	Caddo	310830	2005-06	Turbidity	chlor-a			NLW
Fort Gibson	Cherokee	121600	2006-07	D.O.				NLW
Fort Supply†	Woodward	720500	2005-06	Turbidity	chlor-a			NLW
Foss	Custer	310800 310810 310820 310830 310840	2004-2005					
Frederick	Tillman	311310	2006-07	Turbidity				True Color
Fuqua	Stephens	310810	2006-07					
Grand Lake	Mayes	121600	2005-06	D.O.				
Great Salt Plains	Alfalfa	621010	2005-06	Turbidity			Sulfates & Chlorides	NLW
Greenleaf	Muskogee	120400	2005-06	D.O.	chlor-a			
Guthrie∎	Logan	620910	2005-06		chlor-a			NLW
Healdton City	Carter	311100	2005-06					
Hefner	Oklahoma	520520 520530	2005-06	D.O.				
Henryetta◆	Okmulgee	520700	2007-08	Turbidity, Lead				True Color
Heyburn	Creek	120420	2007-08	D.O., Turbidity				True Color
Holdenville	Hughes	520800	2006-07	D.O. pH	chlor-a			
Hominy Municipal	Osage	121300	2006-07	D.O.				
Hudson	Osage		2005-06	D.O.				
Hudson	Mayes	121600	2006-07					
Hugo	Choctaw	410300	2007-08	Turbidity				True Color
Hulah	Osage	121400	2007-08	Turbidity				True Color, NLW
True Color								
Humphreys	Stephens	310810	2006-07	D.O.	chlor-a			
Jean Neustadt	Carter	310800	2006-07	D.O.				
John Wells	Haskell	220200	2005-06					
Kaw	Osage	621210	2007-08					
Keystone	Tulsa	621200 620900	2005-06	Turbidity			Sulfates & Chlorides	
Konawa	Seminole		2007-08					
Langston	Logan	620900	2007-08					
Lawtonka	Comanche	311300	2006-07	D.O.	chlor-a			
Liberty	Logan	620910	2005-06	Turbidity	chlor-a			
Lloyd Church	Latimer	220100	2005-06	D.O., pH				True Color
Lone Chimney	Pawnee	621200	2003-2004					

Table 1. Lakes Sampled by the BUMP with Associated Use Attainment Status.

Lake Name	County	W.Q. Segment #	Last Year Sampled	FWP	PPWS	PBCR	AG	AES
Lugert-Altus	Greer	311500 311510	2004-2005	Turbidity				
Maysville/Wiley Post	McClain		2007-08	Turbidity				True Color
McAlester	Pittsburg	220600	2007-08	Turbidity				True Color
McGee Creek	Atoka	410400	2006-07	D.O., pH				
McMurtry	Noble	620900	2007-08	D.O., Turbidity				True Color
Meeker	Lincoln	520700	2005-06	Turbidity				
Murray	Love	311100	2005-06	D.O.				
Nanih Waiya	Pushmataha		2007-08					True Color
New Spiro 	LeFlore	220100	2005-06	pН	chlor-a			NLW
Okemah	Okfuskee	520700	2006-07	D.O., Turbidity				True Color
Okmulgee	Okmulgee	520700	2006-07	D.O.				True Color
Oologah	Rogers	121510	2007-08					
Overholser	Oklahoma	520520 520530	2005-06	Turbidity				True Color, NLW
Ozzie Cobb	Pushmataha	410300	2007-08	рН				True Color, NLW
Pauls Valley City	Garvin	310810	2007-08	Turbidity				True Color
Pawhuska	Osage	121600	2007-08	D.O.				
Pawnee	Pawnee	621200	2006-07		chlor-a			
Perry	Noble	621200	2006-07	Turbidity				True Color
Pine Creek	McCurtain	410210	2007-08	D.O., pH				True Color
Ponca	Kay	621200	2007-08	D.O.				True Color
Prague City	Lincoln	520510	2007-08	D.O.				True Color
Purcell	McClain	520610	2007-08	D.O.				
Raymond Gary	Choctaw	410300	2007-08	D.O.				True Color
R.C. Longmire	Garvin	310810	2007-08					
Robert S. Kerr	Sequoyah	220200	2007-08	Turbidity				True Color
Rock Creek	Carter	310800	2006-07	D.O.				
Rocky (Hobart)	Washita	311500	2006-07	Turbidity				NLW
Sahoma	Creek	120420	2005-06	D.O.				
Sardis	Pushmataha	410310	2007-08	D.O.				True Color
Shawnee Twin # 1	Pottawatomie	520510	2005-06	D.O.				
Shawnee Twin # 2	Pottawatomie	520510	2007-08	D.O.				
Shell	Osage	120420	2005-06	D.O.				
Skiatook	Osage	121300	2006-07	D.O.				True Color
Sooner	Pawnee		2006-07	D.O.			Sulfates, TDS, Chlorides	
Spavinaw•	Mayes	121600	2006-07	D.O.	chlor-a			NLW
Sportsman	Seminole	520500	2007-08	D.O.				
Stanley Draper	Cleveland		2005-06	D.O.				
Stilwell City	Adair	220200	2005-06	D.O.				
Stroud	Creek	520700	2005-06	D.O.			Sulfates & Chlorides	
Talawanda # 1	Pittsburg	220600	2007-08	D.O.				
Talawanda # 2	Pittsburg	220600	2007-08					
Taylor (Marlow)	Grady	310840	2007-08	Turbidity				NLW
Tecumseh	Pottawatomie	520510	2007-08	Turbidity				True Color

Table 1. Lakes Sampled by the BUMP with Associated Use Attainment Status.

Lake Name	County	W.Q. Segment #	Last Year Sampled	FWP	PPWS	PBCR	AG	AES
Tenkiller Ferry 	Sequoyah	121700	2005-06	D.O.	chlor-a			
Texoma	Bryan	311100 310800	2007-08	D.O., Turbidity				True Color
Thunderbird	Cleveland	520810	2006-07		chlor-a			NLW
Tom Steed □	Kiowa	311500	2006-07	Turbidity	chlor-a			
Vanderwork	Washita	310830	2007-08	D.O.				NLW
Vincent, Lloyd	Ellis	720500	2007-08					
W.R. Holway	Mayes		2006-07	D.O.				
Waurika	Jefferson	311210	2007-08	Turbidity				True Color
Waxhoma	Osage		2005-06	D.O.				
Wayne Wallace	Latimer	220100	2007-08	рН				True Color
Webbers Falls	Muskogee	121400	2005-06					
Wes Watkins	Pottawatomie	520510	2005-06					
Wetumka	Hughes		2006-07	D.O.				True Color
Wewoka	Seminole	520500	2006-07	D.O., Turbidity				True Color
Wister♣	LeFlore	220100	2007-08	D.O., Turbidity, pH				NLW, True Color
Yahola●	Tulsa	121300	1998-1999					

† Lake Listed Based Upon 1995 U.S. Army Corps. Of Engineers Intensive Study

♣ Lake Listed Based Upon OWRB Phase I Clean Lakes Study

♦ Lake does not fit classic definition of oligotrophy. Inorganic particulates are limiting biological productivity

• Lake was not assessed through the BUMP, but through another OWRB project

■ These Lakes will be recommended for NLW listing as part of the next WQS revision process

Acronyms: NLW = Nutrient Limited Water; D.O. = Dissolved Oxygen; ENT. = Enterococci Bacteria

Assigned WQS Beneficial Uses: FWP = Fish & Wildlife Propagation; AES = Aesthetics; PPWS = Public & Private Water Supply; AG = Agriculture; PBCR = Primary Body Contact Recreation

Introduction

Protecting Oklahoma's valuable water resources is essential to maintaining the quality of life for all Oklahomans. Used for a myriad of purposes, such as irrigation, hydropower, public/private water supply, navigation, and a variety of recreational activities, the state's surface and ground waters provide enormous benefits to Oklahoma from both an economic and recreational standpoint.

The National Recreation Lakes Study Commission (NRLSC) estimates that 32,100 people in Oklahoma are employed in support of activities related to our numerous man-made lakes. Also according to the NRLSC, 18,718,000 visitor days are spent on Oklahoma lakes each year and recreation in and around these lakes contributes approximately \$2.2 billion each year to Oklahoma's economy. Of additional value are the recreational benefits associated with our smaller municipal/watershed projects, Oklahoma Department of Wildlife lakes, and rivers and streams throughout the state, which infuse millions into state coffers through fishing, hunting, camping, and related activities. (In 1987, the Oklahoma Comprehensive Outdoor Recreation Plan estimated that approximately \$10.7 million was realized through camping and \$15.2 million through hunting/fishing. ¹) According to a 2001 federal study, fishing activities alone contribute \$476,019 dollars to Oklahoma's economy, not including the substantial ancillary costs associated with that extremely popular sport.²

In addition to surface waters, abundant ground waters also fuel the state's economy, serving as supply for thousands of municipalities, rural water districts, industrial facilities, and agricultural operations. According to the 1995 update of the Oklahoma Comprehensive Water Plan, groundwater represents the primary water supply for approximately 300 cities and towns and comprises 60 percent of the total water used in the state each year. ³ Groundwater resources also supply approximately 90 percent of the state's irrigation needs.

Oklahoma works to protect and manage its water resources through a number of initiatives, with the Oklahoma Water Quality Standards (WQS) serving as the cornerstone of the state's water quality management programs. The Oklahoma Water Resources Board (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 framework. State agencies are responsible for implementing the WQS as outlined by the OWRB through development of Implementation plans. Protecting our waters is a cooperative effort between many state agencies, and because the WQS are utilized by all agencies and represent a melding of both science and policy, they are an ideal mechanism to assess the effectiveness of our diverse water quality management activities.

The WQS are housed in OAC 785:45 and consist of three main components: beneficial uses, criteria to protect beneficial uses, and an anti-degradation policy. An additional component, which is not directly part of the WQS but necessary to water resource protection, is a monitoring program. A monitoring program is required in order to ensure that beneficial uses are maintained and protected. If uses are not being maintained, the cause of that impairment must be identified and restoration activities should be implemented to improve water quality such that it can meet its assigned beneficial uses.

All state agencies are currently required 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.

With the development of the BUMP, the need for protocols to determine beneficial use impairment was identified. Development of these protocols would facilitate state agencies in directing their time and money to the areas in most need of protection or remediation. The OWRB, working in close concert with other state environmental agencies and concerned parties, developed Use Support Assessment Protocols (USAP) to be used by all parties for assessing if waters were meeting their assigned beneficial uses. In addition, protocols were developed that could be coupled with a trend monitoring system to detect threatened waters before they become

¹ Oklahoma Statewide Comprehensive Outdoor Recreation Plan (SCORP), 1987.

² U.S. Department of Interior, Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau. 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation.

³ Oklahoma Water Resources Board, Update of the Oklahoma Comprehensive Water Plan, 1995.

seriously impaired. Data collection efforts connected with protocol development and/or implementation also serves a vital purpose in refining numerical criteria currently included in the WQS and in developing appropriate numerical and narrative criteria for future WQS documents. It is essential that our waters meet their assigned uses and that WQS implementation protocols are appropriate. Please see Appendix A for the applicable Oklahoma Administrative Code (OAC) 785:46 related to the USAP. Final approval of the USAP occurred in 2000, and the OWRB has constantly worked every year since then to refine the existing protocols and pursue the addition or modification of USAP protocols to further enhance its utility and effectiveness.

Work to be performed towards development and implementation of the critical fourth component of the WQS program, monitoring, is the subject of this report. 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], §319 Non-point Source (NPS) Assessment, and §314 Lake Water Quality Assessment (LWQA).

Background and Problem Definition

The State of Oklahoma has historically had numerous monitoring programs conducted by several state and federal agencies. In general, each environmental agency conducts their monitoring programs with some degree of integration and coordination with other state, municipal, or federal programs. Most water quality monitoring programs in Oklahoma are designed and implemented by each agency to collect information for one specific purpose or project (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.). Information of this type is very specific to each individual project's data quality objectives (DQOs) and is often limited to a very small geographic area. This document describes sampling activities the OWRB has historically conducted for lakes and efforts that are currently ongoing for lakes and streams 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.

Beneficial Use Monitoring Program (BUMP) Overview

The overall goal of the Beneficial Use Monitoring Program is to document beneficial use impairments, identify impairment sources (if possible), detect water quality trends, provide needed information for the WQS, and facilitate the prioritization of pollution control activities.

Beneficial Use Monitoring Program Components

- Monitoring Rivers & Streams--The OWRB is currently monitoring approximately 180 stations on a monthly basis. These sites are segregated into two discrete types of monitoring activities. The first monitoring activity focuses on fixed station monitoring on rivers and streams, and the second monitoring activity focuses on a number of sample stations whose locations rotate on an annual basis. The two monitoring components are explained below.
 - Fixed Station Monitoring on Rivers & Streams--Fixed station monitoring is based largely upon the 67 United States Geological Survey (USGS) 8-digit hydrologic unit code (HUC) basins present in Oklahoma. In general, at least one sample station was located in all of the HUC watersheds with the exception of some of the smaller HUC watersheds adjacent to the state line or in a HUC that does not contain a free flowing stream at some point during the year. After consultation with the other state environmental agencies and over time the OWRB has identified 119 fixed stations of which 99 are currently being monitored.
 - Rotating Station Monitoring on Rivers & Streams--Over the life of the BUMP, rotational sampling has occurred on 200 stream segments. Sample stations and variables monitored are based upon Oklaho-

ma's 303(d) list and input from other state environmental agencies on their monitoring needs. Variables monitored as part of this program component are specific for each stream segment monitored.

- Fixed Station Load Monitoring--The OWRB is currently engaged in a cooperative effort with the USGS to conduct flow monitoring at fixed station BUMP sites that do not currently have an existing USGS flow gage. This effort focuses on collecting both water quality and quantity information in order to calculate pollutant loads, which will provide OWRB staff with the data necessary to make a use support determination. This initiative is facilitated through the OWRB's Cooperative Agreement with USGS and various Compact Commission activities. The USGS cost share program, Oklahoma's 319 program, Oklahoma's 314 program and the 303(d)-process will drive sample site locations associated with this task.
- Fixed Station Lakes Monitoring--Fixed station lakes monitoring goal is designed to facilitate sampling on the 130 largest lakes in Oklahoma every other year. To accomplish this task, the OWRB is currently sampling approximately 40 to 45 lakes on a quarterly basis. Under this scenario, repeat sampling on a lake will occur approximately every 2-3 years, with the inclusion of lakes data collected by other sources, like the Corps of Engineers, to meet the goal of 130 lakes every two years. Data collected consists primarily of water chemistry, nutrients, and chlorophyll-a information. In general, three stations per reservoir, representing the lacustrine zone, transitional zone, and riverine zone are sampled. On many reservoirs, additional sites are monitored, including major arms of the reservoir as appropriate. Water quality parameters have been added to the lakes sampling effort over the years to enhance our ability to make use support determinations.
- Fixed Station Groundwater Monitoring--Limited monitoring as part of this task has occurred in the program.
 Results of monitoring are presented in this report. OWRB staff has made recommendations in this report
 related to the scope and magnitude of groundwater monitoring activities that the state should pursue in the
 future. Any proposed groundwater monitoring efforts will be coordinated with the Oklahoma Department of
 Environmental Quality (ODEQ).

Intensive Investigations--If beneficial use impairment is identified or suspected, then all appropriate state agencies will be alerted and an investigation will be initiated to confirm if beneficial use impairment is occurring. If routine monitoring cannot definitively identify impairments, then an intensive study will be undertaken, and if impairment is present, the source of the impairment will be identified if possible. One potential use for the intensive studies envisioned was identified during the data analysis phase of this reporting process. For example, monies could be spent to identify if high turbidity readings in rivers and streams are due to natural processes or due to human activities in the watershed of concern.

Some potential causes of beneficial use impairment are improper beneficial use or criteria (Oklahoma Water Resources Board jurisdiction), point source problems (Oklahoma Department of Environmental Quality or Oklahoma Department of Agriculture, Food & Forestry), non-point source problems (Oklahoma Conservation Commission, Oklahoma Department of Agriculture, Oklahoma Corporation Commission, or Oklahoma Department of Environmental Quality), oil and gas contamination (Oklahoma Corporation Commission), agricultural activities (Oklahoma Department of Agriculture, Food & Forestry), or mining activities (Oklahoma Department of Mines). All monitoring activities will be cooperative in nature with the agency with statutory authority assuming the lead role for intensive monitoring.

If water bodies are not identified for intensive study as part of this task, then monies will be reallocated for routine monitoring of beneficial use attainment. Other entities (e.g., tribal or governmental units outside of Oklahoma) will be involved as appropriate. All intensive-monitoring activities will be consistent with the WQS and the USAP. If no protocols exist, then best professional judgment or State/Environmental Protection Agency guidance will be used as appropriate.

Lakes Monitoring Program

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. Outcomes have

included in-lake restoration activities or implementation of best management practices in the lake watershed. 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. Lakes with relatively poor water quality are identified, but that does not necessarily mean that these lakes have beneficial use impairments. Some lakes, due to the nature of their watershed and basin morphometry, may never attain the water quality of some of the state's more pristine waters. For example, an expectation that Broken Bow Lake and Great Salt Plains Reservoir can attain the same level of water quality would be unrealistic, because these two reservoirs 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 lake bottom sediments being re-suspended in the water column due to wind action. Because so many factors affect the water quality of a reservoir, comparing lakes from various parts of the state should only be viewed as a relative comparison.

For each lake assessed, a general analysis of water quality was made and a water quality condition map generated. The maps presented are a representation of the water quality throughout the year based on the average of the data collected. Turbidity, measured in nephelometric turbidity units (NTU), and chlorophyll-a values were averaged to obtain an annual value for each site in the lake, and then the maps were generated accordingly. Graphics for seasonal TSI values at each site were also created, as well as seasonal turbidity and true color graphics for each site. A brief narrative summary is included for each lake that presents water quality issues related to the reservoir and assessment of beneficial use support for that lake. Dissolved oxygen/temperature vertical profiles recorded at site 1 (the dam) for each quarter are also included on a graphics page following the lake summary. Hydrolab® profile information is discussed in the narrative section for each lake. The brief synopsis of information presented for each lake should be beneficial in providing a relative comparison of water quality for lakes across the state.

For 2006-2007, the BUMP identified lakes that had beneficial use impairments or threats. However, a data set to truly determine which lakes are not supporting their beneficial uses due to excess nutrients does not currently exist, nor have nutrient criteria for lakes been promulgated into the WQS. The OWRB has previously identified 20 lakes that are listed in the WQS as Nutrient Limited Watersheds (NLW). 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. 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. Currently, the parameters that are analyzed to determine whether or not there is beneficial use impairment or threat include turbidity, true color, 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.

Materials & Methods for Lake Sampling

Data was collected quarterly on 41 lakes across the state from the fall of 2006 through the summer of 2007. Vertical water quality profiles were recorded at one meter intervals from the lake surface to the lake bottom for the following parameters; temperature, pH, dissolved oxygen, salinity, dissolved oxygen % saturation, oxidation-reduction potential (redox), specific conductivity, and total dissolved solids (TDS). A vertical profile was recorded for at least three sites per reservoir: in the central pool area near the dam (lacustrine zone), in the upper portion of the lake and in the major arms of the water body (riverine zone), and in the area between the lacustrine zone and the riverine zone (transitional zone). Turbidity values for each surface site were measured using a HACH portable turbidimeter. For lakes greater than 250 acres in size with only three routine chemical monitoring stations, additional sample sites have been established to ensure minimum data requirements are met. Secchi disk depths (in centimeters) were determined at all routine water chemistry sample sites. Water quality samples were collected at each site at the surface and one meter from the lake bottom at site 1,

the dam, and preserved for analysis of nitrate nitrogen, nitrite nitrogen, ammonia nitrogen, Kjeldahl nitrogen, ortho-phosphorus, total phosphorus, true color, chloride, sulfate, and total alkalinity. OWRB staff calculated total nitrogen based on laboratory-derived values. A Van Dorn sampler was used to collect samples near the lake bottom and grab samples were collected at the lake surface. At the dam site, a churn-splitter was used to split the surface sample for Quality Assurance (QA) purposes. Surface samples were also collected at all sites and analyzed for chlorophyll-a and pheophytin concentrations. Additional chlorophyll-a samples were collected for QA purposes. Filtration and grinding (extraction of the chlorophyll-a collected in a filter with acetone) of the samples was performed immediately upon return to the OWRB lab. All chlorophyll-a samples were filtered, as

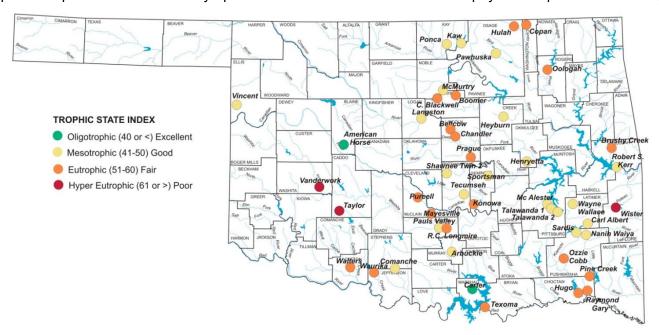


Figure 3. Lakes sampled by the Beneficial Use Monitoring Program in 2008.

stated in Standard Methods (APHA 1995), within 24 hours and stored for no more than 30 days in the freezer.

Sample Lake Locations

Lakes sampled by the BUMP Lakes staff in 2007-2008 are shown in Figure 3. Lake locations are identified on the map and are shaded in different colors based on their calculated TSI values.

Lake Data Analysis Protocols

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. Numerous chemical, and in some cases biological data are utilized in the various trophic indices, which characterize the "trophic status" of a water body. Some of the commonly used water quality parameters utilized in trophic state indices include chlorophyll-a, secchi disc depth, total phosphorus, total nitrogen, aquatic macrophytes, organic nitrogen, turbidity, lake user surveys, and hypolimnetic oxygen depletion rates, etc. Most indices use one or more variables in the determination of trophic status with varying degrees of applicability to reservoir systems. The OWRB has traditionally used Carlson's Trophic State Index (TSI) (Carlson, 1977) for reporting purposes, utilizing chlorophyll-a concentrations in calculating the lake trophic status. Carlson's TSI equation using chlorophyll-a (in µg/L) as the trophic status indicator is as follows:

$TSI = 9.81 \times In(chlorophyll-a) + 30.6.$

In 1998, 1999, and 2000, the TSI was calculated using chlorophyll-a concentrations from the growing season (spring and summer only). Beginning in sample year 2001, an annualized trophic assessment was made as this was determined to be a more accurate reflection of trophic conditions for each reservoir. In order to make beneficial use determinations, minimum data requirements must be met as listed in OAC 785:46-15-3.

A minimum of 20 samples is required on lakes greater than 250 surface acres, and a minimum of 10 samples on lakes 250 surface acres and less. In 2001-2002, sites were added for chlorophyll-a and turbidity collections on lakes greater than 250 surface acres, in order to meet the minimum data requirements annually. Although data can be aggregated and historical values used, there was a concern in using data that was 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 conditions are minimized (i.e. the effects of a single elevated chlorophyll-a value is minimized in the calculation of the TSI). The derived TSI represents an accurate assessment of the water quality of the reservoir 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 2. 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. As stated earlier, prior to 2001, the TSI was based on growing season (spring and summer) chlorophyll-a concentrations. However, beginning in 2001, all TSI evaluations were based on an annualized chlorophyll-a value for each lake and comparisons to previous TSI calculations will be specified as annual, growing season, or summer only evaluations. Prior to the onset of BUMP collections, lakes were sampled only in the summer and therefore the TSI was typically much higher than the annual assessments that are being done currently.

The beneficial use support determinations for the reservoirs sampled were determined following guidelines out-

Table 2. Lake Trophic State Categories	Table 2. La	ke iro	bnic 3	State (cated	ories.
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Carlson TSI No.	Trophic State	Definition
≤ 40	Oligotrophic	Low primary productivity and/or low nutrient levels
41 - 50	Mesotrophic	Moderate primary productivity with moderate nutrient levels
51 – 60	Eutrophic	High primary productivity and nutrient rich
≥ 61	Hypereutrophic	Excessive primary productivity and excessive nutrients

line in the Use Support Assessment Protocols (USAP) promulgated into Oklahoma Administrative Code (OAC) 785-46: Subchapter 15. In general the USAP states that environmental data must be collected to take seasonal conditions into consideration. A minimum of 20 samples is required on lakes more than 250 surface acres to assess beneficial use support for water quality parameters such as dissolved oxygen, pH and temperature. In addition, data more than ten years old should not be used for use support purposes unless more recent data is not available. A minimum of 10 samples is required on lakes or lake-arms of 250 surface acres of less. Samples may be aggregated to meet the minimum data requirements. For some parameters such as metals, organic compounds, or toxics, fewer samples are required. Toxicants (metals and organics) require a minimum of 5 samples to determine use support, but less than 5 samples can be used to determine if a use is partially supported or not supported. Furthermore, if at least 2 sample concentrations of a toxicant exceed the criteria prescribed in the WQS by two or more orders of magnitude, then the use is determined to be "not supporting".

The USAP also addresses the issue of how the data should be used spatially for lake monitoring. In general, when determining what size area the data is representative of best professional judgment is used. Such things as major tributaries and major lake arms are considered when deciding the extent of the area that the data was applied to. Arms or portions of lake may be treated separately from the main body of a lake, however in most instances Water Resources Board staff chose to deal with the lake as a single unit. Unless it was demonstrated to the contrary, a single site was not considered representative of an entire lake or an arm of the lake that was greater than two hundred and fifty surface acres in size.

Default Protocols

USAP outlines the procedures for determining whether a set of data points for a particular variable support, partially support, or do not support a particular beneficial use. These protocols are constructed around two distinct types of numerical variables--short-term averages and long-term averages. In each case, samples collected for the range of water quality parameters are analyzed and aggregated in different ways.

Short-term average numerical variables measure variables with exposure periods of less than seven days (e.g., turbidity or a sample standard for chlorides). In other words, the set of samples that is being analyzed considers each sample as a separate entity. For example, turbidity samples collected monthly from January through December are considered unique samples, and consequently, are not aggregated into a single sample for analysis but are considered a fraction of the whole. Use support determination for short-term numerical variables requires a three-step process:

- 1. Each sample exceeding the prescribed criterion or screening level for a particular variable is identified,
- 2. The number of samples exceeding the prescribed criterion or screening level is divided by the total number of samples collected to obtain a percent exceedance, and
- 3. The percent exceedance is compared to a range of prescribed percent exceedances to determine use support. The prescribed percent exceedances are:
 - i) supporting less than or equal to 10%,
 - ii) partially supporting greater than 10% but less than 25%,
 - iii) not supporting greater than or equal to 25%.

Long-term average numerical variables measure variables with exposure periods of greater than or equal to seven days (e.g., yearly mean standard for chlorides). In other words, the set of samples that is being analyzed is considered a unique entity. For example, chloride samples collected monthly from January through December are aggregated through the calculation of a geometric mean. Use support determination for long-term numerical variables requires a three-step process:

- 1. Samples for a particular variable are aggregated into a geometric mean,
- 2. The geometric mean is compared to the prescribed criterion or screening level, and
- 3. Use support is determined to be supporting if the mean is less than the prescribed criterion or screening level or not supporting if the mean is greater than the prescribed criterion or screening level.

Because the long-term average compares only one value (the geometric mean) to the prescribed criterion or screening level, it cannot be considered partially supporting. In most instances, at least 10 samples are required to calculate a geometric mean.

Assessment of Fish & Wildlife Propagation Beneficial Use Support

The FWP beneficial use utilizes five different water quality variables to assess use support: dissolved oxygen (D.O.) concentration, toxicants, hydrogen ion activity (pH), and turbidity. For purposes of this report, only D.O., metals concentrations in the water column, pH, and turbidity will be used in the assessment. The USAP for dissolved oxygen beneficial use support for lakes reads as follows:

- A) If greater than 70% of the water column at any given sample site in a lake or an arm of a lake is less than 2 mg/L, the Fish and Wildlife Propagation beneficial use shall be deemed to be not supported.
- B) If 50% or more, but not greater than 70%, of the water column at any given sample site in a lake or arm of a lake is less than 2 mg/L, the Fish and Wildlife Propagation beneficial use shall be deemed to be partially supported.
- C) The screening level for surface D.O. in a lake or arm of a lake shall be 4 mg/L from June 16 through October 15 each year and 5.0 mg/L for the remainder of the year.

Use support for dissolved oxygen concentrations was determined following the above criteria. Estimations of lake volume were made based on the depth at each site sampled and USAP criteria were applied accordingly. Water column information at each site is likely representative of lake volume conditions and is currently considered adequate for reporting purposes. A proposal to modify the USAP for assessment of dissolved oxygen during the last WQS revision process was made to more accurately reflect the decision criteria being followed. As of July 1, 2002, the word "volume" was changed to "column" to more accurately reflect the decision criteria utilized. It is possible that in the future a bathymetric map will be constructed for each of the BUMP lakes and a better assessment of dissolved oxygen conditions for the lake volume can be made. For assessing Fish & Wildlife propagation use support related to turbidity concentrations, the criterion outlined in the WQS was used

as the screening level. If an average lake-wide turbidity concentration of >25 nephelometric turbidity units was detected, then the lake was listed as not supporting its Fish & Wildlife propagation beneficial use for turbidity. Rain and storm events were considered when making this determination as conditions dictated. The protocol for short-term average numerical parameters is used to assess the level of support.

For assessing the beneficial use support from pH concentrations, the following criteria were used:

- 1) The Fish and Wildlife Propagation beneficial use designated for a waterbody shall be deemed to be fully supported with respect to pH occurring other than by natural causes if no more than 10% of the sample concentrations from that waterbody fall outside the screening interval prescribed in 785:45-5-12(g)(3).
- 2) The Fish and Wildlife Propagation beneficial use designated for a waterbody shall be deemed to be partially supported with respect to pH occurring other than by natural causes if greater than 10% but less than 25% of the sample concentrations from that waterbody fall outside the screening interval prescribed in 785:45-5-12(g)(3).
- 3) The Fish and Wildlife Propagation beneficial use designated for a waterbody shall be deemed to be not supported with respect to pH occurring other than by natural causes if at least 25% of the sample concentrations from that waterbody fall outside the screening interval prescribed in 785:45-5-12(g)(3).

Each lake was profiled using a Hydrolab, and pH concentrations were recorded at all sites for all four quarters. Based on all the data collected per sample year, the percentage of pH values above or below the acceptable range of 6.5 to 9 units was assessed for each site and this percentage determined whether or not the lake was supporting the Fish & Wildlife Propagation beneficial use. All lakes that exceeded the pH criteria have been only listed as not supporting at this point in time as further examination is necessary to determine "natural causes".

Numerical criteria is prescribed for toxicants in WQS 785:45-5-12(g)(6)(G) in a table entitled "Numerical Criteria for Toxic Substances". To determine use support, the protocol for short-term average numerical parameters is used. Sample values must be compared to both acute and chronic criterion. Both criterions need not be exceeded for the variable to be partially supported or not supported.

Assessment of Agriculture Beneficial Use Support

The AG beneficial use utilizes three variables to assess use support: total dissolved solids, chlorides, and sulfates. Numerical criteria for both yearly mean standards and sample standards are located in Appendix F of OAC 785:45. The yearly mean standard for each variable is compared to the geometric mean of the samples using a long-term average numerical protocol. The sample standard for each variable is also compared to each sample using a short-term average numerical protocol. Use support assessment for each variable requires a three-step process:

- 1) The sample standard and yearly mean standard for the six digit management segment which encompasses the monitoring must be located in Appendix F of OAC 785:45;
- 2) The geometric mean of the samples is compared to the yearly mean standard (if the geometric mean exceeds the yearly mean standard, the use is not supported and no further analysis is necessary);
- 3) If the geometric mean meets the yearly mean standard, the sample standard is compared to each sample and percent exceedance is calculated (depending on the percent exceedance, the variable is supporting, partially supporting, or not supporting). Regardless of the criteria in Appendix F of OAC 785:45, if all TDS samples are less than 750 mg/L and all chloride and sulfate samples are less than 250 mg/L, the AG beneficial use is supported. Only one variable needs to violate the assessment protocol for the beneficial use to be partially supported or not supported.

Assessment of Aesthetics Beneficial Use Support

The Aesthetics beneficial use is assessed using a couple of water quality parameters--true color and nutrients. The sample standard for each variable is compared to the each sample using a short-term average numerical protocol. Criteria are located in OAC 785:45-5-19 and read as follows.

- 1.) Color. Surface waters of the state shall be virtually free from all coloring materials that produce an aesthetically unpleasant appearance. Color producing substances, from other than natural sources, shall be limited to concentrations equivalent to 70 Platinum-cobalt true color units.
- 2.) Nutrients. Nutrients from point source discharges or other sources shall not cause excessive growth of periphyton, phytoplankton, or aquatic macrophyte communities, which impairs any existing or designated beneficial use.

For assessing the Aesthetics beneficial use support status for color, data collected was compared to the numerical standard of 70 units for true color. Assessment of use support for this water quality parameter was simple and straightforward.

For assessing the Aesthetics beneficial use support status for nutrients, Carlson's TSI was applied. As stated in Table 2 a TSI value ≥ 61 is considered to be characteristic of a hypereutrophic lake (excessive primary productivity). Guidelines for determining if a lake is a Nutrient Limited Watershed (NLW) are outlined in the WQS that states a Carlson's TSI value of > 62 is to be the criterion to be used to classify a lake as an NLW. Classification as an NLW in Appendix A of the WQS means that a lake is considered to be threatened due to nutrients. A TSI value of 62 was chosen as the "break-point" because it is a conservative number. As noted in Table 5, several lakes had a TSI value greater than 62 and have not yet been listed as an NLW, and likewise, there are lakes listed as NLW that have a TSI less than 62. This will be addressed during the next standards revision process. If it can be demonstrated that nutrient loading to a lake may be adversely impacting a beneficial use designated for that lake, then the OWRB may determine that the lake and its watershed is an NLW and the lake and watershed will be identified as NLW in Appendix A of OAC 785:45. Once a lake is identified as an NLW, it is assumed to be threatened until an NLW Impairment Study has been conducted to definitively assess if the water body is partially supporting or not supporting. If an NLW Impairment Study demonstrates that beneficial uses are not threatened, then the Board will remove the NLW identification in the WQS.

Assessment of Primary Body Contact Recreation (PBCR) Support

The PBCR beneficial use utilizes two different bacteriological classes and one bacteriological species to assess use support: fecal coliform (FC), Escherichia coli (E. coli), and enterococci (Ent.). The assessment is performed by using the long-term average numerical protocol to compare to a prescribed geometric mean and by using a modified version of the short-term average numerical protocol to compare each sample to a prescribed screening level. The prescribed geometric means (GM) and screening levels (SL) are: FC—GM of 400 colony forming units/mL (cfu/mL) and SL of 400 cfu/mL; E. coli—GM of 126 cfu/mL and SL of 235 cfu/mL in scenic rivers and 406 cfu/mL in all other waters; and Ent.—GM of 33 cfu/mL and SL of 61 cfu/mL in scenic rivers and 406 cfu/mL in all other waters. For E. coli and Ent., both the SL (only one sample exceedance is necessary) and the GM must be exceeded for the use to not be supported. If all of the samples meet the SL or the GM is met, the use is supported. In the case of FC, the use may only be supported if the GM is met and no greater than 25% of the sample concentrations exceed the SL. If either the GM is exceeded or greater than 25% of the sample concentrations exceed the SL, the use is not supported for FC. In no instance is the PBCR beneficial use partially supported. Furthermore, PBCR support is only determined from samples collected during the recreational season from May 1 through September 30 of each year. Only one variable needs to violate the assessment protocol for the beneficial use to be not supported.

Lake Monitoring Results & Discussion

A lake-wide annual average of the chlorophyll-a values was calculated for each lake and used in the final calculation of the TSI. A summary table is included (Table 3) to present the number of lakes and appropriate surface acre size for each of the four trophic categories in 2005-2006 as well as the percentages of the total. As shown in Table 3, ten lakes were hypereutrophic, fourteen were eutrophic, nine were mesotrophic, and three were oligotrophic. Of the total 166,431 surface acres sampled, 41,745 were classified hypereutrophic, 97,879 were classified as eutrophic, 3,979 were classified as mesotrophic and 22,828 acres were classified as oligotrophic. TSI results, county, surface area, and volume for lakes sampled in 2005-2006 are listed in Table 4.

Although TSI based on the chlorophyll-a concentration is used for the BUMP, a comparison of TSI values calculated with total phosphorus and secchi disk depth was generated and is displayed on Table 5. Data displayed is for the growing season using the various water quality parameters that can be used in calculating Carlson's TSI. The chlorophyll and phosphorus TSI calculations were derived through results of regression analysis relating secchi disk depth to the other two variables.

Results for each of the 130 BUMP lakes from the most recent sampling are listed in Table 6. As stated previously, the OWRB is currently monitoring 40 to 45 lakes with repeat sampling on each reservoir scheduled to occur every two to three years. Prior to 1998, data was only collected once for each lake during the summer months. In 1998, the OWRB began collecting data on lakes on a quarterly basis resulting in a great improvement to the data set available to make management decisions on our lake resources. Lakes that are identified as hypereutrophic should be sampled more often than quarterly, especially during the warmer months. Lakes identified as "Nutrient-Limited Watersheds" (NLW) 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 Table 6. Toxicity concerns, if present, are

Table 3. Summary of Lake Trophic Status Results

Trophic Status	Number of Lakes	Percent of Total Lakes	Surface Area (Acres)	Percent of Total Surface Acres
Hyper-Eutrophic	3	6%	7,695	3%
Eutrophic	20	43%	161,722	64%
Mesotrophic	22	53%	84,960	33%
Oligotrophic	2	4%	208	0%
Totals =	47	100%	254,585	100%

Table 4. List of Lakes Sampled in Sample Year 2007-2008

Lake Name	County	Surface Area	Volume	TSI	Year Sampled	Threats or Impairments	Carlson's TSI
American Horse	Blaine	100	2,200	38	2008	D.O., Color	Oligotrophic
Arbuckle	Murray	2,350	72,400	50	2008	D.O.	Mesotrophic
Bell Cow	Lincoln	1,153		52	2008	D.O., Color, Turbidity	Eutrophic
Boomer	Payne	260	3,200	51	2008	D.O., Color, Turbidity, Ent	Eutrophic
Brushy Creek	Sequoyah	358	3,258	53	2008	D.O.	Eutrophic
Carl Albert	Latimer	183	2,739	41	2008	D.O., Ph, Color	Mesotrophic
Carl Blackwell	Payne	3,370	61,500	53	2008	D.O., Color, Turbidity, Ent	Eutrophic
Carter	Marshall	108	990	40	2008		Oligotrophic
Chandler	Lincoln	129	2,778	60	2008	D.O., Color, Turbidity	Eutrophic
Comanche	Stephens	184	2,500	49	2008		Mesotrophic
Copan	Washington	4,850	43,400	60	2008	Color, Turbidity	Eutrophic
Henryetta	Okmulgee	450	6,600	45	2008	Color, Turbidity, Lead	Mesotrophic
Heyburn	Creek	880	7,105	49	2008	D.O., Color, Turbidity	Mesotrophic
Hugo	Choctaw	13,250	157,600	54	2008	Color, Turbidity	Eutrophic
Hulah	Osage	3,570	31,160	55	2008	Color, Turbidity, Nlw	Eutrophic
Kaw	Osage	17,040	428,600	49	2008		Mesotrophic
Kerr, Robert S.	Sequoyah	43,380	525,700	50	2008	Color, Turbidity	Mesotrophic
Konawa	Seminole	1,350	23,000	57	2008		Eutrophic
Langston	Logan	304	5,792	44	2008		Mesotrophic
Longmire, R.C.	Garvin	918		57	2008		Eutrophic
Maysville (Wiley Post)	Mcclain	302	2,082	51	2008	Color, Turbidity	Eutrophic
Mcalester	Pittsburg	1,521	13,398	50	2008	Color, Turbidity	Mesotrophic
Mcmurtry	Noble	1,155	19,733	48	2008	D.O., Color, Turbidity	Mesotrophic
Nanih Waiya **	Pushmataha	131	1,064	45	2008	Color	Mesotrophic
Oologah	Rogers	29,460	553,400	54	2008		Eutrophic
Ozzie Cobb **	Pushmataha	116	833	59	2008		Eutrophic
Pauls Valley	Garvin	750	8,730	50	2008	Color, Turbidity	Mesotrophic
Pawhuska	Osage	96	3,600	41	2008	D.O.	Mesotrophic

Table 4. List of Lakes Sampled in Sample Year 2007-2008

Lake Name	County	Surface Area	Volume	TSI	Year Sampled	Threats or Impairments	Carlson's TSI
Pine Creek	Mccurtain	3,750	53,750	53	2008	D.O., Ph, Color	Eutrophic
Ponca	Kay	805	14,440	48	2008	D.O., Color	Mesotrophic
Prague	Lincoln	225	2,415	51	2008	D.O., Color	Eutrophic
Purcell	Mcclain	150	2,600	54	2008	D.O.	Eutrophic
Raymond Gary	Choctaw	263	1,681	55	2008	D.O., Color	Eutrophic
Sardis	Pushmataha	13,610	274,330	46	2008	D.O., Color	Mesotrophic
Shawnee No. 2	Pottawatomie	1,100	11,400	43	2008	D.O.	Mesotrophic
Sportsman	Seminole	354	5,349	43	2008	D.O.	Mesotrophic
Talawanda No. 1	Pittsburg	91	1,200	42	2008	D.O.	Mesotrophic
Talawanda No. 2	Pittsburg	195	2,750	45	2008		Mesotrophic
Taylor (Marlow)	Grady	227	1,877	64	2008	Turbidity, Nlw	Hypereutrophic
Tecumseh	Pottawatomie	127	1,118	49	2008	Color, Turbidity, Lead	Mesotrophic
Texoma	Bryan	88,000		55	2008	D.O., Color, Turbidity	Eutrophic
Vanderwork	Wahita	135	1,578	64	2008	D.O., NIw	Hypereutrophic
Vincent, Loyd	Ellis	160	2,579	46	2008		Eutrophic
Walters (Dave Boyer)	Cotton	148	861	51	2008	Color, Turbidity	Eutrophic
Waurika	Jefferson	10,100	203,100	54	2008	Color, Turbidity	Eutrophic
Wayne Wallace	Latimer	94	1,746	48	2008	Ph. Color	Mesotrophic
Wister	Leflore	7,333	62,360	61	2008	D.O., Ph, Color, Turbidity, Nlw	Hypereutrophic

listed as provided by the ODEQ as part of their Rotating Lakes Toxics Program and/or through sampling conducted by the OWRB.

Table 5. Comparison of Methods Used to Calculate Carlson's Trophic State Index for 2007-2008.

Lake Name	Chl-A	Trophic State	Total P	Trophic State	Secchi	Trophic State
American Horse	38	Oligotrophic	55	Eutrophic	58	Eutrophic
Arbuckle	50	Mesotrophic	46	Mesotrophic	56	Eutrophic
Bellcow	52	Eutrophic	53	Eutrophic	69	Hypereutrophic
Boomer	51	Eutrophic	61	Hypereutrophic	76	Hypereutrophic
Brushy Creek	53	Eutrophic	50	Mesotrophic	60	Eutrophic
Carl Albert	41	Mesotrophic	49	Mesotrophic	61	Hypereutrophic
Carl Blackwell	53	Eutrophic	56	Eutrophic	74	Hypereutrophic
Carter	40	Oligotrophic	41	Mesotrophic	57	Eutrophic
Chandler	60	Eutrophic	61	Hypereutrophic	74	Hypereutrophic
Comanche	49	Mesotrophic	48	Mesotrophic	62	Hypereutrophic
Copan	60	Eutrophic	68	Hypereutrophic	76	Hypereutrophic
Henryetta	45	Mesotrophic	67	Hypereutrophic	81	Hypereutrophic
Heyburn	49	Mesotrophic	57	Eutrophic	74	Hypereutrophic
Hugo	54	Eutrophic	63	Hypereutrophic	76	Hypereutrophic
Hulah	55	Eutrophic	63	Hypereutrophic	79	Hypereutrophic
Kaw	49	Mesotrophic	80	Hypereutrophic	71	Hypereutrophic
Kerr, R.S.	50	Mesotrophic	76	Hypereutrophic	79	HypereutropHic

Table 5. Comparison of Methods Used to Calculate Carlson's Trophic State Index for 2007-2008.

Lake Name	Chl-A	Trophic State	Total P	Trophic State	Secchi	Trophic State
Konawa	57	Eutrophic	55	Eutrophic	63	Hypereutrophic
Langston	44	Mesotrophic	41	Mesotrophic	65	Hypereutrophic
Longmire, R.C.	57	Eutrophic	53	Eutrophic	66	Hypereutrophic
Maysville	51	Eutrophic	72	Hypereutrophic	86	Hypereutrophic
Mcalester	50	Mesotrophic	57	Eutrophic	72	Hypereutrophic
Mcmurtry	48	Mesotrophic	52	Eutrophic	71	Hypereutrophic
Nanih Waiya	45	Mesotrophic	50	Mesotrophic	60	Eutrophic
Oologah	54	Eutrophic	60	Eutrophic	66	Hypereutrophic
Ozzie Cobb	59	Eutrophic	59	Eutrophic	68	Hypereutrophic
Pauls ValLey	50	Mesotrophic	57	Eutrophic	74	Hypereutrophic
Pawhuska	41	Mesotrophic	32	Oligotrophic	50	Mesotrophic
Pine Creek	53	Eutrophic	52	Eutrophic	63	Hypereutrophic
Ponca	48	Mesotrophic	56	Eutrophic	64	Hypereutrophic
Prague	51	Eutrophic	51	Eutrophic	64	Hypereutrophic
Purcell	54	Eutrophic	52	Eutrophic	68	Hypereutrophic
Raymond Gary	55	Eutrophic	55	Eutrophic	66	Hypereutrophic
Sardis	46	Mesotrophic	50	Mesotrophic	65	Hypereutrophic
Shawnee #2	43	Mesotrophic	42	Mesotrophic	62	Hypereutrophic
Sportsman	43	MesotrOphic	47	Mesotrophic	64	Hypereutrophic
Talawanda #1	42	Mesotrophic	41	Mesotrophic	54	Eutrophic
Talawanda #2	45	Mesotrophic	37	Oligotrophic	55	Eutrophic
Taylor	64	Hypereutrophic	76	Hypereutrophic	73	Hypereutrophic
Tecumseh	49	Mesotrophic	71	Hypereutrophic	92	Hypereutrophic
Texoma	55	Eutrophic	60	Eutrophic	64	Hypereutrophic
Vanderwork	64	Hypereutrophic	64	Hypereutrophic	68	Hypereutrophic
Vincent	46	Mesotrophic	47	Mesotrophic	66	Hypereutrophic
Walters	51	Eutrophic	67	Hypereutrophic	82	Hypereutrophic

Table 6. Lakes Sampled by the BUMP with Their Associated Use Attainment Status.

Lake Name	County	W.Q. Segment #	Last Year Sampled	FWP	PPWS	PBCR	AG	AES
American Horse	Blaine	520620	2007-2008	D.O.				True Color
Arbuckle	Murray	310800	2007-2008	D.O.				
Arcadia	Oklahoma	520710	2006-2007		Chlor-A			
Ardmore City	Carter	310800	2006-2007	D.O.				
Atoka	Atoka	410400	2006-2007	Turbidity				True Color
Bellcow	Lincoln	520700	2007-2008	D.O., Turbidity				True Color
Birch	Osage	121300	2006-2007	D.O.				True Color
Bixhoma	Wagoner	120410	2005-2006	D.O.				
Bluestem	Osage	121300	2005-2006	D.O., TurbidIty				
Boomer	Payne	620900	2007-2008	Turbidity, D.O.		Ent.		True Color
Broken Bow	Mccurtain	410210	2005-2006	pH, D.O.				
Brushy Creek	Sequoyah	220200	2007-2008	D.O.				
Burtschi	Grady	31082002	2005-2006	рН				NLW
Canton	Blaine	720500	2005-2006	Turbidity				
Carl Albert	Latimer	410310	2007-2008	pH, D.O.				True Color
Carl Blackwell	Payne	620900	2007-2008	Turbidity, D.O.				True Color
Carter	Marshall	310800	2007-2008					
Cedar (Mena)	Leflore	410210 410300	2005-2006	D.O., pH				
Chandler	Lincoln	520700	2007-2008	Turbidity, D.O.				True Color
Chickasha	Caddo	310830	2006-2007	D.O.			Sulfates	NLW
Claremore	Rogers	121500	2005-2006		Chlor-A			NLW
Clear Creek	Stephens	310810	2006-2007					
Cleveland City	Pawnee	621200	2006-2007	D.O.				
Clinton	Washita	310830	2003-2004	Turbidity	Chlor-A	Ent.		True Color NLW
Coalgate City	Coal	410400	2006-2007	D.O., Turbidity				True Color
Comanche	Stephens	311300	2007-2008					
Copan	Washington	121400	2007-2008	Turbidity				True Color
Crowder	Washita	310830	2005-2006		Chlor-A			NLW
Cushing Municipal	Payne	620900	2006-2007	Turbidity				True Color
Dave Boyer (Walters)	Cotton	311300	2007-2008	Turbidity				True Color
Dripping Springs	Okmulgee	520700	2006-2007	D.O., Turbidity				True Color
Duncan	Stephens	310810	2006-2007					True Color
El Reno n	Canadian	520530	2006-2007	Turbidity				True Color NLW
Elk City	Beckham	311500	2005-2006					NLW
Ellsworth	Comanche	311300	2006-2007	D.O., Turbidity				True Color
Elmer Thomas	Comanche	311300	2006-2007	рН				
Etling, Carl ■	Cimarron	720900	2003-2004	Turbidity, pH				NLW
Eucha●	Delaware	121600	2006-2007	D.O.	Chlor-A			NLW
Eufaula	Haskell	220600	2006-2007	D.O., Turbidity				True Color
Fairfax City	Osage	621200	2006-2007	D.O.				
Fort Cobb	Caddo	310830	2005-2006	Turbidity	Chlor-A			NLW
Fort Gibson	Cherokee	121600	2006-2007	D.O.				NLW
Fort Supply†	Woodward	720500	2005-2006	Turbidity	Chlor-A			NLW

Table 6. Lakes Sampled by the BUMP with Their Associated Use Attainment Status.

Lake Name	County	W.Q. Segment #	Last Year Sampled	FWP	PPWS	PBCR	AG	AES
Foss	Custer	310800 310810 310820 310830 310840	2004-2005					
Frederick	Tillman	311310	2006-2007	Turbidity				True Color
Fuqua	Stephens	310810	2006-2007					
Grand	Mayes	121600	2005-2006	D.O.				
Great Salt Plains	Alfalfa	621010	2005-2006	Turbidity			Sulfates & Chlorides	NLW
Greenleaf	Muskogee	120400	2005-2006	D.O.	Chlor-A			
Guthrie∎	Logan	620910	2005-2006		Chlor-A			NLW
Healdton City	Carter	311100	2005-2006					
Hefner	Oklahoma	520520 520530	2005-2006	D.O.				
Henryetta♦	Okmulgee	520700	2007-2008	Turbidity, Lead				True Color
Heyburn	Creek	120420	2007-2008	D.O., Turbidity				True Color
Holdenville	Hughes	520800	2006-2007	D.O., pH	Chlor-A			
Hominy Municipal	Osage	121300	2006-2007	D.O.				
Hudson	Osage		2005-2006	D.O.				
Hudson	Mayes	121600	2006-2007					
Hugo	Choctaw	410300	2007-2008	Turbidity				True Color
Hulah	Osage	121400	2007-2008	Turbidity				NLW True Color
Humphreys	Stephens	310810	2006-2007	D.O.	Chlor-A			
Jean Neustadt	Carter	310800	2006-2007	D.O.				
John Wells	Haskell	220200	2005-2006					
Kaw	Osage	621210	2007-2008					
Keystone	Tulsa	621200 620900	2005-2006	Turbidity			Sulfates & Chlorides	
Konawa	Seminole		2007-2008					
Langston	Logan	620900	2007-2008					
Lawtonka	Comanche	311300	2006-2007	D.O.	Chlor-A			
Liberty	Logan	620910	2005-2006	Turbidity	Chlor-A			
Lloyd Church	Latimer	220100	2005-2006	D.O., pH				True Color
Lone Chimney	Pawnee	621200	2003-2004					
Lugert-Altus	Greer	311500 311510	2004-2005	Turbidity				
Mcalester	Pittsburg	220600	2007-2008	Turbidity				True Color
Mcgee Creek	Atoka	410400	2006-2007	D.O., pH				
Mcmurtry	Noble	620900	2007-2008	Turbidity, D.O.				True Color
MeeKer	Lincoln	520700	2005-2006	Turbidity				
Murray	Love	311100	2005-2006	D.O.				
Nanih Waiya	Pushmataha		2007-2008					True Color
New Spiro 	Leflore	220100	2005-2006	рН	Chlor-A			NLW
Okemah	Okfuskee	520700	2006-2007	D.O., Turbidity		Ent.		True Color
Okmulgee	Okmulgee	520700	2006-2007	D.O.				True Color
Oologah	Rogers	121510	2007-2008					

Table 6. Lakes Sampled by the BUMP with Their Associated Use Attainment Status.

Lake Name	County	W.Q. Segment #	Last Year Sampled	FWP	PPWS	PBCR	AG	AES
Overholser	Oklahoma	520520 520530	2005-2006	Turbidity				NLW True Color
Ozzie Cobb	Pushmataha	410300	2007-2008	рН				NLW True Color
Pauls Valley City	Garvin	310810	2007-2008	Turbidity				True Color
Pawhuska	Osage	121600	2007-2008	D.O.				
Pawnee	Pawnee	621200	2006-2007		Chlor-A			
Perry	Noble	621200	2006-2007	Turbidity				True Color
Pine Creek	Mccurtain	410210	2007-2008	D.O., pH				True Color
Ponca	Kay	621200	2007-2008	D.O.				True Color
Prague City	Lincoln	520510	2007-2008	D.O.				True Color
Purcell	Mcclain	520610	2007-2008	D.O.				
Raymond Gary	Choctaw	410300	2007-2008	D.O.				True Color
R.C. Longmire	Garvin	310810	2007-2008					
Robert S. Kerr	Sequoyah	220200	2007-2008	Turbidity				True Color
Rock Creek	Carter	310800	2006-2007	D.O.				
Rocky (Hobart) ■	Washita	311500	2006-2007	Turbidity				NLW
Sahoma	Creek	120420	2005-2006	D.O.				
Sardis	Pushmataha	410310	2007-2008	D.O.				True Color
Shawnee Twin # 1	Pottawatomie	520510	2005-2006	D.O.				
Shawnee Twin # 2	Pottawatomie	520510	2007-2008	D.O.				
Shell	Osage	120420	2005-2006	D.O.				
Skiatook	Osage	121300	2006-2007	D.O.				True Color
Sooner	Pawnee		2006-2007	D.O.			Chlorides, Sulfates &TDS	
Spavinaw●	Mayes	121600	2006-2007	D.O.	Chlor-A			NLW
Sportsman	Seminole	520500	2007-2008	D.O.				
Stanley Draper	Cleveland		2005-2006	D.O.				
Stilwell City	Adair	220200	2005-2006	D.O.				
Stroud	Creek	520700	2005-2006	D.O.			Sulfates & Chlorides	
Talawanda # 1	Pittsburg	220600	2007-2008	D.O.				
Talawanda # 2	Pittsburg	220600	2007-2008					
Taylor (Marlow)	Grady	310840	2007-2008	Turbidity				NLW
Tecumseh	Pottawatomie	520510	2007-2008	Turbidity				True Color
Tenkiller Ferry 	Sequoyah	121700	2005-2006	D.O.	Chlor-A			NLW
Texoma	Bryan	311100 310800	2007-2008	D.O., Turbidity				True Color
Thunderbird∎	Cleveland	520810	2006-2007		Chlor-A			NLW
Tom Steed ■	Kiowa	311500	2006-2007	Turbidity	Chlor-A			
Vanderwork	Washita	310830	2007-2008	D.O.				NLW
Vincent, Lloyd	Ellis	720500	2007-2008					
W.R. Holway	Mayes		2006-2007	D.O.				
<u> </u>	Jefferson	311210	2007-2008	Turbidity				True Color
Waurika								
Waurika Waxhoma	Osage		2005-2006	D.O.				

Table 6. Lakes Sampled by the BUMP with Their Associated Use Attainment Status.

Lake Name	County	W.Q. Segment #	Last Year Sampled	FWP	PPWS	PBCR	AG	AES
Webbers Falls	Muskogee	121400	2005-2006					
Wes Watkins	Pottawatomie	520510	2005-2006					
Wetumka	Hughes		2006-2007	D.O.				True Color
Wewoka	Seminole	520500	2006-2007	Turbidity, D.O.				True Color
Wiley Post (Maysville)	Mcclain		2007-2008	Turbidity				True Color
Wister♣	Leflore	220100	2007-2008	D.O., Turbidity & pH				NLW True Color
Yahola●	Tulsa	121300	1998-1999					

- † Lake Listed Based Upon 1995 U.S. Army Corps. Of Engineers Intensive Study
- ♣ Lake Listed Based Upon OWRB Phase I Clean Lakes Study
- ◆ Lake does not fit classic definition of oligotrophy. Inorganic particulates are limiting biological productivity
- Lake was not assessed through the BUMP, but through another OWRB project
- These Lakes will be recommended for NLW listing as part of the next WQS revision process

Acronyms: NLW = Nutrient Limited Water; D.O. = Dissolved Oxygen; ENT. = Enterococci Bacteria

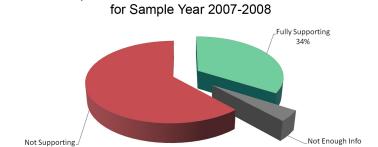
Assigned WQS Beneficial Uses: FWP = Fish & Wildlife Propagation; AES = Aesthetics; PPWS = Public & Private Water Supply; AG = Agriculture; PBCR = Primary Body Contact Recreation

The pH was examined and compared to the WQS for pH, 6.5 to 9 units, listed in 785:45-5. Five of the 47 lakes sampled in 2007-2008 were listed as partially supporting the FWP beneficial use based on pH values and one lake were listed as not supporting (Figure 4). Turbidity, in Nephelometric turbidity units (NTU), was measured via a HACH turbidimeter for all sites on each lake sampled to identify lakes that exceeded the WQS of 25 NTU. Seasonal turbidity values at each site are displayed for each lake as well as the lake-wide annual turbidity value. Of the 47 lakes sampled in 2007-2008, twenty lakes were not supporting their Fish & Wildlife Propagation (FWP) beneficial use, two did not have enough information and twenty-five were fully supporting the use based on turbidity values (see Figure 6). True color units were also averaged for the year to compare to the WQS of 70 units. Seasonal true color values per site are displayed graphically for each lake (see Figure 5.). In 2007-2008, twenty-nine lakes were not supporting the Aesthetics beneficial use based on high true color values. Vertical profiles recorded with a Hydrolab® were examined to determine if anoxic conditions were present and whether or not the lake was meeting the FWP beneficial use. The USAP lists dissolved oxygen violations as values below 2.0 mg/L for 70% of the entire water column and partially supporting if between 50% and 70% of the lake. Of the 47 lakes sampled in 2007-2008, twenty-three were not supporting the FWP beneficial use based on anoxic conditions, primarily in the summer season (See Figure 9.). Chloride and sulfate water quality parameters were also added to the lake sampling program in year 2003-2004. These additions allow for an assessment of the agriculture beneficial use of our reservoirs and much like metals sampling is a sampling effort that we plan on continuing into the future. Analysis of the chloride and sulfate data revealed that all lakes sampled were supporting the agriculture beneficial use (See Figure 8). Analysis of the bacteria data indicated twenty-seven of the lakes sampled were supporting their Primary Body Contact Recreation beneficial use (See Figure 8). It is the intent of the OWRB monitoring program to pursue adding additional monitoring parameters to the lake sampling initiative to allow all beneficial uses to be assessed. It is also the OWRB intent to accomplish this without having to reduce the number of lakes sampled annually.

A brief synopsis of the results from OWRB field sampling for each of the 47 lakes sampled in 2007-2008 as well as the 3 lakes sampled in 2006-2007 is discussed in alphabetical order on the following pages.

Comparison of pH Values to the OWQS for Sample Year 2007-2008 Not Supporting 11% Fully Supporting 89%

Figure 4. Percent of lakes assessed that exceeds or meets the WQS for pH.



Comparison of True Color Values to the OWQS

Figure 5. Percent of lakes assessed that exceeds or meets the WQS for true color.

62%

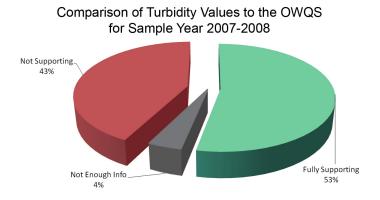


Figure 6. Percent of lakes assessed that exceeds or meets the WQS for turbidity.

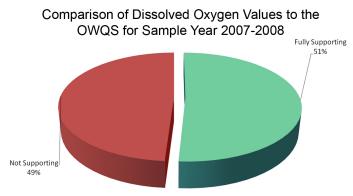


Figure 7. Percent of lakes assessed and their support status of the WQS for dissolved oxygen

Comparison of Chloride & Sulfate Values to the

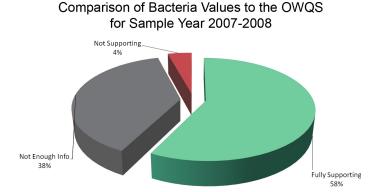


Figure 8. Percent of lakes assessed and their support status of the WQS for bacteria.

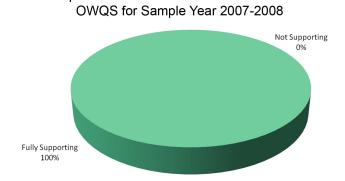


Figure 9. Percent of lakes assessed and their support status of the WQS for chlorides & sulfates.

American Horse

Sample PeriodTimes VisitedSampling SitesOctober 2007 - July 200843

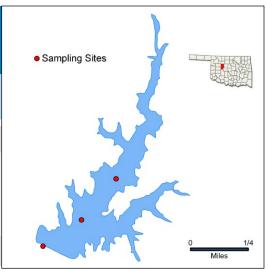
Lake Data

Location Blaine County
Impoundment 1966

Area 100 acres

Capacity 2,200 acre-feet

Purposes Recreation



		Parameter	Result	Notes/Comments
		Average Turbidity	13 NTU	Lake-wide average
		Average True Color	54 units	25% of values > OWQS of 70
		Average Secchi Disk Depth	118 cm	
		Water Clarity Rating	good	
		Trophic State Index	38	Previous value = 49
ত		Trophic Class	oligotrophic	
ete		Salinity	0.07 - 0.13 ppt	
Ĕ		Specific Conductivity	151.5 - 274.7 μS/cm	
Parameters	Profile	рН	7.01 - 8.08 pH units	
"	Pro	Oxidation-Reduction Potential	-4 to 551 mV	
		Dissolved Oxygen	Up to 60% of water column < 2 mg/L in July	
	ts	Surface Total Nitrogen	0.38 mg/L to 1.07 mg/L	
	Nutrients	Surface Total Phosphorus	0.018 mg/L to 0.053 mg/L	
	N	Nitrogen to Phosphorus Ratio	19:1	Phosphorus limited

	9										
			Turbidity	五	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
es	Fish & Wildlife Propagation		S	S	NS	NEI					
I Us	Aesthetics						S	NS			
Beneficial	Agriculture								S		
eue	Primary Body Contact Recreation									S	
m	Public & Private Water Supply										
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	Notes	Lab acciden	t – not en	ough data to	make an a	ssessmen	t			

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

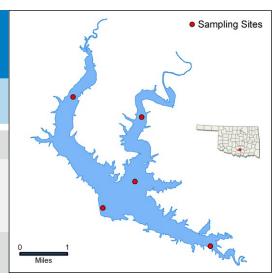
Arbuckle

Sample Period	Times Visited	Sampling Sites
November 2007 - August 2008	4	5

Location Murray County
Impoundment 1967

Area 2,350 acres
Capacity 72,400 acre-feet

Purposes Water Supply, Flood Control, Fish and Wildlife, and Recreation



		Parameter	Result	Notes/Comments
		Average Turbidity	5 NTU	All values < OWQS of 25 NTU
		Average True Color	22 units	All values < OWQS of 70
		Average Secchi Disk Depth	128 cm	
		Water Clarity Rating	Excellent	
		Trophic State Index	50	Previous value = 46
9	0	Trophic Class	mesotrophic	
Parameters		Salinity	0.19 – 0.30 ppt	
		Specific Conductivity	320- 511 μS/cm	
	Profile	pН	6.84 - 8.54 pH units	Neutral to slightly alkaline
ľ	۵	Oxidation-Reduction Potential	-57 to 499 mV	
		Dissolved Oxygen	Up to 73% of water column < 2 mg/L in August	
	y	Surface Total Nitrogen	0.43 mg/L to 0.71 mg/L	
	Nutrients	Surface Total Phosphorus	0.010 mg/L to 0.024 mg/L	
	Ž	Nitrogen to Phosphorus Ratio	33:1	Phosphorus limited

	Z	Nitrogen to Phosphorus Ratio	33:1				I	Phosphore	us limited	d		
				Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
Uses	Fish	& Wildlife Propagation		S	S	NS	S					
	Aest	hetics						S	S			
Beneficial	Agric	culture								S		
ene	Prim	ary Body Contact Recreation									S	
m	Publ	ic & Private Water Supply										
	NS	= Fully Supporting S = Not Supporting El = Not Enough Information	Notes	Lab accider	nt – not en	ough data to	o make an	ı assessme	ent			

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

Arcadia

Sample Period Times Visited Sampling Sites
October 2006 - August 2007 4 5

Take Data
Area
Capa

Location Oklahoma County

Impoundment 1986

Area 1,820 acres

Capacity 27,520 acre-feet

Purposes Water Supply, Flood Control, Recreation



		Parameter	Result	Notes/Comments
		Average Turbidity	42 NTU	30% of values > OWQS of 25 NTU
		Average True Color	53 units	10% of values > OWQS of 70
		Average Secchi Disk Depth	67 cm	
		Water Clarity Rating	average	
		Trophic State Index	58	
ပ္		Trophic Class	eutrophic	
Parameters		Salinity	0.10 – 0.20 ppt	
Ĕ		Specific Conductivity	209.7 - 422 μS/cm	
are	Profile	рН	7.32 - 8.47 pH units	Neutral to slightly alkaline
	P	Oxidation-Reduction Potential	148 to 415 mV	
		Dissolved Oxygen	Up to 38% of water column < 2 mg/L in August	
	ts	Surface Total Nitrogen	0.75 mg/L to 1.85 mg/L	
	Nutrients	Surface Total Phosphorus	0.025 mg/L to 0.231 mg/L	
	2	Nitrogen to Phosphorus Ratio	15:1	Phosphorus limited
				<u>L</u>

	2 Millogen to I nosphorus Ratio	J. I					Позрнон	us illilitet			
			Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
Uses	Fish & Wildlife Propagation		S	S	S	S					
	Aesthetics						S	S			
Beneficial	Agriculture								S		
ene	Primary Body Contact Recreation									NEI	
m	Public & Private Water Supply										
	S = Fully Supporting NS = Not Supporting	otes	to QA/QC i	ssues fo	al use cannot E.coli and E	nterococci	. The peaks	reported	in turbidity &	color are du	ie to

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

NEI = Not Enough Information

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

seasonal storm events and the lake is considered the supporting the Fish and Wildlife Propaga-

ppt = parts per thousand En = Enterococci

tion and Aesthetics beneficial uses.

Ardmore City

Sample Period	Times Visited	Sampling Sites
October 2006 - July 2007	4	3

Location Carter County

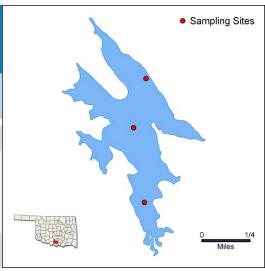
Impoundment 1910

Lake Data

Area 142 acres

Capacity 600 acre-feet

Purposes Recreation



		Parameter	Result		Notes/Comments			
		Average Turbidity	10 NTU		100% of values < O	WQS of 2	25 NTU	
		Average True Color	25 units	100% of values < OWQS of 70				
		Average Secchi Disk Depth	106 cm					
		Water Clarity Rating	excellent					
		Trophic State Index	52					
က္		Trophic Class	eutrophic					
ete		Salinity	0.13 – 0.18 ppt					
Parameters		Specific Conductivity	$278.6 - 365 \mu\text{S/cm}$					
are	Profile	рН	7.16 - 8.85 pH units		Neutral to slightly al	kaline		
<u> </u>	Pro	Oxidation-Reduction Potential	48 to 436 mV					
		Dissolved Oxygen	Up to 63% of water column August	n < 2 mg/L in				
	S S	Surface Total Nitrogen	0.32 mg/L to 0.62 mg/L					
	Nutrients	Surface Total Phosphorus	0.009 mg/L to 0.035 mg/L					
	2	Nitrogen to Phosphorus Ratio	22:1		Phosphorus limited			
				n n	olor	s, es	— ші	

			Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
Nses	Fish & Wildlife Propagation		S	S	NS	S					
	Aesthetics						S	S			
Beneficia	Agriculture								S		
ene	Primary Body Contact Recreation									S	
m	Public & Private Water Supply										
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	Notes									

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

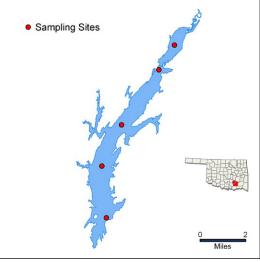
E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivolts

Chlor-a = Chlorophyll-a

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

A	toka			
	Sample P	eriod	Times Visited	Sampling Sites
(October 2006 -	July 2007	4	5
	Location	Atoka County		
ita	Impoundment	1964		
Lake Data	Area	5,700 acres		
Lak	Capacity	125,000 acre-feet		
	Purposes	Water Supply, Rec	creation	
	Paramet	er	Result	



	Pu	ırpo	oses	Water Supply, Recre	ation						A.		M	iles	
			Paramete	r	Result					Notes/Con	nments				
			Average T	urbidity	53 NTU					85% of valu	ues > O\	VQS of 25	NTU		
			Average T	rue Color	160 units					100% of va	lues > C	WQS of 70)		
			Average S	ecchi Disk Depth	33 cm										
			Water Cla	rity Rating	poor										
			Trophic St	ate Index	51										
ည			Trophic CI	ass	eutrophic										
ete			Salinity		0.01 - 0.0)4 ppt									
ä			Specific C	onductivity	44.1 – 97	.7 μS/cm	า								
Parameters	Profile		pН		6.36 - 8.4	11 pH un	iits			Only 12 val	ues (6.9	%) <6.5 pH	l units		
-	Pro	<u> </u>	Oxidation-	Reduction Potential	325 to 45	7 mV									
			Dissolved	Oxygen	Up to 50% August	% of wate	er colum	n < 2 mg/L	. in						
	S)	3	Surface To	otal Nitrogen	0.46 mg/L	to 1.06	mg/L								
	Nutrients	2	Surface To	otal Phosphorus	0.039 mg	/L to 0.1	05 mg/L								
	N To		Nitrogen to	Phosphorus Ratio	11:1					Phosphorus limited					
						>		eq _			olor	, s	ui		
						Turbidity		Dissolved Oxygen	Metals	_	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a	
						Ţ	표	Si X	ĕ	TSI	Ī	Sul	E S S S S S S S S S S S S S S S S S S S	딩	
es	Fis	sh 8	& Wildlife P	ropagation		NS	S	S	S						
SO I	Aes	sth	etics							S	NS				
ficia	Agı	ricu	ulture									S			
Beneficial Uses	Prii	ma	ry Body Co	ontact Recreation									S		
m	Pul	blic	& Private	Water Supply											

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

S = Fully Supporting

NS = Not Supporting

NEI = Not Enough Information

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

Notes

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

Bell Cow

Sample PeriodTimes VisitedSampling SitesOctober 2007 - July 200845

Result

Take Data
Area
Capa

Location Lincoln County

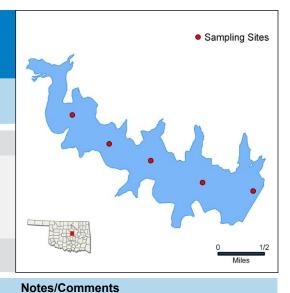
Impoundment 1990

Parameter

Area 1,153 acres

Capacity 15,613 acre-feet

Purposes Water Supply, Flood Control, Recreation



		Average Turbidity	22 NTU					30% of values > OWQS of 25 NTU								
		Average True Color	67 units					75% of val	ues > O'	WQS of 70						
		Average Secchi Disk Depth	54 cm													
		Water Clarity Rating	average													
		Trophic State Index	52													
S		Trophic Class	eutrophi	ic												
ete		Salinity	0.10 - 02													
am	4	Specific Conductivity		2 μS/cm												
Parameters	Profile	рH	7.18 - 8.	.49 pH ur	nits			Neutral to slightly alkaline								
	P.	Oxidation-Reduction Potential	34 to 43	4 mV												
		Dissolved Oxygen	Up to 50 August)% of wat	ter colur	mn < 2 mg/L	. in									
	छ	Surface Total Nitrogen	0.56 mg	/L to 0.92	2 mg/L											
	Nutrients	Surface Total Phosphorus	e Total Phosphorus 0.016 mg/L to 0.073 mg/L													
	N 22	Nitrogen to Phosphorus Ratio	24:1					Phosphoru	ıs limited	I						
				Turbidity	Hd	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a				
es	Fish	& Wildlife Propagation		NS	S	NS	S									
Beneficial Uses	Aest	hetics						S	NS							
ficia	Agric	culture								S						
ene	Prim	ary Body Contact Recreation									S					
ш	Publ	ic & Private Water Supply														
	NS	= Fully Supporting S = Not Supporting El = Not Enough Information	Notes													

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

Birch

Sample Period	Times Visited	Sampling Sites
November 2006 - August 2007	4	5

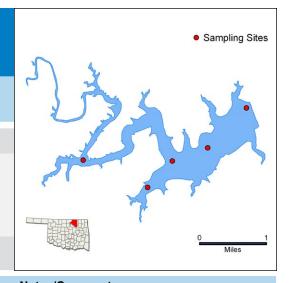
Location Osage County Impoundment 1977 Lake Data

Area 1,137 acres

19,200 acre-feet Capacity

Water Supply, Recreation, Flood Control, Water Quality Control Purposes

and Fish and Wildlife



		Parameter	Result				Notes/Comments							
		Average Turbidity	12 NTU					5% of value	es > OW	'QS of 25 N	ITU			
		Average True Color	55 units					30% of val	ues > O\	NQS of 70				
		Average Secchi Disk Depth	90 cm											
		Water Clarity Rating	good											
		Trophic State Index	52											
ပ္		Trophic Class	eutrophic											
ete		Salinity	0.03 - 0.0	9 ppt										
ä		Specific Conductivity	86.6 – 196	6.9 µS/0	cm									
Parameters	Profile	рН	6.47 - 7.9	2 pH u	nits			Only 5 valu	ues (2.9%	%) <6.5 pH	units			
-	Ā	Oxidation-Reduction Potential	4 to 482 n	to 482 mV										
		Dissolved Oxygen	Up to 73%	o to 73% of water column < 2 mg/L in May										
	ts	Surface Total Nitrogen	0.43 mg/L	to 0.82	2 mg/L									
	Nutrients	Surface Total Phosphorus	0.008 mg/	'L to 0.0)37 mg/L	•								
	Z	Nitrogen to Phosphorus Ratio	29:1					Phosphorus limited						
				Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a		
es	Fish	& Wildlife Propagation		S	S	NS	S							
I Us	Aestl	netics						S	S					
Beneficial Uses	Agric	culture								S				
ene	Prima	ary Body Contact Recreation									S			
m	Publi	c & Private Water Supply												

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

S = Fully Supporting

NS = Not Supporting

NEI = Not Enough Information

E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards

Notes

mV = millivoltsChlor-a = Chlorophyll-a mg/L = milligrams per liter μ S/cm = microsiemens/cm

Bixhoma

Sample Period Times Visited Sampling Sites
October 2005 - July 2006 4 3

Pare Data Area Capaci

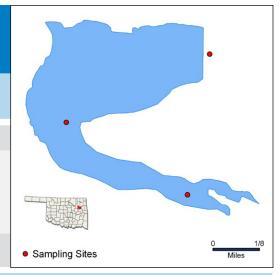
Location Wagoner County

Impoundment 1965

Area 110 acres

Capacity 3,130 acre-feet

Purposes Water Supply, Recreation



		Parameter	Result	Notes/Comments
		Average Turbidity	5 NTU	100% of values < OWQS of 25 NTU
		Average True Color	23 units	100% of values < OWQS of 70
		Average Secchi Disk Depth	146 cm	
		Water Clarity Rating	excellent	
		Trophic State Index	45	
က္		Trophic Class	mesotrophic	
ete		Salinity	0.01 – 0.05 ppt	
Ě		Specific Conductivity	47.4 – 127.5 μS/cm	
Parameters	Profile	рН	6.44 – 8.63 pH units	Only 3 (2.3%) values < 6.5 pH units
"	Pr	Oxidation-Reduction Potential	111 to 482 mV	
		Dissolved Oxygen	Up to 56% of water column < 2 mg/L in the fall & 67% in July	
	छ	Surface Total Nitrogen	0.25 mg/L to 0.45 mg/L	
	Nutrients	Surface Total Phosphorus	0.010 mg/L to 0.026 mg/L	
	Z	Nitrogen to Phosphorus Ratio	22:1	Phosphorus limited

			Turbidity	Hď	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
Nses	Fish & Wildlife Propagation		S	S	NS	S					
	Aesthetics						S	S			
Beneficial	Agriculture								S		
ene	Primary Body Contact Recreation									S	
Ш	Public & Private Water Supply										
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	Notes									

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

Bluestem

Sample Period Times Visited Sampling Sites
October 2005 - July 2006 4 5

Location Osage County

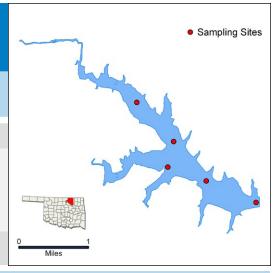
Impoundment 1958

Lake Data

Area 762 acres

Capacity 17,000 acre-feet

Purposes Water Supply, Recreation



		Parameter	Result	Notes/Comments
		Average Turbidity	14 NTU	10.5% of values > OWQS of 25 NTU
		Average True Color	20 units	100% of values < OWQS of 70
		Average Secchi Disk Depth	84 cm	
		Water Clarity Rating	average	
		Trophic State Index	44	
စ		Trophic Class	mesotrophic	
ete		Salinity	0.14 – 0.18 ppt	
Ĕ		Specific Conductivity	290.7 – 366.6 μS/cm	
Parameters	Profile	рН	7.18 – 8.41 pH units	
-	P.	Oxidation-Reduction Potential	113 to 437 mV	
		Dissolved Oxygen	Up to 53% of water column < 2 mg/L in July	Occurred at sites 1 and 5
	र	Surface Total Nitrogen	0.15 mg/L to 0.54 mg/L	
	Nutrients	Surface Total Phosphorus	0.016 mg/L to 0.132 mg/L	
	2	Nitrogen to Phosphorus Ratio	12:1	Phosphorus limited
			7	5

			Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
Nses	Fish & Wildlife Propagation		NS	S	NS	S					
	Aesthetics						S	S			
Beneficial	Agriculture								S		
ene	Primary Body Contact Recreation									S	
m	Public & Private Water Supply										
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	Notes									

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

Boomer

Times Visited Sample Period Sampling Sites October 2007 - July 2008 5

Impoundment Lake Data Area

Location

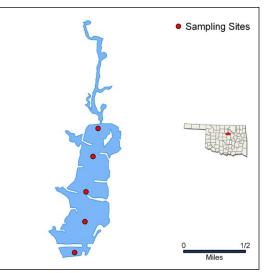
Payne County

1932

260 acres

Capacity 3,200 acre-feet

Purposes Cooling Water and Recreation



		Parameter	Resul	t				Notes/Comments							
		Average Turbidity	50 N	ΓU				75% of va	lues > 25	NTU					
		Average True Color	177 u	nits				75% of va	lues > O	WQS of 70					
		Average Secchi Disk Depth	32 cn	า											
		Water Clarity Rating	avera	ge											
		Trophic State Index	51					Previous v	alue = 5	3					
<u>0</u>		Trophic Class	eutro	phic											
ete		Salinity		0.16 ppt											
am	Φ	Specific Conductivity	191.4	- 322.1 µS/	/cm										
Parameters	Profile	pH	5.15 -	- 8.19 pH ui	nits			Only 1 value <6.5 units							
	4	Oxidation-Reduction Potential	33 to	606 mV											
		Dissolved Oxygen	100%	of water co	olumn <	2 mg/L in J	uly	Occurred at site 3							
	ts	Surface Total Nitrogen	0.60	mg/L to 1.09	9 mg/L										
	Nutrients	Surface Total Phosphorus	0.035	mg/L to 0.0)83 mg/	L									
	ž	Nitrogen to Phosphorus Ratio	17:1					Phosphore	us limited						
				Turbidity	Hd	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a			
S	Fish	& Wildlife Propagation		NS	S	NS	S								
Use	Aest	hetics						S	NS						
Beneficial Uses	Agric	culture								S					
nef	Prim	ary Body Contact Recreation									NS				
å	Publ	ic & Private Water Supply													
		= Fully Supporting S = Not Supporting	Notes	The PBCR three parar		ot supported	as 50% c	of reported va	lues exce	eded the scr	eening level	for all			

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

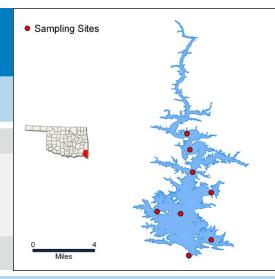
E. coli = Escherichia coli

NEI = Not Enough Information

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

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

Sample Period Times Visited Sampling Sites October 2005 - July 2006 4 8 Location McCurtain County Impoundment 1970 Area 14,200 acres Capacity 918,070 acre-feet Purposes Flood Control, Hydropower, Water Supply, Recreation, Fish &



		vviidiite										
		Parameter	Result					Notes/Cor	nments			
		Average Turbidity	4 NTU					100% of va	alues < C	DWQS of 2	5 NTU	
		Average True Color	14 units					100% of va	alues <	OWQS of 7	' 0	
		Average Secchi Disk Depth	293 cm									
		Water Clarity Rating	excellent									
		Trophic State Index	35									
ည		Trophic Class	oligotrophic									
ete		Salinity	0.0 - 0.05 pp	ot								
Ĕ		Specific Conductivity	25.3 – 66.4 µ	uS/cm	า							
Parameters	Profile	рН	5.73 – 7.56 p	oH un	iits			69% of rec	orded va	alues < 6.5	pH units	
	Pr	Oxidation-Reduction Potential	193 to 532 m	ηV								
		Dissolved Oxygen	Up to 66% of all and up to			n < 2 mg/l	in the					
	छ	Surface Total Nitrogen	0.07 mg/L to	0.39	mg/L							
	Nutrients	Surface Total Phosphorus	0.008 mg/L t	0.0	15 mg/L							
	2	Nitrogen to Phosphorus Ratio	19:1					Phosphoru	s limited			
			<u>.</u> 	y Digity	-	issolved xygen	etals	<u> </u>	ue Color	ulfates, hlorides TDS	n, ecal	hlor-a

	Nitrogen to Phosphorus Ratio 19	9:1 Phosphorus limited									
Beneficial Uses			Turbidity	Hd	Dissolved Oxygen	Metals	IS1	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
	Fish & Wildlife Propagation		S	NS*	NS	S					
	Aesthetics						S	S			
	Agriculture								S		
	Primary Body Contact Recreation									S	
	Public & Private Water Supply										
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	Notes	*Slightly acidic conditions are not unusual in this part of the state due to relatively low soil pH and lack of soluble bedrock. Because of these conditions it is likely that the low pH values may be due to natural causes; therefore the Water Board is looking at the applicability of developing site-specific criteria for waters in the southeastern portion of the state.								

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

Brushy Creek

Sample Period Times Visited Sampling Sites

October 2007 - July 2008 4 5

Location Sequoyah County

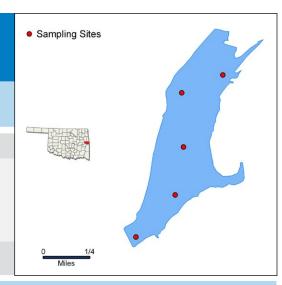
Impoundment 1964

Lake Data

Area 358 acres

Capacity 3,258 acre-feet

Purposes Flood Control and Recreation



		Parameter	Result	Notes/Comments
		Average Turbidity	10 NTU	25% of values > 25 NTU
		Average True Color	41 units	25% of values > OWQS of 70
		Average Secchi Disk Depth	103 cm	
		Water Clarity Rating	good	
		Trophic State Index	53	Previous value = 51
က်		Trophic Class	eutrophic	
ete		Salinity	0.00 - 0.10 ppt	
am		Specific Conductivity	36.3 - 605 μS/cm	
Parameters	rofile	рН	6.02 - 8.12 pH units	Only 7 values < 6.5 units
	Pr	Oxidation-Reduction Potential	33 to 606 mV	
		Dissolved Oxygen	Up to 69% of water column < 2 mg/L in July	Occurred at site 1, the dam
	ts.	Surface Total Nitrogen	0.38 mg/L to 0.72 mg/L	
	Nutrients	Surface Total Phosphorus	0.016 mg/L to 0.050 mg/L	
	Ž	Nitrogen to Phosphorus Ratio	20:1	Phosphorus limited

			Turbidity	五	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
es	Fish & Wildlife Propagation		S	S	NS	S					
II Uses	Aesthetics						S	S			
Beneficial	Agriculture								S		
ene	Primary Body Contact Recreation									S	
m	Public & Private Water Supply										
S = Fully Supporting NS = Not Supporting NEI = Not Enough Information Precipitation data suggests the peak in color & turbidity are likely uses are considered supporting.							due to runo	ff, therefore	the		

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

Burtschi

Sample Period	Times Visited	Sampling Sites
November 2005 - August 2006	4	3

Location Grady County

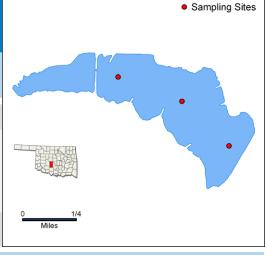
Impoundment 1958

Lake Data

Area 180 acres

Capacity 2,140 acre-feet

Purposes Recreation



		Parameter	Result	Notes/Comments
		Average Turbidity	11 NTU	100% of values < OWQS of 25 NTU
		Average True Color	18 units	100% of values < OWQS of 70
		Average Secchi Disk Depth	72 cm	
		Water Clarity Rating	good	
		Trophic State Index	63	
က္		Trophic Class	hypereutrophic	
ete		Salinity	0.53 – 0.67 ppt	
Ĕ		Specific Conductivity	1011 – 1273 μS/cm	
Parameters	Profile	рН	7.19 – 10.74 pH units	16% of values were > 9 pH units
т.	Pro	Oxidation-Reduction Potential	42 to 428 mV	
		Dissolved Oxygen	Up to 38% of water column < 2 mg/L in August	
	ts	Surface Total Nitrogen	0.92 mg/L to 1.82 mg/L	
	Nutrients	Surface Total Phosphorus	0.027 mg/L to 0.109 mg/L	
	Ž	Nitrogen to Phosphorus Ratio	24:1	Phosphorus limited

			Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
Nses	Fish & Wildlife Propagation		S	NS	S	S					
	Aesthetics						S	S			
Beneficial	Agriculture								S		
ene	Primary Body Contact Recreation									S	
ш	Public & Private Water Supply										
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	Notes									

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

E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivolts

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

Canton

Lake Data

Sample Period Times Visited Sampling Sites
October 2005 - July 2006 4 5

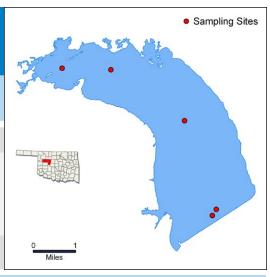
Location Blaine County

Impoundment 1948

Area 7,910 acres

Capacity 111,310 acre-feet

Purposes Flood Control, Water Supply, Irrigation



			mments	Notes/Com					Result	Parameter		
	15% of values > OWQS of 25 NTU								16 NTU	Average Turbidity		
	100% of values < OWQS of 70								18 units	Average True Color		
									63 cm	Average Secchi Disk Depth		
									average	Water Clarity Rating		
					57					Trophic State Index		
								С	eutrophic	Trophic Class		က္
								.93 ppt	0.63 - 0.	Salinity		ete
				cm	749 µS	1201 – 1	Specific Conductivity		Ĕ			
		kaline	slightly al	Neutral to s	7.51– 8.49 pH units					рН	Profile	Parameters
					368 to 487 mV				368 to 48	Oxidation-Reduction Potential	Pro	-
		and 2	at sites 1	Occurred a	in	ın < 2 mg/L	er colum	% of wa	Up to 25 th July	Dissolved Oxygen		
							3 mg/L	_J /L to 1.0	0.63 mg	Surface Total Nitrogen	ts	
							67 mg/L	g/L to 0.	0.033 mg	Surface Total Phosphorus	trien	
			us limited	Phosphorus					13:1	Nitrogen to Phosphorus Ratio	Z	
	ui	s,	olor			р —		>				
Chlor-a	ecal i, & E	fate: loride 'DS	e Cc	_	tals	solv		bidit				
S	<u> </u>	Sul Ch T	T	TS	Μ	S O	F	TuT				
	En,ecal coli, & E. coli	Sulfates, Chlorides Chlorides CTDS			ui Metals	_	3 mg/L 67 mg/L	_J /L to 1.0	July 0.63 mg 0.033 mg	Dissolved Oxygen Surface Total Nitrogen Surface Total Phosphorus	Nutrients	

			Turbidity	Hd	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
Nses	Fish & Wildlife Propagation		NS	S	S	S					
	Aesthetics						S	S			
Beneficial	Agriculture								S		
eue	Primary Body Contact Recreation									S	
m	Public & Private Water Supply										
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	Notes									

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

Carl Albert

Sample PeriodTimes VisitedSampling SitesOctober 2007 - July 200843

Location Latimer County

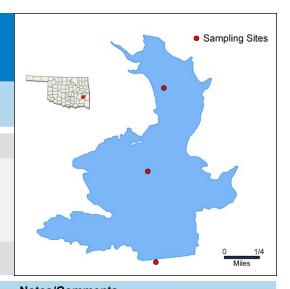
Impoundment 1964

Lake Data

Area 183 acres

Capacity 2,739 acre-feet

Purposes Water Supply, Flood Control, and Recreation



		Parameter	Resul	lt				Notes/Con	nments			
		Average Turbidity	14 N	TU				All values <	< 25 NT	J		
		Average True Color	72 un	its				50% of value	ues > O\	WQS of 70		
		Average Secchi Disk Depth	90 cn	n								
		Water Clarity Rating	good									
		Trophic State Index	41					Previous va	alue = 4	1		
က္		Trophic Class	meso	trophic								
ete		Salinity	0.00 -	0.01 ppt								
am		Specific Conductivity	36 - 9	97 μS/cm								
Parameters	Profile	pH	5.8 -	7.32 pH un	nits			21% of val	ues <6.	5 units		
_	P.	Oxidation-Reduction Potential	22 to	553 mV								
		Dissolved Oxygen	Up to		ater colur	mn < 2 mg/	L in	Occurred a	at site 1,	the dam		
	ß	Surface Total Nitrogen	0.28 r	ng/L to 0.4	9 mg/L							
	Nutrients	Surface Total Phosphorus	0.013	mg/L to 0.0	031 mg/L	-						
	Z	Nitrogen to Phosphorus Ratio	16:1					Phosphoru	s limited			
				dity		Dissolved Oxygen	<u>s</u>		True Color	ites, rides iS	— ы Б Б	ģ
				Turbidity	표	Disso	Metals	TSI	True	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
ses	Fish	& Wildlife Propagation		S	NS	NS	*					
ž	Aestl	netics						S	NS			
Beneficial Uses	Agric	ulture								S		
ene	Prima	ary Body Contact Recreation									S	
<u> </u>	Publi	c & Private Water Supply										
	NS	Fully Supporting = Not Supporting I = Not Enough Information	Notes	*Not supp	orting for I	ead as chror	nic criteria	ı was exceede	ed. All oth	er toxicants	are fully sup	porting.

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

Carl Blackwell

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

Location Payne County

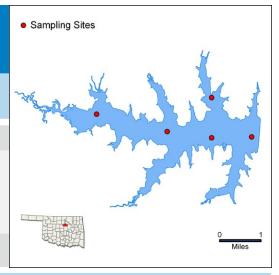
Impoundment 1937

Lake Data

Area 3,370 acres

Capacity 61,500 acre-feet

Purposes Water Supply and Recreation



		Parameter	Resul	t				Notes/Co	mments			
		Average Turbidity	40 N	ΓU				60% of val	ues > 25	NTU		
		Average True Color	119 ur	nits				60% of val	ues > O	WQS of 70		
		Average Secchi Disk Depth	37 cn	า								
		Water Clarity Rating	avera	ge								
		Trophic State Index	53					Previous v	alue = 5	6		
စ		Trophic Class	eutro	phic								
ete		Salinity	0.14 -	0.20 ppt								
Ĕ		Specific Conductivity	287 -	393.4 μS/c	m							
Parameters	Profile	рH	7.18 -	- 8.70 pH ui	nits			Neutral to	slightly a	ılkaline		
-	P	Oxidation-Reduction Potential	-8 to	496 mV								
		Dissolved Oxygen	Up to July	57% of wa	ter colu	mn < 2 mg/l	_ in	Occurred	at site 1	the dam		
	S.	Surface Total Nitrogen	0.71 ו	mg/L to 1.14	4 mg/L							
	Nutrients	Surface Total Phosphorus	0.025	mg/L to 0.0	70 mg/l	L						
	N 22	Nitrogen to Phosphorus Ratio	23:1					Phosphoru	us limited	I		
						ъ			or	(A)		
				idity		olve	<u>8</u>		Sol	ites, ride	Sa ⊞ A	à
				Turbidity	표	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
(n	Fish	& Wildlife Propagation		NS	S	NS	S	•	•	0, 0 0		J
Se		• •		110		110						
	Aest	hetics						S	NS			
ficia	Agric	culture								S		
Beneficial Uses	Prim	ary Body Contact Recreation									NS	
m	Publ	ic & Private Water Supply										
	NS	= Fully Supporting S = Not Supporting El = Not Enough Information	Notes	The PBCR	use is n	ot supported	as 20% d	of enterococci	values ex	ceeded the	screening le	vel.

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

E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivolts

mV = millivolts Chlor-a = Chlorophyll-a mg/L = milligrams per liter μS/cm = microsiemens/cm

Carl Etling

Sample Period Times Visited Sampling Sites
September 2003 – June 2004 4 3

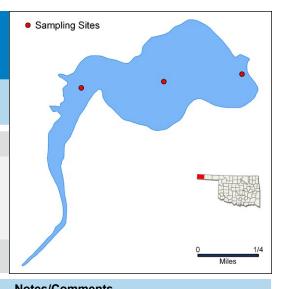
Location Cimarron County

Impoundment 1958

Area 159 acres

Capacity 1717 acre-feet

Purposes Recreation



		Parameter	Re	sult					Notes/Con	nments			
		Average Turbidity	65	NTU					75% of valu	ues > O	WQS of 25	NTU	
		Average True Color	18	units					100% of va	lues < 0	OWQS of 70	כ	
		Average Secchi Disk Depth	22	cm									
		Water Clarity Rating	fai	r									
		Trophic State Index	72										
S		Trophic Class	hy	pereutroph	ic								
ete		Salinity	0.9	90 – 1.4 ppi	t								
am	0	Specific Conductivity	16	88 – 2596	µS/cr	n							
Parameters	Profile	рН	8.1	18 – 9.42 pl	H uni	its			28% of rec	orded v	alues > 9.0	pH units	
	ā	Oxidation-Reduction Potential	26	9 to 499 m	V								
		Dissolved Oxygen		Lake well-mixed – not stratified									
	ts	Surface Total Nitrogen	2.3	31 mg/L to 4	4.51	mg/L							
	Nutrients	Surface Total Phosphorus	0.1	122 mg/L to	0.29	93mg/L							
	Z	Nitrogen to Phosphorus Ratio	16	:1					Phosphoru	s limited	t		
				>:			p ₋			olor	es,	_ ni	
				Turbidity			Dissolved Oxygen	Metals	_	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
				Ē		펍	i≝ ŏ	Σ	ISI	그	S C S	프 8 8	ਠ
S	Fish	& Wildlife Propagation		NS	3	NS	S	S					
Use	Aest	hetics							NS*	S			
Beneficial Uses	Agric	culture									S		
nefi	Prim	ary Body Contact Recreation										S	
Be	Publ	ic & Private Water Supply											
	NS	= Fully Supporting S = Not Supporting EI = Not Enough Information	*1 by						that the Aesthet m non-support		icial use is co	nsidered thre	atened

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

E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivolts

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

Carter

Lake Data

Sample Period	Times Visited	Sampling Sites
November 2007 - August 2008	4	3

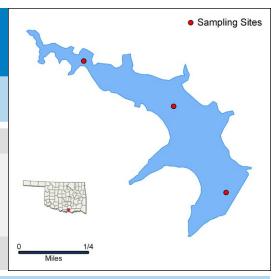
Location Marshall County

Impoundment 1960

Area 108 acres

Capacity 990 acre-feet

Purposes Water Supply and Recreation



			Parameter	Result	Notes/Comments
			Average Turbidity	7 NTU	All values < 25 NTU
			Average True Color	25 units	All Values < OWQS of 70
			Average Secchi Disk Depth	121 cm	
			Water Clarity Rating	excellent	
			Trophic State Index	40	Previous value = 40
	ဖ		Trophic Class	oligotrophic	
,	Parameters		Salinity	0.10 - 0.20 ppt	
			Specific Conductivity	212 – 325 μS/cm	
	ar	Profile	pH	6.98 – 8.33 pH units	Neutral to slightly alkaline
	٠	Pro	Oxidation-Reduction Potential	60 to 557 mV	
			Dissolved Oxygen	Up to 44% of water column < 2 mg/L in August	Occurred at site 1, the dam
		ß	Surface Total Nitrogen	0.41 mg/L to 0.54 mg/L	
		Nutrients	Surface Total Phosphorus	0.011 mg/L to 0.018 mg/L	
		Z	Nitrogen to Phosphorus Ratio	37:1	Phosphorus limited

			Turbidity	Hd	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
Nses	Fish & Wildlife Propagation		S	S	S	S					
	Aesthetics						S	S			
Beneficial	Agriculture								S		
ene	Primary Body Contact Recreation									S	
ш	Public & Private Water Supply										
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	Notes									

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

Cedar

Lake Data

Sample Period	Times Visited	Sampling Sites
October 2005 - July 2006	4	3

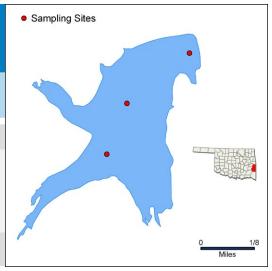
Location Le Flore County

Impoundment 1937

Area 78 acres

Capacity 1,000 acre-feet

Purposes Recreation



Average True Color 19 units 100% of Average Secchi Disk Depth 162 cm Water Clarity Rating excellent	f values < OWQS of 25 NTU f values < OWQS of 70
Average Secchi Disk Depth 162 cm Water Clarity Rating excellent	f values < OWQS of 70
Water Clarity Rating excellent	
T 1: 0: 1 1 1 50	
Trophic State Index 53	
v Trophic Class eutrophic	
Salinity 0.0– 0.09 ppt	
Specific Conductivity 4.9 – 195.7 µS/cm	
Salinity Specific Conductivity Description Salinity Specific Conductivity Specific Conductivity 4.9 – 195.7 µS/cm pH 5.43– 9.16 pH units 36% of v Oxidation-Reduction Potential 18 to 560 mV	values < 6.5 and 6% >9 pH units
Oxidation-Reduction Potential 18 to 560 mV	
Dissolved Oxygen Up to 70% of water column < 2 mg/L in July Occurred	ed at site 1, the dam
Surface Total Nitrogen 0.34 mg/L to 0.84 mg/L	
Surface Total Phosphorus 0.019 mg/L to 0.376 mg/L Nitrogen to Phosphorus Ratio 7:1 Possibly	
Nitrogen to Phosphorus Ratio 7:1 Possibly	co-limited

		Turbidity	Hd	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
es	Fish & Wildlife Propagation	NS	NS	S	S					
l Uses	Aesthetics					S	S			
Beneficial	Agriculture							S		
enel	Primary Body Contact Recreation								S	
M	Public & Private Water Supply									
		011 1 11								

S = Fully Supporting NS = Not Supporting

NEI = Not Enough Information

Slightly acidic conditions are not unusual in this part of the state due to relatively low soil pH and lack of soluble bedrock. Due to these conditions it is likely that the low pH values may be due to natural causes; therefore the Water Board is looking at the applicability of developing site-specific criteria for waters in the southeastern portion of the state.

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 μ S/cm = microsiemens/cm

Chandler Sample Period

Sample PeriodTimes VisitedSampling SitesOctober 2007 - July 200843

Result

Location Lincoln County

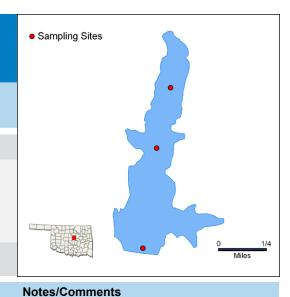
Impoundment 1960

Area 129 acres

Parameter

Capacity 2,778 acre-feet

Purposes Water Supply and Recreation



		Average Turbidity	29 NTU					58% of va	ues > 25	NTU		
		Average True Color	59 units					25% of va	ues > O	WQS of 70		
		Average Secchi Disk Depth	39 cm									
		Water Clarity Rating	average									
		Trophic State Index	60					Previous v	alue = 5	0		
ပ္		Trophic Class	eutrophi	С								
ete		Salinity	0.10 - 0.	.18 ppt								
Parameters		Specific Conductivity	268 – 36	65.7 µS/c	m							
ara	Profile	pН	7.35 - 8	.82 pH u	nits			Neutral to	slightly a	lkaline		
4	P	Oxidation-Reduction Potential	23 to 53	33 mV								
		Dissolved Oxygen	Up to 6	2% of wa	iter colui	mn < 2 mg/	L in	Occurred	at site 1	the dam		
	t)	Surface Total Nitrogen	0.82 mg	/L to 1.59	mg/L							
	Nutrients	Surface Total Phosphorus	0.036 m	g/L to 0.0)82 mg/l	_						
	N	Nitrogen to Phosphorus Ratio	27:1					Phosphoru	us limited	I		
				Turbidity	五	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
es	Fish	& Wildlife Propagation		NS	S	NS						
Beneficial Uses	Aestl	hetics						S	NS			
ficia	Agric	culture								S		
eue	Prima	ary Body Contact Recreation									S	
m	Publi	ic & Private Water Supply					S					
	NS	= Fully Supporting S = Not Supporting EI = Not Enough Information	Notes									

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

μS/cm = microsiemens per centime E. coli = Escherichia coli OWQS = Oklahoma Water Quality Standards mV = millivolts

Chlor-a = Chlorophyll-a

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

Chickasha

Sampling Sites Sample Period Times Visited 5 November 2006 - August 2007

Impoundment Lake Data

Location

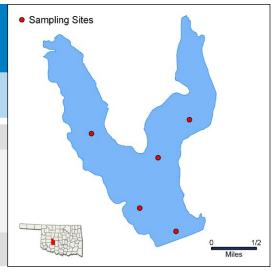
Caddo County

1958

Area 820 acres

41,080 acre-feet Capacity

Purposes Water Supply, Recreation



		Parameter	Result	Notes/Comments
		Average Turbidity	10 NTU	100% of values < OWQS of 25 NTU
		Average True Color	23 units	100% of values < OWQS of 70
		Average Secchi Disk Depth	64 cm	
		Water Clarity Rating	good	
		Trophic State Index	62	
<u>v</u>		Trophic Class	hypereutrophic	
ete		Salinity	1.01 – 2.11 ppt	
am	_	Specific Conductivity	1884 – 3872 μS/cm	
Parameters	Profile	рН	7.02 – 8.30 pH units	Neutral to slightly alkaline
-	Pr	Oxidation-Reduction Potential	-141 to 498 mV	
		Dissolved Oxygen	Up to 57% of water column < 2 mg/L in July	
	t)	Surface Total Nitrogen	1.61 mg/L to 3.72 mg/L	
	Nutrients	Surface Total Phosphorus	0.016 mg/L to 0.082 mg/L	
	Z	Nitrogen to Phosphorus Ratio	61:1	Phosphorus limited

			Turbidity	Hd	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
Nses	Fish & Wildlife Propagation		S	S	NS	S					
	Aesthetics						NS	S			
Beneficial	Agriculture								Sulfate		
ene	Primary Body Contact Recreation									S	
—	Public & Private Water Supply										
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	Notes	ited Waters	shed (NL)	y listed in the W). This listing ve study can	ig means th	nat the lake	is conside	ered threater	ed from nuti	

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

Claremore

Sample PeriodTimes VisitedSampling SitesNovember 2005 - August 200635

Impounding Area
Capacity

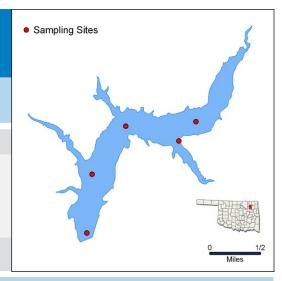
Location Rogers County

Impoundment 1930

Area 470 acres

Capacity 7,900 acre-feet

Purposes Water Supply, Recreation



		Parameter	Result				Notes/Cor	nments					
		Average Turbidity	•	9 NTU					13% of val	ues > O'	WQS of 25	NTU	
		Average True Color	2	24units					100% of va	alues <	OWQS of 7	0	
		Average Secchi Disk Depth	4	11 cm									
		Water Clarity Rating	Ç	jood									
		Trophic State Index	(67									
S		Trophic Class	ł	nypereutrophic	:								
ete		Salinity	().11– 0.12 ppt									
am		Specific Conductivity	2	242 – 257.4 μS	S/cm								
Parameters	Profile	pН	7	7.03– 8.10 pH	l unit	S							
	P	Oxidation-Reduction Potential	2	252 to 454 mV	,								
		Dissolved Oxygen		Jp to 29% of v May	vater	colum	n < 2 mg/	L in	Occurred	at site 1	the dam		
	S	Surface Total Nitrogen	().91 mg/L to 2	2.00 r	ng/L							
	Nutrients	Surface Total Phosphorus	(0.072 mg/L to	72 mg/L to 0.193 mg/L								
	Z	Nitrogen to Phosphorus Ratio		2:1					Phosphoru	ıs Limite	d		
							p			ō	. S	:	
				Turbidity			Dissolved Oxygen	Metals		True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
				Ţ		표	Ox)	Met	ISI	Ę	Sulf Chi	Soli,	S
S	Fish	& Wildlife Propagation		*		S	S	S					
Use	Aest	thetics							NS**	*			
cial	Agri	culture									S		
Beneficial Uses	Prim	nary Body Contact Recreation										S	
Be	Publ	lic & Private Water Supply											
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information *An assessment of the Fish & Wildlife Propagation (FWP) and Aesthetics beneficial use based on turbidity and color cannot be made at this time as minimum data requirements were not met for this sample year. **The lake is listed in the WQS as a NLW indicating that the Aesthetics beneficial use is considered threatened by nutrients until studies can be conducted to confirm non-support status.												

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

OWQS = Oklahoma Water Quality Standards mV = millivolts mg/L = milligrams per liter μS/cm = microsiemens/cm ppt = parts per thousand En = Enterococci

Chlor-a = Chlorophyll-a

Clear Creek

Sample Period Times Visited Sampling Sites

November 2006 - August 2007 4 5

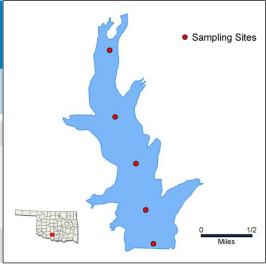
Location Stephens County

Impoundment 1948

Area 722 acres

Capacity 7,711 acre-feet

Purposes Water Supply, Recreation



		Parameter	Result		Notes/Comments		
		Average Turbidity	12 NTU		100% of values < 0	WQS of 25 NTU	
		Average True Color	32 units		25% of values > OV	/QS of 70	
		Average Secchi Disk Depth	70 cm				
		Water Clarity Rating	average				
		Trophic State Index	58				
ပ္		Trophic Class	eutrophic				
ete		Salinity	0.22 – 0.40 ppt				
) W		Specific Conductivity	441.1 – 771 μS/cm				
Parameters	Profile	pН	7.21 – 8.34 pH units		Neutral to slightly al	kaline	
_	Pr	Oxidation-Reduction Potential	-109 to 443 mV				
		Dissolved Oxygen	Up to 11% of water column	n < 2 mg/L in May			
	S.	Surface Total Nitrogen	0.66 mg/L to 0.96 mg/L				
	Nutrients	Surface Total Phosphorus	0.020 mg/L to 0.059 mg/L				
	Ž	Nitrogen to Phosphorus Ratio	25:1		Phosphorus limited		
			rţ.	ved 	olor	SS, des	Ø

		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation	S	S	S	S					
Uses	Aesthetics					S	S			
Beneficial	Agriculture							S		
enef	Primary Body Contact Recreation								NEI	
ğ	Public & Private Water Supply									

NTU = nephelometric turbidity units μS/cm = microsiemens per centimeter

S = Fully Supporting

NS = Not Supporting

NEI = Not Enough Information

E. coli = Escherichia coli

QC issues for E.coli. The peak reported in color is due to seasonal storm events and the lake is considered the supporting the Aesthetics beneficial uses.

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

The PBCR beneficial use cannot be assessed as minimum data requirement were not met due to QA/

ppt = parts per thousand En = Enterococci

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

Cleveland City

Sample Period Times Visited Sampling Sites 4 November 2006 - August 2007 3

Result

Location Lake Data Area

Pawnee County

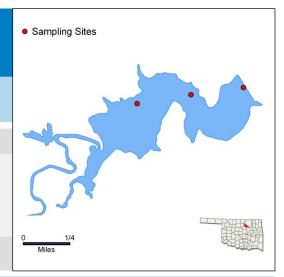
Impoundment 1936

Parameter

159 acres

Capacity 2,200 acre-feet

Water Supply, Recreation Purposes



Notes/Comments

		i didiliotoi	itoouit					110100,001				
		Average Turbidity	17 NTU					8% of valu	es >OW	QS of 25 N	TU	
		Average True Color	63 units	;				25% of val	ues > O	WQS of 70		
		Average Secchi Disk Depth	56 cm									
		Water Clarity Rating	average)								
		Trophic State Index	56									
က		Trophic Class	eutroph	ic								
ete		Salinity	0.08 - 0.0).11 ppt								
ä		Specific Conductivity	173.3 –	235.3 μS	S/cm							
Parameters	Profile	рН	6.93 – 8	3.64 pH u	nits			Neutral to	slightly a	alkaline		
	P	Oxidation-Reduction Potential	82 to 43	88 mV								
		Dissolved Oxygen	Up to 70	0% of wat	ter colun	nn < 2 mg/L	in May					
		Surface Total Nitrogen	0.85 mc	J/L to 1.24	4 ma/l							
	Nutrients	Surface Total Phosphorus	-	ng/L to 0.0	~							
	r <u>t</u>	·		ig/L to o.c	Joo mg/L	-						
	Z	Nitrogen to Phosphorus Ratio	30:1					Phosphoru	s limited	i		
						ъ			or	ω		
				idity		olve yen	<u>s</u>		$\overline{\circ}$	ates ride SS	cal & E	ā
				Turbidity	표	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
40	Fish	& Wildlife Propagation		S	S	NS	S			0,0 %	шоо	J
Ses								0	_			
2	Aest	hetics						S	S			
icia	Agric	culture								S		
Beneficial Uses	Prim	ary Body Contact Recreation									NEI	
ä	Publ	ic & Private Water Supply										
	NS	= Fully Supporting S = Not Supporting El = Not Enough Information	The PB QC issu conside	ues for ente	erococci.		oorted in c	olor is due to		ment were n		

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

OWQS = Oklahoma Water Quality Standards mV = millivolts

mg/L = milligrams per liter μS/cm = microsiemens/cm ppt = parts per thousand En = Enterococci

Chlor-a = Chlorophyll-a

Clinton

Sampling Sites Sample Period Times Visited 5 October 2003 - July 2004

Impoundment 1931 Lake Data Area

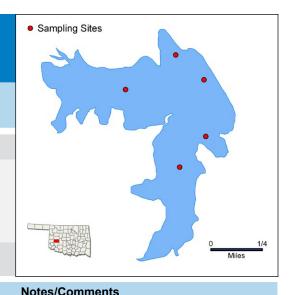
Location

Washita County

335 acres

Capacity 3,980 acre-feet

Purposes Water Supply, Recreation



		Parameter	Result					Notes/Con	nments						
		Average Turbidity	67 NTU					100% of va	alues > C	WQS of 28	5 NTU				
		Average True Color	36 units					15% of value	ues > O\	NQS of 70					
		Average Secchi Disk Depth	23 cm												
		Water Clarity Rating	poor												
		Trophic State Index	66												
S		Trophic Class	hypereut	rophic											
Parameters		Salinity	0.23 - 0.	33 ppt											
am		Specific Conductivity	460.4 – 6	642.9 μS	i/cm										
ar	Profile	рН	8.00 - 8.	74 pH u	nits			Alkaline							
Ť.	Pr	Oxidation-Reduction Potential	149 to 53	34 mV											
		Dissolved Oxygen						Lake well-r	nixed –	not stratifie	d				
	S	Surface Total Nitrogen	1.36 mg/	L to 3.06	6 mg/L										
	Nutrients	Surface Total Phosphorus	0.089 mg	g/L to 0.2	244 mg/L	-									
	N P	Nitrogen to Phosphorus Ratio	13:1					Phosphoru	s limited						
						σ			o	Ø					
				dity		olve	<u>8</u>		CO	ites, ride: S	— ж Е	ت م			
				Turbidity	Ŧ	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E coli	Chlor-a			
	Fich	& Wildlife Propagation		NS	S	S	S			0,0 &	шоо	O			
ses	1 1511	& Wilding Fropagation		NO	3	3	3								
ı	Aestl	hetics						NS*	NS						
cial	Agric	culture								S					
Beneficial Uses	Prim	ary Body Contact Recreation									NS**				
B	Publi	c & Private Water Supply													
	NS	F Fully Supporting S = Not Supporting EI = Not Enough Information	threaten	ed by nut	rients unt	il studies can	be cond	ng that the Aes ucted to confir	rm non-sı	ipport status		ed			

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

OWQS = Oklahoma Water Quality Standards mV = millivolts

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

ppt = parts per thousand En = Enterococci

Chlor-a = Chlorophyll-a

Coalgate City

Sample Period Times Visited Sampling Sites
October 2006 - July 2007 4 5

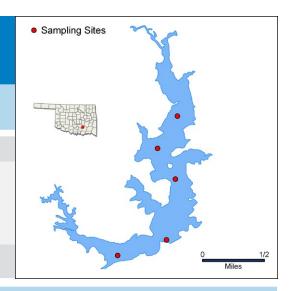
Location Coal County

Impoundment 1965

Area 352 acres

Capacity 3,437 acre-feet

Purposes Water Supply, Recreation and Flood Control



		Parameter	Result					Notes/Cor	nments			
		Average Turbidity	92 NTU					85% of val	ues > O\	VQS of 25	NTU	
		Average True Color	249 units	3				100% of va	alues > C	WQS of 70)	
		Average Secchi Disk Depth	26 cm									
		Water Clarity Rating	poor									
		Trophic State Index	47									
2		Trophic Class	mesotro	phic								
ete		Salinity	0.01 – 0.									
äï	o)	Specific Conductivity	47.1 – 72	•								
Parameters	Profile	pН	6.32– 8.0	03 pH un	its			Only 8 (8%) of vale	s < 6.5 pH	units	
	7	Oxidation-Reduction Potential	230 to 4	45 mV								
		Dissolved Oxygen	Up to 71	% of wat	er colum	n < 2 mg/L	in July	Occurred	at site 2			
	Ŋ	Surface Total Nitrogen	0.90 mg/	L to 1.43	mg/L							
	Nutrients	Surface Total Phosphorus	0.061 mg	g/L to 0.1	55 mg/L							
	N To	Nitrogen to Phosphorus Ratio	13:1					Phosphoru	s limited			
						ъ			or	. ග		
				idity		olve gen	<u>s</u>		SO	ates, ride	cal & E	ā
				Turbidity	표	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
(0	Fis	h & Wildlife Propagation		NS	S	NS	S	,	,	0, 0 0		
Beneficial Uses	Aes	sthetics						S	NS			
<u>a</u>										0		
ij	_	iculture								S		
ene	Pri	mary Body Contact Recreation									NEI	
ă	Pul	olic & Private Water Supply										
	٨	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	The PB0 QC issu	CR benefices for feca			essed as	minimum daf	a require	ment were n	ot met due to	o QA/

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

Comanche

Sample Period Times Visited Sampling Sites

October 2007 - July 2008 4 3

Location Stephens County

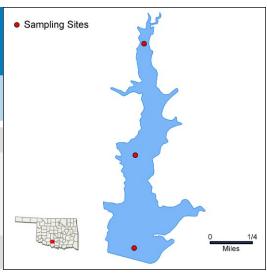
Impoundment 1960

Lake Data

Area 184 acres

Capacity 2,500 acre-feet

Purposes Water Supply and Recreation



		Parameter	Result	Notes/Comments
		Average Turbidity	10 NTU	All values < 25 NTU
		Average True Color	34 units	All values < OWQS of 70
		Average Secchi Disk Depth	87 cm	
		Water Clarity Rating	good	
		Trophic State Index	49	Previous value = 46
SIC		Trophic Class	mesotrophic	
Jete		Salinity	0.12 - 0.18 ppt	
Parameters	<u>o</u>	Specific Conductivity	254 – 359 μS/cm	
Ра	Profile	рН	7.39 – 8.46 pH units	Neutral to slightly alkaline
	Δ.	Oxidation-Reduction Potential	18 to 625 mV	
		Dissolved Oxygen	36% of water column < 2 mg/L in July	Occurred at site 1, the dam
	ıts	Surface Total Nitrogen	0.52 mg/L to 0.88 mg/L	
	Nutrients	Surface Total Phosphorus	0.017 mg/L to 0.025 mg/L	
	ž	Nitrogen to Phosphorus Ratio	30:1	Phosphorus limited

			Turbidity	Æ	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation		S	S	S						
Nses	Aesthetics					S	S	S			
Ca	Agriculture								S		
Beneficia	Primary Body Contact Recreation									S	
ď	Public & Private Water Supply										
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	Notes									

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

Copan

Lake Data

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

Location Washington County

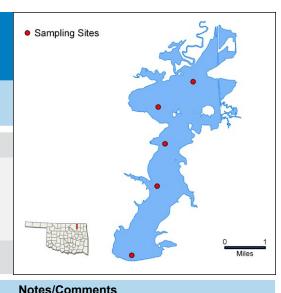
Impoundment 1983

Area 4,850 acres

Capacity 43,400 acre-feet

Flood Control, Water Supply, Water Quality Control, Fish and Purposes

Wildlife, and Recreation



		Parameter	Re	esult					Notes/Cor	nments			
		Average Turbidity	46	NTU					80% of val	ues > 25	NTU		
		Average True Color	12	3 units					60% of val	ues > O\	NQS of 70		
		Average Secchi Disk Depth	32	cm									
		Water Clarity Rating	av	erage									
		Trophic State Index	60						Previous v	alue = 5	1		
ပ္		Trophic Class	eu	trophic									
ete		Salinity	0.0	07 - 0.14 ppt	t								
am	0	Specific Conductivity	15	2.2 – 286.8	μS/cm	1							
Parameters	Profile	рH	6.9	95 – 8.33 pH	l units				Neutral to	slightly a	lkaline		
	<u>Ā</u>	Oxidation-Reduction Potential	23	0 to 486 mV	1								
		Dissolved Oxygen	44	% of water of	columr	1 < 2 r	mg/L in Jul	y	Occurred	at site 1,	the dam		
	ts	Surface Total Nitrogen	0.4	19 mg/L to 1	.24 mg	g/L							
	Nutrients	Surface Total Phosphorus	0.0	034 mg/L to	0.160	mg/L							
	Ž	Nitrogen to Phosphorus Ratio	10	:1					Phosphoru	s limited			
				>			p			olor	, s	i	
				Turbidity			Dissolved Oxygen	<u>8</u>		True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
				Ţ	-	F G	O Xy	Metals	TSI	Ę	Sulf Chi	Soli Soli	당
S	Fish	& Wildlife Propagation		NS	;	S	S	S					
Use	Aest	hetics							S	NS			
cial	Agric	culture									S		
Beneficial Uses	Prim	ary Body Contact Recreation										NEI	
Be	Publ	ic & Private Water Supply											
	NS	= Fully Supporting S = Not Supporting El = Not Enough Information	E E	he PBCR can . coli and ente	inot be erococo	assess	sed as minir	num dat	a requirement	s were no	t met due to	QA/QC issu	es for

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 μ S/cm = microsiemens/cm ppt = parts per thousand En = Enterococci

53

Crowder

Sample PeriodTimes VisitedSampling SitesNovember 2005 - August 200633

Location Washita County

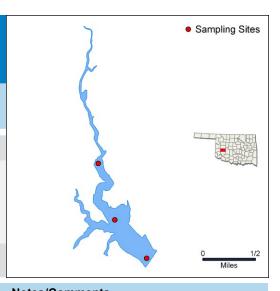
Impoundment 1959

Lake Data

Area 158 acres

Capacity 2,094 acre-feet

Purposes Flood Control, Recreation



		Parameter	Result					Notes/Con	nments			
		Average Turbidity	9 NTU					100% of va	alues < (DWQS of 2	5 NTU	
		Average True Color	17 units					100% of va	alues <	OWQS of 7	0	
		Average Secchi Disk Depth	65 cm									
		Water Clarity Rating	average									
		Trophic State Index	57									
S		Trophic Class	eutrophic									
ete		Salinity	0.38- 0.	57 ppt								
am		Specific Conductivity	744 – 10	88 μS/c	m							
Parameters	Profile	рH	7.03– 8.3	34 pH ur	nits			Neutral to s	slightly a	lkaline		
	P.	Oxidation-Reduction Potential	275 to 4	45 mV								
		Dissolved Oxygen	Up to 37 May	.5% of w	ater col	umn < 2 mg	/L in	Occurred a	at sites	1 and 2		
	छ	Surface Total Nitrogen	0.54 mg/	L to 0.9	3 mg/L							
Surface Total Phosphorus 0.026 mg/L to 0.053 mg/L Nitrogen to Phosphorus Ratio 21:1 Phosphorus Limited												
	N 22	Nitrogen to Phosphorus Ratio	21:1					Phosphoru	s Limite	d		
				>		p _e _			olor	s,	ui	
				Turbidity	표	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
	Tiob.	9 Mildlife Drementies		S		S	S	-		0,0 &	шоо	O
es	FISH	& Wildlife Propagation		5	S	8	5					
S	Aest	hetics						NS*	S			
Beneficial Uses	Agric	culture								S		
enef	Prim	ary Body Contact Recreation									S	
ä	Publ	ic & Private Water Supply										
	NS	= Fully Supporting S = Not Supporting El = Not Enough Information	*The lal					ng that the Ae lucted to confir				ed

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 $\mu S/cm = microsiemens/cm$

Cushing Municipal

Sample Period Times Visited Sampling Sites 4 October 2006 - July 2007

Lake Data Area

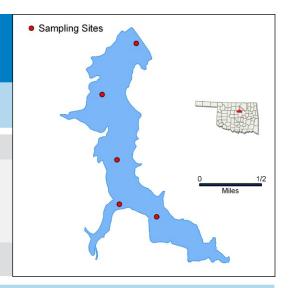
Location Payne County

1950 Impoundment

591 acres

Capacity 3,304 acre-feet

Purposes Water Supply, Recreation



		Parameter	Result					Notes/Cor	nments			
		Average Turbidity	45 NTU					70% of val	ues > O\	WQS of 25	NTU	
		Average True Color	85 units					45% of val	ues > O\	WQS of 70		
		Average Secchi Disk Depth	43 cm									
		Water Clarity Rating	poor									
		Trophic State Index	50									
S		Trophic Class	mesotrop									
ete		Salinity	0.05 - 0.	15 ppt								
ä	ø	Specific Conductivity	131.5 – 3	=								
Parameters	Profile	pН	6.84– 8.3	31 pH un	its			Neutral to	slightly a	lkaline		
	٩	Oxidation-Reduction Potential	359 to 43	32 mV								
		Dissolved Oxygen	Up to 25°	% of wat	er colun	nn < 2 mg/L	in July					
	Ñ	Surface Total Nitrogen	0.66mg/L	to 1.71	mg/L							
	Nutrients	Surface Total Phosphorus	0.036 mg	g/L to 0.1	87 mg/l	_						
	Nut	Nitrogen to Phosphorus Ratio	9:1					Approachir	ng co-lim	nitation		
				ity		ved n			olor	is, des	_ ші	m.
				Turbidity	표	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
								-	-	w O ∞	шоо	O
es	Fish	n & Wildlife Propagation		NS	S	S	S					
Us	Aes	sthetics						S	NS			
Beneficial Uses	Agr	iculture								S		
nef	Prir	mary Body Contact Recreation									NEI	
B	Pub	olic & Private Water Supply										
	٨	S = Fully Supporting US = Not Supporting UEI = Not Enough Information	The PBC issues for	R benefici all param		nnot be asses	sed as mi	nimum data re	quirement	twere not me	t due to QA/C	ıC

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

OWQS = Oklahoma Water Quality Standards mV = millivolts

mg/L = milligrams per liter μ S/cm = microsiemens/cm ppt = parts per thousand En = Enterococci

Chlor-a = Chlorophyll-a

Dave Boyer (Walters)

Sample Period Times Visited Sampling Sites

October 2007 – July 2008 4 3

Location Cotton County

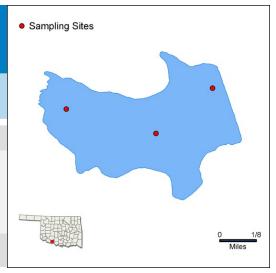
Impoundment 1936

Lake Data

Area 148 acres

Capacity 861 acre feet

Purposes Water Supply, and Recreation



		Parameter	Result					Notes/Con	nments			
		Average Turbidity	98 NTU					75% of valu	ues > 25	NTU		
		Average True Color	166 units	3				75% of valu	ues > O\	NQS of 70		
		Average Secchi Disk Depth	21 cm									
		Water Clarity Rating	poor									
		Trophic State Index	51					Previous va	alue = 52	2		
S		Trophic Class	eutrophic	;								
ete		Salinity	0.12 - 0.	17 ppt								
аш	-	Specific Conductivity	253.8 – 3	353 µS/c	m							
Parameters	Profile	рН	7.92 – 8.	34 pH u	nits			Neutral to s	slightly a	lkaline		
•	P	Oxidation-Reduction Potential	376 to 52	20 mV								
		Dissolved Oxygen						All values >	7 mg/L			
	ιχ	Surface Total Nitrogen	0.47 mg/	L to 1.19	9 mg/L							
	Nutrients	Surface Total Phosphorus	0.029 mg	g/L to 0.	138 mg/L	-						
	N	Nitrogen to Phosphorus Ratio	10:1					Phosphorus	s limited			
				>		р —			olor	, s	ııi.	
				Turbidity	_	Dissolved Oxygen	Metals		True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
				7	Hd	ΘÔ	ž	TSI	Ļ	य ठ ळ	山 8 8	ਠ
S	Fish	& Wildlife Propagation		NS	S	S	S					
Use	Aestl	netics						S	NS			
cial	Agric	ulture								S		
Beneficial Uses	Prima	ary Body Contact Recreation									NEI	
Be	Publi	c & Private Water Supply										
		Fully Supporting										
		= Fully Supporting = Not Supporting II = Not Enough Information										

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

Dripping Springs

Sample Period Times Visited Sampling Sites

October 2006 - July 2007 4 5

Location Okmulgee County

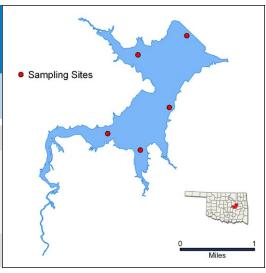
Impoundment 1950

Lake Data

Area 1,150 acres

Capacity 16,200 acre-feet

Purposes Water Supply, Recreation and Flood Control



		Parameter	Result					Notes/Con	nments			
		Average Turbidity	21 NTU					45% of valu	ues > O	WQS of 25	NTU	
		Average True Color	89 units					75% of valu	ues > O	WQS of 70		
		Average Secchi Disk Depth	76 cm									
		Water Clarity Rating	average									
		Trophic State Index	48									
S		Trophic Class	mesotrop	hic								
ete		Salinity	0.01 - 0.	07 ppt								
am		Specific Conductivity	49.7 – 15	66 μS/cm	า							
Parameters	Profile	рН	6.31–7.7	'0 pH un	its			Only 13 (7.	8%) of v	alues < 6.5	pH units	
Ť	Ā	Oxidation-Reduction Potential	128 to 45	54 mV								
		Dissolved Oxygen	Up to 69	% of wat	er colum	n < 2 mg/L	in July	Occurred a	at site 1,	the dam		
	S	Surface Total Nitrogen	0.43 mg/	L to 1.07	mg/L							
	Nutrients	Surface Total Phosphorus	0.014 mg	J/L to 0.0)44 mg/L							
	Nut	Nitrogen to Phosphorus Ratio	26:1					Phosphorus	s limited	Í		
				>		eq _			olor	, o o o	ni	
				Turbidity	_	Dissolved Oxygen	Metals		True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
				구	H	ö ö	ž	ISI	Ę	ਲੇ ਹੁ ਕ	En,e coli,	ਠੋ
S	Fish	& Wildlife Propagation		NS	S	NS	S					
Use	Aestl	netics						S	NS			
cial	Agric	ulture								S		
Beneficial Uses	Prima	ary Body Contact Recreation									NEI	
Be	Publi	c & Private Water Supply										
	NS	Fully Supporting = Not Supporting I = Not Enough Information			ial use can orm and en		ssed as mi	nimum data red	quirement	t were not me	t due to QA/G	QC is-

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

E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards

Chlor-a = Chlorophyll-a

mV = millivolts

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

Duncan

Sample PeriodTimes VisitedSampling SitesNovember 2006 - August 200745

Lake Data

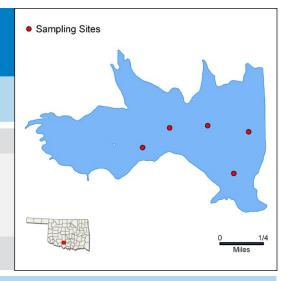
Location Stephens County

Impoundment 1937

Area 500 acres

Capacity 7,200 acre-feet

Purposes Water Supply, Recreation



		Parameter	Result					Notes/Com	ments			
		Average Turbidity	15 NTU					100% of va	lues < C	WQS of 25	5 NTU	
		Average True Color	34 units					15% of valu	es > OV	VQS of 70		
		Average Secchi Disk Depth	58 cm									
		Water Clarity Rating	average									
		Trophic State Index	57									
ပ္		Trophic Class	eutrophic									
ete		Salinity	0.12 - 0.2	4 ppt								
ä		Specific Conductivity	244.5 – 4	72.2 µS/	cm							
Parameters	Profile	рH	7.32-8.4	4 pH unit	ts			Only 13 (7.8	3%) of v	alues < 6.5	pH units	
	P	Oxidation-Reduction Potential	95 to 426	mV								
		Dissolved Oxygen	Up to 22% August	of wate	er colum	n < 2 mg/L	. in	Occurred a	t site 2			
	Ñ	Surface Total Nitrogen	0.59 mg/L	to 0.84	mg/L							
	Nutrients	Surface Total Phosphorus	0.016 mg/	L to 0.03	39 mg/L							
	N	Nitrogen to Phosphorus Ratio	26:1					Phosphorus	limited			
				_		þ			lor	, s		
				Turbidity	_	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
				i i	표		Σ	ř	Ė	ਯੂ ਨੂ ਕ	<u>ш</u> 8 8	ਹ
S	Fish	& Wildlife Propagation		S	S	S	S					
Beneficial Uses	Aest	hetics						S	NS			
cial	Agri	culture								S		
nef	Prim	ary Body Contact Recreation									NEI	
Be	Publ	ic & Private Water Supply										
	NS	= Fully Supporting S = Not Supporting El = Not Enough Information	The PBCR sues for fe				sed as mi	nimum data req	uirement	were not me	t due to QA/0	QC is-

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

 $OWQS = Oklahoma\ Water\ Quality\ Standards$ mV = millivolts

mg/L = milligrams per liter μS/cm = microsiemens/cm ppt = parts per thousand En = Enterococci

mV = millivolts Chlor-a = Chlorophyll-a

El Reno

Lake Data

Sampling Sites Times Visited Sample Period 3 November 2006 - August 2007

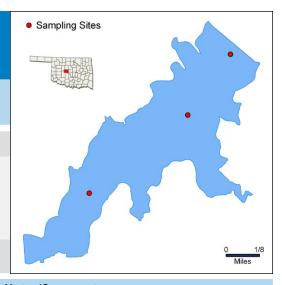
Location Canadian County

Impoundment 1937

Area 500 acres

Capacity 7,200 acre-feet

Purposes Flood Control, Recreation



			Parameter	ı	Result					Notes/Co	mments			
			Average Turbidity	•							alues > OW	QS of 25 N	TU	
			Average True Color	8	36 units					25% of va	alues > OW	QS of 70		
			Average Secchi Disk Depth	;	35 cm									
			Water Clarity Rating	ŀ	oor									
			Trophic State Index	(35									
S			Trophic Class	ł	nypereutr	ophic								
ete			Salinity	(0.53 – 0.7	79 ppt								
am	a	ט	Specific Conductivity	•	1019 – 14	494 μS/c	cm							
Parameters	Profile	5	рН	8	3.25 – 8. ⁴	45 pH ur	nits			Slightly al	kaline			
	٥	Σ	Oxidation-Reduction Potential	4	112 to 43	5mV								
			Dissolved Oxygen							All DO wa	as > 2 mg/L	throughout	the study	period
	Ų	2	Surface Total Nitrogen 1.39 mg/L to 2.05 mg/L											
	Nutriente	<u>=</u>	Surface Total Phosphorus	0.093 mg/L to 0.670 mg/L										
	Ž	2 2	Nitrogen to Phosphorus Ratio	(6:1					Nitrogen I	imited or po	ssibly co-li	mited	
								ъ			or	<u>,</u> ω		
						Turbidity		Dissolved Oxygen	als		True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
						T P	표	Oxy	Metals	ISI	ŢĽ	Sulf Chlc	Soli, e	S
S	Fis	sh 8	& Wildlife Propagation			NS	S	S	S					
Use	Ae	esth	etics							NS	NS			
cial	Ag	gric	ulture									S		
Beneficial Uses	Pri	ima	ary Body Contact Recreation										NEI	
Be	Pu	ublio	c & Private Water Supply											
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information The PBCR benef sues for fecal col								ssed as	minimum dat	a requirement	were not me	t due to QA/0	QC is-

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 ppt = parts per thousand En = Enterococci

mV = millivoltsChlor-a = Chlorophyll-a

Elk City

Sample PeriodTimes VisitedSampling SitesNovember 2005 - August 200643

Result

Location Beckham County

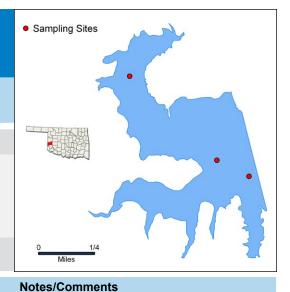
Impoundment 1970

Area 240 acres

Parameter

Capacity 2,583 acre-feet

Purposes Flood Control, Recreation



		Average Turbidity	15 NTU					100% of va	lues < 0	DWQS of 2	NTU	
		Average True Color	26 units					100% of va	lues <	OWQS of 7	0	
		Average Secchi Disk Depth	56 cm									
		Water Clarity Rating	Fair to po	oor								
		Trophic State Index	59									
S		Trophic Class	eutrophic	;								
ete		Salinity	0.30-0.3	39 ppt								
a		Specific Conductivity	593.3 – 7	749.9 μS	S/cm							
Parameters	Profile	pH	7.70– 8.4	19 pH u	nits			Neutral to s	lightly a	lkaline		
	Pr	Oxidation-Reduction Potential	374 to 44	l8 mV								
		Dissolved Oxygen	Up to 229 May	% of wat	ter colum	nn < 2 mg/	L in					
	S.	Surface Total Nitrogen	0.74 mg	/L to 1.0	8 mg/L							
	Nutrients	Surface Total Phosphorus	0.037 mg	g/L to 0.0	067 mg/L	-						
	Z	Nitrogen to Phosphorus Ratio 17:1 Possibly co-limited										
				Turbidity	Ha	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish	& Wildlife Propagation		S	S	S	S					
Use	Aest	netics						NS*	S			
Beneficial Uses	Agric	culture								S		
enef	Prim	ary Body Contact Recreation									S	
ă	Publ	c & Private Water Supply										
	NS	Fully Supporting S = Not Supporting SI = Not Enough Information	*The lake by nutrier					nat the Aesthet n non-support :		cial use is co	nsidered thre	atened

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

Ellsworth

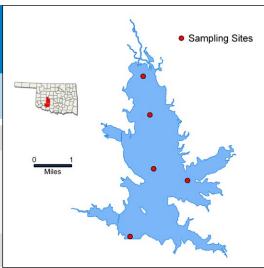
Sampling Sites Sample Period Times Visited October 2006 - July 2007 5

Location **Comanche County** Impoundment 1962 Lake Data

Area 5,600 acres

Capacity 95,200 acre-feet

Purposes Water Supply, Recreation



		Parameter	Result		Notes/Comments			
		Average Turbidity	45 NTU		80% of values > OW	QS of 25	NTU	
		Average True Color	52 units		10% of values > OW	QS of 70		
		Average Secchi Disk Depth	48 cm					
		Water Clarity Rating	Fair to poor					
		Trophic State Index	56					
စ္		Trophic Class	eutrophic					
ete		Salinity	0.11 – 0.30 ppt					
am	Φ	Specific Conductivity	235.1 – 591.6 μS/cm					
Parameters	Profile	рН	6.86 – 8.28 pH units		Slightly alkaline			
_	۵	Oxidation-Reduction Potential	110 to 474mV					
		Dissolved Oxygen	Up to 64% of water column	n < 2 mg/L in July	Occurred at site 1, t	he dam		
	ts	Surface Total Nitrogen	0.57 mg/L to 0.96 mg/L					
	Nutrients	Surface Total Phosphorus	0.056 mg/L to 0.235 mg/L					
	ž	Nitrogen to Phosphorus Ratio	9:1		Phosphorus limited			
			≱	n n	olor	s, les	— ші	

				Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation			NS	S	NS	S					
Uses	Aesthetics							S	NS			
Beneficial	Agriculture									S		
enef	Primary Body Contact Recreation										NEI	
ă	Public & Private Water Supply											
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	Notes	The PBCI issues for			nnot be asses	sed as mini	mum data r	equirement	were not me	t due to QA/0	QC

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 μ S/cm = microsiemens/cm

Elmer Thomas

Sample PeriodTimes VisitedSampling SitesOctober 2006 - July 200745

Location Comanche County

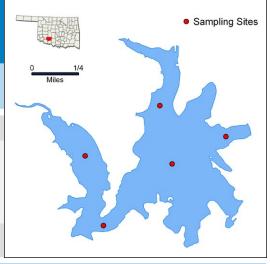
Impoundment N/A

Lake Data

Area 334 acres

Capacity 12,000 acre-feet

Purposes Recreation



		Parameter	Result	Notes/Comments
		Average Turbidity	2 NTU	100% of values < OWQS of 25 NTU
		Average True Color	27 units	100% of values < OWQS of 70
		Average Secchi Disk Depth	175 cm	
		Water Clarity Rating	excellent	
		Trophic State Index	39	
ပ္		Trophic Class	oligotrophic	
ete		Salinity	0.01 – 0.07 ppt	
am	4	Specific Conductivity	36.2 – 150.6 μS/cm	
Parameters	Profile	рН	5.43 – 8.13 pH units	38 (15.4%) of values < 6.5 pH units
	₫	Oxidation-Reduction Potential	41 to 522mV	
		Dissolved Oxygen	Up to 76% of water column < 2 mg/L in July	Occurred at sites 1 and 2
	ts	Surface Total Nitrogen	0.31 mg/L to 0.63 mg/L	
	Nutrients	Surface Total Phosphorus	0.005 mg/L to 0.015 mg/L	
	Z	Nitrogen to Phosphorus Ratio	46:1	Phosphorus limited

				Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation			S	NS	NS	S					
Use	Aesthetics							S	S			
Beneficial	Agriculture									S		
enef	Primary Body Contact Recreation										NEI	
ä	Public & Private Water Supply											
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	Notes	The PBCF sues for E				ssed as minii	mum data re	equirement	t were not me	t due to QA/C	QC is-

NTU = nephelometric turbidity units

μS/cm = microsiemens per centimeter E. coli = Escherichia coli OWQS = Oklahoma Water Quality Standards
mV = millivolts

mV = millivolts Chlor-a = Chlorophyll-a mg/L = milligrams per liter μS/cm = microsiemens/cm

Eucha

Sample PeriodTimes VisitedSampling SitesNovember 2006 - August 200745

Result

Location Delaware County

Impoundment 1952

Parameter

NTU = nephelometric turbidity units

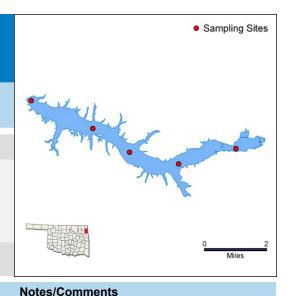
E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

Area 2,860 acres

Capacity 79,600 acre-feet

Purposes Water Supply, Recreation



			Parameter	Result					Notes/Con	iments						
			Average Turbidity	4 NTU				100% of va	lues < 0	DWQS of 2	5 NTU					
			Average True Color	14 units					100% of va	lues < 0	DWQS of 70	כ				
			Average Secchi Disk Depth	151 cm												
			Water Clarity Rating	excellen	t											
			Trophic State Index	50												
Ş			Trophic Class	mesotrop	ohic											
ete			Salinity	0.07 - 0.	14 ppt											
Ē	ı		Specific Conductivity	168.2 – 2	296.3 µS	s/cm										
Parameters		Profile	pH	7.15 – 8.	76 pH u	nits			Neutral to s	slightly a	alkaline					
	1	P	Oxidation-Reduction Potential	63 to 500) mV											
			Dissolved Oxygen	Up to 71 August	% of wat	ter colum	nn < 2 mg/l	_ in	Occurred a	at sites	1, the dam					
		S	Surface Total Nitrogen	0.36 mg/	mg/L to 3.26 mg/L											
		Nutrients	Surface Total Phosphorus	0.007 mg	g/L to 0.0)50 mg/L	-									
		Z	Nitrogen to Phosphorus Ratio	71:1					Phosphorus	s limited	i					
					Turbidity	Hd	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a			
40	F	ish •	& Wildlife Propagation		S	S	NS	S		•						
ses			· •													
Ž	P	\estr	netics						NS	S						
icia	A	Agric	ulture								S					
Beneficial Uses	F	Prima	ary Body Contact Recreation									S				
a	F	Publi	c & Private Water Supply													
		NS	= Not Supporting = Not Enough Information	The lake (WQS) ar			a Nutrient L rient threater		ershed (NLW) i	in the Okl	ahoma Water	Quality Stan	dards			

63

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

Eufaula, Deep Fork Arm (1-2)

Sample Period Times Visited Sampling Sites 4 November 2006 - August 2007 17

Impoundment Lake Data Area

Location

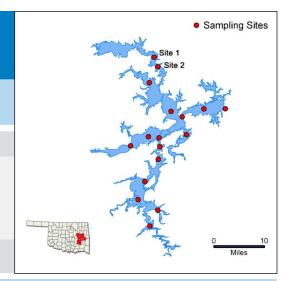
Haskell County

1964

105,000 acres

Capacity 2,314,600 acre-feet

Purposes Water Supply, Flood Control, Hydropower, Sediment Control



		Parameter	Result					Notes/Cor	nments			
		Average Turbidity	24 NTU					25% of val	ues > O\	VQS of 25	NTU	
		Average True Color	71 units					67% of val	ues > O\	VQS of 70		
		Average Secchi Disk Depth	44 cm									
		Water Clarity Rating	poor									
		Trophic State Index	53									
S		Trophic Class	eutrophic									
ete		Salinity	0.10 - 0.									
am	4	Specific Conductivity	206.4 – 5	596.1 μS	/cm							
Parameters	Profile	pН	6.85 - 8.	15pH un	iits			Neutral to	slightly a	lkaline		
_	P	Oxidation-Reduction Potential	216 to 30	02 mV								
		Dissolved Oxygen	Up to 45 August	% of wat	er colum	nn < 2 mg/L	. in					
	δ	Surface Total Nitrogen	0.68mg/l	_ to 0.93	mg/L							
	Nutrients	Surface Total Phosphorus	0.061 mg	g/L to 0.1	08 mg/L							
	Nut	Nitrogen to Phosphorus Ratio	9:1					Phosphoru	s limited			
				>		р —			olor	s,	ui	
				Turbidity	핊	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
Se	Fish	& Wildlife Propagation		NEI	S	S	S					
Us	Aes	thetics						S	NEI			
Beneficial Uses	Agri	culture								S		
nefi	Prin	nary Body Contact Recreation									NEI	
Be	Pub	lic & Private Water Supply										
	N	= Fully Supporting S = Not Supporting EI = Not Enough Information		ere not me				bidity and 67 % and Aesthetics				

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

Eufaula, N. Canadian Arm (3-4)

Sample PeriodTimes VisitedSampling SitesNovember 2006 - August 2007417

Location Haskell County

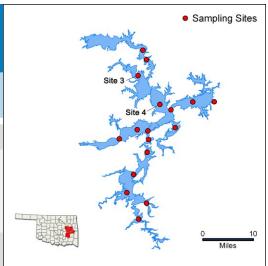
Impoundment 1964

Lake Data

Area 105,000 acres

Capacity 2,314,600 acre-feet

Purposes Water Supply, Flood Control, Hydropower, Sediment Control



		Parameter	Result	Notes/Comments
		Average Turbidity	27 NTU	25% of values > OWQS of 25 NTU
		Average True Color	69 units	50% of values > OWQS of 70
		Average Secchi Disk Depth	49 cm	
		Water Clarity Rating	poor	
		Trophic State Index	55	
ပ္		Trophic Class	eutrophic	
ete		Salinity	0.13 – 0.30 ppt	
Ě		Specific Conductivity	262.2 – 578.7 μS/cm	
Parameters	Profile	рН	6.92 – 8.21 pH units	Neutral to slightly alkaline
-	P	Oxidation-Reduction Potential	242 to 328 mV	
		Dissolved Oxygen	Up to 41% of water column < 2 August	2 mg/L in
	S.	Surface Total Nitrogen	0.66 mg/L to 1.52 mg/L	
	Nutrients	Surface Total Phosphorus	0.053 mg/L to 0.146 mg/L	
	Z	Nitrogen to Phosphorus Ratio	11:1	Phosphorus limited
			.ed ₹	olo s, es — H

	Ů '						•				
			Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation		NEI	S	S	S					
Use	Aesthetics						S	NEI			
Beneficial	Agriculture								S		
nef	Primary Body Contact Recreation									NEI	
ä	Public & Private Water Supply										
	S = Fully Supporting NS = Not Supporting	otes			ceeded the (and an asse						

NTU = nephelometric turbidity units

NEI = *Not Enough Information*

μS/cm = microsiemens per centimeter E. coli = Escherichia coli OWQS = Oklahoma Water Quality Standards mV = millivolts

made for this sample year.

Chlor-a = Chlorophyll-a

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

Eufaula (5-7)

Sample Period Times Visited Sampling Sites

November 2006 - August 2007 4 17

Location Haskell County

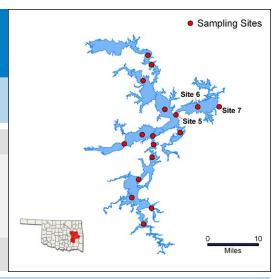
Impoundment 1964

Lake Data

Area 105,000 acres

Capacity 2,314,600 acre-feet

Purposes Water Supply, Flood Control, Hydropower, Sediment Control



		Parameter	Result					Notes/Cor	nments						
		Average Turbidity	Average True Color 62 units							'QS of 25 N	ITU				
		Average True Color	62 units					25% of val	ues > O\	NQS of 70					
		Average Secchi Disk Depth	84 cm												
		Water Clarity Rating	Fair to p	oor											
		Trophic State Index	55												
S		Trophic Class	eutrophic												
ete		Salinity	0.13 – 0.												
am		Specific Conductivity	272.8 – 5	74.9 μS	S/cm										
Parameters	Profile	рН	6.95 – 8.	16 pH u	nits			Neutral to slightly alkaline							
_	Ę	Oxidation-Reduction Potential													
		Dissolved Oxygen	ter colun	nn < 2 mg/L	. in										
	Ş	Surface Total Nitrogen	0.65 mg/	L to 1.46	6 mg/L										
	Nutrients	Surface Total Phosphorus	0.030 mg	_J /L to 0.	127 mg/l	_									
	Z	Nitrogen to Phosphorus Ratio	16:1					Phosphoru	ıs limited						
				_		p			lor	, S					
				Turbidity		Dissolved Oxygen	Metals		True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a			
				Ī	표	ăõ	Σ	ISI	Ţ	ავე <u>%</u>	E Soli,	ပ်			
S	Fish	& Wildlife Propagation		NEI	S	NS	S								
Use	Aest	hetics						S	NEI						
Beneficial Uses	Agri	culture								S					
nef	Prim	ary Body Contact Recreation									NEI				
ä	Publ	lic & Private Water Supply													
	NS	= Fully Supporting S = Not Supporting EI = Not Enough Information	Although ments we sample y	re not me				bidity and 25% P and Aestheti			•				

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 $\mu S/cm = microsiemens/cm$

Eufaula, Longtown Creek Arm (8)

Sample Period	Times Visited	Sampling Sites
November 2006 - August 2007	4	17

Location Haskell County

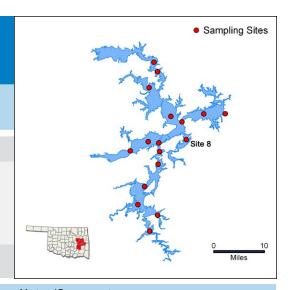
Impoundment 1964

Lake Data

Area 105,000 acres

Capacity 2,314,600 acre-feet

Purposes Water Supply, Flood Control, Hydropower, Sediment Control



		Parameter	Result					Notes/Co	mments			
		Average Turbidity	8 NTU					100% of v	alues < 0	DWQS of 28	5 NTU	
		Average True Color	32 units					100% of v	alues < 0	DWQS of 70)	
		Average Secchi Disk Depth	86 cm									
		Water Clarity Rating	good									
		Trophic State Index	56									
က္		Trophic Class	eutrophic									
ete		Salinity	0.17-0.2	9 ppt								
Ĕ		Specific Conductivity	339.6 – 5	67.4 µS	S/cm							
Parameters	Profile	рН	6.94 - 8.2	29 pH u	nits			Neutral to	slightly a	ılkaline		
-	Pro	Oxidation-Reduction Potential	186 to 33	5 mV								
		Dissolved Oxygen	Up to 56% August	% of wa	ter colur	nn < 2 mg/L	. in					
	S.	Surface Total Nitrogen	0.61 mg/l	_ to 1.20) mg/L							
	Nutrients	Surface Total Phosphorus	0.026 mg	/L to 0.0	034 mg/l	<u>L</u>						
	N P	Nitrogen to Phosphorus Ratio	24:1					Phosphoru	us limited	I		
						ō			lor	, ώ		
				Turbidity		Dissolved Oxygen	Metals	_	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
				₽	H	ăõ	Σ̈́	ISI	그	သူ ည 🍣	Soli, Soli,	ပ်
ς,	Fish	& Wildlife Propagation		NEI	S	NS	S					
Use	Aestl	hetics						S	NEI			
cial	Agric	culture								S		
Beneficial Uses	Prima	ary Body Contact Recreation									NEI	
Be	Publi	ic & Private Water Supply										
	NS	= Fully Supporting S = Not Supporting El = Not Enough Information										

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

Eufaula, Canadian River Arm (9-11)

Sample PeriodTimes VisitedSampling SitesNovember 2006 - August 2007417

Location Haskell County

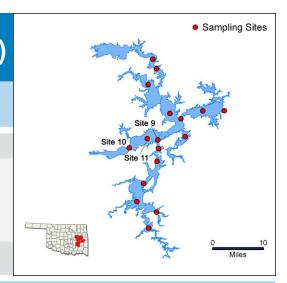
Impoundment 1964

Lake Data

Area 105,000 acres

Capacity 2,314,600 acre-feet

Purposes Water Supply, Flood Control, Hydropower, Sediment Control



		Parameter	F	Result					Notes/Co	mments						
		Average Turbidity	7	4 NTU					58% of va	lues > O\	NQS of 25	NTU				
		Average True Color	•	00 units					50% of va	lues > O\	NQS of 70					
		Average Secchi Disk Depth	Ę	9 cm												
		Water Clarity Rating	ŗ	oor												
		Trophic State Index	4	.5												
9		Trophic Class	r	nesotrophi	С											
ete		Salinity	(.20- 0.30	ppt											
aH		Specific Conductivity	3	46 – 578.9	β µS/cı	m										
Parameters	Profile	pН	7	.24 – 8.27	pH ur	nits			Neutral to slightly alkaline							
	P	Oxidation-Reduction Potential	•	20 to 450	mV											
		Dissolved Oxygen		Jp to 56% (lugust	p to 56% of water column < 2 mg/L in ugust											
	S	Surface Total Nitrogen	(.74 mg/L t	o 1.27	mg/L										
	Nutrients	Surface Total Phosphorus	(.045 mg/L	to 0.2	20 mg/l	-									
	Z	Nitrogen to Phosphorus Ratio	•	1:1					Phosphoru	us limited						
					≥		pe			olor	s, es	— шi				
					Turbidity	玉	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a			
10	Fish	& Wildlife Propagation			⊢ NEI	S	NS	S	F		0) ∪ ∞	шоо	O			
ses																
\tilde{z}	Aest	thetics							S	NEI						
icia	Agri	culture									S					
Beneficial Uses	Prim	nary Body Contact Recreation										NEI				
ă	Publ	lic & Private Water Supply														
	NS	= Fully Supporting S = Not Supporting EI = Not Enough Information	Salon		ts were	e not me	t and an as		or turbidity an							

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

Eufaula, Gaines Creek Arm (12-17)

Sample Period	Times Visited	Sampling Sites
November 2006 - August 2007	4	17

Location Haskell County

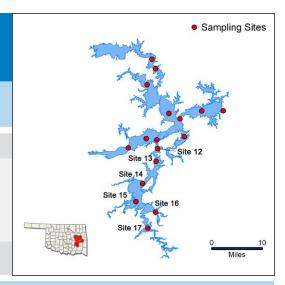
Impoundment 1964

Lake Data

Area 105,000 acres

Capacity 2,314,600 acre-feet

Purposes Water Supply, Flood Control, Hydropower, Sediment Control



		Parameter	Result					Notes/Cor	nments				
		Average Turbidity	44 NTU					58% of values > OWQS of 25 NTU					
		Average True Color	124 units					63% of values > OWQS of 70					
		Average Secchi Disk Depth	59 cm										
		Water Clarity Rating	Fair to po	or									
		Trophic State Index	52										
က်		Trophic Class	eutrophic	;									
ete		Salinity	0.10-0.2	:6 ppt									
ä		Specific Conductivity	339.6 – 5	67.4 μS	/cm								
Parameters	Profile	pН	6.94 - 8.2	29 pH ur	nits			Neutral to	slightly a	lkaline			
"	Pr	Oxidation-Reduction Potential	27 to 481	mV									
		Dissolved Oxygen	Up to 469 August	% of wat	er colum	nn < 2 mg/L	. in						
	S	Surface Total Nitrogen	0.55 mg/l	L to 2.18	3 mg/L								
	Nutrients	Surface Total Phosphorus	0.030 mg	/L to 0.1	29 mg/L	-							
	N	Nitrogen to Phosphorus Ratio	13:1					Phosphoru	s limited				
				dity		Dissolved Oxygen	<u>s</u>		True Color	tes, rides S	E S	ģ	
				Turbidity	Æ	Dissolve Oxygen	Metals	ISI	True	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a	
Se	Fish	& Wildlife Propagation		NS	S	S	S						
Us	Aes	thetics						S	NS				
Beneficial Uses	Agri	culture								S			
nef	Prim	nary Body Contact Recreation									NEI		
a	Pub	lic & Private Water Supply											
	N	= Fully Supporting S = Not Supporting EI = Not Enough Information											

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

Fairfax

Lake Data

Sample PeriodTimes VisitedSampling SitesNovember 2006 - August 200743

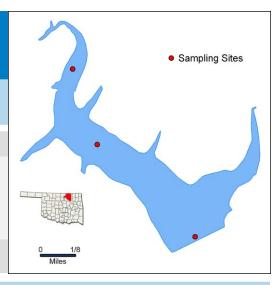
Location Osage County

Impoundment 1936

Area 111 acres

Capacity 1,795 acre-feet

Purposes Water Supply, Recreation



			Parameter	ı	Result					Notes/Con	nments					
			Average Turbidity	•	0 NTU					100% of values < OWQS of 25 NTU						
			Average True Color	4	11 units					25% of values > OWQS of 70						
			Average Secchi Disk Depth	7	'3 cm											
			Water Clarity Rating	Ç	good											
			Trophic State Index	į	57											
S			Trophic Class	•	eutrophic											
ete			Salinity	(0.09– 0.1	3 ppt										
a		a	Specific Conductivity	•	191.6 – 275.3 µS/cm											
Parameters		Profile	рН	7	7.00 – 8.9	93 pH ur	nits			Neutral to	slightly a	lkaline				
		<u>r</u>	Oxidation-Reduction Potential	2	2 to 428mV											
		Dissolved Oxygen Up to 67% of water column < 2 mg/L in Ma														
		S	Surface Total Nitrogen	().61 mg/l	to 0.92	mg/L									
	١,	Nutrients	Surface Total Phosphorus	().016 mg	/L to 0.0	42 mg/l	<u>L</u>								
		Ž	Nitrogen to Phosphorus Ratio	2	27:1					Phosphoru	s limited					
						_		D.			lor	, s	:			
						Turbidity		Dissolved Oxygen	als		True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E coli	Chlor-a		
						Ţ	Ħ	Dis, Oxy	Metals	TSI	Ĭ	Sulf Chi	En,ecal coli, & E. coli	S		
S	Fi	ish 8	& Wildlife Propagation			S	S	NS	S							
Use	А	esth	netics							S	S					
cial	Aesthetics Agriculture Primary Body Contact Recreation Public & Private Water Supply											S				
nefi	Р	rima	ary Body Contact Recreation										S			
B	Р	ubli	c & Private Water Supply													
		NS	Fully Supporting = Not Supporting I = Not Enough Information	Salon				ceed the OW eficial use is c		this peak is like supported.	ely the res	ult of season	al storm ever	nts,		

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

E. coli = Escherichia coli

S = Oklahoma Water Ouality Stand

mg/L = milligrams per liter μS/cm = microsiemens/cm ppt = parts per thousand En = Enterococci

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

Fort Cobb

Sample Period	Times Visited	Sampling Sites
November 2005 - August 2006	4	6

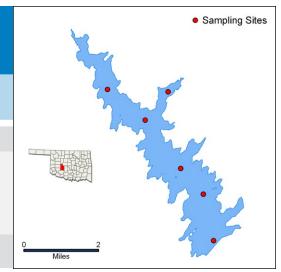
Location Caddo County

Impoundment 1959

Area 4,100 acres

80,010 acre-feet Capacity

Purposes Flood Control, Water Supply, Fish & Wildlife, Recreation



		Parameter		Result					Notes/Con	nments						
		Average Turbidity		13 NTU					12.5% of values > OWQS of 25 NTU							
		Average True Color		20 units					100% of values < OWQS of 70							
		Average Secchi Disk Depth		62 cm												
		Water Clarity Rating		good												
		Trophic State Index		65												
ត		Trophic Class		hypereutr	ophic											
ete		Salinity		0.23– 0.5	8ppt											
a E		Specific Conductivity		451.5 – 1 ⁻	111 µS	/cm										
Parameters	Profile	рН		7.26– 10.	69 pH	units			Only 5.6%	of value	es > 9.0 pH	units				
-	Pro	Oxidation-Reduction Potentia	1 :	249 to 42	9 mV											
		Dissolved Oxygen		Up to 27% August	lp to 27% of water column < 2 mg/L in											
	S	Surface Total Nitrogen		0.77 mg/	L to 1.5	2 mg/L										
	Nutrients	Surface Total Phosphorus		0.050 mg	/L to 0.2	210 mg/	L									
	Z	Nitrogen to Phosphorus Ratio)	11:1					Possibly co	-limited						
					>		p			olor	, se	,,,i				
					Turbidity		Dissolved Oxygen	Metals	_	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a			
					Ţ	표	io Š	Μ̈́	TSI	고	Sul Chl	En,e Soli,	된			
S	Fish	& Wildlife Propagation			NS	S	S	S								
Beneficial Uses	Aest	hetics							NS*	S						
cial	Agric	culture									S					
nef	Prim	ary Body Contact Recreation										S				
B	Publ	ic & Private Water Supply														
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information *The lake is listed in the WQS as a NLW indicating that the Aesthetics beneficial use is considered threated by nutrients until studies can be conducted to confirm non-support status.										atened					

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 μ S/cm = microsiemens/cm

Fort Gibson, Lower (1-4)

Sample Period Times Visited Sampling Sites
October 2006 - July 2007 4 8

Location Cherokee County

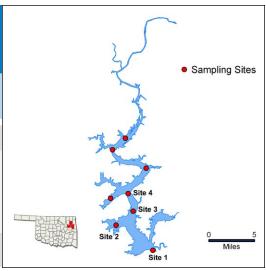
Impoundment 1953

Lake Data

Area 14,900 acres

Capacity 355,200 acre-feet

Purposes Hydropower and Flood Control



		Parameter	Result					Notes/Comments							
		Average Turbidity	7 NTU					100% of values < OWQS of 25 NTU							
		Average True Color	32 units	32 units					alues < C	WQS of 70)				
		Average Secchi Disk Depth	86 cm												
		Water Clarity Rating	good												
		Trophic State Index	60												
ည		Trophic Class	eutrophic	;											
ete		Salinity	0.07- 0.1	5 ppt											
Parameters	a	Specific Conductivity	168.8 – 3	803.9 µS	S/cm										
Par	Profile	рН	6.26 - 8.7	79 pH u	ınits			12% of values < 6.5 pH units							
	₫	Oxidation-Reduction Potential	2 to 403 r	mV											
		Dissolved Oxygen	Up to 829	% of wa	ter colun	nn < 2 mg/l	_ in July	Occurred at site 3							
	ţ	Surface Total Nitrogen	0.62 mg/l	0.62 mg/L to 1.43 mg/L											
	Nutrients	Surface Total Phosphorus	0.038 mg/L to 0.125 mg/L												
	Ş	Nitrogen to Phosphorus Ratio	11:1					Phosphorus limited							
				_		p			lor	, S					
				Turbidity		solve	<u>a</u>		True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E coli	Chlor-a			
				T T	표	Dissolved Oxygen	Metals	TSI	Truk	Sulfate: Chlorid & TDS	En,ecal coli, & E. coli	등			
S	Fish	& Wildlife Propagation		S	S	NS	S								
Use	Aest	hetics						NS	S						
neficial Uses	Agric	culture								S					
efic	Prim	ary Body Contact Recreation									S				
		, ,									_				

NS = Not Supporting
NEI = Not Enough Information

Public & Private Water Supply

(NLW). This listing means that the lake is considered threatened from nutrients until a more intensive study can confirm the Aesthetics beneficial use non-support status.

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

S = Fully Supporting

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

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

The lake is currently listed in the Oklahoma Water Quality Standards (WQS) as a Nutrient Limited Watershed

Fort Gibson, Upper (5-8)

Sample Period **Times Visited Sampling Sites** 4 October 2006 - July 2007

Location Cherokee County

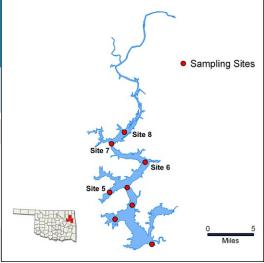
Impoundment 1953

Lake Data

Area 14,900 acres

Capacity 355,200 acre-feet

Purposes Hydropower and Flood Control



		Parameter	Result		Notes/Comments						
		Average Turbidity	10 NTU		100% of values < OWQS of 25 NTU						
		Average True Color	33 units		100% of values < OWQS of 70						
		Average Secchi Disk Depth	73 cm								
		Water Clarity Rating	good								
		Trophic State Index	61								
ပ္		Trophic Class	hypereutrophic								
ete		Salinity	0.07– 0.15 ppt								
am	Φ	Specific Conductivity	164.9 - 351.1 µS/cm								
Parameters	Profile	рН	6.04 – 8.91 pH units		16.5% of values < 6.5 pH units						
	_	Oxidation-Reduction Potential	6 to 382 mV								
		Dissolved Oxygen	Up to 79% of water column	n < 2 mg/L in Jul	Occurred at site 6						
	ıts	Surface Total Nitrogen	0.62 mg/L to 1.50 mg/L								
	Nutrients	Surface Total Phosphorus	0.034 mg/L to 0.261 mg/L								
	Ž	Nitrogen to Phosphorus Ratio	8:1		Phosphorus limited						
			oidity	gen	: Color ates, orides oscal scal & E.	ır-a					

				Turbidity	Hd	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
Si	Fish & Wildlife Propagation			S	S	NS	S					
Uses	Aesthetics							NS	S			
icia	Agriculture									S		
Beneficial	Primary Body Contact Recreation										S	
ă	Public & Private Water Supply											
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	Notes	(NLW). Th	is listing r	neans th	the Oklahom at the lake is o eneficial use r	considered t	hreatened from				

NTU = nephelometric turbidity units

NEI = Not Enough Information

μS/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

Fort Supply

Sample Period Times Visited Sampling Sites

October 2005 - July 2006 4 6

Result

Location Woodward County

Impoundment 1942

Parameter

NTU = nephelometric turbidity units

E. coli = Escherichia coli

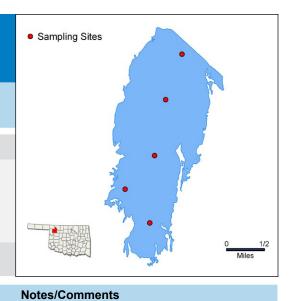
 μ S/cm = microsiemens per centimeter

Lake Data

Area 1,820 acres

Capacity 13,900 acre-feet

Purposes Flood Control, Conservation Purposes



		Average Turbidity	4	5 NTU					74% of valu	ies > O\	NQS of 25	NTU	
		Average True Color	4	6 units					5% of value	es > OV	VQS of 70		
		Average Secchi Disk Depth	5	7 cm									
		Water Clarity Rating	F	air to po	oor								
		Trophic State Index	5	7									
SICS		Trophic Class	е	utrophic	:								
ete		Salinity		.45– 0.5									
am	Φ	Specific Conductivity	8	67.2 – 1	1053 μS	/cm							
Parameters	Profile	pН	7	.33 – 8.	39 pH u	nits							
	Δ.	Oxidation-Reduction Potential	I 3	45 to 42	24 mV								
		Dissolved Oxygen							Not stratifie	ed in an	y quarter		
	ts	Surface Total Nitrogen	0	.76 mg	/L to 1.30	6 mg/L							
	Nutrients	Surface Total Phosphorus	0	.035 mg	g/L to 0.1	26 mg/l	L						
	ž	Nitrogen to Phosphorus Ratio	1:	2:1					Possibly co	-limited			
							p			lor	. v	. :	
					idity		olve gen	S		ပိ	ates oride OS	e ca ™ E	r-a
					Turbidity	표	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E coli	Chlor-a
S	Fish	& Wildlife Propagation			NS	S	S	S					
Use	Aesth	netics							NS*	S			
Beneficial Uses	Agric	culture									S		
nefi	Prima	ary Body Contact Recreation										S	
Be	Publi	c & Private Water Supply											
	NS	= Fully Supporting = Not Supporting I = Not Enough Information							hat the Aesthet n non-support s		cial use is co	nsidered threa	atened

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

Foss

Lake Data

Sample Period	Times Visited	Sampling Sites
September 2004 – June 2005	4	5

Location Custer County

Impoundment 1961

NTU = nephelometric turbidity units

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

Area 8,800 acres

Capacity 256,220 acre-feet

Purposes Recreation



		Parameter	Result					Notes/Cor	nments			
		Average Turbidity	9 NTU					100% of va	alues < 0	DWQS of 28	5 NTU	
		Average True Color	8 units					100% of va	alues < 0	DWQS of 70)	
		Average Secchi Disk Depth	97 cm									
		Water Clarity Rating	average									
		Trophic State Index	52									
S		Trophic Class	eutrophic									
Jete		Salinity	1.06– 1.2	4 ppt								
Parameters	Φ	Specific Conductivity	1963 –23	20 μS/c	cm							
Pal	Profile	рН	6.68 – 8.3	3 pH un	its			28% of rec	orded va	alues > 9.0	pH units	
	₫	Oxidation-Reduction Potential	357 to 55	7mV								
		Dissolved Oxygen						D.O. never	below 2	2.0mg/L dur	ing study p	eriod
	S.	Surface Total Nitrogen	0.49 mg/L	_ to 1.24	4 mg/L					J	0 ,.	
	Nutrients	Surface Total Phosphorus	0.014 mg	/L to 0.0	039 mg/L	_						
	N	Nitrogen to Phosphorus Ratio	30:1					Phosphoru	ıs limited	I		
						ъ			,	(0		
				idity		olve yen	<u>s</u>		S	ates, ride	cal & Ei	r-a
				Turbidity	표	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
v	Fish	& Wildlife Propagation		S	S	S	S					
Use	Aest	netics						S	S			
Beneficial Uses	Agric	culture								S		
nefi	Prim	ary Body Contact Recreation									NEI	
Be	Publi	c & Private Water Supply										
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information *Bacteriological not collected during					ed during sar	nple year	2004-2005.				

75

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

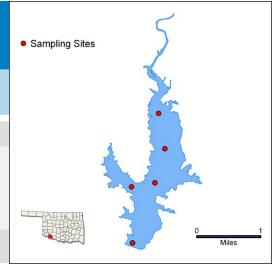
En = Enterococci

OWQS = Oklahoma Water Quality Standards

mV = millivolts

Chlor-a = Chlorophyll-a

F	Frederick												
	Sample P	eriod	Times Visited	Sampling Sites									
No	vember 2006 -	August 2007	4	5									
	Location	Tillman County											
ta	Impoundment	1974											
e Data	Area	925 acres											
Lake	Capacity	9,526 acre-feet											
	Purposes	Water Supply, Re	ecreation and Flood Cor	ntrol									



En = Enterococci

		Parameter	Result					Notes/Co	mments				
		Average Turbidity	59 NTU					100% of v	alues > (DWQS of 2	5 NTU		
		Average True Color	83 units					50% of values > OWQS of 70					
		Average Secchi Disk Depth	26 cm										
		Water Clarity Rating	poor										
		Trophic State Index	57										
ပ္		Trophic Class	eutroph	ic									
ete		Salinity	0.12-0	.31 ppt									
am		Specific Conductivity	245.5 –	614 μS/c	m								
Parameters	Profile	рН	7.61 – 8	3.61 pH ui	nits			Neutral to	slightly a	lkaline			
-	P	Oxidation-Reduction Potential	47 to 39	4 mV									
		Dissolved Oxygen	Up to 36 August	Up to 36% of water column < 2 mg/L in August									
	S	Surface Total Nitrogen	0.74 mg	_J /L to 1.09	mg/L								
	Nutrients	Surface Total Phosphorus	0.023 m	g/L to 0.0)69 mg/	L							
	N	Nitrogen to Phosphorus Ratio	21:1					Phosphore	us limited				
				Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a	
υ,	Fish	& Wildlife Propagation		NS	S	S	S						
Use	Aestl	hetics						S	NS				
Sial	Agric	culture								S			
Beneficial Uses	Prima	ary Body Contact Recreation									S		
Be	Publi	ic & Private Water Supply											
	NS	= Fully Supporting S = Not Supporting El = Not Enough Information											
NTU	= nepl	helometric turbidity units OWO	QS = Oklah	oma Wate	r Quality	Standards	mg/L =	milligrams pe	er liter	ppt = p	arts per thou	usand	

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 μ S/cm = microsiemens/cm

mV = millivolts

Chlor-a = Chlorophyll-a

 μ S/cm = microsiemens per centimeter

E. coli = Escherichia coli

Fuqua

Sampling Sites Sample Period Times Visited November 2006 - August 2007 5

Lake Data Area

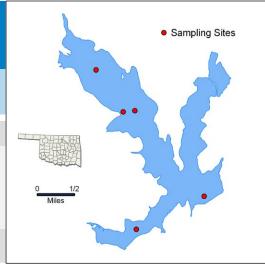
Location Stephens County

1953 Impoundment

1,500 acres

Capacity 21,100 acre-feet

Water Supply, Recreation and Flood Control Purposes



		Parameter	Result			Notes/Comments			
		Average Turbidity	25 NTU			45% of values > OW	VQS of 25 N	NTU	
		Average True Color	51 units			25% of values >OW	'QS of 70		
		Average Secchi Disk Depth	57 cm						
		Water Clarity Rating	average						
		Trophic State Index	52						
က္		Trophic Class	eutrophic						
ete		Salinity	0.13- 0.32 ppt						
Ĕ		Specific Conductivity	$272.6 - 616.3 \mu\text{S/cm}$						
Parameters	Profile	рН	7.29 – 8.44 pH units			Neutral to slightly all	kaline		
"	P	Oxidation-Reduction Potential	43 to 472 mV						
		Dissolved Oxygen	Up to 40% of water column August	n < 2 mg/L in)				
	छ	Surface Total Nitrogen	0.44 mg/L to 0.73 mg/L						
	Nutrients	Surface Total Phosphorus	0.015 mg/L to 0.050 mg/L						
	Z	Nitrogen to Phosphorus Ratio	19:1			Phosphorus limited			
			iţ	ved	6 0	Color	es, des	ш ш	D

			Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation		S	S	S	S					
Uses	Aesthetics						S	S			
ficial	Agriculture								S		
Benef	Primary Body Contact Recreation									S	
ä	Public & Private Water Supply										
	S = Fully Supporting NS = Not Supporting	otes			lata suggest seasonal sto						

NTU = nephelometric turbidity units

NEI = Not Enough Information

 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

Fish & Wildlife Propagation (FWP) and Aesthetics beneficial use for these parameters.

Grand, Lower Lake (1-3)

Sample Period Times Visited Sampling Sites November 2005 - August 2006 13

Impoundment 1940 Area

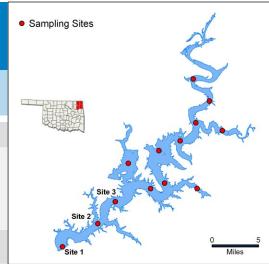
Location

Mayes County

1,820 acres

Capacity 13,900 acre-feet

Purposes Flood Control, Hydropower



		Parameter	Result	Notes/Comments
		Average Turbidity	5 NTU	100% of values < OWQS of 25 NTU
		Average True Color	21units	100% of values < OWQS of 70
		Average Secchi Disk Depth	134 cm	
		Water Clarity Rating	excellent	
		Trophic State Index	50	
က္		Trophic Class	eutrophic	
ete		Salinity	0.13– 0.19 ppt	
Ĕ		Specific Conductivity	264 – 374 μS/cm	
Parameters	Profile	рН	7.07– 8.68 pH units	
-	P	Oxidation-Reduction Potential	289 to 460 mV	
		Dissolved Oxygen	Up to 62% of water column < 2 mg/L in August	
	र	Surface Total Nitrogen	0.46 mg/L to 0.77 mg/L	
	Nutrients	Surface Total Phosphorus	0.023 mg/L to 0.107 mg/L	
	Z	Nitrogen to Phosphorus Ratio	10:1	Phosphorus limited or possibly co-limited

			Turbidity	Ha	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation		S	S	NS	S					
Uses	Aesthetics						S	S			
Beneficial	Agriculture								S		
enef	Primary Body Contact Recreation									S	
ă	Public & Private Water Supply										
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	Notes									

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 ppt = parts per thousand En = Enterococci

E. coli = Escherichia coli

Grand, Mid Lake (4-9)

Mayes County

Sample Period Times Visited Sampling Sites November 2005 - August 2006 4 13

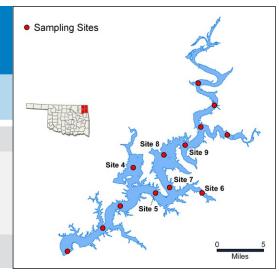
Impoundment 1940 Lake Data

Location

Area 1,820 acres

13,900 acre-feet Capacity

Purposes Flood Control, Hydropower



		Parameter	Result	Notes/Comments
		Average Turbidity	9 NTU	100% of values < OWQS of 25 NTU
		Average True Color	25 units	100% of values < OWQS of 70
		Average Secchi Disk Depth	91 cm	
		Water Clarity Rating	Average to good	
		Trophic State Index	60	
ဖ		Trophic Class	eutrophic	
ete		Salinity	0.11- 0.15ppt	
Ĕ		Specific Conductivity	235.5 – 354 μS/cm	
Parameters	Profile	рН	6.53- 8.59 pH units	
"	Pro	Oxidation-Reduction Potential	62 to 469 mV	
		Dissolved Oxygen	Up to 43% of water column < 2 mg/L in August	
	t S	Surface Total Nitrogen	0.50 mg/L to 1.54 mg/L	
	Nutrients	Surface Total Phosphorus	0.031 mg/L to 0.103 mg/L	
	Z	Nitrogen to Phosphorus Ratio	9:1	Phosphorus limited or possibly co-limited

	Ů ,						•				
			Turbidity	Hd	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
Sé	Fish & Wildlife Propagation		S	S	S	S					
Uses	Aesthetics						S	S			
Beneficial	Agriculture								S		
enef	Primary Body Contact Recreation									S	
ä	Public & Private Water Supply										
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	Notes									

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

Grand, Upper Lake (10-13)

Sample PeriodTimes VisitedSampling SitesNovember 2005 - August 2006413

Lake Data

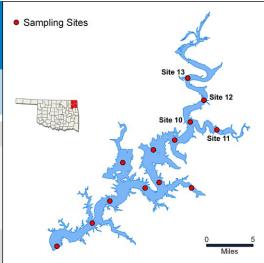
Location Mayes County

Impoundment 1940

Area 1,820 acres

Capacity 13,900 acre-feet

Purposes Flood Control, Hydropower



		Parameter	Result					Notes/Cor	mments			
		Average Turbidity	13 NTU					100% of va	alues < (OWQS of 25	NTU	
		Average True Color	25 units					100% of va	alues <	OWQS of 7	0	
		Average Secchi Disk Depth	69 cm									
		Water Clarity Rating	average									
		Trophic State Index	62									
ဖွ		Trophic Class	hypereuti	rophic								
ete		Salinity	0.11- 0.2	3 ppt								
a		Specific Conductivity	233.4 – 4	53.7 μ	S/cm							
Parameters	Profile	рН	6.75– 8.3	84 pH u	ınits							
-	Pro	Oxidation-Reduction Potential	331 to 42	23 mV								
		Dissolved Oxygen	Up to 439 August	% of wa	ter colun	nn < 2 mg/l	_ in					
	र्य	Surface Total Nitrogen	0.45 mg/	L to 1.7	79 mg/L							
	Nutrients	Surface Total Phosphorus	0.040 mg	/L to 0.:	212 mg/l	L						
	N E	Nitrogen to Phosphorus Ratio	8:1					Phosphoru	us limited	d or possibly	co-limited	
				Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
Se	Fish	& Wildlife Propagation		S	S	S	S					
Use	Aestl	netics						S	S			
neficial Uses	Agric	culture								S		
nef	Prim	ary Body Contact Recreation									S	

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

S = Fully Supporting

NS = Not Supporting

Public & Private Water Supply

NEI = Not Enough Information

 $OWQS = Oklahoma\ Water\ Quality\ Standards$ mV = millivolts

mg/L = milligrams per liter μS/cm = microsiemens/cm ppt = parts per thousand En = Enterococci

Notes

Great Salt Plains

Sample Period Times Visited Sampling Sites 2 October 2005 - July 2006

Impoundment 1941 Lake Data

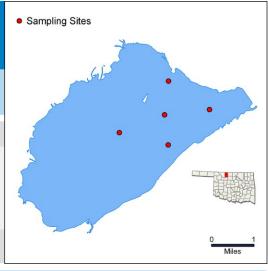
Location

Area 8,690 acres

Capacity 31,240 acre-feet

Purposes Flood Control, Conservation

Alfalfa County



		Parameter	Result					Notes/Con	nments			
		Average Turbidity	193 NTU					98% of value	ues > O	WQS of 25	NTU	
		Average True Color	62 units					17% of value	ues > C	WQS of 70		
		Average Secchi Disk Depth	10 cm									
		Water Clarity Rating	poor									
		Trophic State Index	71									
Parameters		Trophic Class	hypereut	•								
Jet		Salinity	0.02- 5.6	• •								
ran	<u>o</u>	Specific Conductivity	494.6 – 1	10,016 μ	ıS/cm							
Ра	Profile	pН	5.11 – 8.	80 pH u	nits			Only 6.4%	of value	s < 6.5 pH	units	
	Δ.	Oxidation-Reduction Potential	93 to 490) mV								
		Dissolved Oxygen						Not stratifi	ed at an	y sampling	event	
	ts	Surface Total Nitrogen	0.75 mg	/L to 2.8	5 mg/L							
	Nutrients	Surface Total Phosphorus	0.046 mg	g/L to 1.7	'83 mg/L							
	Z	Nitrogen to Phosphorus Ratio	6:1					Nitrogen lir	nited or	possibly co	-limited	
				_		p			lor	, S		
				Turbidity		Dissolved Oxygen	Metals		True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
				Ţ	F.	o Š Š	Μe	ISI	고	S S S	E S S S S S S S S S S S S S S S S S S S	딩
S	Fis	h & Wildlife Propagation		NS	S	S	S					
Use	Aes	sthetics						NS*	S			
Beneficial Uses	Agı	riculture								NS**		
nefi	Prir	mary Body Contact Recreation									NEI	
Be	Pul	olic & Private Water Supply										
	٨	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	threatene ** Becau	ed by nutri se the ext	ients until	studies can ih chloride	be condu	that the Aestl cted to confirm are due to nat	non-sup	port status.		ng into
				147.7								

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

G	reenle	eaf			Sampling Sites	
	Sample Po	eriod	Times Visited	Sampling Sites		
No	vember 2005 -	- Sept. 2006	4	5		
	Location	Muskogee County				_
ta	Impoundment	1939				•
Lake Data	Area	920 acres				~ ·
Lak	Capacity	14,720 acre-feet				• 2
	Purposes	Recreation				

							·					
		Parameter	Result					Notes/Con				
		Average Turbidity	7 NTU					100% of va	alues< C	WQS of 25	NTU	
		Average True Color	15 units					100% of va	alues < 0	OWQS of 70)	
		Average Secchi Disk Depth	111 cm									
		Water Clarity Rating	good									
		Trophic State Index	52									
က္		Trophic Class	eutrophic									
ete		Salinity	0.06-0.1	4 ppt								
Ě		Specific Conductivity	143.6 – 2	97 µS/0	cm							
Parameters	Profile	pН	6.81 – 8.3	31 pH u	ınits							
а.	Pro	Oxidation-Reduction Potential	55 to 511	mV								
		Dissolved Oxygen	Up to 71% September		ter colun	nn < 2 mg/L	. in					
	छ	Surface Total Nitrogen	0.42 mg/	L to 0.8	33 mg/L							
	Nutrients	Surface Total Phosphorus	0.025 mg	/L to 0.	067 mg/l	L						
	N	Nitrogen to Phosphorus Ratio	15:1					Phosphoru	s limited	t		
						D			or	"		
				dity		olve	<u> </u>		Ö	tes, ide	— ж Ш	q
				Turbidity	표	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
v	Fish	& Wildlife Propagation		S	S	NS	S					
Use	Aestl	hetics						S	S			
Beneficial Uses	Agric	culture								S		
nefi	Prima	ary Body Contact Recreation									S	
Be	Publi	ic & Private Water Supply										
	NS	Fully Supporting S = Not Supporting El = Not Enough Information										

OWQS = Oklahoma Water Quality Standards

mV = millivolts

Chlor-a = Chlorophyll-a

NTU = nephelometric turbidity units

E. coli = Escherichia coli

μS/cm = microsiemens per centimeter

mg/L = milligrams per liter

 μ S/cm = microsiemens/cm

ppt = parts per thousand

En = Enterococci

Guthrie

Sample Period	Times Visited	Sampling Sites
October 2005 – July 2006	4	5

Lake Data Area

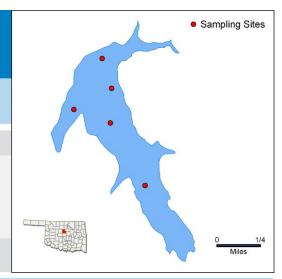
Location Logan County

Impoundment 1919

274 acres

Capacity 3,875 acre-feet

Purposes Water Supply, Recreation



		Parameter	Result	Notes/Comments
		Average Turbidity	19 NTU	20% of values > OWQS of 25 NTU
		Average True Color	21 units	100% of values < OWQS of 70
		Average Secchi Disk Depth	52 cm	
		Water Clarity Rating	Average to good	
		Trophic State Index	61	
က်		Trophic Class	hypereutrophic	
ete		Salinity	0.32- 0.43 ppt	
ä	4)	Specific Conductivity	623.1 – 821 μS/cm	
Parameters	Profile	рН	7.78 – 8.21 pH units	Neutral to slightly alkaline
	ā	Oxidation-Reduction Potential	357 to 470 mV	
		Dissolved Oxygen		Not stratified during any sampling interval
	ıts	Surface Total Nitrogen	0.61 mg/L to 1.33 mg/L	
	Nutrients	Surface Total Phosphorus	0.041mg/L to 0.103 mg/L	
	Ž	Nitrogen to Phosphorus Ratio	15:1	Phosphorus limited

	Milogen to 1 nosphoras real	.10	10.1					Поэрного				
				Turbidity	Hd	Dissolved Oxygen	Metals	1SI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation			S*	S	S	S					
Use	Aesthetics							S	S			
icial	Agriculture									S		
Beneficia	Primary Body Contact Recreation										S	
Be	Public & Private Water Supply											
	S = Fully Supporting	S	* Althoug	ıh 20% of	f the colle	cted turbidity	/ values ex	ceeded the	WQS of 2	5 NTU avail	able flow and	1

NTU = nephelometric turbidity units

NS = Not Supporting

NEI = Not Enough Information

 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 μ S/cm = microsiemens/cm

rainfall data suggest that the peak in turbidity, which occurred in October, is likely due to seasonal storm

ppt = parts per thousand En = Enterococci

events. Therefore, the lake will be listed as supporting its FWP use.

Healdton

Sample PeriodTimes VisitedSampling SitesNovember 2005 – August 200645

Result

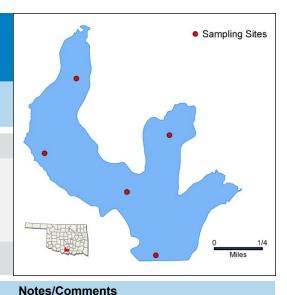
Location Carter County
Impoundment 1979

Area 370 acres

Parameter

Capacity 3,766 acre-feet

Purposes Water Supply, Recreation



		Parameter	Result					Notes/Cor	nments			
		Average Turbidity	48 NTI	J				100% of va	alues > C	OWQS of 28	5 NTU	
		Average True Color	159 un	its				100% of va	alues > C	OWQS of 70)	
		Average Secchi Disk Depth	34 cm									
		Water Clarity Rating	poor									
		Trophic State Index	49									
စ်		Trophic Class	mesotr	ophic								
ete		Salinity	0.13–0).19 ppt								
ä		Specific Conductivity	275.6 -	- 378.5 µS	/cm							
Parameters	Profile	pН	7.05 –	7.86 pH ur	nits			Neutral to	slightly a	lkaline		
-	P.	Oxidation-Reduction Potential	304 to	450 mV								
		Dissolved Oxygen	Up to 3 August		er colum	nn < 2 mg/L	in					
	र्घ	Surface Total Nitrogen	0.59 m	g/L to 0.94	mg/L							
	Nutrients	Surface Total Phosphorus	0.043 r	mg/L to 0.1	00 mg/L							
	N	Nitrogen to Phosphorus Ratio	11:1					Phosphoru	ıs limited			
				Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S)	Fish	& Wildlife Propagation		NS*	S	S	S					
Use	Aest	hetics						S	NS*			
cial	Agric	culture								S		
Beneficial Uses	Prim	ary Body Contact Recreation									NEI*	
B	Publ	ic & Private Water Supply										
	NS	= Fully Supporting S = Not Supporting El = Not Enough Information	* Due					ould not be sa a as minimum				nent

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

E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivolts

mV = millivolts Chlor-a = Chlorophyll-a mg/L = milligrams per liter μS/cm = microsiemens/cm

Hefner

Lake Data

Sample PeriodTimes VisitedSampling SitesNovember 2005 – August 200645

Result

Location Oklahoma County

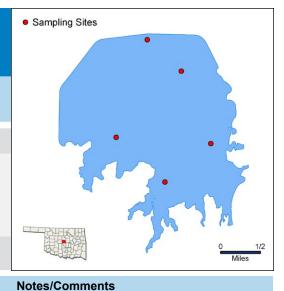
Impoundment 1947

Parameter

Area 2,500 acres

Capacity 75,000 acre-feet

Purposes Water Supply, Recreation



		Average Turbidity	7 NTU					100% of va	alues < (DWQS of 28	5 NTU	
		Average True Color	19 units					100% of va	alues < (DWQS of 70	כ	
		Average Secchi Disk Depth	92 cm									
		Water Clarity Rating	good									
		Trophic State Index	63									
ပ္		Trophic Class	hypereu	trophic								
Parameters		Salinity	0.50- 0.	68 ppt								
ä		Specific Conductivity	959 – 13	314 µS/cr	n							
ara	Profile	рН	7.77 – 8	.68 pH uı	nits			Neutral to	slightly a	alkaline		
	Pro	Oxidation-Reduction Potential	47 to 46	1 mV								
		Dissolved Oxygen	Up to 50 August)% of wat	er colun	nn < 2 mg/L	. in					
	ts	Surface Total Nitrogen	0.69 mg	/L to 1.06	mg/L							
	Nutrients	Surface Total Phosphorus	0.055 m	mg/L to 0.120 mg/L								
	N Z	Nitrogen to Phosphorus Ratio	10:1									
				<u>Ş</u>		ved n			olor	ss, des	<u>_</u> ші	m
				Turbidity	Ŧ	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish	& Wildlife Propagation		S	S	S	S					
Beneficial Uses	Aestl	netics						S	S			
icial	Agric	culture								S		
enef	Prima	ary Body Contact Recreation									S	
ă	Publi	c & Private Water Supply										
	NS	= Fully Supporting = Not Supporting = Not Enough Information										

NTU = nephelometric turbidity units μ S/cm = microsiemens per centimeter OWQS = Oklahoma Water Quality Standards mV = millivolts mg/L = milligrams per liter μS/cm = microsiemens/cm ppt = parts per thousand En = Enterococci

E. coli = Escherichia coli

Chlor-a = Chlorophyll-a

85

Heyburn

Sample PeriodTimes VisitedSampling SitesNovember 2007 - August 200845

Location Creek County

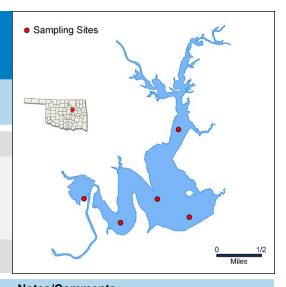
Impoundment 1950

Lake Data

Area 880 acres

Capacity 7,105 acre-feet

Purposes Flood Control and Conservation



		Parameter	Result					Notes/Cor	nments			
		Average Turbidity	50 NTU					75% of val	ues > 25	NTU		
		Average True Color	168 units	3				75% of val	ues > O	WQS of 70		
		Average Secchi Disk Depth	39 cm									
		Water Clarity Rating	average									
		Trophic State Index	49					Previous v	alue = 4	7		
<u>0</u>		Trophic Class	mesotrop	ohic								
ete		Salinity	0.05 - 0.1	15 ppt								
am		Specific Conductivity	116.3 – 3	304.8 µS	s/cm							
Parameters	Profile	рН	6.57 - 7	97 pH u	nits			Neutral				
"	Pr	Oxidation-Reduction Potential	129 to 56	60 mV								
		Dissolved Oxygen	Up to 62 August	2% of wa	iter colur	mn < 2 mg/	L in	Occurred	at site 1	, the dam		
	S	Surface Total Nitrogen	0.62 mg/	L to 1.15	5 mg/L							
	Nutrients	Surface Total Phosphorus	0.008 mg	g/L to 0.0)88 mg/L	-						
	Z	Nitrogen to Phosphorus Ratio	17:1					Phosphoru	s limited	Í		
				Turbidity	Æ	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
(0	Fish	& Wildlife Propagation		NS	S	NS	S					
Beneficial Uses		hetics						S	NS			
								3	INO			
<u>i</u>	Agri	culture								S		
nef	Prim	ary Body Contact Recreation									NEI*	
Be	Publ	ic & Private Water Supply										
	NS	= Fully Supporting S = Not Supporting El = Not Enough Information	* The PE all samp		ot be ass	essed as mii	nimum da	ata requiremer	nts were ı	not met due t	o inability to	access

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 $\mu S/cm = microsiemens/cm$

Holdenville

Sample PeriodTimes VisitedSampling SitesOctober 2006 - July 200735

Location Hughes County

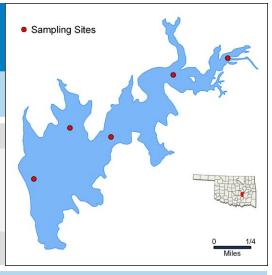
Impoundment 1931

Lake Data

Area 550 acres

Capacity 11,000 acre-feet

Purposes Water Supply, Recreation



		Parameter	Result					Notes/Cor	nments			
		Average Turbidity	16 NTU					20% of val	ues > O	WQS of 25	NTU	
		Average True Color	42 units					100% of va	alues < 0	DWQS of 70)	
		Average Secchi Disk Depth	75 cm									
		Water Clarity Rating	Average t	o good								
		Trophic State Index	60									
က်		Trophic Class	eutrophic									
ete		Salinity	0.06- 0.1	9 ppt								
ä		Specific Conductivity	141.6 – 3	91.7 µS	/cm							
Parameters	Profile	рН	6.10 - 8.2	26 pH ur	nits			11% of value	ues < 6.	5 pH units		
	4	Oxidation-Reduction Potential	2 to 435 r	nV								
		Dissolved Oxygen	Up to 83%	% of wat	er colum	n < 2 mg/l	_ in July					
	ts	Surface Total Nitrogen	0.57 mg/L	to 1.01	mg/L							
	Nutrients	Surface Total Phosphorus	0.015 mg	/L to 0.0)67 mg/L							
	Z	Nitrogen to Phosphorus Ratio	21:1					Phosphoru	s limited	I		
				>		pe _			olor	, se	ni	
				Turbidity	Ŧ	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
10	Fish	& Wildlife Propagation		S	NS	NS	S			0,0 &	шоо	O
ses					110	110			•			
2	Aesi	thetics						S	S			
icia Signatura	Agri	culture								S		
Beneficial Uses	Prim	nary Body Contact Recreation									NEI	
m	Pub	lic & Private Water Supply										
	N	= Fully Supporting S = Not Supporting EI = Not Enough Information	Although ments we be made	re not m	et therefo					andard, mini ation (FWP)		

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

Sample PeriodTimes VisitedSampling SitesNovember 2006 - August 200733

Lake Data

Location Osage County

Impoundment 1940

Area 165 acres

Capacity 5,000 acre-feet

Purposes Water Supply, Recreation



		Parameter	Result					Notes/Con	nments				
		Average Turbidity	9 NTU					100% of va	alues< O	WQS of 25	NTU		
		Average True Color	35 units					100% of values < OWQS of 70					
		Average Secchi Disk Depth	101 cm										
		Water Clarity Rating	excellent										
		Trophic State Index	56										
စ		Trophic Class	eutrophic	;									
ete		Salinity	0.10-0.1	14 ppt									
ä		Specific Conductivity	224 – 29	7.7 µS/c	m								
Parameters	Profile	pH	7.12 – 8.	66 pH ur	nits			Neutral to	slightly a	lkaline			
"	P.	Oxidation-Reduction Potential	-22 to 43	0 mV									
Dissolved Oxygen Up to 62% of water column < 2 mg/L in August Occurred at sites 1 an								and 2					
	S	Surface Total Nitrogen	0.45 mg/	L to 0.98	mg/L								
	Nutrients	Surface Total Phosphorus	0.010 mg	g/L to 0.0	28 mg/L								
	Nut	Nitrogen to Phosphorus Ratio	34:1					Phosphoru	s limited				
				>:		eq			olor	es,	_ ni		
				Turbidity	H H	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a	
S	Fish	& Wildlife Propagation		NEI	S	NS	S						
Use	Aes	thetics						S	NEI				
Beneficial Uses	Agri	culture								S			
nef	Prim	nary Body Contact Recreation									S		
B	Pub	lic & Private Water Supply											
	N	= Fully Supporting S = Not Supporting EI = Not Enough Information	Although Propaga were not	tion (FW				es were belo e cannot be a					

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

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

Hudson

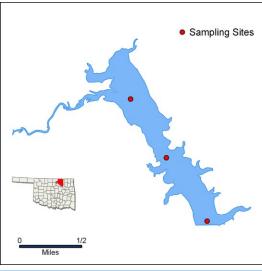
Sample Period	Times Visited	Sampling Sites
October 2005 – July 2006	4	3

Location Osage County Impoundment 1949 Lake Data

Area 250 acres

Capacity 4,000 acre-feet

Purposes Water Supply, Recreation



		Parameter	Result	Notes/Comments
		Average Turbidity	8 NTU	100% of values < OWQS of 25 NTU
		Average True Color	21 units	100% of values < OWQS of 70
		Average Secchi Disk Depth	98 cm	
		Water Clarity Rating	good	
		Trophic State Index	57	
က်		Trophic Class	eutrophic	
ete		Salinity	0.08- 0.14 ppt	
Ĕ		Specific Conductivity	178.3 – 297.4 μS/cm	
Parameters	Profile	рН	6.84 – 8.75 pH units	Neutral to slightly alkaline
т.	Pro	Oxidation-Reduction Potential	61 to 442 mV	
		Dissolved Oxygen	Up to 44% of water column < 2 mg/L in July	
	ţ	Surface Total Nitrogen	0.45 mg/L to 1.01 mg/L	
	Nutrients	Surface Total Phosphorus	0.021 mg/L to 0.073 mg/L	
	Z	Nitrogen to Phosphorus Ratio	18:1	Phosphorus limited

			Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
Sú	Fish & Wildlife Propagation		S	S	S	S					
Uses	Aesthetics						S	S			
Beneficial	Agriculture								S		
enef	Primary Body Contact Recreation									S	
ă	Public & Private Water Supply										
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	Notes									

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

Hudson, Lower (1-4)

Sample Period	Times Visited	Sampling Sites
November 2006 - August 2007	4	8

Location Mayes County

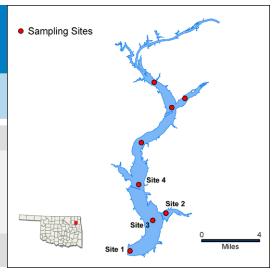
Impoundment 1964

Lake Data

Area 10,900 acres

Capacity 200,300 acre-feet

Purposes Flood Control, Hydropower



		Parameter	Result	Notes/Comments
		Average Turbidity	7 NTU	100% of values< OWQS of 25 NTU
		Average True Color	32 units	100% of values < OWQS of 70
		Average Secchi Disk Depth	107 cm	
		Water Clarity Rating	excellent	
		Trophic State Index	58	
က္		Trophic Class	eutrophic	
ete		Salinity	0.08- 0.14 ppt	
Ě		Specific Conductivity	172.8 – 286.2 μS/cm	
Parameters	Profile	рН	6.98 – 9.36 pH units	Only 0.28% of values > 9.0 pH units
-	Pr	Oxidation-Reduction Potential	255 to 464 mV	
		Dissolved Oxygen	Up to 43% of water column < 2 mg/L in August	
	छ	Surface Total Nitrogen	0.53 mg/L to 1.75 mg/L	
	Nutrients	Surface Total Phosphorus	0.051 mg/L to 0.118 mg/L	
	Z	Nitrogen to Phosphorus Ratio	12:1	Phosphorus limited
	Z	Nitrogen to Phosphorus Ratio	12:1	Phosphorus limited

			Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
Sé	Fish & Wildlife Propagation		S	S	S	S					
Uses	Aesthetics						S	S			
Beneficial	Agriculture								S		
nef	Primary Body Contact Recreation									NEI	
ă	Public & Private Water Supply										
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	Notes									

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

Hudson, Upper (5-8)

Sample Period Times Visited Sampling Sites 4 November 2006 - August 2007

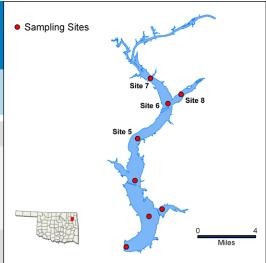
Location **Mayes County** Impoundment Lake Data

1964

Area 10,900 acres

Capacity 200,300 acre-feet

Purposes Flood Control, Hydropower



		Parameter	Result			Notes/Comments						
		Average Turbidity	7 NTU			100% of values< OWQS of 25 NTU						
		Average True Color	35 units			100% of values < O	WQS of 7	0				
		Average Secchi Disk Depth	90 cm									
		Water Clarity Rating	good									
		Trophic State Index	58									
က္		Trophic Class	eutrophic									
ete		Salinity	0.08- 0.14 ppt									
Ĕ		Specific Conductivity	$172.3 - 298.7 \mu\text{S/cm}$									
Parameters	Profile	рН	6.86 – 9.30pH units			Only 2.4% of values	s > 9.0 pH	units				
-	Pro	Oxidation-Reduction Potential	288 to 447 mV									
		Dissolved Oxygen	Up to 44% of water column August	n < 2 mg/L in								
	छ	Surface Total Nitrogen	0.54 mg/L to 1.74 mg/L									
	Nutrients	Surface Total Phosphorus	0.032mg/L to 0.128 mg/L									
	Z	Nitrogen to Phosphorus Ratio	12:1			Phosphorus limited						
			oidity	gen	als	Color	ates, orides OS	scal & E.	r-a			

			Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
Sé	Fish & Wildlife Propagation		S	S	S	S					
Uses	Aesthetics						S	S			
Beneficial	Agriculture								S		
nef	Primary Body Contact Recreation									NEI	
ä	Public & Private Water Supply										
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	Notes									

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

Hugo

Lake Data

Sample Period	Times Visited	Sampling Sites
November 2007 - August 2008	4	5

Location Choctaw County

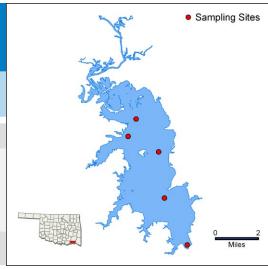
Impoundment 1974

Area 13,250 acres

Capacity 157,600 acre-feet

Purposes Flood Control, Water Supply, Water Quality Control, Fish and

Wildlife, and Recreation



		Parameter	Result					Notes/Con	nments				
		Average Turbidity	37 NTU					80% of value	ues > 25	NTU			
		Average True Color	116 units					95% of values > OWQS of 70					
		Average Secchi Disk Depth	33 cm										
		Water Clarity Rating	poor										
		Trophic State Index	54						alue = 5	3			
S		Trophic Class	eutrophic										
ete		Salinity	0.00 - 0.0	2 ppt									
Parameters	<u>o</u>	Specific Conductivity	55 – 78 μ	S/cm									
Ра	Profile	рН	6.64 – 7.4	I – 7.44 pH units									
		Oxidation-Reduction Potential	388 to 55	3 mV									
		Dissolved Oxygen						All DO was >2 mg/L throughout the study period					
	S	Surface Total Nitrogen	0.50 mg/l	_ to 0.83	3 mg/L								
	Nutrients	Surface Total Phosphorus	0.047 mg	/L to 0.0)79 mg/L								
	ž	Nitrogen to Phosphorus Ratio	10:1					Phosphoru	s limited				
						ъ			o	<u>,</u> ω			
				idity		olve gen	<u>s</u>		8	ates ride SS	cal & E	ā	
				Turbidity	핕	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a	
v	Fish	& Wildlife Propagation		NS	S	S	S						
Use	Aest	hetics						S	NS				
cial	Agrid	culture								S			
Beneficial Uses	Prim	ary Body Contact Recreation									NEI*		
Be	Publ	ic & Private Water Supply											
	NS	= Fully Supporting S = Not Supporting El = Not Enough Information	* The PB E. coli an			essed as m	inimum da	ta requiremer	nts were r	ot met due t	o QA/QC iss	ues for	

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

Hulah

Lake Data

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

Location Osage County

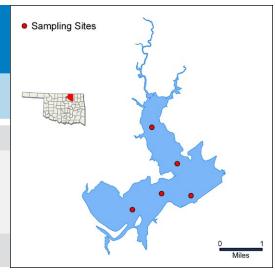
Impoundment 1951

Area 3,570 acres

Capacity 31,160 acre-feet

Purposes Flood Control, Water Supply, Low-flow Regulation, and Conser-

vation



		Parameter	F	Result					Notes/Cor	nments			
		Average Turbidity	4	8 NTU					85% of val	ues > 25	NTU		
		Average True Color	1	06 units					75% of val	ues > O\	NQS of 70		
		Average Secchi Disk Depth	2	7 cm									
		Water Clarity Rating	p	oor									
		Trophic State Index	5	5					Previous v	alue = 54	4		
S		Trophic Class		utrophic									
ete		Salinity		.10 - 0.2									
am	ω	Specific Conductivity	2	49 – 398	3.5 µS/c	m							
Parameters	Profile	рН	7	.21 – 8.3	37 pH ur	nits			Neutral				
	ď	Oxidation-Reduction Potential	1	88 to 48	7 mV								
		Dissolved Oxygen	ι	Jp to 40%	% of wat	er colum	nn < 2 mg/L	-	Occurred a	at site 5			
	ts	Surface Total Nitrogen	0	.60 mg/L	to 1.24	mg/L							
	Nutrients	Surface Total Phosphorus	0	.029 mg	/L to 0.0	83 mg/L	-						
	N	Nitrogen to Phosphorus Ratio	1	3:1					Phosphoru	ıs limited			
							g			<u>o</u>	, g	<u> </u>	
					Turbidity		Dissolved Oxygen	Metals	_	True Color	Sulfates, Chlorides & TDS	f ecal i, & E.	Chlor-a
					Ē	H	ig Q	Σ	ISI	그	Sul	En,f coli,	ਠ
S	Fish	& Wildlife Propagation			NS	S	S	S					
Use	Aestl	netics							NS	NS			
cial	Agric	ulture									S		
Beneficial Uses	Prima	ary Body Contact Recreation										S	
Be	Publi	c & Private Water Supply											
	NS	Fully Supporting = Not Supporting I = Not Enough Information		Standard	s (WQS)	. This me	ans that the	lake is co	Watershed (Nonsidered three use non-support	atened fro			

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 $\mu S/cm = microsiemens/cm$

Humphreys

Sample Period Times Visited Sampling Sites 5 November 2006 - August 2007

Impoundment 1958 Lake Data

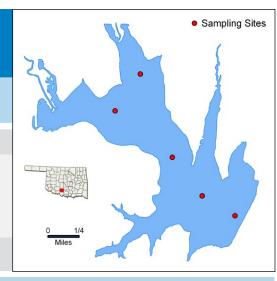
Location

Area 10,900 acres

Capacity 200,300 acre-feet

Purposes Water Supply, Flood Control, Recreation

Stephens County



		Parameter	Result					Notes/Com	ments			
		Average Turbidity	16 NTU					10% of valu	es >OW	/QS of 25 N	UTU	
		Average True Color	32 units					100% of val	ues < O	WQS of 70)	
		Average Secchi Disk Depth	58 cm									
		Water Clarity Rating	Good to a	verage								
		Trophic State Index	61									
<u>s</u>		Trophic Class	hypereutr	ophic								
ete		Salinity	0.19- 0.3	4 ppt								
am		Specific Conductivity	389.8 - 69	59.3 µS/	cm							
Parameters	Profile	рН	7.32 - 8.3	0 pH uni	its							
_	P.	Oxidation-Reduction Potential	-61 to 435	δmV								
		Dissolved Oxygen	Up to 54% August	6 of wate	r columi	n < 2 mg/L	. in	Occurred a	t site 1,	the dam		
	Į.	Surface Total Nitrogen	0.61 mg/L	to 1.20	mg/L							
	Nutrients	Surface Total Phosphorus	0.026mg/	L to 0.09	1 mg/L							
	Nut	Nitrogen to Phosphorus Ratio	20:1					Phosphorus	limited			
				Turbidity	Hd	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
								-	-	w O &	Шбб	0
S	Fish	& Wildlife Propagation		S	S	NS	S					
n S	Aest	thetics						S	S			
cial	Agri	culture								S		
Beneficial Uses	Prim	nary Body Contact Recreation									NEI	
Be	Publ	lic & Private Water Supply										
	NS	= Fully Supporting S = Not Supporting EI = Not Enough Information				nnot be det		as minimum da	ta requir	ements were	e not met du	e to

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

OWQS = Oklahoma Water Quality Standards mV = millivolts

mg/L = milligrams per liter μ S/cm = microsiemens/cm ppt = parts per thousand En = Enterococci

Chlor-a = Chlorophyll-a

Jean Neustadt

Sample Period Times Visited Sampling Sites 4 5 October 2006 - July 2007

Result

Impoundment Lake Data Area

Location

Carter County

1969

462 acres

Capacity 6,106 acre-feet

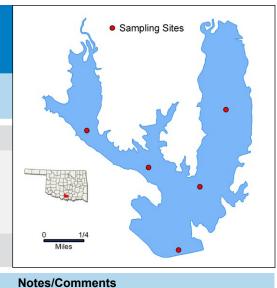
Purposes Recreation

Parameter

NTU = nephelometric turbidity units

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter



		Average Turbidity	13 NTU					100% of val	ues <o< th=""><th>WQS of 25</th><th>NTU</th><th></th></o<>	WQS of 25	NTU	
		Average True Color	27 units					100% of val	ues < C	WQS of 70)	
		Average Secchi Disk Depth	76 cm									
		Water Clarity Rating	Good									
		Trophic State Index	58									
2		Trophic Class	eutrophic									
Jete		Salinity	0.11– 0.1	6 ppt								
Parameters	<u>o</u>	Specific Conductivity	231.1 – 3	32.4 µS/	cm							
Pal	Profile	pH	7.16 – 8.7	7 pH units	S							
	₽	Oxidation-Reduction Potential	95 to 440	mV								
		Dissolved Oxygen	Up to 70%	% of wate	er columi	n < 2 mg/L	in July	Occurred a	t site 1,	the dam		
	ts	Surface Total Nitrogen	0.45 mg/l	_ to 0.98	mg/L							
	Nutrients	Surface Total Phosphorus	0.015mg/	L to 0.04	8 mg/L							
	N	Nitrogen to Phosphorus Ratio	27:1					Phosphorus	limited			
				Turbidity	Hd	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
	Fish	& Wildlife Propagation		S	S	NS	S			0,00	шоо	
ses				O	O	NO	O .					
Ž	Aestl	netics						S	S			
icia	Agric	ulture								S		
Beneficial Uses	Prima	ary Body Contact Recreation									S	
B	Publi	c & Private Water Supply										
	NS	= Not Supporting = Not Supporting I = Not Enough Information										

95

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

Jim Hall (Henryetta)

Sample Period Times Visited Sampling Sites

October 2007 - July 2008 4 5

Location Okmulgee County

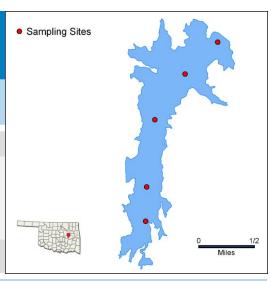
Impoundment 1928

Lake Data

Area 450 acres

Capacity 6,600 acre-feet

Purposes Water Supply and Recreation



		Parameter	ı	Result				Notes/Cor	nments			
		Average Turbidity	(9 NTU				All values	> 25 NTI	J		
		Average True Color	2	254 units				All values :	> OWQS	of 70		
		Average Secchi Disk Depth	2	23 cm								
		Water Clarity Rating	١	ooor								
		Trophic State Index	4	15				Previous v	alue = 4	7		
S		Trophic Class	ı	nesotrophic								
Parameters		Salinity	(0.01 - 0.04 ppt								
am	Ø	Specific Conductivity	ţ	50.7 – 105.1 µS/d	cm							
Par	Profile	pH	(6.58 – 7.53 pH u	nits			Neutral to	slightly a	lkaline		
	7	Oxidation-Reduction Potential		126 to 636 mV								
		Dissolved Oxygen	;	30% of water col	umn <	2 mg/L in July	/	Occurred	at site 1,	the dam		
	ts	Surface Total Nitrogen	(0.90 mg/L to 1.08	3 mg/L							
	Nutrients	Surface Total Phosphorus	(0.058 mg/L to 0.1	121 mg	/L						
	ž	Nitrogen to Phosphorus Ratio		12:1				Phosphoru	s limited			
				idity		Dissolved Oxygen	s		True Color	Sulfates, Chlorides & TDS	cal & E.	r a
				Turbidity	H	Dissolve Oxygen	Metals	ISI	True	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish	& Wildlife Propagation		NS	S	S	*					
Use	Aest	hetics						S	NS			
Beneficial Uses	Agric	culture								S		
nefi	Prim	ary Body Contact Recreation									NEI**	
ä	Publi	ic & Private Water Supply										
	NS	= Fully Supporting S = Not Supporting El = Not Enough Information	Salon	*Not supporting for **The PBCR cann for all parameters	ot be as					_		

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

John Wells

Sample Period Times Visited Sampling Sites

November 2005 – August 2006 4 3

Result

Location Haskell County

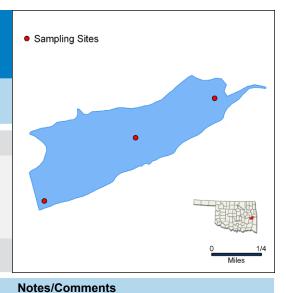
Impoundment 1936

Area 194 acres

Parameter

Capacity 1,352 acre-feet

Purposes Water Supply, Recreation



		Average Turbidity	5 NTU					100% of va	lues < 0	OWQS of 28	5 NTU	
		Average True Color	16 units					100% of va	lues < 0	OWQS of 70)	
		Average Secchi Disk Depth	151 cm									
		Water Clarity Rating	excellent									
		Trophic State Index	46									
ပ္		Trophic Class	mesotrop	hic								
ete		Salinity	0.01-0.0)5 ppt								
am		Specific Conductivity	59.8 – 11	7.9 µS/	'cm							
Parameters	Profile	pH	6.4 - 8.3	8 pH uni	its			Neutral to s	lightly a	alkaline		
-	Pr	Oxidation-Reduction Potential	189 to 48	33 mV								
		Dissolved Oxygen	Up to 45	% of wat	ter colun	nn < 2 mg/L	. in					
	S.	Surface Total Nitrogen	0.20 mg/	L to 0.56	mg/L							
	Nutrients	Surface Total Phosphorus	0.013 mg	g/L to 0.0)20 mg/l	_						
	Z	Nitrogen to Phosphorus Ratio	27:1					Phosphorus	s limited	t		
				>-		ed _			olor	s, es	ui	
				Turbidity		Dissolved Oxygen	Metals	_	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
				Τ̈́	Ħ.	O Si O	Me.	TSI	ī	Sul Chl	S SII	
S	Fish	& Wildlife Propagation		S	S	S	S					
Beneficial Uses	Aest	hetics						S	S			
cial	Agric	culture								S		
nef	Prim	ary Body Contact Recreation									S	
Be	Publi	ic & Private Water Supply										
	NS	F = Fully Supporting S = Not Supporting El = Not Enough Information										

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

Kaw (Lower)

Times Visited Sample Period Sampling Sites October 2007 - July 2008

Lake Data

Location Osage County

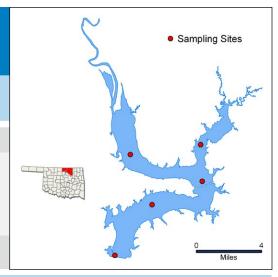
Impoundment 1976

Area 17,040 acres

428,600 acre-feet Capacity

Flood Control, Water Supply, Water Quality Control, and Purposes

Conservation



		Parameter	Result					Notes/Cor	nments			
		Average Turbidity	18 NTU					25% of val	ues > 25	NTU		
		Average True Color	75 units					25% of val	ues > O	WQS of 70		
		Average Secchi Disk Depth	66 cm									
		Water Clarity Rating	average									
		Trophic State Index	42					Previous v	alue = 5	6 (lake-wide	e average)	
S		Trophic Class	mesotro	ohic								
Parameters		Salinity	0.21 - 0.	58 ppt								
'an	ø.	Specific Conductivity	416.2 –	1100 µS	/cm							
Pal	Profile	рН	6.97 – 8.	.38 pH u	nits			Neutral to	slightly a	lkaline		
	۵	Oxidation-Reduction Potential	103 to 48	87 mV								
		Dissolved Oxygen	Up to 24	% of wa	ter colum	n < 2 mg/L		Occurred a	at site 1,	the dam		
	ts	Surface Total Nitrogen	1.08 mg/	L to 2.46	6 mg/L							
	Nutrients	Surface Total Phosphorus	0.168 mg	g/L to 0.2	223 mg/L							
	Z	Nitrogen to Phosphorus Ratio	10:1					Phosphoru	us limited			
				> :		ed _			olor	s, es,	_ ni	
				Turbidity		Dissolved Oxygen	Metals	_	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
				直	H H	S Q	Σ	ISI	뒫	S C Su	En,e Soli,	
S	Fish	n & Wildlife Propagation		NS	S	S	S					
Use	Aes	ethetics						NS	NEI			
cial	Agr	iculture								S		
Beneficial Uses	Prin	mary Body Contact Recreation									S	
Be	Pub	olic & Private Water Supply										
	Ν	S = Fully Supporting US = Not Supporting UEI = Not Enough Information	Although ments w this sam	ere not m				r turbidity and WP and Aesth				

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 μ S/cm = microsiemens/cm

Kaw (Upper)

Times Visited Sample Period Sampling Sites October 2007 - July 2008 4

Lake Data

Location Osage County

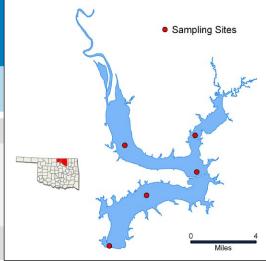
Impoundment 1976

Area 17,040 acres

Capacity 428,600 acre-feet

Flood Control, Water Supply, Water Quality Control, and Conser-Purposes

vation



		Parameter	Result	Notes/Comments
		Average Turbidity	27 NTU	50% of values > 25 NTU
		Average True Color	81 units	67% of values > OWQS of 70
		Average Secchi Disk Depth	35 cm	
		Water Clarity Rating	poor	
		Trophic State Index	53	Previous value = 56 (lake-wide average)
S		Trophic Class	eutrophic	
Jete		Salinity	0.16 - 0.65 ppt	
Parameters	ø	Specific Conductivity	332.2- 1233 μS/cm	
Ра	Profile	pН	7.09 – 8.54 pH units	Neutral to slightly alkaline
	Δ.	Oxidation-Reduction Potential	103 to 487 mV	
		Dissolved Oxygen	Up to 24% of water column < 2 mg/L	Occurred at site 1, the dam
	ıts	Surface Total Nitrogen	1.14 mg/L to 2.64 mg/L	
	Nutrients	Surface Total Phosphorus	0.119 mg/L to 0.263 mg/L	
	ž	Nitrogen to Phosphorus Ratio	9:1	Phosphorus limited
			>	98, 30r

	Nitrogen to Phosphorus Rati	0	9:1					Pnospnoru	us ilmited			
				Turbidity	된	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation			NS	S	S	S					
Use	Aesthetics							NS	NEI			
icial	Agriculture									S		
Beneficia	Primary Body Contact Recreation										S	
Be	Public & Private Water Supply											
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	Notes		ere not me		s exceeded the assessmen						

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 μ S/cm = microsiemens/cm

Keystone (1-2)

Sample Period **Times Visited Sampling Sites** 4 October 2005 - July 2006 12

Impoundment Lake Data Area

Location Tulsa County

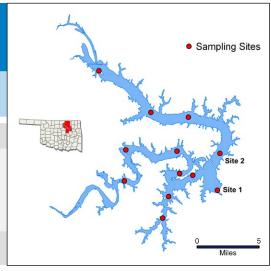
1964

23,610 acres

Capacity 557,600 acre-feet

Flood Control, Water Supply, Hydropower, Navigation, Fish & Purposes

Wildlife



		Parameter	Result	Notes/Comments
		Average Turbidity	13 NTU	13% of values > OWQS of 25 NTU
		Average True Color	29 units	100% of values < OWQS of 70
		Average Secchi Disk Depth	91 cm	
		Water Clarity Rating	good	
		Trophic State Index	54	
ပ္		Trophic Class	eutrophic	
ete		Salinity	0.45 – 4.03 ppt	
) E		Specific Conductivity	867 – 7232 μS/cm	
Parameters	Profile	рН	7.16 – 8.56 pH units	Neutral to slightly alkaline
4	Pro	Oxidation-Reduction Potential	93 to 511 mV	
		Dissolved Oxygen	Up to 62% of water column < 2 mg/L in July	
	ts	Surface Total Nitrogen	0.65 mg/L to 1.10 mg/L	
	Nutrients	Surface Total Phosphorus	0.063 mg/L to 0.193 mg/L	
	Z	Nitrogen to Phosphorus Ratio	8:1	Possibly co-limited
			A eq	s, solor

		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation	S*	S	NS	S					
Uses	Aesthetics					S	S*			
Beneficial	Agriculture							S		
enef	Primary Body Contact Recreation								S	
ă	Public & Private Water Supply									

S = Fully Supporting

NS = Not Supporting

NEI = Not Enough Information

*Although 12.5% of the values exceeded 25 NTU an assessment of the Fish & Wildlife Propagation (FWP) beneficial use cannot be made, as minimum data requirements are not being met. All true color values were below the Aesthetics criteria 70 units however like turbidity there are not enough data for this segment to assess the Aesthetics beneficial use.

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

OWQS = Oklahoma Water Quality Standards mV = millivolts

mg/L = milligrams per liter μ S/cm = microsiemens/cm ppt = parts per thousand En = Enterococci

Chlor-a = Chlorophyll-a

Keystone, Arkansas River Arm (3-5)

Sample PeriodTimes VisitedSampling SitesOctober 2005 – July 2006412

E Impound
Area
Capacity

Location Tulsa County

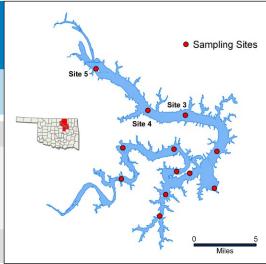
Impoundment 1964

Area 23,610 acres

Capacity 557,600 acre-feet

Purposes Flood Control, Water Supply, Hydropower, Navigation, Fish &

Wildlife



		Parameter	Result	Notes/Comments
		Average Turbidity	51 NTU	67% of values > OWQS of 25 NTU
		Average True Color	40 units	8% of values > OWQS of 70
		Average Secchi Disk Depth	47 cm	
		Water Clarity Rating	average	
		Trophic State Index	64	
S		Trophic Class	hypereutrophic	
ete		Salinity	0.28– 1.24 ppt	
) E		Specific Conductivity	542 – 2317 μS/cm	
Parameters	Profile	рН	7.34 – 8.96 pH units	Neutral to slightly alkaline
-	Pro	Oxidation-Reduction Potential	68 to 421 mV	
		Dissolved Oxygen	Up to 20% of water column < July	2 mg/L in
	ts	Surface Total Nitrogen	0.64 mg/L to 2.04 mg/L	
	Nutrients	Surface Total Phosphorus	0.094 mg/L to 0.362 mg/L	
	Z	Nitrogen to Phosphorus Ratio	6:1	Possibly co-limited
			>	

		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation	S*	S	S	S					
Uses	Aesthetics					S	S*			
Beneficial	Agriculture							S		
enef	Primary Body Contact Recreation								NEI	
ä	Public & Private Water Supply									

S = Fully Supporting

NS = Not Supporting

NEI = Not Enough Information

*Although 67% of the values exceeded 25 NTU an assessment of the Fish & Wildlife Propagation (FWP) beneficial use cannot be made, as minimum data requirements are not being met. Similarly, only 8.3% of true color values were below the Aesthetics criteria 70 units however like turbidity there are not enough data for this segment to assess the Aesthetics beneficial use.

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

Keystone, Lower Cimarron River Arm (6-9)

Sample Period Times Visited Sampling Sites October 2005 - July 2006 12

Location Tulsa County

Impoundment 1964

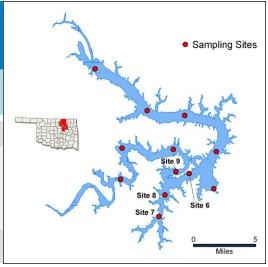
Lake Data

Area 23,610 acres

Capacity 557,600 acre-feet

Flood Control, Water Supply, Hydropower, Navigation, Fish & **Purposes**

Wildlife



			L										
			Parameter	Result					Notes/Co	mments	;		
			Average Turbidity	14 NTU					19% of va	lues > C	WQS of 25	NTU	
			Average True Color	28 units					100% of v	alues <	OWQS of 7	7 0	
			Average Secchi Disk Depth	76 cm									
			Water Clarity Rating	good									
			Trophic State Index	60									
	S		Trophic Class	eutrophic									
	ete		Salinity	0.15-2.66	6 ppt								
	am	Ф	Specific Conductivity	314 – 484	l9 μS/cm	า							
	Parameters	Profile	рН	7.36 - 8.5	66 pH un	iits			Neutral to	slightly	alkaline		
		₫	Oxidation-Reduction Potential	233 to 432	2 mV								
			Dissolved Oxygen	Up to 47%	6 of wate	er colum	nn < 2 mg/L	in July					
		ts	Surface Total Nitrogen	0.61 mg/L	to 1.20	mg/L							
		Nutrients	Surface Total Phosphorus	0.055 mg	_J /L to 0.1	86 mg/l	L						
		ž	Nitrogen to Phosphorus Ratio	8:1					Possibly of	co-limited	t		
					> -		eq -			olor	es,	_ ui	
					Turbidity		Dissolved Oxygen	Metals	_	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
					Ţ	Ā	ig Q	Σ	TSI	Ę	Sul Chi	Soli, ilos ili	ਠੰ
	es	Fish	& Wildlife Propagation		S*	S	S	S					
	-ω ι												

		Turbidity	Hd	Dissolved Oxygen	Metals	ISI	True Colo	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
2	Fish & Wildlife Propagation	S*	S	S	S					
	Aesthetics					S	S*			
5	Agriculture							S		
D	Primary Body Contact Recreation								NEI	

Public & Private Water Supply

S = Fully Supporting NS = Not Supporting

NEI = Not Enough Information

*Although 19% of the values exceeded 25 NTU an assessment of the Fish & Wildlife Propagation (FWP) beneficial use cannot be made, as minimum data requirements are not being met. All true color values were below the Aesthetics criteria 70 units however like turbidity there are not enough data for

NTU = nephelometric turbidity units

μS/cm = microsiemens per centimeter

E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivolts

Chlor-a = Chlorophyll-a

mg/L = milligrams per liter μS/cm = microsiemens/cm ppt = parts per thousand En = Enterococci

this segment to assess the Aesthetics beneficial use.

Keystone, Upper Cimarron River Arm (10-12)

Sample Period	Times Visited	Sampling Sites
October 2005 – July 2006	4	12

Location Tulsa County Impoundment 1964

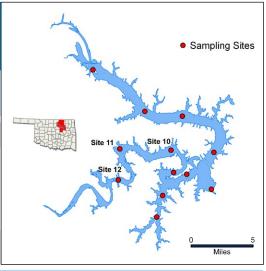
Area 23,610 acres

Lake Data

Capacity 557,600 acre-feet

Flood Control, Water Supply, Hydropower, Navigation, Fish & Purposes

Wildlife



		Parameter	Result	Notes/Comments
		Average Turbidity	41 NTU	58% of values > OWQS of 25 NTU
		Average True Color	40 units	17% of values >OWQS of 70
		Average Secchi Disk Depth	41 cm	
		Water Clarity Rating	average	
		Trophic State Index	63	
က္		Trophic Class	hypereutrophic	
ete		Salinity	0.73– 6.34 ppt	
<u>E</u>		Specific Conductivity	1373 – 11,134 μS/cm	
Parameters	Profile	рН	7.39 – 8.38 pH units	Neutral to slightly alkaline
"	P	Oxidation-Reduction Potential	331 to 423 mV	
		Dissolved Oxygen	Up to 31% of water column < 2 mg/L in July	
	ţ	Surface Total Nitrogen	0.66 mg/L to 1.77 mg/L	
	Nutrients	Surface Total Phosphorus	0.059 mg/L to 0.328 mg/L	
	S	Nitrogen to Phosphorus Ratio	8:1	Possibly co-limited
				L

		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation	S*	S	S	S					
Nses	Aesthetics					S	S*			
Beneficial	Agriculture							S		
enef	Primary Body Contact Recreation								NEI	
B	Public & Private Water Supply									

S = Fully Supporting

NS = Not Supporting

NEI = Not Enough Information

*Although 58% of the values exceeded 25 NTU an assessment of the Fish & Wildlife Propagation (FWP) beneficial use cannot be made, as minimum data requirements are not being met. Similarly, 17% of true color values were below the Aesthetics criteria 70 units however like turbidity there are not enough data for this segment to assess the Aesthetics beneficial use.

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

OWQS = Oklahoma Water Quality Standards mV = millivolts

mg/L = milligrams per liter μ S/cm = microsiemens/cm ppt = parts per thousand En = Enterococci

Chlor-a = Chlorophyll-a

Konawa

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

Impoundment 1968 Lake Data Area

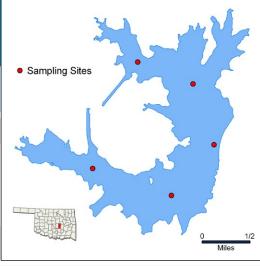
Location

1,350 acres

Capacity 23,000 acre-feet

Seminole County

Purposes **Cooling Water**



		Parameter	Result	Notes/Comments
		Average Turbidity	8 NTU	100% of values < 25 NTU
		Average True Color	21 units	100% of values < OWQS of 70
		Average Secchi Disk Depth	82 cm	
		Water Clarity Rating	good	
		Trophic State Index	57	Previous value = 53
စ		Trophic Class	eutrophic	
ete		Salinity	0.51 – 0.62 ppt	
аШ	Φ	Specific Conductivity	971.7 – 1178 μS/cm	
Parameters	Profile	рН	7.07 – 8.66 pH units	Neutral to slightly alkaline
	Ē	Oxidation-Reduction Potential	-94 to 452 mV	
		Dissolved Oxygen	Up to 33% of water column , 2 mg/L in July	Occurred at site 1
	ts	Surface Total Nitrogen	0.64 mg/L to 0.99 mg/L	
	Nutrients	Surface Total Phosphorus	0.022 mg/L to 0.045 mg/L	
	Z	Nitrogen to Phosphorus Ratio	23:1	Phosphorus limited
			ρ _ο	olo (se

		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation	S	S	S	S					
Uses	Aesthetics					S	S			
Beneficial	Agriculture							S		
nefi	Primary Body Contact Recreation								NEI	
Be	Public & Private Water Supply									

S = Fully Supporting NS = Not Supporting

NEI = Not Enough Information

The PBCR cannot be assessed as minimum data requirements were not met due to QA/QC issues for E. coli and enterococci.

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 μ S/cm = microsiemens/cm

Langston

Sample Period	Times Visited	Sampling Sites
November 2007 – August 2008	4	5

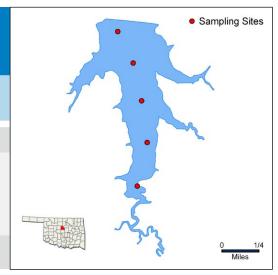
Location Logan County
Impoundment 1966

Lake Data

Area 304 acres

Capacity 5,792 acre-feet

Purposes Water Supply, Flood Control, and Recreation



		Parameter	Result					Notes/Com	nments					
		Average Turbidity	12 NTU					All values <	25 NTL	J				
		Average True Color	29 units					All values <	OWQS	of 70				
		Average Secchi Disk Depth	70 cm											
		Water Clarity Rating	good											
		Trophic State Index	44					Previous value = 47						
Sign		Trophic Class	mesotroph											
Jete		Salinity	0.10 – 0.1											
Parameters	<u>o</u>	Specific Conductivity	289.1 – 30	03 µS/cr	m									
Ра	Profile	pН	7.44 – 8.4	7 pH un	nits			Neutral to s	lightly a	lkaline				
	۵	Oxidation-Reduction Potential	94 to 586	mV										
		Dissolved Oxygen	Up to 36%	of wate	er colum	nn < 2 mg/L	in July	Occurred a	t site 4					
	ţ	Surface Total Nitrogen	0.45 mg/L	.45 mg/L to 0.80 mg/L										
	Nutrients	Surface Total Phosphorus	0.009 mg/	L to 0.0	21 mg/L	-								
	N P	Nitrogen to Phosphorus Ratio	46:1					Phosphorus	s limited					
				>		р —			olor	s,	ııi.			
				Turbidity		Dissolved Oxygen	Metals	_	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a		
				Ţ	H	io Q	Σ	ISI	Ī	Sul Ch T	E 8 8	S		
S	Fish	n & Wildlife Propagation		S	S	S								
Use	Aes	thetics						S	S					
cial	Agri	iculture								S				
Beneficial Uses	Prin	nary Body Contact Recreation									S			
Be	Pub	olic & Private Water Supply					S							
	S	= Fully Supporting												
		= Fully Supporting S = Not Supporting EL = Not Enough Information												
	N	El = Not Enough Information												

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

Lawtonka

Sampling Sites Times Visited Sample Period October 2006 - July 2007 4

Location Comanche County Impoundment 1905 Lake Data

NTU = nephelometric turbidity units

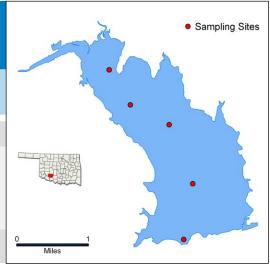
E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

Area 2,398 acres

Capacity 56,574 acre-feet

Purposes Water Supply, Recreation



		Parameter	Result					Notes/Comments					
		Average Turbidity	8 NTU					100% of va	alues <c< td=""><td>WQS of 25</td><td>NTU</td><td></td></c<>	WQS of 25	NTU		
		Average True Color	26 units					100% of va	alues < 0	DWQS of 70)		
		Average Secchi Disk Depth	108 cm										
		Water Clarity Rating	Good										
		Trophic State Index	60										
SI		Trophic Class	eutrophic										
lete		Salinity	0.11- 0.24	1 ppt									
Parameters	O	Specific Conductivity	225.2 – 46	39.7 μS	S/cm								
Pal	Profile	рН	6.76 – 8.6	0 pH u	nits								
	۵	Oxidation-Reduction Potential	42 to 419	mV									
		Dissolved Oxygen	Up to 67%	of wa	ter colum	n < 2 mg/l	_ in July	Occurred	at sites	1 and 2			
	v	Surface Total Nitrogen	0.59 mg/L				·						
	ient	Surface Total Phosphorus	0.015mg/l										
	Nutrients	Nitrogen to Phosphorus Ratio	23:1					Phosphoru	s limited				
				ξį		ved	"		ōlo	es, des	" ш	Ø	
				Turbidity	_	Dissolved Oxygen	Metals	<u></u>	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a	
				7	F.	ā ô	Š	TSI	Ļ	ਯੂ ਨੂੰ ਕ	ш 8 8	ਠ	
S	Fish	& Wildlife Propagation		S	S	NS	S						
Use	Aes	thetics						S	S				
cial	Agri	culture								S			
Beneficial Uses	Prin	nary Body Contact Recreation									S		
B	Pub	lic & Private Water Supply											
		= Fully Supporting S = Not Supporting EL = Not Enough Information											
		EI = Not Enough Information											

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

Liberty

Lake Data

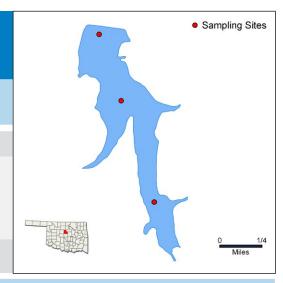
Sample PeriodTimes VisitedSampling SitesOctober 2005 – July 200643

Location Logan County
Impoundment 1948

Area 167 acres

Capacity 2,740 acre-feet

Purposes Water Supply, Recreation



			Parameter	Result					Notes/Com	nments				
			Average Turbidity	21 NTU					16.7% of va	alues >	OWQS of 2	5 NTU		
			Average True Color	20 units					100% of va	lues < 0	DWQS of 70)		
			Average Secchi Disk Depth	42 cm										
			Water Clarity Rating	good										
			Trophic State Index	67										
	S.		Trophic Class	hypereu	•									
	e te		Salinity	0.22 - 0	.30 ppt									
	ا ع	Ø	Specific Conductivity	439.1 –	580.5 μS	S/cm								
	Parameters	Profile	рН	7.94 – 8	.48 pH u	nits			Neutral to slightly alkaline					
		₫.	Oxidation-Reduction Potential	404 to 5	44 mV									
			Dissolved Oxygen						All DO was	>2 mg/l	_ throughou	t the study	period	
		ts	Surface Total Nitrogen	0.82 mg/	/L to 1.19	9mg/L								
		Nutrients	Surface Total Phosphorus	0.056 m	ng/L to 0.	110 mg/	L							
		Z	Nitrogen to Phosphorus Ratio	16:1					Phosphorus	s limited	I			
							ъ			o	₋ v			
					idity		olve gen	S		S	ates ride 0S	cal & E	ā	
					Turbidity	Ha	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a	
	,	Fish	& Wildlife Propagation		NS	S	S	S						
		Aestl	netics						S	S*				
	2	Agric	ulture								S			
4	<u>D</u>	Prima	ary Body Contact Recreation									S		
۵		Publi	c & Private Water Supply											
		NS	Fully Supporting = Not Supporting I = Not Enough Information											

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

Lloyd Church (Wilburton)

Sample Period Times Visited Sampling Sites November 2005 – August 2006 4 3

Lake Data

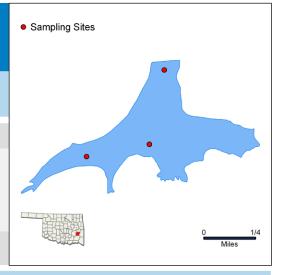
Location **Latimer County**

Impoundment 1964

Area 160 acres

Capacity 3,060 acre-feet

Purposes Water Supply, Recreation, Flood Control



		Parameter	Result					Notes/Comments				
Parameters		Average Turbidity	14 NTU					25% of values > OWQS of 25 NTU				
		Average True Color	79 units				75% of values > OWQS of 70					
		Average Secchi Disk Depth	64 cm									
		Water Clarity Rating	good									
		Trophic State Index	45									
		Trophic Class	mesotrophic									
		Salinity	0.0 – 0.01 ppt									
		Specific Conductivity	25.4 – 71.9 μS/cm									
	Profile	рH	5.9 – 7.51 pH units					26% of values <6.5 pH units				
	7	Oxidation-Reduction Potential	79 to 503 mV									
		Dissolved Oxygen	Up to 62% of water column < 2 mg/L in August									
	र	Surface Total Nitrogen	0.15 mg/L to 0.57 mg/L									
	Nutrients	Surface Total Phosphorus	0.020 mg/L to 0.043 mg/L									
		Nitrogen to Phosphorus Ratio	12:1					Phosphoru	s limited			
Beneficial Uses				Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
	Fish	& Wildlife Propagation		S	NS	NS	S					
	Aest	hetics						S	NS			
	Agric	culture								S		
	Prim	ary Body Contact Recreation									S	
m	Publ	ic & Private Water Supply										
	NS	= Fully Supporting S = Not Supporting EI = Not Enough Information	Available flow and rainfall data suggest that the peak in turbidity, which occurred in March is likely due to seasonal storm events, therefore Lloyd Church Lake will be listed as supporting its Fish & Wildlife Propagation (FWP) beneficial use									

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 μ S/cm = microsiemens/cm

Lone Chimney

Sample Period Times Visited Sampling Sites October 2003 - June 2004 4

Impoundment Lake Data Area

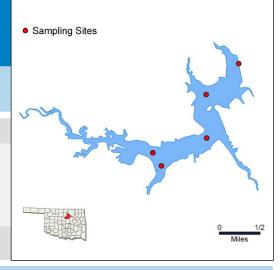
Location Pawnee County

1984

550 acres

Capacity 6,200 acre-feet

Purposes Water Supply, Recreation and Flood Control



		Parameter	Result					Notes/Com	ments			
		Average Turbidity	18 NTU					25% of value	es >OV	/QS of 25 N	NTU	
		Average True Color	41 units					20% of value	es > OV	VQS of 70		
		Average Secchi Disk Depth	63 cm									
		Water Clarity Rating	Good									
		Trophic State Index	53									
S		Trophic Class	eutrophic									
ete		Salinity	0.06-0.17	7 ppt								
am		Specific Conductivity	156.9 – 3	12.5 µS/	cm							
Parameters	Profile	pH	7.01 - 8.3	31 pH uni	its							
"	P.	Oxidation-Reduction Potential	319 to 55	2 mV								
		Dissolved Oxygen	Up to 44% June	6 of wate	r columi	n < 2 mg/L	in	Occurred a	t sites 1	and 2		
	छ	Surface Total Nitrogen	0.58 mg/L	to 1.05	mg/L							
	Nutrients	Surface Total Phosphorus	0.021 mg/	L to 0.08	33 mg/L							
	Nut	Nitrogen to Phosphorus Ratio	19:1					Phosphorus	limited			
				Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
v	Fish	& Wildlife Propagation		S	S	S	*					
Use	Aest	hetics						S	S			
Beneficial Uses	Agric	culture								S		
nefi	Prim	ary Body Contact Recreation									S	
Be	Publ	ic & Private Water Supply										
	NS	= Fully Supporting S = Not Supporting El = Not Enough Information	March is I its Fish &	ikely due Wildlife P	to seasor ropagation	nal storm ev	ents, the	eak in turbidity refore Lone Ch tics beneficial (imney La	ake will be lis	sted as supp	

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

OWQS = Oklahoma Water Quality Standards mV = millivolts

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

Lugert-Altus

Sample PeriodTimes VisitedSampling SitesSeptember 2004 - June 200545

Result

Location Greer County

Impoundment 1947

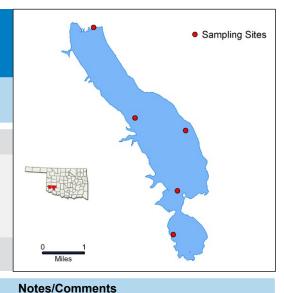
Parameter

Lake Data

Area 6,260 acres

Capacity 132,830 acre-feet

Purposes Water Supply, Flood Control, Irrigation



		Parameter	Result					Notes/Con	nments			
		Average Turbidity	23 NTU					30% of valu	ues >OV	VQS of 25 N	NTU	
		Average True Color	18 units					100% of va	lues < C	OWQS of 70)	
		Average Secchi Disk Depth	37 cm									
		Water Clarity Rating	fair									
		Trophic State Index	59									
<u>છ</u>		Trophic Class	eutrophic	;								
ete		Salinity	1.01 – 1.2	29 ppt								
am	ø.	Specific Conductivity	1866 – 23	397 µS/c	cm							
Parameters	Profile	pH	7.67 - 8.2	22 pH ur	nits							
_	ሷ	Oxidation-Reduction Potential	343 to 48	0 mV								
		Dissolved Oxygen			All DO was	>2 mg/l	_ throughou	t the study	period			
	ts	Surface Total Nitrogen	0.69 mg/l	L to 1.17	mg/L							
	Nutrients	Surface Total Phosphorus	0.031 mg	/L to 0.0	84 mg/L							
	Z	Nitrogen to Phosphorus Ratio	17:1					Phosphoru	s limited			
				>		р _			olor	, ee .	ui.	
				Turbidity		solv	<u>8</u>		True Color	ate; oride DS	En,ecal coli, & E. coli	or-a
				뒫	Ρd	Dissolved Oxygen	Metals	ISI	Ţ	Sulfates, Chlorides & TDS	En,e coli,	Chlor-a
Ś	Fish	& Wildlife Propagation		NS	S	S	*					
Beneficial Uses	Aest	hetics						S	S			
cial	Agri	culture								S		
nefi	Prim	ary Body Contact Recreation									NEI	
Be	Pub	ic & Private Water Supply										
	N	= Fully Supporting S = Not Supporting El = Not Enough Information	of the Pr	imary Boo	dy Contac	ere not collect ot Recreation ample period	(PBCR)	g the 2005 rec beneficial use	creation se cannot t	eason therefoe made at the	ore an asses nis time.	ssment

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

McAlester

Sample PeriodTimes VisitedSampling SitesNovember 2007 – August 200845

Result

Lake Data

Location Pittsburg County

Impoundment 1930

Parameter

NTU = nephelometric turbidity units

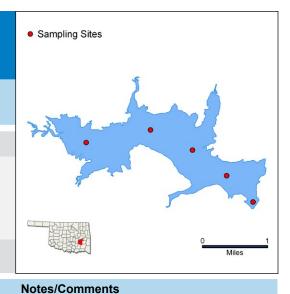
E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

Area 1,521 acres

Capacity 13,398 acre feet

Purposes Water Supply and Recreation



		Average Turbidity	26 NTU					40% of valu	ues > 25	NTU		
		Average True Color	96 units					50% of value	ues > O\	VQS of 70		
		Average Secchi Disk Depth	44 cm									
		Water Clarity Rating	average									
		Trophic State Index	50					Previous va	alue = 42	2		
9		Trophic Class	mesotrop									
Parameters		Salinity	0.00 - 0.	• • •								
am		Specific Conductivity	85.5 – 16	64 µS/cn	n							
ar	Profile	pH	6.59 - 8.	42 pH u	nits			Neutral to s	slightly a	lkaline		
_	P.	Oxidation-Reduction Potential	50 to 635	5 mV								
		Dissolved Oxygen	Up to 42 August	% of wa	ter colur	nn < 2 mg/L	. in	Occurred a	t site 1			
	ts	Surface Total Nitrogen	0.45 mg/	L to 0.83	3 mg/L							
	Nutrients	Surface Total Phosphorus	0.027 mg	g/L to 0.0)66 mg/l	_						
	Z	Nitrogen to Phosphorus Ratio	15:1					Phosphoru	s limited			
				Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish	& Wildlife Propagation		NS	S	S	S					
Beneficial Uses	Aest	hetics						S	NS			
icial	Agric	culture								S		
enef	Prim	ary Body Contact Recreation									S	
m	Publ	ic & Private Water Supply										
	NS	= Fully Supporting S = Not Supporting El = Not Enough Information										

111

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

McGee Creek

Sample PeriodTimes VisitedSampling SitesOctober 2006 - July 200745

Area Capac

Location Atoka County

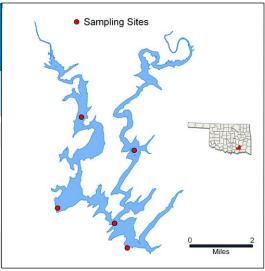
Impoundment 1987

Area 3,810 acres

Capacity 113,930 acre-feet

Purposes Water Supply, Recreation, Water Quality Control, Flood Control,

Fish & Wildlife



		Parameter	Result	Notes/Comments
		Average Turbidity	9 NTU	5% of values >OWQS of 25 NTU
		Average True Color	52 units	10% of values >OWQS of 70
		Average Secchi Disk Depth	132 cm	
		Water Clarity Rating	Good	
		Trophic State Index	43	
က္		Trophic Class	mesotrophic	
ete		Salinity	0.0– 0.03 ppt	
Ĕ		Specific Conductivity	0.6 – 76.9 μS/cm	
Parameters	Profile	рН	5.58 – 7.63 pH units	41% of values< 6.5 pH units
"	Pro	Oxidation-Reduction Potential	-43 to 486 mV	
		Dissolved Oxygen	Up to 57% of water column < 2 mg/L in October and up to 80% in July	
	ts	Surface Total Nitrogen	0.0– 0.03 ppt	
	Nutrients	Surface Total Phosphorus	0.6 – 76.9 μS/cm	
	N	Nitrogen to Phosphorus Ratio	5.58 – 7.63 pH units	41% of values< 6.5 pH units

		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation	S	NS*	NS	S					
Uses	Aesthetics					S	S			
Beneficial	Agriculture							S		
enef	Primary Body Contact Recreation								S	
B	Public & Private Water Supply									

S = Fully Supporting

NS = Not Supporting

NEI = Not Enough Information

Notes

*Slightly acidic conditions are not unusual in this part of the state due to relatively low soil pH and lack of soluble bedrock. Because of these conditions it is likely that the low pH values may be due to natural causes; therefore the Water Board is looking at the applicability of developing site-specific criteria for waters in the southeastern portion of the state.

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

McMurtry

Sample Period Times Visited Sampling Sites

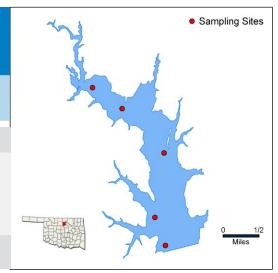
November 2007 – August 2008 4 5

Location Noble County
Impoundment 1971

Area 1,155 acres

Capacity 19,733 acre feet

Purposes Water Supply, Flood Control, and Recreation



		Parameter	Result					Notes/Co	mments				
		Average Turbidity	33 NTU					55% of va	lues > 25	NTU			
		Average True Color	103 units	i				50% of va	lues > O\	NQS of 70			
		Average Secchi Disk Depth	48 cm										
		Water Clarity Rating	average										
		Trophic State Index	48					Previous v	/alue = 47	7			
ပ္		Trophic Class	mesotrop	hic									
ete		Salinity	0.15 - 0.3	20 ppt									
Ĭ,		Specific Conductivity	303.8 - 3	848.3 μS	S/cm								
Parameters	Profile	рH	7.36 - 8.6	6 – 8.60 pH units					slightly a	lkaline			
4	P	Oxidation-Reduction Potential	41 to 820) mV									
		Dissolved Oxygen	Up to 62 ^o August	% of wa	ter colun	nn < 2 mg/	L in	Occurred at site 1					
	ts	Surface Total Nitrogen	0.43 mg/	L to 1.0	2 mg/L								
	Nutrients	Surface Total Phosphorus	0.014 mg	J/L to 0.0	056 mg/L	_							
	Nut	Nitrogen to Phosphorus Ratio	27:1					Phosphore	us limited				
				Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a	
S	Fish	& Wildlife Propagation		NS	S	NS	S						
Use	Aest	hetics						S	NS				
Beneficial Uses	Agric	culture								S			
nefi	Prim	ary Body Contact Recreation									S		
Be	Publ	ic & Private Water Supply											

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

S = Fully Supporting

NS = Not Supporting

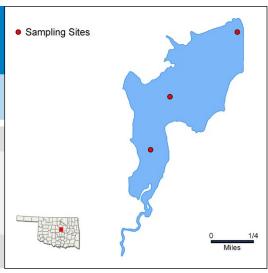
NEI = Not Enough Information

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

Notes

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

M	eeker			
	Sample P	eriod	Times Visited	Sampling Sites
Od	ctober 2005 – A	August 2006	4	3
	Location	Lincoln County		
Data	Impoundment	1970		
e Da	Area	250 acres		
Lake	Capacity	1,818 acre-feet		
	Purposes	Water Supply, Re	ecreation, Flood Control	
	Paramet	er	Result	



		Parameter	Result					Notes/Cor	nments			
		Average Turbidity	48 NTU					75% of val	ues > O'	WQS of 25	NTU	
		Average True Color	43 units					100% of va	alues < 0	DWQS of 70	כ	
		Average Secchi Disk Depth	39 cm									
		Water Clarity Rating	Fair to po	or								
		Trophic State Index	50									
ပ္		Trophic Class	mesotrop	hic								
ete		Salinity	0.12 - 0.	36 ppt								
a		Specific Conductivity	253.2 - 7	'05.4 μ	S/cm							
Parameters	Profile	рH	7.67 - 8.	72 pH u	nits			Neutral to	slightly a	lkaline		
	P.	Oxidation-Reduction Potential	37 to 451	mV								
		Dissolved Oxygen	Up to 389 August	% of wa	ter colun	nn < 2 mg/L	. in	Occurred a	at site 1,	the dam		
	S	Surface Total Nitrogen	0.50 mg/	L to 0.89	9 mg/L							
	Nutrients	Surface Total Phosphorus	0.027 mg	_J /L to 0.0	090 mg/l	_						
	Z	Nitrogen to Phosphorus Ratio	13:1					Phosphoru	s limited	l		
				>		þ			lor	, s	i	
				Turbidity	표	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish	& Wildlife Propagation		NS	S	S	S					
Use	Aest	thetics						S	S			
Beneficial Uses	Agri	culture								S		
nefi	Prim	nary Body Contact Recreation									S	
Be	Pub	lic & Private Water Supply										
	NS	= Fully Supporting S = Not Supporting EI = Not Enough Information										

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

NTU = nephelometric turbidity units

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

Murray

Sample Period	Times Visited	Sampling Sites
November 2005 – August 2006	4	5

Result

Pare Capace Capace

Location Love County

Impoundment 1937

Area 5,728 acres

Capacity 153,250 acre-feet

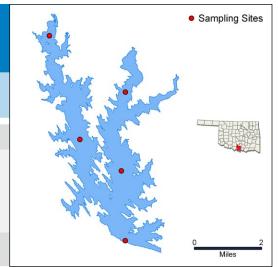
Purposes Recreation

Parameter

NTU = nephelometric turbidity units

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter



Notes/Comments

		Average Turbidity	4 NTU					100% of va	lues < 0	DWQS of 25	5 NTU	
		Average True Color	12 units					100% of va	lues < 0	DWQS of 70)	
		Average Secchi Disk Depth	184 cm									
		Water Clarity Rating	excellent									
		Trophic State Index	36									
S		Trophic Class	oligotroph	nic								
Parameters		Salinity	0.11 – 0.1	5ppt								
a B		Specific Conductivity	230 – 311	1.9 μS/d	cm							
ara	Profile	pН	7.16–8.3	4 pH ur	iits			Neutral to s	lightly a	lkaline		
"	Pro	Oxidation-Reduction Potential	147 to 49	6 mV								
		Dissolved Oxygen	Up to 70% August	% of wat	er colum	nn < 2 mg/L	. in	Occurred a	t site 1,	the dam		
	छ	Surface Total Nitrogen	0.20 mg/l	_ to 0.36	mg/L							
	Nutrients	Surface Total Phosphorus	0.008 mg	/L to 0.0)26 mg/L	=						
	Z	Nitrogen to Phosphorus Ratio	16:1					Phosphoru	s limited	l		
				Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish	& Wildlife Propagation		S	S	NS	S					
Beneficial Uses	Aest	thetics						S	S			
icial	Agri	culture								S		
enef	Prim	nary Body Contact Recreation									S	
ä	Pub	lic & Private Water Supply										
	NS	= Fully Supporting S = Not Supporting EI = Not Enough Information										

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

Nanih Waiya

Sample Period Times Visited Sampling Sites

December 2007 – July 2008 4 3

Impound Area

Capacity

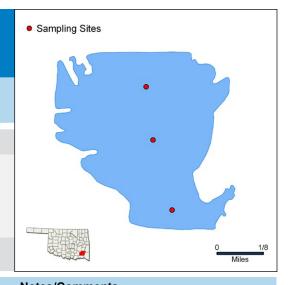
Location Pushmataha County

Impoundment 1958

Area 131 acres

Capacity 1,064 acre feet

Purposes Recreation



			Parameter	Result					Notes/Con	nments			
			Average Turbidity	9 NTU					All values <	< 25 NTU	J		
			Average True Color	45 units					25% of valu	ues > O\	WQS of 70		
			Average Secchi Disk Depth	98 cm									
			Water Clarity Rating	average									
			Trophic State Index	45					Previous va	alue = 4	5		
က်			Trophic Class	mesotrop	hic								
ete			Salinity	0.0 - 0.10) ppt								
Ĭ,			Specific Conductivity	63 – 262	μS/cm								
Parameters		Profile	рН	6.31 - 8.2	22 pH ur	nits			4 values (6	.5%) <6	5 pH units		
-		P	Oxidation-Reduction Potential	5 to 576 r	nV								
			Dissolved Oxygen	Up to 42% August	% of wat	er colum	ın < 2 mg/L	. in	Occurred a	t site 1			
		S	Surface Total Nitrogen	0.32 mg/l	to 0.70	mg/L							
		Nutrients	Surface Total Phosphorus	0.018 mg	/L to 0.0	32 mg/L							
		Z	Nitrogen to Phosphorus Ratio	18:1					Phosphoru	s limited			
					_		p			lor	, so		
					Turbidity	Ŧ.	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
	L		0 Mail 1996 - D						-	-	00 0 ∞	шоо	O
es	ľ	·ish (& Wildlife Propagation		S	S	S	S					
S n	A	esth	netics						S	NS			
Beneficial Uses	Α	gric	ulture								S		
nef	P	Prima	ary Body Contact Recreation									S	
Be	P	Publi	c & Private Water Supply										
		NS	Fully Supporting = Not Supporting I = Not Enough Information										

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 $\mu S/cm = microsiemens/cm$

New Spiro

Sampling Sites Sample Period Times Visited October 2005 - August 2006

Lake Data Area

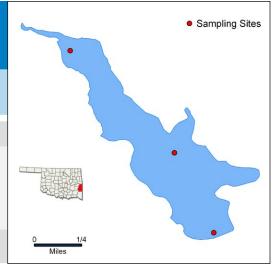
Location Le Flore County

Impoundment 1960

254 acres

Capacity 2,160 acre-feet

Purposes Water Supply, Recreation



		Parameter	Result					Notes/Con	nments			
		Average Turbidity	18 NTU					8% of value	es >OW	QS of 25 N	TU	
		Average True Color	26 units					100% of va	lues < 0	DWQS of 70	0	
		Average Secchi Disk Depth	47 cm									
		Water Clarity Rating	good									
		Trophic State Index	68									
S		Trophic Class	hypereuti	ophic								
ete		Salinity	0.04 - 0.0	09 ppt								
am		Specific Conductivity	106.8 – 1	55.4 µS	S/cm							
Parameters	Profile	рH	7.09 - 9.	24 pH ι	units			10% of value	ues > 9.	0 pH units		
	Ę.	Oxidation-Reduction Potential	121 to 48	3 mV								
		Dissolved Oxygen	Up to 339 August	% of wa	ter colum	nn < 2 mg/l	. in	Occurred a	t site 2			
	ts	Surface Total Nitrogen	0.98 mg/l	_ to 1.6	8 mg/L							
	Nutrients	Surface Total Phosphorus	0.076 mg	/L to 0.	170 mg/L	-						
	Ž Ž	Nitrogen to Phosphorus Ratio	11:1					Phosphoru	s limited	i		
				≥		pe (olor	s, es	— шi	_
				Turbidity	표	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E coli	Chlor-a
								-	-	w O ≪	шбб	O
S	Fish	& Wildlife Propagation		S	NS	S	S					
ns.	Aest	hetics						NS*	S			
Beneficial Uses	Agric	culture								S		
nef	Prim	ary Body Contact Recreation									S	
Be	Publ	ic & Private Water Supply										
	NS	F = Fully Supporting S = Not Supporting El = Not Enough Information	*The lake threatene					ng that the Aes ucted to confi				ed

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

OWQS = Oklahoma Water Quality Standards mV = millivolts

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

Okemah

Sample Period Times Visited Sampling Sites October 2006 - July 2007

Lake Data Area

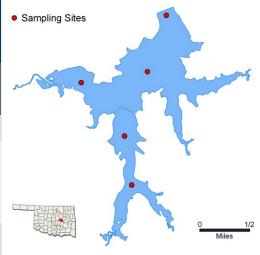
Location Okfuskee County

Impoundment N/A

761 acres

Capacity 13,100 acre-feet

Purposes Water Supply, Recreation



		Parameter	Result			Notes/Comme	ents			
		Average Turbidity	17 NTU			20% of values	>OW	QS of 25 N	UTU	
		Average True Color	61 units			35% of values	>OW	QS of 70		
		Average Secchi Disk Depth	78 cm							
		Water Clarity Rating	average							
		Trophic State Index	46							
S		Trophic Class	mesotrophic							
ete		Salinity	0.06- 0.14ppt							
am	0	Specific Conductivity	140.7 – 289.3 μS/cm							
Parameters	Profile	рН	6.71 – 8.03 pH units							
	Ē	Oxidation-Reduction Potential	126 to 426 mV							
		Dissolved Oxygen	Up to 69% of water column	n < 2 mg/L in	July					
	ıts	Surface Total Nitrogen	0.38 mg/L to 1.01 mg/L							
	Nutrients	Surface Total Phosphorus	0.012 mg/L to 0.063 mg/L							
	ž	Nitrogen to Phosphorus Ratio	23:1			Phosphorus lin	nited			
			>	D.		<u>.</u>	j 0 0	, S	i	
			bidity	solved	als	C) 1)	fates, orides DS	ecal , & E	or-a

	Milogen to 1 hospilorus Rat	10	20.1					i nospilon				
				Turbidity	Hd	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation			NS	S	NS	S					
Uses	Aesthetics							S	NS			
Beneficial	Agriculture									S		
enef	Primary Body Contact Recreation										NS	
ä	Public & Private Water Supply											
	S = Fully Supporting NS = Not Supporting	otes				d, 20% of the			screening	level of 61 c	fu/100 ml ar	nd the

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

mg/L = milligrams per liter μ S/cm = microsiemens/cm ppt = parts per thousand En = Enterococci

Chlor-a = Chlorophyll-a

geometric mean of 33 was also exceeded for enterococci.

Okmulgee

Sample Period Times Visited Sampling Sites

October 2006 - July 2007 4 5

Location Okmulgee County

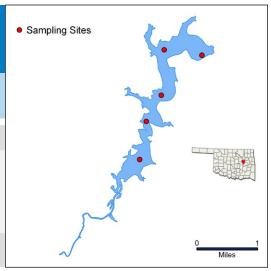
Impoundment 1928

Lake Data

Area 668 acres

Capacity 14,170 acre-feet

Purposes Water Supply, Recreation



		Parameter	Result		Notes/Comments		
		Average Turbidity	11 NTU		100% of values <ov< th=""><th>VQS of 25 NTU</th><th></th></ov<>	VQS of 25 NTU	
		Average True Color	56 units		30% of values >OW	QS of 70	
		Average Secchi Disk Depth	99 cm				
		Water Clarity Rating	good				
		Trophic State Index	46				
<u>0</u>		Trophic Class	mesotrophic				
ete		Salinity	0.02- 0.10ppt				
am	0	Specific Conductivity	$71.3 - 209.8 \mu\text{S/cm}$				
Parameters	Profile	рН	6.36 – 7.90 pH units		12 (6%) of values we	ere < 6.5 pH units	
	Δ.	Oxidation-Reduction Potential	194 to 600 mV				
		Dissolved Oxygen	Up to 71% of water column	< 2 mg/L in July			
	ts	Surface Total Nitrogen	0.36 mg/L to 0.77 mg/L				
	Nutrients	Surface Total Phosphorus	0.011 mg/L to 0.034 mg/L				
	Ž	Nitrogen to Phosphorus Ratio	30:1		Phosphorus limited		
			ı£	r red	color	GS, Teles	æ

			Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
Sé	Fish & Wildlife Propagation		S	S	NS	S					
Uses	Aesthetics						S	NS			
Beneficial	Agriculture								S		
nef	Primary Body Contact Recreation									S	
ă	Public & Private Water Supply										
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	Notes									

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

Oologah

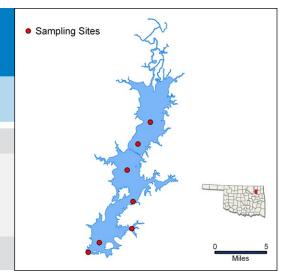
Sample Period Times Visited Sampling Sites December 2007 - July 2008

Location Rogers County Impoundment 1963 Lake Data

Area 29,460 acres

Capacity 553,400 acre feet

Water Supply, Flood Control, and Navigation Purposes



	Parameter	Result	Notes/Comments
	Average Turbidity	20 NTU	25% of values > 25 NTU
	Average True Color	54 units	25% of values > OWQS of 70
	Average Secchi Disk Depth	68 cm	
	Water Clarity Rating	average	
	Trophic State Index	54	Previous value = 46
	Trophic Class	eutrophic	
	Salinity	0.10 – 0.23 ppt	
	Specific Conductivity	161- 451.9 μS/cm	
file	pH	7.10 – 8.65 pH units	Neutral to slightly alkaline
P	Oxidation-Reduction Potential	171 to 563 mV	
	Dissolved Oxygen	Up to 85% of water column < 2 mg/L in August	Occurred at site 1
ţ	Surface Total Nitrogen	0.33 mg/L to 1.13 mg/L	
trien	Surface Total Phosphorus	0.026 mg/L to 0.109 mg/L	
Z	Nitrogen to Phosphorus Ratio	12:1	Phosphorus limited
	Nutrients Profile	Average Turbidity Average True Color Average Secchi Disk Depth Water Clarity Rating Trophic State Index Trophic Class Salinity Specific Conductivity pH Oxidation-Reduction Potential Dissolved Oxygen Surface Total Nitrogen Surface Total Phosphorus	Average Turbidity Average True Color Average Secchi Disk Depth Water Clarity Rating Trophic State Index Trophic Class Salinity Specific Conductivity pH 7.10 – 8.65 pH units Oxidation-Reduction Potential Dissolved Oxygen Surface Total Nitrogen 9 10 NTU 54 units eutrophic 10 10 – 0.23 ppt 161- 451.9 µS/cm 7.10 – 8.65 pH units 171 to 563 mV Dissolved Oxygen Surface Total Nitrogen 10 33 mg/l to 1.13 mg/l

		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation	S	S	S	S					
Uses	Aesthetics					S	S			
Beneficial	Agriculture							S		
enef	Primary Body Contact Recreation								NEI	
ă	Public & Private Water Supply									

S = Fully Supporting NS = Not Supporting

NEI = Not Enough Information

Precipitation data suggest that the peak in turbidity and true color, which occurred in May are likely due to seasonal storm events, therefore Oologah Lake will be listed as supporting its Fish & Wildlife Propagation (FWP) and Aesthetics beneficial use for these parameters. The PBCR cannot be assessed as minimum data requirements were not met due to QA/QC issues for E. coli.

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

Overholser

Times Visited Sample Period Sampling Sites November 2005 – August 2006

Impoundment 1919 Lake Data

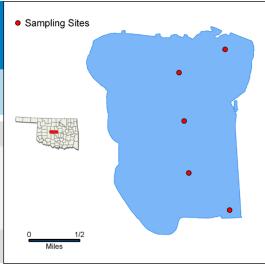
Location

Area 1,500 acres

Capacity 15,000 acre-feet

Purposes Water Supply, Recreation

Oklahoma County



		Parameter	Result					Notes/Cor						
		Average Turbidity	60 NTU					75% of val	ues > O	WQS of 25	NTU			
		Average True Color	38 units					10% of val	ues > O	WQS of 70				
		Average Secchi Disk Depth	32 cm											
		Water Clarity Rating	Fair to po	oor										
		Trophic State Index	67											
SI		Trophic Class	hypereut	rophic										
ete		Salinity	0.04 - 0.	74 ppt										
am	Φ	Specific Conductivity	102 – 13	99 µS/c	m									
Parameters	Profile	pН	7.80– 8.6	64 pH un	nits			Neutral to	slightly a	alkaline				
	<u>P</u>	Oxidation-Reduction Potential	359 to 43	31 mV										
		Dissolved Oxygen						Not stratific	ed during	g any samp	ling interva	I		
	ıts	Surface Total Nitrogen	0.88 mg/	L to 2.38	3 mg/L									
	Nutrients	Surface Total Phosphorus	0.100 mg	g/L to 0.3	317 mg/L									
	ž	Nitrogen to Phosphorus Ratio	7:1					Possibly co	o- limited	t				
						σ			ō	. ග				
				idity		olve Jen	<u>s</u>		<u>0</u>	ride S	E ⊗ E ⊞	ā		
				Turbidity	Ä	Dissolved Oxygen	Metals	IS I	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E coli	Chlor-a		
	Eich	& Wildlife Propagation		NS	S	NS	S			0,00	шоо	O		
es	1 1511	a whalle Fropagation		INO	3	INO	3							
Š	Aest	thetics						NS*	NS					
cial	Agri	culture								S				
Beneficial Uses	Prim	nary Body Contact Recreation									S			
Be	Publ	lic & Private Water Supply												
	NS	= Fully Supporting S = Not Supporting El = Not Enough Information	*The lake	e is listed ed by nut	in the WC	QS as a NL studies ca	W indicating the conditions and the conditions are	g that the Aeucted to confi	sthetics b rm non-s	eneficial use upport status	is 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

Ozzie Cobb

Sample PeriodTimes VisitedSampling SitesNovember 2007 – August 200843

Area Capacit

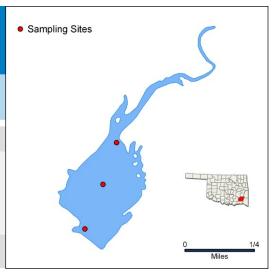
Location Pushmataha County

Impoundment 1958

Area 116 acres

Capacity 833 acre feet

Purposes Recreation



		12 NTU 51 units	All values < 25 NTU
Avera	•	51 units	
			25% of values > OWQS of 70
Avera	age Secchi Disk Depth	56 cm	
Wate	er Clarity Rating	average	
Troph	hic State Index	59	Previous value = 55
<u>ب</u> Troph	hic Class	eutrophic	
Salini	ity	0.00 – 0.20 ppt	
Spec	cific Conductivity	50.6 - 311 μS/cm	
Parameters Salini Spec pH Oxida		6.32 – 7.96 pH units	7 (13%) of values < 6.5
Oxida	ation-Reduction Potential	15 to 543 mV	
Disso	olved Oxygen	Up to 50% of water column < 2 mg/L in August	Occurred at site 1
ည Surfa	ace Total Nitrogen	0.47 mg/L to 0.94 mg/L	
Surfa Surfa Nitro	ace Total Phosphorus	0.034 mg/L to 0.072 mg/L	
Nitro	gen to Phosphorus Ratio	17:1	Phosphorus limited

		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation	S	NS	S	S					
Uses	Aesthetics					S	NS			
Beneficial	Agriculture							S		
nef	Primary Body Contact Recreation								S	
B	Public & Private Water Supply									

S = Fully Supporting

NS = Not Supporting

NEI = Not Enough Information

Slightly acidic conditions are not unusual in this part of the state due to relatively low soil pH and lack of soluble bedrock. Because of these conditions it is likely that the low pH values may be due to natural causes; therefore the Water Board is looking at the applicability of developing site-specific criteria for waters in the southeastern portion of the state.

mg/L = milligrams per liter

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

OWQS = Oklahoma Water Quality Standards mV = millivolts

μS/cm = microsiemens/cm

ppt = parts per thousand En = Enterococci

Chlor-a = Chlorophyll-a

Pauls Valley City

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

Result

Lake Data Area

Location

Garvin County

Impoundment 1954

Parameter

NTU = nephelometric turbidity units

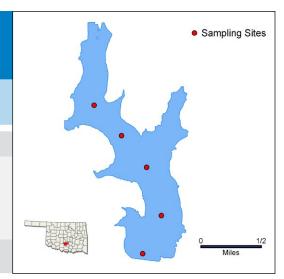
E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

750 acres

Capacity 8,730 acre feet

Purposes Water Supply and Recreation



Notes/Comments

		- urumotor										
		Average Turbidity	43 NTU					80% of valu	ies > 25	NTU		
		Average True Color	126 units					75% of valu	ies > OV	VQS of 70		
		Average Secchi Disk Depth	37 cm									
		Water Clarity Rating	poor									
		Trophic State Index	50					Previous va	lue = 49			
S		Trophic Class	mesotrop									
ete		Salinity	0.10 - 0.1									
am	Φ	Specific Conductivity	206.9 - 27	71 µS/cn	n							
Parameters	Profile	pН	7.14 - 8.5	59 pH un	iits			Neutral to s	lightly al	kaline		
Ī	ā	Oxidation-Reduction Potential	82 to 494	mV								
		Dissolved Oxygen	Up to 44%	% of wate	er colum	ın < 2 mg/L	in July	Occurred a	t site 1			
	ţ	Surface Total Nitrogen	0.44 mg/L	to 0.98	mg/L							
	Nutrients	Surface Total Phosphorus	0.018 mg	/L to 0.0	78 mg/L							
	Ž	Nitrogen to Phosphorus Ratio	17:1					Phosphorus	s limited			
				>		ed_			olor	, s e s	ui	
				Turbidity		Dissolved Oxygen	Metals		True Color	fate; orid DS	En,ecal coli, & E. coli	Chlor-a
				Ţ	표	O _X	Me	ISI	Ξ	Sulfates, Chlorides & TDS	면 입 iii iii	딩
S	Fish	& Wildlife Propagation		NS	S	S	S					
Beneficial Uses	Aes	thetics						S	NS			
cial	Agri	culture								S		
nefi	Prim	nary Body Contact Recreation									S	
Be	Pub	lic & Private Water Supply										
	N.	= Fully Supporting S = Not Supporting EI = Not Enough Information										

123

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

Pawhuska

Sample Period Times Visited Sampling Sites October 2007 – July 2008

Location Osage County

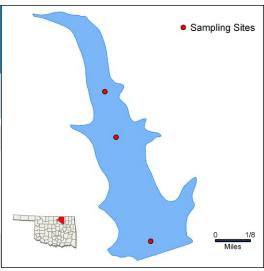
Impoundment 1936

Lake Data

Area 96 acres

Capacity 3,600 acre feet

Purposes Water Supply and Recreation



		Parameter	Result					Notes/Com	ments				
		Average Turbidity	3 NTU					All values <		J			
		Average True Color	21 units					All values <					
		Average Secchi Disk Depth	195 cm					7 111 7 41 4 6 6	01140	. 0. 10			
		Water Clarity Rating	excellent										
		Trophic State Index	41					Previous va	lue = 3	9			
v		Trophic Class	mesotroph	nic									
fer		Salinity	0.15 - 0.2										
me		Specific Conductivity	311.1 – 52	23.1 µS/o	cm								
Parameters	Profile	рН	6.91 – 8.6	6 pH un	its			Neutral to s	lightly a	lkaline			
	ቯ	Oxidation-Reduction Potential	-114 to 48	5 mV									
		Dissolved Oxygen	Up to 54%	of wate	er columi	n < 2 mg/L	in July	Occurred at	site 1				
	ts	Surface Total Nitrogen	0.24 mg/L	to 0.46	mg/L								
	Nutrients	Surface Total Phosphorus	0.005 mg/	'L to 0.00)9 mg/L								
	Ž	Nitrogen to Phosphorus Ratio	51:1					Phosphorus	limited				
				>-		p _			olor	s, es	пi		
				Turbidity		Dissolved Oxygen	Metals	_	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a	
				Ī	H	ŏŏ	Me	ISI	그	သွင်္	Soli, Soli,	ਠ	
S	Fish	& Wildlife Propagation		S	S	NS	S						
Use	Aest	hetics						S	S				
cial	Agric	culture								S			
Beneficial Uses	Prim	ary Body Contact Recreation									NEI		
Be	Publ	ic & Private Water Supply											
	NS	= Fully Supporting S = Not Supporting El = Not Enough Information	The PBCF E. coli and			sed as minir	mum data	a requirements	were no	t met due to	QA/QC issu	es for	

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

Pawnee

Lake Data

Sampling Sites Sample Period **Times Visited** 5 November 2006 - August 2007

Result

Location Pawnee County

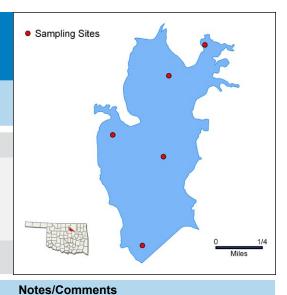
Impoundment 1932

Area 257 acres

Parameter

Capacity 3,855 acre-feet

Purposes Water Supply, Recreation



		Average Turbidity	22 NTU					30% of values > OWQS of 25 NTU						
		Average True Color	66 units					50% of val	ues > C	WQS of 70)			
		Average Secchi Disk Depth	44 cm											
		Water Clarity Rating	average											
		Trophic State Index	59											
ပ္		Trophic Class	eutrophic	,										
ete		Salinity	0.09- 0.1	6 ppt										
ä		Specific Conductivity	205.9 - 3	31 µS/0	cm									
Parameters	Profile	pН	7.25 - 8.0	69 pΗι	units			Neutral to	slightly a	lkaline				
-	P	Oxidation-Reduction Potential	73 to 506	3 mV										
		Dissolved Oxygen	Up to 389 August	Jp to 38% of water column < 2 mg/L in Occurred at sites 1 & 2										
	र	Surface Total Nitrogen	0.80 mg/	L to 1.2	25 mg/L									
	Nutrients	Surface Total Phosphorus	0.023 mg	/L to 0.0	060 mg/l	L								
	Z	Nitrogen to Phosphorus Ratio	24:1					Phosphoru	s limited	I				
				>		р ө _			olor	S.	ııi.			
				Turbidity		Dissolved Oxygen	Metals	_	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a		
				Ţ	H	ig Q	Σ	ISI	5	Sul Ch T	S S F	ਨ		
S	Fish	& Wildlife Propagation		S	S	S	S							
Use	Aest	hetics						S	S					
Beneficial Uses	Agric	culture								S				
nef	Prim	ary Body Contact Recreation									S			
ä	Publ	ic & Private Water Supply												
	NS	F = Fully Supporting S = Not Supporting El = Not Enough Information	Available likely due life Propa	to seas	onal storr		refore Pa	eak in turbidit wnee Lake wi uses.						

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

Perry

Sample Period Times Visited Sampling Sites 5 November 2006 - August 2007

Result

mV = millivolts

Chlor-a = Chlorophyll-a

Location **Noble County** Impoundment 1937 Lake Data

Parameter

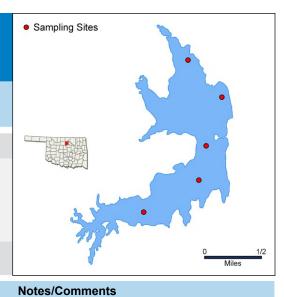
 μ S/cm = microsiemens per centimeter

E. coli = Escherichia coli

Area 614 acres

Capacity 6,892 acre-feet

Purposes Water Supply, Recreation and Flood Control



		Average Turbidity	75 NTU					100% of va	alues >	OWQS of 2	5 NTU		
		Average True Color	143 units					50% of val	ues > 0	WQS of 70			
		Average Secchi Disk Depth	22 cm										
		Water Clarity Rating	poor										
		Trophic State Index	48										
S		Trophic Class	mesotrop	hic									
Parameters		Salinity	0.08- 0.2										
am		Specific Conductivity	181.9 – 4	15 μS/c	m								
ar	Profile	рH	6.90 – 8.1	19 pH u	ınits			Neutral to	slightly a	lkaline			
•	<u>P</u>	Oxidation-Reduction Potential	339 to 43	5mV									
		Dissolved Oxygen	Up to 36% August	% of wat	er colum	n < 2 mg/l	_ in						
	छ	Surface Total Nitrogen	0.50 mg/	L to 1.3	5 mg/L								
	Nutrients	Surface Total Phosphorus	0.027 mg/	0.027 mg/L to 0.253 mg/L									
	Z	Nitrogen to Phosphorus Ratio	9:1					Phosphoru	us limited	I			
				īţ		lved	v		Color	es, des	ie E	ά	
				면		0 5	_		_	# = 8		<u>ٺ</u>	
				Turbidity	핕	Dissolved Oxygen	Metals	IS I	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a	
Se	Fish	& Wildlife Propagation		SN Turbid	Ha S	Disso Oxyg	S Metal	TSI	True (Sulfat Chlori & TD\$	En,ec coli, { coli	Chlor	
l Uses		& Wildlife Propagation hetics						IS 1	ZN True (Sulfat Chlori & TD8	En,ec coli, 4	Chlor	
icial Uses	Aestl									Sulfat S Chlori & TDS	En,ec coli, ¿	Chlor	
eneficial Uses	Aesth	hetics									S coli, &	Chlor	
Beneficial Uses	Aesth Agric Prima	hetics										Chlor	
Beneficial Uses	Aestl Agric Prima Publi	hetics culture ary Body Contact Recreation										Chlor	

 μ S/cm = microsiemens/cm

En = Enterococci

Pine Creek

Sample Period Times Visited Sampling Sites November 2007 - August 2008

Location McCurtain County Impoundment 1969

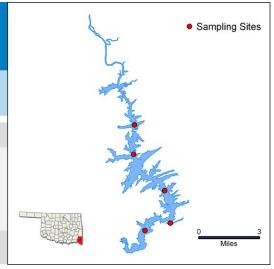
Lake Data

Area 3,750 acres

Capacity 53,750 acre feet

Water Supply, Flood Control, Water quality Control, Fish and Purposes

Wildlife, and Recreation



		Parameter	Result	Notes/Comments
		Average Turbidity	10 NTU	All values < 25 NTU
		Average True Color	51 units	30% of values > OWQS of 70
		Average Secchi Disk Depth	83 cm	
		Water Clarity Rating	good	
		Trophic State Index	53	Previous value = 54
Ų	2	Trophic Class	eutrophic	
9		Salinity	0.0 – 0.01 ppt	
Ē		Specific Conductivity	35 – 106 μS/cm	
Darametere	Profile	рН	5.88 – 8.70 pH units	87 (44%) of values < 6.5
-	P. P.	Oxidation-Reduction Potential	75 to 600 mV	
		Dissolved Oxygen	Up to 56% of water column < 2 mg/L in August	Occurred at site 1
	S S	Surface Total Nitrogen	0.36 mg/L to 0.75 mg/L	
	Nutrients	Surface Total Phosphorus	0.014 mg/L to 0.040 mg/L	
	5 Z	Nitrogen to Phosphorus Ratio	19:1	Phosphorus limited

		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation	S	NS	NS	S					
Uses	Aesthetics					S	NS			
icial	Agriculture							S		
Beneficia	Primary Body Contact Recreation								S	
B	Public & Private Water Supply									

S = Fully Supporting NS = Not Supporting

NEI = Not Enough Information

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

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

Ponca

Sample PeriodTimes VisitedSampling SitesNovember 2007 – August 200845

Lake Data

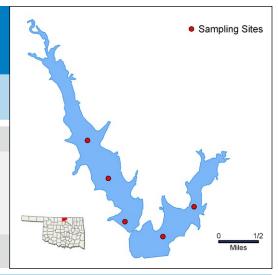
Location Kay County

Impoundment 1935

Area 805 acres

Capacity 14,440 acre feet

Purposes Water Supply and Recreation



		Parameter	Result					Notes/Cor	nments				
		Average Turbidity	12 NTU					All values	< 25 NT	J			
		Average True Color	46 units					10% of val	ues > O'	WQS of 70			
		Average Secchi Disk Depth	74 cm										
		Water Clarity Rating	good										
		Trophic State Index	48					Previous v	Previous value = 52				
ဖွ		Trophic Class	mesotrop	hic									
ete		Salinity	0.0 - 0.20) ppt									
a		Specific Conductivity	112 – 362	2 μS/cm	l								
Parameters	Profile	рН	6.78 - 8.0	6.78 – 8.65 pH units Neutral to slightly alkaline									
4	P	Oxidation-Reduction Potential	-51 to 54	3 mV									
		Dissolved Oxygen	57 - 63% August	- 63% of water column < 2 mg/L in Occurred at sites 1, 4 & 5									
	Ŋ	Surface Total Nitrogen	0.51 mg/l	L to 1.17	7 mg/L								
	Nutrients	Surface Total Phosphorus	0.024 mg	/L to 0.0	057 mg/L								
	N	Nitrogen to Phosphorus Ratio	25:1					Phosphoru	ıs limited	I			
				_		p			lor	, s			
				Turbidity	핍	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a	
S	Fis	h & Wildlife Propagation		S	S	NS	S						
Use	Aes	sthetics						S	NS				
Beneficial Uses	Agı	iculture								S			
nef	Prir	mary Body Contact Recreation									NEI		
Be	Pul	olic & Private Water Supply											
	٨	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information	The PBC E. coli.	R canno	t be asses	sed as mini	mum data	ı requirement	s were no	ot met due to	QA/QC issu	es for	

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

OWQS = Oklahoma Water Quality Standards mV = millivolts

mV = millivolts $\mu S/cm = microsiemens/cm$ Chlor-a = Chlorophyll-a

mg/L = milligrams per liter

Prague City

Sample Period Times Visited Sampling Sites

October 2007 – July 2008 4 3

Take Data
Area
Capacit

Location

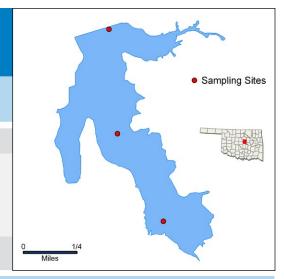
Lincoln County

Impoundment 1984

Area 225 acres

Capacity 2,415 acre feet

Purposes Water Supply, Flood Control and Recreation



			Parameter	Result					Notes/Com	ments			
			Average Turbidity	14 NTU					All values <	25 NTU			
			Average True Color	55 units					25% of value	es > OW	'QS of 70		
			Average Secchi Disk Depth	78 cm									
			Water Clarity Rating	good									
			Trophic State Index	51					Previous va	lue = 45			
2	0		Trophic Class	eutrophic									
,			Salinity	0.09 - 0.2	0 ppt								
5	8	Ø	Specific Conductivity	201 – 403	s.6 µS/cn	n							
Daramotore	5	Profile	рН	7.18 – 8.3	7 pH un	its			Neutral to sl	ightly all	kaline		
		_	Oxidation-Reduction Potential	77 to 457	mV								
			Dissolved Oxygen	Up to 50%	6 of wate	er columi	n < 2 mg/L	in July	Occurred at	site 1			
		ts	Surface Total Nitrogen	0.61 mg/L	to 0.76	mg/L							
		Nutrients	Surface Total Phosphorus	0.021 mg/	L to 0.03	36 mg/L							
		N	Nitrogen to Phosphorus Ratio	25:1					Phosphorus	limited			
					>		D 0			olor	s,	ııi.	
	1				Turbidity		Dissolved Oxygen	Metals	_	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
					Ī	H	ŏŏ	Ψ	TSI	뒫	လ ဂ်	필요요	ਹ
U		Fish	& Wildlife Propagation		S	S	NS	S					
		Aestl	netics						S	NS			
<u> </u>	3	Agric	ulture								S		
Beneficial Uses		Prima	ary Body Contact Recreation									S	
Ω.		Publi	c & Private Water Supply										
		S =	Fully Supporting										
			= Not Supporting = Not Enough Information										
		NE	I = Not Enough Information										

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 $\mu S/cm = microsiemens/cm$

Purcell

Sample Period	Times Visited	Sampling Sites
November 2007 – August 2008	4	3

Pare Data Capac

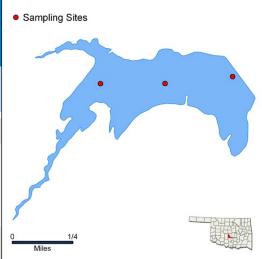
Location McClain County

Impoundment 1930

Area 150 acres

Capacity 2,600 acre feet

Purposes Water Supply and Recreation



		Parameter	Result			Notes/Comments						
		Average Turbidity	14 NTU			All values < 25 NTU						
		Average True Color	25 units			All values < OWQS of 70						
		Average Secchi Disk Depth	57 cm									
		Water Clarity Rating	good									
		Trophic State Index	51			Previous value = 50						
ပ္		Trophic Class	eutrophic									
ete		Salinity	0.19 – 0.23 ppt									
Ĕ		Specific Conductivity	374 – 462.8 μS/cm									
Parameters	Profile	рН	7.17 – 8.37 pH units			Neutral to slightly alkaline						
	Pr	Oxidation-Reduction Potential	18 to 645 mV									
		Dissolved Oxygen	Up to 50% of water column August	n < 2 mg/L in		Occurred at site 1 & 2						
	ts	Surface Total Nitrogen	0.60 mg/L to 0.83 mg/L									
	Nutrients	Surface Total Phosphorus	0.018 mg/L to 0.041 mg/L									
	Z	Nitrogen to Phosphorus Ratio	24:1			Phosphorus limited						
			dity	en	တ	Color tes, sal sal	Ġ					

		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation	S	S	NS	S					
Uses	Aesthetics					S	S			
icial	Agriculture							S		
Beneficia	Primary Body Contact Recreation								NEI	
B	Public & Private Water Supply									

S = Fully Supporting

NS = Not Supporting

NEI = Not Enough Information

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

The PBCR cannot be assessed as minimum data requirements were not met due to QA/QC issues for

ppt = parts per thousand En = Enterococci

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

OWQS = Oklahoma Water Quality Standards mV = millivolts

E. coli and fecal coliform.

Chlor-a = Chlorophyll-a

Notes

R.C. Longmire

Sample Period	Times Visited	Sampling Sites
November 2007 – August 2008	4	5

Location Lake Data Area

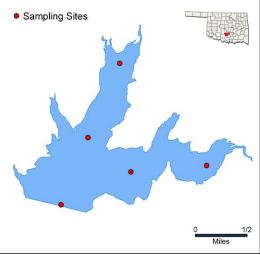
Garvin County

Impoundment 1989

918 acres

N/A Capacity

Purposes Water Supply and Recreation



		Parameter	Result	Notes/Comments
		Average Turbidity	12 NTU	All values < 25 NTU
		Average True Color	29 units	All values < OWQS of 70
		Average Secchi Disk Depth	67 cm	
		Water Clarity Rating	good	
		Trophic State Index	57	Previous value = 56
စ္		Trophic Class	eutrophic	
ete		Salinity	0.10 – 0.20 ppt	
<u> </u>		Specific Conductivity	267 – 388 μS/cm	
Parameters	Profile	рН	6.9 – 8.61 pH units	Neutral to slightly alkaline
т.	Pro	Oxidation-Reduction Potential	65 to 545 mV	
		Dissolved Oxygen	Up to 58% of water column < 2 mg/L in August	Occurred at site 1
	छ	Surface Total Nitrogen	0.56 mg/L to 0.89 mg/L	
	Nutrients	Surface Total Phosphorus	0.021 mg/L to 0.047 mg/L	
	5 Z	Nitrogen to Phosphorus Ratio	24:1	Phosphorus limited

		Turbidity	Æ	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation	S	S	S						
Uses	Aesthetics					S	S			
Beneficial	Agriculture							S		
enef	Primary Body Contact Recreation								S	
ă	Public & Private Water Supply				S					
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information									

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

Raymond Gary

Sample Period Times Visited Sampling Sites

November 2007 – August 2008 4 5

Lake Data

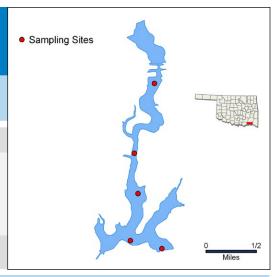
Location Choctaw County

Impoundment 1956

Area 263 acres

Capacity 1,681 acre feet

Purposes Recreation



		Parameter	Result					Notes/Con	nments				
		Average Turbidity	11 NTU					All values <	< 25 NT	J			
		Average True Color	53 units					32% of valu	ues > O	WQS of 70			
		Average Secchi Disk Depth	67 cm										
		Water Clarity Rating	good										
		Trophic State Index	55					Previous value = 50					
ō		Trophic Class	eutrophic										
ete		Salinity	0.0 – 0.60 ppt										
am		Specific Conductivity	64.4 – 12	17 µS/c	m								
Parameters	Profile	pН	6.64 - 7.5	3 pH u	nits			Neutral					
"	P	Oxidation-Reduction Potential	38 to 513	mV									
		Dissolved Oxygen	Up to 50% August	6 of wat	ter colum	nn < 2 mg/L	. in	Occurred a	t site 1				
	छ	Surface Total Nitrogen	0.23 mg/L	to 0.62	2 mg/L								
	Nutrients	Surface Total Phosphorus	0.027 mg/	'L to 0.0)59 mg/L	_							
	Z	Nitrogen to Phosphorus Ratio	12:1					Phosphoru	s limited	I			
						ъ			o	. ω			
				idity		olve Jen	S		S	ates ride S	cal & E	ā	
				Turbidity	표	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a	
v	Fish	a & Wildlife Propagation		S	S	NS	S	,	•	0, 0 10			
Use	Aes	thetics						S	NS				
Beneficial Uses	Agri	iculture								S			
nefi	Prin	nary Body Contact Recreation									NEI		
ä	Pub	lic & Private Water Supply											
	N	= Fully Supporting S = Not Supporting EI = Not Enough Information	The PBCI E. coli and			ssed as mini	mum data	a requirements	s were no	ot met due to	QA/QC issu	es for	

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

er mV = millivolts

OWQS = Oklahoma Water Quality Standards

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

Chlor-a = Chlorophyll-a

Robert S. Kerr

Sample Period Times Visited Sampling Sites October 2007 - July 2008 4

Impoundment 1970 Lake Data Area

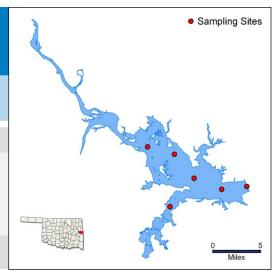
Location

Sequoyah County

43,800 acres

525,700 acre feet Capacity

Purposes Navigation, Hydropower, and Recreation



		Parameter	Result					Notes/Con	nments			
		Average Turbidity	78 NTU					88% of value	ues > 25	NTU		
		Average True Color	137 units	s				All values >	> OWQS	of 70		
		Average Secchi Disk Depth	26 cm									
		Water Clarity Rating	poor									
		Trophic State Index	50					Previous va	alue = 5	8		
S		Trophic Class	eutrophi	С								
ete		Salinity	0.02 - 0	.60 ppt								
am	Φ	Specific Conductivity	57.6 – 1	148 µS/c	m							
Parameters	Profile	pН	6.98 – 8	.43 pH u	nits			Neutral to	slightly a	lkaline		
	ā	Oxidation-Reduction Potential	272 to 5	26 mV								
		Dissolved Oxygen						Never belo	w 6.0 m	g/L		
	ts	Surface Total Nitrogen	0.70 mg	/L to 1.72	2 mg/L							
	Nutrients	Surface Total Phosphorus	0.065 m	g/L to 0.2	210 mg/L							
	Ž	Nitrogen to Phosphorus Ratio	8:1					Phosphoru	s limited	I		
						ō			lor	. w		
				Turbidity		Dissolved Oxygen	als		True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	or-a
				TuT.	표	Diss	Metals	ISI	True	Sulfates, Chlorides & TDS	En,ecal coli, & E coli	Chlor-a
y,	Fish	& Wildlife Propagation		NS	S	S	S					
Use	Aes	thetics						S	NS			
cial	Agri	culture								S		
Beneficial Uses	Prim	nary Body Contact Recreation									NEI	
Be	Pub	lic & Private Water Supply										
	N.	= Fully Supporting S = Not Supporting EI = Not Enough Information		CR canno nd fecal c		sed as min	imum data	requirements	s were no	t met due to	QA/QC issu	es for

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

OWQS = Oklahoma Water Quality Standards mV = millivolts

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

ppt = parts per thousand En = Enterococci

Chlor-a = Chlorophyll-a

Rocky

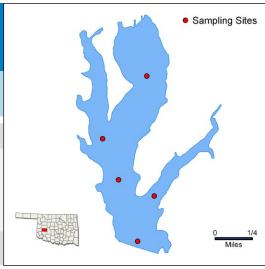
Sample Period	Times Visited	Sampling Sites
November 2006 - July 2007	4	5

Location Washita County 1933 Impoundment Lake Data

Area 347 acres

Capacity 4,210 acre-feet

Purposes Water Supply, Recreation



		Parameter	Result	Notes/Comments
		Average Turbidity	46 NTU	90% of values > OWQS of 25 NTU
		Average True Color	46 units	100% of values < OWQS of 70
		Average Secchi Disk Depth	27 cm	
		Water Clarity Rating	poor	
		Trophic State Index	69	
က္		Trophic Class	hypereutrophic	
ete		Salinity	0.24- 0.34 ppt	
Parameters	Ð	Specific Conductivity	471.5 – 652.6 μS/cm	
Par	Profile	рН	7.77 – 8.67 pH units	Neutral to slightly alkaline
	Δ.	Oxidation-Reduction Potential	264 to 430 mV	
		Dissolved Oxygen	Up to 25% of water column < 2 mg/L in Jul	у
	ts	Surface Total Nitrogen	1.23 mg/L to 1.81 mg/L	
	Nutrients	Surface Total Phosphorus	0.074 mg/L to 0.181 mg/L	
	Z	Nitrogen to Phosphorus Ratio	12:1	Phosphorus limited
			7	o . s .

	·						•				
			Turbidity	Hd	Dissolved Oxygen	Metals	1SI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
Se	Fish & Wildlife Propagation		NS	S	S	S					
Uses	Aesthetics						NS*	S			
Beneficial	Agriculture								S		
nefi	Primary Body Contact Recreation									NEI**	
Bei	Public & Private Water Supply										
		*The lake	is curren	tlv listed i	n the Oklahon	na Water Qı	uality Standa	rds (WQS) as a Nutrien	t Limited Wat	ershed

S = Fully Supporting NS = Not Supporting

NEI = *Not Enough Information*

(NLW). 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.

**The PBCR beneficial use cannot be determined as minimum data requirements were not met due to quality control issues for E. coli and Fecal Coliform.

NTU = nephelometric turbidity units μ S/cm = microsiemens per centimeter OWQS = Oklahoma Water Quality Standards mV = millivoltsChlor-a = Chlorophyll-a

Notes

mg/L = milligrams per liter μ S/cm = microsiemens/cm ppt = parts per thousand En = Enterococci

E. coli = Escherichia coli

Sahoma

Sampling Sites Times Visited Sample Period 5 November 2005 – August 2006

Result

Impoundment 1947 Lake Data Area

Location

Creek County

Parameter

NTU = nephelometric turbidity units

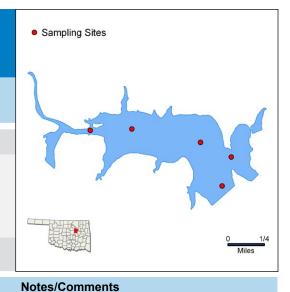
E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

312 acres

Capacity 4,850 acre-feet

Purposes Water Supply, Recreation



		Average Turbidity	9 NTU					100% of va	alues < 0	DWQS of 25	5 NTU	
		Average True Color	30 units					100% of va	alues < 0	DWQS of 70)	
		Average Secchi Disk Depth	73 cm									
		Water Clarity Rating	Fair									
		Trophic State Index	51									
ō		Trophic Class	eutrophic	2								
Parameters		Salinity	0.08 – 0.									
am		Specific Conductivity	184.1 – 2	203.1 μ ⁽	S/cm							
ar	Profile	pH	7.02– 7.8	30 pH ur	nits			Neutral to	slightly a	lkaline		
	Pr	Oxidation-Reduction Potential	125 to 4	51 mV								
		Dissolved Oxygen	Up to 69 May	% of wa	ter colur	mn < 2 mg/L	in	Occurred a	at site 1,	the dam		
	ts	Surface Total Nitrogen	0.58 mg	/L to 0.7	4 mg/L							
	Nutrients	Surface Total Phosphorus	0.023 mg	g/L to 0.0	039 mg/l	L						
	Z Z	Nitrogen to Phosphorus Ratio	22:1					Phosphoru	s limited	I		
				Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
ဟ	Fish	& Wildlife Propagation		S	S	NS	S					
Beneficial Uses	Aestl	hetics						S	S			
icial	Agric	culture								S		
nef	Prima	ary Body Contact Recreation									S	
ă	Publi	ic & Private Water Supply										
	NS	Fully Supporting S = Not Supporting El = Not Enough Information										

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

Sardis

Sampling Sites Sample Period Times Visited 5 December 2007 - August 2008

Pushmataha County

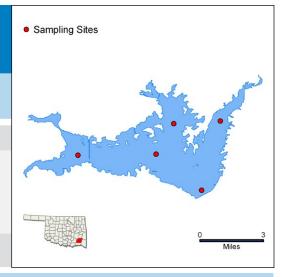
Impoundment 1970 Lake Data

Location

Area 13,610 acres

Capacity 274,330 acre feet

Purposes Flood Control, Water Supply, Fish and Wildlife, and Recreation



		Parameter	Result					Notes/Cor	nments			
		Average Turbidity	15 NTU					30% of val	ues > 25	NTU		
		Average True Color	62 units					30% of val	ues > O\	NQS of 70		
		Average Secchi Disk Depth	72 cm									
		Water Clarity Rating	average									
		Trophic State Index	46					Previous v	alue = 50)		
<u>0</u>		Trophic Class	mesotropl									
Parameters		Salinity	0.0 - 0.02									
am		Specific Conductivity	47 – 81 µ	S/cm								
ar	Profile	pH	6.58 - 7.7	'4 pH un	its			Neutral				
	Ę.	Oxidation-Reduction Potential	29 to 574	mV								
		Dissolved Oxygen	Up to 42% August	of wate	er colum	nn < 2 mg/l	_ in	Occurred a	at site 1			
	Ş.	Surface Total Nitrogen	0.24 mg/L	to 0.56	mg/L							
	Nutrients	Surface Total Phosphorus	0.013 mg/	'L to 0.04	45 mg/L							
	Ž	Nitrogen to Phosphorus Ratio	16:1					Phosphoru	s limited			
				Turbidity	H.	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
				F	₫		Σ	F	F	w 0 %	шбб	O
S	Fish	& Wildlife Propagation		S	S	NS	S					
NS(Aest	hetics						S	NS			
Beneficial Uses	Agric	culture								S		
enef	Prim	ary Body Contact Recreation									S	
m	Publi	ic & Private Water Supply										
	NS	= Fully Supporting S = Not Supporting El = Not Enough Information	Available due to sea Propagati	asonal sto	orm ever	nts, therefore	Sardis L	rbidity and tru ake will be lis e for these par	ted as su			

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

Scott King (Rock Creek)

Sample Period Times Visited Sampling Sites
October 2006 - July 2007 4 3

Location Carter County

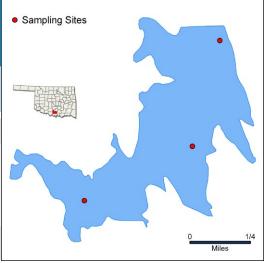
Impoundment 1979

Lake Data

Area 248 acres

Capacity 3,588 acre-feet

Purposes Recreation



		Parameter	Result					Notes/Co	mments			
		Average Turbidity	13 NTU					100% of v	alues < 0	OWQS of 2	5 NTU	
		Average True Color	26 units					100% of v	alues < 0	OWQS of 7	0	
		Average Secchi Disk Depth	85 cm									
		Water Clarity Rating	good									
		Trophic State Index	48									
S		Trophic Class	mesotropl	hic								
ete		Salinity	0.12- 0.10	6 ppt								
am	Φ	Specific Conductivity	250.7 – 3	33 μS/ci	m							
Parameters	Profile	рH	7.20 - 8.7	′ 1 pH u	nits			Neutral to	slightly a	lkaline		
_	ā	Oxidation-Reduction Potential	97 to 519	mV								
		Dissolved Oxygen	Up to 60%	% of wat	er colun	nn < 2 mg/L	in July	Occurred	at site 1,	the dam		
	ts	Surface Total Nitrogen	0.44 mg/L	to 0.96	mg/L							
	Nutrients	Surface Total Phosphorus	0.011 mg/	/L to 0.0	32 mg/L	-						
	Ž	Nitrogen to Phosphorus Ratio	33:1					Phosphoru	us limited	I		
				>		р 0 _			olor	, se	ni.	
				Turbidity	玉	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish	& Wildlife Propagation		S	S	NS	S					
ses	A 1	L . C			0	0						

			Turbidity	Hd	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation		S	S	NS	S					
OSe	Aesthetics						S	S			
Cla	Agriculture								S		
benet	Primary Body Contact Recreation									S	
ň	Public & Private Water Supply										
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	Notes									

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. 1

Pottawatomie County

Sample Period Sampling Sites Times Visited 4 5 November 2005 – August 2006

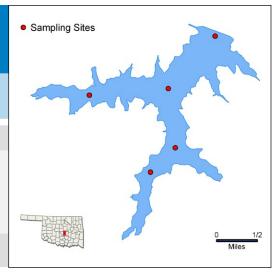
Impoundment 1935 Lake Data

Location

Area 1,336 acres

Capacity 22,600 acre-feet

Purposes Water Supply, Recreation



			Parameter	Result					Notes/Com	ments			
			Average Turbidity	15 NTU					9% of value	s > OW	QS of 25 N	ITU	
			Average True Color	29 units					7% of value	s > OW	QS of 70		
			Average Secchi Disk Depth	67 cm									
			Water Clarity Rating	good									
			Trophic State Index	41									
S			Trophic Class	mesotropl	nic								
ete			Salinity	0.08 - 0.2									
am		4	Specific Conductivity	82 – 433.	5 μS/cm	1							
Parameters	9	Profile	pH	7.08 – 9.8	5 pH un	its			Only 0.34%	of valu	es > 9.0 pH	l units	
_	۵	ŗ	Oxidation-Reduction Potential	43 to 523	mV								
			Dissolved Oxygen	Up to 67% summer	of wate	er colum	n < 2 mg/L	. in	Occurred at	site 1,	the dam		
	٥	ည	Surface Total Nitrogen	0.06 mg/l	_ to 2.33	mg/L							
	2	Nutrients	Surface Total Phosphorus	0.003 mg/	L to 0.07	78 mg/L							
	Ž	Z Z	Nitrogen to Phosphorus Ratio	22:1					Phosphorus	limited			
					_		þ			lor	, S		
					Turbidity		Dissolved Oxygen	Metals		True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
					Ī	H _G	Oxy	Met	TSI	Ţ	Sulf Chi		S
S	Fis	sh 8	& Wildlife Propagation		S	S	NS	S					
Use	Ae	esth	netics						S	S			
Beneficial Uses	Ag	gric	ulture								S		
nef	Pri	rima	ary Body Contact Recreation									NEI	
ä	Pu	ublio	c & Private Water Supply										
		NS	Fully Supporting = Not Supporting I = Not Enough Information										

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

NTU = nephelometric turbidity units

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

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

Shawnee Twin No. 2

Sample Period Sampling Sites Times Visited 4 5 October 2007 - July2008

Result

mV = millivolts

Chlor-a = Chlorophyll-a

Location Impoundment Lake Data Area

Pottawatomie County

1960

Parameter

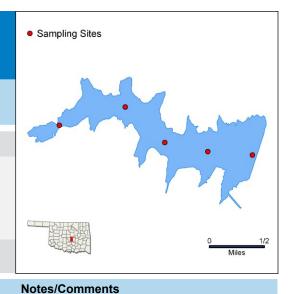
 μ S/cm = microsiemens per centimeter

E. coli = Escherichia coli

1,100 acres

Capacity 11,400 acre feet

Purposes Water Supply and Recreation



		Average Turbidity	8 NTU					All values <	25 NTU			
		Average True Color	35 units					5% of value	s > OW	QS of 70		
		Average Secchi Disk Depth	89 cm									
		Water Clarity Rating	good									
		Trophic State Index	43					Previous va	lue = 42			
2		Trophic Class	mesotrop									
Parameters		Salinity	0.01 – 0.1									
ä	<u>o</u>	Specific Conductivity	52.8 – 24	·2.3 μS/c	m							
Par	Profile	рH	7.03 - 8.2	3 pH un	its			Neutral				
	<u>~</u>	Oxidation-Reduction Potential	40 to 625	mV								
		Dissolved Oxygen	Up to 58%	of wate	er columr	n < 2 mg/L	in July	Occurred at	site 1			
	ts	Surface Total Nitrogen	0.45 mg/L	to 1.02	mg/L							
	Nutrients	Surface Total Phosphorus	0.010 mg/	L to 0.02	27 mg/L							
	Z	Nitrogen to Phosphorus Ratio	39:1					Phosphorus	limited			
						σ			or	Ø		
				idity		olve	S		S	ates, ride:)S	_ ы — ы	ā
				Turbidity	핊	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
Ø	Fish	& Wildlife Propagation		S	S	NS	S					
Use	Aest	hetics						S	0			
<u>a</u>								0	S			
<u>ပ</u>	Agric	culture						5	5	S		
nefic		culture ary Body Contact Recreation						5	5	S	S	
Beneficial Uses	Prim							5	5	S	S	
Benefic	Prima Publi S = NS	ary Body Contact Recreation						3	5	S	S	

139

 μ S/cm = microsiemens/cm

En = Enterococci

Shell

Sample Period	Times Visited	Sampling Sites
November 2005 – August 2006	4	5

Result

Location Osage County Impoundment 1922 Lake Data Area 573 acres

Parameter

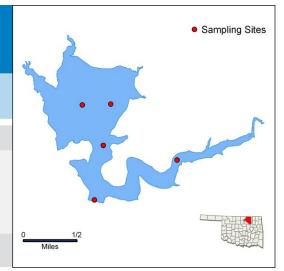
NTU = nephelometric turbidity units

E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

Capacity 9,500 acre-feet

Purposes Water Supply, Recreation



Notes/Comments

		Average Turbidity	9 NTU					100% of va	lues < C	WQS of 25	5 NTU	
		Average True Color	21 units					100% of va	lues < C	WQS of 70)	
		Average Secchi Disk Depth	83 cm									
		Water Clarity Rating	excellent									
		Trophic State Index	53									
ပ္		Trophic Class	eutrophic									
ete		Salinity	0.08 - 0.2	0 ppt								
E E		Specific Conductivity	172.2 – 28	30.5 µS	/cm							
Parameters	Profile	pН	6.74 - 8.5	52 pH uı	nits			Neutral to s	lightly a	lkaline		
-	P.	Oxidation-Reduction Potential	327 to 496	6 mV								
		Dissolved Oxygen	Up to 67% May	of wate	er colum	n < 2 mg/L	in	Occurred a	t site 1,	the dam		
	र	Surface Total Nitrogen	0.55 mg/L	to 0.96	mg/L							
	Nutrients	Surface Total Phosphorus	0.019 mg/	L to 0.0	27 mg/L							
	ž	Nitrogen to Phosphorus Ratio	35:1					Phosphorus	s limited			
				Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish	& Wildlife Propagation		S	S	NS	S					
Beneficial Uses	Aest	hetics						S	S			
icial	Agric	culture								S		
enef	Prim	ary Body Contact Recreation									S	
ă	Publ	ic & Private Water Supply										
	NS	= Fully Supporting S = Not Supporting El = Not Enough Information										

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

Skiatook

Sample Period	Times Visited	Sampling Sites
November 2006 - August 2007	4	7

Location Osage County Impoundment 1984 Lake Data

Area 10,190 acres

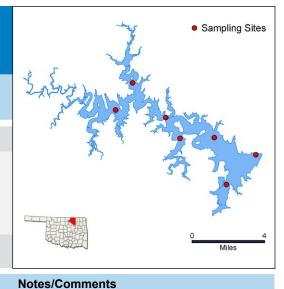
Parameter

Capacity 322,700 acre-feet

Flood Control, Water Supply, Water Quality Control, Recreation Purposes

Result

and Fish & Wildlife



			Average Turbidity	13 NTU				7% of values > OWQS of 25 NTU							
			Average True Color	34 units					10% of values > OWQS of 70						
			Average Secchi Disk Depth	98 cm											
			Water Clarity Rating	good											
	ı		Trophic State Index	47											
S			Trophic Class	mesotrop											
Parameters			Salinity	0.07- 0.1											
3			Specific Conductivity	7.5 – 305	.5 μS/cr	n									
Jar		Profile	pH	6.80 - 8.0	80 – 8.05 pH units Neutral to slightly alk										
"	1	P.	Oxidation-Reduction Potential	38 to 395	mV										
			Dissolved Oxygen	Up to 59% August	Up to 59% of water column < 2 mg/L in August					Occurred at site 3					
		S.	Surface Total Nitrogen	0.35 mg/l	0.35 mg/L to 1.02 mg/L										
	ı	Nutrients	Surface Total Phosphorus	0.006 mg/L to 0.054 mg/L											
		N	Nitrogen to Phosphorus Ratio	29:1					Phosphoru	s limited					
					Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a		
S	F	ish ·	& Wildlife Propagation		S	S	NS	S							
Beneficial Uses	A	Aesth	netics						S	NS					
ic a	F	Agric	ulture								S				
enef	F	Prima	ary Body Contact Recreation									S			
ă	F	Publi	c & Private Water Supply												
		NS	Fully Supporting = Not Supporting I = Not Enough Information												

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

Sooner

Sample Period	Times Visited	Sampling Sites
November 2006 - August 2007	4	5

Lake Data

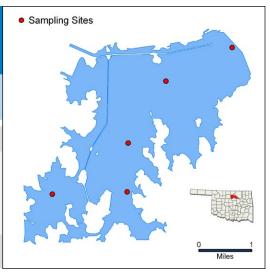
Location Pawnee County

1972 Impoundment

Area 5,400 acres

Capacity 149,000 acre-feet

Purposes **Cooling Water**



		Parameter	Result	Notes/Comments
		Average Turbidity	6 NTU	100% of values < OWQS of 25 NTU
		Average True Color	20 units	100% of values < OWQS of 70
		Average Secchi Disk Depth	115 cm	
		Water Clarity Rating	excellent	
		Trophic State Index	46	
Parameters		Trophic Class	mesotrophic	
		Salinity	0.54 – 1.10 ppt	
Ĕ		Specific Conductivity	1039 – 2066 μS/cm	
are	Profile	рН	7.21 – 8.46 pH units	Neutral to slightly alkaline
4	P	Oxidation-Reduction Potential	269 to 485 mV	
		Dissolved Oxygen	Up to 52% of water column < 2 mg/L in August	Occurred at sites 1 and 4
	ts	Surface Total Nitrogen	0.46 mg/L to 0.69 mg/L	
	Nutrients	Surface Total Phosphorus	0.007 mg/L to 0.027 mg/L	
	Z	Nitrogen to Phosphorus Ratio	38:1	Phosphorus limited
			<u>_</u>	_

		Turbidity	표	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation	S	S	NS	S					
Uses	Aesthetics					S	S			
Beneficial	Agriculture							NS*		
nef	Primary Body Contact Recreation								NEI**	
m	Public & Private Water Supply									

S = Fully Supporting

NS = Not Supporting

NEI = Not Enough Information

* Approximately 70% of the Sulfate values were above the standard, the AG use is therefore considered not supported.

** Due to minimum data requirements not being met, an assessment of the PBCR beneficial use cannot be made for sample year 2006-2007.

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 μ S/cm = microsiemens/cm

Spavinaw

Sample PeriodTimes VisitedSampling SitesNovember 2006 - August 200745

Location Mayes County

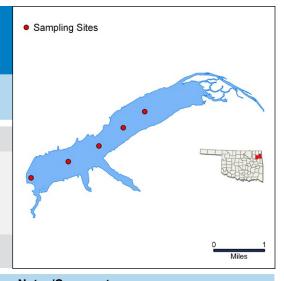
Impoundment 1924

Lake Data

Area 1,584 acres

Capacity 38,000 acre-feet

Purposes Water Supply, Recreation, Fish & Wildlife



		Parameter	Result					Notes/Com	ments				
		Average Turbidity	6 NTU					100% of values < OWQS of 25 NTU					
		Average True Color	15 units					100% of values < OWQS of 70					
		Average Secchi Disk Depth	131 cm	31 cm									
		Water Clarity Rating	excellent										
		Trophic State Index	53										
<u>0</u>		Trophic Class	eutrophic										
ete		Salinity	0.07 - 0.1	6 ppt									
am		Specific Conductivity	167.9 – 3	31.2 µS/	'cm								
Parameters	Profile	pН	7.22 – 8.8	9 pH u	nits			Neutral to s	lightly a	lkaline			
_	P.	Oxidation-Reduction Potential	58 to 485	mV									
		Dissolved Oxygen	Up to 67% August	Jp to 67% of water column < 2 mg/L in August Occurred at sites 1, the dam									
	Σī	Surface Total Nitrogen	0.44 mg/L	0.44 mg/L to 1.24 mg/L									
	Nutrients	Surface Total Phosphorus	0.009 mg/L to 0.038 mg/L										
	Nut	Nitrogen to Phosphorus Ratio	33:1					Phosphorus	limited				
				-\$		/ed n			olor	is,	_ ш	æ	
				Turbidity	표	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a	
Se	Fish	& Wildlife Propagation		S	S	NS	S						
ns(Aes	thetics						NS*	S				
Beneficial Uses	Agri	culture								S			
nef	Prim	nary Body Contact Recreation									S		
Be	Pub	lic & Private Water Supply											
	N	= Fully Supporting S = Not Supporting EI = Not Enough Information	*The lak Quality S					nited Waters I nutrient thre			Oklahoma V	Vater	

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

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

Sportsman

Sample Period Times Visited Sampling Sites

October 2007 – July 2008 4 5

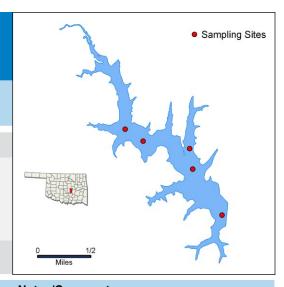
Location Seminole County
Impoundment 1958

Lake Data

Area 354 acres

Capacity 5,349 acre feet

Purposes Waters Supply and Recreation



	Parameter Result								Notes/Comments						
			Average Turbidity	23 NTU					25% of valu	ies > 25	NTU				
			Average True Color	82 units					25% of values > OWQS of 70						
			Average Secchi Disk Depth	76 cm											
			Water Clarity Rating	average	verage										
	L		Trophic State Index	43					Previous va	lue = 40)				
Sign			Trophic Class	mesotro	•										
Parameters			Salinity	0.06 – 0											
ran		Φ	Specific Conductivity	148.3 –	- 251.2 μS	S/cm									
Pal		Profile	pH	6.6 - 7.9	93 pH uni	ts			Neutral						
		₫	Oxidation-Reduction Potential	37 to 50	4 mV										
			Dissolved Oxygen	Up to 60	0% of wat	er colum	n < 2 mg/L	in July	Occurred at	t site 1					
	ı	S	Surface Total Nitrogen	0.43 mg	/L to 0.71	mg/L									
		Nutrients	Surface Total Phosphorus	0.010 m	g/L to 0.0)62 mg/L									
		5 Z	Nitrogen to Phosphorus Ratio	23:1					Phosphorus	s limited					
					>-		eq_			olor	es,	ui			
					Turbidity		Dissolved Oxygen	Metals	_	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a		
					Ę	Б Н	O X	Ğ ⊠	TSI	르	Sul Chl	En,e Soli,			
S	F	ish	& Wildlife Propagation		S	S	NS	S							
Use	Α	esth	netics						S	S					
Beneficial Uses	Α	gric	ulture								S				
nefi	Р	rima	ary Body Contact Recreation									NEI			
Be	Р	Publi	c & Private Water Supply												
		NS	Fully Supporting = Not Supporting I = Not Enough Information	Precipitation data suggest that the peaks in turbidity and true color, which occurred in May are likely due to seasonal storm events, therefore Sportsman Lake will be listed as supporting its Fish & Wildlife Propagation (FWP) and Aesthetics beneficial use for these parameters. The PBCR cannot be assessed due to QA/QC issues for fecal coliform and enterococci.											

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

Stanley Draper

Sample PeriodTimes VisitedSampling SitesNovember 2005 – August 200645

Result

Cape Data Cap

Location Cleveland County

Impoundment 1962

Parameter

NTU = nephelometric turbidity units

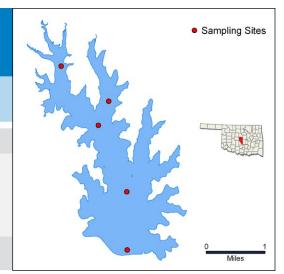
E. coli = Escherichia coli

 μ S/cm = microsiemens per centimeter

Area 2,900 acres

Capacity 100,000 acre-feet

Purposes Water Supply, Recreation



Notes/Comments

Average True Color 28 units 100% of values < OWQS of Average Secchi Disk Depth 133 cm Water Clarity Rating good Trophic State Index 40 Trophic Class oligotrophic Salinity 0.03 – 0.09 ppt Specific Conductivity 95 – 191.5 µS/cm pH 6.90 – 8.18 pH units Oxidation-Reduction Potential 356 to 445 mV Dissolved Oxygen Up to 52% of water column < 2 mg/L in August Surface Total Nitrogen 0.16 mg/L to 0.33 mg/L Surface Total Phosphorus 0.010 mg/L to 0.015 mg/L Nitrogen to Phosphorus Ratio 20:1 Phosphorus limited Fish & Wildlife Propagation S S NS S Agriculture S S Agricu	1														
Average Secchi Disk Depth 133 cm Water Clarity Rating good Trophic State Index 40 Trophic Class oligotrophic Salinity 0.03 – 0.09 ppt Specific Conductivity 95 – 191.5 µS/cm pH 6.90 – 8.18 pH units Oxidation-Reduction Potential 356 to 445 mV Dissolved Oxygen Up to 52% of water column < 2 mg/L in August Surface Total Nitrogen 0.16 mg/L to 0.33 mg/L Surface Total Phosphorus 0.010 mg/L to 0.015 mg/L Nitrogen to Phosphorus Ratio 20:1 Phosphorus limited Fish & Wildlife Propagation S S NS S Agriculture S Primary Body Contact Recreation Public & Private Water Supply			Average Turbidity	7 NTU					100% of values < OWQS of 25 NTU						
Water Clarity Rating good Trophic State Index 40 Trophic Class oligotrophic Salinity 0.03 – 0.09 ppt Specific Conductivity 95 – 191.5 µS/cm PH 6.90 – 8.18 pH units Oxidation-Reduction Potential 356 to 445 mV Dissolved Oxygen Up to 52% of water column < 2 mg/L in August Surface Total Nitrogen 0.16 mg/L to 0.33 mg/L Surface Total Phosphorus 0.010 mg/L to 0.015 mg/L Nitrogen to Phosphorus Ratio 20:1 Phosphorus limited Fish & Wildlife Propagation S S NS S Aesthetics S S Agriculture S Primary Body Contact Recreation Public & Private Water Supply			Average True Color	28 units					100% of va	alues < 0	DWQS of 70	0			
Trophic State Index Trophic Class Oligotrophic Salinity 0.03 – 0.09 ppt Specific Conductivity 95 – 191.5 µS/cm pH 6.90 – 8.18 pH units Oxidation-Reduction Potential 356 to 445 mV Dissolved Oxygen Up to 52% of water column < 2 mg/L in August Surface Total Nitrogen 0.16 mg/L to 0.33 mg/L Surface Total Phosphorus Nitrogen to Phosphorus Ratio Vitrogen to Phosphorus Ratio Fish & Wildlife Propagation Aesthetics Agriculture Primary Body Contact Recreation Public & Private Water Supply			Average Secchi Disk Depth	133 cm											
Trophic Class oligotrophic Salinity 0.03 – 0.09 ppt Specific Conductivity 95 – 191.5 µS/cm Ph 6.90 – 8.18 pH units Oxidation-Reduction Potential 356 to 445 mV Dissolved Oxygen Up to 52% of water column < 2 mg/L in August Occurred at site 1, the dam August Surface Total Nitrogen 0.16 mg/L to 0.33 mg/L Surface Total Phosphorus 0.010 mg/L to 0.015 mg/L Nitrogen to Phosphorus Ratio 20:1 Phosphorus limited Fish & Wildlife Propagation S S NS S Agriculture S Primary Body Contact Recreation Public & Private Water Supply			Water Clarity Rating	good											
Salinity 0.03 – 0.09 ppt Specific Conductivity 95 – 191.5 µS/cm 6.90 – 8.18 pH units Oxidation-Reduction Potential 356 to 445 mV Dissolved Oxygen Up to 52% of water column < 2 mg/L in August Occurred at site 1, the dam August Surface Total Nitrogen 0.16 mg/L to 0.33 mg/L Surface Total Phosphorus 0.010 mg/L to 0.015 mg/L Nitrogen to Phosphorus Ratio 20:1 Phosphorus limited Fish & Wildlife Propagation S S NS S Agriculture S Primary Body Contact Recreation Public & Private Water Supply			Trophic State Index	40											
Dissolved Oxygen Up to 52% of water column < 2 mg/L in August Occurred at site 1, the dam	ပ္		Trophic Class	oligotrop	hic										
Dissolved Oxygen Up to 52% of water column < 2 mg/L in August Occurred at site 1, the dam	ete		Salinity	0.03 - 0.	09 ppt										
Dissolved Oxygen Up to 52% of water column < 2 mg/L in August Occurred at site 1, the dam	E I		Specific Conductivity	95 – 191	.5 µS/cn	n									
Dissolved Oxygen Up to 52% of water column < 2 mg/L in August Occurred at site 1, the dam	ar	file	pH	6.90 - 8	.18 pH ι	ınits									
Surface Total Nitrogen Surface Total Phosphorus Nitrogen to Phosphorus Ratio Fish & Wildlife Propagation August Occurred at sile 1, the dam August Occurred at sile 1, the dam Occurred at sile 2, the dam Occurred at sile 2, the dam Occurred at sile 2, the dam Occurred	<u> </u>	Pr	Oxidation-Reduction Potential	356 to 44	15 mV										
Surface Total Phosphorus Nitrogen to Phosphorus Ratio Ail Phosphorus limited Phosphorus limited Fish & Wildlife Propagation Aesthetics Agriculture Primary Body Contact Recreation Public & Private Water Supply			Dissolved Oxygen												
Fish & Wildlife Propagation Agriculture Primary Body Contact Recreation Public & Private Water Supply		छ	Surface Total Nitrogen	0.16 mg/	6 mg/L to 0.33 mg/L										
Fish & Wildlife Propagation Aesthetics Agriculture Primary Body Contact Recreation Public & Private Water Supply		trient	Surface Total Phosphorus	0.010 mg	g/L to 0.0)15 mg/l	_								
Fish & Wildlife Propagation S S NS S Aesthetics S S Agriculture S Primary Body Contact Recreation Public & Private Water Supply		2	Nitrogen to Phosphorus Ratio	20:1					Phosphoru	s limited	I				
Fish & Wildlife Propagation S S NS S Aesthetics S S Agriculture S Primary Body Contact Recreation Public & Private Water Supply					>		eq			olor	es,	_ ui			
Fish & Wildlife Propagation S S NS S Aesthetics S S Agriculture S Primary Body Contact Recreation Public & Private Water Supply					bidii		solv /ger	tals	_	ن ه	fate orid DS	En,ecal coli, & E. coli	Chlor-a		
Fish & Wildlife Propagation S S NS S Aesthetics S S Agriculture S Primary Body Contact Recreation Public & Private Water Supply					Ę	F	Ox O	<u>≅</u>	ISI	길	Sul Chl	E SI II			
Fublic & Frivate Water Supply	Ø	Fish	& Wildlife Propagation		S	S	NS	S							
Fublic & Filvate Water Supply	Use	Aestl	netics						S	S					
Fublic & Filvate Water Supply	cial	Agric	culture								S				
Fublic & Frivate Water Supply	nef	Prima	ary Body Contact Recreation									S			
S = Fully Supporting NS = Not Supporting	å	Publi	c & Private Water Supply												
NEI = Not Enough Information		NS	= Not Supporting												

145

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

Stilwell City

Sample Period Times Visited Sampling Sites

October 2005 – August 2006 3 3

Lake Data

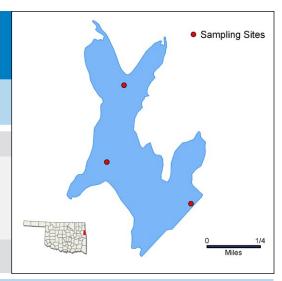
Location Adair County

Impoundment 1965

Area 188 acres

Capacity 3,110 acre-feet

Purposes Water Supply, Recreation, Flood Control

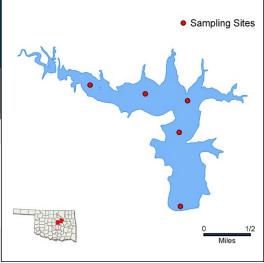


		Parameter	Result					Notes/Com	ments			
		Average Turbidity	6 NTU					100% of val	ues < C	WQS of 25	5 NTU	
		Average True Color	14 units					100% of val	ues < C	WQS of 70)	
		Average Secchi Disk Depth	161 cm									
		Water Clarity Rating	excellent									
		Trophic State Index	54									
ဖွ		Trophic Class	eutrophic									
ete		Salinity	0.07 - 0.14	4 ppt								
am		Specific Conductivity	159.1 – 29	7.2 µS/	cm							
Parameters	Profile	рН	6.87 - 8.5	3 pH ur	iits							
-	P	Oxidation-Reduction Potential	88 to 452 i	mV								
		Dissolved Oxygen	Up to 64% August	of wate	r colum	n < 2 mg/L	in	Occurred at	site 1,	the dam		
	S	Surface Total Nitrogen	0.32 mg/L	to 0.88	mg/L							
	Nutrients	Surface Total Phosphorus	0.019 mg/l	L to 0.04	l4 mg/L							
	S	Nitrogen to Phosphorus Ratio	20:1					Phosphorus	limited			
						ъ			or	Ø		
				idity		olve	<u>s</u>		S	ride:	— в Е П	r a
				Turbidity	H	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
ဟ	Fis	h & Wildlife Propagation		S	S	NS	S	'	•	0, 0, 0		
Use	Aes	sthetics						S	S			
Beneficial Uses	Agı	riculture								S		
enef	Prir	mary Body Contact Recreation									S	
ä	Pul	olic & Private Water Supply										
	٨	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information										

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

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

Si	troud			
	Sample P	eriod	Times Visited	Sampling Sites
(October 2005 –	- July 2006	4	5
	Location	Creek County		
ta	Impoundment	1968		
e Data	Area	600 acres		
Lake	Capacity	8,800 acre-feet		
	Purposes	Water Supply, Red	creation, Flood Control	



		Parameter	Result					Notes/Cor	nmonte			
		Average Turbidity	5 NTU							DWQS of 2	5 NTU	
		Average True Color	15 units							DWQS of 70		
		Average Secchi Disk Depth	126 cm					10070 01 10	aluco • c	3 V Q O O 1 7 V	,	
		Water Clarity Rating	excellent									
		Trophic State Index	41									
Ø		Trophic Class	mesotrop	hic								
ter		Salinity	0.08 – 0.1									
me		Specific Conductivity	178.6 – 2	14.5 µS	/cm							
Parameters	Profile	pH	7.03 – 8.	-								
<u></u>	P.	Oxidation-Reduction Potential	155 to 50	0 mV								
		Dissolved Oxygen	Up to 60%	% of wat	er columi	n < 2 mg/L	in July	Occurred a	at site 2			
	Ø	Surface Total Nitrogen	0.10 mg/L	to 0.41	mg/L							
	Nutrients	Surface Total Phosphorus	0.008 mg	/L to 0.0)20 mg/L							
	Nut	Nitrogen to Phosphorus Ratio				Phosphoru	ıs limited	I				
						D.			lor	~ Ñ		
				Turbidity		Dissolved Oxygen	as		True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	or-a
				Turk	Ħ	Diss Oxy	Metals	ISI	True	Sulfates Chlorid & TDS	En,e coli,	Chlor-a
v	Fish	& Wildlife Propagation		S	S	NS	S					
Use	Aes	thetics						S	S			
ial	Agri	culture								NS*		
Beneficial Uses	Prin	nary Body Contact Recreation									S	
Be	Pub	lic & Private Water Supply										
	c	= Fully Supporting										
		= Fully Supporting S = Not Supporting EL = Not Enough Information	*Samplir	ng in 200	5-2006 fou	ind the Agrid 785:45 – Ap	culture be	neficial use n	ot suppor	ted based on	numerical o	riteria
	N	EI = Not Enough Information	I TOI SUIId	cs locale	Ja III OAC	700. 4 0 – Αμ	pendix F.					

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

Talawanda No. 1

Times Visited Sample Period Sampling Sites 4 November 2007 – August 2008

Impoundment Lake Data Area

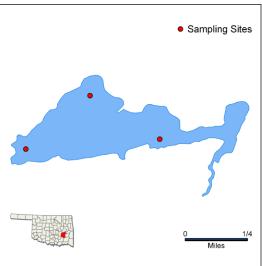
Location Pittsburg County

1902

91 acres

Capacity 12,000 acre feet

Purposes Waters Supply and Recreation



		Parameter	Result					Notes/Cor	nments			
		Average Turbidity	3 NTU					All values	< 25 NTU	J		
		Average True Color	28 units					All values	< OWQS	of 70		
		Average Secchi Disk Depth	155 cm									
		Water Clarity Rating	excellent									
		Trophic State Index	42					Previous v	alue = 44	4		
S		Trophic Class	mesotroph	iic								
ete		Salinity	0.0 - 0.10	ppt								
a		Specific Conductivity	82 – 192	µS/cm								
Parameters	Profile	pH	6.36 - 7.5	7 pH uı	nits			3 (4%) of v	alues < 0	6.5		
	Pr	Oxidation-Reduction Potential	13 to 513	o 513 mV								
		Dissolved Oxygen	Up to 60% August	of wat	er colun	nn < 2 mg/L	. in	Occurred a	at site 1			
	छ	Surface Total Nitrogen	0.43 mg/L to 1.50 mg/L									
	Nutrients	Surface Total Phosphorus	0.010 mg/	010 mg/L to 0.017 mg/L								
	Z	Nitrogen to Phosphorus Ratio	45:1					Phosphoru	ıs limited			
				dity		Dissolved Oxygen	<u> </u>		True Color	tes, ides S	cal E	G
				Turbidity	표	Dissolve Oxygen	Metals	ISI	True	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
Se	Fish	& Wildlife Propagation		S	S	NS	S					
eneficial Uses	Aestl	netics						S	S			
cia	Agric	culture								S		
											S	

Public & Private Water Supply S = Fully Supporting

NS = Not Supporting

NEI = Not Enough Information

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

OWQS = Oklahoma Water Quality Standards mV = millivolts

Notes

Chlor-a = Chlorophyll-a

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

Talawanda No. 2

Sample Period **Times Visited Sampling Sites** November 2007 - August 2008 4 3

Impoundment 1924 Lake Data

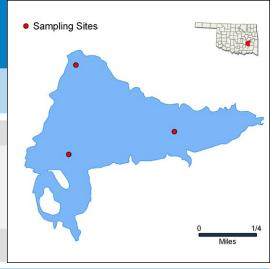
Location

Area 195 acres

Capacity 2,750 acre feet

Purposes Waters Supply and Recreation

Pittsburg County



		Parameter	Result	Notes/Comments
		Average Turbidity	5 NTU	All values < 25 NTU
		Average True Color	22 units	All values < OWQS of 70
		Average Secchi Disk Depth	140 cm	
		Water Clarity Rating	excellent	
		Trophic State Index	45	Previous value = 38
က်		Trophic Class	mesotrophic	
ete		Salinity	0.0 – 0.10 ppt	
E E		Specific Conductivity	100.6 - 145 μS/cm	
Parameters	Profile	рН	6.57 – 7.85 pH units	Neutral
"	Pro	Oxidation-Reduction Potential	61 to 513 mV	
		Dissolved Oxygen	Up to 47% of water column < 2 mg/L in August	Occurred at site 1
	ts	Surface Total Nitrogen	0.19 mg/L to 0.42 mg/L	
	Nutrients	Surface Total Phosphorus	0.008 mg/L to 0.011 mg/L	
	Ž	Nitrogen to Phosphorus Ratio	32:1	Phosphorus limited

			Turbidity	Hd	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
Se	Fish & Wildlife Propagation		S	S	S	S					
Uses	Aesthetics						S	S			
Beneficial	Agriculture								S		
enef	Primary Body Contact Recreation									S	
ă	Public & Private Water Supply										
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	Notes									

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 μ S/cm = microsiemens/cm

Taylor

Sampling Sites Sample Period Times Visited October 2007 - July 2008 3

Impoundment Lake Data

Location

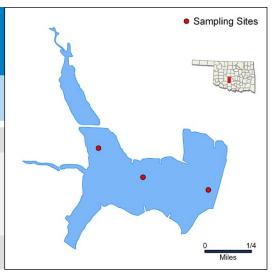
Grady County

1960

Area 227 acres

Capacity 1,877 acre feet

Purposes Waters Supply, Flood Control, and Recreation



		Parameter	Result	Notes/Comments
		Average Turbidity	20 NTU	17% of values > 25 NTU
		Average True Color	34 units	All values < OWQS of 70
		Average Secchi Disk Depth	41 cm	
		Water Clarity Rating	average	
		Trophic State Index	64	Previous value = 63
S		Trophic Class	hypereutrophic	
ete		Salinity	0.20 – 0.33 ppt	
am		Specific Conductivity	399.9 – 645 μS/cm	
Parameters	Profile	рН	7.7 – 8.62 pH units	Neutral to slightly alkaline
	₫	Oxidation-Reduction Potential	381 to 460 mV	
		Dissolved Oxygen		D.O. always > 5.0 mg/L
	Ş.	Surface Total Nitrogen	0.95 mg/L to 1.53 mg/L	
	Nutrients	Surface Total Phosphorus	0.077 mg/L to 0.237 mg/L	
	Z	Nitrogen to Phosphorus Ratio	8:1	Phosphorus limited

				Turbidity	Hd	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation			NS	S	S	S					
Use	Aesthetics							NS	S			
icial	Agriculture									S		
Beneficia	Primary Body Contact Recreation										S	
ä	Public & Private Water Supply											
S = Fully Supporting NS = Not Supporting NEI = Not Enough Information Currently, the lake 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 intensive study can confirm the Aesthetics beneficial use non-support status.										ı more		

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 μ S/cm = microsiemens/cm

Tecumseh

Sample Period Times Visited Sampling Sites

October 2007 – July 2008 4 3

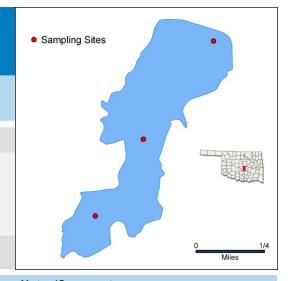
Location Pottawatomie County

Impoundment 1934

Area 127 acres

Capacity 1,118 acre feet

Purposes Waters Supply, and Recreation



		Parameter	Result					Notes/Co	mments			
		Average Turbidity	132 NTU	J				All values	> 25 NT	J		
		Average True Color	244 unit	s				All values	> OWQS	of 70		
		Average Secchi Disk Depth	11 cm									
		Water Clarity Rating	poor									
		Trophic State Index	49					Previous v	alue = 5	7		
2		Trophic Class	mesotro	phic								
ete		Salinity	0.00 - 0	.10 ppt								
am	Φ	Specific Conductivity	105.6 –	141 µS/d	cm							
Parameters	Profile	pH	7.08 – 7	.60 pH ı	units			Neutral				
	<u>P</u>	Oxidation-Reduction Potential	337 to 5	37 mV								
		Dissolved Oxygen						D.O. alwa	ys > 5.0 ı	mg/L		
	ts	Surface Total Nitrogen	1.01 mg	/L to 1.5	5 mg/L							
	Nutrients	Surface Total Phosphorus	0.066 m	g/L to 0.	131 mg/L	_						
	Ž	Nitrogen to Phosphorus Ratio	12:1					Phosphoru	us limited			
						ъ			or	Ø		
				idity		olve	<u>s</u>		S	ride;	са — ш	ج ھ
				Turbidity	చ	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
(n	Fish	& Wildlife Propagation		NS	S	S	*					
Beneficial Uses	Aest	hetics						S	NS			
ial	Aario	culture								S		
efic	_										N.I⊏1++	
ē	Prim	ary Body Contact Recreation									NEI**	
m	Publ	ic & Private Water Supply										
	NS	Fully Supporting S = Not Supporting El = Not Enough Information	**The P	-	not be ass			xceeded. All o				

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

Tenkiller (1,2,7)

Sample Period Times Visited Sampling Sites October 2005 - July 2006

Location Sequoyah County

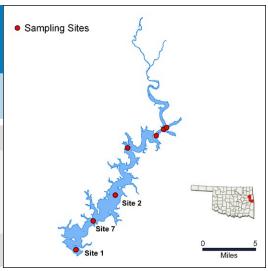
Impoundment 1953

Lake Data

Area 12,900 acres

Capacity 654,100 acre-feet

Flood Control, Hydropower **Purposes**



		Parameter	Result	Notes/Comments
		Average Turbidity	2 NTU	100% of values < OWQS of 25 NTU
		Average True Color	11 units	100% of values < OWQS of 70
		Average Secchi Disk Depth	217 cm	
		Water Clarity Rating	excellent	
		Trophic State Index	48	
ပ္		Trophic Class	mesotrophic	
ete		Salinity	0.05 – 0.42 ppt	
am	E S	Specific Conductivity	135.3 – 806.2 µS/cm	
Par	Profile	рН	6.57 – 10.05 pH units	10% of recorded values > 9.0 pH units
	_	Oxidation-Reduction Potential	38 to 528 mV	
		Dissolved Oxygen	52 to 69% of water column < 2 mg/L in July	
	ts	Surface Total Nitrogen	0.11 mg/L to 0.46 mg/L	
	Nutrients	Surface Total Phosphorus	0.009 mg/L to 0.022 mg/L	
	Ž	Nitrogen to Phosphorus Ratio	23:1	Phosphorus limited
				<u></u>

		Turbidity	Hd	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation	S*	S	NS	S					
Uses	Aesthetics					NS	S*			
Beneficial	Agriculture							S		
nef	Primary Body Contact Recreation								NEI	
B	Public & Private Water Supply									

S = Fully Supporting

NS = Not Supporting

NEI = *Not Enough Information*

*Although values were below 25 NTU an assessment of the FWP beneficial use cannot be made, as minimum data requirements are not being met. True color values were below the Aesthetics criteria 70 units however like turbidity there are not enough data for this segment to assess the Aesthetics beneficial use. The lake is listed in the WQS as a NLW indicating that the Aesthetics beneficial use is considered threatened by nutrients until studies can be conducted to confirm non-support status.

NTU = nephelometric turbidity units μS/cm = microsiemens per centimeter

E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivolts

Chlor-a = Chlorophyll-a

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

Tenkiller, Illinois River Arm (3-6)

Sample Period Times Visited Sampling Sites 4 October 2005 - July 2006

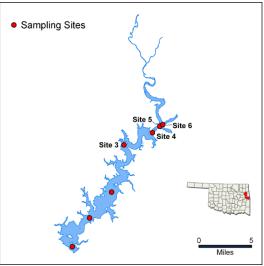
Location Sequoyah County Impoundment Lake Data

1953

Area 12,900 acres

Capacity 654,100 acre-feet

Flood Control, Hydropower Purposes



		Parameter	Result	Notes/Comments
		Average Turbidity	7 NTU	100% of values < OWQS of 25 NTU
		Average True Color	13 units	100% of values < OWQS of 70
		Average Secchi Disk Depth	106 cm	
		Water Clarity Rating	excellent	
		Trophic State Index	59	
က		Trophic Class	eutrophic	
ete		Salinity	0.07 – 0.41 ppt	
Parameters	Ø	Specific Conductivity	159.3 – 786.4 μS/cm	
Par	rofile	рН	7.02 – 9.23 pH units	4% of recorded values > 9.0 pH units
	₫	Oxidation-Reduction Potential	103 to 454 mV	
		Dissolved Oxygen	50 to 60% of water column < 2 mg/L in Jul	У
	ts	Surface Total Nitrogen	0.19 mg/L to 0.85 mg/L	
	Nutrients	Surface Total Phosphorus	0.015 mg/L to 0.085mg/L	
	Z	Nitrogen to Phosphorus Ratio	10:1	Phosphorus limited
			, ō	<u>o</u>

	That ogoth to Throophioras Tradic	10.1				поортисто				
		Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation	S*	S	NS	S					
Uses	Aesthetics					NS	S*			
Beneficial	Agriculture							S		
enef	Primary Body Contact Recreation								NEI	
B	Public & Private Water Supply									
		* ^ 4		OF NITH -			MD banas	:-:-!		

S = Fully Supporting NS = Not Supporting

NEI = Not Enough Information

*Although values were below 25 NTU an assessment of the FWP beneficial use cannot be made, as minimum data requirements are not being met. True color values were below the Aesthetics criteria 70 units however like turbidity there are not enough data for this segment to assess the Aesthetics beneficial use. The lake is listed in the WQS as a NLW indicating that the Aesthetics beneficial use is considered threatened by nutrients until studies can be conducted to confirm non-support status.

NTU = nephelometric turbidity units μS/cm = microsiemens per centimeter

E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivolts

Chlor-a = Chlorophyll-a

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

Texoma (1-2)

Sample Period Times Visited Sampling Sites October 2007 - July 2008 13

Impoundment Lake Data

Location

1944

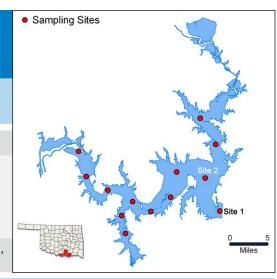
Area 88,000 acres

Capacity 2,643,000 acre-feet

Flood Control, Waters Supply, Hydropower, Low-flow Regulation, Purposes

and Recreation

Bryan County



Average Turbidity 5 NTU All values < 25 NTU Average True Color 19 units All values < 0WQS of 70 Average Secchi Disk Depth 130 cm Water Clarity Rating excellent Trophic State Index 51 Previous value = 57 Trophic Class mesotrophic Salinity 0.46 – 0.70 ppt Specific Conductivity 887.6 – 1301 µS/cm pH 7.27 – 8.42 pH units Neutral to slightly alkaline Vidation-Reduction Potential 28 to 581 mV Dissolved Oxygen Up to 63% of water column < 2 mg/L in July Occurred at site 1 Surface Total Nitrogen 0.53 mg/L to 0.86 mg/L Surface Total Phosphorus 0.018 mg/L to 0.050 mg/L Nitrogen to Phosphorus Ratio 19:1 Phosphorus limited Fish & Wildlife Propagation S S NS S Aesthetics S S Agriculture S S Primary Body Contact Recreation Public & Private Water Surply		
Average Secchi Disk Depth Water Clarity Rating Trophic State Index Trophic Class Trophic Class Mesotrophic Salinity Specific Conductivity BPH T.27 – 8.42 pH units Dissolved Oxygen Up to 63% of water column < 2 mg/L in July Dissolved Oxygen Vultaria to slightly alkaline Surface Total Nitrogen Surface Total Phosphorus Up to 63% of water column < 2 mg/L in July Occurred at site 1 Surface Total Phosphorus Nitrogen to Phosphorus Ratio 19:1 Phosphorus limited Figh 8 M/lidlife Paragetics Average Secchi Disk Depth Water Clarity Rating excellent Previous value = 57 Neutral to slightly alkaline Occurred at site 1 Occurred at site 1 Phosphorus limited Figh 8 M/lidlife Paragetics Surface Total Phosphorus Ratio Phosphorus limited		
Water Clarity Rating Trophic State Index Trophic Class Mesotrophic Salinity Salinity Oxidation-Reduction Potential Surface Total Nitrogen Surface Total Phosphorus Ox18 mg/L to 0.050 mg/L Nitrogen to Phosphorus Ratio Water Clarity Rating Trophic State Index 51 Previous value = 57 Neutral to slightly alkaline Neutral to slightly alkaline Occurred at site 1 Occurred at site 1 Surface Total Nitrogen O.018 mg/L to 0.050 mg/L Nitrogen to Phosphorus Ratio Phosphorus limited		
Trophic State Index Trophic Class Trophic Class Trophic Class Mesotrophic Salinity Salinity Salinity Specific Conductivity pH 7.27 – 8.42 pH units Oxidation-Reduction Potential Surface Total Nitrogen Surface Total Phosphorus Nitrogen to Phosphorus Ratio Aijing Agriculture Aijing Agriculture Previous value = 57 Previous value =		
Trophic Class mesotrophic Salinity 0.46 – 0.70 ppt Specific Conductivity 887.6 – 1301 µS/cm pH 7.27 – 8.42 pH units Neutral to slightly alkaline Oxidation-Reduction Potential 28 to 581 mV Dissolved Oxygen Up to 63% of water column < 2 mg/L in July Occurred at site 1 Surface Total Nitrogen 0.53 mg/L to 0.86 mg/L Surface Total Phosphorus 0.018 mg/L to 0.050 mg/L Nitrogen to Phosphorus Ratio 19:1 Phosphorus limited		
Salinity Specific Conductivity Specific Cond		
Oxidation-Reduction Potential 28 to 581 mV Dissolved Oxygen Up to 63% of water column < 2 mg/L in July Occurred at site 1 Surface Total Nitrogen 0.53 mg/L to 0.86 mg/L Surface Total Phosphorus 0.018 mg/L to 0.050 mg/L Nitrogen to Phosphorus Ratio 19:1 Phosphorus limited Phosphorus limited Surface Total Phosphorus Ratio 19:1 Phosphorus limited		
Oxidation-Reduction Potential 28 to 581 mV Dissolved Oxygen Up to 63% of water column < 2 mg/L in July Occurred at site 1 Surface Total Nitrogen 0.53 mg/L to 0.86 mg/L Surface Total Phosphorus 0.018 mg/L to 0.050 mg/L Nitrogen to Phosphorus Ratio 19:1 Phosphorus limited Phosphorus limited Surface Total Phosphorus Ratio 19:1 Phosphorus limited		
Oxidation-Reduction Potential 28 to 581 mV Dissolved Oxygen Up to 63% of water column < 2 mg/L in July Occurred at site 1 Surface Total Nitrogen 0.53 mg/L to 0.86 mg/L Surface Total Phosphorus 0.018 mg/L to 0.050 mg/L Nitrogen to Phosphorus Ratio 19:1 Phosphorus limited Phosphorus limited Surface Total Phosphorus Ratio 19:1 Phosphorus limited		
Oxidation-Reduction Potential 28 to 581 mV Dissolved Oxygen Up to 63% of water column < 2 mg/L in July Occurred at site 1 Surface Total Nitrogen 0.53 mg/L to 0.86 mg/L Surface Total Phosphorus 0.018 mg/L to 0.050 mg/L Nitrogen to Phosphorus Ratio 19:1 Phosphorus limited Phosphorus limited Surface Total Phosphorus Ratio 19:1 Phosphorus limited		
Surface Total Nitrogen 0.53 mg/L to 0.86 mg/L Surface Total Phosphorus 0.018 mg/L to 0.050 mg/L Nitrogen to Phosphorus Ratio 19:1 Phosphorus limited Alignment of the Surface Surf		
Surface Total Phosphorus Nitrogen to Phosphorus Ratio O.018 mg/L to 0.050 mg/L Phosphorus limited Phosphorus limited Surface Total Phosphorus Ratio 19:1 Phosphorus limited Surface Surface Representation		
True Color True Color True Color True Color Sulfates, Chlorides & TDS		
True Color True Color True Color True Color Sulfates, Chlorides & TDS		
Fish 9 Wildlife Dranggetion		
Figh 9 Wildlife Dranggetion	ui.	
Figh 9 Wildlife Dranggetion	En,ecal coli, & E. coli	NIO - 4
Fish & Wildlife Propagation S S NS S Aesthetics S S	шбб С)
Aesthetics S S		
Agriculture S		
Primary Body Contact Recreation	S	
Public & Private Water Supply		
S = Fully Supporting NS = Not Supporting NEI = Not Enough Information		

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

Texoma Lower Washita River Arm (3-4)

Sample Period	Times Visited	Sampling Sites
October 2007 – July 2008	4	13

Location **Bryan County**

Impoundment 1944

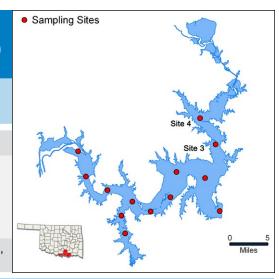
Lake Data

Area 88,000 acres

Capacity 2,643,000 acre-feet

Flood Control, Waters Supply, Hydropower, Low-flow Regulation, Purposes

and Recreation



		Parameter	Result	Notes/Comments
		Average Turbidity	8 NTU	All values < 25 NTU
		Average True Color	22 units	All values < OWQS of 70
		Average Secchi Disk Depth	97 cm	
		Water Clarity Rating	excellent	
		Trophic State Index	52	Previous value = 57
<u>s</u>		Trophic Class	eutrophic	
ete		Salinity	0.30 – 0.63 ppt	
Parameters	Profile	Specific Conductivity	587.2 – 1204 μS/cm	
Pal		рН	7.29 – 8.39 pH units	Neutral to slightly alkaline
	₫.	Oxidation-Reduction Potential	-12 to 528 mV	
		Dissolved Oxygen	Up to 38% of water column < 2 mg/L in July	Occurred at site 3
	ıts	Surface Total Nitrogen	0.51 mg/L to 1.02 mg/L	
	Nutrients	Surface Total Phosphorus	0.019 mg/L to 0.048 mg/L	
	Ž	Nitrogen to Phosphorus Ratio	19:1	Phosphorus limited

			Turbidity	Ha	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation		S	S	S	S					
Nses	Aesthetics						S	S			
cia	Agriculture								S		
Beneficia	Primary Body Contact Recreation									S	
ď	Public & Private Water Supply										
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	Notes									

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 μ S/cm = microsiemens/cm

Texoma Lower Red River Arm (5-11)

Sample Period Times Visited Sampling Sites 4 October 2007 - July 2008 13

Result

mV = millivolts

Chlor-a = Chlorophyll-a

Impoundment Lake Data Area

Location

Bryan County

1944

Parameter

 μ S/cm = microsiemens per centimeter

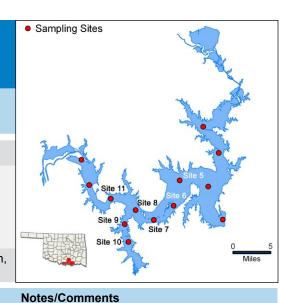
E. coli = Escherichia coli

88,000 acres

Capacity 2,643,000 acre-feet

Flood Control, Waters Supply, Hydropower, Low-flow Regulation, Purposes

and Recreation



En = Enterococci

		Average Turbidity	12 NTU					7% of value	es > 25 N	VTU		
		Average True Color	32 units					3.5% of val	ues > O	WQS of 70	1	
		Average Secchi Disk Depth	71 cm									
		Water Clarity Rating	good									
		Trophic State Index	55					Previous va	alue = 57	7		
SIS		Trophic Class	eutrophic									
net		Salinity	0.50 – 1.7	'0 ppt								
Parameters	Ð	Specific Conductivity	976 – 305	55 μS/cn	า							
Ра	Profile	рН	7.13 – 8.7	75 pH u	nits			Neutral to s	lightly a	lkaline		
	_	Oxidation-Reduction Potential	-12 to 528	3 mV								
		Dissolved Oxygen	Up to 58%	6 of wate	er colum	nn < 2 mg/	L in July	Occurred a	t site 7			
	ts	Surface Total Nitrogen	0.57 mg/L	to 1.08	mg/L							
	Nutrients	Surface Total Phosphorus	0.020 mg	/L to 0.0	86 mg/L	-						
	Z	Nitrogen to Phosphorus Ratio	16:1					Phosphorus	s limited			
						ō			or	, γ		
				Turbidity		Dissolved Oxygen	<u>8</u>		True Color	ates oride OS	En,ecal coli, & E coli	or-a
				되고 기	표	Dissolve Oxygen	Metals	ISI	True	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish	& Wildlife Propagation		S	S	S	S					
ns	Aestl	netics						S	S			
Beneficial Uses	Agric	ulture								S		
nef	Prima	ary Body Contact Recreation									S	
B	Publi	c & Private Water Supply										
	NS	= Fully Supporting = Not Supporting I = Not Enough Information										
NTU = nephelometric turbidity units OWQS = Oklahoma Water Quality Standards mg/L = milligrams per liter pp										nnt = r	arts per thou	isand

 μ S/cm = microsiemens/cm

Texoma Upper Red River Arm (12-13)

Sample Period	Times Visited	Sampling Sites
October 2007 – July 2008	4	13

Location **Bryan County**

Impoundment 1944

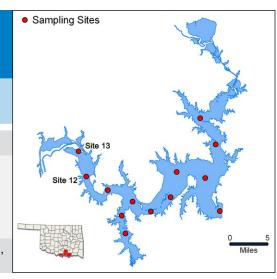
Lake Data

Area 88,000 acres

Capacity 2,643,000 acre-feet

Flood Control, Waters Supply, Hydropower, Low-flow Regulation, Purposes

and Recreation



		Parameter	Result				Notes/Comments						
		Average Turbidity	59 NTU					50% of valu	ues > 25	NTU			
		Average True Color	67 units					25% of valu	ues > OV	VQS of 70			
		Average Secchi Disk Depth	33 cm										
		Water Clarity Rating	average										
		Trophic State Index	63					Previous va	alue = 57	7			
S		Trophic Class	hypereutr	ophic									
Parameters		Salinity	0.70 - 1.7	70 ppt									
'an	Φ	Specific Conductivity	1364 – 30	062 µS/d	cm								
Pal	Profile	pН	7.84 – 8.6	65 pH u	nits			Neutral to slightly alkaline					
	ā	Oxidation-Reduction Potential	255 to 45	7 mV									
		Dissolved Oxygen			L								
	ts	Surface Total Nitrogen	0.77 mg/l	_ to 1.28	mg/L								
	Nutrients	Surface Total Phosphorus	0.070 mg	/L to 0.1	73 mg/L								
	Z	Nitrogen to Phosphorus Ratio	10:1					Phosphorus	s limited				
				_		p			lor	, S			
				Turbidity		Dissolved Oxygen	als		True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a	
				Ī	표	Oxy	Metals	TSI	Ţ	Sulf Chil	Soli Soli	S S	
S	Fish	& Wildlife Propagation		NS	S	S	S						
Use	Aes	thetics						NS	NS				
cial	Agri	culture								S			
Beneficial Uses	Prim	nary Body Contact Recreation									S		
Be	Pub	lic & Private Water Supply											
	N	= Fully Supporting S = Not Supporting EI = Not Enough Information	Not supp	orting for	Aesthetic	s based on	TSI greate	er than 62.					

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 μ S/cm = microsiemens/cm

Thunderbird

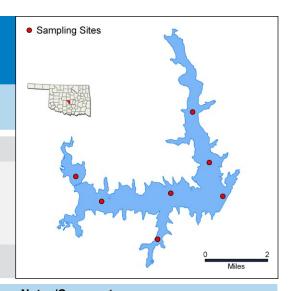
Sample Period Times Visited Sampling Sites October 2006 - June 2007

Location Cleveland County Impoundment 1965 Lake Data

Area 6,070 acres

Capacity 119,600 acre-feet

Purposes Flood Control, Water Supply, Recreation, Fish & Wildlife



		Parameter		Result					Notes/Co	mments				
		Average Turbidity	2	28 NTU					46% of val	lues > O	WQS of 25	NTU		
		Average True Color	;	32 units					7% of values >OWQS of 70					
		Average Secchi Disk Depth	ţ	53 cm										
		Water Clarity Rating	á	average										
		Trophic State Index	į	57										
ဖွ		Trophic Class	•	eutrophic										
ete		Salinity	(0.18 – 0.2	3 ppt									
am		Specific Conductivity	(367.5 – 46	80.9 µS	/cm								
Parameters	Profile	pH	7	7.28 – 8.5	7 pH u	nits			Neutral to	slightly a	lkaline			
	P	Oxidation-Reduction Potential	9	95 to 447	mV									
		Dissolved Oxygen		Jp to 47% June	of wate	er colur	mn < 2 mg/L	in	Occurred	at sites ′	1, the dam			
	t)	Surface Total Nitrogen	().59 mg/L	to 1.18	mg/L								
	Nutrients	Surface Total Phosphorus	().023 mg/	L to 0.4	29 mg/	L							
	Z Z	Nitrogen to Phosphorus Ratio	•	13:1					Phosphoru	us limited	I			
					Turbidity	Hd	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a	
w	Fish	& Wildlife Propagation			NS	S	S	S						
Beneficial Uses	Aestl	netics							NS*	S				
a		eulture									S			
fic	_										3			
ene	Prima	ary Body Contact Recreation										S		
Ď	Publi	c & Private Water Supply												
	NS	= Fully Supporting = Not Supporting II = Not Enough Information	Notes	(NLW). Th	is listing	means	that the lake i	s consid	ty Standards (ered threatene non-support st	ed from no				

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

OWQS = Oklahoma Water Quality Standards mV = millivolts

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

Tom Steed

Sample Period **Times Visited Sampling Sites** 5 November 2006 - July 2007

Location **Kiowa County**

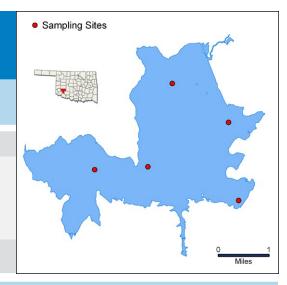
Impoundment 1975

Lake Data

Area 6,400 acres

Capacity 88,970 acre-feet

Purposes Flood Control, Water Supply, Recreation, Fish & Wildlife



		Parameter	Result					Notes/Cor	mments					
		Average Turbidity	30 NTU					50% of val	ues > O	WQS of 25	NTU			
		Average True Color	40 units					100% of values < OWQS of 70						
		Average Secchi Disk Depth	57 cm											
		Water Clarity Rating	average											
		Trophic State Index	55											
S		Trophic Class	eutrophic	•										
ete		Salinity	0.37 - 0.5	52ppt										
am	Ø	Specific Conductivity	722.9 – 1	001 μS/	/cm									
Parameters	Profile	pH	7.70 – 8.5	55 pH u	ınits	slightly a	slightly alkaline							
	₽.	Oxidation-Reduction Potential	277 to 39	277 to 399 mV										
		Dissolved Oxygen	Up to 25%	% of wat	ter colun	nn < 2 mg/l	in July	Occurred	at sites 1	I, the dam				
	ts	Surface Total Nitrogen	0.59 mg/l	L to 1.04	1 mg/L									
	Nutrients	Surface Total Phosphorus	0.038 mg	J/L to 0.1	108 mg/L	-								
	Z	Nitrogen to Phosphorus Ratio	12:1	Phosphorus limited										
						D			lor	. م				
				Turbidity		Dissolved Oxygen	als		True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	or-a		
				TuT.	표	Diss	Metals	TSI	True	Sulfates, Chlorides & TDS	Soli, e	Chlor-a		
S	Fish	& Wildlife Propagation		NS	S	S	S							
Uses	Aest	hetics						S	S					
eficial	Agric	culture								S				
efi	Dring	ary Rady Contact Regression									C			

			Turbidity	Hd	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation		NS	S	S	S					
Nses	Aesthetics						S	S			
<u>cia</u>	Agriculture								S		
Beneticial	Primary Body Contact Recreation									S	
ň	Public & Private Water Supply										
	S = Fully Supporting NS = Not Supporting NEI = Not Enough Information	Notes									

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 μ S/cm = microsiemens/cm

Vanderwork

Sampling Sites Sample Period Times Visited 4 October 2007 - July 2008

Impoundment Lake Data Area

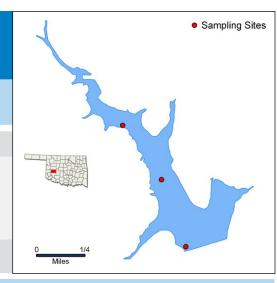
Location Washita County

1968

135 acres

Capacity 1,578 acre feet

Purposes Recreation



			Parameter	Res	ult					Notes/Com	ments			
			Average Turbidity	9 NT	Ū					All values <	25 NTL	J		
			Average True Color	17 u	nits					All values <	OWQS	of 70		
			Average Secchi Disk Depth	59 c	m									
			Water Clarity Rating	good	t									
			Trophic State Index	64						Previous va	lue = 60)		
S			Trophic Class	hype	ereutro	phic								
ete			Salinity	0.83	- 1.01	ppt								
a			Specific Conductivity	1568	3 – 189	96 µS/cn	n							
Parameters	9	Ргопіе	pH	7.2 -	- 8.18	pH units	3			Neutral to s	lightly a	lkaline		
"	۵	7	Oxidation-Reduction Potential	-116	to 530) mV								
			Dissolved Oxygen	Up to		of water	r columr	n < 2 mg/l	_ in	Occurred at	t site 1			
	٥	S	Surface Total Nitrogen	0.87	mg/L	to 1.75 r	ng/L							
	i.	Nutrients	Surface Total Phosphorus	0.04	1 mg/L	to 0.10	0 mg/L							
	Z	5 Z	Nitrogen to Phosphorus Ratio	18:1						Phosphorus	s limited			
								ס			o	. v		
						idity		olve gen	SE		S	ates rride 0S	& E	ā
						Turbidity	H	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
ς,	Fis	sh 8	& Wildlife Propagation			S	S	NS	S					
Beneficial Uses	Ae	esth	etics							NS	NS			
icial	Ag	gric	ulture									S		
nef	Pri	ima	ary Body Contact Recreation										NEI	
ă	Pu	ublio	c & Private Water Supply											
		NS	Fully Supporting = Not Supporting = Not Enough Information	The (WC	QS). Th	is listing ı	means th	at the lake	is conside	I (NLW) in the ered threatene on-support sta	d from nu			

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

OWQS = Oklahoma Water Quality Standards mV = millivolts

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

Vincent

Sample Period	Times Visited	Sampling Sites
October 2007 – July 2008	3	3

Location Impoundment Lake Data Area

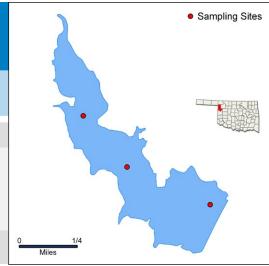
Ellis County

1961

160 acres

Capacity 2,579 acre feet

Recreation Purposes



		Parameter	Result		Notes/Comments			
		Average Turbidity	14 NTU		All values < 25 NTU			
		Average True Color	36 units		All values < OWQS o	f 70		
		Average Secchi Disk Depth	68 cm					
		Water Clarity Rating	good					
		Trophic State Index	46		Previous value = 44			
က္		Trophic Class	mesotrophic					
ete		Salinity	0.40 – 0.42 ppt					
am	Ø	Specific Conductivity	$808.6 - 832 \mu\text{S/cm}$					
Parameters	Profile	рН	7.32 – 8.38 pH units		Neutral to slightly alk	aline		
	•	Oxidation-Reduction Potential	394 to 512 mV					
		Dissolved Oxygen			All values > 6 mg/L			
	ţ	Surface Total Nitrogen	0.52 mg/L to 0.74 mg/L					
	Nutrients	Surface Total Phosphorus	0.018 mg/L to 0.023 mg/L					
	ž	Nitrogen to Phosphorus Ratio	32:1		Phosphorus limited			
				n n	olor	ss, des	_ ші	Œ

		Turbidity	듄	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish & Wildlife Propagation	S	S	S	S					
Nses	Aesthetics					S	S			
icial	Agriculture							S		
Beneficia	Primary Body Contact Recreation								NEI	
m	Public & Private Water Supply									
	S - Fully Supporting									

S = Fully Supporting NS = Not Supporting

NEI = Not Enough Information

The PBCR cannot be assessed as minimum data requirements were not met due to the lake being drained during the summer quarter.

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

Notes

OWQS = Oklahoma Water Quality Standards

mV = millivoltsChlor-a = Chlorophyll-a

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

W.R. Holway

Sample Period Times Visited Sampling Sites

November 2006 - August 2007 4 5

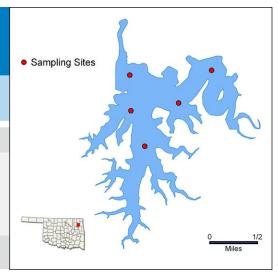
Location Mayes County
Impoundment 1968

Lake Data

Area 712 acres

Capacity 48,000 acre-feet

Purposes Water Supply, Hydropower, Recreation



		Parameter	Result					Notes/Cor	nments			
		Average Turbidity	4 NTU					100% of va	alues <	OWQS of 2	5 NTU	
		Average True Color	24 units					100% of va	alues <	OWQS of 7	0	
		Average Secchi Disk Depth	161 cm									
		Water Clarity Rating	excellent									
		Trophic State Index	58									
စ္		Trophic Class	eutrophic									
ete		Salinity	0.09 - 0.7	16 ppt								
E E		Specific Conductivity	190.1 – 3	22.2 µS	/cm							
Parameters	Profile	рН	7.10 – 9.2	25 pH u	ınits			Only 8% of	f values	> 9.0 pH ur	nits	
4	P	Oxidation-Reduction Potential	263 to 51	4 mV								
		Dissolved Oxygen	Up to 41% August	% of wat								
	S S	Surface Total Nitrogen	0.529 mg	/L to 1.3	35 mg/L							
	Nutrients	Surface Total Phosphorus	0.022 mg	/L to 0.0)88 mg/l	-						
	Z	Nitrogen to Phosphorus Ratio	13:1					Phosphoru	s limited			
				> :		eq			olor	es,	_ ni	
				Turbidity	_	Dissolved Oxygen	Metals		True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
				1	표	Ö Ö	ž	ISI	Ė	ळ ठ ळ	<u></u>	ਠੋ
S	Fish	& Wildlife Propagation		S	S	S	S					
Uses	Aestl	netics						S	S			
neficial	Agric	ulture								S		
nefi	Prima	ary Body Contact Recreation						S				

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

S = Fully Supporting

NS = Not Supporting

Public & Private Water Supply

NEI = Not Enough Information

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

Notes

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

Waurika

Lake Data

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

Location Jefferson County

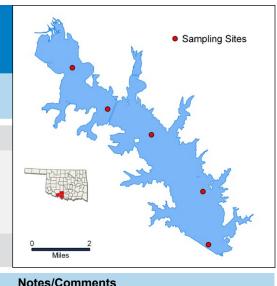
Impoundment 1977

Area 10,100 acres

203,100 acre feet Capacity

Flood Control, Irrigation, Water Supply, Water Quality Control, Purposes

Fish and Wildlife, and Recreation



		Parameter	Result					Notes/Cor	nments			
		Average Turbidity	34 NTU					45% of val	ues > 25	NTU		
		Average True Color	63 units					10% of val	ues > O	WQS of 70		
		Average Secchi Disk Depth	51 cm									
		Water Clarity Rating	average									
		Trophic State Index	54					Previous v	alue = 6	0		
2		Trophic Class	eutrophic	;								
ete		Salinity	0.19 - 0.	35 ppt								
Parameters	O	Specific Conductivity	389.3 – 3	353 µS/d	m							
Par	Profile	рН	7.57 – 8.	59 pH u	nits			Neutral to	slightly a	lkaline		
	ā	Oxidation-Reduction Potential	228 to 50)7 mV								
		Dissolved Oxygen	Up to 27	% of wa	ter colur	nn , 2 mg/L	in July	Occurred a	at site 1,	the dam		
	Š	Surface Total Nitrogen	0.53 mg/	L to 1.09	9 mg/L							
	Nutrients	Surface Total Phosphorus	0.063 mg	g/L to 0.	154 mg/l	_						
	2	Nitrogen to Phosphorus Ratio	8:1					Phosphoru	s limited	I		
						p			lor	. v	. :	
				Turbidity		solve	als		True Color	Sulfates, Chloride: & TDS	En,ecal coli, & E. coli	Chlor-a
				Turk	표	Dissolved Oxygen	Metals	ISI	Truk	Sulfates, Chlorides & TDS	E SI, E	S
S	Fisl	h & Wildlife Propagation		NS	S	S	S					
Use	Aes	sthetics						S	NS			
cial	Agr	iculture								S		
Beneficial Uses	Prir	mary Body Contact Recreation									S	
Be	Pul	olic & Private Water Supply										
	٨	S = Fully Supporting IS = Not Supporting IEI = Not Enough Information										

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 μ S/cm = microsiemens/cm

Waxhoma

Times Visited Sample Period Sampling Sites October 2005 - July 2006

Lake Data

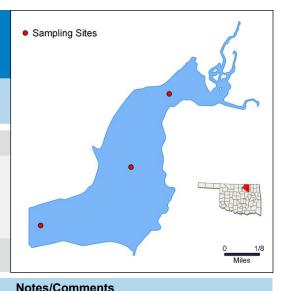
Location Osage County

Impoundment 1955

Area 197 acres

Capacity 2,100 acre-feet

Purposes Water Supply, Recreation



		Parameter		Result					Notes/Cor	nments			
		Average Turbidity		5 NTU					100% of va	alues < 0	DWQS of 2	5 NTU	
		Average True Color		18 units					100% of va	alues < 0	DWQS of 70	כ	
		Average Secchi Disk Depth		153 cm									
		Water Clarity Rating		excellent									
		Trophic State Index		45									
2		Trophic Class		mesotrop	hic								
ete		Salinity		0.09 – 0.1	1 ppt								
am		Specific Conductivity		187.6 – 2	31.6 µS	S/cm							
Parameters	Profile	рН		6.77 – 8.	77 pH ι	ınits			Neutral to	slightly a	lkaline		
	P.	Oxidation-Reduction Potentia	ı	135 to 43	8 mV								
		Dissolved Oxygen		Up to 62% July	6 of wa	ter colum	ın < 2 mg/	'L in					
	S	Surface Total Nitrogen		0.15 mg/L	to 0.49	9 mg/L							
	Nutrients	Surface Total Phosphorus		0.011mg/l	L to 0.0	23 mg/L							
	Z	Nitrogen to Phosphorus Ratio)	14:1					Phosphoru	s limited	l		
					> -		eq .			olor	es,	_ ni	
					Turbidity	玉	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
	5	O MCLUIC Day of the							F	-	W C &	шоо	O
es	Fish	& Wildlife Propagation			S	S	NS	S					
S n	Aest	hetics							S	S			
cia	Agrid	culture									S*		
Beneficial Uses	Prim	ary Body Contact Recreation										S	
Be	Publ	ic & Private Water Supply											
	NS	= Fully Supporting S = Not Supporting El = Not Enough Information	Notes				ınd the Agr 785:45 – A		neficial use no	ot suppor	ted based or	ı numerical d	criteria

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

OWQS = Oklahoma Water Quality Standards mV = millivolts

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

Wayne Wallace

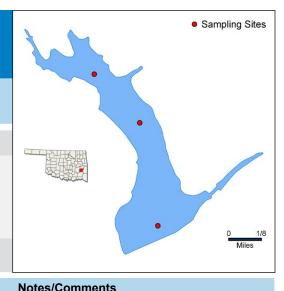
Sample Period Times Visited Sampling Sites 4 December 2007 - August 2008

Location **Latimer County** 1969 Impoundment Lake Data

Area 94 acres

Capacity 1,746 acre feet

Purposes Flood Control and Recreation



		Parameter	Result					Notes/Cor	nments			
		Average Turbidity	16 NTU					All values	< 25 NT	J		
		Average True Color	98 units					All values	> OWQS	of 70		
		Average Secchi Disk Depth	76 cm									
		Water Clarity Rating	average									
		Trophic State Index	48					Previous v	alue = 4	1		
က္		Trophic Class	mesotrop	ohic								
ete		Salinity	0.0 - 0.0	2 ppt								
am		Specific Conductivity	46 – 59.5	5 μS/cm)							
Parameters	Profile	рH	6.09 - 7	11 pH u	ınits			33% of pH	values	< 6.5		
т.	P	Oxidation-Reduction Potential	437 to 54	12 mV								
		Dissolved Oxygen	Up to 20 ^o August	% of wa	iter colun	nn , 2 mg/L	in	Occurred a	at site 1,	the dam		
	S	Surface Total Nitrogen	0.47 mg/	L to 0.5	9 mg/L							
	Nutrients	Surface Total Phosphorus	0.027 mg	g/L to 0.	045 mg/l	_						
	Z	Nitrogen to Phosphorus Ratio	16:1					Phosphoru	ıs limited	I		
				Turbidity	五	Dissolved Oxygen	Metals	TSI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish	& Wildlife Propagation		S	NS	S	S					
Beneficial Uses	Aest	hetics						S	NS			
icial	Agric	culture								S		
enef	Prim	ary Body Contact Recreation									NEI	
ă	Publ	ic & Private Water Supply										
	NS	= Fully Supporting S = Not Supporting El = Not Enough Information	of soluble causes;	e bedroo	k. Due to the	these conditi	ions it is l oking at t	t of the state, ikely that the l he applicabilit	ow pH va	lues may be	due to natur	al

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

Webbers Falls

Sample PeriodTimes VisitedSampling SitesNovember 2005 – Sept. 200646

Location Muskogee County

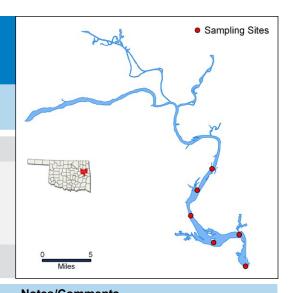
Impoundment 170

Lake Data

Area 11,600 acres

Capacity 170,100 acre-feet

Purposes Navigation, Hydropower



		Parameter	Result					Notes/Con	nments			
		Average Turbidity	21 NTU					30% of valu	ues > O	WQS of 25	NTU	
		Average True Color	32 units					4% of value	es > OV	/QS of 70		
		Average Secchi Disk Depth	53 cm									
		Water Clarity Rating	average									
		Trophic State Index	56									
S		Trophic Class	eutrophic									
ete		Salinity	0.37 – 1.4	47 ppt								
am	Φ	Specific Conductivity	718 – 27	33 µS/cı	n							
Parameters	Profile	рН	7.32 – 8.	.56 pH ι	ınits			Neutral to s	slightly a	alkaline		
	_	Oxidation-Reduction Potential	346 to 44	51 mV								
		Dissolved Oxygen						Values > 2.	0 mg/L	throughout	study perio	d
	ts	Surface Total Nitrogen	0.73 mg/l	L to 1.39	mg/L							
	Nutrients	Surface Total Phosphorus	0.117 mg	/L to 0.2	230 mg/L							
	Ž	Nitrogen to Phosphorus Ratio	6:1					Possibly co	-limited			
				_		p			lor	, s		
				Turbidity		Dissolved Oxygen	Metals	_	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
				Ţ	H H	i≅ ŏ	Me	ISI	그	Sul T &	E S S S S S S S S S S S S S S S S S S S	ਠ
S	Fish	& Wildlife Propagation		S*	S	S	S					
Use	Aes	thetics						S	S			
cial	Agri	culture								S		
Beneficial Uses	Prim	nary Body Contact Recreation									S	
Be	Pub	lic & Private Water Supply										
	N.	= Fully Supporting S = Not Supporting EI = Not Enough Information	*Seven o NTU, how is likely d FWP ber	wever ava	ailable flov asonal stoi	v and rainfa	all data sug	I the Oklahom gest that the Vebbers Falls	peak in t	urbidity, whic	h occurred ii	n May

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

Wes Watkins

Sample Period Times Visited Sampling Sites 5 October 2005 - August 2006

Result

Location Pottawatomie County

1997 Impoundment

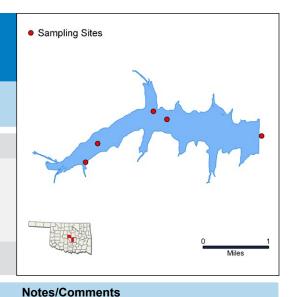
Parameter

Lake Data

Area 1,142 acres

Capacity 14,065 acre-feet

Purposes Water Supply, Recreation, Flood Control



		Average Turbidity	8 NTU					100% of va	alues < C	WQS of 2	5 NTU	
		Average True Color	19 units					100% of va	alues < C	WQS of 70	כ	
		Average Secchi Disk Depth	92 cm									
		Water Clarity Rating	good									
		Trophic State Index	53									
ers		Trophic Class	eutrophic									
net		Salinity	0.13 – 0.	• •								
Parameters	<u>e</u>	Specific Conductivity	262.4 – 3	•								
a	Profile	рН	7.38 – 8	.13 pH ι	ınits							
		Oxidation-Reduction Potential	377 to 45	52 mV								
		Dissolved Oxygen										
	ts	Surface Total Nitrogen	0.57 mg/	L to 1.25	5 mg/L							
	Nutrients	Surface Total Phosphorus	0.016 mg	g/L to 0.0	043 mg/l	_						
	Z	Nitrogen to Phosphorus Ratio	34:1				I	Phosphoru	s limited			
						Ф			or	. w		
				idity		Dissolved Oxygen	<u>als</u>		True Color	Sulfates, Chlorides & TDS	& E	or-a
				Turbidity	표	Dissolve Oxygen	Metals	TSI	True	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
S	Fish	& Wildlife Propagation		S	S	S	S					
nse	Aestl	hetics						S	S			
Beneficial Uses	Agric	culture								S		
nef	Prim	ary Body Contact Recreation									S	
ä	Publi	ic & Private Water Supply										
	NS	Fully Supporting S = Not Supporting El = Not Enough Information										
	NTU = nephelometric turbidity units OWQS = Oklahoma Water Quality Standards mg/L = milligrams per liter ppt = parts per thousand											

 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 μ S/cm = microsiemens/cm

Wetumka

Sample Period Times Visited Sampling Sites

October 2006 - July 2007 4 3

Result

Lake Data

Location Hughes County

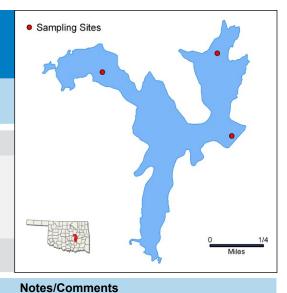
Impoundment 1939

Area 169 acres

Parameter

Capacity 1839 acre-feet

Purposes Water Supply, Recreation



		Average Turbidity	1	18 NTU					8% of valu	es >OW	'QS of 25 N	ITU	
		Average True Color	5	58 units					58% of va	lues > O	WQS of 70	1	
		Average Secchi Disk Depth	5	59 cm									
		Water Clarity Rating		air									
		Trophic State Index	5	53									
Sign		Trophic Class		eutrophic									
Jet (Salinity		0.03 – 0.0									
Parameters	Φ	Specific Conductivity	ç	92.4 – 17	3.3 µS/c	m							
Pal	Profile	рН	6	6.49 – 7.9	00 pH ur	nits			Only 2 val	ues < 6.5	pH units		
	4	Oxidation-Reduction Potential	1 2	298 to 46	1 mV								
		Dissolved Oxygen	ι	Jp to 67%	6 of wate	er colum	n < 2 mg/	L in July	Occurred	at site 1,	the dam		
	ıts	Surface Total Nitrogen	C).52 mg/L	to 1.35	mg/L							
	Nutrients	Surface Total Phosphorus	C	0.022 mg/	/L to 0.08	88 mg/L							
	ž	Nitrogen to Phosphorus Ratio	1	13:1					Phosphoru	us limited			
					>		p _e _			olor	s,	ui	
					Turbidity		Dissolved Oxygen	als		True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a
					Ī	표	Dissolve Oxygen	Metals	ISI	ž	Sulf Chil	Soli, e	S C
S	Fish	& Wildlife Propagation			S	S	NS	S					
Use	Aest	hetics							S	NS			
Beneficial Uses	Agric	culture									S		
nefi	Prim	ary Body Contact Recreation										NEI	
Be	Publ	ic & Private Water Supply											
	NS	= Fully Supporting S = Not Supporting El = Not Enough Information	Notes	The PBCI fecal colif				imum data	a requirement	s were no	t met due to	QA/QC issu	es for

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

NTU = nephelometric turbidity units

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

Wewoka

Times Visited Sample Period Sampling Sites October 2006 - July 2007

Location

Seminole County

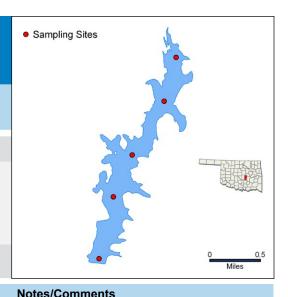
1925 Impoundment

Lake Data

Area 371 acres

Capacity 3,301 acre-feet

Water Supply, Recreation Purposes



		Parameter	Result					Notes/Comments						
		Average Turbidity	59 NTU					75% of values > OWQS of 25 NTU						
		Average True Color	103 units					60% of values > OWQS of 70						
		Average Secchi Disk Depth	35 cm											
rs.		Water Clarity Rating	poor											
		Trophic State Index	55											
		Trophic Class	eutrophic											
ete		Salinity	0.00 - 0.7	10 ppt										
Parameters	Profile	Specific Conductivity	25.6 – 21	9 μS/cn	n									
		рН	6.67 - 8.7	18 pHι	units									
		Oxidation-Reduction Potential	139 to 44	7 mV										
		Dissolved Oxygen	Up to 50% of water column < 2 mg/L in July Occurred at site 1, the dam											
	Nutrients	Surface Total Nitrogen	0.67 mg/L to 1.32 mg/L											
		Surface Total Phosphorus	0.021 mg/L to 0.190 mg/L											
		Nitrogen to Phosphorus Ratio	15:1					Phosphoru	ıs limited					
				_		þ			lor	, S				
				Turbidity		Dissolved Oxygen	Metals	_	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a		
				Ţ	H	ig Š	Me	ISI	뒫	Sul Ch T	<u> </u>	ਠ		
S	Fish	& Wildlife Propagation		NS	S	NS	S							
Beneficial Uses	Aest	hetics						S	NS					
	Agric	culture								S				
	Prim	ary Body Contact Recreation									NEI			
Be	Publ	ic & Private Water Supply												

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

S = Fully Supporting

NS = Not Supporting

NEI = Not Enough Information

E. coli = Escherichia coli

OWQS = Oklahoma Water Quality Standards mV = millivolts

fecal coliform and enterococci.

Notes

Chlor-a = Chlorophyll-a

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

The PBCR cannot be assessed as minimum data requirements were not met due to QA/QC issues for

Wiley Post Memorial (Maysville)

Sample Period Times Visited Sampling Sites

November 2007 – August 2008 4 5

Pake Data
Area
Cap

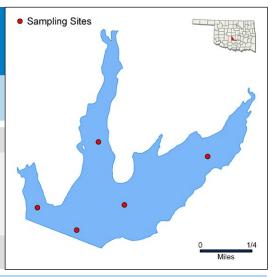
Location McClain County

Impoundment 1971

Area 302 acres

Capacity 2,086 acre feet

Purposes Water Supply, Flood Control, and Recreation



		Parameter	Result					Notes/Comments						
		Average Turbidity	79 NTU					100% of values > 25 NTU						
		Average True Color	223 units					100% of values > OWQS of 70						
S		Average Secchi Disk Depth	16 cm											
		Water Clarity Rating	poor											
		Trophic State Index	51					Previous value = 57						
		Trophic Class	eutrophic											
ete		Salinity	0.10 – 0.	20 ppt										
am		Specific Conductivity	280 – 34	·9.9 μS/c	cm									
Parameters	Profile	рH	7.24 – 8	41 pH u	nits			Neutral to slightly alkaline						
	P.	Oxidation-Reduction Potential	246 to 6	64 mV										
		Dissolved Oxygen	Up to 50 August	% of wa	ter colun	nn < 2 mg/L	. in	Occurred at site 4						
	छ	Surface Total Nitrogen	0.66 mg/L to 1.28 mg/L											
	Nutrients	Surface Total Phosphorus	0.081 mg/L to 0.159 mg/L											
		Nitrogen to Phosphorus Ratio	9:1					Phosphorus limited						
						ō			or	, w				
				idity		olve gen	<u>s</u>		S S	ates oride OS	& E E	r-a		
				Turbidity	H _d	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a		
S	Fish	& Wildlife Propagation		NS	S	S	S							
Use	Aest	hetics						S	NS					
Beneficial Uses	Agric	culture								S				
	Primary Body Contact Recreation										NEI			
	Publ	ic & Private Water Supply												
	NS	= Fully Supporting S = Not Supporting El = Not Enough Information	The PBCR cannot be assessed as minimum data requirements were not met due to QA/QC issues for E. coli and fecal coliform.											

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

Wister

Sample Period Times Visited Sampling Sites December 2007 - August 2008 5

LeFlore County Impoundment Lake Data

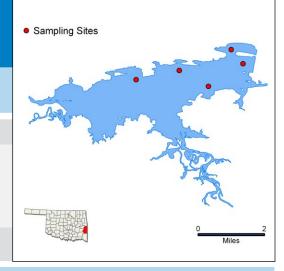
Location

1949

Area 7,333 acres

62,360 acre feet Capacity

Purposes Flood Control, Water Supply, Low flow Regulation, Conservation



		Parameter	Result					Notes/Comments					
Parameters		Average Turbidity	25 NTU					35% of values > 25 NTU					
		Average True Color	91 units					65% of values > OWQS of 70					
		Average Secchi Disk Depth	41 cm										
		Water Clarity Rating	average										
		Trophic State Index	61					Previous value = 52					
		Trophic Class	hypereutrophic										
		Salinity	0.0 - 0.0	3 ppt									
		Specific Conductivity	58.5 – 93	8.9 µS/cr	m								
	Profile	pН	6.23 – 7.47 pH units 15% of pH values < 6.5										
	P	Oxidation-Reduction Potential	382 to 54	5 mV									
		Dissolved Oxygen	Up to 62% of water column, 2 mg/L in August Occurred at site 1, the dam										
	र	Surface Total Nitrogen	0.43 mg/L to 0.77 mg/L										
	Nutrients	Surface Total Phosphorus	0.049 mg/L to 0.099 mg/L										
		Nitrogen to Phosphorus Ratio	9:1					Phosphorus	s limited				
				>		p			olor	, se	ui.		
				Turbidity	핍	Dissolved Oxygen	Metals	ISI	True Color	Sulfates, Chlorides & TDS	En,ecal coli, & E. coli	Chlor-a	
S	Fish	& Wildlife Propagation		NS	NS	NS							
Use	Aest	hetics						NS	NS				
cial	Agric	culture								S			
Beneficial Uses	Prim	ary Body Contact Recreation									S		
	Publ	ic & Private Water Supply											
	NS	= Fully Supporting S = Not Supporting El = Not Enough Information	Slightly acidic conditions are common in this part of the state, due to relatively low soil pH and lack of soluble bedrock. Due to these conditions it is likely that the low pH values may be due to natural causes; therefore the Water Board is looking at the applicability of developing site-specific criteria for waters in the southeastern portion of the state.										

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

ppt = parts per thousand En = Enterococci

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