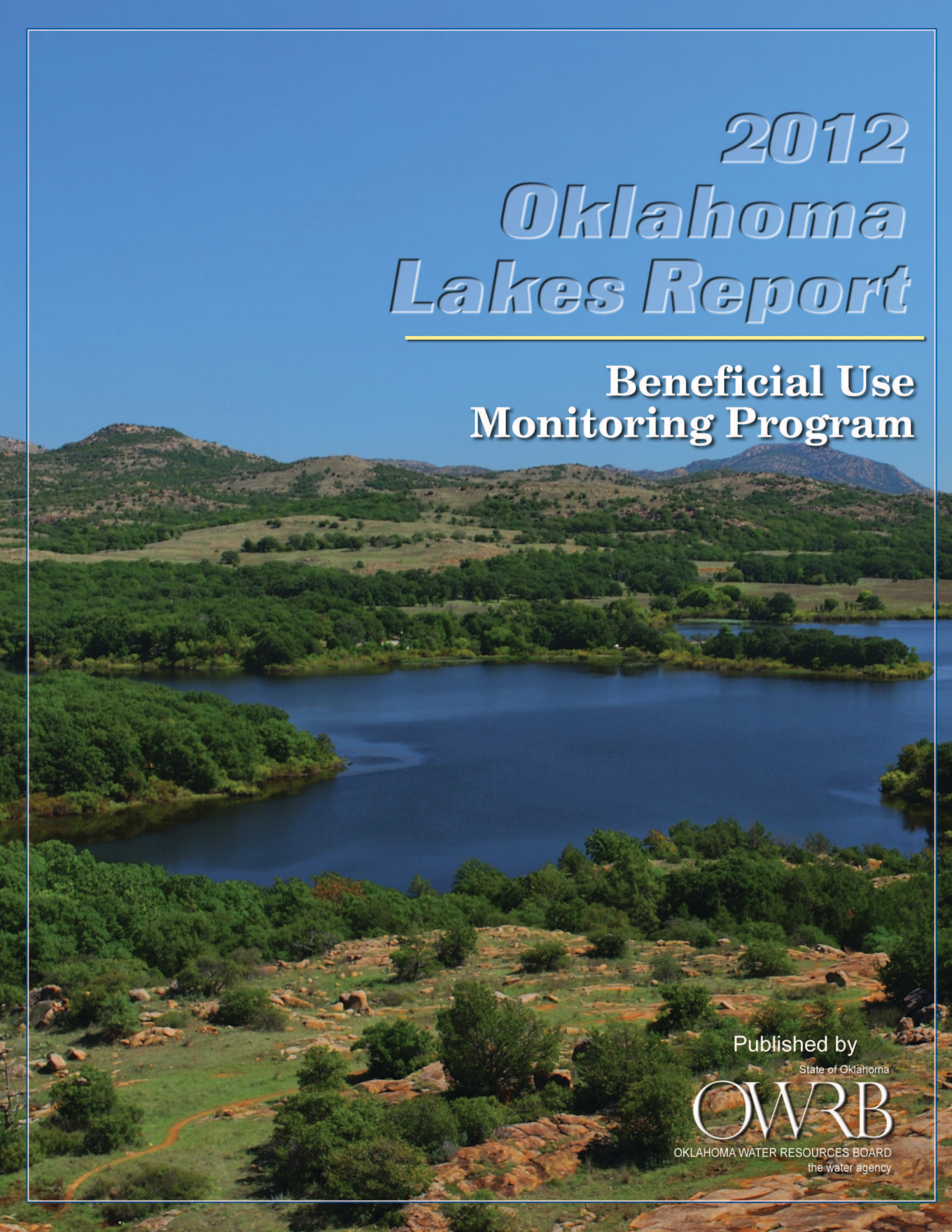

2012 Oklahoma Lakes Report

Beneficial Use Monitoring Program

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OKLAHOMA WATER RESOURCES BOARD
the water agency

2012 Oklahoma Lakes Report

Beneficial Use Monitoring Program

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.

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

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 OWRB 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 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 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 nonpoint 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 (BUMP) under the direction of the Oklahoma Water Resources Board, who promulgates the WQS and WQS Implementation Rule. BUMP brings the OWRB's overall water quality management program full circle. From the promulgation of WQS, to permitting and enforcement of permits stemming from WQS-established criteria, to nonpoint source

controls, all agency water quality management activities are intended to work in concert to restore, protect, and maintain designated beneficial uses.

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

Beneficial Use Monitoring Program Components

Monitoring Rivers & Streams - The OWRB is currently monitoring approximately 84 stations on a 6-week rotation. Fixed station monitoring is based largely upon the 84 planning basins as outlined in the Oklahoma Comprehensive water Plan (OCWP). In general, at least one sample station is located at the terminal end of each of the planning basins. The OWRB also conducts on-going special studies as well as 25-30 probabilistic monitoring stations annually.

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

Fixed Station Lakes Monitoring – As part of BUMP, the OWRB conducts sampling on lakes and reservoirs across the State of Oklahoma. To accomplish this task, the OWRB has taken a probabilistic survey approach for the lakes monitoring program. This survey design allows the state's objectives to be met as well as ensure various sized waterbodies are represented adequately. The survey population includes all lakes above 50 surface acres, which encompasses approximately 206 different waterbodies. The population is then stratified into two groups – lakes greater than 500 surface acres and those below 500 surface acres. The greater than 500 surface acres group includes 68 lakes, of which approximately one-fifth are monitored annually (quarterly samples) on a randomized draw. They are then monitored again during a subsequent year in the 5-year rotation, so that each lake greater than 50 surface acres is sampled 2 non-consecutive years during each 5 year rotation. The lakes managed by our Federal partners, the USACE and Bureau of Reclamation (BoR) are included in the 68 large lakes. Additionally, ten randomly drawn lakes of less than 500 surface acres are sampled annually (quarterly samples) over the 5 year sample frame. Many of these smaller lakes have not been sampled historically through BUMP and include small municipal water supplies.

The OWRB works with other agencies, such as the USACE, for inclusion of additional information on waterbodies managed by the Corps. Data collected consists primarily of water chemistry, nutrients, and chlorophyll-a information. In general, a minimum of three to five stations per reservoir are sampled depending on the size of the reservoir. Stations are located such that they represent the lacustrine, transitional, and riverine zones of the lake. 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 program ability to make use support determinations.

Fixed Station Groundwater Monitoring – This new program was made possible as result of a $1,500,000 increase in funding received from the Oklahoma Legislature for water quality/quantity monitoring based on recommendations of the 2012 Update of the Oklahoma Comprehensive Water Plan. These additional monies are being utilized to restore funding levels of the Beneficial Use Monitoring Program as well as to implement the new groundwater program. The new groundwater program prioritizes efforts on Oklahoma's 21 major groundwater aquifers and will be phased in over the next 4 years. This baseline period will focus

on 4-6 aquifers per year and will assess concentrations of nutrients, metals and major ion species. By design, a minimum of 30 wells will be used to collect water quality data from each aquifer. When fully implemented, there will be 750 wells in the statewide groundwater quality network statewide. In addition, the OWRB's annual groundwater level measurement program will be doubled in capacity (from around 530 to 1100 wells) and will be spatially redistributed. For ½ of the water level network, manual measurements will become tri-annual events. Additionally, over the 4 year baseline period, the OWRB plans to install 30-50 continuous water level recorders to obtain daily or hourly measurements that are more sensitive to detecting seasonal changes (brought on by drought or variable climate conditions) than can be obtained by annual measurements. Update: The data collection phase of a groundwater assessment pilot project on the Rush Springs Aquifer was completed in April 2013. Analytical results will be available in July of 2013.

Intensive Investigations – Historically, work occurred in the area in the early years of the program, but no work of this nature has occurred in the last 5-6 years. Work was discontinued to address other monitoring needs as the costs to operate the program have continued to increase since program inception.

Program History/Overview

Sampling of the numerous lakes, streams, and rivers across this state was initiated in the summer and fall of 1998. Lake sampling in connection with BUMP 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 had 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 lake can range from oligotrophic (low biological productivity) to hypereutrophic (excessive biological productivity). In general, the more productive a lake is 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 OWRB was able to obtain a one-time federal CWA 319 nonpoint source grant to continue the lake trophic state assessment program. The OWRB subsequently initiated a quarterly lake sampling program in the spring of 1998 and was able to roll the existing lake program into BUMP.

The OWRB has developed USAPs 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 OWRB 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 quarterly basis for 33 lakes from the October of 2011 through August of 2012. The results of the sampling efforts are summarized below. As shown in Figure 1, 30% of lakes sampled were determined to have serious water quality nutrient concerns based upon their classification as hypereutrophic. Lakes classified as hypereutrophic have the potential for beneficial use impairments due to low dissolved oxygen concentrations, taste and odor problems, nutrient inputs, excessive productivity, and general lake aesthetics. Hypereutrophic waters are adversely impacted primarily by excessive nutrients and primary productivity and should be monitored intensively in the future to document the presence or absence of "beneficial use impairments." Forty-three 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, 24% 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 one of the 33 lakes sampled was classified as oligotrophic. Based on the results for trophic state index calculations, 73% of the waters sampled were exhibiting high to excessive levels of primary productivity and nutrient rich conditions characteristic of eutrophic and hypereutrophic waterbodies.

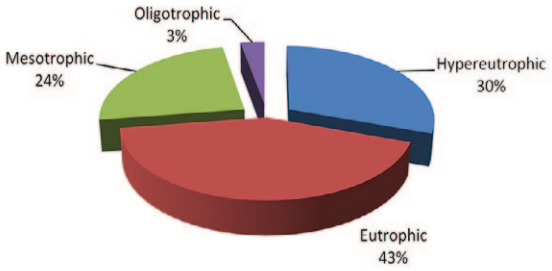


Figure 1 - Trophic Status of Lakes for Sample Year 2011-2012

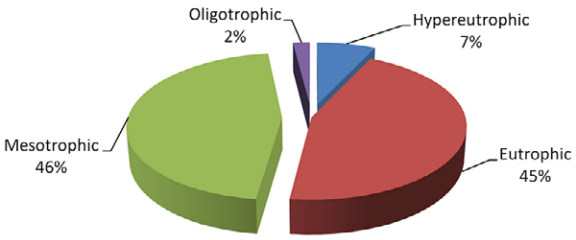


Figure 2. Lake Surface Acres by Trophic Status for Lakes Sampled in 2011-2012

The distribution changes somewhat when the lake surface acres for each 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. Lake trophic status, when broken out by the number of lake surface acres in each trophic state category, finds 45% of all surface acres sampled were eutrophic, 46% mesotrophic, 7% hypereutrophic, and 2% oligotrophic. One of the largest lakes sampled in 2011-2012, Lake Eufaula, was classified as mesotrophic, which skewed the surface acres percentages heavily towards the mesotrophic category. In general, the larger lakes 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 lakes 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 lakes in Oklahoma are experiencing adverse environmental impacts. However, with the available data it is not possible to adequately assess if lakes are meeting their assigned beneficial uses as they relate to nutrients. At this time, 21 lakes 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 BUMP, their trophic status, and potential threats or impairments are listed in Table 1. Information contained in this table represents the most recently approved Integrated Water Quality Monitoring and Assessment Report (2010), which is the State's impaired water list.

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

Lake Name	County	W.Q. Segment #	Last Year Sampled	FWP	PPWS	PBCR	AG	AES
American Horse	Blaine	520620	2007-2008	D.O.				
Arbuckle	Murray	310800	2010-2011	D.O.				
Arcadia	Oklahoma	520710	2006-2007	Turbidity	Chlor-a			
Ardmore City	Carter	310800	2006-2007	D.O.				
Atoka	Atoka	410400	2011-2012	D.O., Turbidity				True Color
Bellcow	Lincoln	520700	2011-2012	Turbidity				
Birch	Osage	121300	2010-2011	pH, D.O.				
Bixhoma	Wagoner	120410	2005-2006	D.O.				
Bluestem	Osage	121300	2011-2012	D.O., Turbidity		Ent.		
Boomer	Payne	620900	2008-2009	D.O., Turbidity		Ent. /		
Broken Bow	McCurtain	410210	2010-2011	pH, D.O				
Brushy Creek	Sequoyah	220200	2007-2008	pH, D.O		Ent.		
Burtschi	Grady	31082002	2005-2006	pH				NLW
Canton	Blaine	720500	2011-2012	Turbidity				
Carl Albert	Latimer	410310	2007-2008	pH, D.O				
Carl Blackwell	Payne	620900	2010-2011	D.O., Turbidity	Chlor-a			True Color
Carter	Marshall	310800	2007-2008	D.O.		Ent.		
Cedar (Mena)	LeFlore	410210 410300	2010-2011	pH, D.O				
Chandler	Lincoln	520700	2007-2008	D.O., Turbidity	Chlor-a	Ent.		
Chickasha	Caddo	310830	2010-2011	D.O.			Sulfates	NLW
Claremore	Rogers	121500	2005-2006	D.O.	Chlor-a			NLW
Clear Creek	Stephens	310810	2010-2011					
Cleveland City	Pawnee	621200	2006-2007	D.O., Turbidity				True Color
Clinton	Washita	310830	2003-2004	Turbidity	Chlor-a			True Color NLW
Coalgate City	Coal	410400	2006-2007	D.O., Turbidity				True Color
Comanche	Stephens	311300	2010-2011	D.O.				
Copan	Washington	121400	2007-2008	D.O., Turbidity	Chlor-a	E. coli		True Color
Crowder	Washita	310830	2005-2006	D.O., Turbidity	Chlor-a			NLW
Cushing Municipal	Payne	620900	2011-2012	Turbidity				True Color
Dave Boyer (Walters)	Cotton	311300	2007-2008	Turbidity				True Color
Dripping Springs	Okmulgee	520700	2011-2012	D.O., Turbidity		Ent.		True Color
Duncan	Stephens	310810	2006-2007					
El Reno	Canadian	520530	2011-2012	Turbidity				NLW
Elk City	Beckham	311500	2005-2006	Turbidity				NLW
Ellsworth	Comanche	311300	2011-2012	D.O., Turbidity	Chlor-a	Ent.		
Elmer Thomas	Comanche	311300	2006-2007	D.O.				
Etling, Carl	Cimarron	720900	2003-2004	Turbidity pH				NLW
Eucha	Delaware	121600	2006-2007	D.O.	Chlor-a			NLW
Eufaula	Haskell	220600 520700 520500	2011-2012	D.O., Turbidity				True Color
Fairfax City	Osage	621200	2010-2011	D.O.				
Fort Cobb	Caddo	310830	2011-2012	Turbidity		Ent.		NLW
Fort Gibson	Cherokee	121600	2006-2007	D.O.				NLW

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

Lake Name	County	W.Q. Segment #	Last Year Sampled	FWP	PPWS	PBCR	AG	AES
Fort Supply†	Woodward	720500	2010-2011	Turbidity	Chlor-a			NLW
Foss	Custer	310840	2010-2011					
Frederick	Tillman	311310	2006-2007	Turbidity				True Color
Fuqua	Stephens	310810	2010-2011	Turbidity				
Grand Lake	Mayes	121600	2008-2009	D.O., Turbidity				
Great Salt Plains	Alfalfa	621010	2011-2012	Turbidity		Ent.		NLW
Greenleaf	Muskogee	120400	2011-2012	D.O., Turbidity	Chlor-a			
Guthrie◘	Logan	620910	2005-2006		Chlor-a			NLW
Healdton City	Carter	311100	2005-2006	Turbidity				True Color
Hefner	Oklahoma	520520 520530	2010-2011	D.O.				
Henryetta♦	Okmulgee	520700	2011-2012	Turbidity	Lead			True Color
Heyburn	Creek	120420	2010-2011	D.O., Turbidity		Ent.		True Color
Holdenville	Hughes	520800	2006-2007	D.O., Turbidity	Chlor-a			
Hominy Municipal	Osage	121300	2006-2007	D.O.				
Hudson (Bartlesville)	Osage	121400	2011-2012	D.O. Turbidity				
Hudson (Markham Ferry)	Mayes	121600	2011-2012	D.O.				
Hugo	Choctaw	410300	2011-2012	Turbidity				True Color
Hulah	Osage	121400	2011-2012	Turbidity				True Color NLW
Humphreys	Stephens	310810	2011-2012	D.O.	Chlor-a	Ent. / E. coli		
Jean Neustadt	Carter	310800	2011-2012	D.O.				
John Wells	Haskell	220200	2008-2009	D.O.		Ent.		
Kaw	Osage	621210	2007-2008	D.O., Turbidity				
Keystone	Tulsa	621200 620900	2011-2012	D.O., Turbidity				
Konawa	Seminole	520600	2011-2012					
Langston	Logan	620900	2010-2011			Ent.		
Lawtonka	Comanche	311300	2010-2011		Chlor-a			
Liberty	Logan	620910	2005-2006	D.O.	Chlor-a	Ent.		
Lloyd Church	Latimer	220100	2005-2006	pH, D.O				
Lone Chimney	Pawnee	621200	2010-2011	D.O.				
Lugert-Altus	Greer	311500 311510	2010-2011					
Maysville / Wiley Post	McClain	310810	2007-2008	D.O., Turbidity				True Color
McAlester	Pittsburg	220600	2008-2009	Turbidity				True Color
McGee Creek	Atoka	410400	2008-2009	pH, D.O				
McMurtry	Noble	620900	2011-2012	D.O., Turbidity				
Meeker	Lincoln	520700	2008-2009	Turbidity				
Murray	Love	311100	2011-2012	D.O.				
Nanih Waiya	Pushmataha	410310	2007-2008			Ent.		
New Spiro	LeFlore	220100	2005-2006	D.O.	Chlor-a			NLW
Okemah	Okfuskee	520700	2011-2012	D.O., Turbidity				
Okmulgee	Okmulgee	520700	2010-2011	D.O.				

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

Lake Name	County	W.Q. Segment #	Last Year Sampled	FWP	PPWS	PBCR	AG	AES
Oologah	Rogers	121510	2011-2012	D.O., Turbidity				
Overholser	Oklahoma	520520 520530	2011-2012	Turbidity			Sulfates	NLW
Ozzie Cobb	Pushmataha	410300	2007-2008	D.O., pH, Turbidity				NLW
Pauls Valley City	Garvin	310810	2007-2008	Turbidity				True Color
Pawhuska	Osage	121600	2007-2008	D.O.			Sulfates	
Pawnee	Pawnee	621200	2006-2007	Turbidity	Chlor-a			True Color
Perry	Noble	621200	2006-2007	Turbidity				True Color
Pine Creek	McCurtain	410210	2010-2011	pH, D.O				
Ponca	Kay	621200	2010-2011	D.O.	Chlor-a	Ent.		
Prague City	Lincoln	520510	2007-2008	D.O.				
Purcell	McClain	520610	2007-2008	D.O.				
Raymond Gary	Choctaw	410300	2008-2009	pH, D.O				
R.C. Longmire	Garvin	310810	2011-2012	D.O.		Ent.		
Robert S. Kerr	Sequoyah	220200	2010-2011	Turbidity				True Color
Rock Creek	Carter	310800	2008-2009	D.O., Turbidity				
Rocky (Hobart)	Washita	311500	2011-2012	Turbidity	Chlor-a	Ent		NLW
Sahoma	Creek	120420	2005-2006	D.O., Turbidity				
Sardis	Pushmataha	410310	2010-2011	D.O., Turbidity		Ent.		
Shawnee Twin #1	Pottawatomie	520510	2010-2011	D.O.				
Shawnee Twin #2	Pottawatomie	520510	2010-2011	D.O., Turbidity				
Shell	Osage	120420	2008-2009	D.O.				
Skiatook	Osage	121300	2011-2012	D.O.				
Sooner	Pawnee	621200	2006-2007	D.O.			Sulfates	
Spavinaw	Mayes	121600	2011-2012	D.O.	Chlor-a			NLW
Sportsman	Seminole	520500	2007-2008	D.O., Turbidity		E. coli		True Color
Stanley Draper	Cleveland	520810	2005-2006	Turbidity				
Stilwell City	Adair	220200	2005-2006	D.O.				
Stroud	Creek	520700	2011-2012	D.O.				
Talawanda #1	Pittsburg	220600	2010-2011	pH, D.O				
Talawanda #2	Pittsburg	220600	2010-2011	D.O.				
Taylor (Marlow)	Grady	310840	2008-2009	Turbidity				NLW
Tecumseh	Pottawatomie	520510	2007-2008	Turbidity				True Color
Tenkiller Ferry	Sequoyah	121700	2011-2012	D.O.	Chlor-a			NLW
Texoma	Bryan	311100 310800	2010-2011	D.O., Turbidity				
Thunderbird	Cleveland	520810	2006-2007	D.O., Turbidity	Chlor-a			NLW
Tom Steed	Kiowa	311500	2006-2007	Turbidity	Chlor-a			
Vanderwork	Washita	310830	2007-2008	D.O.		Ent.		NLW
Vincent, Lloyd	Ellis	720500	2010-2011	D.O.				
W.R. Holway	Mayes		2010-2011	D.O.				
Waurika	Jefferson	311210	2007-2008	Turbidity	Chlor-a			
Waxhoma	Osage	121300	2005-2006	D.O.				
Wayne Wallace	Latimer	220100	2011-2012	pH, D.O				
Webbers Falls	Muskogee	121400	2010-2011	Turbidity		Ent.		

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

Lake Name	County	W.Q. Segment #	Last Year Sampled	FWP	PPWS	PBCR	AG	AES
Wes Watkins	Pottawatomie	520510	2010-2011					
Wetumka	Hughes	520500	2006-2007	D.O., Turbidity		Ent.		
Wewoka	Seminole	520500	2008-2009	Turbidity				True Color
Wister♣	LeFlore	220100	2010-2011	D.O., pH, Turbidity	Chlor-a	Ent.		True Color NLW
Yahola●	Tulsa	121300	1998-1999					

Symbols:

† 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

Note:

Red colored parameter entries indicate not supporting.

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 (ODWC) lakes, and rivers and streams throughout the state, which infuse millions into state economy 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). According to a 2011 federal study, fishing activities alone contribute $730,503,000 dollars to Oklahoma's economy, not including the substantial ancillary costs associated with that extremely popular sport.

In addition to surface waters, abundant groundwaters also fuel the state's economy, serving as supply for thousands of municipalities, rural water districts, industrial facilities, and agricultural operations. According to the 2012 Update of the Oklahoma Comprehensive Water Plan (OCWP), groundwater represents the primary water supply for hundreds of cities and towns across Oklahoma and comprises 44 percent of the total water used in the state each year. 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 OWQS serving as the cornerstone of the state's water quality management programs. The OWRB is designated by state statute as the agency responsible for promulgating water quality standards and developing or assisting the other environmental agencies with implementation 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 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 USAPs 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 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], CWA §319 Nonpoint 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.

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 can attain the same level of water quality would be unrealistic, because these two lakes exhibit great differences in basin morphometry and substrate material and are located in totally different parts of the state. Soil types such as clays have a very small particle size such that the clay particulates are constantly re-suspended in the lake water column and never settle out, which is evident in some lakes across the state. In addition, the shallow nature of many of our lakes contributes to lake bottom sediments being re-

suspended in the water column due to wind action. Because so many factors affect the water quality of any given lake, comparing lakes from various parts of the state should only be viewed as a relative comparison.

For the 2011-2012 sampling season, 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 21 lakes that are listed in the OWQS as NLWs. 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 33 lakes across the state from the fall of 2011 through the summer of 2012. 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 lake : 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

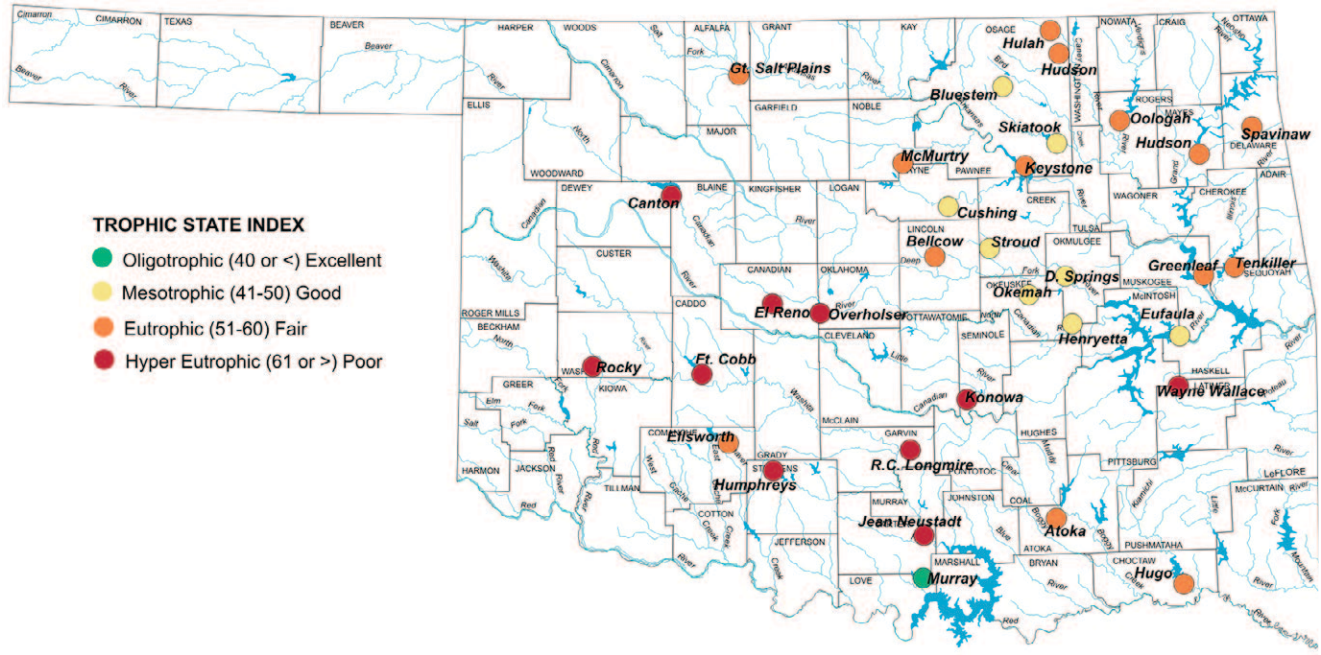


Figure 3. Lakes sampled by the Beneficial Use Monitoring Program in 2011-2012.

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 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 2011-2012 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 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:

$$TSI = 9.81 \times \ln(\text{chlorophyll-a}) + 30.6.$$

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 . 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 with 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 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

Table 2. Lake Trophic State Categories.

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

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 lakes sampled were determined following guidelines outline in the USAP promulgated into 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 or 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 OWRB 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 250 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.

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 Fish & Wildlife Propagation (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 each parameter as it relates to USAP are located in OAC:45-5-12 and can be found on the OWRB website:

www.owrb.ok.gov/standards

Assessment of Agriculture Beneficial Use Support

The Agriculture 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. A description of the USAP for the Agriculture beneficial use can be found on the OWRB website:

www.owrb.ok.gov/standards

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 which can be found on the OWRB website:

www.owrb.ok.gov/standards

Assessment of Primary Body Contact Recreation (PBCR) Support

The PBCR beneficial use utilizes the following microorganisms to assess use support:, Escherichia coli (E. coli), and enterococci (Ent.). The criteria are located in OAC 785:45-5-16 and can be found on the OWRB website:

www.owrb.ok.gov/standards

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 2011-2012 as well as the percentages of the total. As shown in Table 3, ten lakes were hypereutrophic, fourteen were eutrophic, eight were mesotrophic, and one was oligotrophic. Of the total 262,207 surface acres sampled, 17,733 were classified hypereutrophic, 118,742 were classified as eutrophic, 120,004 were classified as mesotrophic and 5,728 acres were classified as oligotrophic. TSI results, county, surface area, and volume for lakes sampled in 2011-2012 are listed in Table 4.

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
Hypereutrophic	10	30%	17,733	7%
Eutrophic	14	42%	118,742	45%
Mesotrophic	8	24%	120,004	46%
Oligotrophic	1	3%	5,728	2%
Totals =	33	100%	262,207	100%

Although TSI based on the chlorophyll-a concentration is used for BUMP, a comparison of TSI values calculated with total phosphorus and secchi disk depth was generated and 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-a and phosphorus TSI calculations were derived through results of regression analysis relating secchi disk depth to the other two variables.

Calculations using secchi disk depth may not be a good parameter to use in highly colored or turbid reservoirs where turbidity is inorganic in nature. Both are common components of Oklahoma lakes. Additionally, phosphorus may not be an accurate variable to use in calculating the TSI in lakes that are not phosphorus-limited or those that are highly turbid due to clay particulates. Carlson (1977) stated chlorophyll-a seems to be the most acceptable parameter to use in calculating TSI, especially during the growing season, and for estimating algal biomass. In accordance with historical calculations at OWRB and Carlson's suggestion to measure chlorophyll-a, rather than secchi disk depth or total phosphorus, it is the variable utilized for BUMP's TSI calculations. The values displayed in Table 5 were calculated using lake-wide annual averages for all three parameters.

Using the chlorophyll-a methodology, four lakes were hypereutrophic, twenty- lakes were eutrophic, ten lakes were mesotrophic, and none were oligotrophic. Using total phosphorus and secchi disk depth in the TSI calculation produced a much different result although classification using these two variables is somewhat comparable to each other. Using the total phosphorus variable for TSI, six lakes were hypereutrophic,

Table 4. List of Lakes Sampled in Sample Year 2011-2012

Lake Name	County	Surface Area (acres)	Volume (ac-ft)	TSI	Year Sampled	Threats or Impairments	Carlson's TSI
Atoka	Atoka	5,700	125,000	58	2012	Chlor-a	Eutrophic
Bellcow	Lincoln	1,153	15,613	59	2012	Turbidity	Eutrophic
Bluestem	Osage	762	17,000	48	2012	Turbidity	Mesotrophic
Canton	Blaine	7,910	111,310	64	2012	Turbidity	Hypereutrophic
Cushing	Payne	591	3,304	50	2012	Turbidity	Mesotrophic
Dripping Springs	Okmulgee	1,150	16,200	46	2012	Turbidity	Mesotrophic
El Reno	Canadian	170	709	73	2012		Hypereutrophic
Ellsworth	Comanche	5,600	95,200	60	2012	Turbidity Chlor-a	Eutrophic
Eufaula	Haskell	105,500	2,314,600	50	2012	Turbidity	Mesotrophic
Ft. Cobb	Caddo	4,100	80,010	68	2012	Chlor-a/NLW	Hypereutrophic
Great Salt Plains	Alfalfa	8,690	31,240	57	2012	NLW	Eutrophic
Greenleaf	Muskogee	920	14,720	54	2012	Chlor-a	Eutrophic
Henryetta	Okmulgee	450	6,600	43	2012	Turbidity	Mesotrophic
Hudson (Bartlesville)	Osage	268	2,776	51	2012		Eutrophic
Hudson (M-F)	Mayes	11,029	200,184	55	2012	D.O. /Turbidity	Eutrophic
Hugo	Choctaw	13,250	157,600	54	2012	Turbidity	Eutrophic
Hulah	Osage	3,570	31,160	52	2012	Turbidity/NLW	Eutrophic
Humphreys	Stephens	882	14,041	65	2012	Chlor-a	Hypereutrophic
Jean Neustadt	Carter	462	6,106	61	2012		Hypereutrophic
Keystone	Tulsa	23,610	557,600	58	2012	Turbidity	Eutrophic
Konowa	Seminole	1,350	23,000	62	2012		Hypereutrophic
McMurtry	Noble	1,155	19,733	51	2012	Turbidity	Eutrophic
Murray	Love	5,728	153,250	37	2012		Oligotrophic
Okemah	Okfuskee	761	13,100	46	2012		Mesotrophic
Oolagah	Rogers	29,460	553,400	51	2012	Turbidity	Eutrophic
Overholser	Oklahoma	1,500	15,000	69	2012	Turbidity/NLW /Chlor-a	Hypereutrophic
R.C. Longmire	Garvin	918	14,424	63	2012	Turbidity/Ent.	Hypereutrophic
Rocky (Hobart)	Washita	347	4,210	68	2012	Turbidity/NLW /Ent.	Hypereutrophic
Skiatook	Osage	10,190	322,700	47	2012	Turbidity	Mesotrophic
Spavinaw	Mayes	1,584	38,000	59	2012	NLW	Eutrophic
Stroud	Creek	600	8,800	46	2012		Mesotrophic
Tenkiller	Sequoyah	12,900	654,100	55	2012	D.O./NLW/ Chlor-a	Eutrophic
Wayne Wallace	Latimer	94	1,746	63	2012	pH	Hypereutrophic

thirteen lakes were eutrophic, thirteen lakes were mesotrophic and two were oligotrophic. Using the secchi disk depth variable for TSI twenty-four lakes were identified as hypereutrophic, none lakes were eutrophic, one lake was mesotrophic and zero lakes were oligotrophic. The TSI values calculated using secchi depth were the highest of the three variables. For example, Heyburn Lake was classified as mesotrophic using chlorophyll-a concentration, eutrophic using total phosphorus as the, and hypereutrophic using secchi disk depth. Most of the TSI values were lowest using the chlorophyll-a concentration; therefore, it seems reasonable to say that this parameter is the most conservative variable to use.

Table 5. Comparison of Methods Used to Calculate Carlson's Trophic State Index for 2011-2012.

Lake Name	Chl-a	Trophic State	Total P	Trophic State	Secchi	Trophic State
Atoka	58	Eutrophic	70	Hypereutrophic	86	Hypereutrophic
Bellcow	59	Eutrophic	47	Mesotrophic	77	Hypereutrophic
Bluestem	48	Mesotrophic	41	Mesotrophic	74	Hypereutrophic
Canton	64	Hypereutrophic	65	Hypereutrophic	82	Hypereutrophic
Cushing	50	Mesotrophic	68	Hypereutrophic	80	Hypereutrophic
Dripping Springs	46	Mesotrophic	27	Oligotrophic	64	Hypereutrophic
Ellsworth	60	Eutrophic	63	Hypereutrophic	79	Hypereutrophic
Eufaula	50	Mesotrophic	58	Eutrophic	70	Hypereutrophic
El Reno	73	Hypereutrophic	85	Hypereutrophic	80	Hypereutrophic
Ft. Cobb	68	Hypereutrophic	67	Hypereutrophic	71	Hypereutrophic
Greenleaf	54	Eutrophic	46	Mesotrophic	66	Hypereutrophic
Great Salt Plains	57	Eutrophic	88	Hypereutrophic	90	Hypereutrophic
Henryetta	43	Mesotrophic	74	Hypereutrophic	96	Hypereutrophic
Hudson (Bartlesville)	51	Eutrophic	41	Mesotrophic	66	Hypereutrophic
Hudson (Markham Ferry)	55	Eutrophic	62	Hypereutrophic	65	Hypereutrophic
Hugo	54	Eutrophic	66	Hypereutrophic	80	Hypereutrophic
Hulah	52	Eutrophic	64	Hypereutrophic	86	Hypereutrophic
Humphreys	65	Hypereutrophic	52	Eutrophic	70	Hypereutrophic
Jean Neustadt	61	Hypereutrophic	46	Mesotrophic	72	Hypereutrophic
Keystone	58	Eutrophic	79	Hypereutrophic	75	Hypereutrophic
Konowa	62	Hypereutrophic	51	Eutrophic	64	Hypereutrophic
McMurtry	51	Eutrophic	41	Mesotrophic	70	Hypereutrophic
Murray	37	Oligotrophic	27	Oligotrophic	54	Eutrophic
Okemah	46	Mesotrophic	30	Oligotrophic	65	Hypereutrophic
Oolagah	51	Eutrophic	62	Hypereutrophic	76	Hypereutrophic
Overholser	69	Hypereutrophic	83	Hypereutrophic	84	Hypereutrophic
R.C. Longmire	63	Hypereutrophic	52	Eutrophic	77	Hypereutrophic
Rocky (Hobart)	68	Hypereutrophic	82	Hypereutrophic	80	Hypereutrophic
Skiatook	47	Mesotrophic	43	Mesotrophic	63	Hypereutrophic
Spavinaw	59	Eutrophic	40	Oligotrophic	66	Hypereutrophic
Stroud	46	Mesotrophic	28	Oligotrophic	60	Eutrophic
Tenkiller	55	Eutrophic	51	Eutrophic	61	Hypereutrophic
Wayne Wallace	63	Hypereutrophic	33	Oligotrophic	58	Eutrophic

Results for each of the 130 BUMP lakes from the most recently approved Integrated Report (303(d) list) are listed in Table 1. As stated previously, the OWRB is currently monitoring 30 to 40 lakes with repeat sampling on each scheduled to occur every three years. Prior to 1998, data was only collected once for each lake during the summer months. In 1998, the OWRB began collecting data quarterly. This greatly improved the data set available to resource managers. Lakes that are identified as hypereutrophic should be sampled more often than quarterly, especially during the warmer months. Lakes identified as 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 1. Toxicity concerns, if present, are listed as provided by the ODEQ as part of their Rotating Lakes Toxics Program and/or through sampling conducted by the OWRB.

The pH was examined and compared to the WQS for pH, 6.5 to 9 units, listed in 785:45-5. Thirty-two of the 33 lakes sampled in the 2011-2012 sampling season were listed as supporting the Fish & Wildlife Propagation (FWP) beneficial use based on pH values and one lake was 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. Of the 34 lakes sampled in the 2011-2012 sampling season, 7 lakes were not supporting their FWP beneficial use, 2 did not have enough information and 25 were fully supporting the use based on turbidity values (see Figure 5).

For dissolved oxygen (D.O.) 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 D.O. violations as values below 2.0 mg/L in >70% of the entire water column, undetermined if between 50% and 70% of the water column and fully supporting if 50% of the water column is below 2.0 mg/L. Of the 34 lakes sampled in the 2011-2012 sampling season, only one lake was not supporting the FWP beneficial use based on anoxic conditions, primarily in the summer season (See Figure 6.).

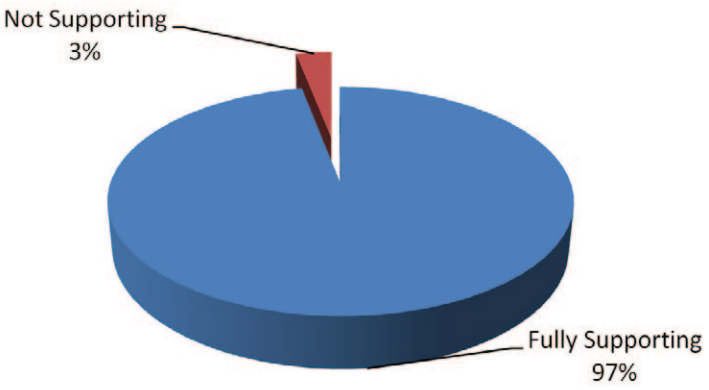


Figure 4. Comparison of pH Values to WQS for Sample Year 2011-2012.

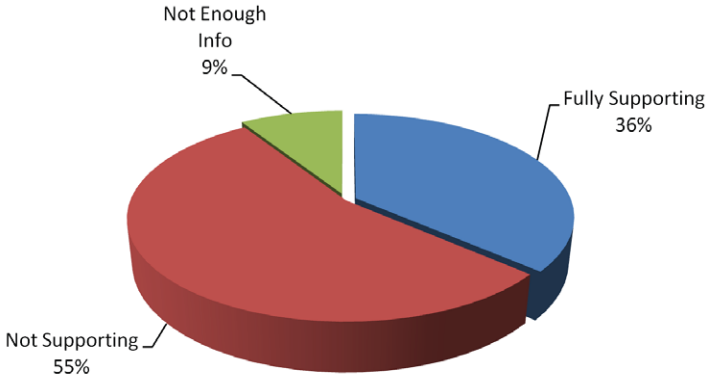


Figure 5. Comparison of Turbidity Values to the WQS for Sample Year 2011-2012.

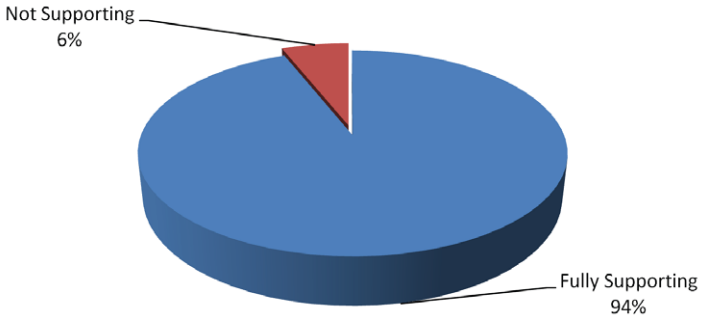


Figure 6. Comparison of Dissolved oxygen Values to the WQS for Sample Year 2011-2012.

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 lakes and much like metals sampling is a sampling effort that we plan on continuing into the future. The chloride and sulfate data revealed that 33 of the 34 lakes sampled were supporting the Agriculture beneficial use (See Figure 7).

Bacteria analysis indicated 9 of the lakes sampled were supporting their Primary Body Contact Recreation beneficial use and 25 did not have enough information (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's intent to accomplish this without having to reduce the number of lakes sampled annually.

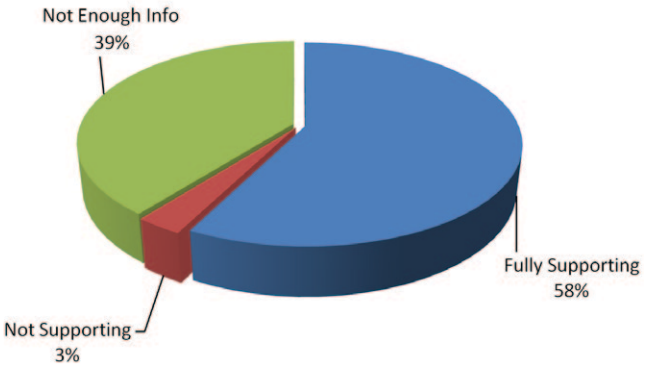


Figure 7. Comparison of Bacteria Values to WQS for Sample Year 2011-2012

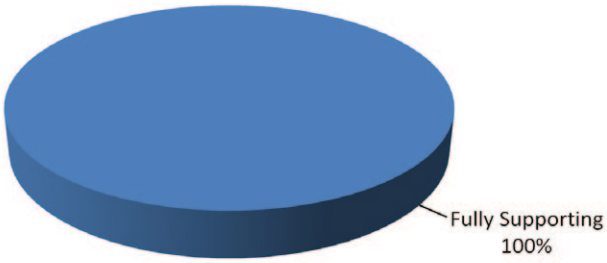


Figure 8. Comparison of Chloride and Sulfate Values to WQS for Sample Year 2011-2012.

DATA TABLES FOR SAMPLED LAKES

A

B

C

D

E

F

G

H

J

K

L

M

N

O

P

R

S

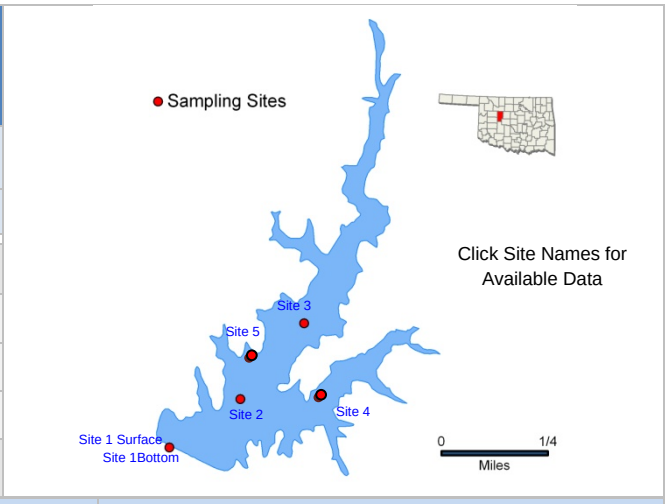
T

V

W

American Horse

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



General

Location	Blaine County	Click map for site data
Impoundment	1966	
Area	100 acres	
Capacity	2,200 acre-feet	
Purposes	Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	13 nephelometric turbidity units (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
	Trophic Class	oligotrophic	
Profile	Salinity	0.07 - 0.13 ppt	
Profile	Specific Conductivity	151.5 - 274.7 µS/cm	
Profile	pH	7.01 - 8.08 pH units	
Profile	Oxidation-Reduction Potential	-4 to 551 mV	
Profile	Dissolved Oxygen	Up to 60% of water column < 2 mg/L in July	
Nutrients	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	
Nutrients	Nitrogen to Phosphorus Ratio	19:1	Phosphorus limited

Beneficial Uses

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

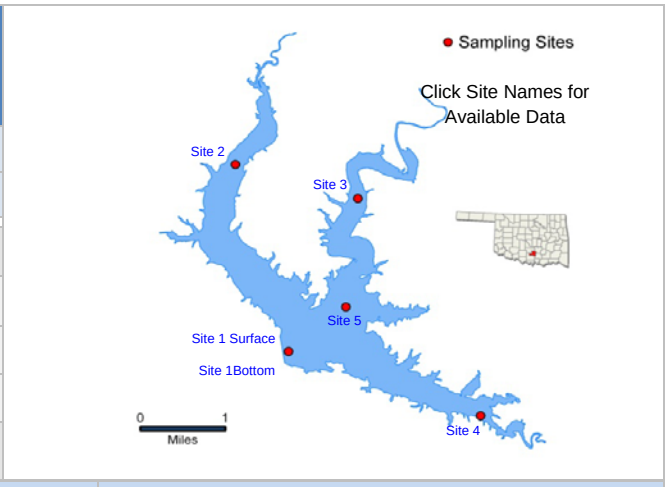
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes: *Lab accident – not enough data to make an assessment*

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

Arbuckle

Sample Period	Times Visited	Sampling Sites
October 2010-June 2011	4	5



General

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

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	5 NTU	100% of values < OWQS of 25 NTU (n=20)
	Average Secchi Disk Depth	177 cm	
	Water Clarity Rating	Excellent	
	Chlorophyll-a	7 mg/m3	
	Trophic State Index	50	Previous value = 59
	Trophic Class	Mesotrophic	
Profile	Salinity	0.03-0.23 ppt	
	Specific Conductivity	88.7-454.3 µS/cm	
	pH	6.77-8.28 pH units	Neutral to slightly alkaline
	Oxidation-Reduction Potential	-68-406 mV	
	Dissolved Oxygen	Up to 57% of water column < 2.0 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.35 mg/L to 0.57 mg/L	
	Surface Total Phosphorus	0.013 mg/L to 0.027 mg/L	
	Nitrogen to Phosphorus Ratio	26:1	Phosphorus limited

Beneficial Uses

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

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

Notes *Did not collect for these parameters

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

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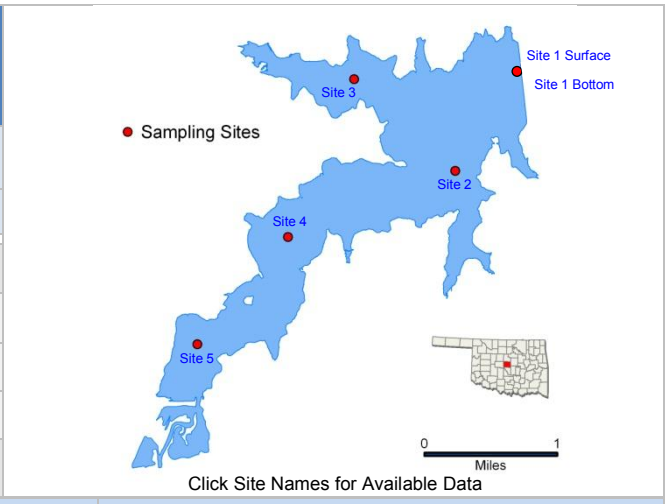
Arcadia

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



Click Site Names for Available Data

General

Location	Oklahoma County	Click map for site data
Impoundment	1986	
Area	1,820 acres	
Capacity	27,520 acre-feet	
Purposes	Water Supply, Flood Control, Recreation	

Parameters

	Parameter (Descriptions)	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	
	Trophic Class	eutrophic	
Profile	Salinity	0.10 – 0.20 ppt	
Profile	Specific Conductivity	209.7 - 422 µS/cm	
Profile	pH	7.32 - 8.47 pH units	Neutral to slightly alkaline
Profile	Oxidation-Reduction Potential	148 to 415 mV	
Profile	Dissolved Oxygen	Up to 38% of water column < 2 mg/L in August	
Nutrients	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	
Nutrients	Nitrogen to Phosphorus Ratio	15:1	Phosphorus limited

Beneficial Uses

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

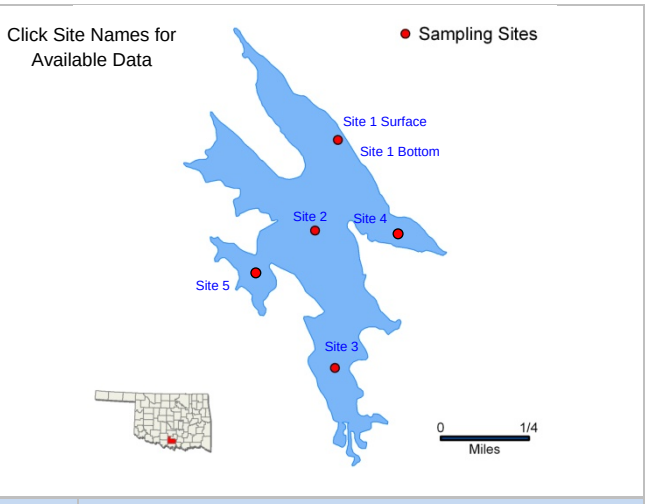
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

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

Ardmore City

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



General

Location	Carter County	Click map for site data
Impoundment	1910	
Area	142 acres	
Capacity	600 acre-feet	
Purposes	Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	10 NTU	100% of values < OWQS of 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	
	Trophic Class	eutrophic	
Profile	Salinity	0.13 – 0.18 ppt	
Profile	Specific Conductivity	278.6 – 365 µS/cm	
Profile	pH	7.16 - 8.85 pH units	Neutral to slightly alkaline
Profile	Oxidation-Reduction Potential	48 to 436 mV	
Profile	Dissolved Oxygen	Up to 63% of water column < 2 mg/L in August	
Nutrients	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	
Nutrients	Nitrogen to Phosphorus Ratio	22:1	Phosphorus limited

Beneficial Uses

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

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

Notes

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

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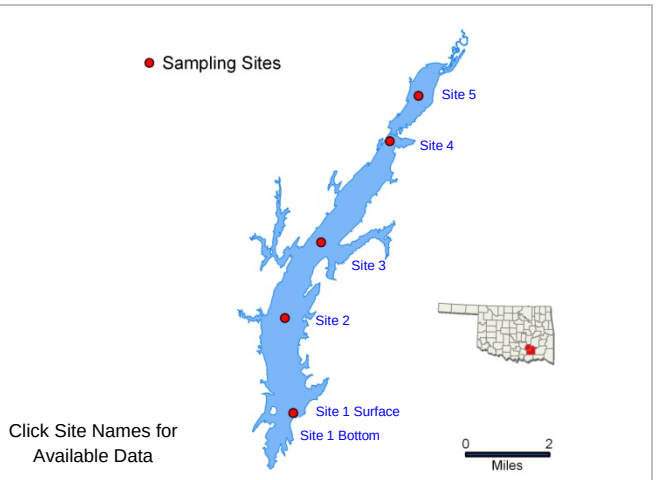
Atoka

Sample Period	Times Visited	Sampling Sites
November 2011 - August 2012	3	5



General

Location	Atoka County	Click map for site data
Impoundment	1964	
Area	5,700 acres	
Capacity	125,000 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	115 NTU	100% of values > OWQS of 25 NTU
	Average Secchi Disk Depth	17 cm	
	Water Clarity Rating	Poor	
	Chlorophyll-a	16 mg/m3	
	Trophic State Index	58	
	Trophic Class	Eutrophic	
Profile	Salinity	0.05 – 0.06 ppt	
	Specific Conductivity	103 – 106 µS/cm	
	pH	6.98 – 8.27 pH units	All recorded values within standards
	Oxidation-Reduction Potential	192 to 538 mV	
	Dissolved Oxygen	All data are above screening level of 2.0 mg/L	
Nutrients	Surface Total Nitrogen	0.47 mg/L to 1.73 mg/L	
	Surface Total Phosphorus	0.047 mg/L to 0.226 mg/L	
	Nitrogen to Phosphorus Ratio	11:1	Phosphorus limited

Beneficial Uses

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

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

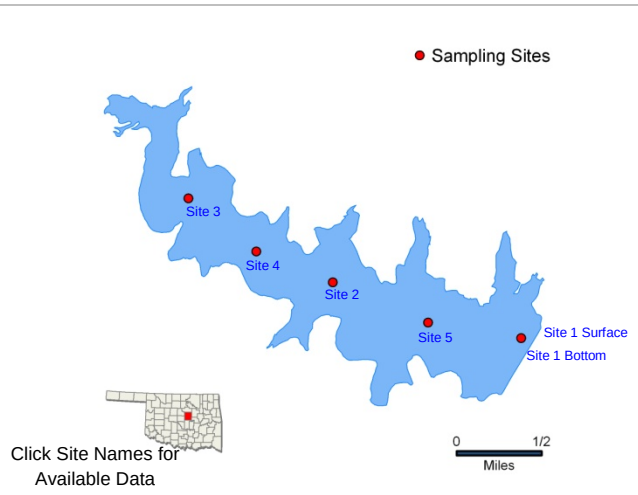
Notes

**N/A – parameters not collected in current sample year.*
** Although 100% of the turbidity samples exceed 25NTU, an assessment for the current sample year cannot be made due to minimum data requirements not being met.*

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

Bell Cow

Sample Period	Times Visited	Sampling Sites
October 2011 - July 2012	4	3



General

Location	Lincoln County	Click map for site data
Impoundment	1990	
Area	1,153 acres	
Capacity	15,613 acre-feet	
Purposes	Water Supply, Flood Control, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	23 NTU	50% of values > OWQS of 25 NTU
	Average Secchi Disk Depth	31 cm	
	Water Clarity Rating	Fair	
	Chlorophyll-a	18 mg/m3	
	Trophic State Index	59	Previous Value = 52
	Trophic Class	Eutrophic	
Profile	Salinity	0.17 - 0.21 ppt	
	Specific Conductivity	359 - 429 µS/cm	
	pH	7.27 - 8.88 pH units	Neutral to slightly alkaline
	Oxidation-Reduction Potential	52 to 536 mV	
	Dissolved Oxygen	Up to 60% of water column < 2 mg/L in July	
Nutrients	Surface Total Nitrogen	0.93 mg/L to 1.13 mg/L	
	Surface Total Phosphorus	0.005 mg/L to 0.043 mg/L	
	Nitrogen to Phosphorus Ratio	53:1	Phosphorus limited

Beneficial Uses

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

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

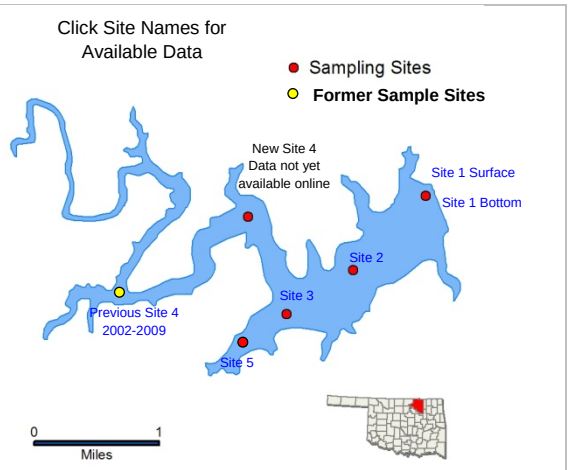
Notes

**N/A – parameters not collected in current sample year.*
* 50-70% range is undetermined for DO.

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

Birch

Sample Period	Times Visited	Sampling Sites
December 2010-September 2011	4	5



General

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

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	10 NTU	100% of values < OWQS of 25 NTU (n=16)
	Average Secchi Disk Depth	88 cm	
	Water Clarity Rating	Good	
	Chlorophyll-a	8 mg/m3	
	Trophic State Index	51	Previous value = 53
	Trophic Class	Eutrophic	
Profile	Salinity	0.08 – 0.11 ppt	
	Specific Conductivity	183.3 – 235.6 µS/cm	TDS=12.8 g/L
	pH	6.8 – 8.12 pH units	
	Oxidation-Reduction Potential	231 to 519 mV	
	Dissolved Oxygen	Up to 10% of water column < 2.0 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.51 mg/L to 0.78 mg/L	
	Surface Total Phosphorus	0.014 mg/L to 0.026 mg/L	
	Nitrogen to Phosphorus Ratio	30:1	Phosphorus limited

Beneficial Uses

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

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

Notes

*Did not collect for these parameters.

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

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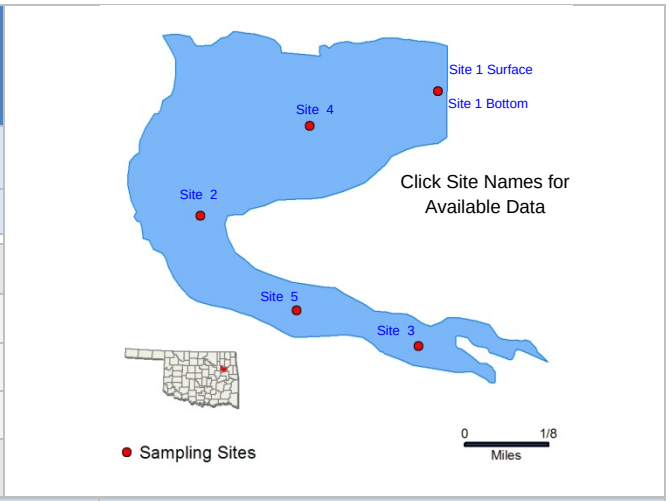
Bixhoma

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



General

Location	Wagoner County	Click map for site data
Impoundment	1965	
Area	110 acres	
Capacity	3,130 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	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	
	Trophic Class	mesotrophic	
Profile	Salinity	0.01 – 0.05 ppt	
Profile	Specific Conductivity	47.4 – 127.5 µS/cm	
Profile	pH	6.44 – 8.63 pH units	Only 3 (2.3%) values < 6.5 pH units
Profile	Oxidation-Reduction Potential	111 - 482 mV	
Profile	Dissolved Oxygen	Up to 56% of water column < 2 mg/L in the fall & 67% in July	
Nutrients	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	
Nutrients	Nitrogen to Phosphorus Ratio	22:1	Phosphorus limited

Beneficial Uses

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

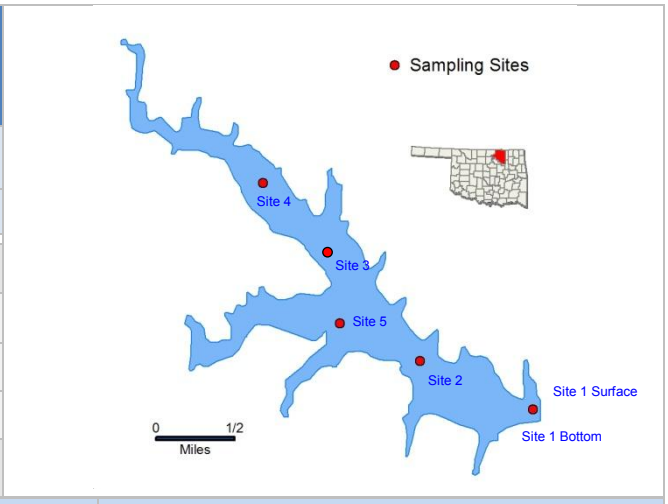
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

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

Bluestem

Sample Period	Times Visited	Sampling Sites
December 2011 - July 2012	4	4



General

Location	Osage County	Click map for site data
Impoundment	1958	
Area	762 acres	
Capacity	17,000 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	28 NTU	25% of values > OWQS of 25 NTU (n=16)
	Average Secchi Disk Depth	38 cm	
	Water Clarity Rating	Average	
	Chlorophyll-a	6 mg/m3	
	Trophic State Index	48	
	Trophic Class	Mesotrophic	
Profile	Salinity	0.00 – 0.16 ppt	
Profile	Specific Conductivity	271 – 327 µS/cm	
Profile	pH	7.02 – 8.27 pH units	
Profile	Oxidation-Reduction Potential	118 - 473 mV	
Profile	Dissolved Oxygen	Up to 67% of water column < 2.0 mg/L in July	
Nutrients	Surface Total Nitrogen	0.36 mg/L to 0.98 mg/L	
Nutrients	Surface Total Phosphorus	0.005 mg/L to 0.041 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	44:1	Phosphorus limited

Beneficial Uses

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

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

Notes

**N/A – parameters not collected in current sample year.*
* 50-70% range is undetermined for DO.

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

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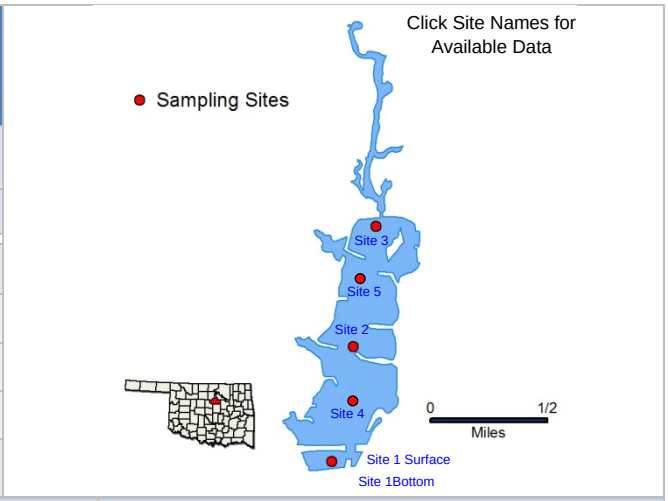
Boomer

Sample Period	Times Visited	Sampling Sites
November 2008 - August 2009	4	5



General

Location	Payne County	Click map for site data
Impoundment	1932	
Area	260 acres	
Capacity	3,200 acre-feet	
Purposes	Cooling Water and Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	24 NTU	42% of values > OWQS of 25 NTU (n=12)
	Average True Color		Did not collect for these parameters
	Average Secchi Disk Depth	42 cm	
	Water Clarity Rating	Average	
	Trophic State Index	59	Previous value = 51
	Trophic Class	Eutrophic	
Profile	Salinity	0.10 - 0.21 ppt	
Profile	Specific Conductivity	278 – 424.5 µS/cm	
Profile	pH	7.17 - 8.26 pH units	
Profile	Oxidation-Reduction Potential	-19 to 574 mV	
Profile	Dissolved Oxygen	Up to 38% of water column < 2.0 mg/L in August	
Nutrients	Surface Total Nitrogen	0.49 mg/L to 0.97 mg/L	
Nutrients	Surface Total Phosphorus	0.010 mg/L to 0.071 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	18:1	Phosphorus limited

Beneficial Uses

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

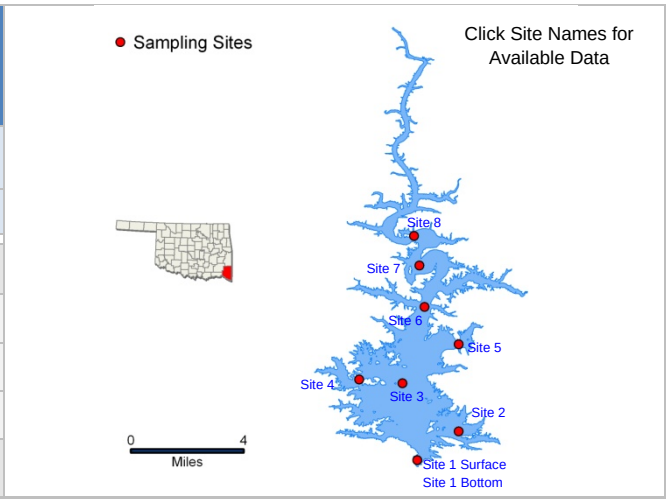
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes
*Did not collect for these parameters.
The PBCR beneficial use cannot be assessed as minimum data requirement were not met due to QA/QC issues for *E.coli*.

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

Broken Bow

Sample Period	Times Visited	Sampling Sites
November 2010 – July 2011	4	8



General

Location	McCurtain County	Click map for site data
Impoundment	1970	
Area	14,200 acres	
Capacity	918,070 acre-feet	
Purposes	Flood Control, Hydropower, Water Supply, Recreation, Fish & Wildlife	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	3 NTU	100% of values < OWQS of 25 NTU (n=32)
	Average Secchi Disk Depth	274 cm	
	Water Clarity Rating	Excellent	
	Chlorophyll-a	3 mg/m3	
	Trophic State Index	41	Previous value = 46
	Trophic Class	Mesotrophic	
Profile	Salinity	0.0 – 0.01 ppt	
	Specific Conductivity	27.2 - 41.1 µS/cm	
	pH	5.01 – 7.48 pH units	79.5% of values < 6.50 pH units
	Oxidation-Reduction Potential	305 - 570 mV	
	Dissolved Oxygen	Up to 44% of water column < 2.0 mg/L in the summer	
Nutrients	Surface Total Nitrogen	0.12 mg/L to 0.36 mg/L	
	Surface Total Phosphorus	0.005 mg/L to 0.017 mg/L	
	Nitrogen to Phosphorus Ratio	27:1	Phosphorus limited

Beneficial Uses

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

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

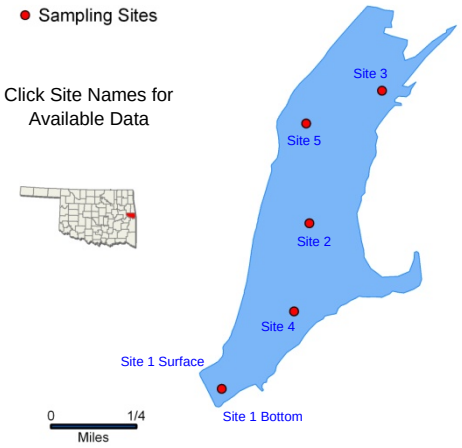
Notes

*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. *Did not collect for these parameters.

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

Brushy Creek

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



General

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

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	10 nephelometric turbidity units (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
	Trophic Class	eutrophic	
Profile	Salinity	0.00 - 0.10 ppt	
Profile	Specific Conductivity	36.3 - 605 µS/cm	
Profile	pH	6.02 - 8.12 pH units	Only 7 values < 6.5 units
Profile	Oxidation-Reduction Potential	33 to 606 mV	
Profile	Dissolved Oxygen	Up to 69% of water column < 2 mg/L in July	Occurred at site 1, the dam
Nutrients	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	
Nutrients	Nitrogen to Phosphorus Ratio	20:1	Phosphorus limited

Beneficial Uses

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

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

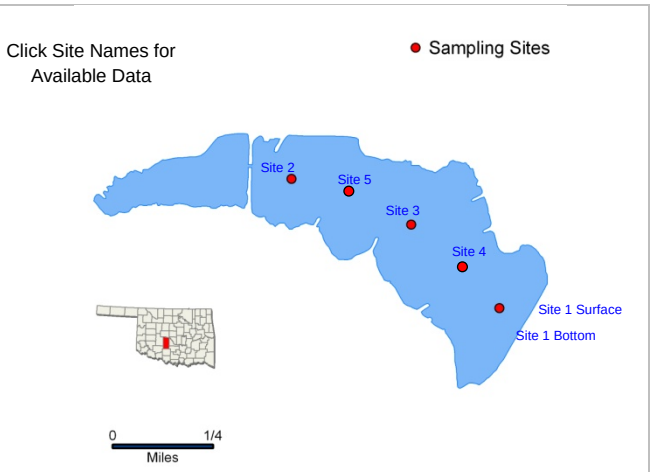
Notes

Precipitation data suggests the peak in color & turbidity are likely due to runoff, therefore the uses are considered supporting.

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

Burtschi

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



General

Location	Grady County	Click map for site data
Impoundment	1958	
Area	180 acres	
Capacity	2,140 acre-feet	
Purposes	Recreation	

Parameters

	Parameter (Descriptions)	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	
	Trophic Class	hypertrophic	
Profile	Salinity	0.53 – 0.67 ppt	
Profile	Specific Conductivity	1011 – 1273 µS/cm	
Profile	pH	7.19 – 10.74 pH units	16% of values were > 9 pH units
Profile	Oxidation-Reduction Potential	42 - 428 mV	
Profile	Dissolved Oxygen	Up to 38% of water column < 2 mg/L in August	
Nutrients	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	
Nutrients	Nitrogen to Phosphorus Ratio	24:1	Phosphorus limited

Beneficial Uses

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

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

Notes

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

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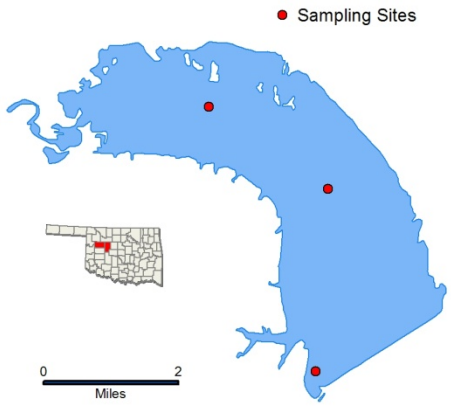
Canton

Sample Period	Times Visited	Sampling Sites
November 2011 - August 2012	4	3



General

Location	Blaine County	Click map for site data
Impoundment	1948	
Area	7,910 acres	
Capacity	111,310 acre-feet	
Purposes	Flood Control, Water Supply, Irrigation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	35 NTU	75% of values > OWQS of 25 NTU (n=12)
	Average Secchi Disk Depth	22 cm	
	Water Clarity Rating	Poor	
	Chlorophyll-a	29 mg/m3	
	Trophic State Index	64	Previous value = 60
	Trophic Class	Hypereutrophic	
Profile	Salinity	0.71 – 0.97 ppt	
	Specific Conductivity	1420 – 1920 µS/cm	
	pH	7.62– 8.34 pH units	Neutral to slightly alkaline
	Oxidation-Reduction Potential	196 - 530 mV	
	Dissolved Oxygen	All data are above screening level of 2.0 mg/L	
Nutrients	Surface Total Nitrogen	0.94 mg/L to 1.65 mg/L	
	Surface Total Phosphorus	0.048 mg/L to 0.091 mg/L	
	Nitrogen to Phosphorus Ratio	18:1	Phosphorus limited

Beneficial Uses

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

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

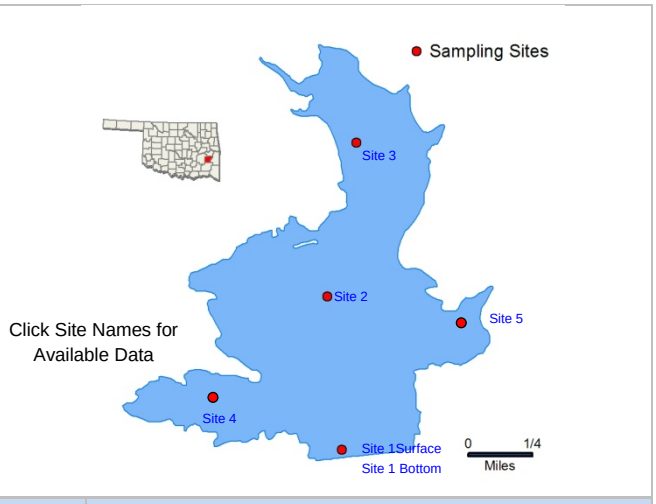
Notes

**N/A – parameters not collected in current sample year.*

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

Carl Albert

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



General

Location	Latimer County
Impoundment	1964
Area	183 acres
Capacity	2,739 acre-feet
Purposes	Water Supply, Flood Control, and Recreation

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	14 nephelometric turbidity units (NTU)	All values < 25 NTU
	Average True Color	72 units	50% of values > OWQS of 70
	Average Secchi Disk Depth	90 cm	
	Water Clarity Rating	good	
	Trophic State Index	41	Previous value = 41
	Trophic Class	mesotrophic	
Profile	Salinity	0.00 - 0.01 ppt	
Profile	Specific Conductivity	36 - 97 µS/cm	
Profile	pH	5.8 - 7.32 pH units	21% of values <6.5 units
Profile	Oxidation-Reduction Potential	22 to 553 mV	
Profile	Dissolved Oxygen	Up to 62% of water column < 2 mg/L in August	Occurred at site 1, the dam
Nutrients	Surface Total Nitrogen	0.28 mg/L to 0.49 mg/L	
Nutrients	Surface Total Phosphorus	0.013 mg/L to 0.031 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	16:1	Phosphorus limited

Beneficial Uses

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

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

Notes

**Not supporting for lead as chronic criteria was exceeded. All other toxicants are fully supporting.*

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

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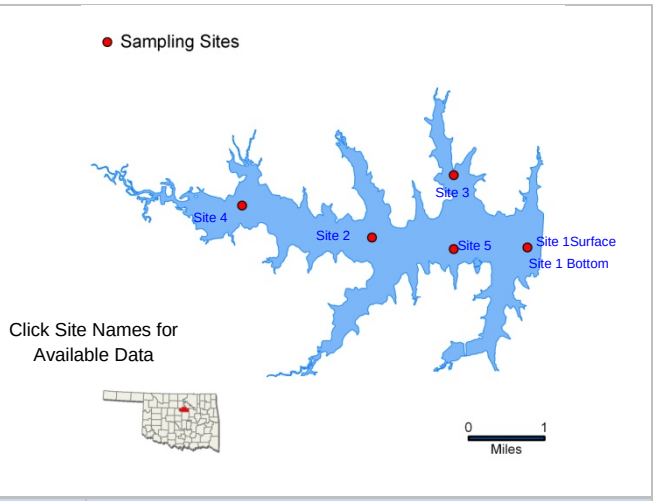
Carl Blackwell

Sample Period	Times Visited	Sampling Sites
November 2010 - July 2011	4	5



General

Location	Payne County — Click map for site data
Impoundment	1937
Area	3,370 acres
Capacity	61,500 acre-feet
Purposes	Water Supply and Recreation

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	28 NTU	47% of values > 25 NTU
	Average Secchi Disk Depth	46 cm	
	Water Clarity Rating	Average	
	Chlorophyll-a	8 mg/m3	
	Trophic State Index	51	Previous value = 53
	Trophic Class	Eutrophic	
Profile	Salinity	0.19 – 0.22 ppt	
	Specific Conductivity	379.3 - 433 µS/cm	
	pH	6.82 – 8.64 pH units	Neutral to slightly alkaline
	Oxidation-Reduction Potential	33 - 497 mV	
	Dissolved Oxygen	Up to 50% of water column < 2 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.47 mg/L to 1.22 mg/L	
	Surface Total Phosphorus	0.023 mg/L to 0.054 mg/L	
	Nitrogen to Phosphorus Ratio	25:1	Phosphorus limited

Beneficial Uses

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

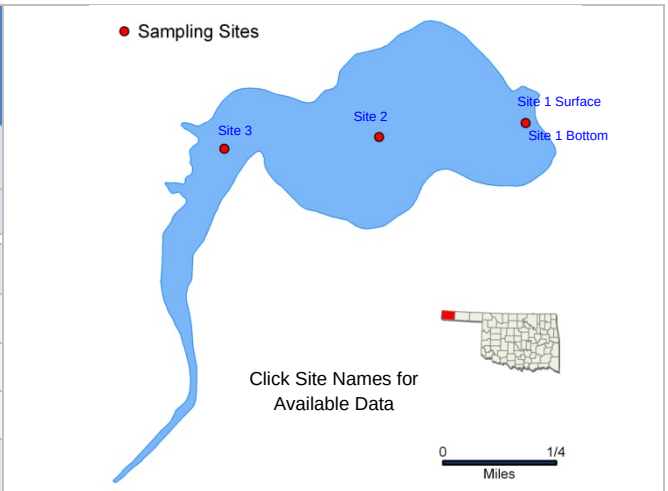
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes: *Did not collect for these parameters.

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

Carl Etling

Sample Period	Times Visited	Sampling Sites
October 2003 – July 2004	4	3



General

Location	Cimarron County	Click map for site data
Impoundment	1958	
Area	159 acres	
Capacity	1717 acre-feet	
Purposes	Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	65 NTU	75% of values > OWQS of 25 NTU
	Average True Color	18 units	100% of values < OWQS of 70
	Average Secchi Disk Depth	22 cm	
	Water Clarity Rating	fair	
	Trophic State Index	72	
	Trophic Class	hypereutrophic	
Profile	Salinity	0.90 – 1.4 ppt	
Profile	Specific Conductivity	1688 – 2596 µS/cm	
Profile	pH	8.18 – 9.42 pH units	28% of recorded values > 9.0 pH units
Profile	Oxidation-Reduction Potential	269– 499 mV	
Profile	Dissolved Oxygen		Lake well-mixed – not stratified
Nutrients	Surface Total Nitrogen	2.31 mg/L to 4.51 mg/L	
Nutrients	Surface Total Phosphorus	0.122 mg/L to 0.293mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	16:1	Phosphorus limited

Beneficial Uses

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

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

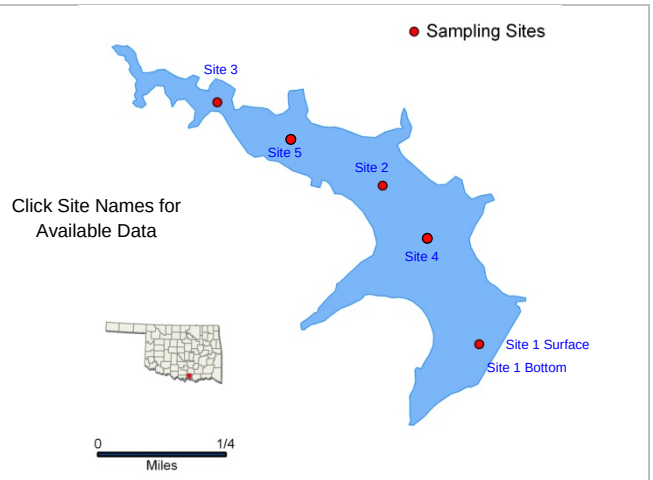
Notes

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

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

Carter

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



General

Location	Marshall County — Click map for site data
Impoundment	1960
Area	108 acres
Capacity	990 acre-feet
Purposes	Water Supply and Recreation

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	7 nephelometric turbidity units (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
	Trophic Class	oligotrophic	
Profile	Salinity	0.10 - 0.20 ppt	
Profile	Specific Conductivity	212 – 325 µS/cm	
Profile	pH	6.98 – 8.33 pH units	Neutral to slightly alkaline
Profile	Oxidation-Reduction Potential	60 to 557 mV	
Profile	Dissolved Oxygen	Up to 44% of water column < 2 mg/L in August	Occurred at site 1, the dam
Nutrients	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	
Nutrients	Nitrogen to Phosphorus Ratio	37:1	Phosphorus limited

Beneficial Uses

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

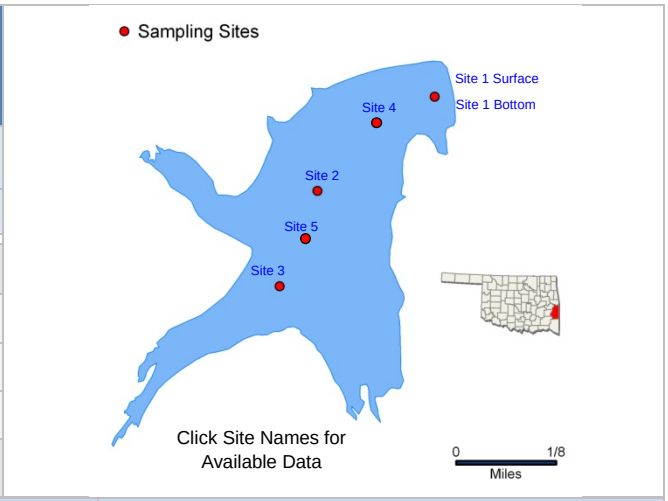
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

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

Cedar

Sample Period	Times Visited	Sampling Sites
February 2011 - July 2011	4	5



General

Location	Le Flore County	Click map for site data
Impoundment	1937	
Area	78 acres	
Capacity	1,000 acre-feet	
Purposes	Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	6 NTU	100% of values < OWQS of 25 NTU
	Average Secchi Disk Depth	99 cm	
	Water Clarity Rating	Excellent	
	Chlorophyll-a	13 mg/m3	
	Trophic State Index	56	Previous Value=53
	Trophic Class	Eutrophic	
Profile	Salinity	0.0– 0.04 ppt	
	Specific Conductivity	32.8 – 106.4 µS/cm	
	pH	5.6 - 8.94 pH units	51.56% < 6.5
	Oxidation-Reduction Potential	-12 - 509 mV	
	Dissolved Oxygen	Up to 70% of water column < 2 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.18 mg/L to 0.97 mg/L	
	Surface Total Phosphorus	0.016 mg/L to 0.057 mg/L	
	Nitrogen to Phosphorus Ratio	18:1	Phosphorus limited

Beneficial Uses

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

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

Notes

*Did not collect for these parameters. Although all turbidity values are <25 NTU, The FWP beneficial use cannot be assessed for this sample year as minimum data requirements were not met.

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

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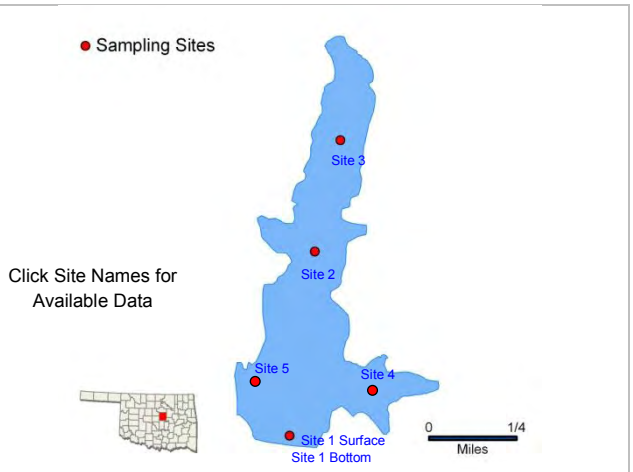
Chandler

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



General

Location	Lincoln County	Click map for site data
Impoundment	1960	
Area	129 acres	
Capacity	2,778 acre-feet	
Purposes	Water Supply and Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	29 nephelometric turbidity units (NTU)	58% of values > 25 NTU
	Average True Color	59 units	25% of values > OWQS of 70
	Average Secchi Disk Depth	39 cm	
	Water Clarity Rating	average	
	Trophic State Index	60	Previous value = 50
	Trophic Class	eutrophic	
Profile	Salinity	0.10 - 0.18 ppt	
Profile	Specific Conductivity	268 – 365.7 µS/cm	
Profile	pH	7.35 – 8.82 pH units	Neutral to slightly alkaline
Profile	Oxidation-Reduction Potential	23 to 533 mV	
Profile	Dissolved Oxygen	Up to 62% of water column < 2 mg/L in July	Occurred at site 1, the dam
Nutrients	Surface Total Nitrogen	0.82 mg/L to 1.59 mg/L	
Nutrients	Surface Total Phosphorus	0.036 mg/L to 0.082 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	27:1	Phosphorus limited

Beneficial Uses

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

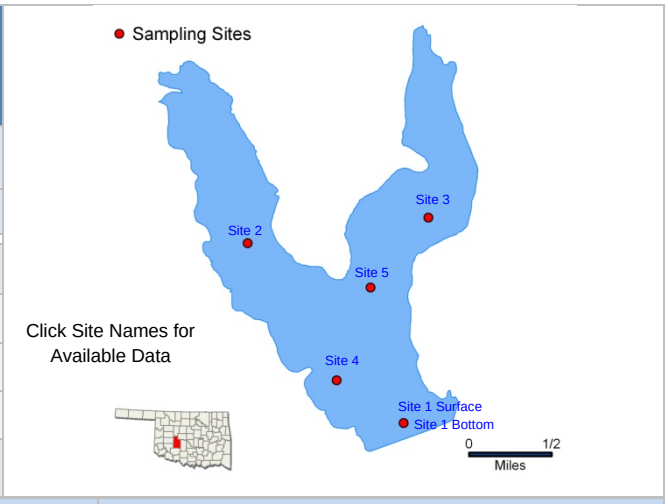
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes

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

Chickasha

Sample Period	Times Visited	Sampling Sites
October 2010 - June 2011	4	5



General

Location	Caddo County
Impoundment	1958
Area	820 acres
Capacity	41,080 acre-feet
Purposes	Water Supply, Recreation

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	14 NTU	1% of values > OWQS of 25 NTU
	Average Secchi Disk Depth	51 cm	
	Water Clarity Rating	Good	
	Chlorophyll-a	27 mg/m3	
	Trophic State Index	63	Previous Value=62
	Trophic Class	Hypereutrophic	
Profile	Salinity	1.15 – 1.22 ppt	
	Specific Conductivity	2140 – 2266 µS/cm	
	pH	7.43 – 8.39 pH units	Neutral to slightly alkaline
	Oxidation-Reduction Potential	349 to 472 mV	
	Dissolved Oxygen	All data are above screening level	
Nutrients	Surface Total Nitrogen	0.82 mg/L to 1.35 mg/L	
	Surface Total Phosphorus	0.032 mg/L to 0.07 mg/L	
	Nitrogen to Phosphorus Ratio	21:1	Phosphorus limited

Beneficial Uses

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

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

Notes

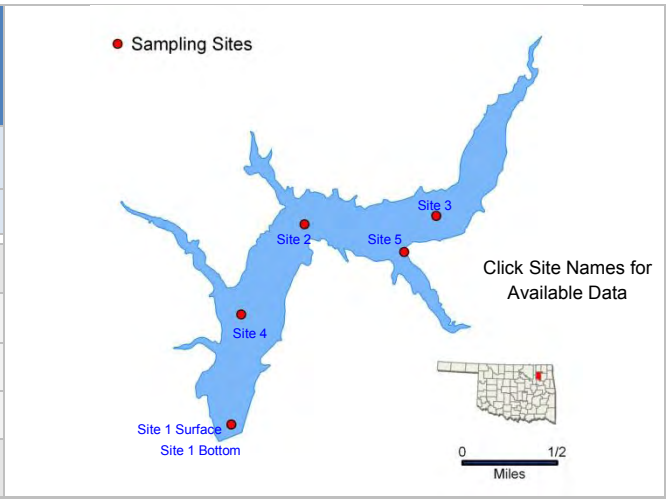
The lake is currently listed in the Oklahoma Water Quality Standards (WQS) as a Nutrient Limited Watershed (NLW). This listing means that the lake is considered threatened from nutrients until a more intensive study can confirm the Aesthetics beneficial use non-support status.

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

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

Claremore

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



General

Location	Rogers County	Click map for site data
Impoundment	1930	
Area	470 acres	
Capacity	7,900 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	19 NTU	13% of values > OWQS of 25 NTU
	Average True Color	24units	100% of values < OWQS of 70
	Average Secchi Disk Depth	41 cm	
	Water Clarity Rating	good	
	Trophic State Index	67	
	Trophic Class	hypereutrophic	
Profile	Salinity	0.11– 0.12 ppt	
Profile	Specific Conductivity	242 – 257.4 µS/cm	
Profile	pH	7.03– 8.10 pH units	
Profile	Oxidation-Reduction Potential	252- 454 mV	
Profile	Dissolved Oxygen	Up to 29% of water column < 2 mg/L in May	Occurred at site 1, the dam
Nutrients	Surface Total Nitrogen	0.91 mg/L to 2.00 mg/L	
Nutrients	Surface Total Phosphorus	0.072 mg/L to 0.193 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	12:1	Phosphorus Limited

Beneficial Uses

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

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

Notes

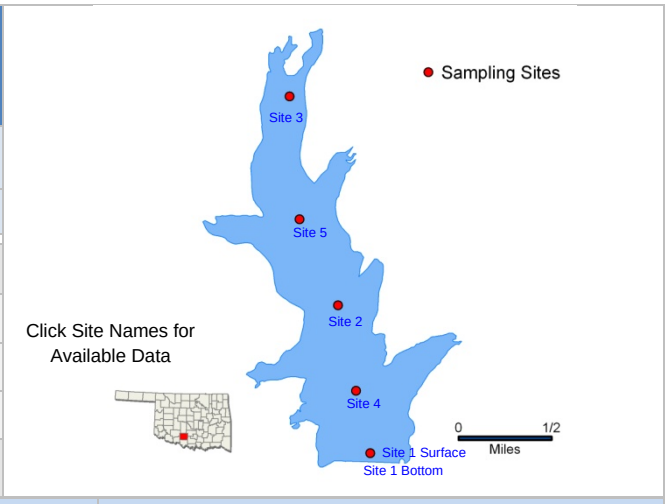
*An assessment of the Fish & Wildlife Propagation (FWP) and Aesthetics beneficial use based on turbidity and color cannot be made at this time as minimum data requirements were not met for this sample year.

**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
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

Clear Creek

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



General

Location	Stephens County	Click map for site data
Impoundment	1948	
Area	722 acres	
Capacity	7,711 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	11 NTU	100% of values < OWQS of 25 NTU
	Average Secchi Disk Depth	65 cm	
	Water Clarity Rating	Average	
	Chlorophyll-a	17 mg/m3	
	Trophic State Index	59	Previous Value=58
	Trophic Class	Eutrophic	
Profile	Salinity	0.3 – 0.35 ppt	
	Specific Conductivity	588.3 – 687.6 µS/cm	
	pH	5.92 – 7.37 pH units	Neutral to slightly alkaline
	Oxidation-Reduction Potential	-101 to 438 mV	
	Dissolved Oxygen	Up to 25% of water column < 2 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.7 mg/L to 0.99 mg/L	
	Surface Total Phosphorus	0.023 mg/L to 0.053 mg/L	
	Nitrogen to Phosphorus Ratio	23:1	Phosphorus limited

Beneficial Uses

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

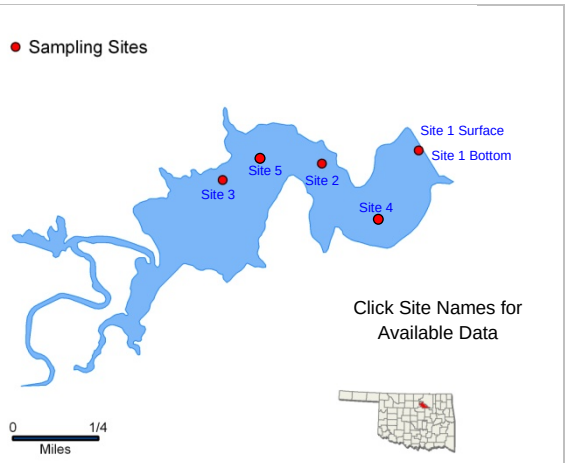
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes: The PBCR beneficial use cannot be assessed as minimum data requirement were not met due to QA/QC issues for *E.coli*. * Did not collect for this parameter.

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

Cleveland City

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



General

Location	Pawnee County
Impoundment	1936
Area	159 acres
Capacity	2,200 acre-feet
Purposes	Water Supply, Recreation

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	17 NTU	8% of values >OWQS of 25 NTU
	Average True Color	63 units	25% of values > OWQS of 70
	Average Secchi Disk Depth	56 cm	
	Water Clarity Rating	average	
	Trophic State Index	56	
	Trophic Class	eutrophic	
Profile	Salinity	0.08 – 0.11 ppt	
Profile	Specific Conductivity	173.3 – 235.3 µS/cm	
Profile	pH	6.93 – 8.64 pH units	Neutral to slightly alkaline
Profile	Oxidation-Reduction Potential	82 to 438 mV	
Profile	Dissolved Oxygen	Up to 70% of water column < 2 mg/L in May	
Nutrients	Surface Total Nitrogen	0.85 mg/L to 1.24 mg/L	
Nutrients	Surface Total Phosphorus	0.021 mg/L to 0.050 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	30:1	Phosphorus limited

Beneficial Uses

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

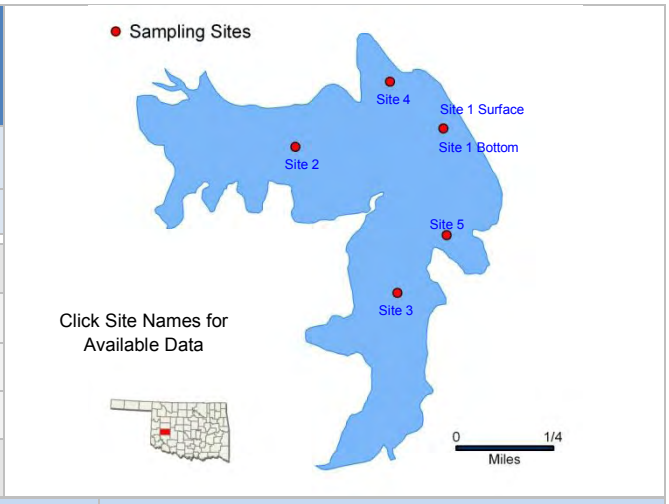
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes: The PBCR beneficial use cannot be assessed as minimum data requirement were not met due to QA/QC issues for *enterococci*. The peak reported in color is due to seasonal storm events and the lake is considered the supporting the Aesthetics beneficial use.

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

Clinton

Sample Period	Times Visited	Sampling Sites
October 2003 – July 2004	4	5



General

Location	Washita County	Click map for site data
Impoundment	1931	
Area	335 acres	
Capacity	3,980 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	67 NTU	100% of values > OWQS of 25 NTU
	Average True Color	36 units	15% of values > OWQS of 70
	Average Secchi Disk Depth	23 cm	
	Water Clarity Rating	poor	
	Trophic State Index	66	
	Trophic Class	hypereutrophic	
Profile	Salinity	0.23 – 0.33 ppt	
Profile	Specific Conductivity	460.4 – 642.9 µS/cm	
Profile	pH	8.00 – 8.74 pH units	Slightly alkaline
Profile	Oxidation-Reduction Potential	149 – 534 mV	
Profile	Dissolved Oxygen		Lake well-mixed – not stratified
Nutrients	Surface Total Nitrogen	1.36 mg/L to 3.06 mg/L	
Nutrients	Surface Total Phosphorus	0.089 mg/L to 0.244 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	13:1	Phosphorus limited

Beneficial Uses

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

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

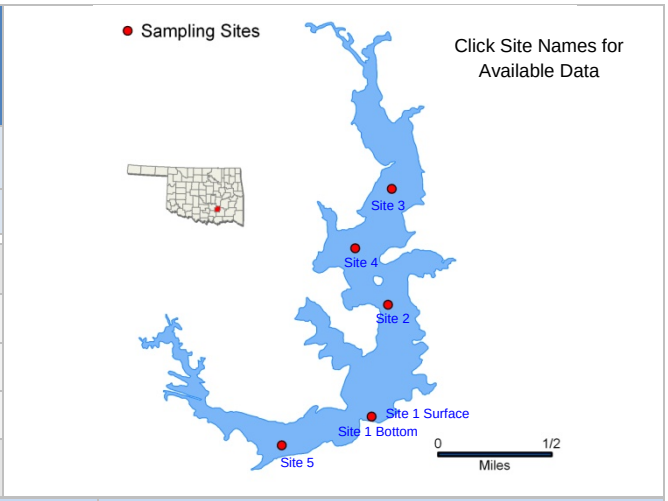
Notes

*The lake is listed in the WQS as a NLW indicating that the Aesthetics beneficial use is considered threatened by nutrients until studies can be conducted to confirm non-support status.
** Both the screening level & geometric mean for enterococci were exceeded.

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

Coalgate City

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



General

Location	Coal County	Click map for site data
Impoundment	1965	
Area	352 acres	
Capacity	3,437 acre-feet	
Purposes	Water Supply, Recreation and Flood Control	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	92 NTU	85% of values > OWQS of 25 NTU
	Average True Color	249 units	100% of values > OWQS of 70
	Average Secchi Disk Depth	26 cm	
	Water Clarity Rating	poor	
	Trophic State Index	47	
	Trophic Class	mesotrophic	
Profile	Salinity	0.01 – 0.02 ppt	
Profile	Specific Conductivity	47.1 – 72.7 µS/cm	
Profile	pH	6.32– 8.03 pH units	Only 8 (8%) of vales < 6.5 pH units
Profile	Oxidation-Reduction Potential	230 to 445 mV	
Profile	Dissolved Oxygen	Up to 71% of water column < 2 mg/L in July	Occurred at site 2
Nutrients	Surface Total Nitrogen	0.90 mg/L to 1.43 mg/L	
Nutrients	Surface Total Phosphorus	0.061 mg/L to 0.155 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	13:1	Phosphorus limited

Beneficial Uses

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

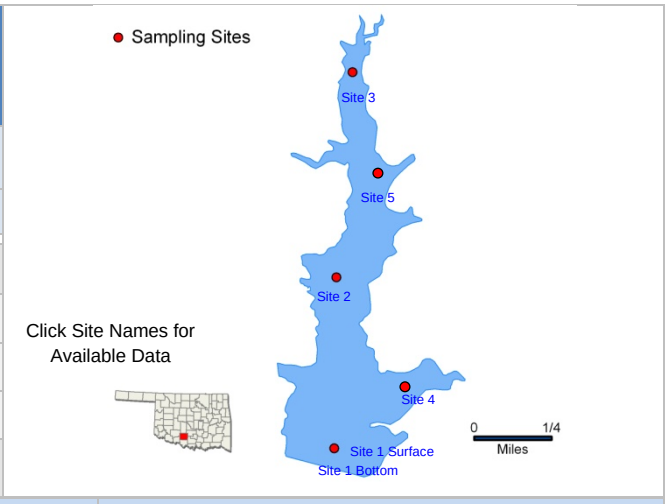
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes: The PBCR beneficial use cannot be assessed as minimum data requirement were not met due to QA/QC issues for fecal coliform.

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

Comanche

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



General

Location	Stephens County	Click map for site data
Impoundment	1960	
Area	184 acres	
Capacity	2,500 acre-feet	
Purposes	Water Supply and Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	12 NTU	100% of values < OWQS of 25 NTU
	Average Secchi Disk Depth	86	Did not collect for true color
	Water Clarity Rating	Good	
	Chlorophyll-a	8 mg/m3	
	Trophic State Index	50	Previous value = 58
	Trophic Class	Mesotrophic	
Profile	Salinity	0.14 - 0.2 ppt	
	Specific Conductivity	284.8 – 398.1 µS/cm	
	pH	6.9 – 8.89 pH units	Neutral to slightly alkaline
	Oxidation-Reduction Potential	-47 to 427 mV	
	Dissolved Oxygen	50% of water column < 2.0 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.49 mg/L to 0.72 mg/L	
	Surface Total Phosphorus	0.015 mg/L to 0.031 mg/L	
	Nitrogen to Phosphorus Ratio	28:1	Phosphorus limited

Beneficial Uses

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

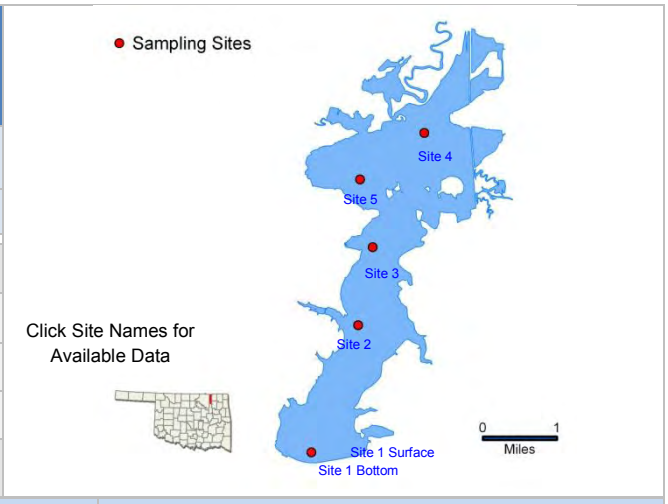
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes *Did not collect for these parameters

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

Copan

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



General

Location	Washington County
Impoundment	1983
Area	4,850 acres
Capacity	43,400 acre-feet
Purposes	Flood Control, Water Supply, Water Quality Control, Fish and Wildlife, and Recreation

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	46 nephelometric turbidity units (NTU)	80% of values > 25 NTU
	Average True Color	123 units	60% of values > OWQS of 70
	Average Secchi Disk Depth	32 cm	
	Water Clarity Rating	average	
	Trophic State Index	60	Previous value = 51
	Trophic Class	eutrophic	
Profile	Salinity	0.07 - 0.14 ppt	
Profile	Specific Conductivity	152.2 – 286.8 µS/cm	
Profile	pH	6.95 – 8.33 pH units	Neutral to slightly alkaline
Profile	Oxidation-Reduction Potential	230 to 486 mV	
Profile	Dissolved Oxygen	44% of water column < 2 mg/L in July	Occurred at site 1, the dam
Nutrients	Surface Total Nitrogen	0.49 mg/L to 1.24 mg/L	
Nutrients	Surface Total Phosphorus	0.034 mg/L to 0.160 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	10:1	Phosphorus limited

Beneficial Uses

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

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

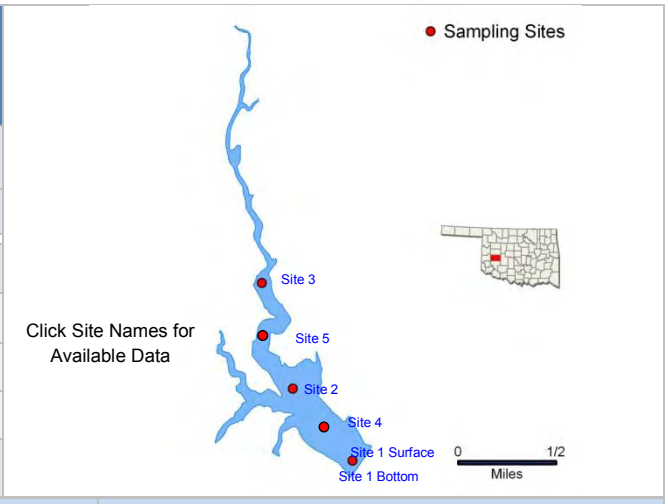
Notes

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
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

Crowder

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



General

Location	Washita County
Impoundment	1959
Area	158 acres
Capacity	2,094 acre-feet
Purposes	Flood Control, Recreation

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	9 NTU	100% of values < OWQS of 25 NTU
	Average True Color	17 units	100% of values < OWQS of 70
	Average Secchi Disk Depth	65 cm	
	Water Clarity Rating	average	
	Trophic State Index	57	
	Trophic Class	eutrophic	
Profile	Salinity	0.38– 0.57 ppt	
Profile	Specific Conductivity	744 – 1088 µS/cm	
Profile	pH	7.03– 8.34 pH units	Neutral to slightly alkaline
Profile	Oxidation-Reduction Potential	275- 445 mV	
Profile	Dissolved Oxygen	Up to 37.5% of water column < 2 mg/L in May	Occurred at sites 1 and 2
Nutrients	Surface Total Nitrogen	0.54 mg/L to 0.93 mg/L	
Nutrients	Surface Total Phosphorus	0.026 mg/L to 0.053 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	21:1	Phosphorus Limited

Beneficial Uses

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

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

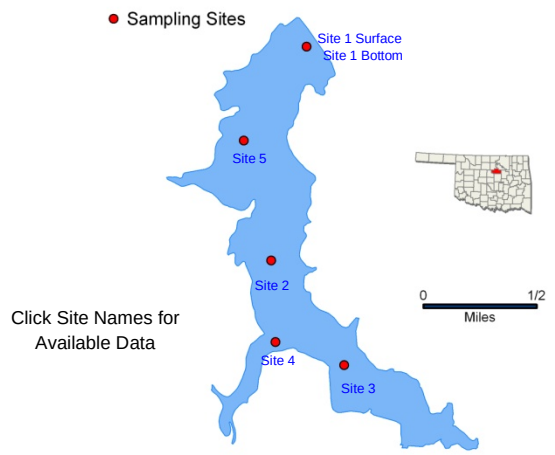
Notes

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

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

Cushing Municipal

Sample Period	Times Visited	Sampling Sites
October 2011 - July 2012	4	5



General

Location	Payne County	Click map for site data
Impoundment	1950	
Area	591 acres	
Capacity	3,304 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	44 NTU	92% of values > OWQS of 25 NTU
	Average Secchi Disk Depth	25 cm	
	Water Clarity Rating	Poor	
	Chlorophyll-a	7 mg/m3	
	Trophic State Index	50	Previous value = 50
	Trophic Class	Mesotrophic	
Profile	Salinity	0.15 – 0.19 ppt	
Profile	Specific Conductivity	324 – 402 µS/cm	
Profile	pH	7.32– 8.20 pH units	Neutral to slightly alkaline
Profile	Oxidation-Reduction Potential	335 to 613 mV	
Profile	Dissolved Oxygen	Up to 17% of water column < 2 mg/L in July	
Nutrients	Surface Total Nitrogen	0.56 mg/L to 1.12 mg/L	
Nutrients	Surface Total Phosphorus	0.038 mg/L to 0.113 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	10:1	Phosphorus limited

Beneficial Uses

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

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

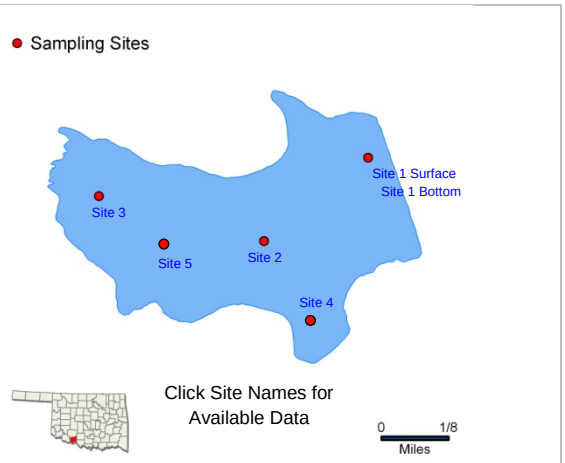
Notes

**N/A – parameters not collected in current sample year.*

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

Dave Boyer (Walters)

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



General

Location	Cotton County	Click map for site data
Impoundment	1936	
Area	148 acres	
Capacity	861 acre feet	
Purposes	Water Supply, and Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	98 nephelometric turbidity units (NTU)	75% of values > 25 NTU
	Average True Color	166 units	75% of values > OWQS of 70
	Average Secchi Disk Depth	21 cm	
	Water Clarity Rating	poor	
	Trophic State Index	51	Previous value = 52
	Trophic Class	eutrophic	
Profile	Salinity	0.12 – 0.17 ppt	
Profile	Specific Conductivity	253.8 – 353 µS/cm	
Profile	pH	7.92 – 8.34 pH units	Neutral to slightly alkaline
Profile	Oxidation-Reduction Potential	376 to 520 mV	
Profile	Dissolved Oxygen		All values >7 mg/L
Nutrients	Surface Total Nitrogen	0.47 mg/L to 1.19 mg/L	
Nutrients	Surface Total Phosphorus	0.029 mg/L to 0.138 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	10:1	Phosphorus limited

Beneficial Uses

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

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

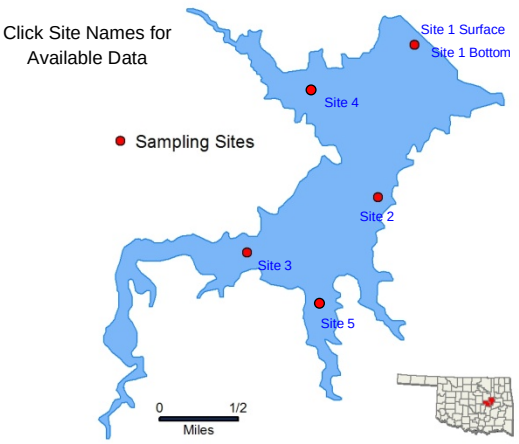
Notes

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

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

Dripping Springs

Sample Period	Times Visited	Sampling Sites
October 2011 - July 2012	4	5



General

Location	Okmulgee County
Impoundment	1950
Area	1,150 acres
Capacity	16,200 acre-feet
Purposes	Water Supply, Recreation and Flood Control

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	9 NTU	100% of values < OWQS of 25 NTU (n=12)
	Average Secchi Disk Depth	76 cm	
	Water Clarity Rating	Good	
	Chlorophyll-a	5 mg/m3	
	Trophic State Index	46	Previous value = 54
	Trophic Class	Mesotrophic	
Profile	Salinity	0.06 – 0.09 ppt	
Profile	Specific Conductivity	122 – 192µS/cm	
Profile	pH	6.44– 7.99 pH units	Only 3.54% of values below 6.5
Profile	Oxidation-Reduction Potential	90.2 to 633.8 mV	
Profile	Dissolved Oxygen	Up to 57% of water column < 2.0 mg/L in July	
Nutrients	Surface Total Nitrogen	0.28 mg/L to 0.73 mg/L	
Nutrients	Surface Total Phosphorus	0.005 mg/L to 0.005 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	107:1	Phosphorus limited

Beneficial Uses

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

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

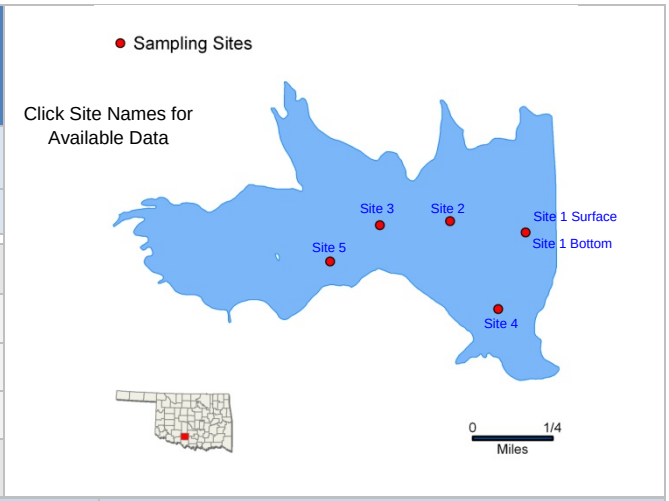
Notes

**N/A – parameters not collected in current sample year.*
* 50-70% range is undetermined for DO.

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

Duncan

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



General

Location	Stephens County
Impoundment	1937
Area	500 acres
Capacity	7,200 acre-feet
Purposes	Water Supply, Recreation

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	15 NTU	100% of values < OWQS of 25 NTU
	Average True Color	34 units	15% of values > OWQS of 70
	Average Secchi Disk Depth	58 cm	
	Water Clarity Rating	average	
	Trophic State Index	57	
	Trophic Class	eutrophic	
Profile	Salinity	0.12 – 0.24 ppt	
Profile	Specific Conductivity	244.5 – 472.2 µS/cm	
Profile	pH	7.32– 8.44 pH units	Only 13 (7.8%) of values < 6.5 pH units
Profile	Oxidation-Reduction Potential	95 to 426 mV	
Profile	Dissolved Oxygen	Up to 22% of water column < 2 mg/L in August	Occurred at site 2
Nutrients	Surface Total Nitrogen	0.59 mg/L to 0.84 mg/L	
Nutrients	Surface Total Phosphorus	0.016 mg/L to 0.039 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	26:1	Phosphorus limited

Beneficial Uses

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

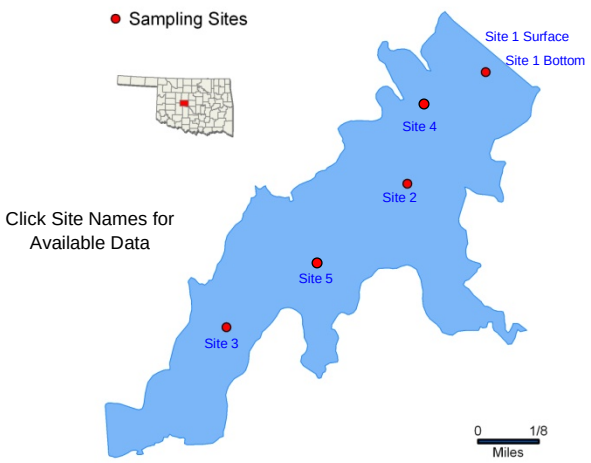
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes: The PBCR beneficial use cannot be assessed as minimum data requirement were not met due to QA/QC issues for fecal coliform and enterococci.

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

El Reno

Sample Period	Times Visited	Sampling Sites
December 2011 - August 2012	4	3



General

Location	Canadian County	Click map for site data
Impoundment	1937	
Area	500 acres	
Capacity	7,200 acre-feet	
Purposes	Flood Control, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	36 NTU	50% of values > OWQS of 25 NTU (n=12)
	Average Secchi Disk Depth	25 cm	
	Water Clarity Rating	Poor	
	Chlorophyll-a	20 mg/m3	
	Trophic State Index	78	
	Trophic Class	Hypereutrophic	
Profile	Salinity	0.55 – 0.81 ppt	
	Specific Conductivity	1108 – 1617 µS/cm	
	pH	7.70 – 9.22 pH units	Slightly alkaline
	Oxidation-Reduction Potential	225 to 544 mV	
	Dissolved Oxygen	All data are above screening level of 2.0 mg/L	
Nutrients	Surface Total Nitrogen	1.33 mg/L to 2.69 mg/L	
	Surface Total Phosphorus	0.149 mg/L to 0.441 mg/L	
	Nitrogen to Phosphorus Ratio	7:1	Possibly co-limited

Beneficial Uses

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

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

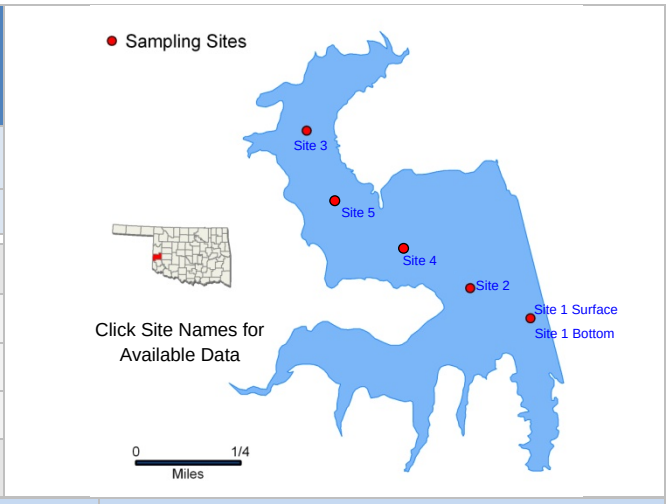
Notes

**N/A – parameters not collected in current sample year.*
** Based on the TSI and chlorophyll-a values, lake will be recommended to be considered and NLW.*

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

Elk City

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



General

Location	Beckham County	Click map for site data
Impoundment	1970	
Area	240 acres	
Capacity	2,583 acre-feet	
Purposes	Flood Control, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	15 NTU	100% of values < OWQS of 25 NTU
	Average True Color	26 units	100% of values < OWQS of 70
	Average Secchi Disk Depth	56 cm	
	Water Clarity Rating	Fair to poor	
	Trophic State Index	59	
	Trophic Class	eutrophic	
Profile	Salinity	0.30– 0.39 ppt	
Profile	Specific Conductivity	593.3 – 749.9 µS/cm	
Profile	pH	7.70– 8.49 pH units	Neutral to slightly alkaline
Profile	Oxidation-Reduction Potential	374 - 448 mV	
Profile	Dissolved Oxygen	Up to 22% of water column < 2 mg/L in May	
Nutrients	Surface Total Nitrogen	0.74 mg/L to 1.08 mg/L	
Nutrients	Surface Total Phosphorus	0.037 mg/L to 0.067 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	17:1	Possibly co-limited

Beneficial Uses

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

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

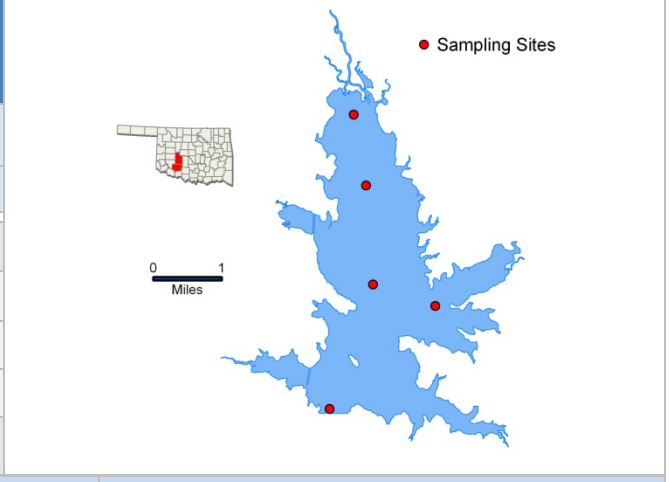
Notes

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

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

Ellsworth

Sample Period	Times Visited	Sampling Sites
November 2011 - August 2012	4	5



General

Location	Comanche County	Click map for site data
Impoundment	1962	
Area	5,600 acres	
Capacity	95,200 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	31 NTU	56% of values > OWQS of 25 NTU (n=20)
	Average Secchi Disk Depth	27 cm	
	Water Clarity Rating	Poor	
	Chlorophyll-a	20 mg/m3	
	Trophic State Index	60	Previous value = 54
	Trophic Class	Eutrophic	
Profile	Salinity	0.25 – 0.30 ppt	
	Specific Conductivity	520 – 607 µS/cm	
	pH	7.79 – 8.88 pH units	Slightly alkaline
	Oxidation-Reduction Potential	-129 to 349 mV	
	Dissolved Oxygen	All data are above screening level of 2.0 mg/L	
Nutrients	Surface Total Nitrogen	0.95 mg/L to 1.47 mg/L	
	Surface Total Phosphorus	0.039 mg/L to 0.098 mg/L	
	Nitrogen to Phosphorus Ratio	20:1	Phosphorus limited

Beneficial Uses

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

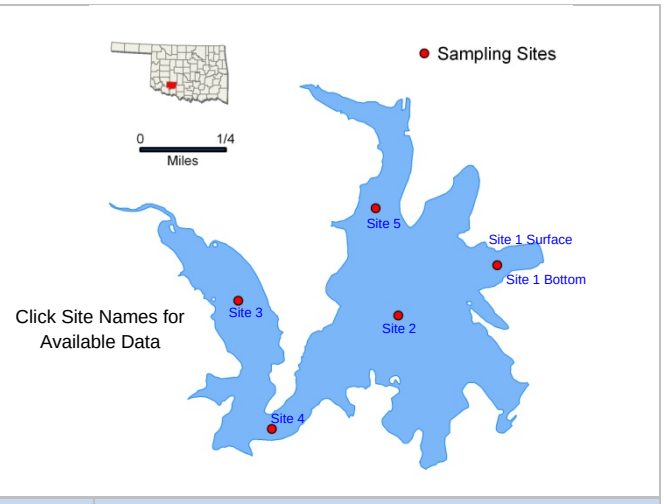
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes *N/A – parameters not collected in current sample year.

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

Elmer Thomas

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



General

Location	Comanche County	Click map for site data
Impoundment		
Area	334 acres	
Capacity	12,000 acre-feet	
Purposes	Recreation	

Parameters

	Parameter (Descriptions)	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	
	Trophic Class	oligotrophic	
Profile	Salinity	0.01 – 0.07 ppt	
Profile	Specific Conductivity	36.2 – 150.6 µS/cm	
Profile	pH	5.43 – 8.13 pH units	38 (15.4%) of values < 6.5 pH units
Profile	Oxidation-Reduction Potential	41 to 522mV	
Profile	Dissolved Oxygen	Up to 76% of water column < 2 mg/L in July	Occurred at sites 1 and 2
Nutrients	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	
Nutrients	Nitrogen to Phosphorus Ratio	46:1	Phosphorus limited

Beneficial Uses

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

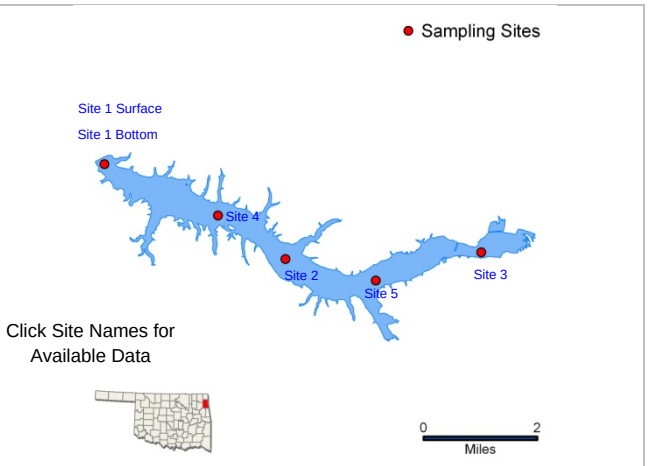
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes: The PBCR beneficial use cannot be assessed as minimum data requirement were not met due to QA/QC issues for *E. coli* and fecal coliform.

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

Eucha

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



General

Location	Delaware County	Click map for site data
Impoundment	1952	
Area	2,860 acres	
Capacity	79,600 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	4 NTU	100% of values < OWQS of 25 NTU
	Average True Color	14 units	100% of values < OWQS of 70
	Average Secchi Disk Depth	151 cm	
	Water Clarity Rating	excellent	
	Trophic State Index	50	
	Trophic Class	mesotrophic	
Profile	Salinity	0.07 – 0.14 ppt	
Profile	Specific Conductivity	168.2 – 296.3 µS/cm	
Profile	pH	7.15 – 8.76 pH units	Neutral to slightly alkaline
Profile	Oxidation-Reduction Potential	63 to 500 mV	
Profile	Dissolved Oxygen	Up to 71% of water column < 2 mg/L in August	Occurred at sites 1, the dam
Nutrients	Surface Total Nitrogen	0.36 mg/L to 3.26 mg/L	
Nutrients	Surface Total Phosphorus	0.007 mg/L to 0.050 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	71:1	Phosphorus limited

Beneficial Uses

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

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

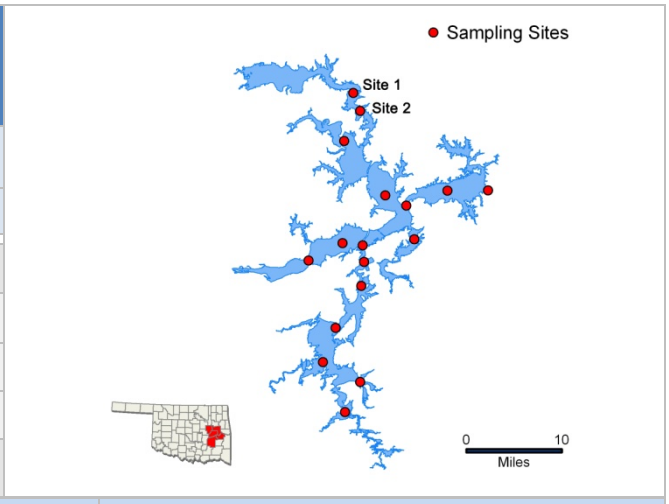
Notes

The lake is currently listed as a Nutrient Limited Watershed (NLW) in the Oklahoma Water Quality Standards (WQS) and is considered nutrient threatened.

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

Eufaula, Deep Fork Arm (1-2)

Sample Period	Times Visited	Sampling Sites
January 2012 – July 2012	3	17



General

Location	Haskell County	Click map for site data
Impoundment	1964	
Area	105,000 acres	
Capacity	2,314,600 acre-feet	
Purposes	Water Supply, Flood Control, Hydropower, Sediment Control	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	55 NTU	50% of values > OWQS of 25 NTU (n=6)
	Average Secchi Disk Depth	21 cm	
	Water Clarity Rating	Poor	
	Chlorophyll-a	8 mg/m3	
	Trophic State Index	51	
	Trophic Class	Eutrophic	
Profile	Salinity	0.10 – 0.19 ppt	
	Specific Conductivity	205 – 411 µS/cm	
	pH	5.61 – 8.02pH units	Only 3.54% of values below 6.5 pH units
	Oxidation-Reduction Potential	292 –492 mV	
	Dissolved Oxygen	All data are above screening level of 2.0 mg/L	
Nutrients	Surface Total Nitrogen	0.77 mg/L to 1.56 mg/L	
	Surface Total Phosphorus	0.029 mg/L to 0.138 mg/L	
	Nitrogen to Phosphorus Ratio	14:1	Phosphorus limited

Beneficial Uses

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

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

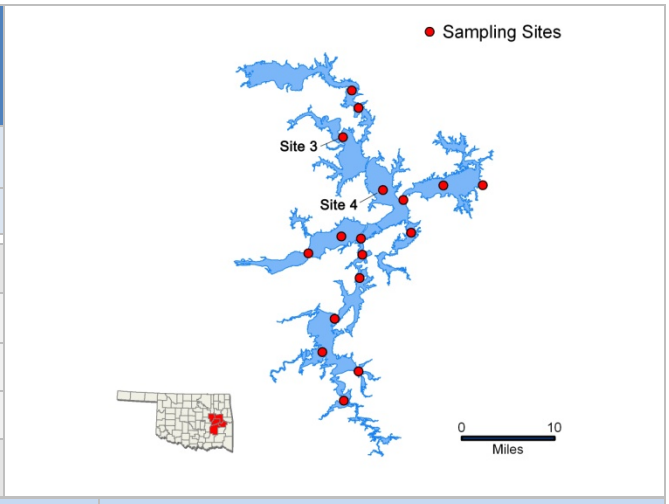
Notes

Although 75% of values exceeded the OWQS for turbidity, the minimum data requirements were not met and an assessment of the FWP beneficial use cannot be made for this sample year.
**N/A – parameters not collected in current sample year.*

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

Eufaula, N. Canadian Arm (3-4)

Sample Period	Times Visited	Sampling Sites
January 2012 – July 2012	3	17



General

Location	Haskell County	Click map for site data
Impoundment	1964	
Area	105,000 acres	
Capacity	2,314,600 acre-feet	
Purposes	Water Supply, Flood Control, Hydropower, Sediment Control	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	23 NTU	50% of values > OWQS of 25 NTU (n=6)
	Average Secchi Disk Depth	43 cm	
	Water Clarity Rating	Poor	
	Chlorophyll-a	6 mg/m3	
	Trophic State Index	48	Previous value = 55
	Trophic Class	Mesotrophic	
Profile	Salinity	0.15 – 0.22 ppt	
	Specific Conductivity	316 – 464 µS/cm	
	pH	5.44 – 8.39 pH units	Only 9.4% of values are below 6.5
	Oxidation-Reduction Potential	121 – 500 mV	
	Dissolved Oxygen	Up to 25% of water column < 2.0 mg/L in July	
Nutrients	Surface Total Nitrogen	0.66 mg/L to 2.04 mg/L	
	Surface Total Phosphorus	0.017 mg/L to 0.112 mg/L	
	Nitrogen to Phosphorus Ratio	20:1	Phosphorus Limited

Beneficial Uses

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

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

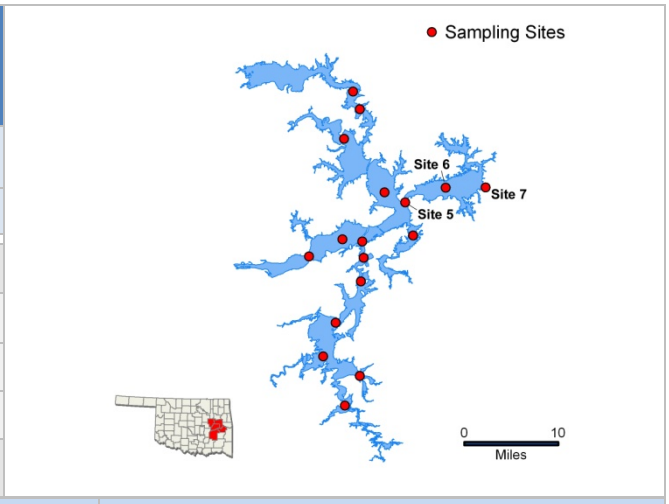
Notes

Although 38% of values exceeded the OWQS for turbidity, the minimum data requirements were not met and an assessment of the FWP beneficial use cannot be made for this sample year.
**N/A – parameters not collected in current sample year.*

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

Eufaula (5-7)

Sample Period	Times Visited	Sampling Sites
January 2012 – July 2012	3	17



General

Location	Haskell County	Click map for site data
Impoundment	1964	
Area	105,000 acres	
Capacity	2,314,600 acre-feet	
Purposes	Water Supply, Flood Control, Hydropower, Sediment Control	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	6 NTU	100% of values < OWQS of 25 NTU (n=9)
	Average Secchi Disk Depth	101 cm	
	Water Clarity Rating	Excellent	
	Chlorophyll-a	8 mg/m3	
	Trophic State Index	51	Previous value = 55
	Trophic Class	Eutrophic	
Profile	Salinity	0.15 – 0.19 ppt	
	Specific Conductivity	317 – 411 µS/cm	
	pH	5.58 – 8.43 pH units	Only 0.54% of values below 6.5 pH units
	Oxidation-Reduction Potential	97 – 461 mV	
	Dissolved Oxygen	Up to 48% of water column < 2.0 mg/L in July	
Nutrients	Surface Total Nitrogen	0.56 mg/L to 1.00 mg/L	
	Surface Total Phosphorus	0.005 mg/L to 0.050 mg/L	
	Nitrogen to Phosphorus Ratio	50:1	Phosphorus limited

Beneficial Uses

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

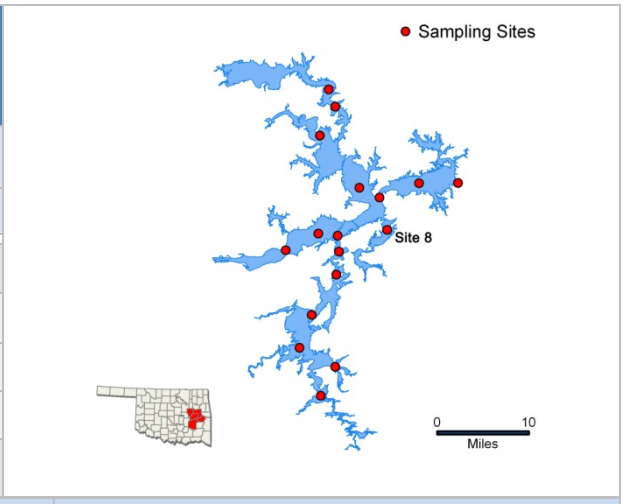
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes **N/A – parameters not collected in current sample year.*

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

Eufaula, Longtown Creek Arm (8)

Sample Period	Times Visited	Sampling Sites
January 2012 – July 2012	3	17



General

Location	Haskell County	Click map for site data
Impoundment	1964	
Area	105,000 acres	
Capacity	2,314,600 acre-feet	
Purposes	Water Supply, Flood Control, Hydropower, Sediment Control	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	6 NTU	100% of values < OWQS of 25 NTU (n=3)
	Average Secchi Disk Depth	85 cm	
	Water Clarity Rating	Good	
	Chlorophyll-a	7 mg/m3	
	Trophic State Index	50	Previous value = 58
	Trophic Class	Mesotrophic	
Profile	Salinity	0.14 – 0.19 ppt	
	Specific Conductivity	285 – 400 µS/cm	
	pH	5.84 – 8.64 pH units	Only 7% of values below 6.5 pH units
	Oxidation-Reduction Potential	197 – 444 mV	
	Dissolved Oxygen	All data above screening level of 2.0 mg/L	
Nutrients	Surface Total Nitrogen	0.53 mg/L to 0.89 mg/L	
	Surface Total Phosphorus	0.005 mg/L to 0.014 mg/L	
	Nitrogen to Phosphorus Ratio	75:1	Phosphorus limited

Beneficial Uses

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

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

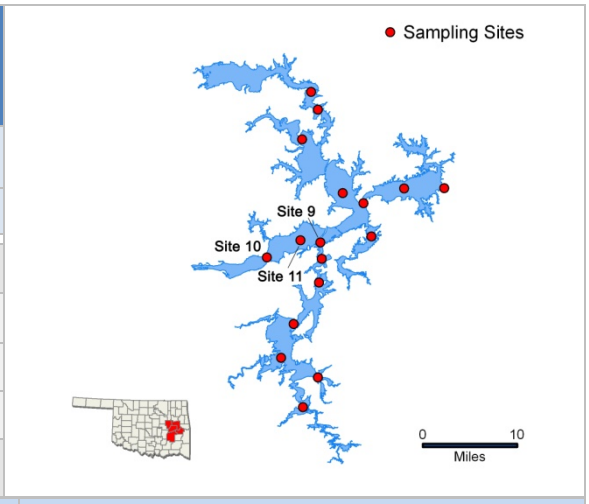
Notes

Although all values were less than the OWQS for turbidity, the minimum data requirements were not met and an assessment of the FWP beneficial use cannot be made for this sample year.
***N/A – parameters not collected in current sample year.*

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

Eufaula, Canadian River Arm (9-11)

Sample Period	Times Visited	Sampling Sites
January 2012 – July 2012	3	17



General

Location	Haskell County	Click map for site data
Impoundment	1964	
Area	105,000 acres	
Capacity	2,314,600 acre-feet	
Purposes	Water Supply, Flood Control, Hydropower, Sediment Control	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	25 NTU	33% of values > OWQS of 25 NTU (n=9)
	Average Secchi Disk Depth	46 cm	
	Water Clarity Rating	Fair to Poor	
	Chlorophyll-a	8 mg/m3	
	Trophic State Index	50	Previous value = 57
	Trophic Class	Eutrophic	
Profile	Salinity	0.14 – 0.26 ppt	
Profile	Specific Conductivity	308 – 539 µS/cm	
Profile	pH	5.26 – 8.76 pH units	Only 5.49% of values below 6.5 pH units
Profile	Oxidation-Reduction Potential	128 – 477 mV	
Profile	Dissolved Oxygen	Up to 27% of water column < 2.0 mg/L in the July	
Nutrients	Surface Total Nitrogen	0.50 mg/L to 1.15 mg/L	
Nutrients	Surface Total Phosphorus	0.016 mg/L to 0.078 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	20:1	Phosphorus limited

Beneficial Uses

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

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

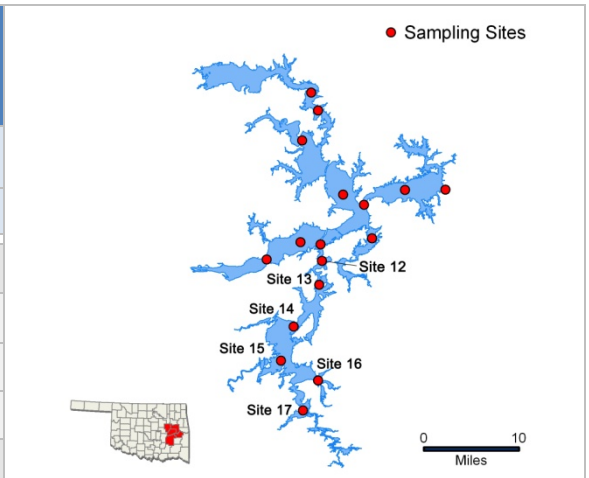
Notes

**N/A – parameters not collected in current sample year.*

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

Eufaula, Gaines Creek Arm (12-17)

Sample Period	Times Visited	Sampling Sites
January 2012 – July 2012	3	17



General

Location	Haskell County	Click map for site data
Impoundment	1964	
Area	105,000 acres	
Capacity	2,314,600 acre-feet	
Purposes	Water Supply, Flood Control, Hydropower, Sediment Control	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	61 NTU	67% of values > OWQS of 25 NTU (n=18)
	Average Secchi Disk Depth	33 cm	
	Water Clarity Rating	Poor	
	Chlorophyll-a	7 mg/m3	
	Trophic State Index	50	Previous value = 55
	Trophic Class	Mesotrophic	
Profile	Salinity	0.03 – 0.21 ppt	
	Specific Conductivity	67 – 432 µS/cm	
	pH	6.71 – 8.12 pH units	
	Oxidation-Reduction Potential	150 – 482 mV	
	Dissolved Oxygen	Up to 50% of water column < 2.0 mg/L in the summer	
Nutrients	Surface Total Nitrogen	0.46 mg/L to 1.68 mg/L	
	Surface Total Phosphorus	0.009 mg/L to 0.227 mg/L	
	Nitrogen to Phosphorus Ratio	14:1	Phosphorus limited

Beneficial Uses

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

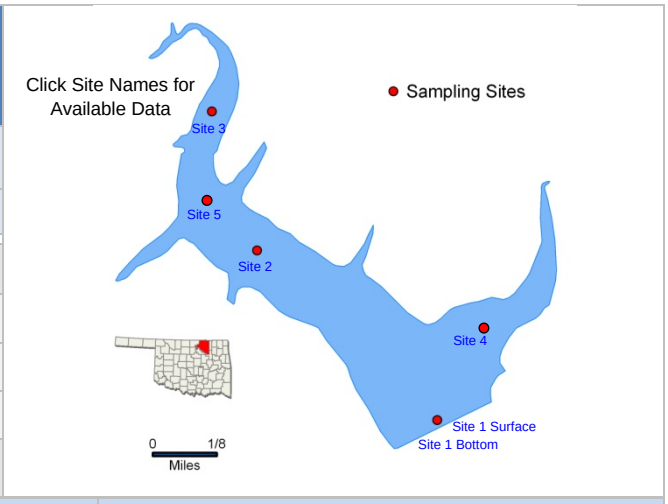
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes **N/A – parameters not collected in current sample year.*

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

Fairfax

Sample Period	Times Visited	Sampling Sites
March 2011 – September 2011	4	5



General

Location	Osage County	Click map for site data
Impoundment	1936	
Area	111 acres	
Capacity	1,795 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	11 NTU	100% of values < OWQS of 25 NTU
	Average Secchi Disk Depth	87 cm	
	Water Clarity Rating	good	
	Chlorophyll-a	12 mg/m3	
	Trophic State Index	55	Previous Value= 57
	Trophic Class	Eutrophic	
Profile	Salinity	0.12– 0.2 ppt	
	Specific Conductivity	243.9 – 400.4 µS/cm	
	pH	7.08 – 8.36 pH units	Neutral to slightly alkaline
	Oxidation-Reduction Potential	-23 – 473 mV	
	Dissolved Oxygen	Up to 40% of water column < 2 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.46 mg/L to 0.73 mg/L	
	Surface Total Phosphorus	0.025 mg/L to 0.033 mg/L	
	Nitrogen to Phosphorus Ratio	22:1	Phosphorus limited

Beneficial Uses

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

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

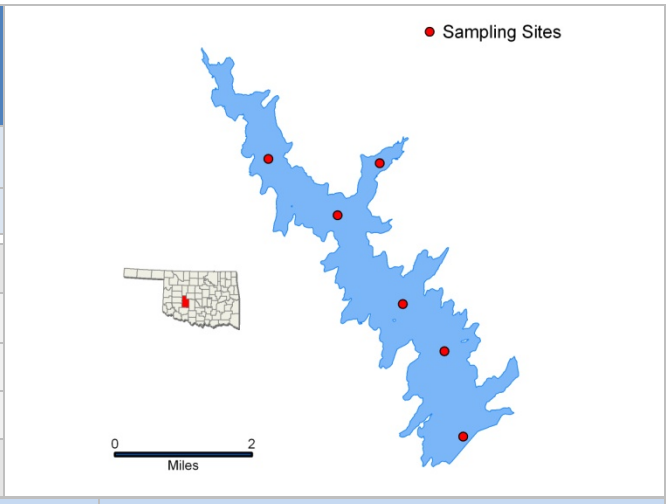
Notes

*Did not collect for this parameter. Although all turbidity values are <25 NTU, The FWP beneficial use cannot be assessed for this sample year as minimum data requirements were not met. The PBCR use cannot be assessed as minimum data requirements were not met due to QA/QC issue for Enterocci.

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

Ft. Cobb

Sample Period	Times Visited	Sampling Sites
December 2011 - August 2012	4	6



General

Location	Caddo County	Click map for site data
Impoundment	1959	
Area	4,100 acres	
Capacity	80,010 acre-feet	
Purposes	Flood Control, Water Supply, Fish & Wildlife, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	14 NTU	5% of values > OWQS of 25 NTU (n=20)
	Average Secchi Disk Depth	48 cm	
	Water Clarity Rating	Average	
	Chlorophyll-a	43 mg/m3	
	Trophic State Index	68	Previous value = 65
	Trophic Class	Hypereutrophic	
Profile	Salinity	0.25– 0.30 ppt	
	Specific Conductivity	531 – 606 µS/cm	
	pH	7.47– 9.54 pH units	Only 2.76% of values > 9 pH units
	Oxidation-Reduction Potential	151 – 564 mV	
	Dissolved Oxygen	All data above screening level of 2.0 mg/L	
Nutrients	Surface Total Nitrogen	1.16 mg/L to 2.20 mg/L	
	Surface Total Phosphorus	0.015 mg/L to 0.163 mg/L	
	Nitrogen to Phosphorus Ratio	19:1	Phosphorus limited

Beneficial Uses

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

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

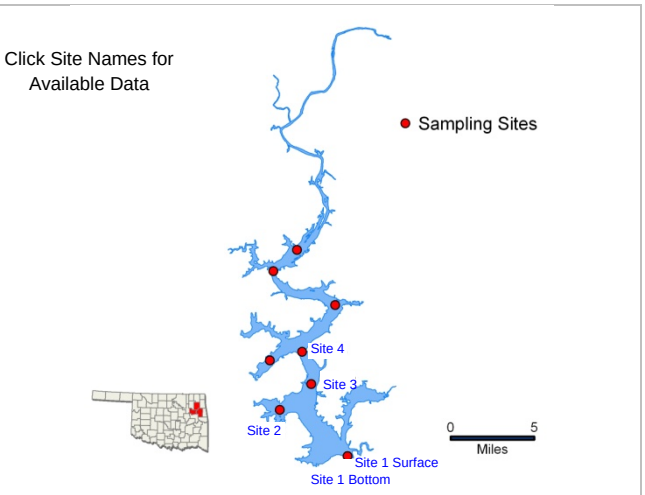
Notes

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

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

Ft. Gibson, Lower (1-4)

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



General

Location	Cherokee County
Impoundment	1953
Area	14,900 acres
Capacity	355,200 acre-feet
Purposes	Hydropower and Flood Control

Parameters

	Parameter (Descriptions)	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	86 cm	
	Water Clarity Rating	good	
	Trophic State Index	60	
	Trophic Class	eutrophic	
Profile	Salinity	0.07– 0.15 ppt	
Profile	Specific Conductivity	168.8 – 303.9 µS/cm	
Profile	pH	6.26 – 8.79 pH units	12% of values < 6.5 pH units
Profile	Oxidation-Reduction Potential	mV	
Profile	Dissolved Oxygen	Up to 82% of water column < 2 mg/L in July	Occurred at site 3
Nutrients	Surface Total Nitrogen	0.62 mg/L to 1.43 mg/L	
Nutrients	Surface Total Phosphorus	0.038 mg/L to 0.125 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	11:1	Phosphorus limited

Beneficial Uses

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

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

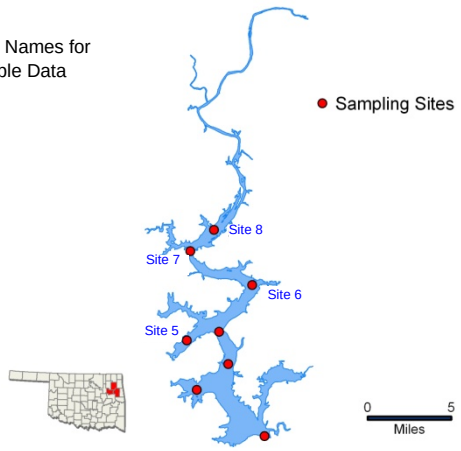
Notes: The lake is currently listed in the Oklahoma Water Quality Standards (WQS) as a Nutrient Limited Watershed (NLW). This listing means that the lake is considered threatened from nutrients until a more intensive study can confirm the Aesthetics beneficial use non-support status.

NTU = nephelometric turbidity units
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

Ft. Gibson, Lower (5-8)

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

Click Site Names for Available Data



General

Location	Cherokee County	Click map for site data
Impoundment	1953	
Area	14,900 acres	
Capacity	355,200 acre-feet	
Purposes	Hydropower and Flood Control	

Parameters

	Parameter (Descriptions)	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	
	Trophic Class	hypereutrophic	
Profile	Salinity	0.07– 0.15 ppt	
Profile	Specific Conductivity	164.9 – 351.1 µS/cm	
Profile	pH	6.04 – 8.91 pH units	16.5% of values < 6.5 pH units
Profile	Oxidation-Reduction Potential	mV	
Profile	Dissolved Oxygen	Up to 79% of water column < 2 mg/L in July	Occurred at site 6
Nutrients	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	
Nutrients	Nitrogen to Phosphorus Ratio	8:1	Phosphorus limited

Beneficial Uses

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

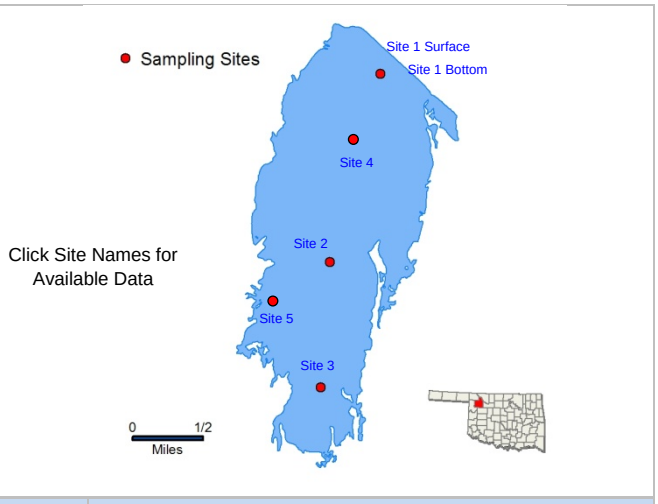
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

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

Ft. Supply

Sample Period	Times Visited	Sampling Sites
November 2010 - July 2011	4	5



General

Location	Woodward County	Click map for site data
Impoundment	1942	
Area	1,820 acres	
Capacity	13,900 acre-feet	
Purposes	Flood Control, Conservation Purposes	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	59 NTU	53% of values > OWQS of 25 NTU
	Average Secchi Disk Depth	26 cm	
	Water Clarity Rating	Fair to Poor	
	Chlorophyll-a	18 mg/m3	
	Trophic State Index	59	Previous value = 58
	Trophic Class	Eutrophic	
Profile	Salinity	0.51 – 0.64 ppt	
	Specific Conductivity	983 – 1217 µS/cm	
	pH	7.53 – 10.36 pH units	Only 2.2% of values > 9 pH units
	Oxidation-Reduction Potential	212 – 617 mV	
	Dissolved Oxygen	All data are above screening level of 2.0 mg/L	
Nutrients	Surface Total Nitrogen	0.5 mg/L to 1.37 mg/L	
	Surface Total Phosphorus	0.037 mg/L to 0.119 mg/L	
	Nitrogen to Phosphorus Ratio	11:1	Possibly co-limited

Beneficial Uses

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

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

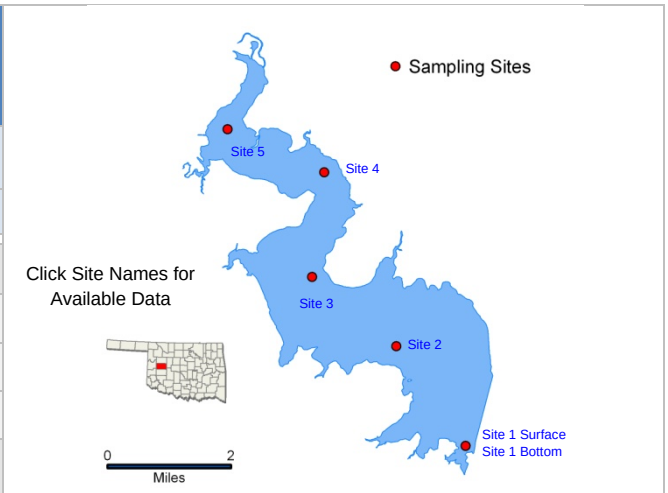
Notes

*Did not collect for these parameters. *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. The PBCR beneficial use cannot be assessed as minimum data requirement were not met due to QA/QC issues for *E.coli* and enterococci.

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

Foss

Sample Period	Times Visited	Sampling Sites
October 2010 – July 2011	4	5



General

Location	Custer County	Click map for site data
Impoundment	1961	
Area	8,800 acres	
Capacity	256,220 acre-feet	
Purposes	Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	11 NTU	5% of values > OWQS of 25 NTU
	Average Secchi Disk Depth	98 cm	
	Water Clarity Rating	Good	
	Chlorophyll-a	7 mg/m3	
	Trophic State Index	49	Previous Value= 52
	Trophic Class	Mesotrophic	
Profile	Salinity	1.07– 1.23 ppt	
	Specific Conductivity	1994 –2297 µS/cm	
	pH	6.69 – 8.28 pH units	
	Oxidation-Reduction Potential	234– 663 mV	
	Dissolved Oxygen	Up to 50% < 2 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.46 mg/L to 0.72 mg/L	
	Surface Total Phosphorus	0.011 mg/L to 0.038 mg/L	
	Nitrogen to Phosphorus Ratio	26:1	Phosphorus limited

Beneficial Uses

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

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

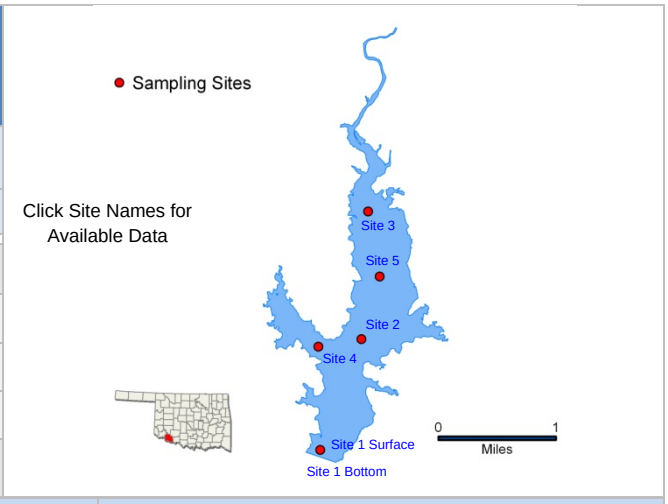
Notes

*Did not collect for this parameter. The PBCR beneficial use cannot be assessed as minimum data requirement were not met due to QA/QC issues for *E.coli* and enterococci.

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

Frederick

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



General

Location	Tillman County	Click map for site data
Impoundment	1974	
Area	925 acres	
Capacity	9,526 acre-feet	
Purposes	Water Supply, Recreation and Flood Control	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	59 NTU	100% of values > OWQS of 25 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	
	Trophic Class	eutrophic	
Profile	Salinity	0.12– 0.31 ppt	
Profile	Specific Conductivity	245.5 – 614 µS/cm	
Profile	pH	7.61 – 8.61 pH units	Neutral to slightly alkaline
Profile	Oxidation-Reduction Potential	47 – 394 mV	
Profile	Dissolved Oxygen	Up to 36% of water column < 2 mg/L in August	
Nutrients	Surface Total Nitrogen	0.74 mg/L to 1.09 mg/L	
Nutrients	Surface Total Phosphorus	0.023 mg/L to 0.069 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	21:1	Phosphorus limited

Beneficial Uses

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

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

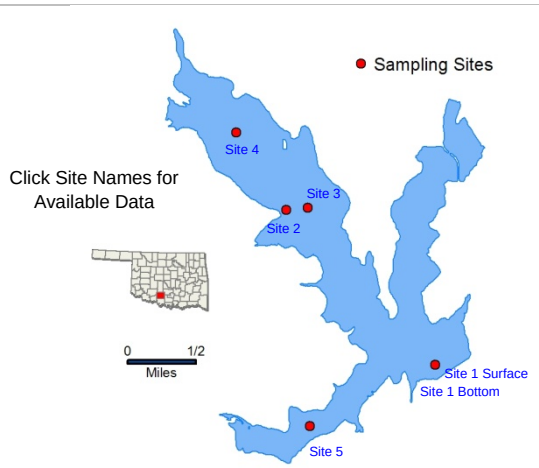
Notes

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

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

Fuqua

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



General

Location	Stephens County	Click map for site data
Impoundment	1953	
Area	1,500 acres	
Capacity	21,100 acre-feet	
Purposes	Water Supply, Recreation and Flood Control	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	14 NTU	11% of values > OWQS of 25 NTU (n=20)
	Average Secchi Disk Depth	87 cm	
	Water Clarity Rating	Average	
	Chlorophyll-a	14 mg/m3	
	Trophic State Index	57	Previous Value= 52
	Trophic Class	Eutrophic	
Profile	Salinity	0.27– 0.33 ppt	
	Specific Conductivity	529.4 – 647.5 µS/cm	
	pH	6.69 – 8.74 pH units	
	Oxidation-Reduction Potential	-89 - 434 mV	
	Dissolved Oxygen	Up to 40% of water column < 2 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.33 mg/L to 0.97 mg/L	
	Surface Total Phosphorus	0.010 mg/L to 0.047 mg/L	
	Nitrogen to Phosphorus Ratio	27:1	Phosphorus limited

Beneficial Uses

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

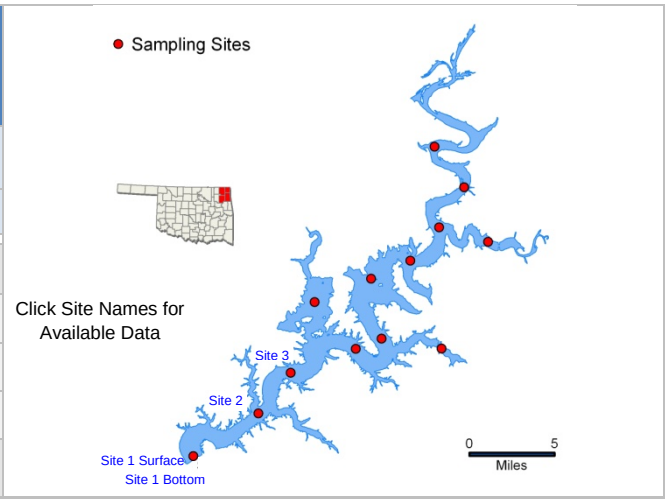
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes The PBCR beneficial use cannot be assessed as minimum data requirement were not met due to QA/QC issues for enterococci. * did not collect for these parameters.

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

Grand, Lower Lake (1-3)

Sample Period	Times Visited	Sampling Sites
October 2008 - July 2009	4	13



General

Location	Mayes County
Impoundment	1940
Area	1,820 acres
Capacity	13,900 acre-feet
Purposes	Flood Control, Hydropower

Click map for site data

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	6 NTU	100% of values < OWQS of 25 NTU (n=12)
	Average True Color		Did not collect for true color
	Average Secchi Disk Depth	110 cm	
	Water Clarity Rating	Excellent	
	Trophic State Index	56	Previous value = 50
	Trophic Class	Eutrophic	
Profile	Salinity	0.10 – 0.20 ppt	
Profile	Specific Conductivity	208 – 369 µS/cm	
Profile	pH	6.76 – 8.63 pH units	
Profile	Oxidation-Reduction Potential	68 – 591 mV	
Profile	Dissolved Oxygen	Up to 53% of water column in the Fall & up to 68% < 2.0 mg/L in July	
Nutrients	Surface Total Nitrogen	0.73 mg/L to 1.68 mg/L	
Nutrients	Surface Total Phosphorus	0.028 mg/L to 0.092mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	17:1	Phosphorus limited

Beneficial Uses

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

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

Notes: *Did not collect for these parameters

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

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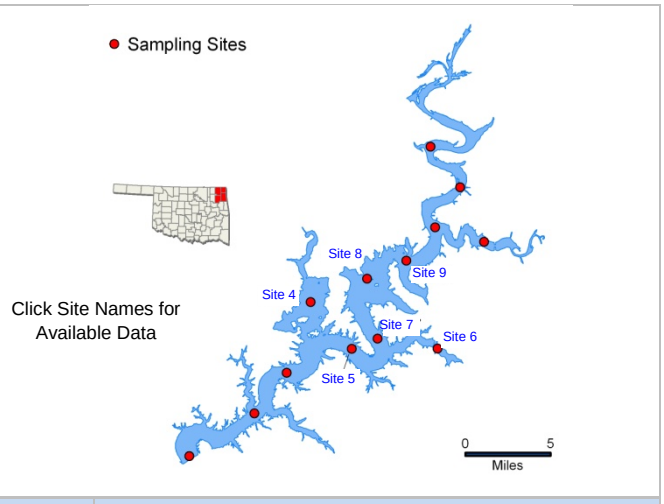
Grand, Mid Lake (4-9)

Sample Period	Times Visited	Sampling Sites
October 2008 - July 2009	4	13



General

Location	Mayes County
Impoundment	1940
Area	1,820 acres
Capacity	13,900 acre-feet
Purposes	Flood Control, Hydropower

Click map for site data

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	14 NTU	17% of values > OWQS of 25 NTU (n=24)
	Average True Color		Did not collect for true color
	Average Secchi Disk Depth	63 cm	
	Water Clarity Rating	Average to good	
	Trophic State Index	60	Previous value = 60
	Trophic Class	Eutrophic	
Profile	Salinity	0.10 – 0.20 ppt	
Profile	Specific Conductivity	247 – 383 µS/cm	
Profile	pH	7.02 – 8.84 pH units	
Profile	Oxidation-Reduction Potential	134 – 485 mV	
Profile	Dissolved Oxygen	Up to 59% of water column < 2.0 mg/L in July	Occurred at site 7
Nutrients	Surface Total Nitrogen	0.72 mg/L to 2.18 mg/L	
Nutrients	Surface Total Phosphorus	0.038 mg/L to 0.147 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	15:1	Phosphorus limited

Beneficial Uses

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

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

Notes

*Did not collect for these parameters

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

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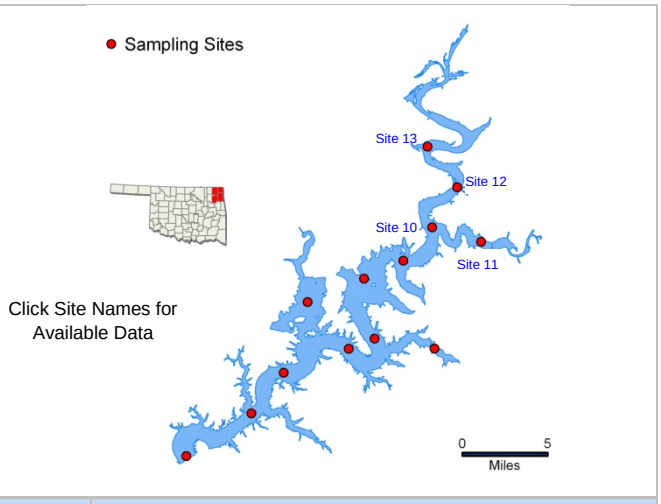
Grand, Upper Lake (10-13)

Sample Period	Times Visited	Sampling Sites
October 2008 - July 2009	4	13



General

Location	Mayes County	Click map for site data
Impoundment	1940	
Area	1,820 acres	
Capacity	13,900 acre-feet	
Purposes	Flood Control, Hydropower	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	32 NTU	67% of values > OWQS of 25 NTU (n=16)
	Average True Color		Did not collect for true color
	Average Secchi Disk Depth	35 cm	
	Water Clarity Rating	Average	
	Trophic State Index	59	Previous value = 62
	Trophic Class	Eutrophic	
Profile	Salinity	0.10 – 0.25 ppt	
Profile	Specific Conductivity	251 – 500.7 µS/cm	
Profile	pH	7.16 – 8.29 pH units	
Profile	Oxidation-Reduction Potential	175 – 477 mV	
Profile	Dissolved Oxygen	Up to 33% of water column < 2.0 mg/L in August	
Nutrients	Surface Total Nitrogen	0.71 mg/L to 1.94 mg/L	
Nutrients	Surface Total Phosphorus	0.032 mg/L to 0.192 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	12:1	Phosphorus limited

Beneficial Uses

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

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

Notes

*Did not collect for these parameters

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

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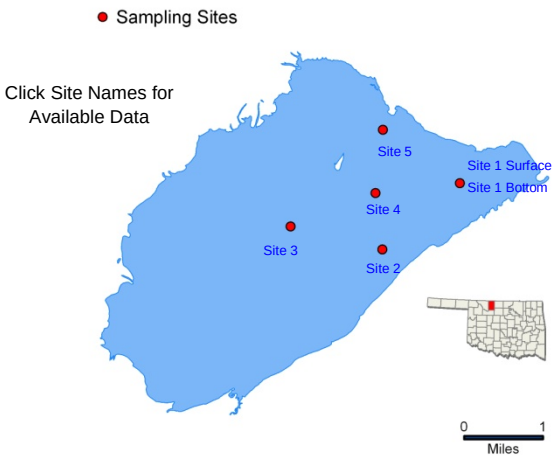
Great Salt Plains

Sample Period	Times Visited	Sampling Sites
February 2012 – May 2012	2	5



General

Location	Alfalfa County	Click map for site data
Impoundment	1941	
Area	8,690 acres	
Capacity	31,240 acre-feet	
Purposes	Flood Control, Conservation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	289 NTU	100% of values > OWQS of 25 NTU (n=4)
	Average Secchi Disk Depth	13 cm	
	Water Clarity Rating	Poor	
	Chlorophyll-a	15 mg/m3	
	Trophic State Index	57	Previous value = 71
	Trophic Class	Eutrophic	
Profile	Salinity	3.57– 10.08 ppt	
	Specific Conductivity	6543 – 17,185 µS/cm	
	pH	8.03 – 8.35 pH units	
	Oxidation-Reduction Potential	93 – 490 mV	
	Dissolved Oxygen		Not stratified at any sampling event
Nutrients	Surface Total Nitrogen	1.56 mg/L to 3.75 mg/L	
	Surface Total Phosphorus	0.091 mg/L to 0.676 mg/L	
	Nitrogen to Phosphorus Ratio	7:1	possibly co-limited

Beneficial Uses

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

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

Notes

*The lake is listed in the WQS as a NLW indicating that the Aesthetics beneficial use is considered threatened by nutrients until studies can be conducted to confirm non-support status.
** Due to low water conditions the lake was only sampled twice during the current sample year.
N/A – parameters not collected in current sample year. Min. data requirements not met for turbidity.*

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

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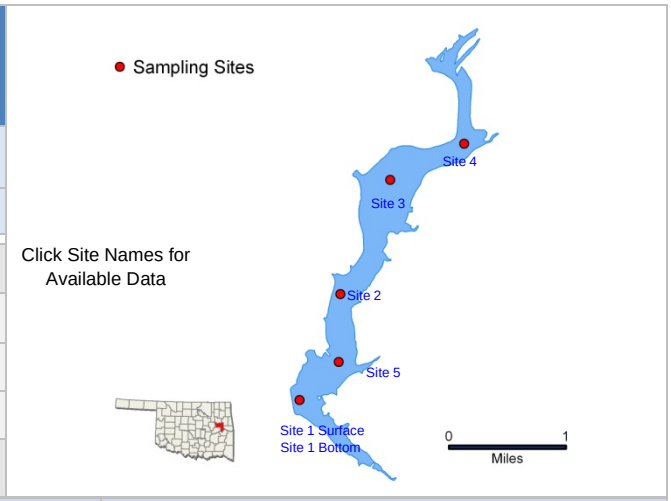
Greenleaf

Sample Period	Times Visited	Sampling Sites
November 2011 – August. 2012	4	5



General

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

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	12 NTU	8% of values > OWQS of 25 NTU (n=12)
	Average Secchi Disk Depth	67 cm	
	Water Clarity Rating	Good	
	Chlorophyll-a	11 mg/m3	
	Trophic State Index	54	Previous value = 52
	Trophic Class	Eutrophic	
Profile	Salinity	0.06– 0.12 ppt	
	Specific Conductivity	146 – 243 µS/cm	
	pH	6.89 – 8.65 pH units	
	Oxidation-Reduction Potential	22 – 427 mV	
	Dissolved Oxygen	Up to 57% of water column < 2 mg/L in May	
Nutrients	Surface Total Nitrogen	0.45 mg/L to 1.28 mg/L	
	Surface Total Phosphorus	0.006 mg/L to 0.030 mg/L	
	Nitrogen to Phosphorus Ratio	42:1	Phosphorus limited

Beneficial Uses

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

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

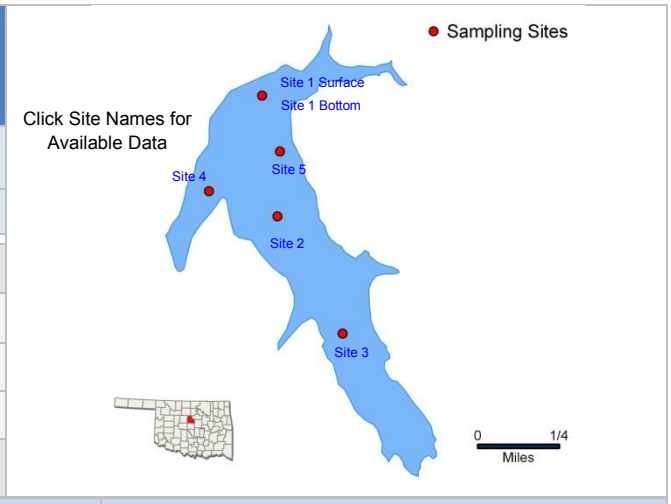
Notes

**N/A – parameters not collected in current sample year.*
* 50-70% range is undetermined for DO.

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

Guthrie

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



General

Location	Logan County	Click map for site data
Impoundment	1919	
Area	274 acres	
Capacity	3,875 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	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	
	Trophic Class	hypereutrophic	
Profile	Salinity	0.32– 0.43 ppt	
Profile	Specific Conductivity	623.1 – 821 µS/cm	
Profile	pH	7.78 – 8.21 pH units	Neutral to slightly alkaline
Profile	Oxidation-Reduction Potential	357 – 470 mV	
Profile	Dissolved Oxygen		Not stratified during any sampling interval
Nutrients	Surface Total Nitrogen	0.61 mg/L to 1.33 mg/L	
Nutrients	Surface Total Phosphorus	0.041mg/L to 0.103 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	15:1	Phosphorus limited

Beneficial Uses

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

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

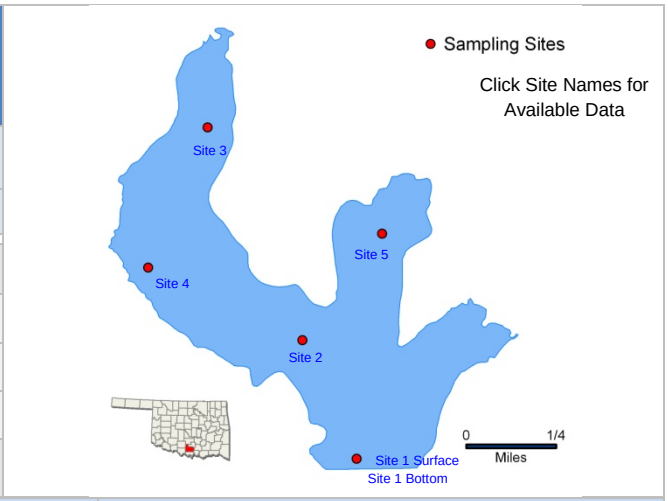
Notes

* Although 20% of the collected turbidity values exceeded the WQS of 25 NTU, available flow and rainfall data suggest that the peak in turbidity, which occurred in October, is likely due to seasonal storm events; therefore the lake will be listed as supporting its FWP use.

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

Healdton

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



General

Location	Carter County	Click map for site data
Impoundment	1979	
Area	370 acres	
Capacity	3,766 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	48 NTU	100% of values > OWQS of 25 NTU
	Average True Color	159 units	100% of values > OWQS of 70
	Average Secchi Disk Depth	34 cm	
	Water Clarity Rating	poor	
	Trophic State Index	49	
	Trophic Class	mesotrophic	
Profile	Salinity	0.13– 0.19 ppt	
Profile	Specific Conductivity	275.6 – 378.5 µS/cm	
Profile	pH	7.05 – 7.86 pH units	Neutral to slightly alkaline
Profile	Oxidation-Reduction Potential	304 – 450 mV	
Profile	Dissolved Oxygen	Up to 33% of water column < 2 mg/L in August	
Nutrients	Surface Total Nitrogen	0.59 mg/L to 0.94 mg/L	
Nutrients	Surface Total Phosphorus	0.043 mg/L to 0.100 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	11:1	Phosphorus limited

Beneficial Uses

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

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

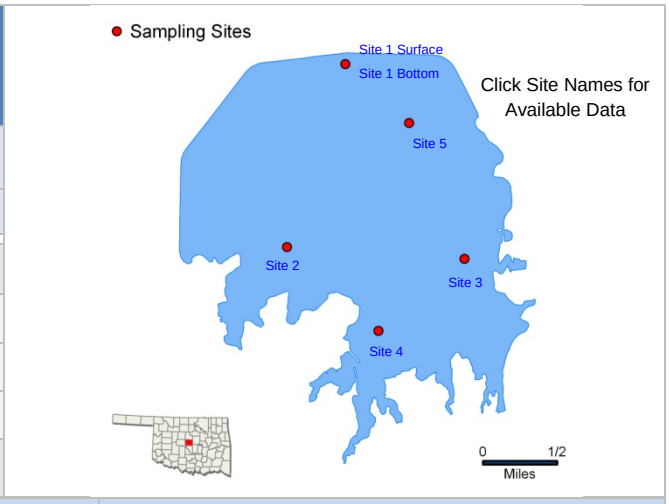
Notes

* Due to inclement weather conditions all sites could not be sample in May, therefore an assessment cannot be made for turbidity, true color or bacteria as minimum data requirements were not met.

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

Hefner

Sample Period	Times Visited	Sampling Sites
October 2010 – June 2011	4	5



General

Location	Oklahoma County	Click map for site data
Impoundment	1947	
Area	2,500 acres	
Capacity	75,000 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	9 NTU	100% of values < OWQS of 25 NTU
	Average Secchi Disk Depth	67 cm	
	Water Clarity Rating	Good	
	Chlorophyll-a	26 mg/m3	
	Trophic State Index	63	Previous Value= 63
	Trophic Class	Hypereutrophic	
Profile	Salinity	0.55– 0.65 ppt	
	Specific Conductivity	1042 – 1237 µS/cm	
	pH	7.76 – 8.63 pH units	Neutral to slightly alkaline
	Oxidation-Reduction Potential	317 – 505 mV	
	Dissolved Oxygen	Up to 6% of water column < 2 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.75 mg/L to 1.04 mg/L	
	Surface Total Phosphorus	0.054mg/L to 0.104 mg/L	
	Nitrogen to Phosphorus Ratio	12:1	Phosphorus limited

Beneficial Uses

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

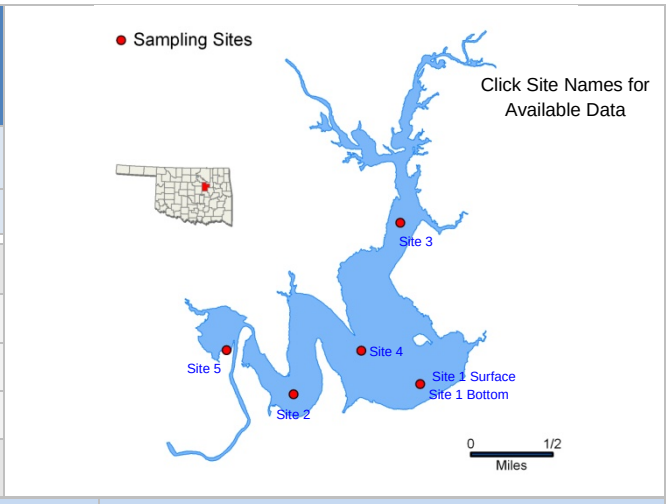
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes: The PBCR beneficial use cannot be assessed as minimum data requirement were not met due to QA/QC issues for *E.coli* and enterococci. * This parameter not collected 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

Heyburn

Sample Period	Times Visited	Sampling Sites
December 2010 - July 2011	4	5



General

Location	Creek County	Click map for site data
Impoundment	1950	
Area	880 acres	
Capacity	7,105 acre-feet	
Purposes	Flood Control and Conservation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	53 NTU	42% of values > 25 NTU (n=16)
	Average Secchi Disk Depth	59 cm	75% of values > OWQS of 70
	Water Clarity Rating	Fair	
	Chlorophyll-a	6 mg/m3	
	Trophic State Index	49	Previous value = 49
	Trophic Class	Mesotrophic	
Profile	Salinity	0.08 - 0.16 ppt	
	Specific Conductivity	181.2 – 323.6 µS/cm	
	pH	6.64 – 7.74 pH units	Neutral
	Oxidation-Reduction Potential	215 to 607 mV	
	Dissolved Oxygen	Up to 60% of water column < 2 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.27 mg/L to 0.97 mg/L	
	Surface Total Phosphorus	0.009 mg/L to 0.087 mg/L	
	Nitrogen to Phosphorus Ratio	13:1	Phosphorus limited

Beneficial Uses

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

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

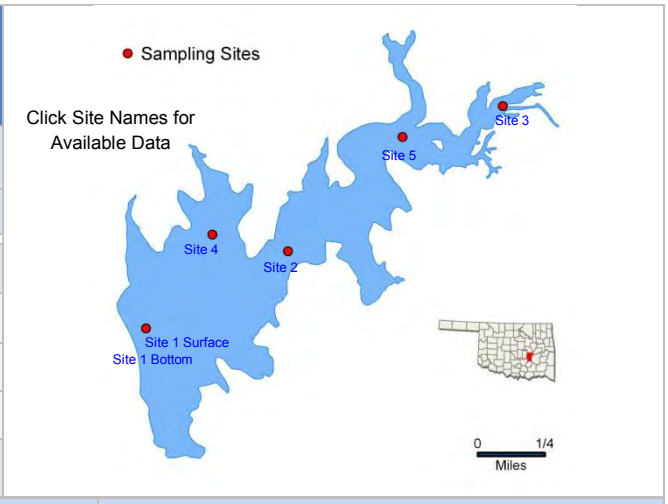
Notes

* Did not collect for this parameter. The PBCR beneficial use cannot be assessed as minimum data requirement were not met due to QA/QC issues for enterococci.

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

Holdenville

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



General

Location	Hughes County	Click map for site data
Impoundment	1931	
Area	550 acres	
Capacity	11,000 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	16 NTU	20% of values > OWQS of 25 NTU
	Average True Color	42 units	100% of values < OWQS of 70
	Average Secchi Disk Depth	75 cm	
	Water Clarity Rating	Average to good	
	Trophic State Index	60	
	Trophic Class	eutrophic	
Profile	Salinity	0.06– 0.19 ppt	
Profile	Specific Conductivity	141.6 – 391.7 µS/cm	
Profile	pH	6.10 – 8.26 pH units	11% of values < 6.5 pH units
Profile	Oxidation-Reduction Potential	2 - 435 mV	
Profile	Dissolved Oxygen	Up to 83% of water column < 2 mg/L in July	
Nutrients	Surface Total Nitrogen	0.57 mg/L to 1.01 mg/L	
Nutrients	Surface Total Phosphorus	0.015 mg/L to 0.067 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	21:1	Phosphorus limited

Beneficial Uses

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

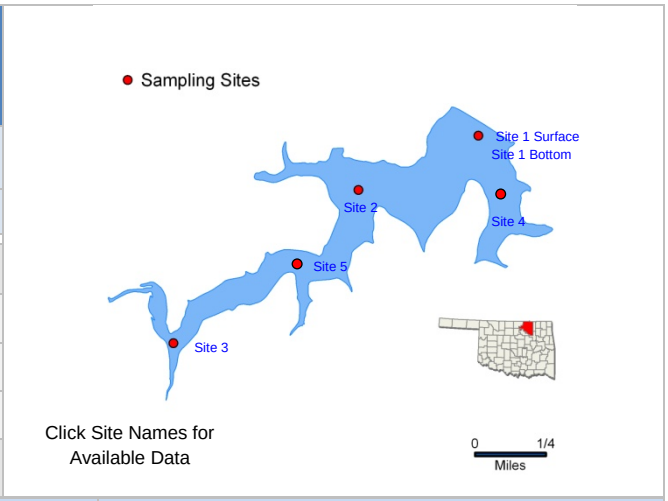
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes: Although 20% of the samples collected in 2006-2007 were above the standard, minimum data requirements were not met therefore assessment of the Fish & Wildlife Propagation (FWP) beneficial cannot be made at this time.

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

Hominy Municipal

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



General

Location	Osage County	Click map for site data
Impoundment	1940	
Area	165 acres	
Capacity	5,000 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	9 NTU	100% of values< OWQS 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	
	Trophic Class	eutrophic	
Profile	Salinity	0.10– 0.14 ppt	
	Specific Conductivity	224 – 297.7 µS/cm	
	pH	7.12 – 8.66 pH units	Neutral to slightly alkaline
	Oxidation-Reduction Potential	-22 - 430 mV	
	Dissolved Oxygen	Up to 62% of water column < 2 mg/L in August	Occurred at sites 1 and 2
Nutrients	Surface Total Nitrogen	0.45 mg/L to 0.98 mg/L	
	Surface Total Phosphorus	0.010 mg/L to 0.028 mg/L	
	Nitrogen to Phosphorus Ratio	34:1	Phosphorus limited

Beneficial Uses

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

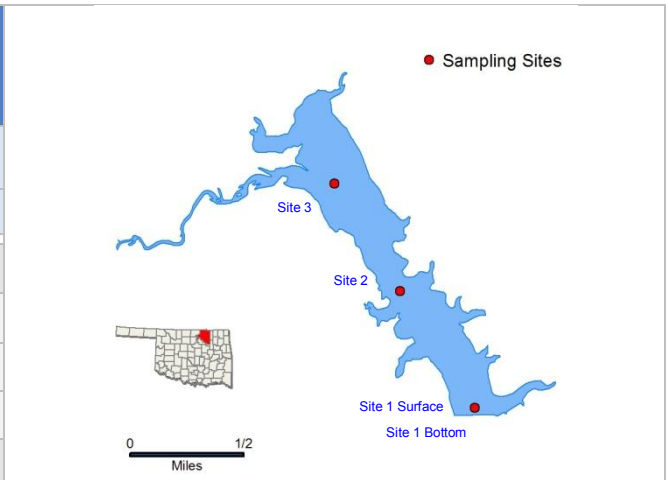
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes: Although 100% of the turbidity and color samples were below the standard, the Fish & Wildlife Propagation (FWP) and Aesthetics beneficial use cannot be assessed as minimum data requirements were not met.

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

Hudson (Bartlesville)

Sample Period	Times Visited	Sampling Sites
November 2011 – July 2012	4	3



General

Location	Osage County
Impoundment	1949
Area	268 acres
Capacity	2,776 acre-feet
Purposes	Water Supply, Recreation

Click map for site data

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	11 NTU	100% of values< OWQS of 25 NTU (n=8)
	Average Secchi Disk Depth	66 cm	
	Water Clarity Rating	Average	
	Chlorophyll-a	8 mg/m3	
	Trophic State Index	51	Previous value = 58
	Trophic Class	Eutrophic	
Profile	Salinity	0.08 – 0.15 ppt	
	Specific Conductivity	172 – 313 µS/cm	
	pH	5.99 – 8.22 pH units	Only 5.22% of values < 6.5 pH units
	Oxidation-Reduction Potential	75 – 495 mV	
	Dissolved Oxygen	Up to 50% of water column < 2.0 mg/L in July	
Nutrients	Surface Total Nitrogen	0.62 mg/L to 0.98 mg/L	
	Surface Total Phosphorus	0.005 mg/L to 0.021 mg/L	
	Nitrogen to Phosphorus Ratio	60:1	Phosphorus limited

Beneficial Uses

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

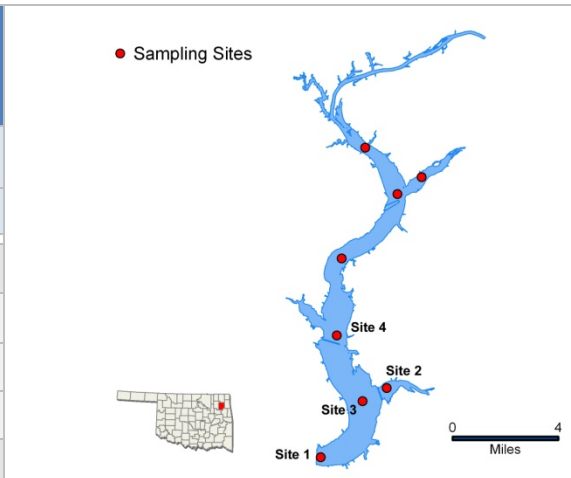
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes **N/A – parameters not collected in current sample year.*

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

Hudson, Lower (1-4)

Sample Period	Times Visited	Sampling Sites
October 2011 - July 2012	4	8



General

Location	Mayes County	Click map for site data
Impoundment	1964	
Area	10,900 acres	
Capacity	200,300 acre-feet	
Purposes	Flood Control, Hydropower	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	10 NTU	6% of values< OWQS of 25 NTU (n=16)
	Average Secchi Disk Depth	89 cm	
	Water Clarity Rating	Good	
	Chlorophyll-a	10 mg/m3	
	Trophic State Index	53	Previous value = 54
	Trophic Class	Eutrophic	
Profile	Salinity	0.06 – 0.13 ppt	
	Specific Conductivity	137 – 279 µS/cm	
	pH	6.99 – 8.63 pH units	
	Oxidation-Reduction Potential	110 – 458mV	
	Dissolved Oxygen	Up to 90% of water column < 2.0 mg/L in July	
Nutrients	Surface Total Nitrogen	0.45 mg/L to 2.01 mg/L	
	Surface Total Phosphorus	0.010 mg/L to 0.126 mg/L	
	Nitrogen to Phosphorus Ratio	17:1	Phosphorus limited

Beneficial Uses

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

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

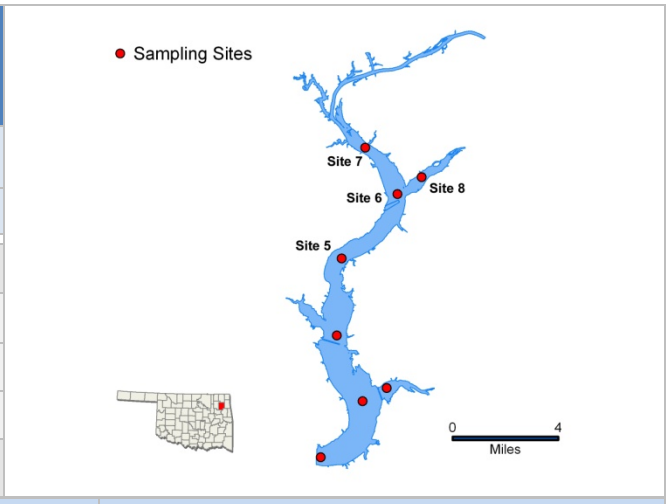
Notes

**N/A – parameters not collected in current sample year.*

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

Hudson, Upper (5-8)

Sample Period	Times Visited	Sampling Sites
October 2011 - July 2012	4	8



General

Location	Mayes County	Click map for site data
Impoundment	1964	
Area	10,900 acres	
Capacity	200,300 acre-feet	
Purposes	Flood Control, Hydropower	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	26 NTU	25% of values< OWQS of 25 NTU (n=16)
	Average Secchi Disk Depth	50 cm	
	Water Clarity Rating	Average	
	Chlorophyll-a	14 mg/m3	
	Trophic State Index	56	Previous value = 54
	Trophic Class	Eutrophic	
Profile	Salinity	0.10 – 0.12 ppt	
	Specific Conductivity	212 – 257 µS/cm	
	pH	7.21 – 8.78 pH units	
	Oxidation-Reduction Potential	237 – 460mV	
	Dissolved Oxygen	Up to 36% of water column < 2.0 mg/L in July	
Nutrients	Surface Total Nitrogen	0.47 mg/L to 2.07 mg/L	
	Surface Total Phosphorus	0.034 mg/L to 0.143 mg/L	
	Nitrogen to Phosphorus Ratio	15:1	Phosphorus limited

Beneficial Uses

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

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

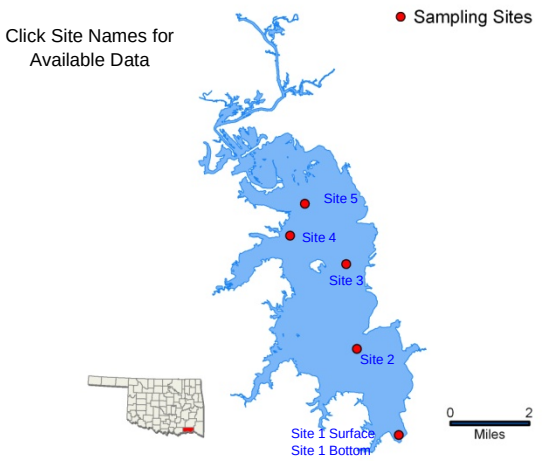
Notes

**N/A – parameters not collected in current sample year.*

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

Hugo

Sample Period	Times Visited	Sampling Sites
December 2011 - August 2012	4	5



General

Location	Choctaw County	Click map for site data
Impoundment	1974	
Area	13,250 acres	
Capacity	157,600 acre-feet	
Purposes	Flood Control, Water Supply, Water Quality Control, Fish and Wildlife, and Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	61 NTU	90% of values > OWQS of 25 NTU (n=20)
	Average Secchi Disk Depth	25 cm	
	Water Clarity Rating	Poor	
	Chlorophyll-a	11 mg/m3	
	Trophic State Index	54	Previous value = 54
	Trophic Class	Eutrophic	
Profile	Salinity	0.02 - 0.05 ppt	
	Specific Conductivity	37 – 114 µS/cm	
	pH	6.59 – 8.21 pH units	Neutral
	Oxidation-Reduction Potential	191 to 456 mV	
	Dissolved Oxygen	All data are above screening level of 2.0 mg/L	
Nutrients	Surface Total Nitrogen	0.68 mg/L to 1.54 mg/L	
	Surface Total Phosphorus	0.016 mg/L to 0.127 mg/L	
	Nitrogen to Phosphorus Ratio	14:1	Phosphorus limited

Beneficial Uses

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

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

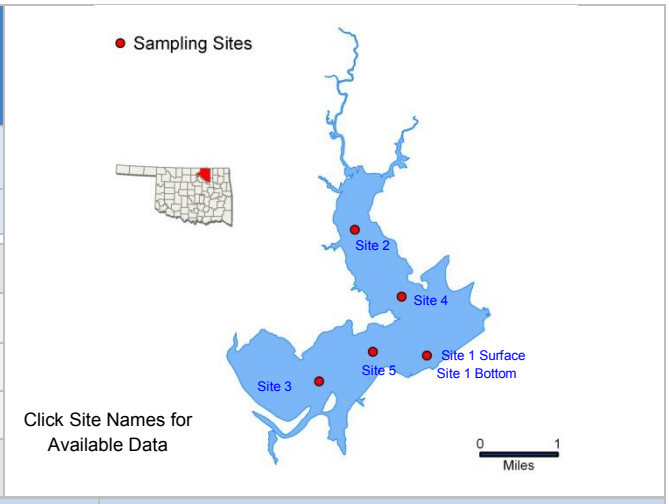
Notes

** The PBCR cannot be assessed as minimum data requirements were not met due to QA/QC issues*
**N/A – parameters not collected in current sample year.*

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

Hulah

Sample Period	Times Visited	Sampling Sites
November 2011 – July 2012	4	5



General

Location	Osage County
Impoundment	1951
Area	3,570 acres
Capacity	31,160 acre-feet
Purposes	Flood Control, Water Supply, Low-flow Regulation, and Conservation

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	78 NTU	100% of values > OWQS of 25 NTU (n=12)
	Average Secchi Disk Depth	17 cm	
	Water Clarity Rating	Poor	
	Chlorophyll-a	9 mg/m3	
	Trophic State Index	52	Previous value = 55
	Trophic Class	Eutrophic	
Profile	Salinity	0.10 - 0.16 ppt	
	Specific Conductivity	202 – 347 µS/cm	
	pH	7.41 – 8.29 pH units	
	Oxidation-Reduction Potential	269 to 514 mV	
	Dissolved Oxygen	All data are above screening level of 2.0 mg/L	
Nutrients	Surface Total Nitrogen	0.66 mg/L to 1.12 mg/L	
	Surface Total Phosphorus	0.018 mg/L to 0.132 mg/L	
	Nitrogen to Phosphorus Ratio	13:1	Phosphorus limited

Beneficial Uses

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

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

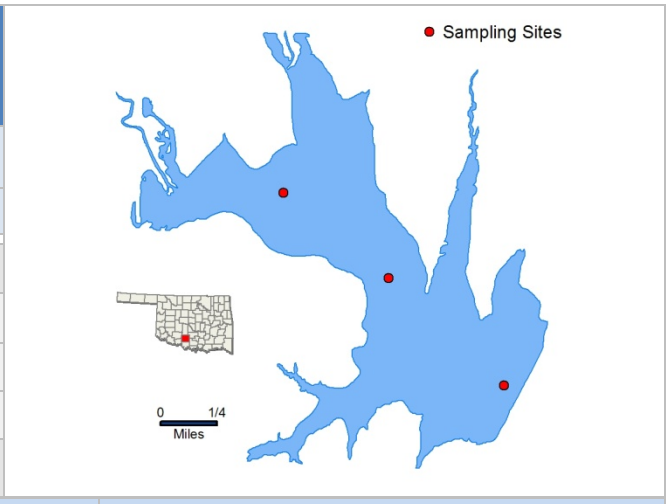
Notes

Currently, this lake is listed as a Nutrient Limited Watershed (NLW) in the Oklahoma Water Quality Standards (WQS). This means that the lake is considered threatened from nutrients until a more intensive study can confirm the Aesthetics beneficial use non-support status.
N/A – parameters not collected in current sample year.

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

Humphreys

Sample Period	Times Visited	Sampling Sites
October 2011 – August 2012	4	3



General

Location	Stephens County	Click map for site data
Impoundment	1958	
Area	10,900 acres	
Capacity	200,300 acre-feet	
Purposes	Water Supply, Flood Control, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	10 NTU	100% of values < OWQS of 25 NTU (n=12)
	Average Secchi Disk Depth	49 cm	
	Water Clarity Rating	Average	
	Chlorophyll-a	32 mg/m3	
	Trophic State Index	65	Previous value = 63
	Trophic Class	Hypereutrophic	
Profile	Salinity	0.29 – 0.38 ppt	
	Specific Conductivity	602 – 775 µS/cm	
	pH	5.44 – 8.68 pH units	
	Oxidation-Reduction Potential	-54 – 536 mV	
	Dissolved Oxygen	Up to 30% of water column < 2.0 mg/L in August	
Nutrients	Surface Total Nitrogen	1.23 mg/L to 1.62 mg/L	
	Surface Total Phosphorus	0.005 mg/L to 0.061 mg/L	
	Nitrogen to Phosphorus Ratio	51:1	Phosphorus limited

Beneficial Uses

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

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

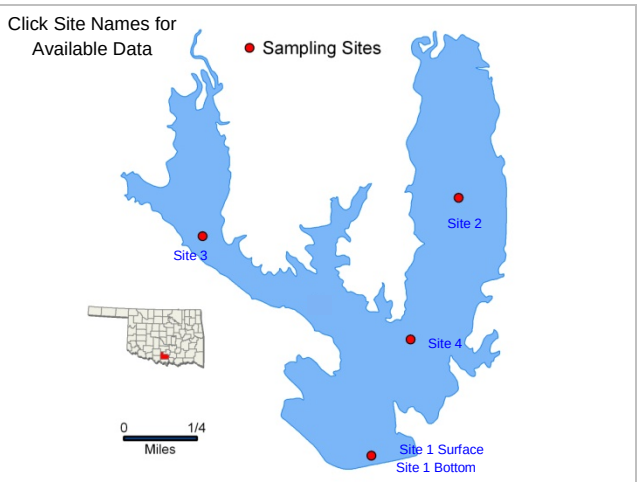
Notes

N/A – parameters not collected in current sample year.
*With a TSI of 63 this lake will be further reviewed to determine the need to be considered as an NLW water body.

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

Jean Neustadt

Sample Period	Times Visited	Sampling Sites
November 2011 - July 2012	4	5



General

Location	Carter County	Click map for site data
Impoundment	1969	
Area	462 acres	
Capacity	6,106 acre-feet	
Purposes	Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	17 NTU	8% of values > OWQS of 25 NTU (n=12)
	Average Secchi Disk Depth	44 cm	
	Water Clarity Rating	Average	
	Chlorophyll-a	23 mg/m3	
	Trophic State Index	61	Previous value = 58
	Trophic Class	Eutrophic	
Profile	Salinity	0.13– 0.20 ppt	
	Specific Conductivity	271 – 406 µS/cm	
	pH	6.70 – 9 pH units	
	Oxidation-Reduction Potential	-27 - 538 mV	
	Dissolved Oxygen	Up to 67% of water column < 2 mg/L in July	Occurred at site 1, the dam
Nutrients	Surface Total Nitrogen	0.69 mg/L to 1.59 mg/L	
	Surface Total Phosphorus	0.005mg/L to 0.039 mg/L	
	Nitrogen to Phosphorus Ratio	61:1	Phosphorus limited

Beneficial Uses

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

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

Notes

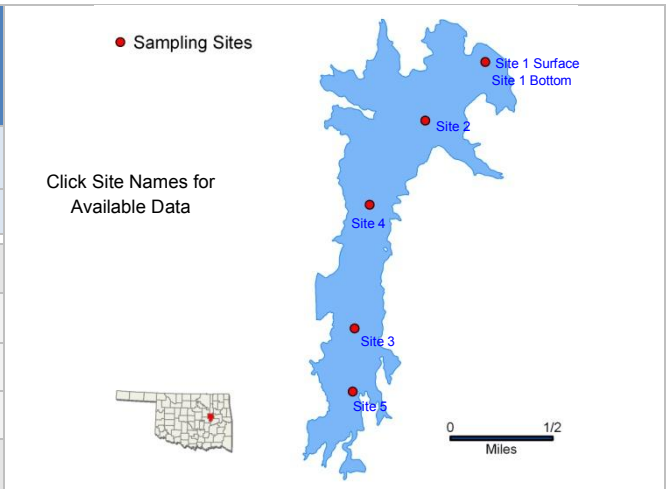
N/A – parameters not collected in current sample year.

* 50-70% range is undetermined for DO.

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

Jim Hall (Henryetta)

Sample Period	Times Visited	Sampling Sites
2012	4	5



General

Location	Okmulgee County
Impoundment	1928
Area	450 acres
Capacity	6,600 acre-feet
Purposes	Water Supply and Recreation

Click map for site data

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	132 NTU	100% of values > OWQS of 25 NTU (n=12)
	Average Secchi Disk Depth	8 cm	
	Water Clarity Rating	Poor	
	Chlorophyll-a	3 mg/m3	
	Trophic State Index	43	Previous Value = 45
	Trophic Class	Mesotrophic	
Profile	Salinity	0.04 - 0.05 ppt	
	Specific Conductivity	87 – 111 µS/cm	
	pH	6.50 – 8.04 pH units	
	Oxidation-Reduction Potential	298 to 637 mV	
	Dissolved Oxygen	Up to 11% of water column < 2 mg/L in July	
Nutrients	Surface Total Nitrogen	1.19 mg/L to 1.36 mg/L	
	Surface Total Phosphorus	0.088 mg/L to 0.192 mg/L	
	Nitrogen to Phosphorus Ratio	10:1	Phosphorus limited

Beneficial Uses

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

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

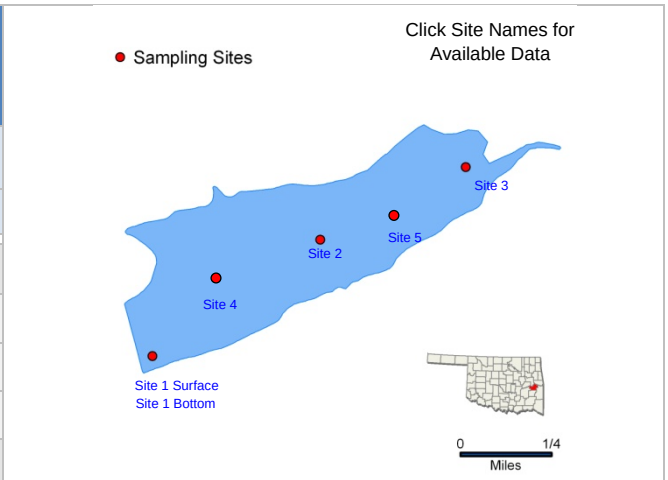
Notes

***The PBCR cannot be assessed as minimum data requirements were not met due to QA/QC issues for all parameters*
**N/A – parameters not collected in current sample year.*

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

John Wells

Sample Period	Times Visited	Sampling Sites
October 2008 – July 2009	4	5



General

Location	Haskell County	Click map for site data
Impoundment	1936	
Area	194 acres	
Capacity	1,352 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	3 NTU	100% of values < OWQS of 25 NTU (n=12)
	Average True Color		Did not collect for true color
	Average Secchi Disk Depth	180 cm	
	Water Clarity Rating	Excellent	
	Trophic State Index	45	Previous value = 46
	Trophic Class	Mesotrophic	
Profile	Salinity	0.02 – 0.10 ppt	
Profile	Specific Conductivity	73 – 207.5 µS/cm	
Profile	pH	6.3 – 9.13 pH units	1% of values < 6.50 and 2.38% > 9.00 pH units
Profile	Oxidation-Reduction Potential	-35 – 503 mV	
Profile	Dissolved Oxygen	Up to 50% of water column < 2.0 mg/L in July	
Nutrients	Surface Total Nitrogen	0.30 mg/L to 0.54 mg/L	
Nutrients	Surface Total Phosphorus	0.005 mg/L to 0.014 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	43:1	Phosphorus limited

Beneficial Uses

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

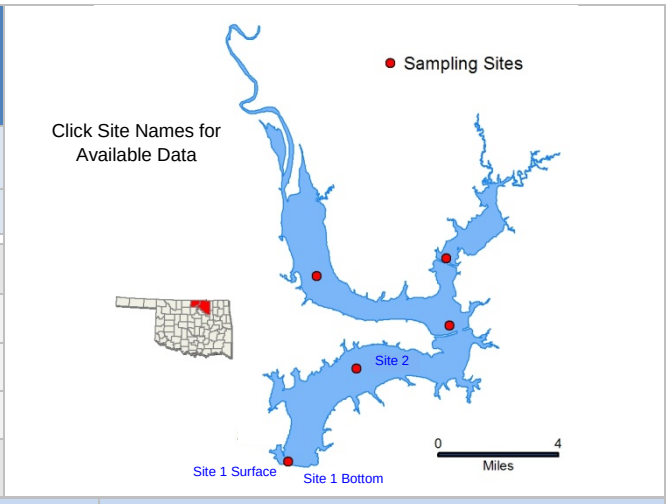
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes *Did not collect for these parameters

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

Kaw (Lower)

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



General

Location	Osage County	Click map for site data
Impoundment	1976	
Area	17,040 acres	
Capacity	428,600 acre-feet	
Purposes	Flood Control, Water Supply, Water Quality Control, and Conservation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	18 nephelometric turbidity units (NTU)	25% of values > 25 NTU
	Average True Color	75 units	25% of values > OWQS of 70
	Average Secchi Disk Depth	66 cm	
	Water Clarity Rating	average	
	Trophic State Index	42	Previous value = 56 (lake-wide average)
	Trophic Class	mesotrophic	
Profile	Salinity	0.21 - 0.58 ppt	
Profile	Specific Conductivity	416.2 – 1100 µS/cm	
Profile	pH	6.97 – 8.38 pH units	Neutral to slightly alkaline
Profile	Oxidation-Reduction Potential	103 to 487 mV	
Profile	Dissolved Oxygen	Up to 24% of water column < 2 mg/L	Occurred at site 1, the dam
Nutrients	Surface Total Nitrogen	1.08 mg/L to 2.46 mg/L	
Nutrients	Surface Total Phosphorus	0.168 mg/L to 0.223 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	10:1	Phosphorus limited

Beneficial Uses

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

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

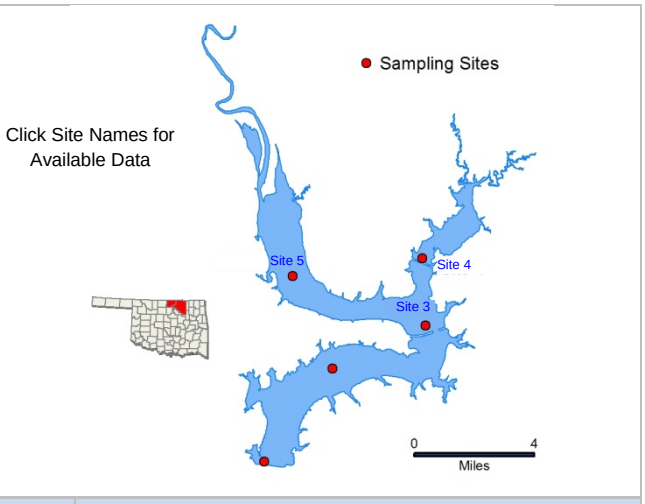
Notes

Although 25% of values exceeded the OWQS for turbidity and true color, the minimum data requirements were not met and an assessment of the FWP and Aesthetics beneficial use cannot be made for this sample year.

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

Kaw (Upper)

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



General

Location	Osage County	Click map for site data
Impoundment	1976	
Area	17,040 acres	
Capacity	428,600 acre-feet	
Purposes	Flood Control, Water Supply, Water Quality Control, and Conservation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	27 nephelometric turbidity units (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)
	Trophic Class	eutrophic	
Profile	Salinity	0.16 - 0.65 ppt	
Profile	Specific Conductivity	332.2– 1233 µS/cm	
Profile	pH	7.09 – 8.54 pH units	Neutral to slightly alkaline
Profile	Oxidation-Reduction Potential	103 to 487 mV	
Profile	Dissolved Oxygen	Up to 24% of water column < 2 mg/L	Occurred at site 1, the dam
Nutrients	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	
Nutrients	Nitrogen to Phosphorus Ratio	9:1	Phosphorus limited

Beneficial Uses

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

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

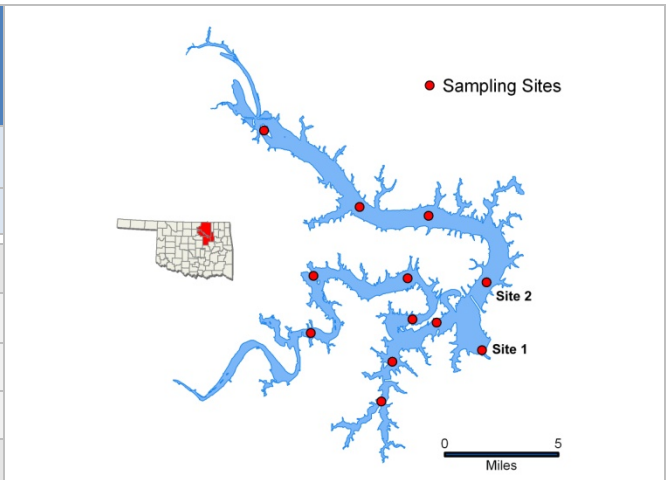
Notes

Although 50-67% of values exceeded the OWQS for turbidity and true color, the minimum data requirements were not met and an assessment of the FWP and Aesthetics beneficial use cannot be made for this sample year.

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

Keystone (1-2)

Sample Period	Times Visited	Sampling Sites
November 2011 – August 2012	4	12



General

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

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	29 NTU	25% of values > OWQS of 25 NTU (n=8)
	Average Secchi Disk Depth	50 cm	
	Water Clarity Rating	Average	
	Chlorophyll-a	7 mg/m3	
	Trophic State Index	49	Previous value = 57
	Trophic Class	Mesotrophic	
Profile	Salinity	021 – 1.42 ppt	
	Specific Conductivity	434 – 2734 µS/cm	
	pH	7.38 – 8.42 pH units	
	Oxidation-Reduction Potential	59 – 545mV	
	Dissolved Oxygen	Up to 47% of water column < 2.0 mg/L in August	
Nutrients	Surface Total Nitrogen	0.83 mg/L to 1.4 mg/L	
	Surface Total Phosphorus	0.085 mg/L to 0.207 mg/L	
	Nitrogen to Phosphorus Ratio	8:1	Possibly co-limited

Beneficial Uses

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

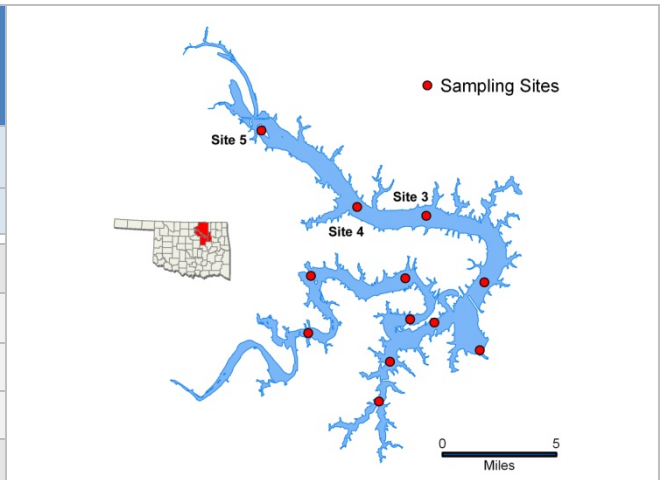
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes: *N/A – parameters not collected in current sample year.* Although 50% 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.

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

Keystone, Arkansas River Arm (3-5)

Sample Period	Times Visited	Sampling Sites
November 2011 – August 2012	4	12



General

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

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	125 NTU	75% of values > OWQS of 25 NTU (n=12)
	Average Secchi Disk Depth	24 cm	
	Water Clarity Rating	Poor	
	Chlorophyll-a	18 mg/m3	
	Trophic State Index	59	Previous value = 61
	Trophic Class	Eutrophic	
Profile	Salinity	0.26 – 0.88 ppt	
	Specific Conductivity	551 – 1743 µS/cm	
	pH	7.60 – 8.46 pH units	
	Oxidation-Reduction Potential	206 – 525 mV	
	Dissolved Oxygen	Up to 22% of water column < 2.0 mg/L in July	
Nutrients	Surface Total Nitrogen	0.93 mg/L to 3.99 mg/L	
	Surface Total Phosphorus	0.107 mg/L to 0.480 mg/L	
	Nitrogen to Phosphorus Ratio	8:1	Possibly co-limited

Beneficial Uses

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

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

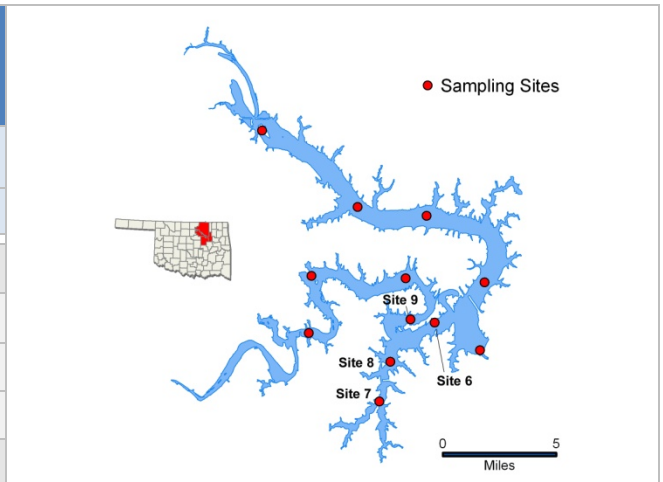
Notes

N/A – parameters not collected in current sample year.

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

Keystone, Lower Cimarron River Arm (6-9)

Sample Period	Times Visited	Sampling Sites
November 2011 – August 2012	4	12



General

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

Click map for site data

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Stu	Average Turbidity	28 NTU	31% of values > OWQS of 25 NTU (n=14)
	Average Secchi Disk Depth	47 cm	
	Water Clarity Rating	Fair	
	Chlorophyll-a	11 mg/m3	
	Trophic State Index	54	Previous value = 57
	Trophic Class	Eutrophic	
Profile	Salinity	0.24 – 1.22 ppt	
	Specific Conductivity	507 – 2394 µS/cm	
	pH	7.60 – 8.74 pH units	
	Oxidation-Reduction Potential	188 – 445 mV	
	Dissolved Oxygen	Up to 8% of water column < 2.0 mg/L in August	
Nutrients	Surface Total Nitrogen	0.67 mg/L to 1.72 mg/L	
	Surface Total Phosphorus	0.067 mg/L to 0.204 mg/L	
	Nitrogen to Phosphorus Ratio	10:1	Phosphorus limited or Possibly co-limited

Beneficial Uses

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

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

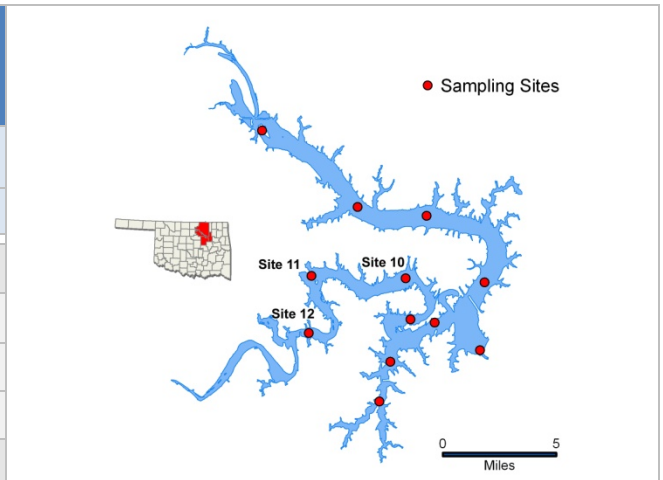
Notes

*Did not collect for these parameters.

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

Keystone, Upper Cimarron River Arm (10-12)

Sample Period	Times Visited	Sampling Sites
November 2011 – August 2012	4	12



General

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

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	306 NTU	67% of values > OWQS of 25 NTU (n=9)
	Average Secchi Disk Depth	16 cm	
	Water Clarity Rating	Poor	
	Chlorophyll-a	34 mg/m3	
	Trophic State Index	65	Previous value = 60
	Trophic Class	Hypereutrophic	
Profile	Salinity	028 – 3.68 ppt	
	Specific Conductivity	576 – 6762 µS/cm	
	pH	7.56 – 8.82 pH units	Neutral to slightly alkaline
	Oxidation-Reduction Potential	66 – 405 mV	
	Dissolved Oxygen	Up to 64% of water column < 2.0 mg/L in August	
Nutrients	Surface Total Nitrogen	1.14 mg/L to 3.74 mg/L	
	Surface Total Phosphorus	0.098 mg/L to 0.696 mg/L	
	Nitrogen to Phosphorus Ratio	7:1	Possibly co-limited

Beneficial Uses

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

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

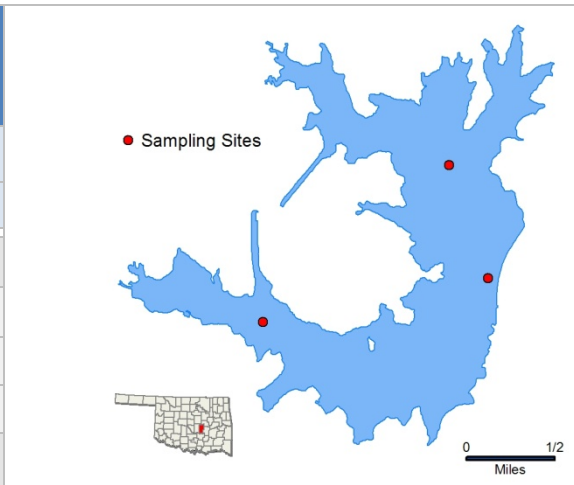
Notes

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.
*Did not collect for these parameters.
* 50-70% range is undetermined for DO.

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

Konawa

Sample Period	Times Visited	Sampling Sites
November 2011 – August 2012	4	3



General

Location	Seminole County	Click map for site data
Impoundment	1968	
Area	1,350 acres	
Capacity	23,000 acre-feet	
Purposes	Cooling Water	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	7 NTU	100% of values < OWQS of 25 NTU (n=12)
	Average Secchi Disk Depth	75 cm	
	Water Clarity Rating	Good	
	Chlorophyll-a	24 mg/m3	
	Trophic State Index	62	Previous value = 54
	Trophic Class	Hypereutrophic	
Profile	Salinity	0.57 – 0.64 ppt	
	Specific Conductivity	1144 – 1297 µS/cm	
	pH	8.02 – 8.77 pH units	
	Oxidation-Reduction Potential	-49 to 552 mV	
	Dissolved Oxygen	Up to 33% of water column < 2.0 mg/L in August	
Nutrients	Surface Total Nitrogen	0.85 mg/L to 1.45 mg/L	
	Surface Total Phosphorus	0.007 mg/L to 0.037 mg/L	
	Nitrogen to Phosphorus Ratio	42:1	Phosphorus limited

Beneficial Uses

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

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

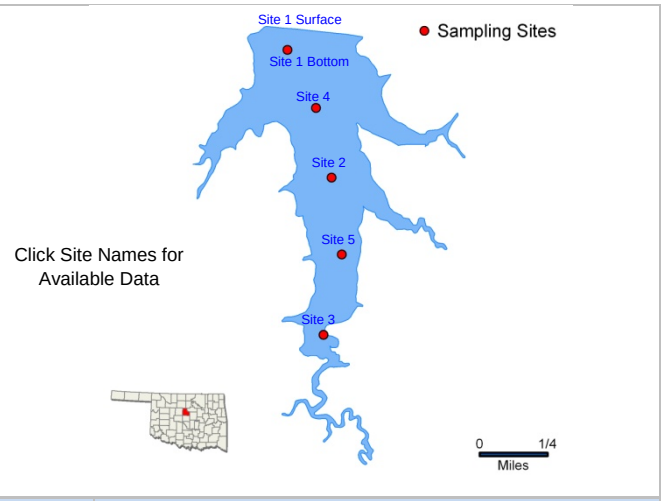
Notes

*Did not collect for these parameters
The PBCR beneficial use is considered not supporting for enterococci as 1 (10%) of the values exceeded the screening levels of 61.

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

Langston

Sample Period	Times Visited	Sampling Sites
November 2010 – July 2011	4	5



General

Location	Logan County	Click map for site data
Impoundment	1966	
Area	304 acres	
Capacity	5,792 acre-feet	
Purposes	Water Supply, Flood Control, and Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	13 NTU	5% of values > 25
	Average Secchi Disk Depth	73 cm	
	Water Clarity Rating	Average	
	Chlorophyll-a	4 mg/m3	
	Trophic State Index	45	Previous value = 44
	Trophic Class	Mesotrophic	
Profile	Salinity	0.16 – 0.19 ppt	
	Specific Conductivity	325.2 – 384.3 µS/cm	
	pH	6.49 – 8.54 pH units	Only 0.97% of values < 6.5 pH units
	Oxidation-Reduction Potential	-104 to 518 mV	
	Dissolved Oxygen	Up to 46% of water column < 2 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.27 mg/L to 0.64 mg/L	
	Surface Total Phosphorus	0.011 mg/L to 0.014 mg/L	
	Nitrogen to Phosphorus Ratio	41:1	Phosphorus limited

Beneficial Uses

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

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

Notes

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

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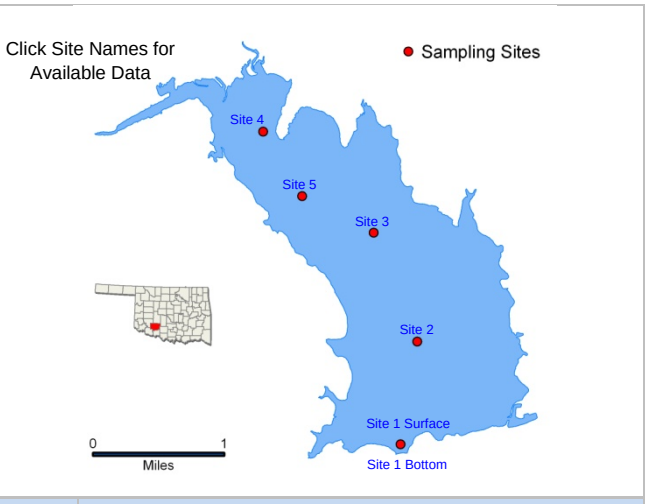
Lawtonka

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



General

Location	Comanche County	Click map for site data
Impoundment	1905	
Area	2,398 acres	
Capacity	56,574 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	7 NTU	100% of values <OWQS of 25 NTU
	Average Secchi Disk Depth	130 cm	
	Water Clarity Rating	Excellent	
	Chlorophyll-a	13 mg/m3	
	Trophic State Index	56	Previous Value= 60
	Trophic Class	Eutrophic	
Profile	Salinity	0.16– 0.21 ppt	
	Specific Conductivity	326.9 – 422.1 µS/cm	
	pH	6.55 – 8.73 pH units	
	Oxidation-Reduction Potential	-123 - 456 mV	
	Dissolved Oxygen	Up to 66% of water column < 2 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.35 mg/L to 0.88 mg/L	
	Surface Total Phosphorus	0.015mg/L to 0.030 mg/L	
	Nitrogen to Phosphorus Ratio	22:1	Phosphorus limited

Beneficial Uses

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

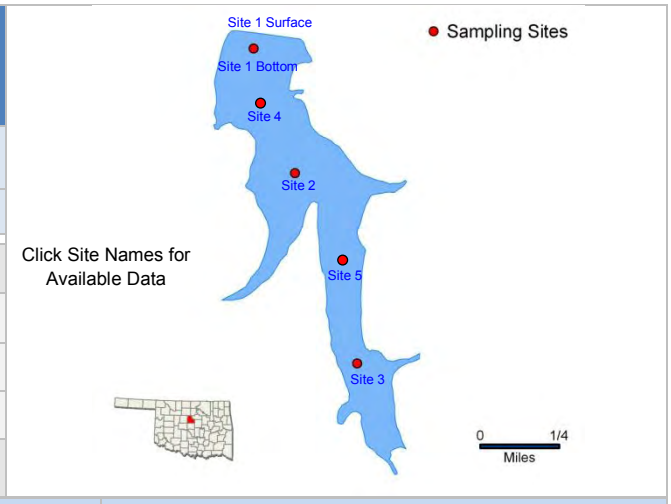
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes *Did not collect for these parameters

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

Liberty

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



General

Location	Logan County	Click map for site data
Impoundment	1948	
Area	167 acres	
Capacity	2,740 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	21 NTU	16.7% of values > OWQS of 25 NTU
	Average True Color	20 units	100% of values < OWQS of 70
	Average Secchi Disk Depth	42 cm	
	Water Clarity Rating	good	
	Trophic State Index	67	
	Trophic Class	hypereutrophic	
Profile	Salinity	0.22 – 0.30 ppt	
Profile	Specific Conductivity	439.1 – 580.5 µS/cm	
Profile	pH	7.94 – 8.48 pH units	Neutral to slightly alkaline
Profile	Oxidation-Reduction Potential	404-544 mV	
Profile	Dissolved Oxygen		
Nutrients	Surface Total Nitrogen	0.82 mg/L to 1.19mg/L	
Nutrients	Surface Total Phosphorus	0.056 mg/L to 0.110 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	16:1	Phosphorus limited

Beneficial Uses

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

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

Notes

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

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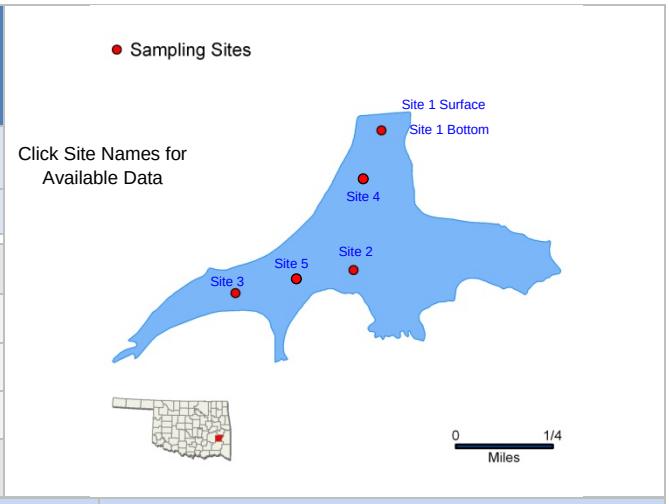
Lloyd Church (Wilburton)

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



General

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

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	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	
Profile	Salinity	0.0 – 0.01 ppt	
Profile	Specific Conductivity	25.4 – 71.9 µS/cm	
Profile	pH	5.9 – 7.51 pH units	26% of values <6.5 pH units
Profile	Oxidation-Reduction Potential	79 -503 mV	
Profile	Dissolved Oxygen	Up to 62% of water column < 2 mg/L in August	
Nutrients	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	
Nutrients	Nitrogen to Phosphorus Ratio	12:1	Phosphorus limited

Beneficial Uses

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

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

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

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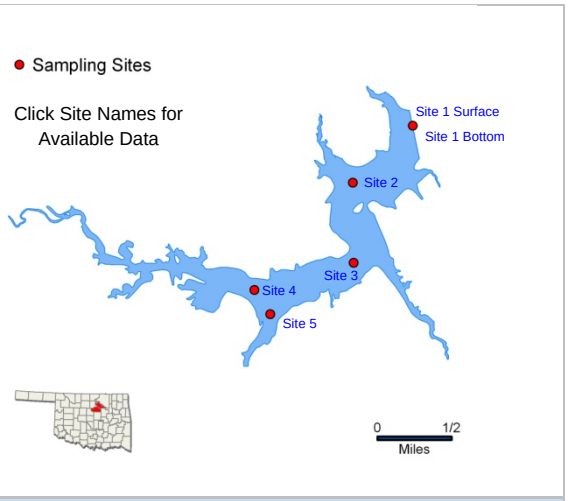
Lone Chimney

Sample Period	Times Visited	Sampling Sites
November 2010 – June 2011	4	5



General

Location	Pawnee County	Click map for site data
Impoundment	1984	
Area	550 acres	
Capacity	6,200 acre-feet	
Purposes	Water Supply, Recreation and Flood Control	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	15 NTU	1% of values >OWQS of 25 NTU
	Average Secchi Disk Depth	67 cm	
	Water Clarity Rating	Good	
	Chlorophyll-a	10 mg/m3	
	Trophic State Index	53	Previous Value=53
	Trophic Class	Eutrophic	
Profile	Salinity	0.1– 0.14 ppt	
	Specific Conductivity	223.2 – 290.9 µS/cm	TDS= 152 g/L
	pH	6.78 – 8.24 pH units	
	Oxidation-Reduction Potential	64 - 449 mV	
	Dissolved Oxygen	Up to 50% of water column < 2 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.59 mg/L to 0.74 mg/L	
	Surface Total Phosphorus	0.018 mg/L to 0.034 mg/L	
	Nitrogen to Phosphorus Ratio	19:1	Phosphorus limited

Beneficial Uses

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

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

Notes

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

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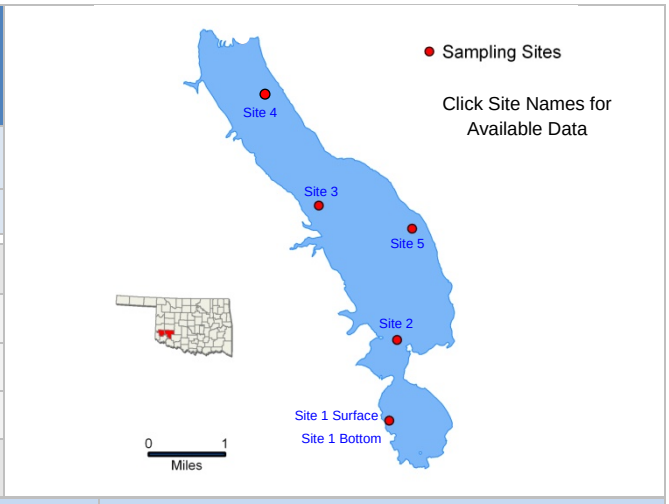
Lugert-Altus

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



General

Location	Greer County	Click map for site data
Impoundment	1947	
Area	6,260 acres	
Capacity	132,830 acre-feet	
Purposes	Water Supply, Flood Control, Irrigation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	21 NTU	11% of values >OWQS of 25 NTU
	Average Secchi Depth	64 cm	
	Water Clarity Rating	Fair	
	Chlorophyll-a	16 mg/m3	
	Trophic State Index	58	Previous Value= 59
	Trophic Class	Eutrophic	
Profile	Salinity	1.23 – 1.64 ppt	
	Specific Conductivity	2295 –3037 µS/cm	
	pH	7.65 – 8.43 pH units	
	Oxidation-Reduction Potential	257 - 443 mV	
	Dissolved Oxygen	All data are above screening level	
Nutrients	Surface Total Nitrogen	0.1mg/L to 0.99 mg/L	
	Surface Total Phosphorus	0.025 mg/L to 0.080 mg/L	
	Nitrogen to Phosphorus Ratio	17:1	Phosphorus limited

Beneficial Uses

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

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

Notes

*This parameter not collected 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

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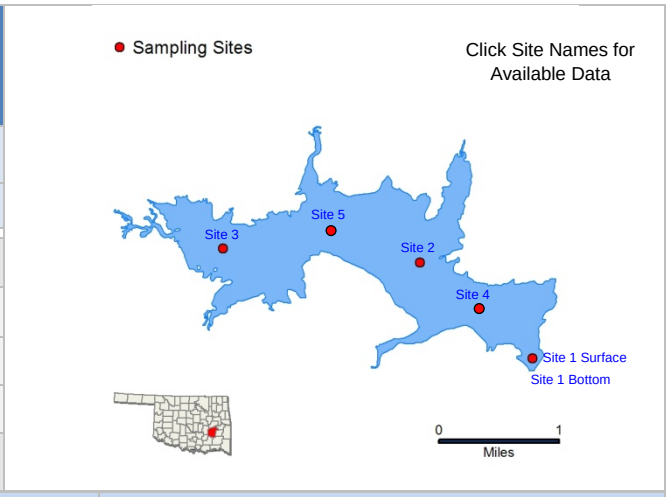
McAlester

Sample Period	Times Visited	Sampling Sites
November 2008 – July 2009	4	3



General

Location	Pittsburg County	Click map for site data
Impoundment	1930	
Area	1,521 acres	
Capacity	13,398 acre feet	
Purposes	Water Supply and Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	34 NTU	50% of values > OWQS of 25 NTU (n=12)
	Average True Color		Did not collect for true color
	Average Secchi Disk Depth	38 cm	
	Water Clarity Rating	Average	
	Trophic State Index	54	Previous value = 50
	Trophic Class	Eutrophic	
Profile	Salinity	0.00 – 0.07 ppt	
Profile	Specific Conductivity	97.6 – 151.2 µS/cm	
Profile	pH	6.72 – 7.64 pH units	
Profile	Oxidation-Reduction Potential	74 to 514 mV	
Profile	Dissolved Oxygen	Up to 42% of water column < 2.0 mg/L in July	
Nutrients	Surface Total Nitrogen	0.43 mg/L to 0.91 mg/L	
Nutrients	Surface Total Phosphorus	0.006 mg/L to 0.082 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	15:1	Phosphorus limited

Beneficial Uses

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

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

Notes

*Did not collect for these parameters
The PBCR beneficial use cannot be assessed as minimum data requirement were not met due to QA/QC issues for *E.coli*.

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

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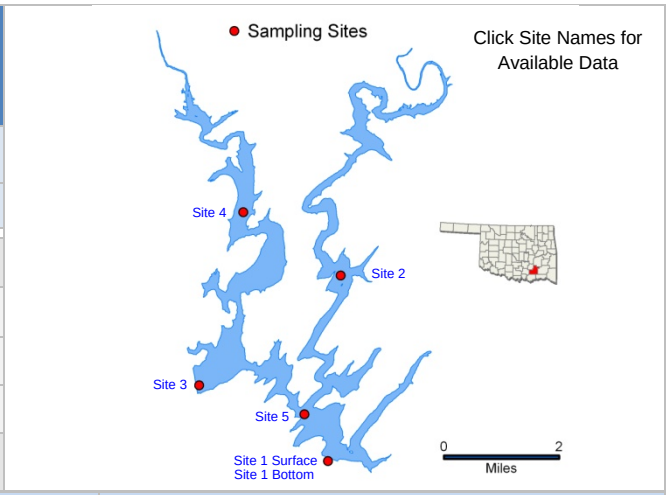
McGee Creek

Sample Period	Times Visited	Sampling Sites
November 2008 – August 2009	4	5



General

Location	Atoka County	Click map for site data
Impoundment	1987	
Area	3,810 acres	
Capacity	113,930 acre-feet	
Purposes	Water Supply, Recreation, Water Quality Control, Flood Control, Fish & Wildlife	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	4 NTU	100% of values < OWQS of 25 NTU (n=20)
	Average True Color		Did not collect for true color
	Average Secchi Disk Depth	149 cm	
	Water Clarity Rating	Excellent	
	Trophic State Index	46	Previous value = 43
	Trophic Class	Mesotrophic	
Profile	Salinity	0.00 – 0.04 ppt	
Profile	Specific Conductivity	52.2 – 97.1 µS/cm	
Profile	pH	5.71 – 7.56 pH units	41% of values < 6.50 pH units
Profile	Oxidation-Reduction Potential	-6 to 544 mV	
Profile	Dissolved Oxygen	Up to 76% of water column < 2.0 mg/L in August	Occurred at site 1, the dam
Nutrients	Surface Total Nitrogen	0.29 mg/L to 0.61 mg/L	
Nutrients	Surface Total Phosphorus	0.005 mg/L to 0.023 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	30:1	Phosphorus limited

Beneficial Uses

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

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

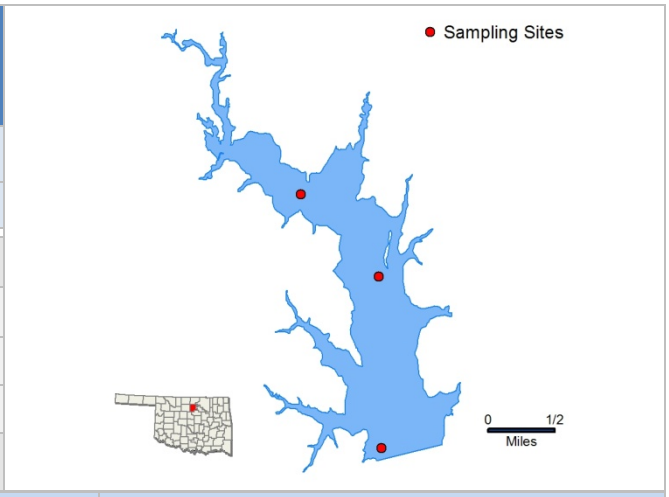
Notes

*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
*Did not collect for these parameters

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

McMurtry

Sample Period	Times Visited	Sampling Sites
October 2011 – July 2012	4	3



General

Location	Noble County	Click map for site data
Impoundment	1971	
Area	1,155 acres	
Capacity	19,733 acre feet	
Purposes	Water Supply, Flood Control, and Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	20 NTU	42% of values > OWQS of 25 NTU (n=12)
	Average Secchi Disk Depth	52 cm	
	Water Clarity Rating	Average	
	Chlorophyll-a	8 mg/m3	
	Trophic State Index	51	Previous value = 55
	Trophic Class	Eutrophic	
Profile	Salinity	0.17 – 0.23 ppt	
	Specific Conductivity	354 – 479 µS/cm	
	pH	7.18 – 8.41 pH units	
	Oxidation-Reduction Potential	55 to 67 mV	
	Dissolved Oxygen	Up to 50% of water column < 2.0 mg/L in July	
Nutrients	Surface Total Nitrogen	0.57 mg/L to 0.78 mg/L	
	Surface Total Phosphorus	0.005 mg/L to 0.030 mg/L	
	Nitrogen to Phosphorus Ratio	49:1	Phosphorus limited

Beneficial Uses

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

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

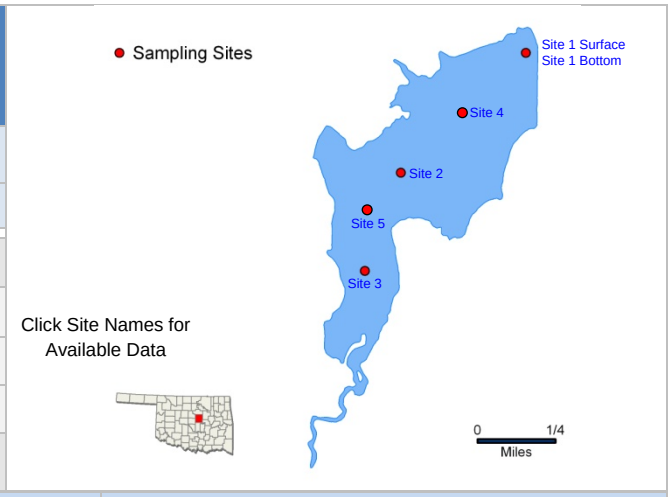
Notes

** N/A – parameters not collected in current sample year.*

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

Meeker

Sample Period	Times Visited	Sampling Sites
October 2008 – July 2009	4	5



General

Location	Lincoln County	Click map for site data
Impoundment	1970	
Area	250 acres	
Capacity	1,818 acre-feet	
Purposes	Water Supply, Recreation, Flood Control	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	143 NTU	100% of values > OWQS of 25 NTU (n=12)
	Average True Color		Did not collect for true color
	Average Secchi Disk Depth	10 cm	
	Water Clarity Rating	Poor	
	Trophic State Index	50	Previous value = 50
	Trophic Class	Mesotrophic	
Profile	Salinity	0.10 – 0.11 ppt	
	Specific Conductivity	208.9 – 231.5 µS/cm	
	pH	7.33 – 8.37 pH units	
	Oxidation-Reduction Potential	213 to 468 mV	
	Dissolved Oxygen	All data are above screening level of 2.0 mg/L	
Nutrients	Surface Total Nitrogen	0.73 mg/L to 1.07 mg/L	
	Surface Total Phosphorus	0.062 mg/L to 0.105 mg/L	
	Nitrogen to Phosphorus Ratio	11:1	Phosphorus limited, possibly co-limited

Beneficial Uses

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

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

Notes

*Did not collect for these parameters

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

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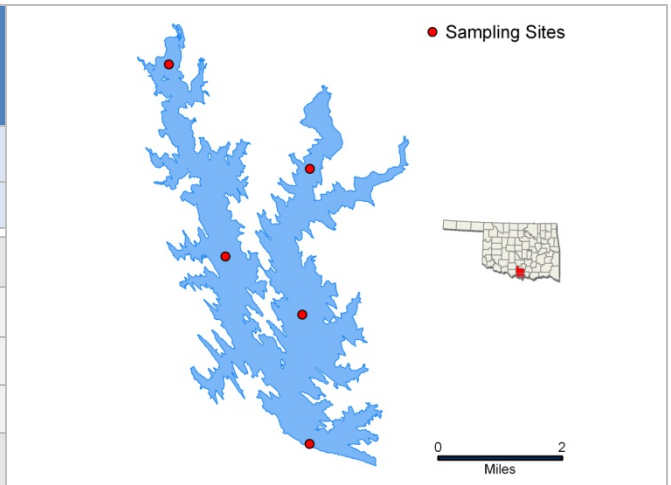
Murray

Sample Period	Times Visited	Sampling Sites
November 2011 – July 2012	4	5



General

Location	Love County	Click map for site data
Impoundment	1937	
Area	5,728 acres	
Capacity	153,250 acre-feet	
Purposes	Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	6 NTU	100% of values < OWQS of 25 NTU (n=20)
	Average Secchi Disk Depth	141 cm	
	Water Clarity Rating	Excellent	
	Chlorophyll-a	2 mg/m3	
	Trophic State Index	37	Previous value = 37
	Trophic Class	Oligotrophic	
Profile	Salinity	0.14 – 0.18 ppt	
	Specific Conductivity	299 – 368 µS/cm	
	pH	7.54 – 9.53 pH units	Only 8% of values > 9 pH units
	Oxidation-Reduction Potential	121 to 549 mV	
	Dissolved Oxygen	Up to 48% of water column < 2.0 mg/L in July	
Nutrients	Surface Total Nitrogen	0.28 mg/L to 0.61 mg/L	
	Surface Total Phosphorus	0.005 mg/L to 0.005 mg/L	
	Nitrogen to Phosphorus Ratio	79:1	Phosphorus limited

Beneficial Uses

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

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

Notes

* *N/A – parameters not collected in current sample year.*

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

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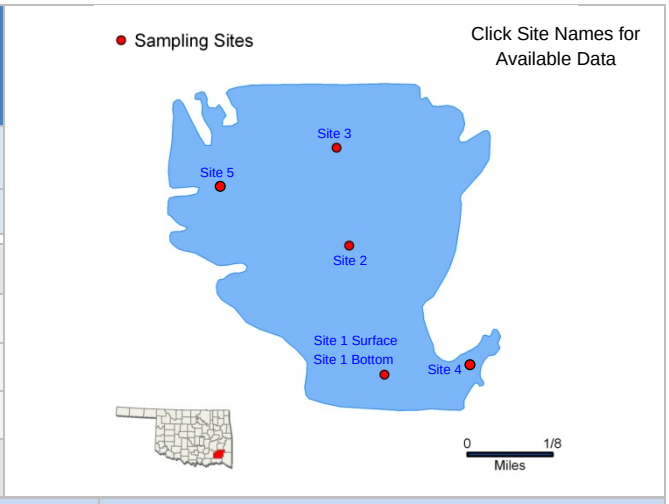
Nanih Waiya

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



General

Location	Pushmataha County
Impoundment	1958
Area	131 acres
Capacity	1,064 acre feet
Purposes	Recreation

Click map for site data

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	9 nephelometric turbidity units (NTU)	All values < 25 NTU
	Average True Color	45 units	25% of values > OWQS of 70
	Average Secchi Disk Depth	98 cm	
	Water Clarity Rating	average	
	Trophic State Index	45	Previous value = 45
	Trophic Class	mesotrophic	
Profile	Salinity	0.0 – 0.10 ppt	
Profile	Specific Conductivity	63 – 262 µS/cm	
Profile	pH	6.31 – 8.22 pH units	4 values (6.5%) <6.5 pH units
Profile	Oxidation-Reduction Potential	5 to 576 mV	
Profile	Dissolved Oxygen	Up to 42% of water column < 2 mg/L in August	Occurred at site 1
Nutrients	Surface Total Nitrogen	0.32 mg/L to 0.70 mg/L	
Nutrients	Surface Total Phosphorus	0.018 mg/L to 0.032 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	18:1	Phosphorus limited

Beneficial Uses

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

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

Notes

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

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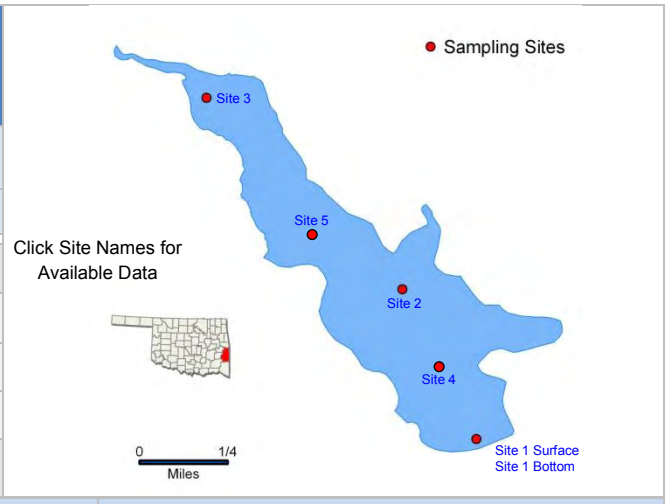
New Spiro

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



General

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

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	18 NTU	8% of values >OWQS of 25 NTU
	Average True Color	26 units	100% of values < OWQS of 70
	Average Secchi Disk Depth	47 cm	
	Water Clarity Rating	good	
	Trophic State Index	68	
	Trophic Class	hypereutrophic	
Profile	Salinity	0.04 – 0.09 ppt	
Profile	Specific Conductivity	106.8 – 155.4 µS/cm	
Profile	pH	7.09 – 9.24 pH units	10% of values > 9.0 pH units
Profile	Oxidation-Reduction Potential	121 - 483 mV	
Profile	Dissolved Oxygen	Up to 33% of water column < 2 mg/L in August	Occurred at site 2
Nutrients	Surface Total Nitrogen	0.98 mg/L to 1.68 mg/L	
Nutrients	Surface Total Phosphorus	0.076 mg/L to 0.170 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	11:1	Phosphorus limited

Beneficial Uses

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

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

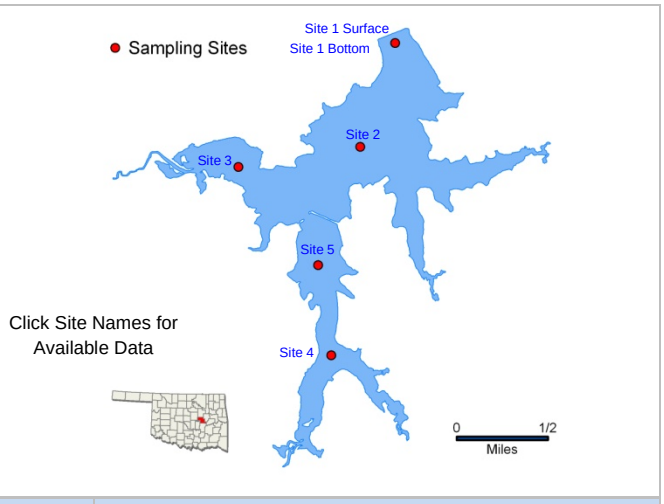
Notes

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

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

Okemah

Sample Period	Times Visited	Sampling Sites
October 2011 - July 2012	4	5



General

Location	Okfuskee County	Click map for site data
Impoundment		
Area	13,100 acre-feet	
Capacity	Water Supply, Recreation	
Purposes	761 acres	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	10 NTU	100% of values < OWQS of 25 NTU (n=15)
	Average Secchi Disk Depth	72 cm	
	Water Clarity Rating	Good	
	Chlorophyll-a	5 mg/m3	
	Trophic State Index	46	Previous value = 46
	Trophic Class	Mesotrophic	
Profile	Salinity	0.10– 0.14ppt	
	Specific Conductivity	209 –307 µS/cm	
	pH	6.79 – 8.08 pH units	
	Oxidation-Reduction Potential	138.5 - 565 mV	
	Dissolved Oxygen	Up to 40% of water column < 2 mg/L in July	
Nutrients	Surface Total Nitrogen	0.46 mg/L to 0.70 mg/L	
	Surface Total Phosphorus	0.005 mg/L to 0.013 mg/L	
	Nitrogen to Phosphorus Ratio	91:1	Phosphorus limited

Beneficial Uses

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

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

Notes

- *N/A – parameters not collected in current sample year.*

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

Okmulgee

Sample Period	Times Visited	Sampling Sites
November 2010 – June 2011	4	5

General

Location	Okmulgee County	Click map for site data
Impoundment	1928	
Area	668 acres	
Capacity	14,170 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	8 NTU	100% of values <OWQS of 25 NTU
	Average Secchi Disk Depth	116	
	Water Clarity Rating	Excellent	
	Chlorophyll-a	6 mg/m3	
	Trophic State Index	48	Previous Value= 46
	Trophic Class	Mesotrophic	
Profile	Salinity	0.05– 0.06 ppt	
	Specific Conductivity	118.6 – 136.9 µS/cm	
	pH	6.18– 7.62 pH units	12% of values < 6.5 pH units
	Oxidation-Reduction Potential	270 - 441 mV	
	Dissolved Oxygen	Up to 54% of water column < 2 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.29 mg/L to 0.56 mg/L	
	Surface Total Phosphorus	0.010 mg/L to 0.030 mg/L	
	Nitrogen to Phosphorus Ratio	25:1	Phosphorus limited

Beneficial Uses

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

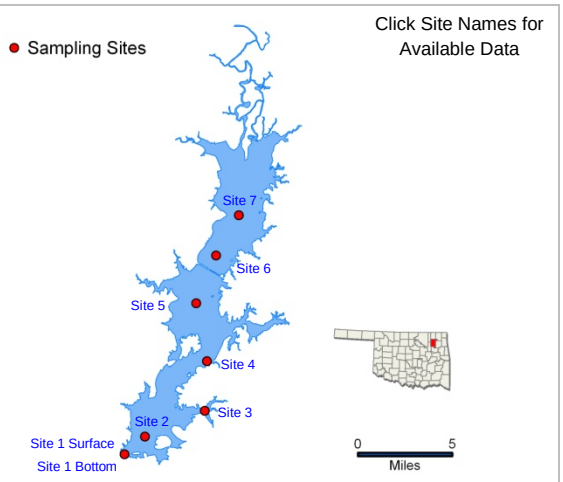
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes *Did not collect for this parameter

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

Oologah

Sample Period	Times Visited	Sampling Sites
February 2012 – August 2012	4	7



General

Location	Rogers County	Click map for site data
Impoundment	1963	
Area	29,460 acres	
Capacity	553,400 acre feet	
Purposes	Water Supply, Flood Control, and Navigation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	39 NTU	57% of values > OWQS of 25 NTU (n=21)
	Average Secchi Disk Depth	33 cm	
	Water Clarity Rating	Poor	
	Chlorophyll-a	8 mg/m3	
	Trophic State Index	51	Previous value = 54
	Trophic Class	Eutrophic	
Profile	Salinity	0.12 – 0.21 ppt	
	Specific Conductivity	254- 434 µS/cm	
	pH	7.44 – 8.73 pH units	Neutral to slightly alkaline
	Oxidation-Reduction Potential	134 to 582 mV	
	Dissolved Oxygen	All data are above the screening level of 2 mg/L	
Nutrients	Surface Total Nitrogen	0.22 mg/L to 1.46 mg/L	
	Surface Total Phosphorus	0.005 mg/L to 0.132 mg/L	
	Nitrogen to Phosphorus Ratio	14:1	Phosphorus limited

Beneficial Uses

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

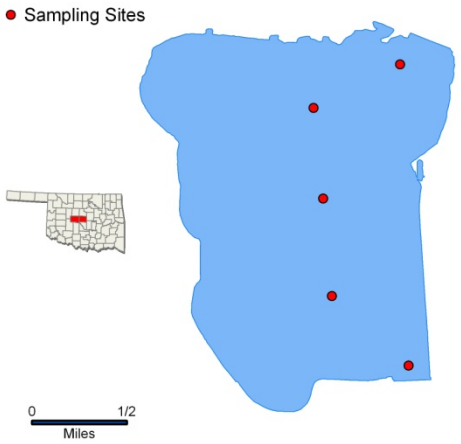
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes * *N/A – parameters not collected in current sample year.*

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

Overholser

Sample Period	Times Visited	Sampling Sites
December 2011 – August 2012	4	5



General

Location	Oklahoma County	Click map for site data
Impoundment	1919	
Area	1,500 acres	
Capacity	15,000 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	42 NTU	91% of values > OWQS of 25 NTU (n=11)
	Average Secchi Disk Depth	19 cm	
	Water Clarity Rating	Poor	
	Chlorophyll-a	49 mg/m3	
	Trophic State Index	69	Previous value = 67
	Trophic Class	Hypereutrophic	
Profile	Salinity	0.52 – 0.72 ppt	
	Specific Conductivity	1051 – 1449 µS/cm	
	pH	8.14– 8.88 pH units	
	Oxidation-Reduction Potential	225 - 482 mV	
	Dissolved Oxygen		Not stratified during any sampling interval
Nutrients	Surface Total Nitrogen	1.2 mg/L to 2.14 mg/L	
	Surface Total Phosphorus	0.152 mg/L to 0.427 mg/L	
	Nitrogen to Phosphorus Ratio	6:1	Possibly co- limited

Beneficial Uses

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

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

Notes

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

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

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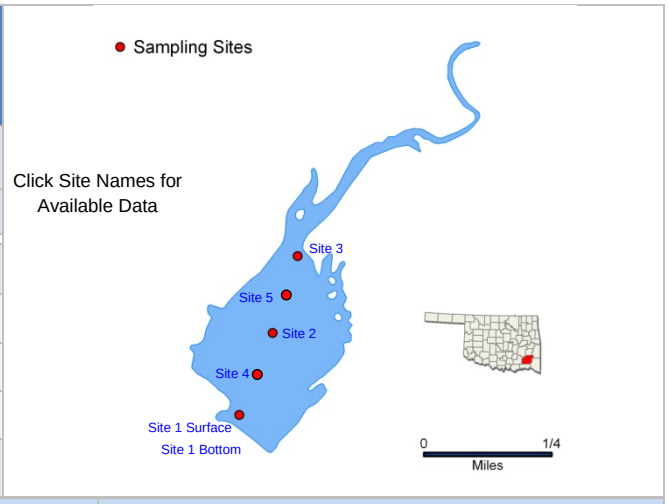
Ozzie Cobb

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



General

Location	Pushmataha County	Click map for site data
Impoundment	1958	
Area	116 acres	
Capacity	833 acre feet	
Purposes	Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	12 nephelometric turbidity units (NTU)	All values < 25 NTU
	Average True Color	51 units	25% of values > OWQS of 70
	Average Secchi Disk Depth	56 cm	
	Water Clarity Rating	average	
	Trophic State Index	59	Previous value = 55
	Trophic Class	eutrophic	
Profile	Salinity	0.00 – 0.20 ppt	
	Specific Conductivity	50.6 - 311 µS/cm	
	pH	6.32 – 7.96 pH units	7 (13%) of values < 6.5
	Oxidation-Reduction Potential	15 to 543 mV	
	Dissolved Oxygen	Up to 50% of water column < 2 mg/L in August	Occurred at site 1
Nutrients	Surface Total Nitrogen	0.47 mg/L to 0.94 mg/L	
	Surface Total Phosphorus	0.034 mg/L to 0.072 mg/L	
	Nitrogen to Phosphorus Ratio	17:1	Phosphorus limited

Beneficial Uses

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

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

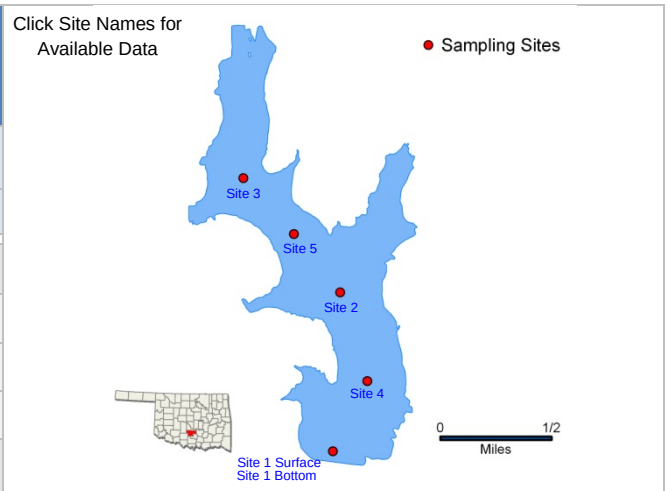
Notes

*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. **This is an NLW waterbody in the OWQS.*

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

Pauls Valley City

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



General

Location	Garvin County	Click map for site data
Impoundment	1954	
Area	750 acres	
Capacity	8,730 acre feet	
Purposes	Water Supply and Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	43 nephelometric turbidity units (NTU)	80% of values > 25 NTU
	Average True Color	126 units	75% of values > OWQS of 70
	Average Secchi Disk Depth	37 cm	
	Water Clarity Rating	poor	
	Trophic State Index	50	Previous value = 49
	Trophic Class	mesotrophic	
Profile	Salinity	0.10 – 0.12 ppt	
Profile	Specific Conductivity	206.9 - 271 µS/cm	
Profile	pH	7.14 – 8.59 pH units	Neutral to slightly alkaline
Profile	Oxidation-Reduction Potential	82 to 494 mV	
Profile	Dissolved Oxygen	Up to 44% of water column < 2 mg/L in July	Occurred at site 1
Nutrients	Surface Total Nitrogen	0.44 mg/L to 0.98 mg/L	
Nutrients	Surface Total Phosphorus	0.018 mg/L to 0.078 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	17:1	Phosphorus limited

Beneficial Uses

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

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

Notes

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

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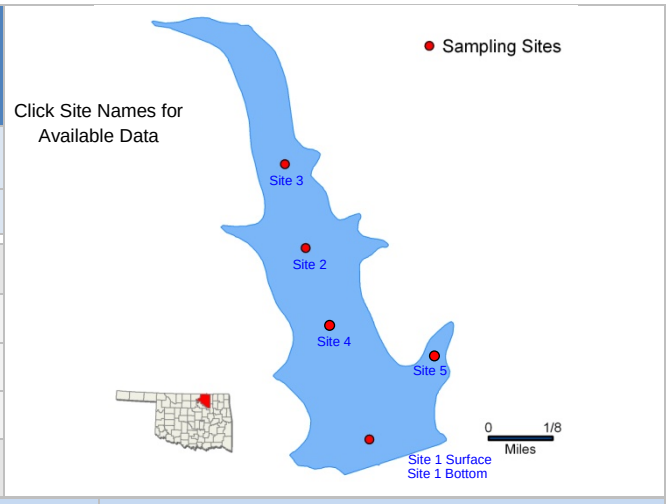
Pawhuska

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



General

Location	Osage County	Click map for site data
Impoundment	1936	
Area	96 acres	
Capacity	3,600 acre feet	
Purposes	Water Supply and Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	3 nephelometric turbidity units (NTU)	All values < 25 NTU
	Average True Color	21 units	All values < OWQS of 70
	Average Secchi Disk Depth	195 cm	
	Water Clarity Rating	excellent	
	Trophic State Index	41	Previous value = 39
	Trophic Class	mesotrophic	
Profile	Salinity	0.15 – 0.27 ppt	
	Specific Conductivity	311.1 – 523.1 µS/cm	
	pH	6.91 – 8.66 pH units	Neutral to slightly alkaline
	Oxidation-Reduction Potential	-114 to 485 mV	
	Dissolved Oxygen	Up to 54% of water column < 2 mg/L in July	Occurred at site 1
Nutrients	Surface Total Nitrogen	0.24 mg/L to 0.46 mg/L	
	Surface Total Phosphorus	0.005 mg/L to 0.009 mg/L	
	Nitrogen to Phosphorus Ratio	51:1	Phosphorus limited

Beneficial Uses

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

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

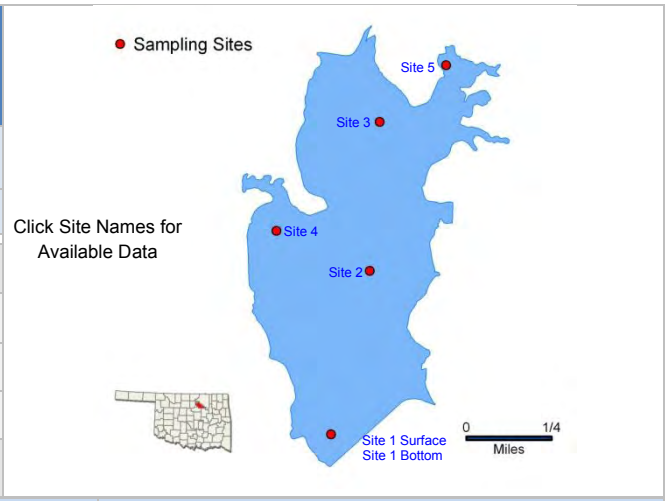
Notes

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
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

Pawnee

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



General

Location	Pawnee County	Click map for site data
Impoundment	1932	
Area	257 acres	
Capacity	3,855 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	22 NTU	30% of values > OWQS of 25 NTU
	Average True Color	66 units	50% of values > OWQS of 70
	Average Secchi Disk Depth	44 cm	
	Water Clarity Rating	average	
	Trophic State Index	59	
	Trophic Class	eutrophic	
Profile	Salinity	0.09– 0.16 ppt	
Profile	Specific Conductivity	205.9 – 331 µS/cm	
Profile	pH	7.25 – 8.69 pH units	Neutral to slightly alkaline
Profile	Oxidation-Reduction Potential	73 - 506 mV	
Profile	Dissolved Oxygen	Up to 38% of water column < 2 mg/L in August	Occurred at sites 1 & 2
Nutrients	Surface Total Nitrogen	0.80 mg/L to 1.25 mg/L	
Nutrients	Surface Total Phosphorus	0.023 mg/L to 0.060 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	24:1	Phosphorus limited

Beneficial Uses

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

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

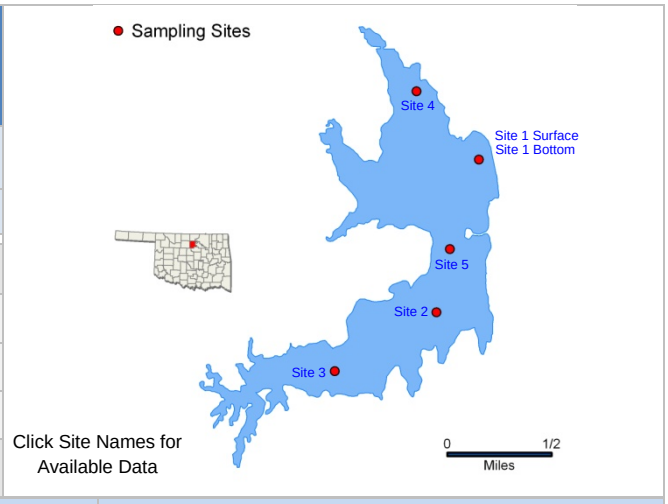
Notes

Available flow and rainfall data suggest that the peak in turbidity and color, which occurred in May is likely due to seasonal storm events, therefore Pawnee Lake will be listed as supporting its Fish & Wildlife Propagation (FWP) and Aesthetics beneficial uses.

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

Perry

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



General

Location	Noble County	Click map for site data
Impoundment	1937	
Area	614 acres	
Capacity	6,892 acre-feet	
Purposes	Water Supply, Recreation and Flood Control	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	75 NTU	100% of values > OWQS of 25 NTU
	Average True Color	143 units	50% of values > OWQS of 70
	Average Secchi Disk Depth	22 cm	
	Water Clarity Rating	poor	
	Trophic State Index	48	
	Trophic Class	mesotrophic	
Profile	Salinity	0.08– 0.21 ppt	
Profile	Specific Conductivity	181.9 – 415 µS/cm	
Profile	pH	6.90 – 8.19 pH units	Neutral to slightly alkaline
Profile	Oxidation-Reduction Potential	339 - 435mV	
Profile	Dissolved Oxygen	Up to 36% of water column < 2 mg/L in August	
Nutrients	Surface Total Nitrogen	0.50 mg/L to 1.35 mg/L	
Nutrients	Surface Total Phosphorus	0.027 mg/L to 0.253 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	9:1	Phosphorus limited

Beneficial Uses

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

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

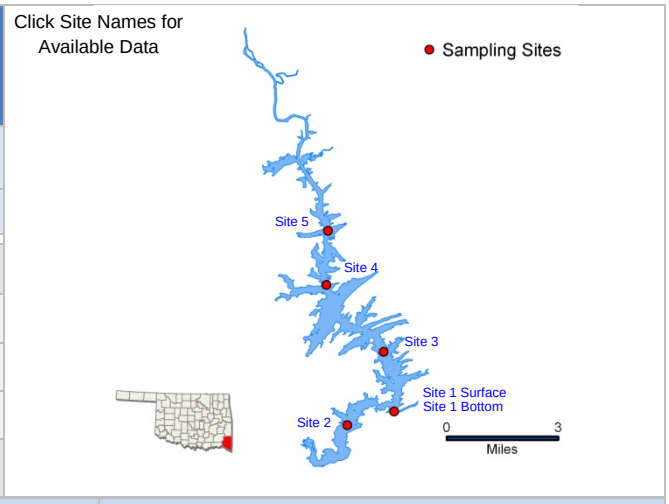
Notes

Available flow and rainfall data suggest that the peak in turbidity and color, which occurred in May is likely due to seasonal storm events, therefore Pawnee Lake will be listed as supporting its Fish & Wildlife Propagation (FWP) and Aesthetics beneficial uses.

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

Pine Creek

Sample Period	Times Visited	Sampling Sites
November 2010 – July 2011	4	5



General

Location	Mc Curtain County
Impoundment	1969
Area	3,750 acres
Capacity	53,750 acre feet
Purposes	Water Supply, Flood Control, Water quality Control, Fish and Wildlife, and Recreation

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	13 NTU	100% of Values < OWQS of 25
	Average Secchi Disk Depth	67 cm	
	Water Clarity Rating	Good	
	Chlorophyll-a	16 mg/m3	
	Trophic State Index	58	Previous value = 53
	Trophic Class	Eutrophic	
Profile	Salinity	0.0 – 0.03 ppt	
	Specific Conductivity	34.4 – 190.8 µS/cm	
	pH	5.34 – 8.49 pH units	67.7% of values < 6.5
	Oxidation-Reduction Potential	-23 to 500 mV	
	Dissolved Oxygen	Up to 71% of water column < 2 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.27 mg/L to 0.73 mg/L	
	Surface Total Phosphorus	0.021 mg/L to 0.060 mg/L	
	Nitrogen to Phosphorus Ratio	16:1	Phosphorus limited

Beneficial Uses

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

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

Notes

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

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

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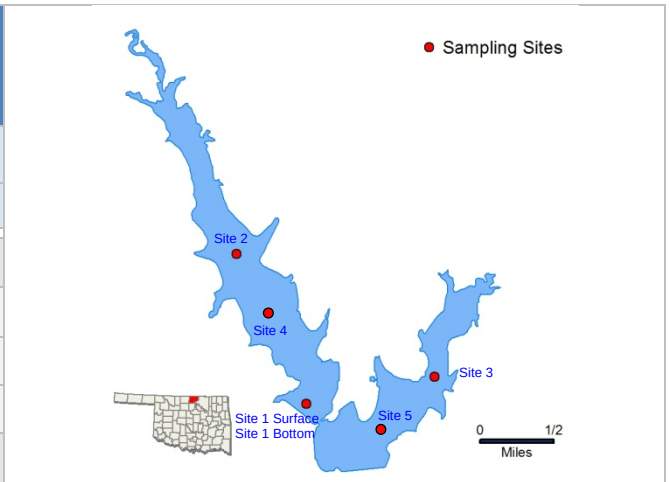
Ponca

Sample Period	Times Visited	Sampling Sites
November 2010 – July 2011	4	5



General

Location	Kay County	Click map for site data
Impoundment	1935	
Area	805 acres	
Capacity	14,440 acre feet	
Purposes	Water Supply and Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	11NTU	5% of values < OWQS of 25 NTU
	Average Secchi Disk Depth	78 cm	
	Water Clarity Rating	Good	
	Chlorophyll-a	15 mg/m3	
	Trophic State Index	57	Previous value = 61
	Trophic Class	Eutrophic	
Profile	Salinity	0.17 – 0.19 ppt	
	Specific Conductivity	340 – 376.8 µS/cm	
	pH	7.11 – 8.49 pH units	
	Oxidation-Reduction Potential	167 to 504 mV	
	Dissolved Oxygen	Up to 35% of water column < 2.0 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.49 mg/L to 0.81 mg/L	
	Surface Total Phosphorus	0.019 mg/L to 0.046 mg/L	
	Nitrogen to Phosphorus Ratio	20:1	Phosphorus limited

Beneficial Uses

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

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

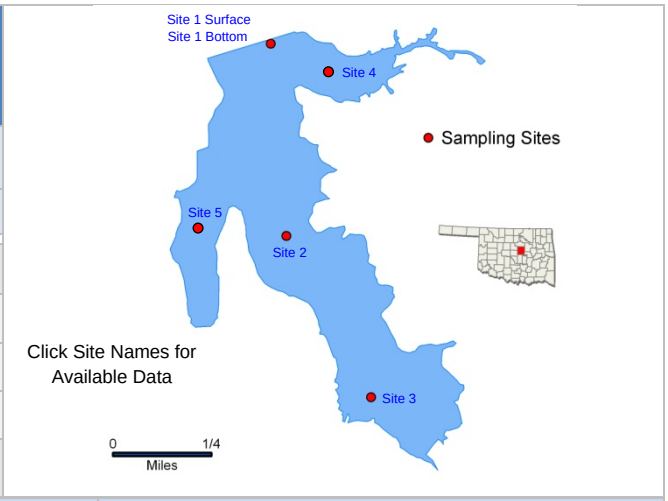
Notes

*Did not collect for these parameters
The PBCR beneficial use cannot be assessed as minimum data requirement were not met due to QA/QC issues for *E.coli* and enterococci.

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

Prague City

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



General

Location	Lincoln County	Click map for site data
Impoundment	84	
Area	225 acres	
Capacity	2,415 acre feet	
Purposes	Water Supply and Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	12 nephelometric turbidity units (NTU)	All values < 25 NTU
	Average True Color	46 units	10% of values > OWQS of 70
	Average Secchi Disk Depth	74 cm	
	Water Clarity Rating	good	
	Trophic State Index	48	Previous value = 52
	Trophic Class	mesotrophic	
Profile	Salinity	0.0 – 0.20 ppt	
Profile	Specific Conductivity	112 – 362 µS/cm	
Profile	pH	6.78 – 8.65 pH units	Neutral to slightly alkaline
Profile	Oxidation-Reduction Potential	-51 to 543 mV	
Profile	Dissolved Oxygen	57 - 63% of water column < 2 mg/L in August	Occurred at sites 1, 4 & 5
Nutrients	Surface Total Nitrogen	0.51 mg/L to 1.17 mg/L	
Nutrients	Surface Total Phosphorus	0.024 mg/L to 0.057 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	25:1	Phosphorus limited

Beneficial Uses

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

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

Notes

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

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

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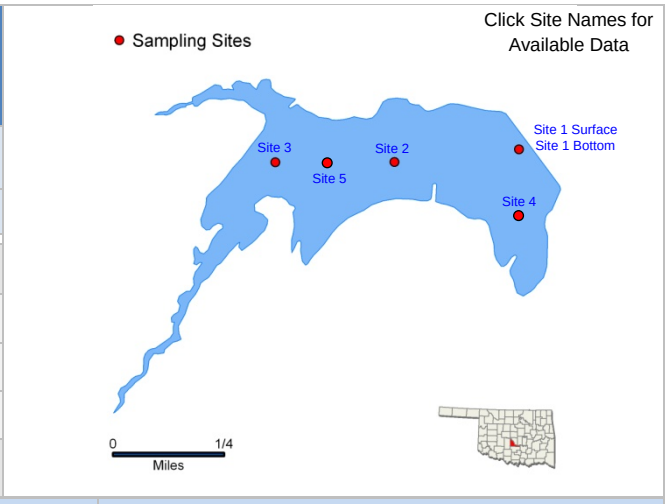
Purcell

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



General

Location	McClain County	Click map for site data
Impoundment	1930	
Area	150 acres	
Capacity	2,600 acre feet	
Purposes	Water Supply and Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	14 nephelometric turbidity units (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
	Trophic Class	eutrophic	
Profile	Salinity	0.19 – 0.23 ppt	
	Specific Conductivity	374 – 462.8 µS/cm	
	pH	7.17 – 8.37 pH units	Neutral to slightly alkaline
	Oxidation-Reduction Potential	18 to 645 mV	
	Dissolved Oxygen	Up to 50% of water column < 2 mg/L in August	Occurred at site 1 & 2
Nutrients	Surface Total Nitrogen	0.60 mg/L to 0.83 mg/L	
	Surface Total Phosphorus	0.018 mg/L to 0.041 mg/L	
	Nitrogen to Phosphorus Ratio	24:1	Phosphorus limited

Beneficial Uses

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

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

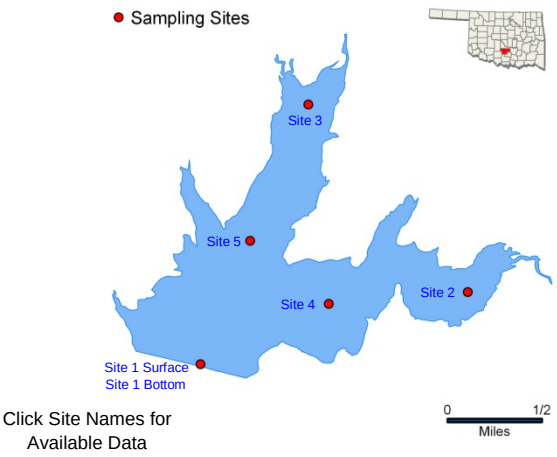
Notes

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
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

R.C. Longmire

Sample Period	Times Visited	Sampling Sites
November 2011 – August 2012	4	5



Click Site Names for Available Data

General

Location	Garvin County	Click map for site data
Impoundment	1989	
Area	935 acres	
Capacity	13,162 acre feet	
Purposes	Navigation, Hydropower, and Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	28 NTU	42% of values > OWQS of 25 NTU (n=12)
	Average Secchi Disk Depth	31 cm	All values < OWQS of 70
	Water Clarity Rating	Poor	
	Chlorophyll-a	28 mg/m3	
	Trophic State Index	63	Previous value = 57
	Trophic Class	Hypereutrophic	
Profile	Salinity	0.14 – 018 ppt	
	Specific Conductivity	305 – 389 µS/cm	
	pH	7.41 – 8.51 pH units	
	Oxidation-Reduction Potential	65 to 545 mV	
	Dissolved Oxygen	Up to 11% of water column < 2mg/L in August	Occurred at site 1
Nutrients	Surface Total Nitrogen	1.04 mg/L to 1.82 mg/L	
	Surface Total Phosphorus	0.006 mg/L to 0.060 mg/L	
	Nitrogen to Phosphorus Ratio	49:1	Phosphorus limited

Beneficial Uses

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

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

Notes

* *N/A – parameters not collected in current sample year.*

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

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Raymond Gary

Sample Period	Times Visited	Sampling Sites
November 2008 – August 2009	4	5

General

Location	Choctaw County	Click map for site data
Impoundment	1956	
Area	263 acres	
Capacity	1,681 acre feet	
Purposes	Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	11 NTU	100% of values < OWQS of 25 NTU (n=11)
	Average True Color		Did not collect for true color
	Average Secchi Disk Depth	55 cm	
	Water Clarity Rating	Average	
	Trophic State Index	55	Previous value = 55
	Trophic Class	Eutrophic	
Profile	Salinity	0.00 – 0.49 ppt	
Profile	Specific Conductivity	69.3 – 936.2 µS/cm	
Profile	pH	6.61 – 7.83 pH units	
Profile	Oxidation-Reduction Potential	83 to 521 mV	
Profile	Dissolved Oxygen	Up to 67% of water column < 2.0 mg/L in June	Occurred at site 1, the dam
Nutrients	Surface Total Nitrogen	0.30 mg/L to 0.82 mg/L	
Nutrients	Surface Total Phosphorus	0.005 mg/L to 0.048 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	17:1	Phosphorus limited

Beneficial Uses

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

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

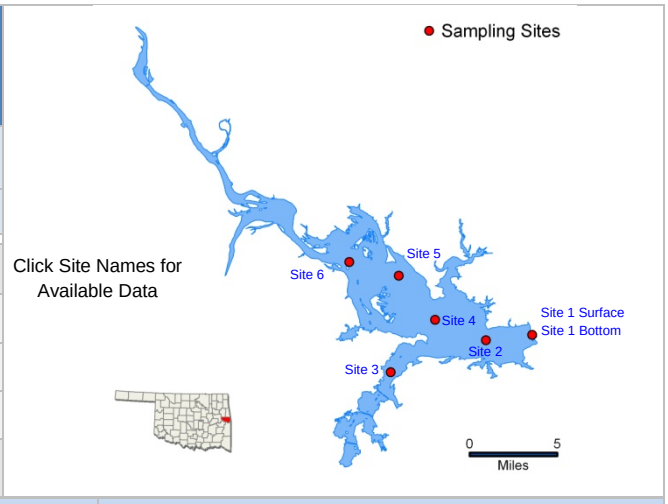
Notes

*Did not collect for these parameters
The PBCR beneficial use cannot be assessed as minimum data requirement were not met due to QA/QC issues for *E.coli*.

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

Robert S. Kerr

Sample Period	Times Visited	Sampling Sites
November 2010 – June 2011	4	6



General

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

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	30 NTU	63% of values > 25 NTU (n=24)
	Average Secchi Depth	57 cm	All values > OWQS of 70
	Water Clarity Rating	Fair	
	Chlorophyll-a	11 mg/m3	
	Trophic State Index	54	Previous value = 50
	Trophic Class	Eutrophic	
Profile	Salinity	0.09– 0.93 ppt	
	Specific Conductivity	190.2 – 1754 µS/cm	
	pH	7.25 – 8.52 pH units	Neutral to slightly alkaline
	Oxidation-Reduction Potential	301 to 448 mV	
	Dissolved Oxygen	All data are above screening level of 2.0 mg/L	
Nutrients	Surface Total Nitrogen	0.26 mg/L to 1.12 mg/L	
	Surface Total Phosphorus	0.048 mg/L to 0.124mg/L	
	Nitrogen to Phosphorus Ratio	9:1	Phosphorus limited

Beneficial Uses

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

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

Notes

**Did not collect for this parameter.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
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

Rocky

Sample Period	Times Visited	Sampling Sites
November 2011 –September 2012	4	3

General

Location	Washita County	Click map for site data
Impoundment	1933	
Area	347 acres	
Capacity	4,210 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	83 NTU	58% of values > OWQS of 25 NTU (n=12)
	Average Secchi Disk Depth	25 cm	
	Water Clarity Rating	Poor	
	Chlorophyll-a	46 mg/m3	
	Trophic State Index	68	Previous value = 73
	Trophic Class	Hypereutrophic	
Profile	Salinity	0.22 – 0.31 ppt	
	Specific Conductivity	448 – 631 µS/cm	
	pH	7.87 – 8.98 pH units	
	Oxidation-Reduction Potential	360 to 523 mV	
	Dissolved Oxygen	All data are above screening level of 2.0 mg/L	
Nutrients	Surface Total Nitrogen	1.59 mg/L to 3.66 mg/L	
	Surface Total Phosphorus	0171 mg/L to 0.316 mg/L	
	Nitrogen to Phosphorus Ratio	11:1	Phosphorus limited

Beneficial Uses

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

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

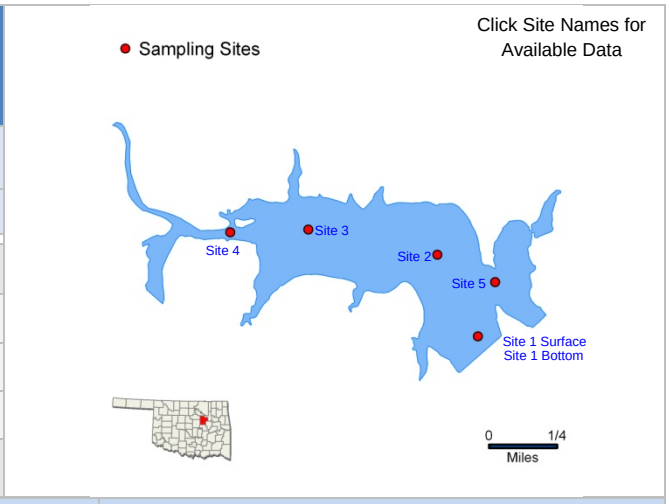
Notes

** N/A – parameters not collected in current sample year.*
*Currently, the lake is listed as a Nutrient Limited Watershed (NLW) in the Oklahoma Water Quality Standards (WQS). This listing means that the lake is considered threatened from nutrients until a more intensive study can confirm the Aesthetics beneficial use non-support status.

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

Sahoma

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



General

Location	Creek County
Impoundment	1947
Area	312 acres
Capacity	4,850 acre-feet
Purposes	Water Supply, Recreation

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	9 NTU	100% of values < OWQS of 25 NTU
	Average True Color	30 units	100% of values < OWQS of 70
	Average Secchi Disk Depth	73 cm	
	Water Clarity Rating	Fair	
	Trophic State Index	51	
	Trophic Class	eutrophic	
Profile	Salinity	0.08 – 0.09 ppt	
Profile	Specific Conductivity	184.1 – 203.1 µS/cm	
Profile	pH	7.02– 7.80 pH units	Neutral to slightly alkaline
Profile	Oxidation-Reduction Potential	125 - 451 mV	
Profile	Dissolved Oxygen	Up to 69% of water column < 2 mg/L in May	Occurred at site 1, the dam
Nutrients	Surface Total Nitrogen	0.58 mg/L to 0.74 mg/L	
Nutrients	Surface Total Phosphorus	0.023 mg/L to 0.039 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	22:1	Phosphorus limited

Beneficial Uses

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

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

Notes

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

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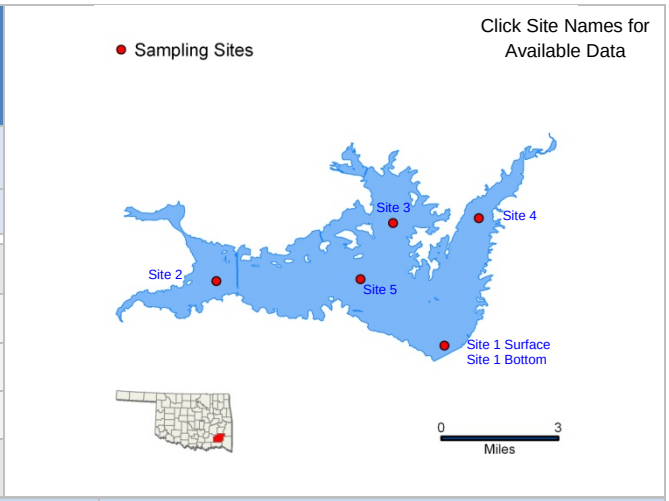
Sardis

Sample Period	Times Visited	Sampling Sites
November 2010 – July 2011	4	5



General

Location	Pushmataha County — Click map for site data
Impoundment	1970
Area	13,610 acres
Capacity	274,330 acre feet
Purposes	Flood Control, Waters Supply, Fish and Wildlife, and Recreation

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	16 NTU	21% of values > 25 NTU (n=20)
	Average Secchi Disk Depth	81 cm	30% of values > OWQS of 70
	Water Clarity Rating	Average	
	Chlorophyll-a	9 mg/m3	
	Trophic State Index	52	Previous value = 46
	Trophic Class	Eutrophic	
Profile	Salinity	0.01 – 0.02 ppt	
	Specific Conductivity	49.4 – 71.8 µS/cm	
	pH	5.5 – 7.77 pH units	35.7% of values < 6.5 pH units
	Oxidation-Reduction Potential	288 to 570 mV	
	Dissolved Oxygen	Up to 44% of water column < 2 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.16 mg/L to 0.47 mg/L	
	Surface Total Phosphorus	0.012 mg/L to 0.04 mg/L	
	Nitrogen to Phosphorus Ratio	16:1	Phosphorus limited

Beneficial Uses

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

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

Notes: *Available rainfall data suggest that the peak in turbidity and true color, which occurred in May is likely due to seasonal storm events, therefore Sardis Lake will be listed as supporting its Fish & Wildlife Propagation (FWP) and Aesthetics beneficial use for these parameters. * Did not collect for these parameters.*

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

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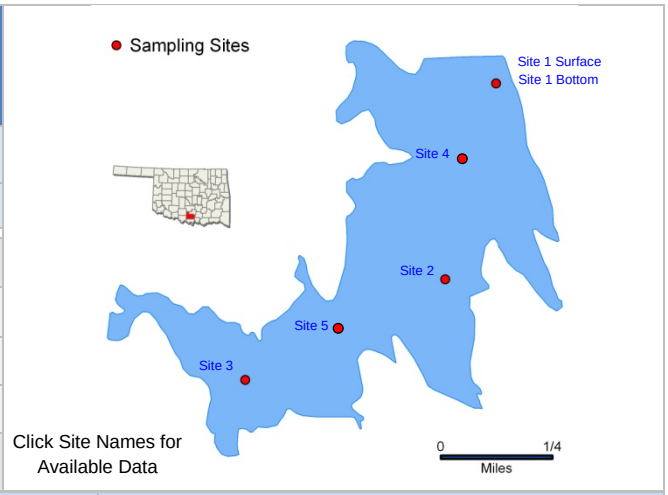
Scott King (Rock Creek)

Sample Period	Times Visited	Sampling Sites
October 2008 – July 2009	4	5



General

Location	Carter County	Click map for site data
Impoundment	1979	
Area	248 acres	
Capacity	3,588 acre-feet	
Purposes	Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	9 NTU	100% of values < OWQS of 25 NTU (n=12)
	Average True Color		Did not collect for true color
	Average Secchi Disk Depth	80 cm	
	Water Clarity Rating	Good	
	Trophic State Index	51	Previous value = 48
	Trophic Class	Eutrophic	
Profile	Salinity	0.10 – 0.15 ppt	
	Specific Conductivity	278.8 – 307 µS/cm	
	pH	6.96 – 8.53 pH units	
	Oxidation-Reduction Potential	-10 to 461 mV	
	Dissolved Oxygen	Up to 50% of water column < 2.0 mg/L in July	
Nutrients	Surface Total Nitrogen	0.55 mg/L to 0.80 mg/L	
	Surface Total Phosphorus	0.009 mg/L to 0.026 mg/L	
	Nitrogen to Phosphorus Ratio	39:1	Phosphorus limited

Beneficial Uses

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

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

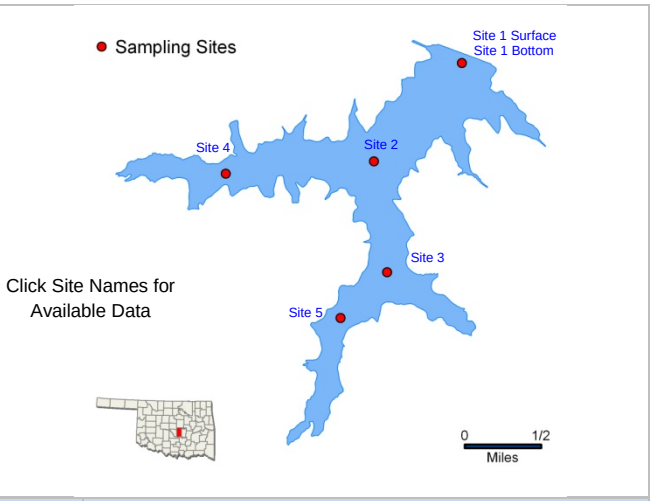
Notes

*Did not collect for these parameters
The PBCR beneficial use cannot be assessed as minimum data requirement were not met due to QA/QC issues for *Enterococci*.

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

Shawnee Twin No. 1

Sample Period	Times Visited	Sampling Sites
November 2010 – July 2011	4	5



General

Location	Pottawatomie County	Click map for site data
Impoundment	1935	
Area	1,336 acres	
Capacity	22,600 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	13 NTU	100% of value < OWQS of 25 NTU
	Average Secchi Disk Depth	103 cm	
	Water Clarity Rating	Average	
	Chlorophyll-a	5 mg/m3	
	Trophic State Index	46	Previous Value=41
	Trophic Class	Mesotrophic	
Profile	Salinity	0.11 – 0.13 ppt	
	Specific Conductivity	161.7 – 268.2 µS/cm	
	pH	7.32 – 8.57 pH units	
	Oxidation-Reduction Potential	180 to 402 mV	
	Dissolved Oxygen	Up to 31% of water column < 2 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.26 mg/L to 0.5 mg/L	
	Surface Total Phosphorus	0.008 mg/L to 0.014 mg/L	
	Nitrogen to Phosphorus Ratio	30:1	Phosphorus limited

Beneficial Uses

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

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

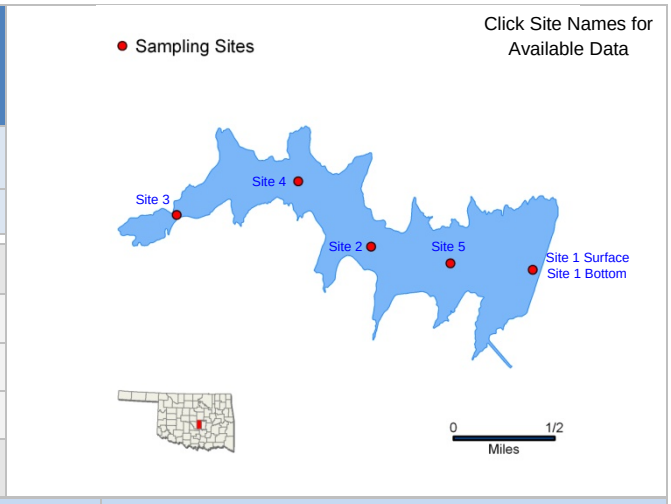
Notes

*Did not collect for these parameters.

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

Shawnee Twin No. 2

Sample Period	Times Visited	Sampling Sites
November 2010 – July 2011	4	5



General

Location	Pottawatomie County — Click map for site data
Impoundment	1960
Area	1,100 acres
Capacity	11,400 acre feet
Purposes	Waters Supply and Recreation

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	12 NTU	11% of values > OWQS of 25 NTU
	Average Secchi Disk Depth	80 cm	
	Water Clarity Rating	Good	
	Chlorophyll-a	9 mg/m3	
	Trophic State Index	52	Previous value = 43
	Trophic Class	Eutrophic	
Profile	Salinity	0.1 – 0.15 ppt	
	Specific Conductivity	224.6 – 301.6 µS/cm	TDS= 160 g/L
	pH	7.21 – 8.69 pH units	Neutral
	Oxidation-Reduction Potential	-67 to 451 mV	
	Dissolved Oxygen	Up to 45% of water column < 2 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.35 mg/L to 2.00 mg/L	
	Surface Total Phosphorus	0.010 mg/L to 0.026 mg/L	
	Nitrogen to Phosphorus Ratio	36:1	Phosphorus limited

Beneficial Uses

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

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

Notes

**Did not collect for these parameters.*

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

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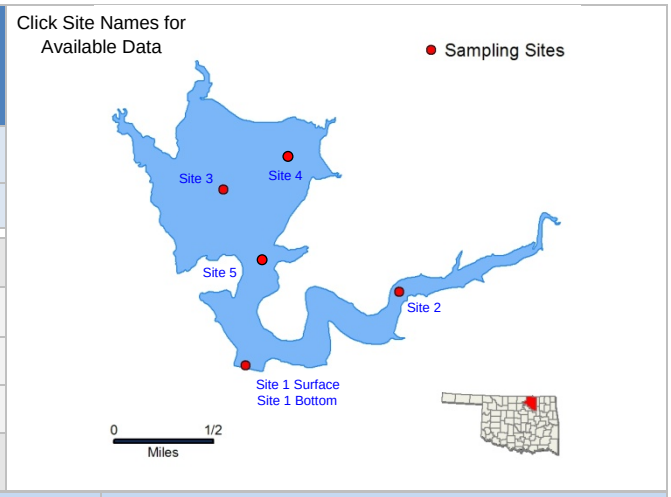
Shell

Sample Period	Times Visited	Sampling Sites
November 2008 – August 2009	4	5



General

Location	Osage County	Click map for site data
Impoundment	1922	
Area	573 acres	
Capacity	9,500 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	11 NTU	100% of values < OWQS of 25 NTU (n=12)
	Average True Color		Did not collect for true color
	Average Secchi Disk Depth	67 cm	
	Water Clarity Rating	Average	
	Trophic State Index	55	Previous value = 53
	Trophic Class	Eutrophic	
Profile	Salinity	0.07 – 0.10 ppt	
Profile	Specific Conductivity	130 – 196 µS/cm	
Profile	pH	6.33 – 8.58 pH units	Only 5% of values < 6.50 pH units
Profile	Oxidation-Reduction Potential	-17 to 507 mV	
Profile	Dissolved Oxygen	Up to 64% of water column < 2.0 mg/L in August	Occurred at site 1, the dam
Nutrients	Surface Total Nitrogen	0.72 mg/L to 0.94 mg/L	
Nutrients	Surface Total Phosphorus	0.022 mg/L to 0.038 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	28:1	Phosphorus limited

Beneficial Uses

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

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

Notes

*Did not collect for these parameters

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

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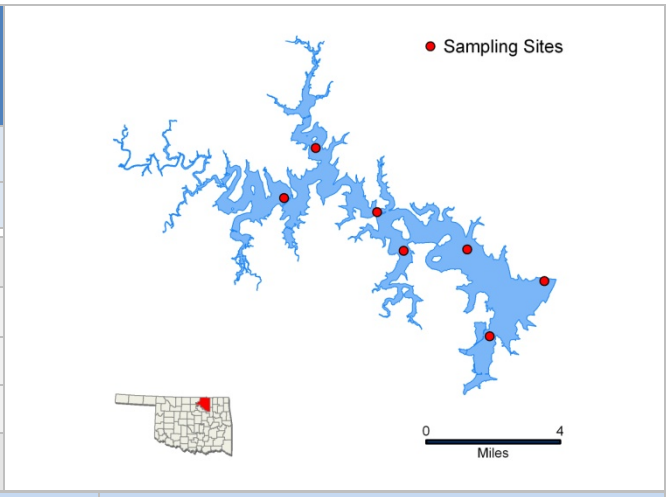
Skiatook

Sample Period	Times Visited	Sampling Sites
October 2011 – July 2012	4	7



General

Location	Osage County	Click map for site data
Impoundment	1984	
Area	10,190 acres	
Capacity	322,700 acre-feet	
Purposes	Flood Control, Water Supply, Water Quality Control, Recreation and Fish & Wildlife	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	21 NTU	14% of values > OWQS of 25 NTU (n=28)
	Average Secchi Disk Depth	82 cm	
	Water Clarity Rating	Good	
	Chlorophyll-a	5 mg/m3	
	Trophic State Index	47	Previous value = 48
	Trophic Class	Mesotrophic	
Profile	Salinity	0.09 – 0.24 ppt	
	Specific Conductivity	192 – 486 µS/cm	
	pH	6.72– 8.61 pH units	
	Oxidation-Reduction Potential	100 to 520 mV	
	Dissolved Oxygen	Up to 65% of water column < 2.0 mg/L in July	
Nutrients	Surface Total Nitrogen	0.28 mg/L to 1.31 mg/L	
	Surface Total Phosphorus	0.005 mg/L to 0.114 mg/L	
	Nitrogen to Phosphorus Ratio	39:1	Phosphorus limited

Beneficial Uses

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

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

Notes

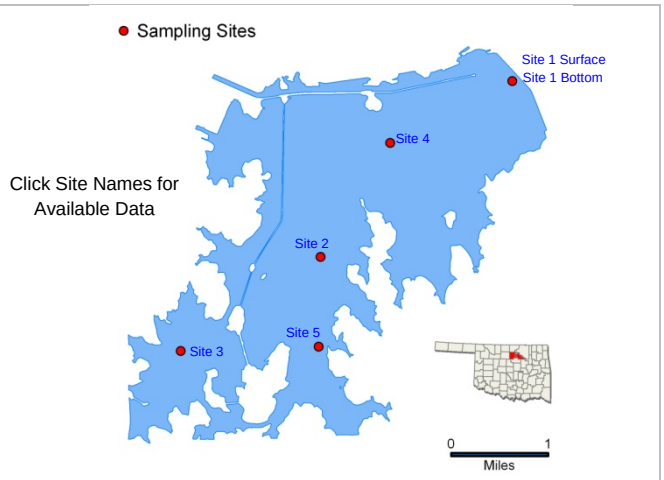
** N/A – parameters not collected in current sample year.*

* 50-70% range is undetermined for DO.

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

Sooner

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



General

Location	Pawnee County	Click map for site data
Impoundment	1972	
Area	5,400 acres	
Capacity	149,000 acre-feet	
Purposes	Cooling Water	

Parameters

	Parameter (Descriptions)	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	
	Trophic Class	mesotrophic	
Profile	Salinity	0.54 – 1.10 ppt	
Profile	Specific Conductivity	1039 – 2066 µS/cm	
Profile	pH	7.21 – 8.46 pH units	Neutral to slightly alkaline
Profile	Oxidation-Reduction Potential	269 - 485 mV	
Profile	Dissolved Oxygen	Up to 52% of water column < 2 mg/L in August	Occurred at sites 1 and 4
Nutrients	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	
Nutrients	Nitrogen to Phosphorus Ratio	38:1	Phosphorus limited

Beneficial Uses

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

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

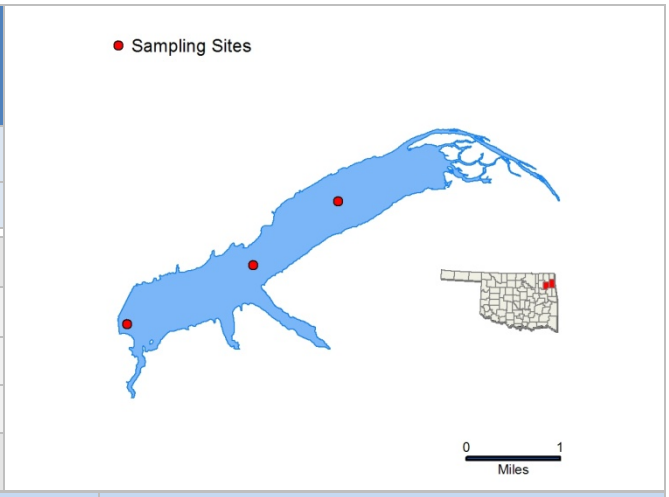
Notes

* 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
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

Spavinaw

Sample Period	Times Visited	Sampling Sites
October 2011 – July 2012	4	3



General

Location	Mayes County	Click map for site data
Impoundment	1924	
Area	1,584 acres	
Capacity	38,000 acre-feet	
Purposes	Water Supply, Recreation, Fish & Wildlife	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	8 NTU	100% of values < OWQS of 25 NTU (n=12)
	Average Secchi Disk Depth	65 cm	
	Water Clarity Rating	Average	
	Chlorophyll-a	19 mg/m3	
	Trophic State Index	59	Previous value = 57
	Trophic Class	Eutrophic	
Profile	Salinity	0.06 – 0.12 ppt	
	Specific Conductivity	141 – 257 µS/cm	
	pH	6.33 – 8.83 pH units	Only 4.34% of values below 6.5 pH units
	Oxidation-Reduction Potential	53 to 531 mV	
	Dissolved Oxygen	Up to 67% of water column < 2.0 mg/L in July	
Nutrients	Surface Total Nitrogen	0.61 mg/L to 1.29 mg/L	
	Surface Total Phosphorus	0.005 mg/L to 0.013 mg/L	
	Nitrogen to Phosphorus Ratio	67:1	Phosphorus limited

Beneficial Uses

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

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

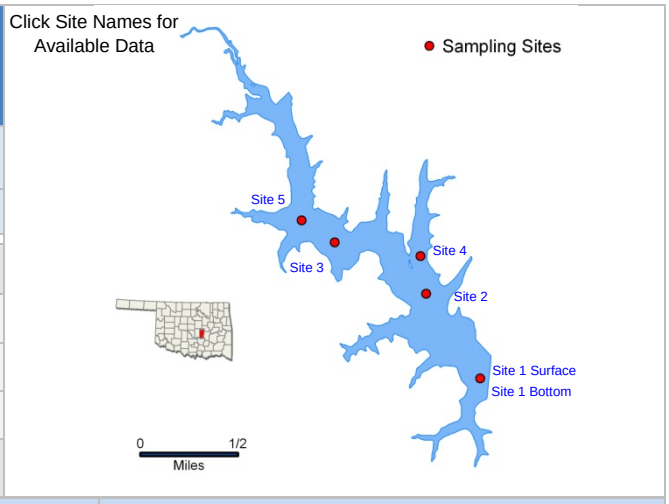
Notes

*Did not collect for these parameters
*Currently, the lake is listed as a Nutrient Limited Watershed (NLW) in the Oklahoma Water Quality Standards (WQS). This listing means that the lake is considered threatened.
* 50-70% range is undetermined for DO.

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

Sportsman

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



General

Location	Seminole County	Click map for site data
Impoundment	1958	
Area	354 acres	
Capacity	5,349 acre feet	
Purposes	Waters Supply and Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	23 nephelometric turbidity units (NTU)	25% of values > 25 NTU
	Average True Color	82 units	25% of values > OWQS of 70
	Average Secchi Disk Depth	76 cm	
	Water Clarity Rating	average	
	Trophic State Index	43	Previous value = 40
	Trophic Class	mesotrophic	
Profile	Salinity	0.06 – 0.12 ppt	
Profile	Specific Conductivity	148.3 – 251.2 µS/cm	
Profile	pH	6.6 – 7.93 pH units	Neutral
Profile	Oxidation-Reduction Potential	37 to 504 mV	
Profile	Dissolved Oxygen	Up to 60% of water column < 2 mg/L in July	Occurred at site 1
Nutrients	Surface Total Nitrogen	0.43 mg/L to 0.71 mg/L	
Nutrients	Surface Total Phosphorus	0.010 mg/L to 0.062 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	23:1	Phosphorus limited

Beneficial Uses

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

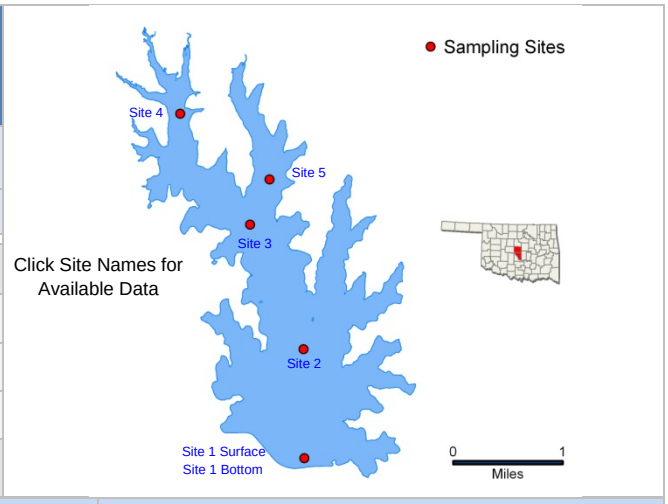
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes: *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
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

Stanley Draper

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



General

Location	Cleveland County
Impoundment	1962
Area	2,900 acres
Capacity	100,000 acre-feet
Purposes	Water Supply, Recreation

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	7 NTU	100% of values < OWQS of 25 NTU
	Average True Color	28 units	100% of values < OWQS of 70
	Average Secchi Disk Depth	133 cm	
	Water Clarity Rating	good	
	Trophic State Index	40	
	Trophic Class	oligotrophic	
Profile	Salinity	0.03 – 0.09 ppt	
Profile	Specific Conductivity	95 – 191.5 µS/cm	
Profile	pH	6.90 – 8.18 pH units	
Profile	Oxidation-Reduction Potential	356 - 445 mV	
Profile	Dissolved Oxygen	Up to 52% of water column < 2 mg/L in August	Occurred at site 1, the dam
Nutrients	Surface Total Nitrogen	0.16 mg/L to 0.33 mg/L	
Nutrients	Surface Total Phosphorus	0.010 mg/L to 0.015 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	20:1	Phosphorus limited

Beneficial Uses

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

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

Notes

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

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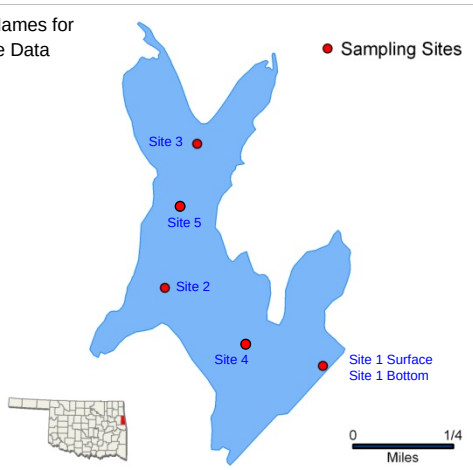
Stilwell City

Sample Period	Times Visited	Sampling Sites
October 2005 – August 2006	3	5

Click Site Names for Available Data



General

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

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	6 NTU	100% of values < OWQS of 25 NTU
	Average True Color	14 units	100% of values < OWQS of 70
	Average Secchi Disk Depth	161 cm	
	Water Clarity Rating	excellent	
	Trophic State Index	54	
	Trophic Class	eutrophic	
Profile	Salinity	0.07 – 0.14 ppt	
Profile	Specific Conductivity	159.1 – 297.2 µS/cm	
Profile	pH	6.87 – 8.53 pH units	
Profile	Oxidation-Reduction Potential	88 – 452 mV	
Profile	Dissolved Oxygen	Up to 64% of water column < 2 mg/L in August	Occurred at site 1, the dam
Nutrients	Surface Total Nitrogen	0.32 mg/L to 0.88 mg/L	
Nutrients	Surface Total Phosphorus	0.019 mg/L to 0.044 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	20:1	Phosphorus limited

Beneficial Uses

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

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

Notes

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

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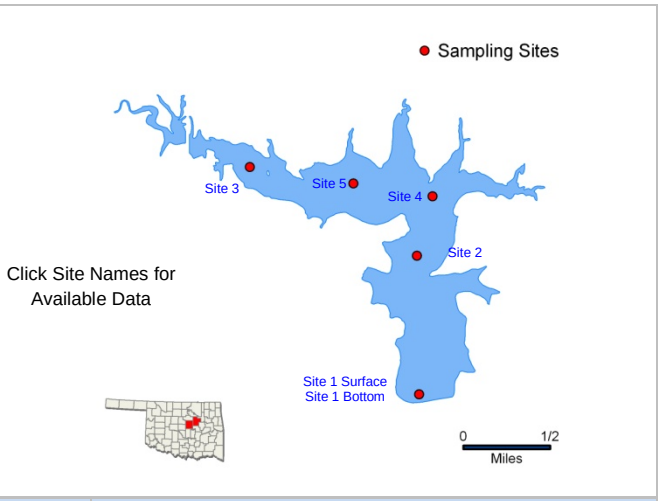
Stroud

Sample Period	Times Visited	Sampling Sites
December 2011 – Sept. 2012	4	5



General

Location	Creek County	Click map for site data
Impoundment	1968	
Area	600 acres	
Capacity	8,800 acre-feet	
Purposes	Water Supply, Recreation, Flood Control	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	6 NTU	100% of values < OWQS of 25 NTU (n=12)
	Average Secchi Disk Depth	101 cm	
	Water Clarity Rating	Excellent	
	Chlorophyll-a	5 mg/m3	
	Trophic State Index	46	Previous value = 41
	Trophic Class	Mesotrophic	
Profile	Salinity	0.12 – 0.13 ppt	
	Specific Conductivity	251 – 279 µS/cm	
	pH	7.18 – 8.40 pH units	
	Oxidation-Reduction Potential	118 – 438 mV	
	Dissolved Oxygen	Up to 18% of water column < 2 mg/L in September	
Nutrients	Surface Total Nitrogen	0.44 mg/L to 0.67 mg/L	
	Surface Total Phosphorus	0.005 mg/L to 0.008 mg/L	
	Nitrogen to Phosphorus Ratio	104:1	Phosphorus limited

Beneficial Uses

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

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

Notes

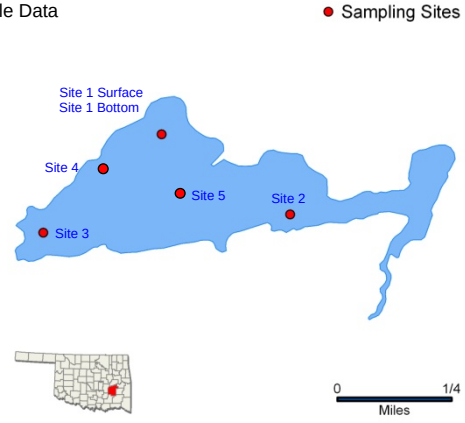
* **This page reflects the current sample year only.**

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

Talawanda No. 1

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

Click Site Names for Available Data



General

Location	Pittsburg County	Click map for site data
Impoundment	1902	
Area	91 acres	
Capacity	12,000 acre feet	
Purposes	Waters Supply and Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	3 NTU	100% of Values < OWQS of 25 NTU
	Average Secchi Disk Depth	153 cm	
	Water Clarity Rating	Excellent	
	Chlorophyll-a	5 mg/m3	
	Trophic State Index	47	Previous value = 42
	Trophic Class	Mesotrophic	
Profile	Salinity	0.03 – 0.07 ppt	
	Specific Conductivity	90.4 – 152.1 µS/cm	
	pH	6.22 – 7.75 pH units	10.53% of values < 6.5 pH units
	Oxidation-Reduction Potential	-34 to 434 mV	
	Dissolved Oxygen	Up to 44% of water column < 2 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.41 mg/L to 0.65 mg/L	
	Surface Total Phosphorus	0.009 mg/L to 0.016 mg/L	
	Nitrogen to Phosphorus Ratio	39:1	Phosphorus limited

Beneficial Uses

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

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

Notes

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

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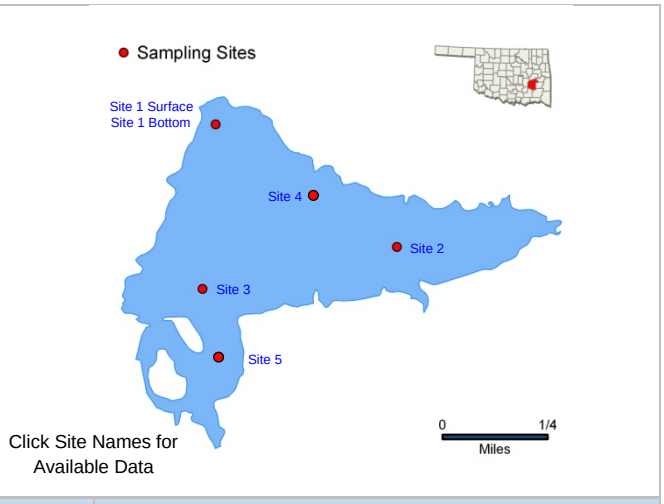
Talawanda No. 2

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



General

Location	Pittsburg County	Click map for site data
Impoundment	1924	
Area	195 acres	
Capacity	2,750 acre feet	
Purposes	Waters Supply and Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	6 NTU	100% of Values < OWQS of 25 NTU
	Average Secchi Disk Depth	123 cm	
	Water Clarity Rating	Excellent	
	Chlorophyll-a	4 mg/m3	
	Trophic State Index	44	Previous value = 45
	Trophic Class	Mesotrophic	
Profile	Salinity	0.04 – 0.06 ppt	
	Specific Conductivity	99.7 – 141.2 µS/cm	
	pH	6.42 – 8.06 pH units	6.82% of values < 6.5 pH units
	Oxidation-Reduction Potential	-48 to 486 mV	
	Dissolved Oxygen	Up to 50% of water column < 2 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.19 mg/L to 0.37 mg/L	
	Surface Total Phosphorus	0.006 mg/L to 0.013 mg/L	
	Nitrogen to Phosphorus Ratio	31:1	Phosphorus limited

Beneficial Uses

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

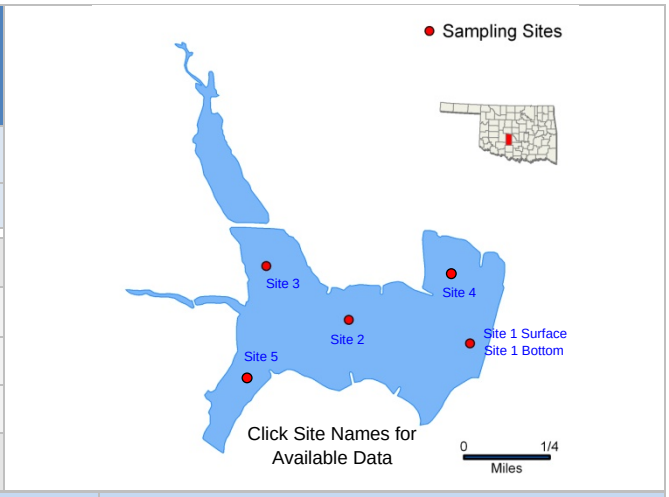
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes: The PBCR beneficial use cannot be assessed for this sample year as minimum data requirement were not met due to QA/QC issues for *E. coli.*

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

Taylor

Sample Period	Times Visited	Sampling Sites
October 2008 – July 2009	4	5



General

Location	Grady County	Click map for site data
Impoundment	1960	
Area	227 acres	
Capacity	1,877 acre feet	
Purposes	Waters Supply, Flood Control, and Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	14 NTU	8% of values > OWQS of 25 NTU (n=12)
	Average True Color		Did not collect for true color
	Average Secchi Disk Depth	48 cm	
	Water Clarity Rating	Average	
	Trophic State Index	68	Previous value = 64
	Trophic Class	Hypereutrophic	
Profile	Salinity	0.23 – 0.30 ppt	
Profile	Specific Conductivity	461.2 – 553 µS/cm	
Profile	pH	8.05 – 8.51 pH units	
Profile	Oxidation-Reduction Potential	315 to 583 mV	
Profile	Dissolved Oxygen	All data are above screening level of 2.0 mg/L	
Nutrients	Surface Total Nitrogen	0.85 mg/L to 1.56 mg/L	
Nutrients	Surface Total Phosphorus	0.067 mg/L to 0.223 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	10:1	Phosphorus limited, possibly co-limited

Beneficial Uses

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

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

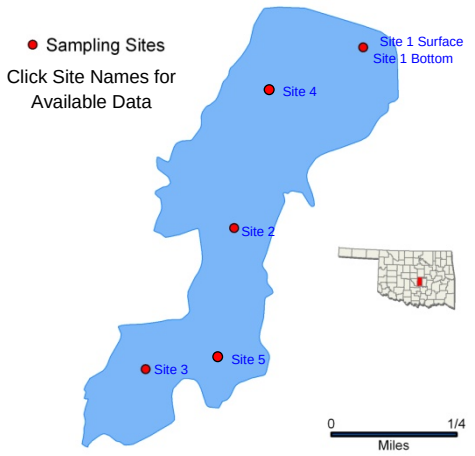
Notes

*Did not collect for these parameters. *Currently, the lake is listed as a Nutrient Limited Watershed (NLW) in the Oklahoma Water Quality Standards (WQS). This listing means that the lake is considered threatened from nutrients until a more intensive study can confirm the Aesthetics beneficial use non-support status.

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

Tecumseh

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



General

Location	Pottawatomie County	Click map for site data
Impoundment	1934	
Area	127 acres	
Capacity	1,118 acre feet	
Purposes	Waters Supply, and Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	132 nephelometric turbidity units (NTU)	All values > 25 NTU
	Average True Color	244 units	All values > OWQS of 70
	Average Secchi Disk Depth	11 cm	
	Water Clarity Rating	poor	
	Trophic State Index	49	Previous value = 57
	Trophic Class	mesotrophic	
Profile	Salinity	0.00 – 0.10 ppt	
Profile	Specific Conductivity	105.6 – 141 µS/cm	
Profile	pH	7.08 – 7.60 pH units	Neutral
Profile	Oxidation-Reduction Potential	337 to 537 mV	
Profile	Dissolved Oxygen		D.O. always > 5.0 mg/L
Nutrients	Surface Total Nitrogen	1.01 mg/L to 1.55 mg/L	
Nutrients	Surface Total Phosphorus	0.066 mg/L to 0.131 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	12:1	Phosphorus limited

Beneficial Uses

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

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

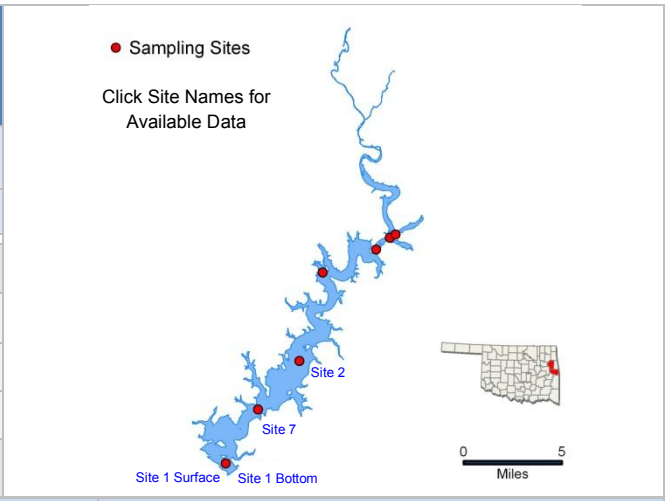
Notes

**Not supporting for lead as chronic criteria was exceeded. All other toxicants are fully supporting.*
***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
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

Tenkiller (1,2,7)

Sample Period	Times Visited	Sampling Sites
November 2011 – August 2012	4	7



General

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

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In Situ	Average Turbidity	5 NTU	100% of values < OWQS of 25 NTU (n=11)
	Average Secchi Disk Depth	138 cm	
	Water Clarity Rating	Excellent	
	Chlorophyll-a	8 mg/m3	
	Trophic State Index	51	Previous value = 53
	Trophic Class	Eutrophic	
Profile	Salinity	0.08 – 0.13 ppt	
	Specific Conductivity	177 – 278 µS/cm	
	pH	6.56 – 9.02 pH units	Only 0.54% of recorded values > 9 pH units
	Oxidation-Reduction Potential	124-574mV	
	Dissolved Oxygen	Up to 73% of water column < 2 mg/L in August	
Nutrients	Surface Total Nitrogen	0.40 mg/L to 1.46 mg/L	
	Surface Total Phosphorus	0.005 mg/L to 0.016 mg/L	
	Nitrogen to Phosphorus Ratio	124:1	Phosphorus limited

Beneficial Uses

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

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

Notes

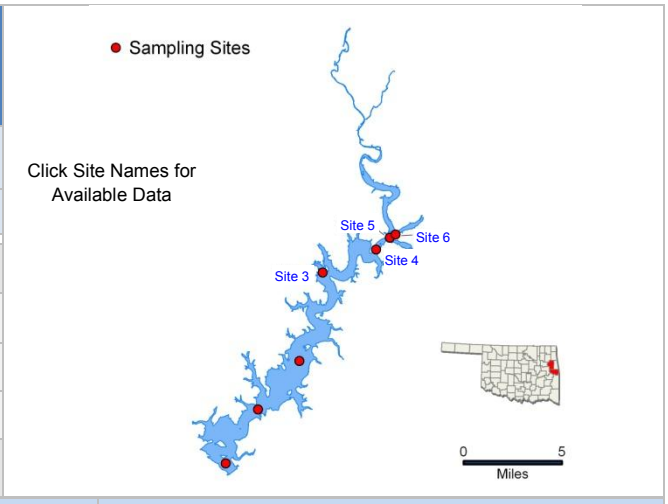
*The lake is listed in the WQS as a NLW indicating that the Aesthetics beneficial use is considered threatened by nutrients until studies can be conducted to confirm non-support status.
N/A – parameters not collected in current sample year.

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

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

Tenkiller, Illinois River Arm (3-6)

Sample Period	Times Visited	Sampling Sites
November 2011 – August 2012	4	7



General

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

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	14 NTU	14% of values < OWQS of 25 NTU (n=16)
	Average Secchi Disk Depth	56 cm	
	Water Clarity Rating	Average	
	Chlorophyll-a	16 mg/m3	
	Trophic State Index	58	Previous value = 59
	Trophic Class	Eutrophic	
Profile	Salinity	0.09 – 0.13 ppt	
	Specific Conductivity	197 – 275 µS/cm	
	pH	7.47 – 9.01 pH units	Only 0.66% of recorded values are > 9 pH units
	Oxidation-Reduction Potential	86-567mV	
	Dissolved Oxygen	Up to 50% of water column < 2 mg/L in August	
Nutrients	Surface Total Nitrogen	0.50 mg/L to 3.43 mg/L	
	Surface Total Phosphorus	0.005 mg/L to 0.097 mg/L	
	Nitrogen to Phosphorus Ratio	51:1	Phosphorus limited

Beneficial Uses

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

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

Notes

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

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

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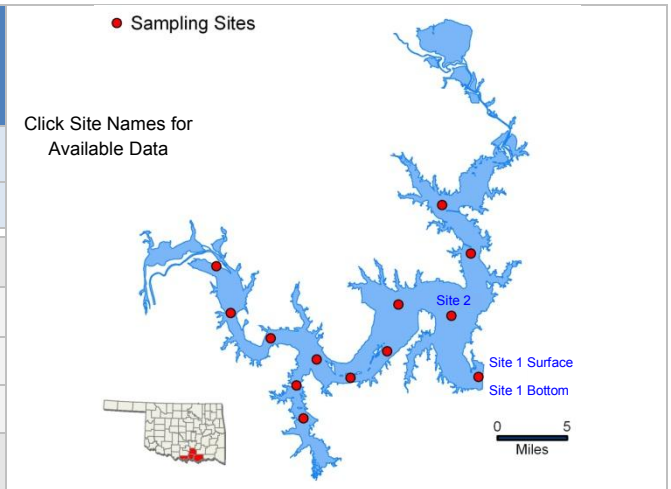
Texoma (1-2)

Sample Period	Times Visited	Sampling Sites
October 2010 – June 2011	4	13



General

Location	Bryan County	Click map for site data
Impoundment	1944	
Area	88,000 acres	
Capacity	2,643,000 acre-feet	
Purposes	Flood Control, Waters Supply, Hydropower, Low-flow Regulation, and Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	5 NTU	100% of values < OWQS of 25 NTU
	Average Secchi Disk Depth	142 cm	
	Water Clarity Rating	Excellent	
	Chlorophyll-a	8 mg/m3	
	Trophic State Index	51	Previous value = 56
	Trophic Class	Eutrophic	
Profile	Salinity	0.9 – 1.02 ppt	
	Specific Conductivity	1698 - 1908 µS/cm	
	pH	7.16 – 8.47 pH units	
	Oxidation-Reduction Potential	255 to 422 mV	
	Dissolved Oxygen	Up to 12% of water column < 2.0 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.45 mg/L to 0.66 mg/L	
	Surface Total Phosphorus	0.018 mg/L to 0.038 mg/L	
	Nitrogen to Phosphorus Ratio	19:1	Phosphorus limited

Beneficial Uses

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

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

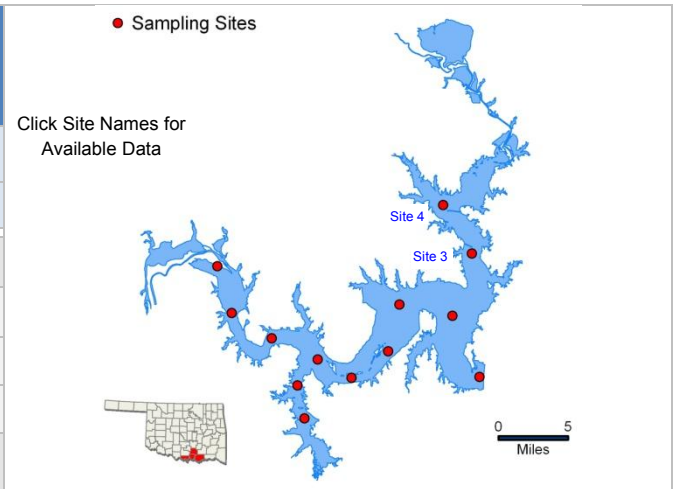
Notes: Although all values were less than the OWQS for turbidity, the minimum data requirements were not met and an assessment of the FWP beneficial use cannot be made for this sample year. *Did not collect for these parameters.

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

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

Texoma Lower Washita River Arm (3-4)

Sample Period	Times Visited	Sampling Sites
October 2010 – June 2011	4	13



General

Location	Bryan County	Click map for site data
Impoundment	1944	
Area	88,000 acres	
Capacity	2,643,000 acre-feet	
Purposes	Flood Control, Waters Supply, Hydropower, Low-flow Regulation, and Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	8 NTU	100% of values < OWQS of 25 NTU
	Average Secchi Disk Depth	105 cm	Did not collect for true color
	Water Clarity Rating	Excellent	
	Chlorophyll-a	10 mg/m3	
	Trophic State Index	53	Previous value = 56
	Trophic Class	Eutrophic	
Profile	Salinity	0.73 – 1.01 ppt	
	Specific Conductivity	1388 - 1899 µS/cm	
	pH	7.49 – 8.35 pH units	
	Oxidation-Reduction Potential	299 to 413 mV	
	Dissolved Oxygen	Up to 9% of water column < 2.0 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.46 mg/L to 0.64 mg/L	
	Surface Total Phosphorus	0.024 mg/L to 0.035 mg/L	
	Nitrogen to Phosphorus Ratio	18:1	Phosphorus limited

Beneficial Uses

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

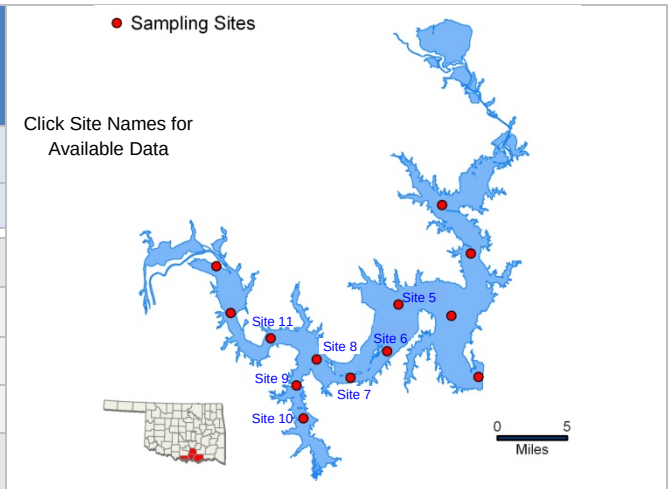
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes: Although all values were less than the OWQS for turbidity, the minimum data requirements were not met and an assessment of the FWP beneficial use cannot be made for this sample year. *Did not collect for these parameters. Although 63% of Chloride samples exceeded sample standard, an assessment for the Ag beneficial use cannot be made for Chlorides and Sulfates, as minimum data requirements are not being met.

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

Texoma Lower Red River Arm (5-11)

Sample Period	Times Visited	Sampling Sites
October 2010 – June 2011	4	13



General

Location	Bryan County	Click map for site data
Impoundment	1944	
Area	88,000 acres	
Capacity	2,643,000 acre-feet	
Purposes	Flood Control, Waters Supply, Hydropower, Low-flow Regulation, and Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	9 NTU	100% of Values < OWQS of 25 NTU
	Average Secchi Disk Depth	87 cm	
	Water Clarity Rating	Good	
	Chlorophyll-a	45 mg/m3	
	Trophic State Index	59	Previous value = 59
	Trophic Class	Eutrophic	
Profile	Salinity	0.00 – 1.56 ppt	
	Specific Conductivity	33.2 – 2897 µS/cm	
	pH	7.10 – 8.63 pH units	
	Oxidation-Reduction Potential	172 to 437 mV	
	Dissolved Oxygen	Up to 33% of water column < 2.0 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.42 mg/L to 0.88 mg/L	
	Surface Total Phosphorus	0.024 mg/L to 0.065 mg/L	
	Nitrogen to Phosphorus Ratio	15:1	Phosphorus limited

Beneficial Uses

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

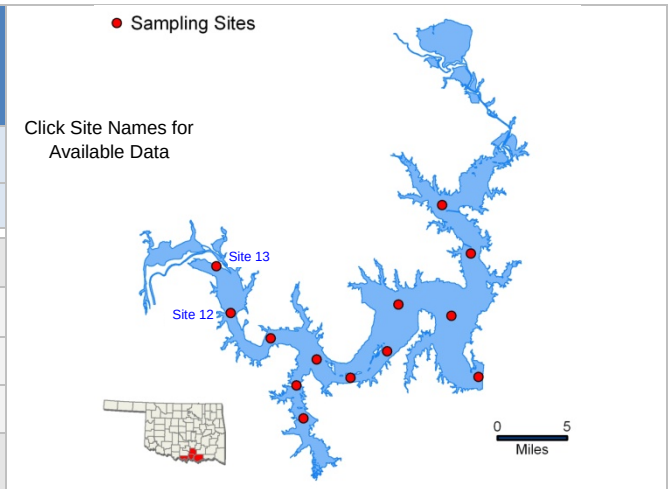
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes *Did not collect for these parameters

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

Texoma Upper Red River Arm (12-13)

Sample Period	Times Visited	Sampling Sites
October 2010 – June 2011	4	13



General

Location	Bryan County	Click map for site data
Impoundment	1944	
Area	88,000 acres	
Capacity	2,643,000 acre-feet	
Purposes	Flood Control, Waters Supply, Hydropower, Low-flow Regulation, and Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	40 NTU	21% of values > OWQS of 25 NTU
	Average Secchi Disk Depth	27 cm	Did not collect for true color
	Water Clarity Rating	Fair to Poor	
	Chlorophyll-a	84 mg/m3	
	Trophic State Index	66	Previous value = 63
	Trophic Class	Hypereutrophic	
Profile	Salinity	1.21 – 1.77 ppt	
	Specific Conductivity	2262 - 3271 µS/cm	
	pH	8.06 – 8.58 pH units	
	Oxidation-Reduction Potential	355 to 413 mV	
	Dissolved Oxygen	All data are above screening level of 2.0 mg/L	
Nutrients	Surface Total Nitrogen	0.75 mg/L to 1.03 mg/L	
	Surface Total Phosphorus	0.055 mg/L to 0.115mg/L	
	Nitrogen to Phosphorus Ratio	10:1	Phosphorus limited

Beneficial Uses

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

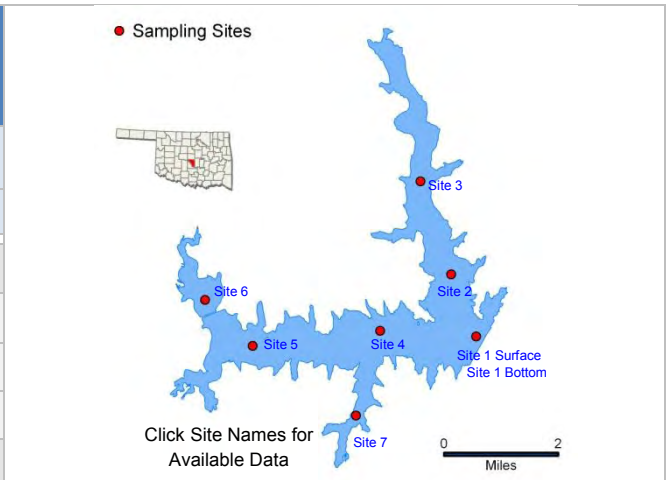
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes: Although 21% of the values exceeded the OWQS for turbidity, the minimum data requirements were not met and an assessment of the FWP beneficial use cannot be made for this sample year. *Did not collect for these parameters.

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

Thunderbird

Sample Period	Times Visited	Sampling Sites
October 2006 - June 2007	4	7



General

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

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	28 NTU	46% of values > OWQS of 25 NTU
	Average True Color	32 units	7% of values >OWQS of 70
	Average Secchi Disk Depth	53 cm	
	Water Clarity Rating	average	
	Trophic State Index	57	
	Trophic Class	eutrophic	
Profile	Salinity	0.18 – 0.23 ppt	
Profile	Specific Conductivity	367.5 – 460.9 µS/cm	
Profile	pH	7.28 – 8.57 pH units	Neutral to slightly alkaline
Profile	Oxidation-Reduction Potential	95 - 447 mV	
Profile	Dissolved Oxygen	Up to 47% of water column < 2 mg/L in June	Occurred at sites 1, the dam
Nutrients	Surface Total Nitrogen	0.59 mg/L to 1.18 mg/L	
Nutrients	Surface Total Phosphorus	0.023 mg/L to 0.429 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	13:1	Phosphorus limited

Beneficial Uses

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

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

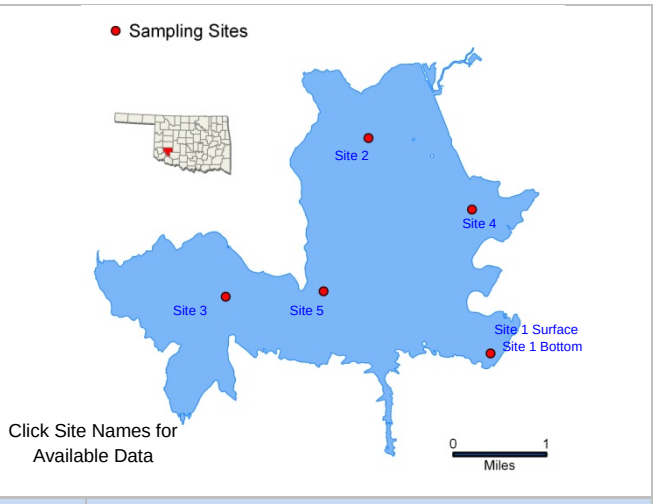
Notes

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

Tom Steed

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



General

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

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	30 NTU	50% of values > OWQS 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	
	Trophic Class	eutrophic	
Profile	Salinity	0.37 – 0.52ppt	
Profile	Specific Conductivity	722.9 – 1001 µS/cm	
Profile	pH	7.70 – 8.55 pH units	Neutral to slightly alkaline
Profile	Oxidation-Reduction Potential	277 - 399 mV	
Profile	Dissolved Oxygen	Up to 25% of water column < 2 mg/L in July	Occurred at sites 1, the dam
Nutrients	Surface Total Nitrogen	0.59 mg/L to 1.04 mg/L	
Nutrients	Surface Total Phosphorus	0.038 mg/L to 0.108 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	12:1	Phosphorus limited

Beneficial Uses

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

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

Notes

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

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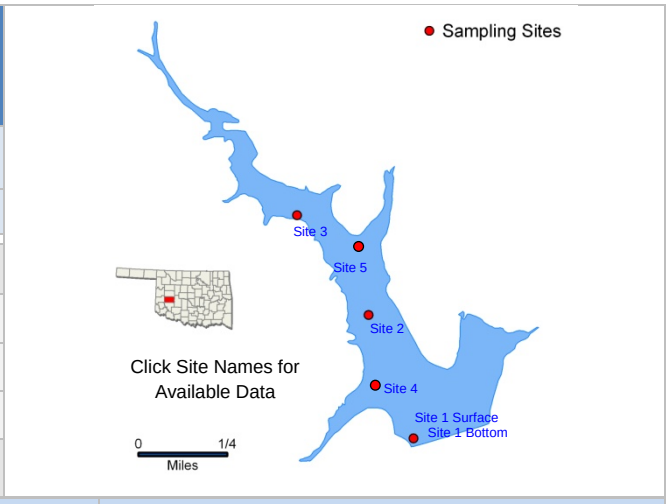
Vanderwork

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



General

Location	Washita County	Click map for site data
Impoundment	1968	
Area	135 acres	
Capacity	1,578 acre feet	
Purposes	Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	9 nephelometric turbidity units (NTU)	All values < 25 NTU
	Average True Color	17 units	All values < OWQS of 70
	Average Secchi Disk Depth	59 cm	
	Water Clarity Rating	good	
	Trophic State Index	64	Previous value = 60
	Trophic Class	hypereutrophic	
Profile	Salinity	0.83 - 1.01 ppt	
Profile	Specific Conductivity	1568 – 1896 µS/cm	
Profile	pH	7.2 – 8.18 pH units	Neutral to slightly alkaline
Profile	Oxidation-Reduction Potential	-116 to 530 mV	
Profile	Dissolved Oxygen	Up to 50% of water column < 2 mg/L in June	Occurred at site 1
Nutrients	Surface Total Nitrogen	0.87 mg/L to 1.75 mg/L	
Nutrients	Surface Total Phosphorus	0.041 mg/L to 0.100 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	18:1	Phosphorus limited

Beneficial Uses

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

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

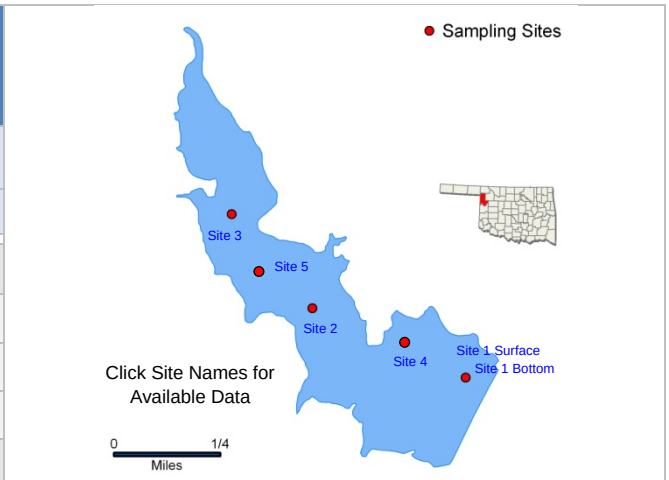
Notes

The lake is listed as a Nutrient Limited Watershed (NLW) in the Oklahoma Water Quality Standards (WQS). This listing means that the lake is considered threatened from nutrients until a more intensive study can confirm the Aesthetics beneficial use non-support status.

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

Vincent

Sample Period	Times Visited	Sampling Sites
November 2010 – July 2011	4	5



General

Location	Ellis County	Click map for site data
Impoundment	1961	
Area	160 acres	
Capacity	2,579 acre feet	
Purposes	Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	14 NTU	100% of Values < OWQS of 25 NTU
	Average Secchi Disk Depth	63 cm	
	Water Clarity Rating	Good	
	Chlorophyll-a	8 mg/m3	
	Trophic State Index	51	Previous value = 46
	Trophic Class	Eutrophic	
Profile	Salinity	0.43 – 0.48 ppt	
	Specific Conductivity	833.1 - 928 µS/cm	
	pH	7.14 – 8.19 pH units	Neutral to slightly alkaline
	Oxidation-Reduction Potential	-50 to 490 mV	
	Dissolved Oxygen	Up to 45 % < 2 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.27 mg/L to 0.55 mg/L	
	Surface Total Phosphorus	0.015 mg/L to 0.028 mg/L	
	Nitrogen to Phosphorus Ratio	21:1	Phosphorus limited

Beneficial Uses

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

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

Notes

The PBCR cannot be assessed as minimum data requirements were not met due QA/QC issue with enterococci.

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

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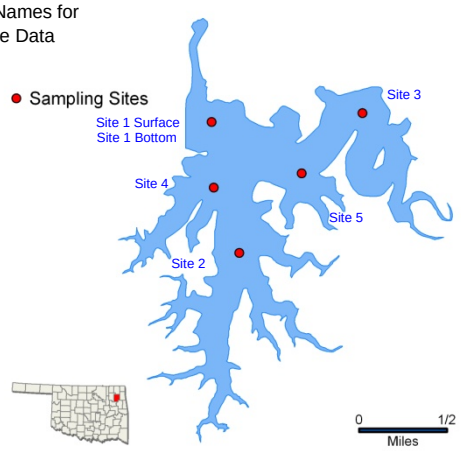
W.R. Holway

Sample Period	Times Visited	Sampling Sites
March 2011 – September 2011	4	5

Click Site Names for Available Data



General

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

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	4 NTU	100% of Values < OWQS of 25
	Average Secchi Disk Depth	198 cm	
	Water Clarity Rating	Excellent	
	Chlorophyll-a	13 mg/m3	
	Trophic State Index	56	Previous Value= 58
	Trophic Class	Eutrophic	
Profile	Salinity	0.10 – 0.14 ppt	
	Specific Conductivity	215.4 - 283 µS/cm	
	pH	7.10 – 9.01 pH units	0.30% of Values > 9 pH units
	Oxidation-Reduction Potential	308 to 600 mV	
	Dissolved Oxygen	Up to 45% of water column < 2 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.45 mg/L to 1.18 mg/L	
	Surface Total Phosphorus	0.051 mg/L to 0.066 mg/L	
	Nitrogen to Phosphorus Ratio	14:1	Phosphorus limited

Beneficial Uses

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

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

Notes

*Did not collect for these parameters

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

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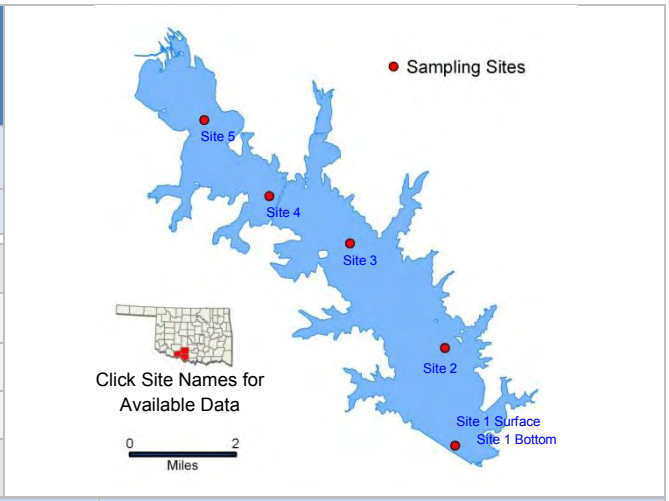
Waurika

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



General

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

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	34 nephelometric turbidity units (NTU)	45% of values > 25 NTU
	Average True Color	63 units	10% of values > OWQS of 70
	Average Secchi Disk Depth	51 cm	
	Water Clarity Rating	average	
	Trophic State Index	54	Previous value = 60
	Trophic Class	eutrophic	
Profile	Salinity	0.19 – 0.35 ppt	
	Specific Conductivity	389.3 – 353 µS/cm	
	pH	7.57 – 8.59 pH units	Neutral to slightly alkaline
	Oxidation-Reduction Potential	228 to 507 mV	
	Dissolved Oxygen	Up to 27% of water column , 2 mg/L in July	Occurred at site 1, the dam
Nutrients	Surface Total Nitrogen	0.53 mg/L to 1.09 mg/L	
	Surface Total Phosphorus	0.063 mg/L to 0.154 mg/L	
	Nitrogen to Phosphorus Ratio	8:1	Phosphorus limited

Beneficial Uses

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

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

Notes

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

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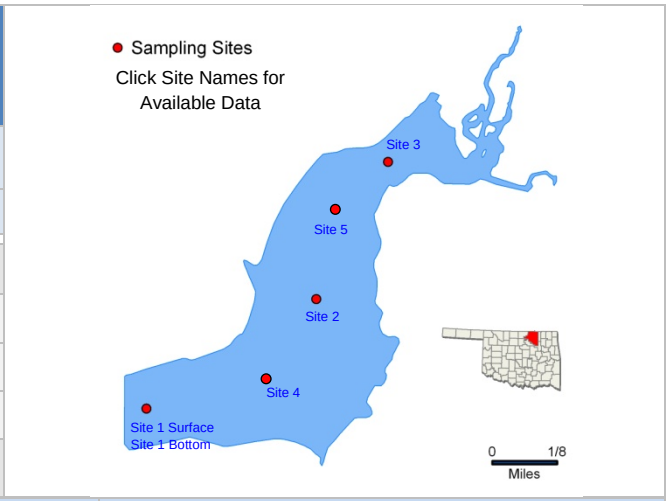
Waxhoma

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



General

Location	Osage County	Click map for site data
Impoundment	1955	
Area	197 acres	
Capacity	2,100 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	5 NTU	100% of values < OWQS of 25 NTU
	Average True Color	18 units	100% of values < OWQS of 70
	Average Secchi Disk Depth	153 cm	
	Water Clarity Rating	excellent	
	Trophic State Index	45	
	Trophic Class	mesotrophic	
Profile	Salinity	0.09 – 0.11 ppt	
	Specific Conductivity	187.6 – 231.6 µS/cm	
	pH	6.77 – 8.77 pH units	Neutral to slightly alkaline
	Oxidation-Reduction Potential	135 – 438 mV	
	Dissolved Oxygen	Up to 62% of water column < 2 mg/L in July	
Nutrients	Surface Total Nitrogen	0.15 mg/L to 0.49 mg/L	
	Surface Total Phosphorus	0.011mg/L to 0.023 mg/L	
	Nitrogen to Phosphorus Ratio	14:1	Phosphorus limited

Beneficial Uses

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

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

Notes

*Sampling in 2005-2006 found the Agriculture beneficial use not supported based on numerical criteria for sulfates located in OAC 785:45 – Appendix F.

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

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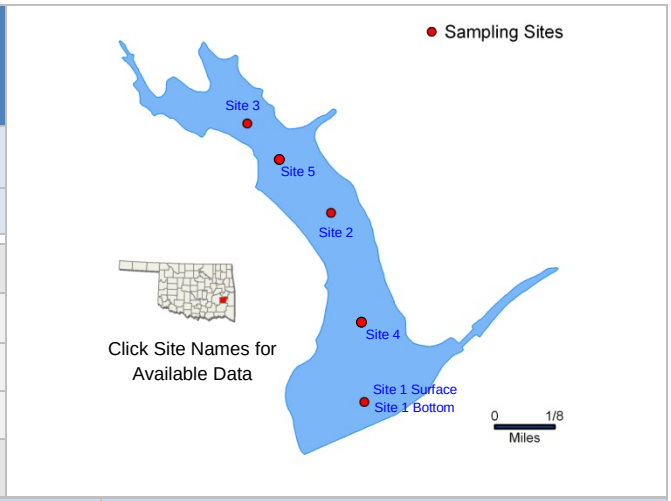
Wayne Wallace

Sample Period	Times Visited	Sampling Sites
February 2012 – August 2012	4	5



General

Location	Latimer County	Click map for site data
Impoundment	1969	
Area	94 acres	
Capacity	1,746 acre feet	
Purposes	Flood Control and Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	6 NTU	100% of values < OWQS of 25 NTU (n=6)
	Average Secchi Disk Depth	115 cm	
	Water Clarity Rating	Excellent	
	Chlorophyll-a	27 mg/m3	
	Trophic State Index	63	Previous value = 48
	Trophic Class	Hypereutrophic	
Profile	Salinity	0.02 – 0.07 ppt	
	Specific Conductivity	56 – 153.5 µS/cm	
	pH	6.11 – 9.4 pH units	14.5% of recorded values are < 6.5 pH units
	Oxidation-Reduction Potential	51 to 484 mV	
	Dissolved Oxygen	Up to 60% of water column < 2 mg/L in August	
Nutrients	Surface Total Nitrogen	0.48 mg/L to 0.59 mg/L	
	Surface Total Phosphorus	0.005 mg/L to 0.014 mg/L	
	Nitrogen to Phosphorus Ratio	74:1	Phosphorus limited

Beneficial Uses

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

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

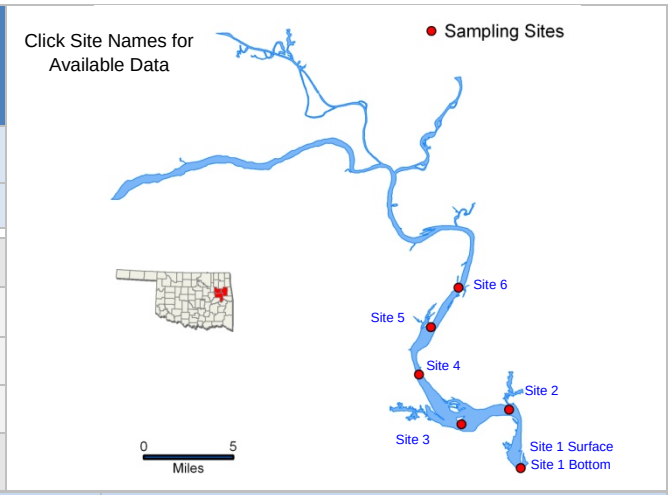
Notes

Slightly acidic conditions are 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. * 50-70% range is undetermined for DO.

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

Webbers Falls

Sample Period	Times Visited	Sampling Sites
November 2010 – August 2011	4	6



General

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

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	13 NTU	100% of values < OWQS of 25 NTU (n=17)
	Average Secchi Disk Depth	63 cm	
	Water Clarity Rating	Average	
	Chlorophyll-a	27 mg/m3	
	Trophic State Index	63	Previous value = 55
	Trophic Class	Hypereutrophic	
Profile	Salinity	0.21 – 0.79 ppt	
	Specific Conductivity	422.1 - 1490 µS/cm	
	pH	7.52 – 9.07 pH units	0.45% of Values > 9 pH units
	Oxidation-Reduction Potential	276 - 458 mV	
	Dissolved Oxygen	All data are above screening level of 2.0 mg/L	
Nutrients	Surface Total Nitrogen	0.38 mg/L to 1.3 mg/L	
	Surface Total Phosphorus	0.101 mg/L to 0.166 mg/L	
	Nitrogen to Phosphorus Ratio	7:1	Phosphorus limited, possibly co-limited

Beneficial Uses

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

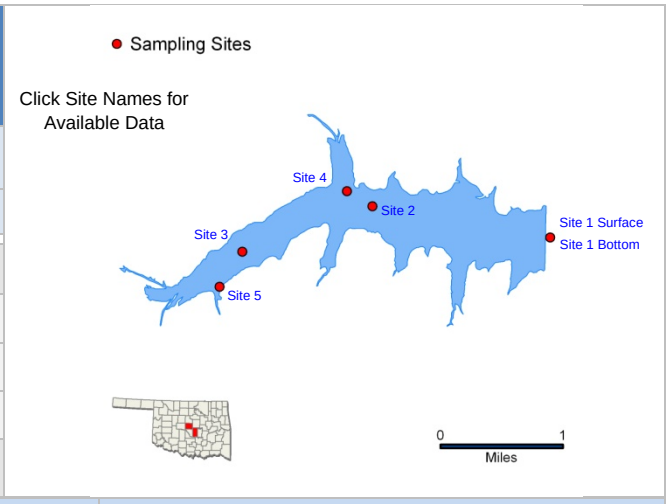
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes: Although 100% of the turbidity values are < 25 NTU, an assessment of the FWP beneficial use cannot be made for this sample year as minimum data requirements were not met.

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

Wes Watkins

Sample Period	Times Visited	Sampling Sites
November 2010 – June 2011	3	5



General

Location	Pottawatomie County	Click map for site data
Impoundment	1997	
Area	1,142 acres	
Capacity	14,065 acre-feet	
Purposes	Water Supply, Recreation, Flood Control	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	18 NTU	16% of values > OWQS of 25 NTU
	Average Secchi Disk Depth	65 cm	
	Water Clarity Rating	Good	
	Chlorophyll-a	13 mg/m3	
	Trophic State Index	56	Previous Values= 53
	Trophic Class	Eutrophic	
Profile	Salinity	0.11 – 0.16 ppt	
	Specific Conductivity	231.5 – 336.1 µS/cm	
	pH	6.91 – 8.83 pH units	
	Oxidation-Reduction Potential	18 - 459 mV	
	Dissolved Oxygen	Up to 45 % < 2 mg/L in summer	
Nutrients	Surface Total Nitrogen	0.69 mg/L to 1.12 mg/L	
	Surface Total Phosphorus	0.033 mg/L to 0.050 mg/L	
	Nitrogen to Phosphorus Ratio	25:1	Phosphorus limited

Beneficial Uses

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

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

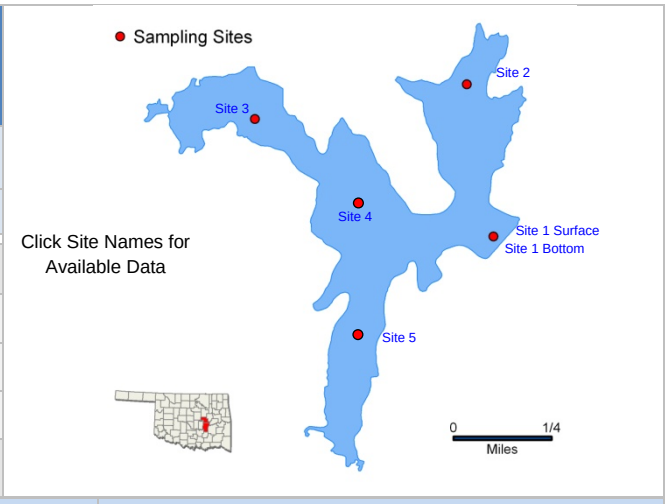
Notes

*Although 16% of the values exceeded 25 NTU, available rainfall data suggests this is likely due to seasonal rain events. The lake is therefore considered supporting the FWP beneficial use for this sample year.

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

Wetumka

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



General

Location	Hughes County	Click map for site data
Impoundment	1939	
Area	169 acres	
Capacity	1839 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	18 NTU	8% of values >OWQS of 25 NTU
	Average True Color	58 units	58% of values > OWQS of 70
	Average Secchi Disk Depth	59 cm	
	Water Clarity Rating	fair	
	Trophic State Index	53	
	Trophic Class	eutrophic	
Profile	Salinity	0.03 – 0.08 ppt	
Profile	Specific Conductivity	92.4 – 173.3 µS/cm	
Profile	pH	6.49 – 7.90 pH units	Only 2 values < 6.5 pH units
Profile	Oxidation-Reduction Potential	298 - 461 mV	
Profile	Dissolved Oxygen	Up to 67% of water column < 2 mg/L in July	Occurred at site 1, the dam
Nutrients	Surface Total Nitrogen	0.52 mg/L to 1.35 mg/L	
Nutrients	Surface Total Phosphorus	0.022 mg/L to 0.088 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	13:1	Phosphorus limited

Beneficial Uses

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

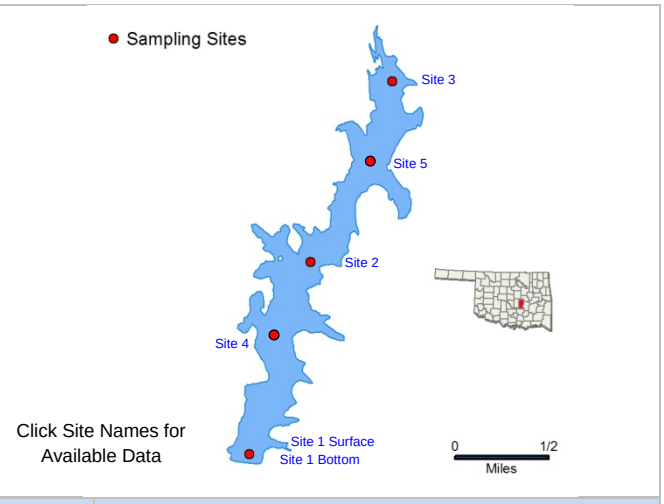
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes: The PBCR cannot be assessed as minimum data requirements were not met due to QA/QC issues for fecal coliform and enterococci.

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

Wewoka

Sample Period	Times Visited	Sampling Sites
November 2008 - August 2009	4	5



General

Location	Seminole County	Click map for site data
Impoundment	1925	
Area	371 acres	
Capacity	3,301 acre-feet	
Purposes	Water Supply, Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	31 NTU	58% of values > OWQS of 25 NTU (n=12)
	Average True Color		Did not collect for true color
	Average Secchi Disk Depth	33 cm	
	Water Clarity Rating	Average	
	Trophic State Index	56	Previous value = 55
	Trophic Class	Eutrophic	
Profile	Salinity	0.08 – 0.12 ppt	
Profile	Specific Conductivity	135 – 254.1 µS/cm	
Profile	pH	6.64 – 7.90 pH units	
Profile	Oxidation-Reduction Potential	20 - 477 mV	
Profile	Dissolved Oxygen	Up to 25% of water column < 2.0 mg/L in August	
Nutrients	Surface Total Nitrogen	0.58 mg/L to 0.88 mg/L	
Nutrients	Surface Total Phosphorus	0.016 mg/L to 0.078 mg/L	
Nutrients	Nitrogen to Phosphorus Ratio	16:1	Phosphorus limited

Beneficial Uses

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

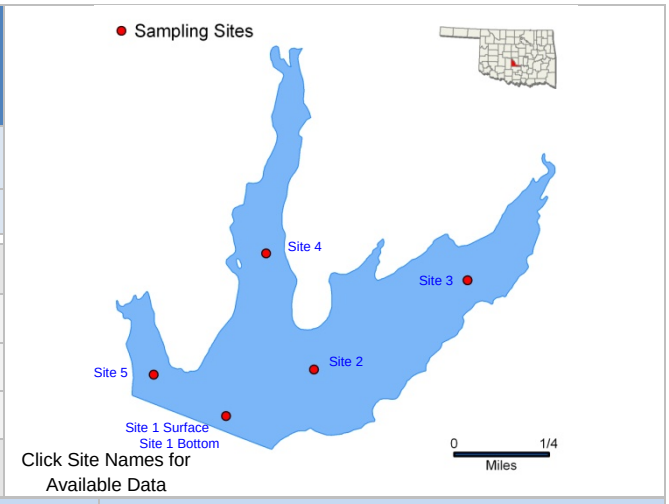
S = Fully Supporting
NS = Not Supporting
NEI = Not Enough Information

Notes: *Did not collect for these parameters

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

Wiley Post Memorial (Maysville)

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



Click Site Names for Available Data

General

Location	McClain County	Click map for site data
Impoundment	1971	
Area	302 acres	
Capacity	2,086 acre feet	
Purposes	Water Supply, Flood Control, and Recreation	

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
	Average Turbidity	79 nephelometric turbidity units (NTU)	100% of values > 25 NTU
	Average True Color	223 units	100% of values > OWQS of 70
	Average Secchi Disk Depth	16 cm	
	Water Clarity Rating	poor	
	Trophic State Index	51	Previous value = 57
	Trophic Class	eutrophic	
Profile	Salinity	0.10 – 0.20 ppt	
Profile	Specific Conductivity	280 – 349.9 µS/cm	
Profile	pH	7.24 – 8.41 pH units	Neutral to slightly alkaline
Profile	Oxidation-Reduction Potential	246 to 664 mV	
Profile	Dissolved Oxygen	Up to 50% of water column < 2 mg/L in August	Occurred at site 4
Nutrients	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	
Nutrients	Nitrogen to Phosphorus Ratio	9:1	Phosphorus limited

Beneficial Uses

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

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

Notes

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

Wister

Sample Period	Times Visited	Sampling Sites
November 2010 – July 2011	4	5

General

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

Parameters

	Parameter (Descriptions)	Result	Notes/Comments
In-Situ	Average Turbidity	17 NTU	100% of values < OWQS 25 NTU
	Average Secchi Disk Depth	54 cm	
	Water Clarity Rating	Average	
	Chlorophyll-a	14 mg/m3	
	Trophic State Index	57	Previous value = 62
	Trophic Class	Eutrophic	
Profile	Salinity	0.01 – 0.04 ppt	
	Specific Conductivity	53.9 – 112.8 µS/cm	
	pH	6.04 – 8.64 pH units	24.1 % of Values < 6.5 pH units
	Oxidation-Reduction Potential	32 to 493 mV	
	Dissolved Oxygen	Up to 30% of water column < 2.0 mg/L in spring	
Nutrients	Surface Total Nitrogen	0.29 mg/L to 0.67 mg/L	
	Surface Total Phosphorus	0.036 mg/L to 0.063 mg/L	
	Nitrogen to Phosphorus Ratio	9:1	Phosphorus limited

Beneficial Uses

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

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

Notes

*Did not collect for these parameters. *Currently, the lake is listed as a Nutrient Limited Watershed (NLW) in the Oklahoma Water Quality Standards (WQS). This listing means that the lake is considered threatened from nutrients until a more intensive study can confirm the Aesthetics beneficial use non-support status.

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

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

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APPENDIX A

OKLAHOMA'S USE SUPPORT ASSESSMENT PROTOCOLS

[UNOFFICIAL]

Amendments effective as of 07/01/2013

TITLE 785. OKLAHOMA WATER RESOURCES BOARD
CHAPTER 46. IMPLEMENTATION OF OKLAHOMA'S WATER QUALITY STANDARDS
SUBCHAPTER 15. USE SUPPORT ASSESSMENT PROTOCOLS

Available online:

www.owrb.ok.gov/util/rules/pdf_rul/current/Ch46.pdf