OKLAHOMA'S NONPOINT SOURCE MANAGEMENT PROGRAM

2019 - 2029

Drafted by:

Oklahoma Conservation Commission
Water Quality Programs

OKLAHOMA'S NONPOINT SOURCE MANAGEMENT

PROGRAM PLAN

2019 - 2029

Drafted by:

Oklahoma Conservation Commission
Water Quality Programs

This publication is issued by the Oklahoma Conservation Commission as authorized by Trey Lam, Executive Director. It is available through www.documents.ok.gov and www.conservation.ok.gov. All programs and services of the Oklahoma Conservation Commission and the Conservation Districts are offered on a nondiscriminatory basis without regard to race, color, national origin, religion, gender, marital status or disability.

i. EXECUTIVE SUMMARY

Nonpoint source (NPS) pollution refers to diffuse pollutants that may seem minor but when summed together from an entire region, become significant. In general, NPS pollution does not result from a discharge at a specific location but generally results from land runoff, percolation, precipitation, or atmospheric deposition. The pollutants degrade aquatic systems by altering the physical and chemical quality and can result in drastic biological effects. Nonpoint source pollution is a significant contributor to water quality problems in the State of Oklahoma. This document describes the processes and programs used by the State of Oklahoma to address NPS pollution and conserve and improve its natural resources through responsible care. The mission statement of the NPS Program in Oklahoma is as follows:

> ***Conserve and Improve Water Resources through Assessment, Planning, Education, and Implementation***

This mission statement guides the activities of the NPS Program by developing a foundation for conservation, improvement, and restoration of water resources. In establishing an effective program to address NPS pollution, a hierarchy of tasks is followed to ensure that a sound and pragmatic approach is undertaken. As outlined in the mission statement, the four major components are addressed in the plan: Assessment, Planning, Education, and Implementation.

The Oklahoma NPS Program is built upon the foundation of water quality standards with long-term goals to attain and maintain beneficial uses in all the State's waters. This long-term goal leads to the objectives of reducing NPS pollution in the State's priority watersheds through implementation programs, identifying sources of NPS pollution in the State, and increasing the coverage of water quality enhanced education programs. These goals and objectives are detailed in the Introduction and Table 1 and serve three main functions; definition of the NPS related water quality problems with reference to severity and temporal extent of the problems, definition of methods to solve the problems, and implementation of actions to solve the problems. The goals for the next five to fifteen years target specific priority watersheds (Table 1 and Figure 12). These goals and objectives are ultimately the responsibility of numerous state and federal agencies. Further clarification of each agency's jurisdiction and responsibilities can be found in Section 8. Roles, Responsibilities and Oversight of this report. Cooperation among state and federal agencies is essential for the success of this program and is addressed through several avenues including the activities of the NPS Working Group, multi-agency review of this framework document, and facilitation by the Office of the Secretary of Energy and the Environment (OSEE).

Water quality programs in the State utilize a variety of funding sources, detailed throughout the plan and in Appendix A. NPS program activities are primarily funded under Section 319(h) of the Clean Water Act (CWA), along with State-funded cost-share programs. The NPS program in Oklahoma will strive to increase the variety of funding sources it uses to address NPS issues in the State.

The State of Oklahoma follows a stepwise pattern in addressing the goals and objectives of the NPS Management Program. The process begins with assessment of the physical, chemical, and biological health of waters of the State, including the watershed around them, to identify threats and impairments to the water resource, along with the cause, source, and extent of the problem. The primary function of assessment is identification of the problem, but it also serves to verify where programs or landowners are

successful in reducing NPS pollution. This assessment process is mainly the responsibility of the Oklahoma Conservation Commission (OCC), but numerous other agencies contribute significantly to the process, including the Oklahoma Water Resources Board (OWRB), Oklahoma Department of Environmental Quality (ODEQ), Oklahoma Corporation Commission (Corp. Comm.), Oklahoma Department of Wildlife Conservation (ODWC), Oklahoma Department of Agriculture, Food and Forestry (ODAFF), Grand River Dam Authority (GRDA), United States Environmental Protection Agency (EPA), United States Geological Survey (USGS), and the Army Corps of Engineers (USACE).

The OCC is responsible for assessment of all identified NPS categories except silviculture, urban storm water runoff, and industrial runoff. The ODAFF is responsible for management and monitoring of NPS pollution from silviculture, pesticides, concentrated animal feeding operations, and poultry feeding operations. The ODEQ is responsible for NPS pollution from urban stormwater and industrial runoff. In general, the OCC conducts physical, chemical, and biological monitoring in small and medium streams to focus on NPS pollution. The OWRB conducts physical, chemical, and biological monitoring on medium and large rivers and all the State's major lakes. The ODEQ conducts or facilitates physical and chemical monitoring in association with discharges of waste or stormwater in the formulation of Total Maximum Daily Loads (TMDLs), toxics monitoring, and monitoring in response to environmental complaints across the state. The Corp. Comm. conducts physical and chemical monitoring associated with oil and gas activities. The GRDA monitors water quality of various State Scenic Rivers, and all of these State monitoring programs are supplemented by the water quality and flow gauging stations of the USGS and the USACE. It is important that data used for purposes of assessment be collected and evaluated following procedures defined in Oklahoma's Use Support Assessment Protocols, the Continuing Planning Process (CPP) and based on Oklahoma's Water Quality Standards.

Guided by assessment activities, the second step involves prioritization and planning. The State of Oklahoma prioritized its watersheds following strategies defined in the Clean Water Action Plan and has maintained a Unified Watershed Assessment (UWA). This UWA was updated based on impaired waterbodies identified in Oklahoma's 2012 Integrated Report. Watersheds were prioritized based on percent of waterbodies impaired, types of pollutants, ongoing work in the watershed, public and private use of waters, habitat for endangered species, and amount of protected special designation land and water resources in the watershed. The NPS Program, through the NPS Working Group, narrowed this list to watersheds prioritized for NPS action. These NPS Priority watersheds were selected because corrective actions are most likely to be successful and the water quality problem stems primarily from NPS-related causes and sources.

Following prioritization, a TMDL, Watershed Based Plan (in accordance with EPA's nine-key elements for watershed plans), or some other implementation plan is developed to reduce or remedy the problem. This plan is developed based on information collected during assessment that specifies the nature of the problem and defines the sources of pollution where actions should be directed and by what magnitude. An important part of the plan is definition of the goals of implementation; these goals or measures of success are critical to evaluating the success of the implementation.

The third component, education is a critical portion of the process and can generally begin during the assessment phase. In general, the goal of most implementation projects is to achieve a level of change in an entire watershed. Landowners and other users of the watershed must become educated on the issues in order to effect behavior change throughout the entire watershed. They must understand the importance of

the resource, what the problems are, and what they can do to reduce the problems. In most cases, NPS programs rely on voluntary cooperation of landowners to implement projects. Landowners must understand the importance of their cooperation, as well as how participation can help them protect their assets and improve their return.

The final component, implementation, involves the application of remedial efforts, such as conservation practices, educational activities, and other innovative efforts that are tailored to address NPS water quality pollution. Specific projects are undertaken to demonstrate the effectiveness of innovative, but proven technology. The tools used in developing and implementing these projects are described in §IV of this document. Monitoring is generally conducted during this stage to verify the success of the implementation.

The process then repeats itself with assessment to evaluate the project and program to determine its successes and failures and to recommend changes for the next round of the process. This will involve post-implementation monitoring of the water resources or other evaluations of the success of the program (such as percent of priority areas with implemented practices or extent of education programs). Once this step has been completed and the outcome evaluated, the process can begin anew with assessment to determine where NPS-related water quality concerns exist in the State of Oklahoma and what their causes and sources are. An important part of this process is review of the actual NPS program with respect to success and failures, in addition to its correspondence with, and function in, the State's overall environmental programs and with other federal programs. To facilitate this evaluation, this report will be reviewed and updated as needed at least every five years. In addition, less formal annual reviews will be conducted to allow the program to more efficiently address NPS concerns.

This page intentionally left blank.

ii. TABLE OF CONTENTS

iii. LIST OF FIGURES

iv. LIST OF TABLES

v. LIST OF ACRONYMS

ACOG- Association of Central Oklahoma Governments
AWQMS- Ambient Water Quality Monitoring System
BMPs- Best Management Practices
BUMP- Beneficial Use Monitoring Program
CAFO- Confined Animal Feeding Operation
Corp. Comm. - Oklahoma Corporation Commission
CPP- Continuing Planning Process
CPs- Conservation Practices
CWA- Clean Water Act
EPA- Environmental Protection Agency
EQIP- Environmental Quality Incentives Program
FSA- Farm Services Agency
GRDA- Grand River Dam Authority
INCOG- Indian Nations Council of Governments
NPS- Nonpoint Source
NPSMP- Nonpoint Source Management Program
NRCS- Natural Resources Conservation Service
OCC- Oklahoma Conservation Commission
OCES- Oklahoma Cooperative Extension Service
OCWCP- Oklahoma's Comprehensive Wetlands Conservation Plan
ODAFF-Oklahoma Department of Agriculture, Food, and Forestry
ODEQ- Oklahoma Department of Environmental Quality
ODM- Oklahoma Department of Mines
ODOT- Oklahoma Department of Transportation
ODWC- Oklahoma Department of Wildlife Conservation
OERB- Oklahoma Energy Resources Board
OSEE- Office of the Secretary of Energy and the Environment
OSU- Oklahoma State University
OU- University of Oklahoma
OWQS- Oklahoma Water Quality Standards
OWRB- Oklahoma Water Resources Board
OWWG- Oklahoma Wetlands Working Group
QMP- Quality Management Plan
SRF- State Revolving Fund
SOP- Standard Operating Procedure
SWAT- Soil and Water Assessment Tool
TMDL- Total Maximum Daily Load
USACE- U.S. Army Corps of Engineers
USAP- Use Support Assessment Protocols
USDA- United States Department of Agriculture
USFWS- United States Fish and Wildlife Service
USGS- United States Geological Survey
UWA- Unified Watershed Assessment
WAG- Watershed Advisory Group

WBP- Watershed Based Plan
WRAS- Watershed Restoration Action Strategy

1. Introduction

1.1 Purpose and Authority of the Document

Section 319(h) of the Clean Water Act requires states to assess waterbodies threatened or impaired by NPS pollution and to develop a plan to address the identified threats or impairments. States must produce two main United States Environmental Protection Agency (EPA) approved documents to be eligible for §319 funding. The first of these, the Nonpoint Source (NPS) Assessment Report, identifies waters threatened or impaired by NPS pollution. The second is a Nonpoint Source Management Program (NPSMP) that outlines the measures by which NPS pollution will be assessed, evaluated, and remediated in the State of Oklahoma. This NPSMP describes the framework for controlling NPS pollution, given the water quality problems defined in the NPS Assessment Report.

In addition, this document must meet the needs of various federal and State requirements dealing with NPS pollution. For example, this document must meet the needs of the State's 208 (Water Quality Management Plan) planning requirements for dealing with NPS pollution. The State Continuing Planning Process (CPP) must also be amended to reference the NPSMP, and the role of the NPS Management Program must be defined within the State's overall pollution control strategy.

Section 319(h) authorizes funding to implement the programs outlined in this plan. States must have an EPA approved NPSMP to receive §319 funding, and the methods, practices and other activities to be employed in the NPS program must also be described in the NPSMP.

1.2 Nonpoint Source Management Program Goals

1.2.1 Program Mission

Oklahoma's NPS program is a combination of many federal, State, and local programs. The Oklahoma Conservation Commission (OCC) is the NPS technical lead State agency, however, numerous other agencies play a vital role in the overall State program. The vision statement of OK's NPS program is:

Responsible Care for Oklahoma's Natural Resources

This vision allows for both protection and utilization of Oklahoma's natural resources. Responsible care means that sound management techniques will be followed when human activity could affect the natural resources of our State. The statement implies that continual maintenance is required to ensure protection of our natural resources.

The vision statement is further refined to address the State's water resources. Nonpoint source pollution may directly influence the air and soil, but all NPS pollution ultimately influences water. Activities that occur within a watershed will affect the quality of the water draining from that basin. The following mission statement further delineates the NPS Program's vision:

Conserve and Improve Water Resources through Assessment, Planning, Education, and Implementation

This mission statement guides the activities of the OK NPS Program by developing a foundation for conservation, improvement, and restoration of water resources. A hierarchy of tasks is followed to ensure that a sound and pragmatic approach is undertaken. As outlined in the mission statement, the four major components are addressed in succession: Assessment, Planning, Education, and Implementation.

Assessment is the starting point to address NPS pollution. Quantifying and identifying the causes and sources of NPS pollution and distinguishing real from perceived problems is the critical first step. Without knowledge of the magnitude or scope of the problem, any remedial action would be fruitless. Once the problem(s) and cause(s) have been identified, a process to improve the situation can be developed. Using the information generated during the assessment phase, an appropriate plan is drafted to meet the needs of the situation. The plan development follows the NPSMP that unifies or focuses the efforts of the NPS Program. A fundamental component of the plan is the development of a public awareness campaign to change current behaviors and to disseminate information. Educational efforts are an essential element in developing an effective program. On-the-ground implementation projects that improve water quality are the final component of a NPS management program. Demonstration projects designed to address the NPS pollution issues identified in the watershed are used as the fundamental tools for water quality improvement and protection. Monies are specifically available in Section 319(h) of the Clean Water Act (CWA), USDA Farm Bill programs, the State cost share program, and other conservation partnership efforts to implement these projects. Project implementation is a culmination of all previous activities. A breakdown in any of the four components of the program leads to a less effective program.

1.2.2 Program Goals

Setting long- and short-term goals, objectives and strategies is one of the key components of Nonpoint Source Management Programs. The long-term goal of Oklahoma's Nonpoint Source Management Program is:

> By 2030, the State of Oklahoma will have established a Watershed Based Plan, TMDL, implementation plan, or achieve full or partial delisting based on water quality success (unless the original basis for listing a waterbody is no longer valid) to restore and maintain beneficial uses in remaining watersheds identified as impacted by NPS pollution in the 2002 303(d) list. The 2002 303(d) list identified 7,306 miles of stream and 232,552 acres of lake area as impaired or fully supporting but threatened. The State will continue to foster its relationship with the Natural Resources Conservation Service and seek other partnerships to maximize the resources spent effectively on watershed restoration. By 2050, the State will attain and maintain beneficial uses in waterbodies listed on the 2002 303(d) list as threatened or impaired solely by NPS pollution.

1.2.3 Objectives

The objectives (or short-term goals) of Oklahoma's NPS Management Program help further define the mechanisms by which the State will achieve its long-term goal. Objectives are listed below, the strategies, actions, and milestones necessary to achieve those objectives are detailed in the following four sections of the document.

Objective 1- Assessment: Oklahoma's Nonpoint Source Program will monitor at least 250 streams, rivers and other waterbodies every five years to determine causes and sources of nonpoint source

impairments to waters of the State. This information will help identify areas of the state where assistance to land users is needed to help protect water resources, but it will also identify areas where stream systems are healthy and support their designated beneficial uses.

Objective 2- Planning: The State will prioritize watersheds, then draft and update Watershed Based Plans (WBP) or similar planning documents following priorities identified in the Unified Watershed Assessment (UWA) using the processes defined in this plan (see Appendix B).

Objective 3- Education: As funding allows, the Blue Thumb Program will continue to provide educational outreach to Oklahoma's 84 conservation districts, and to support the districts' efforts to educate citizens about nonpoint source pollution.

Objective 4- Implementation: Oklahoma will continue to follow the priorities established by the Unified Watershed Assessment (UWA), TMDL schedule, and the NPS Working Group to reduce NPS loading in priority watersheds with accepted watershed based plans. Please see Table 1 for projected milestones and project periods. Oklahoma partners will also implement NPS water quality restoration and protection efforts in an additional two to ten priority watersheds, annually, as identified by the UWA, depending on available resources.

These goals are tied to specific actions and milestones taken from EPA accepted watershed plans or subsequent workplans or planning documents. The goals from watershed plans are listed in Table 1 and further detailed within the following sections on assessment, planning, education, and implementation. Although some milestones have passed, the table has been updated over time to track actions taken in each watershed.

Table 1. Goals and Milestones for High Priority NPS Watersheds as Identified in Accepted Watershed Based Plans.

Priority Watersheds	Stream Miles and Lake Area Listed on 303(d) List*	Causes	General Sources	Goals	Projected Actions/Milestones	Projected Time Frame
Black Bear Creek	143.63 stream miles and 1421 lake acres	Turbidity, pathogens, fecal coliform, *E. coli, Enterococcus,* lead, chloride, sulfates, total dissolved solids, thallium, fishes bioassessment, dissolved oxygen, chlorophyll-a	Rural land use, septic systems, municipal land use, petroleum and natural gas activities, wastewater, municipal point sources	Reduce total suspended solids by 60.3%	TMDL Development	2008
					Watershed Management Plan	2012
					Implement National Water Quality Initiative Program	2013-2015
					Water Quality Monitoring	1990 - present
					Develop 319 and other workplans	2008 and ongoing
Elk City Lake- 240 lake acres and 29 miles of stream	0% of stream miles and 240 or 100% of lake acres fail to meet water quality standards	Turbidity	Urban development, agriculture, septic systems, wildlife, source unknown	Reduce phosphorus and sediment by 30%	Pre-implementation monitoring- Cause and source identification	1998-2014
					Watershed based plan development	2008
					Draft Regional Conservation Partnership Program (RCPP) proposal	2014
					Implement RCPP	2015-2020
					Implementation Monitoring	2015-2020
Ft. Cobb- 95 stream miles and 4,258 lake acres	4,258 acres or 100% of the lake area and 9 miles or 10% of the stream miles fail to meet WQ standards.	Phosphorus, turbidity, *E. coli*, fecal coliform, *Enterococcus*, chlorophyll-*a*, dissolved oxygen	Agriculture, petroleum act., channelization, highway maint., removal of riparian vegetation, septic systems, wildlife	Achieve a 78% phosphorus load reduction through conversion to no-till and cropland to pasture, nutrient management and riparian buffer protection.	Pre-implementation monitoring- cause and source identification	1990s – 2001
					Establish Watershed Advisory Group	2003
					WRAS development	2001
					TMDL development	2006
					Develop §319(h) workplan	2003
					Implementation of practices	2004 - present
					Post-implementation monitoring	2001 - present
					Evaluation of measures of success	2005 - present
					Draft Lake Creek Nonpoint Source Success Story	2007

Priority Watersheds	Stream Miles and Lake Area Listed on 303(d) List*	Causes	General Sources	Goals	Projected Actions/Milestones	Projected Time Frame
Grand Lake-46,500 lake acres and 389 stream miles in Oklahoma[1]	46,500 acres or 100% of the lake area and 140 miles of stream or 43% of the stream miles in Oklahoma fail to meet WQ standards.	Organic enrichment / DO, ammonia, *enterococcus*, *E. coli*, metals (Zn, Pb, Cd), chlorides, total dissolved solids, sulfate, pH, turbidity	Agriculture, construction, in-place contaminants, urban runoff, wastewater, resource extraction / exploration, mill and mine tailings	Reduce bacteria loading by 28 – 99% in 11 OK streams; reduce nutrients to a level that will no longer impair beneficial uses.	Pre-implementation monitoring- Cause and source identification Clean Lakes Study USGS monitoring Load verification monitoring	1990 – 2000
					Establish Watershed Advisory Group	2001
					WRAS development	2001
					Watershed based plan development	2005, 2009
					TMDL development	2008 bacteria
					Develop §319(h) workplans	2001-2012
					Implementation of practices in subwatersheds, beginning in Honey Creek	2006-2012
					Post-implementation monitoring	2007-2012
					Draft RCPP proposal in cooperation with KS	2014
					Implement RCPP Project	2015-2020
					Conduct implementation monitoring	2015-2020
					Implement long-term (30 year) riparian area agreements in partnership with GRDA	2020-2050
Honey Creek	38 miles or 14% of total watershed stream miles in Oklahoma fail to meet WQ standards	*E. coli* and *Enterococcus* bacteria and total dissolved solids	Agriculture, construction, septic systems, highway/road/bridge runoff, land applications of wastes, legacy	Reduce bacteria, sediment and nutrient loading to Honey Creek and downstream Honey Creek Arm of Grand	Pre-implemenation monitoring	1990-2006
					Watershed Based Plan and 319 workplan	2006
					Implement 319 workplan(s)	2007-2016
					Develop Honey Creek Nonpoint Source Success Stories	2017, 2018

[1] The Grand Lake Watershed Plan has not been accepted by EPA; however, the Honey Creek (a subwatershed of Grand Lake) Watershed Plan has been approved. Therefore, work began in Honey Creek and will extend to other portions of the watershed as possible, given additional watershed plans and funding sources.

Priority Watersheds	Stream Miles and Lake Area Listed on 303(d) List*	Causes	General Sources	Goals	Projected Actions/Milestones	Projected Time Frame
			oil and gas operations, urban runoff, wastewater, pets, wildlife, source unknown	Lake sufficiently to delist from the 303 (d) list	Post-implemenation monitoring	ongoing
Illinois River- 526 miles of stream and 14,034 lake acres	13,470 lake acres or 96% of the lake area and 150 miles or 29% of the stream miles in Oklahoma fail to meet WQ standards.	Total phosphorus, *Enterococcus*, *E. coli*, lead, fecal coliform, low dissolved oxygen, turbidity, nitrates, chlorophyll-*a*, and fish bioassessment	Agriculture, wastewater, construction, removal of riparian vegetation, land development, flow regulation, silviculture, streambank stabilization	Short-term: reduce NPS Loading by 132,000 kg/yr. (40%) in the Oklahoma portion of the Illinois River Watershed. Long-term: reduction to a level that will no longer threaten or impair beneficial uses, to be decided in upcoming TMDL.	Pre-implementation monitoring- cause and source identification National Eutrophication Survey USGS monitoring Clean Lakes Study	1970-1999
					Establish Watershed Advisory Group	1999, 2020
					WRAS development	1999
					TMDL development	???
					Develop §319(h) workplan(s)	2000 – present
					Watershed based plan development	2011 (update beginning in 2020)
					Conservation Reserve Enhancement Program (or replacement)	2007-2050
					Implementation of practices	2000-2050
					Post-implementation monitoring	2005-2050
					Evaluation of measures of success	2001-2050
					Document 303(d) delistings and publish NPS Success Stories	2008, 2019
					Report load reductions	Annually
Lake Eucha- 4,444 lake acres and 94 miles of stream	4,444 lake acres or 100% of the lake area and 40 miles or 43% of watershed stream	Nutrients, dissolved oxygen, *Enterococcus*	Agriculture, wastewater	Short-term: Reduce NPS phosphorus loading to Lake Eucha by 50%;	Pre-implementation monitoring- Cause and source identification Clean Lakes Study	1993-1997
					Establish Watershed Advisory Group	1999
					WRAS development	1999

Priority Watersheds	Stream Miles and Lake Area Listed on 303(d) List*	Causes	General Sources	Goals	Projected Actions/Milestones	Projected Time Frame
	miles fail to meet WQ standards.			Long-term: maintain a trophic state index of <62, requiring a 70.4% P reduction to Eucha and a 44.6% P reduction to Lake Spavinaw.	TMDL development	2010
					Develop §319(h) workplan(s)	1998 – 2012
					Watershed based plan development	2009
					Conservation Reserve Enhancement Program (or replacement)	2007 - present
					Implementation of practices	1999 - present
					Post-implementation monitoring	2004 - present
					Evaluation of measures of success	2000 - present
					Document 303(d) delistings and publish NPS Success Story(ies)	2007
					Report load reductions	annually
Lake Thunderbird- 8,995 lake acres and 83 miles of stream	19 or 24% of the stream miles and 8,970 or 99.75% of lake acres fail to meet water quality standards.	Turbidity, dissolved oxygen, color, *E. coli*, total dissolved solids, chloride,	Urban development, construction, agriculture, septic systems, shoreline and streambank erosion, wildlife	Reduce phosphorus by 58% to achieve a 32% reduction in chlorophyll-*a* in Lake Thunderbird.	Pre-implementation monitoring- Cause and source identification	1998-2009
					Implementation of education programs	2005 - 2014
					TMDL development	2013
					Develop §319(h) workplans	2008, 2011
					Demonstration of practices	2005-2010
					Post-implementation monitoring	2010-2012
					Evaluation of measures of success	2006-2013
					TMDL implementation	2016 - current
					TMDL compliance monitoring	2016 - current
					Develop follow-up workplans	2015
Little Beaver Creek	52.54 miles or 68% of stream miles fail to meet water quality standards	Total dissolved solids, *Enterococcus, E. coli,* turbidity, poor fish community	Agriculture, removal of riparian vegetation, septic systems, streambank erosion, wildlife	Reduce total dissolved solids by 75%, *Enterococcus* by 86% and *E. coli* by 31%.	Implementation monitoring- Cause and source identification; conservation effects	2004 - present
					TMDL development	2012
					Implementation of practices	2015-2023
					Watershed Based Plan development	2019
					Establish Watershed Advisory Group	2019-2020
					Evaluation of measures of success	2015 - present
					Cause and source identification	1998-2014

Priority Watersheds	Stream Miles and Lake Area Listed on 303(d) List*	Causes	General Sources	Goals	Projected Actions/Milestones	Projected Time Frame
New Spiro Lake – 254 lake acres	254 lake acres or 100% of lake acres but 0% of stream miles fail to meet water quality standards	Dissolved oxygen, color, chlorophyll-*a*	Grazing in riparian or shoreline zones, septic systems, rangeland grazing, land application of poultry litter	Reduce nutrient and sediment loads by 30%	Watershed based plan development	2015
					TMDL development	2021
					Implementaion of practices	2015-2020
North Canadian River- 1,815 lake acres and 264 stream miles between	1,670 acres or 92% of the lake area (including Lake Overholser) and 129 miles or 49% of the stream miles fail to meet WQ standards.	Pathogens, turbidity, and low dissolved oxygen	Wastewater, agriculture, construction, septic systems, oil and gas production	Reduce NPS loading of bacteria by 89%; reduce phosphorus to Lake Overholser by 75%.	Pre-implementation monitoring- Cause and source identification USGS monitoring	1980s – 2007
					Establish Watershed Advisory Group	2007
					Watershed based plan development	2009
					TMDL development	2005/2006
					Develop §319(h) workplans	2007-2012
					Implementation of practices	2007 - present
					Post-implementation monitoring	2007 - present
					Evaluation of measures of success	2007 - present
					Develop NPS *E. coli* Success Story for North Canadian River	2018
Pennington Creek	Not listed - Protectionary	*Enterococcus*	Grazing in riparian or shorelines zones, septic systems, recreation and rangeland grazing	Currently attaining all designated uses	Pre-implementation monitoring – Cause and source identification	2004-2006
					Implementation of practices	2006 - present
					Watershed based plan development	2015
					Post-implementation monitoring	2009 - present

Priority Watersheds	Stream Miles and Lake Area Listed on 303(d) List*	Causes	General Sources	Goals	Projected Actions/Milestones	Projected Time Frame
Stillwater Creek	4,811 or 99% of lake acres and 50.37 or 38% of stream miles do not meet water quality standards	Turbidity, *E. coli, Enterococcus,* nitrates, benthic macroinvertebrates, chlorophyll-a, mercury, and dissolved oxygen	Grazing in riparian or shorelines zones, highway, road and bridge runoff, municipal point sources, agriculture, septic systems, permitted CAFO runoff, oil and natural gas activities, rangeland grazing, residential districts, lagoons, wildlife	33% reduction for *E coli* (18% within first 5 years), 85 % reduction for *Enterococcus* (40% within first 5 years); 20% reduction in total suspended solids (10% within first 5 years)	Pre-implementation monitoring- Cause and source identification	1990s-2016
					Watershed based plan development	2016-2018
					Establish Watershed Advisory Group	2019
					Implementation of practices	2019-2022
					Post-implementation monitoring	2019 - present

*refers to the approved 303(d) list that was current when the watershed plan was developed as opposed to the current 303(d) list.

1.2.4 Discussion of the Eight Key Components and Organization of the Document

EPA NPS Program guidance (United States Environmental Protection Agency, 2012) requires that eight key components must be addressed in state NPS management programs. A state that incorporates all eight components and has a proven track record of effective implementation will be formally recognized as a NPS Enhanced Benefits State. Nonpoint Source Enhanced Benefits States will be afforded substantially reduced oversight and maximum flexibility to implement their state programs and to achieve water quality objectives.

The eight components are listed below, along with sections of this document in which the components are discussed.

1. Explicit short- and long-term goals, objectives, and strategies to restore and protect surface and groundwater. Setting long- and short-term goals, objectives, and strategies for the program helps the program to better evaluate its impacts, and to prioritize the use of resources towards activities that will best help it achieve its goals. The long term-goal of the program is discussed in 1.2.2 Program Goals, and the shorter-term goals (objectives) begin immediately below in 1.2.3 Objectives. The short-term goals are further discussed in the four sections of assessment, planning, education and implementation, including activities, strategies, and milestones set for each of the four objectives.
2. Strong working partnerships, linkages, and collaboration with appropriate state, interstate, tribal, regional, and local entities (including conservation districts), private sector groups, citizen groups, and federal agencies. The challenge of addressing nonpoint source pollution is best achieved through a strong partnership as no one group has the authority, expertise, or resources to fully address the problem. The NPS Working Group (3.2 Nonpoint Source Working Group) is made up of the primary partners in Oklahoma's NPS Management Program and serves as an important mechanism for communication and public involvement in the NPS Program. Nonpoint Source Working Group member agency identification and their roles in the program are discussed throughout the document. However, the Roles, Responsibilities, and Oversight section (8. Roles, Responsibilities and Oversight) further defines the Oklahoma partnership. It is important to note that State statute sets many requirements on Oklahoma agencies to work collaboratively to address their area(s) of jurisdiction. In most cases, these statutes replace the need for detailed memoranda of understanding between or among agencies.
3. A balanced approach that emphasizes both statewide NPS programs and on-the-ground projects to achieve water quality benefits. Efforts should be well-integrated with other relevant state and federal programs. Some efforts to address NPS pollution, such as educating the public about water quality and nonpoint source pollution or assessing waters for nonpoint source pollution impacts are best accomplished at a state-wide level. Other efforts, such as removing streams from the §303(d) list of impaired streams are best accomplished through on-the ground projects in specific watersheds. The Oklahoma NPS Management Program uses a combination of these two strategies; however, more than half of the program's resources are devoted towards on-the-ground efforts in specific watersheds as these efforts generate the most direct results towards the §319(h) program's measurable goals of nitrogen, phosphorus, and sediment load reductions and success stories where water quality standards are met in formerly §303(d)-listed streams. The primary discussions about how the Oklahoma NPS Program addresses both statewide and watershed-specific actions are contained in the following four sections on Assessment, Planning, Education, and Implementation

(2. Component I: Assessment of NPS Pollution, 3. Component II: Nonpoint Source Program Planning, 4. Component III: Nonpoint Source Program Education, 5. Component IV: Implementation to Address Nonpoint Source Impacts). The integration of the program with other relevant programs is discussed throughout the document, specifically in the sections on assessment, planning, education and implementation, but also in the section on State and Federal Consistency (6. State and Federal Consistency) and the section on Other State Approved Plans and Programs with Nonpoint Source Authorities (7. Other State Approved Plans and Programs with NPS Authorities).

4. A description of how resources will be allocated between (a) abating known water quality impairments resulting from NPS pollution and (b) protecting threatened and high quality waters from significant threats caused by present and future NPS impacts. Resources immediately available are always in limited supply, so care must be taken to prioritize resources between protection and abatement. The bulk of Oklahoma's resources focus on abating known water quality impairments as the national goals for the program are almost entirely focused towards this end. However, that is not to say that Oklahoma ignores the protection of threatened and high quality waters. The prioritization process (described in 3.1 Prioritization of Oklahoma's NPS Management Program and again in APPENDIX B: Unified Watershed Assessment: 2014 Update) for selection of watersheds includes several metrics geared towards protection of threatened and high quality waters. In addition, any work to address impaired waters also protects threatened, but not yet impaired streams in that particular watershed. Further discussion about abating known impairments and protecting unimpaired waters is included primarily in the following four sections on assessment, planning, education, and implementation.
5. An identification of waters impaired by NPS pollution as well as priority unimpaired waters for protection and a process to prioritize and progressively address these waters by conducting more detailed watershed assessments and developing and implementing watershed based plans. Given that resources are limited, a significant number of Oklahoma's waters are in need of remediation and protection, thus prioritization of these waters becomes very important. The processes by which these impaired waters are addressed by the program are primarily discussed in the following four sections of assessment, planning, education, and implementation. A discussion of the extent of NPS pollution including primary causes and sources of the problem in Oklahoma, and the process to update that identification follows in 1.4 Extent of the Nonpoint Source Water Quality Problem. The prioritization of waters to be addressed by the Oklahoma NPS program is discussed in detail in 3.1 Prioritization of Oklahoma's NPS Management Program and further in Appendix B.
6. Implementation of all program components required by Section 319(b) of the CWA and establishment of strategic approaches and adaptive management to achieve and maintain beneficial use support of waters of the state as expeditiously as practicable. These components include:
    a. Identification of measures to be used to control NPS pollution
    b. Identification of key programs to achieve implementation of the measures
    c. Description of the processes used to coordinate and integrate programs used in the NPS program
    d. Schedule of goals, objectives, and annual milestones for implementation
    e. Sources of funding from federal, state, local and private sources
    f. Federal land management programs, development projects, and financial assistance programs
    g. A description of monitoring and other evaluation programs that the state will conduct to determine short- and long-term NPS Management program effectiveness

h. Baseline requirements established by other applicable federal or state laws.

In order to receive federal funding, states agree to complete several tasks, including semi-annual and annual reports, maintaining an updated NPS Management Program document, a NPS assessment report (which can be included in a state's Integrated Report), and maintaining project updates in the Grants Reporting and Tracking System. These tasks help set the goals for the program and help EPA evaluate a program which is largely implemented by States and their partners. The Oklahoma processes, goals, activities, and milestones associated with these efforts are covered in the Planning section of the document (3. Component II: Nonpoint Source Program Planning). Of these required efforts, the updated NPS Management Program is one of the most critical as it sets the stage for what the program can and will accomplish. In other words, if an action isn't identified in the NPS Management Program, then it can't be funded with EPA Section 319 monies. The Implementation section (5. Component IV: Implementation to Address Nonpoint Source Impacts), highlights the types of practices used by the program to address NPS impairments, and well as the process used to select them, which is also addressed in the Local Watershed Group portion of the Planning section (3.3 Local Watershed Working Groups). The key programs used to achieve implementation are also discussed in the Implementation section of the document, although further references can be found throughout the document. Milestones, goals, and objectives related to implementation at the earliest practical date are also highlighted in the implementation section, although some detail is also included in Table 1. Sources of funding are discussed in the Program Financial Management section (9. Program and Financial Management), in APPENDIX A: Funding and throughout the document. Program coordination and federal programs are discussed throughout the document and in the section on Roles, Responsibilities, and Oversight. The process of evaluating program success is discussed in the Assessment section (2. Component I: Assessment of NPS Pollution), the Process to Update and Evaluate the Management Program section (10. Process to Evaluate and Update the Management Program Plan), and throughout the remainder of the document. Finally, applicability to baseline requirements established by other state and federal laws is discussed in the State and Federal Consistency section (6. State and Federal Consistency), and throughout the document.

7. Efficient and effective management and implementation of the State's NPS program, including necessary financial management. Nonpoint source projects include appropriate monitoring and/or environmental indicators to gauge effectiveness. Given the importance of water quality improvement and protection and the scrutiny by many on the §319 program, it is critical that State programs are managed in such a way as to most expeditiously and efficiently use resources awarded to them. This means not only using monies wisely and quickly, but also such that it is possible to see meaningful results in a timely manner. This involves not only minimizing the amount of unliquidated obligations a State's §319 program has, but also making satisfactory progress toward program goals, objective and milestones. This satisfactory progress will be reported within the State's annual report, discussed in the planning section of the document (3. Component II: Nonpoint Source Program Planning), and referred to at numerous other points in the document. The Program and Financial Management Section (9. Program and Financial Management) gives further detail on this process, along with many other references throughout the document.
8. A feedback loop whereby the state reviews, evaluates, and revises its NPS Management Program at least every five years based on environmental and functional measures of success. NPS-related water quality problems have taken decades or even centuries to develop and therefore it is unrealistic to expect them to be solved within a single, five to ten year window of a NPS

Management Program Plan. Therefore, it is critical that a Management Program employ an iterative process to determine where the program has and hasn't been successful, and to plan accordingly. The process to review and update the Management Program is specifically highlighted in 10. Process to Evaluate and Update the Management Program Plan, but references to evaluation and program adjustment are found throughout the document.

1.3 What Is Nonpoint Source Pollution?

Nonpoint source pollution refers to diffuse pollutants that may seem minor, but when combined from an entire watershed, become significant. In general, NPS pollution does not result from a discharge at a specific location (such as a pipe) but results from runoff, percolation, precipitation, or atmospheric deposition. Any pollutant, regardless of the concentration, can contribute to NPS pollution when released in a watershed. Precipitation washes pollutants from the air and land into streams and lakes or into groundwater. The pollutants degrade aquatic systems by altering the physical and chemical quality and can result in drastic biological effects.

Nonpoint source pollution is not as easy to identify as sewage or industrial effluent from a point source. Seemingly minor or harmless activities that disturb the watershed or pollute the water can have cumulative effects. Common sources of NPS pollution include agriculture, forestry, oil and gas exploration and mining, surface and subsurface mining of various resources, septic systems, recreational boating, urban runoff, construction, road development and maintenance, physical changes to stream channels, habitat degradation, and negligent or uninformed household management practices. Natural sources of NPS pollution include impacts of wildlife populations, extreme weather events and natural geology.

1.4 Extent of the Nonpoint Source Water Quality Problem

NPS pollution is the primary cause of water quality impairments across the nation (United States Environmental Protection Agency, 2012). According to the National Evaluation of the CWA Section 319 Program (United States Environmental Protection Agency, 2011), NPS pollution is the leading source of impairment in over 33,000 waters, or roughly seventy-five percent of all impaired waters for which total maximum daily loads (TMDLs) have been calculated.

According to Oklahoma's 2016 Integrated Report (Oklahoma Department of Environmental Quality, 2016), the most common potential sources of impairment in lakes and streams are unknown sources (85% of lakes and 34% of streams), which may be point source or NPS in nature. However, if you exclude the unknown sources, the majority of potential sources are NPS-derived for both lakes and streams (Figure 2). Seven hundred and eighty-nine waterbodies are listed as impaired in the 2016 Integrated Report (Figure 1). In addition, more streams than lakes suggest potential point source impacts as shown in Figure 2.

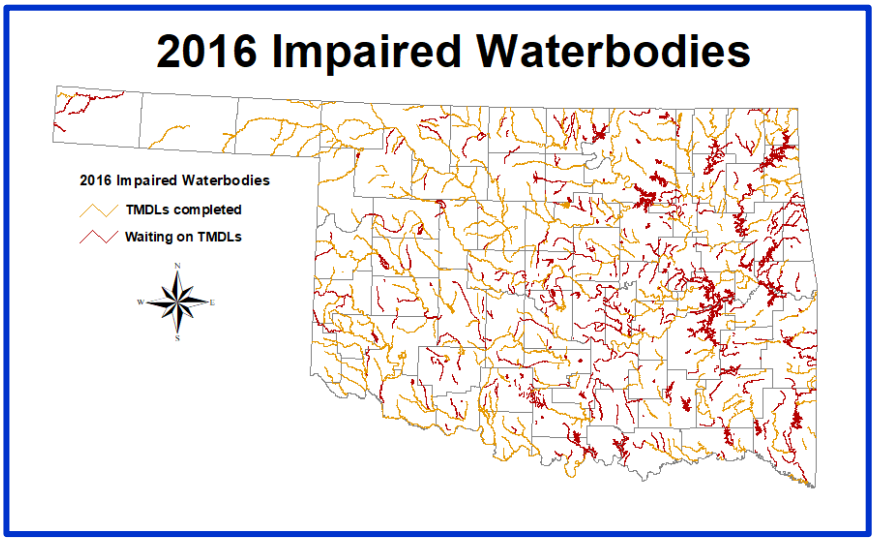

Figure 1. Impaired Waterbodies Designated in Oklahoma's 2016 Integrated Report.

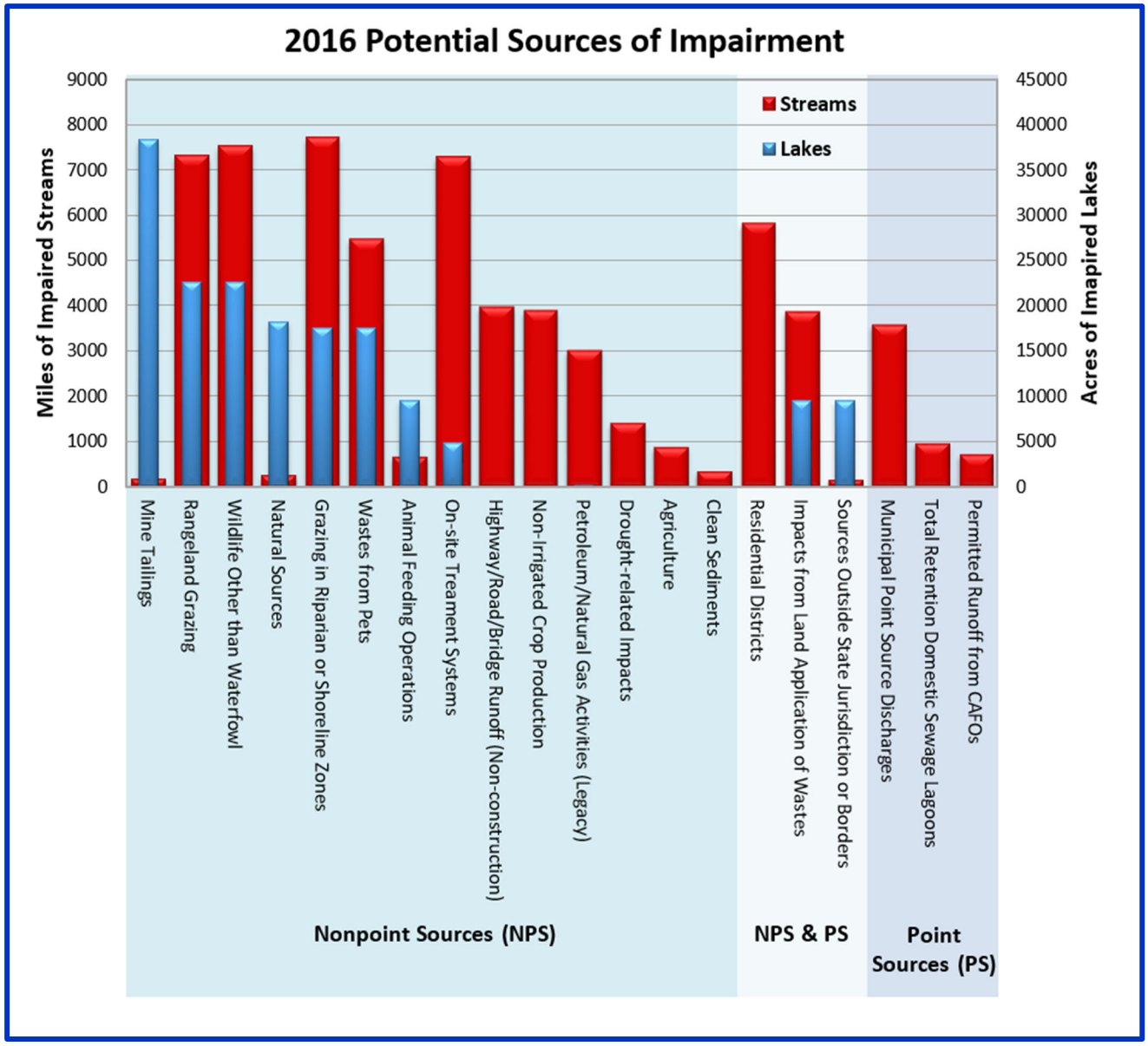

Figure 2. 2016 Potential Sources of Pollution as Reported in the Integrated Report.

These results suggest that land management related to grazing in riparian or shoreline zones, rangeland grazing, wildlife (other than waterfowl) and onsite septic systems are major potential sources of impairment in Oklahoma streams, whereas mine tailings, wastes from pets and natural sources are additional significant potential sources that may be impacting lakes. Additional studies indicating these sources as major contributors to NPS pollution in Oklahoma watersheds include TMDLs published by the Oklahoma Department of Environmental Quality (ODEQ) on the Fort Cobb, Canadian River, Neosho River, and Thunderbird watersheds, published on their website (Oklahoma Department of Environmental Quality, 2019). Various Watershed Based Plans published by the OCC (Oklahoma Conservation Commission, 2019) also indicate these sources as potential contributors.

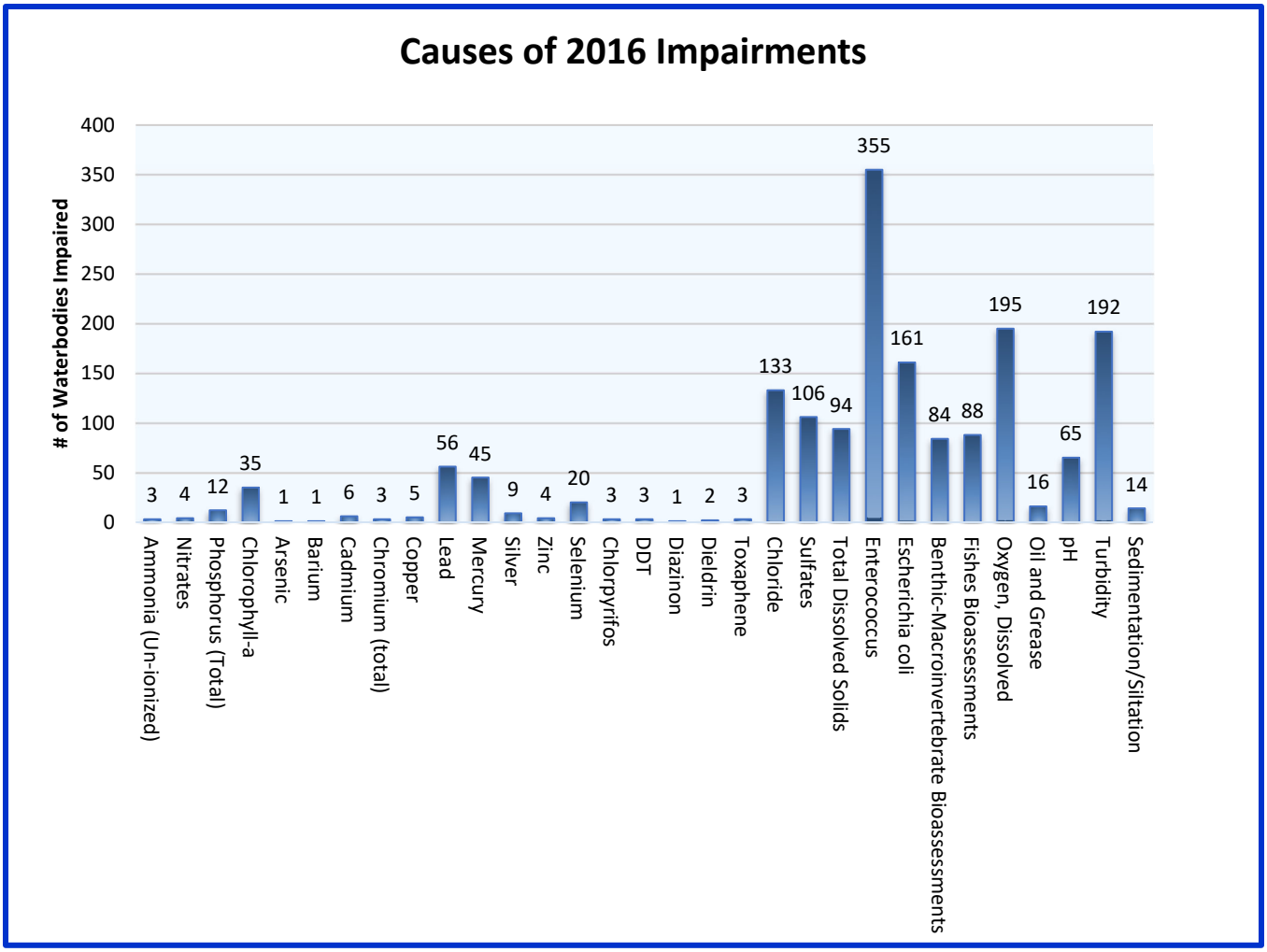

Figure 3. Causes of Water Quality Impairment as listed in the 2016 Integrated Report.

Figure 3 depicts the most prevalent NPS pollutants in Oklahoma are fecal indicator bacteria, turbidity, and low dissolved oxygen as reported in the 2016 Integrated Report (Oklahoma Department of Environmental Quality, 2016). Other significant NPS pollutants include sulfates, chlorides, and total dissolved solids (TDS). Agricultural land, road building and maintenance, animal feeding operations, construction sites, septic tanks, silvicultural activities, oil and gas-related activities, mining activities (gravel, coal, etc.), streambank erosion, urban lawn and garden maintenance activities, and other land disturbances are contributors of these pollutants. Fish consumption advisories, beach closures, habitat destruction, unsafe drinking water, fish kills, and many other severe environmental and human health problems result from NPS pollutants. These pollutants also impact clean water habitats by causing algal blooms, sedimentation, erosion, and other aesthetic effects.

Equally concerning are the economic impacts that result from NPS pollution. Water quality problems in the State have become a tremendous obstacle requiring extremely large investments to remediate their effects. For the past 20-30 years, Oklahoma has expended considerable resources annually to restore and protect water resources damaged by NPS pollutants. However, efforts to reduce NPS pollution originally received significant attention following the dustbowl days when agricultural agencies and various federal

agencies devoted enormous resources towards reducing soil erosion. The State continues to realize the increasing significance of NPS pollution and to focus attention towards decreasing its impacts.

A coalition of numerous Federal, State, Native American tribes, municipal, and community groups works to manage NPS pollution in Oklahoma. This group works toward this end through numerous avenues discussed in this plan. This document is the State of Oklahoma's Nonpoint Source Management Program Plan; it represents the interests, concerns, activities, goals, and plans of the coalition related to NPS pollution in Oklahoma.

1.5 NPS Program Progress

Significant progress has been made in addressing waterbodies listed on the 2002 303(d) list thus far. Watershed Based Plans, TMDLs, Nonpoint Source Success Stories, or full delistings have been completed on 83% of waterbodies listed on the 2002 303(d) list (Table 2) (Appendix C). Seventy of the original 436 waterbodies listed on the 2002 303(d) list have been delisted (which represents 16% of the 2002 impaired waterbodies), as reported in the 2016 303(d) list. Forty-six waterbodies are included in nine element Watershed Based Plans designed to address NPS water quality problems. Fourty-four waterbodies have been at least partially delisted due to NPS-based remedial efforts to install conservation practices in their watersheds. Four hundred twenty one of the 1,524 waterbody pollutant pairs listed as impaired on the 2002 list are no longer impaired in 2016. Finally, 45 or 39% of the nutrient-related (dissolved oxygen, nitrate or phosphorus), 96 or 55% of the sediment related (turbidity), and 93 or 42% of the pathogen-related waterbody impairments have been delisted between 2002 and 2016. One hundred ninety-nine TMDLs have been developed for parameters listed on the 202 303(d) list.

Table 2. NPS Program Progress Measured in Differences Between 2002 and 2012 Impaired Waterbodies.

Measure of Improvement	Number of waterbodies	Percent of total
TMDL Developed	199	46
Watershed Plan Developed	46	11
NPS Success Story (Partial or full delistings of 2002 listed streams)	44	10
Waterbody/pollutant pair delistings	421	28
Waterbody Fully Delisted	70	16
Total	360	83

In addition, Oklahoma drafted another 40 NPS Success Stories for waterbodies listed after 2002 (84 total) which are published on EPA's success story website (https://www.epa.gov/nps/success-stories-about-restoring-water-bodies-impaired-nonpoint-source-pollution). For at least the past nine years, Oklahoma has been a national leader in nutrient load reduction as reported in EPA's Grants Reporting and Tracking System database. Five hundred twenty-four additional TMDLs have been drafted (723 total) to address water quality impairments.

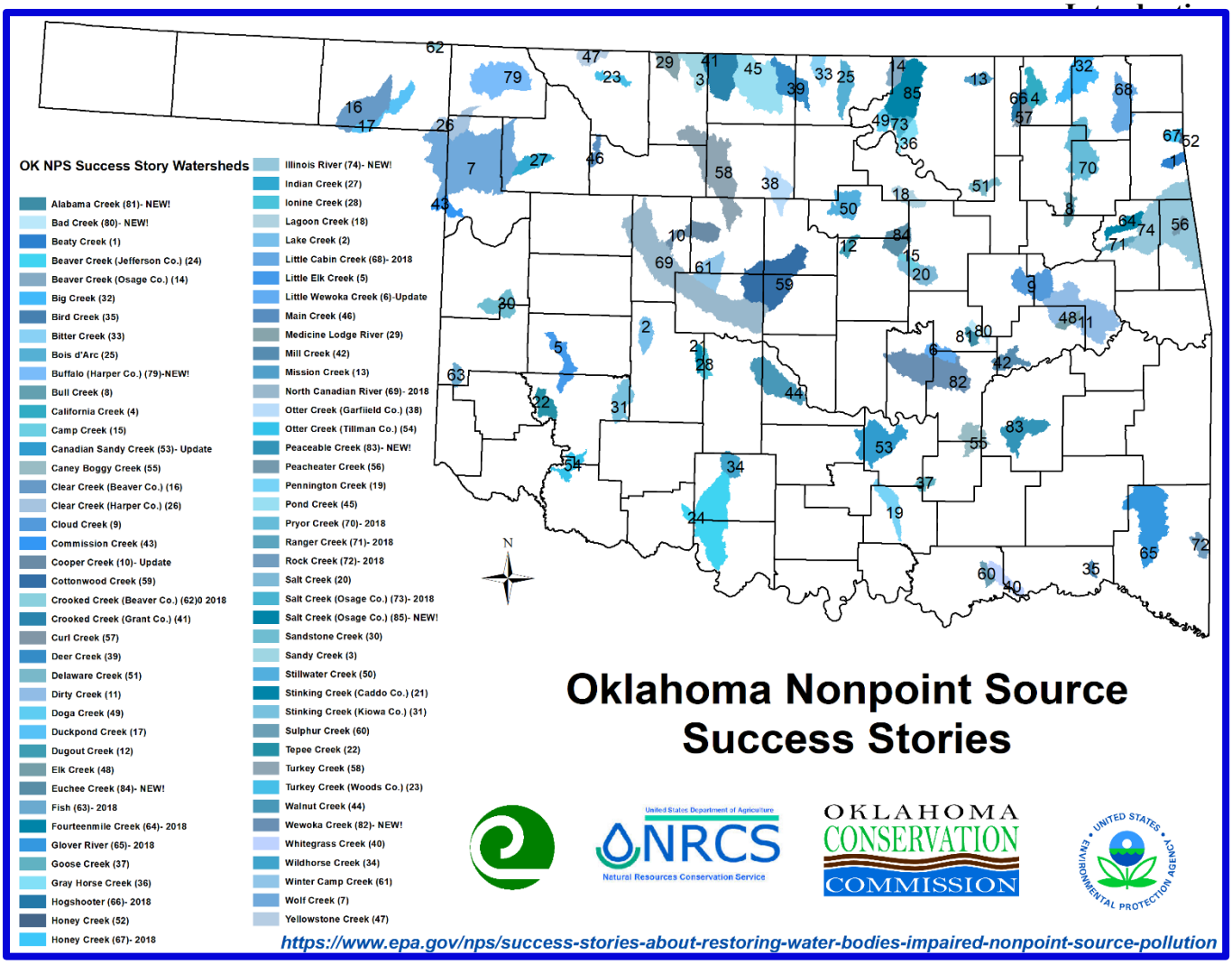

Figure 4. Oklahoma's Nonpoint Source Success Stories.

These TMDLs primarily address NPS impairments caused by turbidity, bacteria, and nutrient related causes. Oklahoma has drafted thirteen EPA-accepted Watershed Based Plans in the highest NPS priority watersheds. Significant progress has also been made in addressing some of the key concerns in NPS Priority Watersheds, ranging from extensive implementation of conservation practices to increased awareness of NPS-related water quality issues and new partners are participating in the process. For example, poultry litter applications are significantly reduced (in some years by as much as 90%) in the Illinois River and Eucha/Spavinaw Watersheds. Private corporations have partnered with State agencies to fund conservation practices that protect water quality. Thousands of landowners have installed conservation practices through §319 funded and complementary water quality priority watershed implementation projects. Many of these projects have documented notable water quality improvements, including reduced nutrient, sediment, and bacteria loading rates, improved biological communities, and delistings from the 303(d) list.

Despite the progress, significant work remains to address NPS impacted waterbodies. Oklahoma's strategy to achieve the water quality goals and objectives described in the introduction follows a stepwise pattern. Initial work focuses on statewide efforts towards assessing NPS pollution across the State so that an overall characterization of NPS pollution in the State can be made. This characterization is useful for prioritizing both spatially and by pollutant or source the efforts necessary to reduce NPS pollution in the State. This

prioritization is necessary to ensure the optimal use of available resources towards achieving goals. The process Oklahoma uses to address NPS pollution to waters of the State is as follows 1) statewide monitoring to assess NPS pollution across the State, and identify spatially and by pollutant (sediment, nutrients, etc.) hot spots or priority areas; 2) planning followed by diagnostic monitoring or modeling as necessary to identify priority areas within a watershed where action is necessary to address water quality impairments; 3) education to inform stakeholders about the problem and their potential role in its solutions; and 4) implementation of efforts, either watershed-specific or statewide, to address those specific pollutants and sources. This process is repeated with follow-up monitoring to determine program effectiveness and necessary adjustments to continue to make progress.

The statewide and watershed based strategies can also operate independently of one another. There are many ubiquitous pollutants that are best controlled at a statewide, rather than a watershed level. This management plan will also address strategies for reducing pollutants. Statewide strategies for education, incentives, and regulation should be in place to prevent further degradation and to prevent additional waters of the State from becoming impaired. Some watersheds have particular interests that set them apart from the statewide prioritization strategy and warrant watershed implementation. For instance, even though the Blue River or Mountain Fork of the Little River watersheds have few water quality concerns, their pristine status demands proactive implementation to preserve their integrity. This pristine status is the result of landowner activities that protect the resource. It is important to protect these activities as well as use them as examples that may be transferred to other watersheds.

Conservation districts are the key to successful planning for most NPS categories. Districts within each watershed must be updated with available data and participate in the decision making and planning processes. Districts are uniquely capable of conducting watershed assessments and inventorying the practices needed. Conservation districts have knowledge of land and people at the local level, but are also the repositories of land treatment records and conservation plans. Many districts will need additional staff, training, and equipment to become aggressively involved in additional programs. Conservation districts are the logical coordinator for watershed advisory groups and public participation for restoration actions.

Numerous programs address NPS pollution and water quality in the State. The programs range from education efforts of nearly every State and federal agency to actual pollution control programs. For the overall NPS program to be successful, many changes in practices and attitudes of the citizens of Oklahoma are necessary. There is no way of knowing how quickly those changes could take place. However, the State has a much more comprehensive approach to achieving those changes than ever before. Citizens are becoming more aware of NPS issues and more concerned about water quality. This concern extends to all generations, which suggests that sustained, organized efforts to reduce the impacts of NPS pollution will have greater potential to be successful than ever before.

The following sections of this document describe the Oklahoma process in more detail, including the strategies, actions, and milestones for each of the four steps of the process. The statewide and watershed based strategies are integrally tied to one another. On a statewide basis, Oklahoma will continue to identify and verify waters and watersheds impaired by NPS pollution and unimpaired waters that are threatened or otherwise at risk. This process is updated at least every two years in the Integrated Report. Further, on a watershed basis, Oklahoma will progressively address these identified waters by conducting more detailed watershed assessments and developing and implementing watershed based plans. The State will follow a simple cyclical process of identifying waters of concern through monitoring, identifying pollution

sources, planning, and implementing measures to remedy the water quality problem and continued monitoring to verify that the pollution has been abated and no new pollution is occurring. The process of identifying watersheds and assessing their water quality is outlined in Component I, the assessment section (2. Component I: Assessment of NPS Pollution). Component II, the planning section (3. Component II: Nonpoint Source Program Planning) in turn describes the planning process involved to establish Watershed Based Plans, implementation plans, and steps necessary to develop Component III, education projects (4. Component III: Nonpoint Source Program Education) and Component V, implementation projects (5. Component IV: Implementation to Address Nonpoint Source Impacts) to remedy identified water quality problems.

2. Component I: Assessment of NPS Pollution

2.1 Background

Since 1981, the OCC has been designated "(to) act as the management agency having jurisdiction over and responsibility for directing NPS pollution prevention programs outside the jurisdiction or control of cities or towns in Oklahoma. As stated in Oklahoma Statutes (State of Oklahoma, 2019), Title 27A, the Commission, otherwise, shall be responsible for all identified non-point source categories except silviculture, urban storm water runoff, and industrial runoff" (Title 82 O. S. §§ 1501-205 (19)). Varying ODAFF divisions are responsible for NPS pollution from silviculture, CAFOs, and pesticides, and the ODEQ is responsible for NPS pollution from urban stormwater and industrial runoff. In addition, Senate Bill 1170 of 1998 gave ODAFF jurisdiction over NPS pollution prevention from Poultry Feeding Operations (Title 20.S. §§ 10-9.1 *et seq*. 1998). Senate Bill 549 gave ODAFF regulatory authority over all agricultural NPS pollution, unless otherwise noted in statute. In February 1987, the Federal Clean Water Act (Public Law 100-4) was reauthorized, and passage included a new section entitled, §*319, Non-Point Source Management Programs*. This addition emphasized that NPS pollution is a significant factor affecting the quality of the nation's water and subsequently preventing attainment of the mandate of the CWA—fishable and swimmable waters.

EPA has charged each states' NPS Program with two primary tasks: 1) Identify all waters being impacted by NPS pollution; 2) Develop a management program describing NPS pollution programs to be implemented to correct any identified problems.

In addition, each state's NPS Program is charged with an identification of all programs, including enforcement, to achieve implementation, cooperation with local, regional and interstate entities which are actively planning for NPS controls, and to report on program status of addressing NPS impacts and improving water quality.

Given such tasks, the OCC developed a monitoring program, coordinated with other Oklahoma programs, to address NPS issues in the State. Assessment of the State's water quality is the foundation for meeting the long-term goals for the State NPS program. To fully address NPS pollution, a dynamic program consisting of four monitoring categories has been adopted. The first category includes a comprehensive, coordinated investigation and analysis of the causes and sources of NPS pollution throughout the State—Ambient Monitoring. The second category involves more intensive, specialized monitoring designed to identify specific causes and sources of NPS pollution in important watersheds—Diagnostic Monitoring. The data from diagnostic monitoring can be used to formulate an implementation plan to specifically address the sources and types of NPS pollution identified in diagnostic monitoring. The third monitoring category, conducted during the execution of the implementation plans, is designed to inform remedial and/or mitigation efforts to address the NPS problems—Implementation Monitoring. Finally, the fourth category evaluates the effectiveness of the implementation through assessment and post-implementation monitoring—Success Monitoring.

As stated above, NPS monitoring is required by federal mandate as well as State statute. However, monitoring is more than a requirement; it is the driving force behind the implementation of the NPS

program and also generates a NPS water quality database for the people of Oklahoma. Information deposited in this database can be used as a powerful tool to address water pollution issues.

In general, the State of Oklahoma takes into consideration the following in the context of Oklahoma Water Quality Standards (OWQS) and Use Support Assessment Protocols (USAP) to definitively address NPS pollution:

1. What are the actual levels of pollution that prevent the attainment of the mandate of the CWA?
2. What levels of pollutants are due to natural sources and anthropogenic sources?
3. What levels of pollutants are reasonable to expect under present modern day land uses, and are these levels protective of aquatic life;
4. What aquatic communities should be present in any given size stream or area of the State;
5. Which waterbodies are non-supporting due to NPS pollution, and which waterbodies are supporting?
6. Which waterbodies show elevated or increasing levels of NPS pollutants that threaten water quality?
7. What are the sources and magnitude of pollution loading within impaired waterbodies;
8. What land uses or changes in land use are potential sources for pollutants causing impairment?
9. What remedial efforts are effective at addressing sources of NPS water quality pollution?
10. What reductions in pollutant loadings have been realized where remediation was implemented; and
11. Where a remediation program has been implemented, are beneficial uses supported?

These monitoring needs are addressed through four categories of monitoring efforts described previously. The first six needs are met through monitoring efforts of State agencies. The second category addresses needs seven and eight, and is diagnostic in nature. Implementation practices (category 4) address the needs of item nine. Finally, the third category addresses needs ten and eleven, and is specific to assessing the benefits and water quality improvements of remedial programs.

The NPS monitoring program has been designed to determine, with regard to NPS pollution, beneficial use attainment status, to identify water quality pollutants, to aid in the identification of NPS pollution sources, to monitor the effectiveness of conservation practices (CPs), and to prioritize CP implementation. The Oklahoma Water Resources Board (OWRB) has sole responsibility for designating beneficial uses for waterbodies within the State. These assignments are listed and explained in OWQS. Water quality numerical criteria and biological and habitat assessments are used to determine use attainment status, when available, in a manner consistent with OWRB's USAP.

A statewide collection of positive reference streams suggests the expected and achievable community for any stream in the State for use with 785:45-12(e)(5) in OWRB's OWQS (Oklahoma Water Resources Board, 2014). Reference sites have been established for the various ecoregions (Omernick, 2012) in Oklahoma. All monitoring data is compared to appropriate reference sites and OWQS to determine use attainment status. In addition, results from assessments are applied to the available standards and water quality criteria along with the decision criteria presented in the most current version of Integrated Reporting and Listing Decisions Guidance as listed on EPA's website (United States Environmental Protection Agency, 2013). Protocols for determining beneficial use support (USAP) are found in the Oklahoma Administrative Code 785:46-15 (Oklahoma Water Resources Board, 2014). Streams are considered non-supporting when OWQS are violated as determined by criteria and rules listed in OAC 785:46-15. Parameters not addressed in OAC 785:46-15 are assessed using applicable State and federal rules and regulations to determine non-support.

2.2 NPS Monitoring Program

Nonpoint Source monitoring is the impetus for achieving the NPS Program's vision of conserving and improving water resources. To fully address NPS pollution, a dynamic monitoring program has been adopted and is discussed below.

2.2.1 Assessment Monitoring

The Assessment Monitoring stage of the NPS Program is accomplished through a coordinated effort between several State and federal monitoring programs, most of which are described below and shown in Figure 5 and Figure 6. The OCC's NPS Assessment/Monitoring program known as the Small Watershed Rotating Basin Monitoring Program is based on a rotational sampling protocol encompassing roughly 414 watersheds. Watersheds have been delineated based on the USGS 11-digit waterbody system and overlaid by the State's 11 whole basin planning management basins. Primary samples are collected at the outlet of the HUC 11 basins located entirely in the state along with secondary sites located upstream in selected watersheds. Fixed stations are segregated into strategic basin groups and are sampled every five weeks for a period of two years. Each year, sampling is initiated in a new basin group, resulting in a statewide coverage of all sites in five years.

The following discussion and strategy for achieving comprehensive monitoring coverage of the State is contingent on available funding. The current level of funding available through the CWA Section 319(h) is adequate to sustain a yearly sampling effort of 130-150 sites. The monitoring program is adjusted to meet the State's needs with the resources available.

Fundamentally, the State must identify all waters within the State that are being impacted by NPS pollution, and develop a management program covering NPS pollution activities and remediation or protection strategies. From this basic requirement, the following four reasons for monitoring have been developed:

1) *Beneficial Use Monitoring:* The most important reason for monitoring is to ensure that the State of Oklahoma meets CWA goals. The beneficial uses assigned to waterbodies are thoroughly evaluated through comprehensive water quality monitoring. The monitoring program is specifically directed at evaluating fish and wildlife propagation, agricultural uses, primary and secondary body contact recreation, and aesthetics. Other use designations including public and emergency drinking water supplies, hydroelectric power generation, industrial and municipal process and cooling water, and navigation are indirectly evaluated. Assessment of beneficial use attainment is based on OWQS and evaluated following USAP.

2) *Water Quality Trend Monitoring*: Compilation of long-term water quality data is necessary to develop preventative and corrective measures to address NPS pollution. Monitoring water quality trends over time provide a warning of water quality degradation. Factors such as land use, population density, cultural conditions, economic factors, climate and others which affect water quality can be evaluated within each 11-digit basin. The selection of watersheds has been sufficient to associate changes in water quality with these factors.

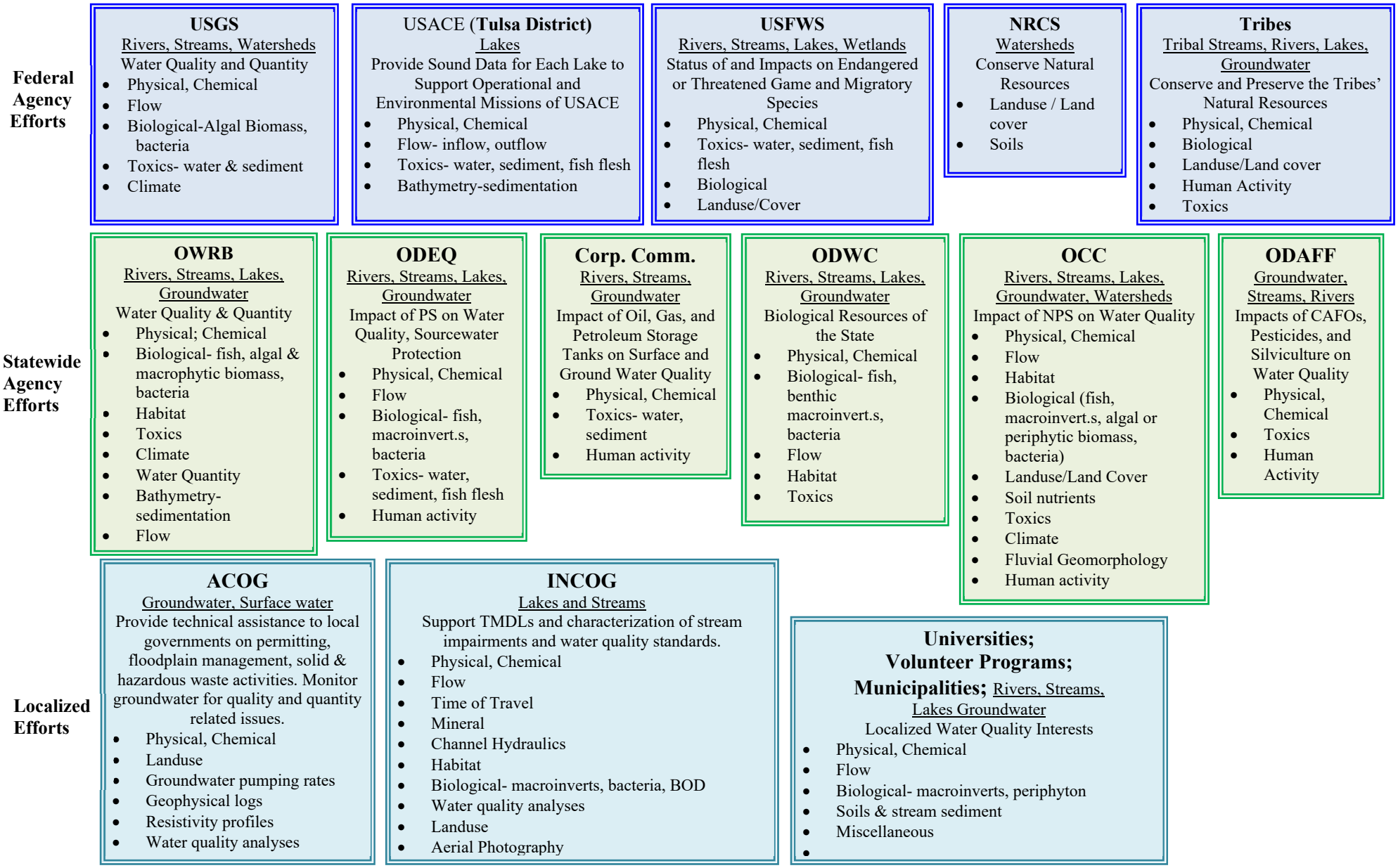

Figure 5. Types of Waterbodies Monitored, Monitoring Mission, and Types of Information Collected by Various State and Federal Agencies.

AGENCY
Waterbodies Monitored
Monitoring Mission
- Types of Monitoring Performed

Figure 6. Text Block Key to Figure 5.

3) *Development and Evaluation of Mitigation Strategies:* Information generated during the monitoring program can be specifically applied to the development and evaluation of mitigation strategies. Consistent, reliable data is available to land management agencies such as the United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), Oklahoma Department of Wildlife Conservation (ODWC), Conservation Districts, U.S. Fish and Wildlife Service (USFWS), ODAFF, *et cetera*, for development and evaluation of CPs.

4) *Stream Water Quality Data Source:* Information gathered by the State is made available to citizens in an understandable form. This information allows the public to make informed decisions on water related issues. In addition, the data is available to State and federal agencies, universities, and environmental researchers as a base-line reference and to support refinement of OWQS.

Monitoring Design

The OCC's monitoring effort is designed to evaluate the impact of NPS pollution on the quality of rivers and streams throughout the State. Monitoring occurs on a rotating basis so that the entire State is evaluated every five years. A comprehensive program involving chemical, physical, habitat, and biological parameters has been developed so that causes and sources of NPS pollution can be identified.

Spatial Considerations

Oklahoma was divided into approximately 414 USGS 11-digit planning basins (Figure 7). These watersheds guide monitoring site selection for the rotational program. Evaluating changes using the 11-digit watersheds is more sensitive than using larger watersheds. In larger basins, small effects caused by a single source can be obscured by the magnitude of water from the entire watershed.

The majority of 11-digit watersheds located entirely within the State of Oklahoma are monitored at their outlet. In addition to the main outlet stream, a lower order stream situated higher in the watershed may also be monitored. This type of sample collection allows for a general representation of water quality for the entire watershed. Watersheds where the principal stream is flowing out of the State are monitored as near as possible to the State line. Watersheds where the principal stream is flowing into the State are monitored at their outlet.

Not all of the 414 watersheds are monitored. Watersheds that do not have perennial water flow and watersheds that are a segment of a larger river being sampled by another agency are not monitored. When the designated watershed is in a large river segment, the OCC monitors a stream with perennial water that is a tributary to that large river, and the OWRB monitors the large river. When there is a choice between several streams in such a watershed, an effort is made to monitor a stream draining an area of land use different from the majority of the other streams being monitored in that region.

After assessing the 414 watersheds and removing those sites that do not meet the sampling criteria for the NPS program, approximately 250 sites are monitored through the rotational monitoring program (Figure 7). The current level of funding indicates available monies for 250 sites every five years (fifty sites per year for two years, with a maximum of 100 - 125 sites being monitored every year). The OCC coordinates with other monitoring agencies to prioritize the location of those sites. All sites are located far enough upstream of the receiving waterbody so backwater effects are negated. This includes alluvial water of the receiving waterbody as well as surface water. Lack of landowner permission, lack of perennial water, closed county roads, impacts of point source discharges and monitoring sites maintained by partnering agencies are some of the reasons why a monitoring site may have to be rejected or moved.

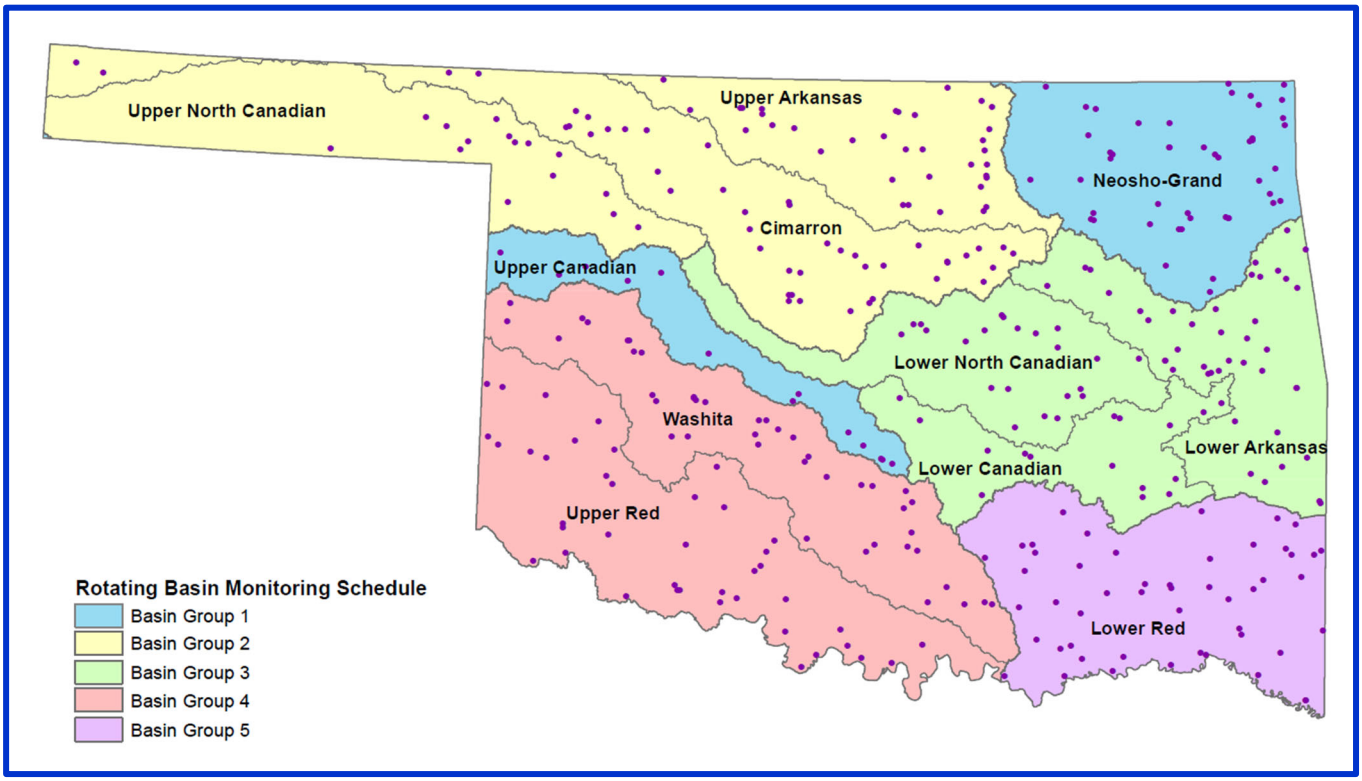

Figure 7. OCC Small Watershed Rotating Basin Monitoring Program Sites.

Temporal Conditions

Oklahoma's eleven whole basin planning basins were divided into basin groups consisting of two to three basins to facilitate the collection of samples during the five year rotational period. The pairing of basins depended on the number of streams within a management basin and the geographic location. Each year, monitoring in a new basin group begins and continues for two years; thus, at any given time the streams in four or five basins are monitored. At the end of a rotation, the process begins again with the initial basin group. Utilizing this strategy produces a comprehensive sampling protocol that consistently monitors the State. During a rotation, all 250 streams have been monitored for two years, and at any given time, at least 40% of the State is undergoing assessment. Figure 7 shows locations of the major basins. The pairings are 1) Neosho-Grand (11070207190) & Upper Arkansas (11060002020), 2) Lower North Canadian (11110103060) & Lower Arkansas (11100301060), 3) Lower Canadian (11090204080) & Lower Red

(11140103010), 4) Upper Red & Washita (11130202010) & Upper Canadian (11090103020), and 5) Upper North Canadian (11100101030) & Cimarron (11040001050).

Water Quality Considerations and Monitoring Parameters

Sites are selected to monitor waterbodies with varying levels of water quality; sites are monitored that have "good", "average", and "poor" water quality to maximize the uses of the data. However, some known "high quality" or "best achievable" sites are occasionally added to ensure a pool of reference or best achievable sites for comparison. Data can be used for developing and identifying reference sites and conditions as well as verifying or revising water quality or use attainment status of a waterbody. All sites within a basin group are monitored at specific time intervals during the two year period. The monitoring frequency has been planned to meet data quality objectives identified for the NPS program and to be consistent with the requirements specified in USAP. The parameters and sampling frequency are as follows:

Routine Physical and Chemical (Including Bacteria) Parameters

Sites are monitored for physical and chemical parameters on a fixed interval schedule of ten sampling events per year, reducing bias for optimal weather sampling. Samples are collected during both baseflow and highflow conditions. Parameters collected include: turbidity, pH, dissolved oxygen (DO), alkalinity, conductivity, water temperature, instantaneous discharge, nitrate (NO_3) plus nitrite (NO_2), orthophosphate (PO_4), total phosphorous (TP), total Kjeldahl nitrogen (TKN), chloride (Cl), sulfate (SO_4), total suspended solids (TSS), total dissolved solids (TDS), and total hardness. *Escherichia coli.* and ammonia (NH_4) are monitored during the summer months (May through September) only.

Biological and Habitat Collection

Sites are monitored twice yearly for benthic macroinvertebrates and benthic habitat during the two year collection period. The sample collections are evenly divided between the winter and summer dry periods, thus utilizing the most stable index periods. Fish and fish habitat are monitored once during the summer index each rotation cycle to minimize the impact on fish populations within small streams. Additional information on the geomorphology of the stream is collected on selected streams and used to develop a correlation with Rosgen stream type classification (Rosgen, 1996). Specifically, width-to-depth ratios, bank full estimations, entrenchment calculations, and substrate type and size distribution are estimated.

Land Use/Land Cover

Current land use / land cover in each of the 11-digit watersheds are obtained from currently available data, including the National Land Cover Dataset (NLCD), Crop Layer Data (CLD), and other national datasets. Other factors connected with land use such as soil type, soil erodibility, slope, and others are relatively constant, and are compiled in-house. Soil testing may also be completed, such as that required by legislation associated with poultry litter application. Soil testing may be provided to poultry growers in priority watersheds to help meet their needs. Land use information is necessary for source delineation, but it should also be coupled with areas with good water quality to commend conservation-minded landowners and uses.

Human Population

Human population effects are are accounted for in the modeling process using the EPA STEPL model. Through this process, information regarding urban area, septic tank density, population, and other factors are assessed for each watershed.

Agricultural Use

Agricultural information with regard to crop type and acreage, domestic animal type and population as well as farm size is summarized annually for each county. The majority of this information is available from the STEPL model data server as well, although it is verified with data from the Oklahoma Census of Agriculture, which is generated by the US Department of Commerce, Bureau of Census (United States Department of Agriculture, 2017).

Climate

Information on average rainfall and other climate patterns are also summarized annually in the STEPL model data server for use in load reduction estimates. However, this data is also compared to information compiled from the Oklahoma Climate Survey's Mesonet system. Climatic factors are also monitored during the sampling period to correlate weather conditions with overall stream quality.

2.2.2 Diagnostic Monitoring

Information generated during the assessment phase of the monitoring program sometimes illuminates the need for more specific and intensive watershed monitoring. This monitoring is tailored to identify NPSs and address larger scale NPS problems within the watersheds. Where water quality threats or impairments have been identified, pollutant sources and loadings are evaluated to facilitate the planning of remedial programs. This diagnostic phase helps determine what NPS pollutant sources must be addressed for water quality standards to be met. More intensive and specific monitoring is conducted to create a baseline for future implementation efforts. In addition to the project specific diagnostic monitoring, environmental impact investigations in response to specific events and contract monitoring are sometimes performed as requested by partners or as resources allow.

Diagnostic monitoring of NPS pollution can occur in various forms and is completed by several agencies in Oklahoma. However, not all diagnostic monitoring in the state is NPS diagnostic monitoring. Some diagnostic monitoring may reveal point sources as a significant contributor.

2.2.3 Implementation Monitoring

Once a water quality problem or threat has been identified and diagnosed, an effort can be formulated to address the specific causes and sources of the problem. Implementation involves the application of remedial efforts, such as CPs, educational activities, and other innovative efforts that are tailored to address NPS pollution. In the CWA Section 319(h), money is made available to demonstrate the effectiveness of these efforts on a watershed level. Specific 319(h) projects are undertaken to demonstrate the effectiveness of innovative but proven technology. Demonstrating the effectiveness of new approaches generates a precedence on which further remedial or protective activities can be based. A monitoring program is designed to provide data to substantiate or refute the effectiveness of the effort.

In general, the goal of most implementation projects is to make changes to an entire watershed. Frequently the change desired is to upgrade water resources to meet or protect assigned beneficial uses. Implementation monitoring is established within the project area but may consider only a portion of the entire watershed. Parameters that are monitored vary depending on the specific activities, but commonly include biological, habitat, physical, and chemical monitoring, as well as less frequently surveyed information such as landowner knowledge or opinions and cost-benefit analysis of practices. In addition, this monitoring may indicate that more baseline information is necessary. Consequently, additional diagnostic monitoring may be needed to refine the implementation effort.

2.2.4 Success Monitoring

Implementation and demonstration projects designed to protect high quality waters or to address water quality impacts require monitoring to evaluate their effectiveness. Post-implementation monitoring is designed to meet the project objectives. In most project plans, post-implementation monitoring is included; however, sometimes additional monitoring outside of a §319(h) project plan is required.

Monitoring follows specific guidelines to effectively determine the efficacy of the project. Measures of success include whether assigned beneficial uses are being met and/or protected, has there been a change in behavior of stakeholders in the watershed, etc. Monitoring activities are based on desired output and goals of the remedial or protective effort. Data quality objectives are developed that give adequate confidence for decisions based upon the data collected.

2.2.5 Monitoring Methods

Sample collection and data manipulation follow accepted USAPs. Specific sample collection methods for OCC's monitoring program have been outlined in the OCC's Standard Operating Procedures (SOPs) document, which are reviewed annually and updated as needed. These methods have been subject to peer review by other State agencies, as well as EPA approval. The Oklahoma Department of Agriculture, Food, and Forestry (ODAFF) Environmental Laboratory analyzes the chemical parameters. A discussion of the quality assurance and quality control factors is presented in the following sections, along with a discussion of how the data is manipulated and evaluated. Should ODAFF no longer be an appropriate laboratory, for quality assurance or other reasons, OCC will use some other quality approved laboratory as detailed in the OCC Quality Management Plan.

2.2.6 Use of the Data

The availability of comprehensive, complete data, collected under peer and EPA reviewed quality assurance project plans and interpreted using OWQS following USAP for the entire State, is a powerful tool for decision makers. Reliable data over an extended period allows for informed planning and development as well as remediation activities. The following three uses have been identified.

1) Development of §319 Management Program

Data-derived information will direct the NPS Management Program by identifying causes and sources of NPS pollution. This helps avoid political or unwarranted direction of funds and resources. Resources can be logically and scientifically directed to where they are needed and will provide the most benefit.

2) Provision of Sound Data for Inclusion in Water Quality Assessment Reports

The OCC's collection of data on a five year rotating basis, in addition to data collected annually by the State and federal programs listed in C, will facilitate a continuous update on the status of water quality in the State. This information can then be incorporated into assessment reports required by State and federal agencies. Data generated from this monitoring program will meet the requirements of the NPS Assessment mandate of the CWA through direct incorporation into the State's Integrated Report, which is required by EPA every two years.

3) Dissemination of Information

The data generated from the OCC's monitoring program is made available to the citizenry through Conservation District Offices, newspapers, and other media outlets, as well as being mailed in a simple factsheet to participating landowners, so that the public can make informed decisions on environmental matters related to water quality. The OCC will assemble its information into countywide informational brochures on a biannual basis to distribute to Conservation District offices, landowners, and other interested parties that summarizes recent water quality collections in their area. This data will also be entered in STORET and forwarded to ODEQ for inclusion in the State environmental database.

2.3 Other State Monitoring Programs with NPS Components

Some agencies have programs that also monitor for effects of NPS pollution but were not developed solely with that focus. In effect, they do not specifically monitor for NPS pollution, nor can they always separate the impacts of PS from those of NPS pollution. These include programs that monitor for overall beneficial use attainment, effects of specific types of pollutant spills, or specific types of NPS pollution in limited areas of the State. However, these monitoring programs are essential to the NPS management program and the State's water quality management program in general, by fulfilling the following functions:

- Providing a larger, more appropriate measure when the endpoint of concern is beneficial use attainment of waters of the State (i.e. Integrated Report, TMDLs, etc.). OCC's program provides information about NPS impacts, but OWRB, USGS, and other agencies' monitoring programs supplement that information to better describe the total impacts to water quality in the State and across State boundaries. The "big picture" is critical in prioritizing water quality efforts to different large watersheds or areas of the State.

- Differentiating between point source and NPS portions of the pollutant load. The Small Watershed Rotating Basin Monitoring Program generally monitors wadeable streams above point source discharges, whereas OWRB and USGS monitoring stations often fall below discharges. Coupling the programs together helps separate out the relative effects of the two types of sources.

- Supplementing data in areas (geographically, temporally, and conceptually) the OCC program does not cover (Figure 8). Oklahoma is fortunate to have a vast number of water resources, too many for any one agency to adequately monitor and assess. The multiple areas of expertise and manpower differ from one agency to the next and combining those resources results in a better overall product.

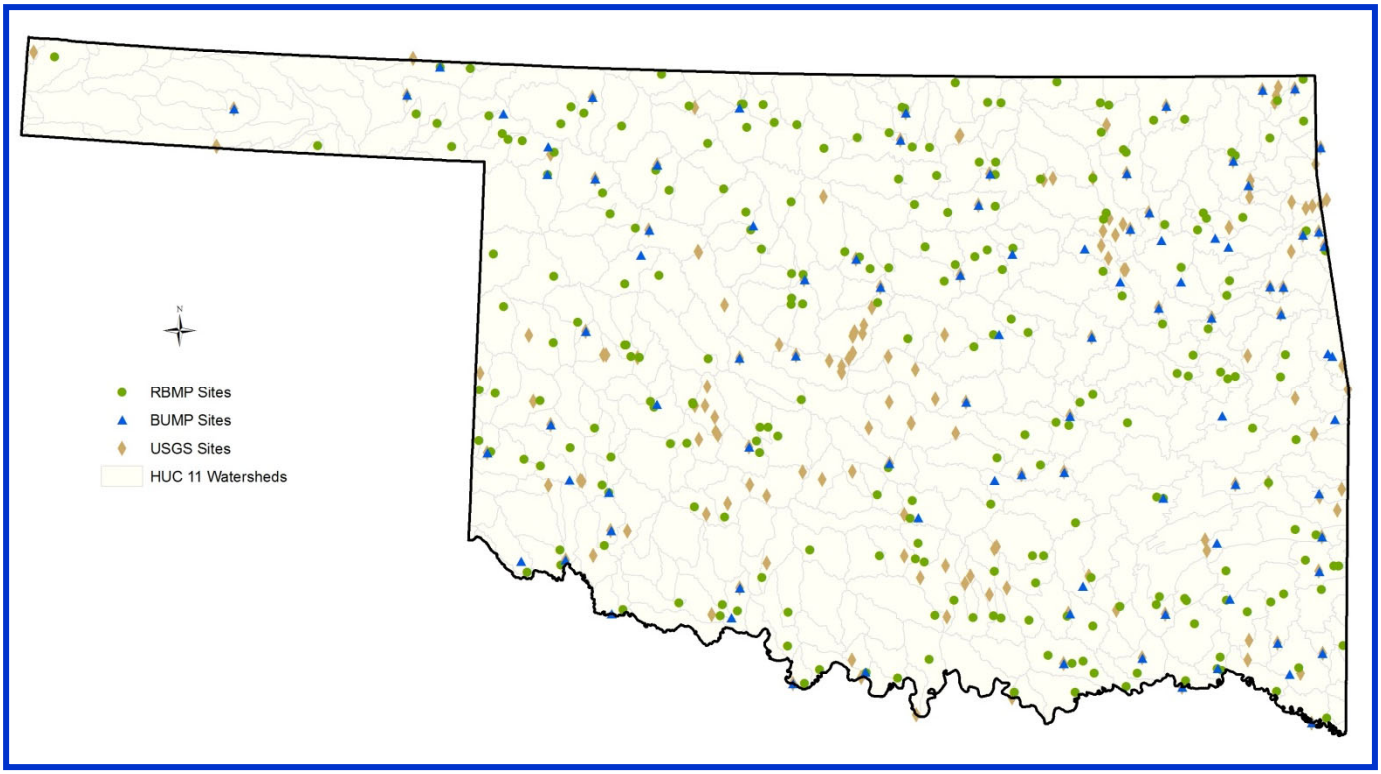

Figure 8. Map of 2014 Oklahoma Monitoring Program Sites.

Every two years, the OWRB summarizes the State surface water monitoring efforts with the "Status of Water Quality Monitoring in Oklahoma - Water Monitoring Strategy Document", (Oklahoma Water Resources Board, 2017).

2.3.1 Oklahoma Water Resources Board Water Quality Monitoring Programs

The Oklahoma Water Resources Board (OWRB) conducts monitoring to assess beneficial use support attainment through the "Beneficial Use Monitoring Program" (BUMP). The specific objectives of BUMP are to detect and quantify water quality trends, document and quantify beneficial use impairments, and identify pollution problems before a pollution crisis arises. The OWRB monitors numerous waterbodies across the state to diagnose water quality problems, make recommendations for actions which can be implemented to improve water quality, document attainment of pollutant reduction goals, develop criteria for OWQS, perform bathymetric mapping, and conduct specific groundwater basin studies. Monitoring of wetlands and performance of Use Attainment Analyses (UAAs) are also performed on an as-needed basis. The OWRB and United States Geological Survey (USGS) work cooperatively to conduct flow and water quality monitoring statewide. The OWRB conducts numerous groundwater basin studies in cooperation with the USGS on assessing the quality of groundwater resources and the vulnerability of groundwater basins to pollution. Additionally, the OWRB also conducts hydrological and hydrogeological investigations to assess water quantity needs and the availability of water resources. During the 2012 Oklahoma legislative session, an additional $1.3 million in State funds was provided to the OWRB to support monitoring activities. This money will be used to further enhance OWRB surface water monitoring activities, but the bulk of the new monies will be used to develop and implement a holistic groundwater monitoring program.

BUMP includes three components:

- **Lake monitoring-** fixed stations on approximately 130 lakes statewide sampled on a five year rotation. The OWRB uses a fixed station and probabilistic survey sampling design which includes all lakes above 50 surface acres to include a total of 206 waterbodies. The probabilistic survey population is stratified into two groups, lakes larger than 500 surface acres (68 lakes) and lakes smaller than 500 acres (138 lakes). Approximately 1/5 of the larger lakes are monitored quarterly, on an annual basis, based on a randomized draw. These lakes are then monitored again during a subsequent year in the five year period such that each of the 68 lakes are monitored two non-consecutive years during the five year rotation. Additionally, ten randomly drawn smaller lakes are sampled quarterly on an annual basis over the five year sample rotation. Many of these smaller lakes have not had significant historical sampling, and many are municipal water supplies.
- **Stream monitoring**- monitors river and stream sites with both fixed and rotating stations sampled each year (Figure 9). The OWRB currently monitors 84 stations on a six week rotation. These stations are generally located at the outlet of each of the 84 planning basins outlined in the Oklahoma Comprehensive Water Plan (Oklahoma Water Resources Board, 2012). The OWRB also conducts probabilistic monitoring at 25 – 30 stations annually, as well as ongoing special studies. The OWRB also works with the USGS, USACE), GRDA and the National Weather Service to conduct flow monitoring at all fixed station sites that are not part of the USGS/State of Oklahoma Cooperative Gauging Network. This monitoring is important for loading calculations, trends assessment, and assessment of beneficial use support.

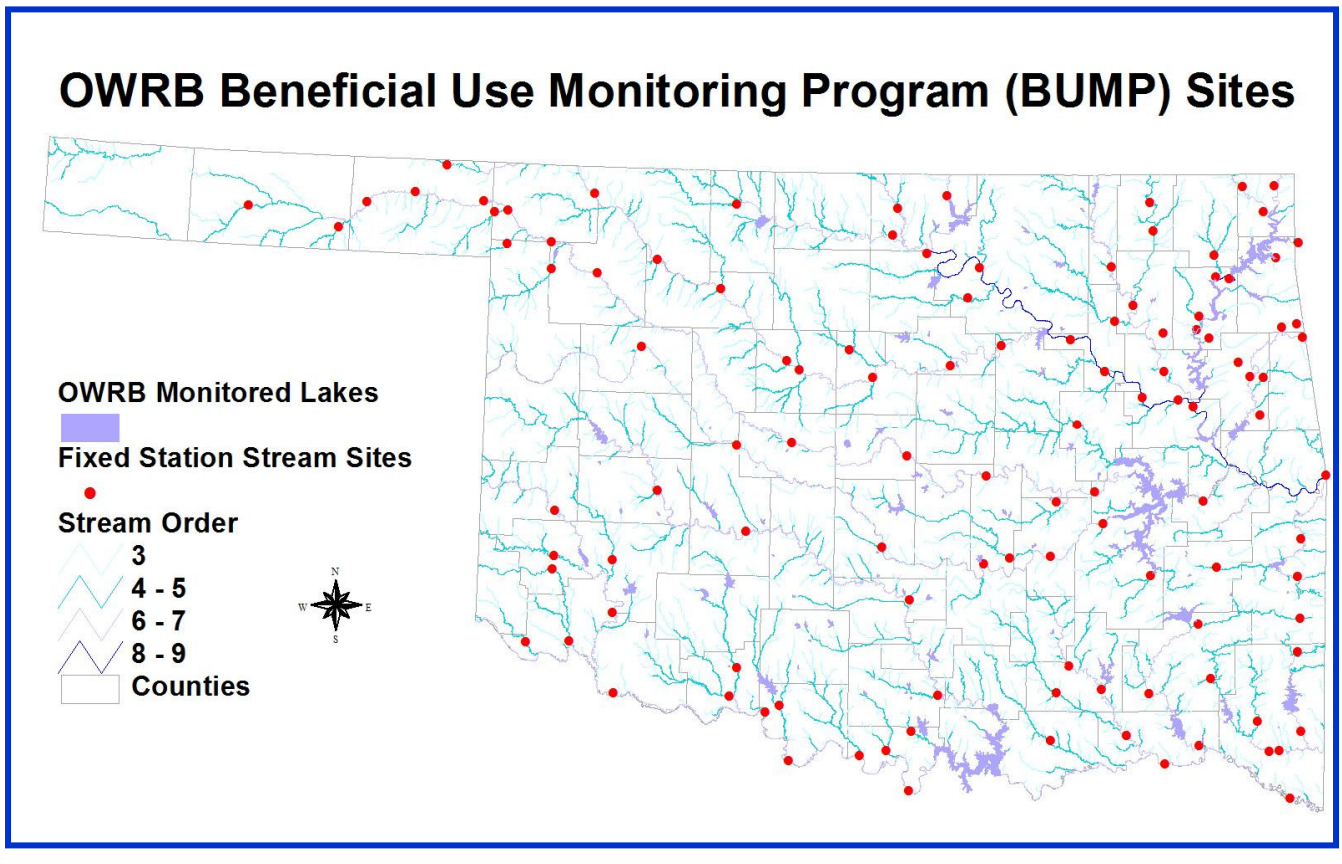

Figure 9. OWRB BUMP Stream and River Monitoring Sites.

- **Groundwater monitoring**- With funding beginning in 2012, the OWRB began a new groundwater monitoring program which includes a network of approximately 750 wells in Oklahoma's 21 major aquifers to be phased in by 2019 and sampled on a four-year rotation. The first four years of the program establishes baseline monitoring by focusing on approximately four to six aquifers per year and will assess nutrient, metals, and major ion concentrations. Data is collected from well networks on the basis of the aquifer's areal extent. In general, Oklahoma's 15 largest aquifers are sampled at a minimum of 30 wells, while smaller aquifers have fewer wells, but proportionally more sites per area. This monitoring also allows the OWRB's annual groundwater level measurement program to double in size from around 530 wells to 900 wells.

The OWRB also maintains the Lakes and Special Studies Program whose function is to provide information and solutions for repairing Oklahoma lakes facing serious impairments due to cultural eutrophication. The program consists of three distinct efforts: lake diagnostics and watershed modeling, lake restoration, and bathymetric mapping.

2.3.2 USGS Monitoring

The water resources mission of the USGS is to provide the hydrologic information needed by others to help manage the Nation's water resources. To accomplish its mission, the USGS, in cooperation with State, local, and other Federal agencies:

- Collects data on a systematic basis to determine the quantity, quality, and use of surface and groundwater and the quality of precipitation;
- Conducts water resources investigations and assessments at national, State, and local scales, characterizes water resources conditions, and provides the capability to predict the impact on the resource of managerial actions, proposed development plans, and natural phenomena;
- Conducts basic and problem-oriented hydrologic research that is likely to produce knowledge useful for the resolution of water resources problems facing the State, regions, and Nation;
- Acquires information useful in predicting and delineating water related natural hazards from flooding, volcanoes, mudflows, and land subsidence;
- Coordinates the activities of all federal agencies in the acquisition of water data, and operates water information centers;
- Disseminates data and results through reports, maps, and other forms of public release;
- Provides scientific and technical assistance in hydrology to other federal agencies, to State and local agencies, to licensees of the Federal Energy Regulatory Commission, and, on behalf of the U.S. Department of State, to international agencies; and
- Administers the Water Resources Research Act of 1984, which include the State Water Resources Research Institute Program (§ 104) and the Water Resources Research Grant Program (§ 105).

Specifically, the USGS Oklahoma District, with cooperation from various federal and State agencies, currently maintains and utilizes at least 19 surface water quality monitoring sites, 217 stream flow stations, and 36 groundwater elevation monitoring stations. In addition, they are conducting numerous projects that involve additional monitoring. Details are found here (United States Geological Survey, 2019) and include alluvial aquifer studies, development of a digital database of historical flooding information, estimating drainage basin characteristics for ungauged streams, and other studies. The USGS also publishes

information about drought and flooding conditions in the USGS Drought Watch Maps available on their website here and USGS FloodWatch Maps available on their website here.

2.3.3 ODEQ Water Monitoring

The ODEQ facilitates and conducts surface water monitoring in concert with their permitting programs and TMDL development. ODEQ requires municipal, industrial, and stormwater dischargers to monitor their discharges to demonstrate permit compliance. This includes municipal monitoring of stormwater, which in some cases includes biological and habitat monitoring. In addition, the ODEQ conducts or supplements existing monitoring efforts to provide data for TMDL development which includes time of travel studies, routine monitoring, diurnal dissolved oxygen studies, storm event sampling, and other case-specific sampling to collect the necessary data to complete a TMDL. ODEQ monitors fish flesh in area lakes to determine human health risks due to mercury exposure from fish ingestion. ODEQ samples approximately 87 lakes across Oklahoma for mercury accumulation in game species. ODEQ also conducts environmental monitoring in response to environmental complaints and pollution spills.

2.3.4 ODAFF Licensed Managed Feeding Operations Monitoring Well Program

ODAFF conducts its Licensed Managed Feeding Operations (LMFO) Well Monitoring Program to ensure that licensed swine lagoons do not impact nearby groundwater resources. ODAFF works with the OWRB to collect data from swine facility monitoring wells at more than 800 wells. If wells are found to be dry for at least three consecutive years, sampling may occur only once every three years; otherwise, well sampling occurs on an annual basis. Wells are assessed for nitrate-nitrogen, ammonium-nitrogen, total phosphorus, and fecal coliform.

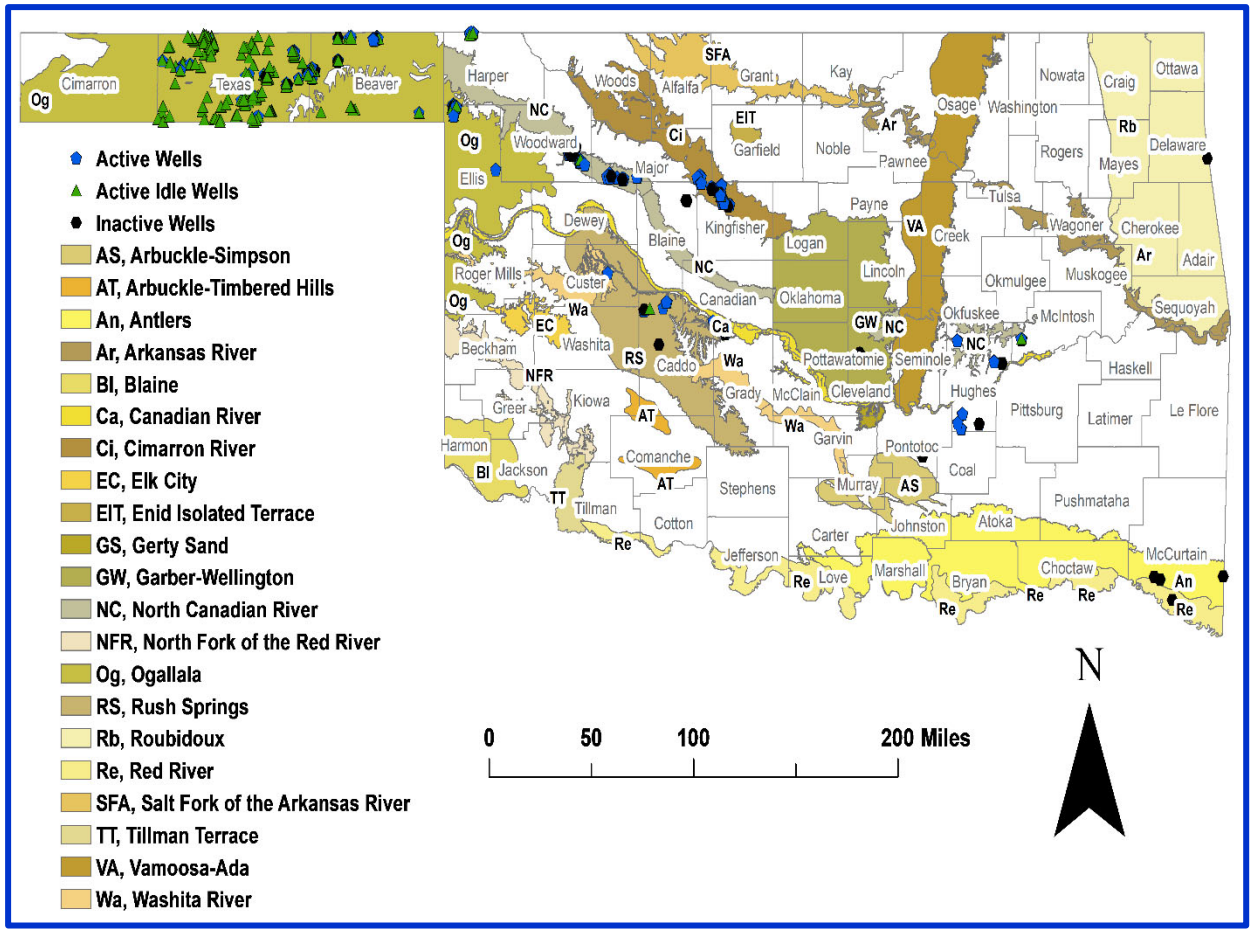

Figure 10. ODAFF LMFO Monitoring Site Locations (Oklahoma Department of Agriculture, Food & Forestry, 2019)

2.3.5 Oklahoma Corporation Commission Water Quality Monitoring

The OK Corporation Commission (Corp. Comm.) monitors surface and groundwater in relation to potential current or historical petroleum industry and retail underground and above ground storage tank pollution sites. This monitoring generally falls within five types:

1) Stream, pond, and spring sampling of Brownfield sites where there could be residual pollution because of the prior property use;
2) Stream, pond, and spring sampling near obvious spills, purging wells, or other ongoing or catastrophic pollution sources to determine their impacts;
3) Stream, pond, or spring sampling around pits and producing locations where there have been allegations of pollution to determine the extent and possible sources;
4) Stream, pond, spring, and other surface water sampling in historic oilfield areas to determine the overall impact of historical oilfield activity on waters of the State; and
5) Sampling to evaluate the need for and to propose watershed-specific revisions to surface water quality standards.

Corp. Comm. collects surface water samples, often in partnership with other agencies for the purposes of evaluating potential oilfield-related water quality impacts. Corp. Comm. also conducts groundwater

monitoring from private and public water wells, seeps, groundwater monitoring borings and wells, producing and injection wells, sumps, and other locations. Corp. Comm. sometimes also uses electromagnetic (EM) surveys to help determine potential groundwater impacts and surface water/groundwater interaction. This type of monitoring is often conducted for the purpose of spill or complaint investigations or to monitor the effectiveness of a cleanup activity.

Corp. Comm. requires groundwater monitoring around all newly installed underground storage tanks which includes interstitial, vapor, and/or groundwater monitoring. This monitoring allows spills or leaks to be detected before they have a chance to significantly impact groundwater. Monitoring is also required when a spill or leak occurs at a gas or diesel station. Groundwater monitoring wells are installed to map the contamination plume and monitor the effectiveness of its cleanup.

2.3.6 Grand River Dam Authority (GRDA)

The GRDA established a monitoring program in 2011 to assess conditions in Grand Lake, Lake Hudson, and the W.R. Holloway pumped storage facility. Data generated by this program is used in the management of these facilities to protect the health and public safety of lake residents and users. The program samples these lakes twice per month during the summer (May – September) and monthly during the winter. Samples are collected from 14 locations on Grand, seven on Hudson, and four on W.R. Holloway, and then tested for nutrients, bacteria, bluegreen algae, and standard physicochemical parameters. The program also sponsors graduate research projects in partnership with Oklahoma State University (OSU) and the University of Oklahoma (OU) that consider other water quality concerns related to metals, eutrophication, toxicity, and potential remedial efforts.

GRDA also coordinates with the U.S. Geological Survey and other state agencies to conduct water quality monitoring and maintain stream gages in the Illinois River Watershed. This network includes support to five USGS gages in the watershed, as well as oversight of law enforcement and float operations in the scenic river watersheds.

2.3.7 Local Monitoring Efforts

Numerous other agencies conduct monitoring in the state, but often with a more localized, rather than a statewide effort. These include monitoring conducted by Native American Tribes on tribal land for purposes of beneficial use support assessment, permitting, and various other programs. Indian Nations Council of Governments (INCOG) and Association of Central Oklahoma Governments (ACOG) conduct monitoring associated with the needs of the various municipalities they represent. ODWC's Stream Team conducts fish community assessments across the state relating to fisheries management. The universities in the state conduct research and monitoring that is often critical in defining and identifying water quality problems in the State, but also in developing methods to more accurately and efficiently assess water quality. The Bureau of Reclamation conducts monitoring associated with the Bureau's projects and interests in the state, and the USFWS conducts extensive monitoring associated with endangered species, migratory birds, and other wildlife in the state. Finally, numerous volunteer programs in the state monitor for a wide variety of parameters in order to assess water quality problems and sources of those problems.

Although much of this research is done on a localized scale with specific purposes, it is often essential to supplementing the major monitoring programs and working towards the overall water quality goals of the

State. This information is used in permitting, development of standards, and drafting and implementing TMDLs, implementation projects, and other remedial programs.

2.3.8 Historical Data

In evaluating the water quality of the State's waters, it is often necessary to evaluate historical data either as an indication of change or perhaps because historical data is all that exists for a certain waterbody. Section 305(b) and 319(h) guidance mandates that all available data must be used to evaluate the quality of the State's waters. Federal programs must reference past reports associated with the same programs. Historical data must be considered. It is often our only means by which we can determine if the waterbody is actually being impaired by anthropogenic sources or whether the water quality condition is natural for that stream.

However, because sampling techniques and quality assurance have evolved with technology, historical data may not hold up to current quality assurance measures. Therefore, whenever older reports and data are referenced, care must be given in evaluating such data to ensure the correct actions are taken as a result of such data review. It is desirable to collect current data whenever possible, but when historical data must be used, its limitations and constraints must be recognized.

This is not to imply that historical data is inferior in quality to current data, but merely that the data quality standards were generally different in the past and the possibility exists that it may not be entirely comparable to current data. Data may have been collected for slightly different purposes than its current use. For instance, sites may have been situated in such a way that they would bias the data as it is currently being used; sites may have overemphasized or diluted the effects of certain types or sources of loading rather than considering the overall beneficial use support status of the stream and the overall effect of NPS loading.

2.3.9 Consistency in Monitoring

With so many different agencies conducting monitoring efforts in the State and the use of much of this data from various sources in single documents, agencies realized the importance of standardizing methods of data collection and evaluation. With this in mind, the OWRB developed the USAP to ensure that different agencies and individuals considered the same parameters with at least a specified minimum amount of data collected over a temporally specific time period to make use support determinations. Although the USAP, like the OWQS, is an evolving document, it greatly reduces the potential for agencies to reach different conclusions on the water quality status of a certain waterbody.

2.4 Assessment Strategies and Actions to Address NPS Program Goals

The State has identified a number of actions necessary to address the program goals and objectives in the stepwise manner of assessment, prioritization and planning, education, and implementation. The assessment-related strategies are detailed below:

- **Systematically identify waters and watersheds threatened or impaired by NPS pollution based on OWQS at least every five years through the year 2029**. The specific action for identifying NPS threats and impairments is to monitor water quality and the integrity of the aquatic

community and habitat in 250 streams in the State through a rotating program, cycling through the state every five years. The OWRB's Beneficial Use Monitoring Program will also contribute significantly to this goal by monitoring larger streams and lakes across the state. Numerous other agencies also conduct monitoring programs to evaluate the status of the State's waters. It is imperative within this goal that threats to pristine waters (e.g., waters identified within the WQS for additional protection such as Scenic Rivers and Outstanding Resources Waters) be identified. This goal falls under the responsibilities of OWRB, OCC, ODEQ, ODWC, ODAFF, Corp. Comm., GRDA, and the Office of the Secretary of Energy and the Environment (OSEE). This information is used in the Integrated Report, which is produced every two years, and is a combination of three previously separate reports, including the §319 NPS Assessment, §305(b) reports, and the §303(d) List.

- **Continue monitoring waters identified as impaired or threatened by NPS pollution**. The State will continue monitoring waterbodies listed on the 303(d) list to determine the current beneficial use support status (based on USAP and OWQS) and whether immediate action is required. The OCC's monitoring program monitors approximately 20% of the 303(d) waterbodies listed for NPS-related impairments (streams and rivers only) and the OWRB monitors a considerable number of these 303(d) waterbodies including lakes. Steps have been taken to avoid duplication of effort between programs. Other monitoring programs that can be used to further this goal include the USGS, ODWC, Corp. Comm., and GRDA.

- **Monitor groundwater**. The OWRB began a comprehensive groundwater monitoring program in 2012. USGS also contributes significantly to the groundwater monitoring effort in the State.

- **Identify pollutant sources within watersheds listed on the 303(d) list as threatened or impaired by NPS pollution**. The OCC identifies potential NPS-related pollutant sources with each submission of impaired streams reported to ODEQ for biennial updates of the Integrated Report.

- **Follow-up: Monitor and evaluate performance of implementation efforts**. The purpose of this goal is to ensure that, when concerted efforts are made to install concentrated water-quality focused conservation practices in a watershed, adequate follow-up monitoring is conducted to determine if the objectives of the project are met. The State and federal partners will plan follow-up measures and implementation based upon this goal. Follow-up monitoring supports and verifies whether the State program is successful in striving towards the goal of beneficial use attainment and protection. This is generally the responsibility of the OCC, but other monitoring efforts (BUMP, USGS, etc.) could supplement this effort. The NPS Working Group will consider the results of this follow-up monitoring in directing the development of future NPS activities.

- **Investigate NPS-related pollution complaints**. Nonpoint source related pollution complaints are investigated to determine if there is a regulatory authority to address the issue and to determine other measures necessary to remedy verified impairments. The specific goal is to investigate all 50-plus NPS-related citizen complaints received annually. This goal is first the responsibility of ODEQ, although they can assign complaints to be investigated by the agency(ies) whose statutes assign them jurisdiction over the specific type of complaint.

- **Maintain all NPS monitoring and project data entry into STORET annually**. This will be completed by the OCC and will be eventually automated through the Ambient Water Quality Monitoring System (AWQMS).

  Provide data and information to the public in a user-friendly format. OCC is working cooperatively with partners to develop a data management system that will facilitate public access to OCC data by 2023. Access to OCC reports and technical bulletins is available from the OCC website.

2.5 NPS Program Assessment Milestones

Milestones to assess program progress toward assessment objectives and program overall goals are:

- Oklahoma's Nonpoint Source Program will monitor at least 250 streams every five years through its Small Watersheds Rotating Basin Monitoring Program, collecting physicochemical, biological, and habitat data to identify causes and sources of nonpoint source pollution as well as to identify waterbodies meeting assigned beneficial uses. Each year the State will monitor between 75 and 100 waterbodies to complete the fourth cycle of the program in 2023 and the fifth cycle of the program in 2025.
- Annually, the NPS Program will produce a summary report of the most recent Rotating Basin Monitoring Program Basins completed.
- Annually, the NPS Program will produce abbreviated reports of the recently completed Rotating Basin Monitoring Program that can be distributed to landowners, conservation districts, and the general public, summarizing stream health
- Combined Oklahoma monitoring efforts will fully or partially assess a representative sample of at least 24% (991 of 4,203) of the State's waterbodies to be reported in the Integrated Report in 2020, 2022, 2024, 2026, and 2028.
- In 2020 and subsequent years as defined in future workplans, Oklahoma will review monitoring results from implementation efforts to document water quality results due to conservation practices installed.

3. Component II: Nonpoint Source Program Planning

As stated previously, the Oklahoma program for NPS management follows a stepwise pattern beginning with assessment of the waters of the State, planning and prioritization, education, and implementation, followed by evaluation of measures of success. The following section details the tools used in Oklahoma's NPS Program planning process. This information includes some of the major programmatic and technological resources available to and used by the State NPS Program.

3.1 Prioritization of Oklahoma's NPS Management Program

Oklahoma's 2016 Integrated Report summarizes water quality data from 4,212 waterbodies statewide. These waters include 33,016 stream miles and 621,051 lake acres of which the State has fully assessed only a limited percentage (approximately 34% of stream miles and 86% of reservoir area). This is a significant improvement from 2000 when the state had only assessed eight percent of its stream miles and 60 percent of its lake acres; however, a large number of waterbodies remain either completely or partially unassessed. The State has still only fully assessed approximately 795, or 19% of its waterbodies (Figure 11). Three hundred and five waterbodies are supporting some assigned beneficial uses, but data is not available to fully assess all assigned beneficial use support. Another 3,112 waterbodies lack sufficient data to fully assess any of their assigned beneficial uses. This lack of full assessment of waterbodies is largely due to limited budgets. The State has collaborated with its federal partners to stretch available monitoring dollars as far as possible; however, the need for long-term, consistent data to assess trends and beneficial use support in critical waterbodies limits the State's ability to assess a larger percentage of waters.

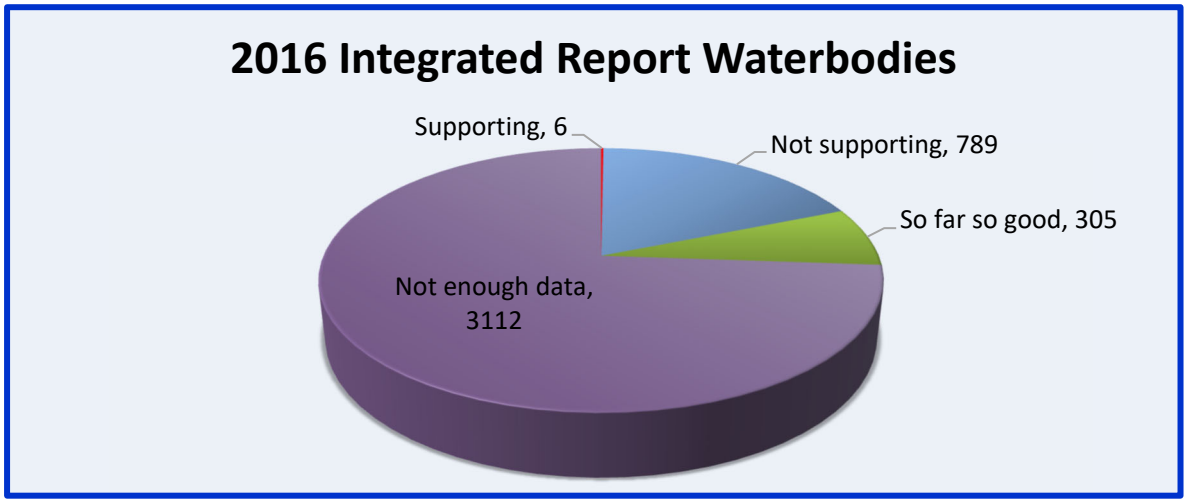

Figure 11. Number of Waterbodies Supporting, Not Supporting, and Not Fully Assessed as Reported in Oklahoma's 2016 Integrated Report.

In addition to collaboration among State and federal agencies to develop consistent, long-term ambient stream and lake monitoring programs, the State has cooperated to complete probabilistic surveys of its rivers, lakes, and wetlands in order to assess whether or not the ambient stations are representative of the ecoregions and larger population of unassessed streams. Preliminary analysis of this data suggests that although the State has at least partially evaluated only 1,100 (26%) of its waterbodies, the assessed 26% are reasonably representative of the remaining 74% not assessed.

The leading causes of nonsupport are fecal bacteria, dissolved oxygen, turbidity, chlorides, and sulfates. Nonpoint sources of pollution are major contributors to these causes.

The State of Oklahoma determined that the most appropriate methods for prioritization of NPS efforts would follow the watershed-based approaches detailed in federal guidance defining the Unified Watershed Assessment. The 1998 Clean Water Action Plan was a major step toward identifying waters to target for restoration or protective measures. Following the Clean Water Action Plan, the State brought together all State, tribal, federal, and local entities working in water quality to compile water quality information and prioritize watersheds. The State of Oklahoma developed the original Unified Watershed Assessment (UWA) in 1998 (Oklahoma Office of the Secretary of Environment, 1998). The UWA was based on the 1988 §319(h) NPS Assessment Report, the 1998 305(b) Report, and the 1998 303(d) List**.** This prioritization effort was formally updated for NPS prioritization in 2006 (Oklahoma Conservation Commission, 2006) and 2014.

Much of the foundation for Oklahoma's water resources programs is built at the HUC 11 or larger watershed scale including beneficial use and water quality standards assignment, water quality monitoring programs (including the NPS monitoring program), TMDLs, and even permits. However, with the 2014 update to the UWA, it was recognized that future prioritization of efforts to address water quality problems may be more effective, particularly for the NPS program, at the smaller HUC 12 scale. Although some programs, such as TMDLs, monitoring, and standards will likely remain at the larger scale, they can also be applied at the smaller scale. Therefore, the 2014 UWA prioritization was completed at the HUC 12 scale for the purposes of more efficiently and effectively implementing to achieve water quality success in NPS efforts.

Oklahoma's current UWA (Appendix B) lists 290 Category I Watersheds (HUC 12) or watersheds in need of immediate attention to reduce pollution. Figure 12 illustrates Category I Watersheds and identifies the 50 highest priority of these watersheds in the eastern and western halves of the State. Oklahoma's 2016 Integrated Report identifies 789 waterbody segments as impaired by 1,719 impairments of 31 different causes, primarily bacteria, sediment, and nutrient related. The magnitude of impairments necessitates focusing programs on areas where the problem is believed to be most significant and where implementation efforts can be most effective given the type of impairment, population affected, and the likelihood of restoring the beneficial use support. The UWA helps delineate these areas.

The UWA considers factors such as percent of waterbodies impaired, threatened and endangered species habitat, existing conservation efforts, pollution causes, and public and private water supplies in prioritizing watersheds. Many of the 100 top priority watersheds selected by the UWA are good candidates for NPS efforts to address water quality impairments and to protect unimpaired waterbodies within those watersheds. However, other watersheds, due to land use, hydrological, or other factors may be less appropriate. Others of the lower priority Category I watersheds may also be appropriate candidates for NPS programs, depending on factors which would contribute to a high likelihood of successful remediation of the demonstrated water quality problems or concerns.

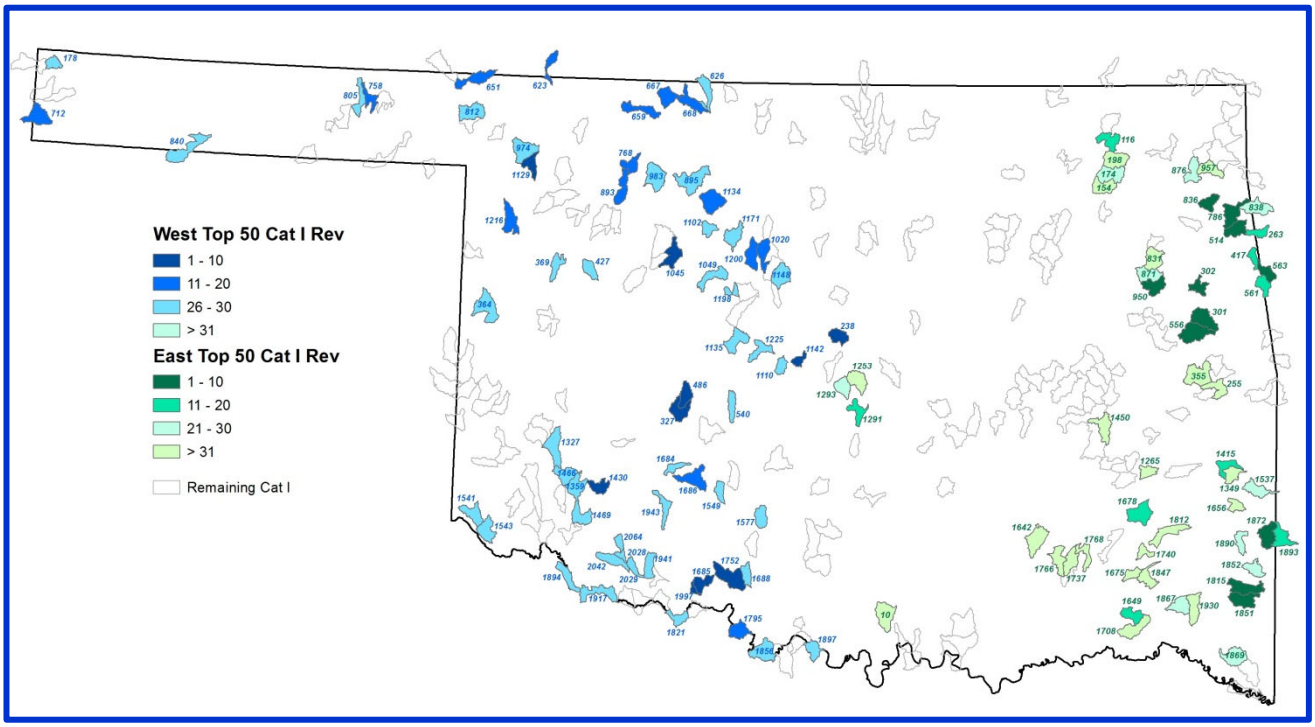

Figure 12. Top 50 East and West Category I Watersheds Identified by 2014 UWA.

The OCC and the NPS Working Group will continue to use the UWA highest priority watersheds, supplemented as appropriate with other Category I watersheds (based on the most current 303d list), to select watersheds in which to focus 319-funded and other NPS planning, education, and implementation efforts. In addition to UWA rank, the group will consider factors which influence the likelihood of a successful project to select NPS priority watersheds for remedial and protective activities. These factors include:

- **Local support**- willing local partners such as conservation districts who demonstrate their interest in supporting a program through assembling a local stakeholder group, drafting or planning portions of a watershed-based plan, or some other mechanism are critical for the success of a NPS pollution reduction effort.
- **Area of the watershed within Oklahoma**- Oklahoma will likely have more success directing a project in Oklahoma than outside the state; however, we have successfully partnered with conservation districts in other states in the past.
- **Causes and sources of impairment**- watersheds where significant causes and sources of pollution are such that methods exist to address the problem within a reasonable cost. A reasonable cost would be one which landowners could theoretically bear, either without financial assistance or where some other form of assistance, is available to supplement the cost of corrective measures. Examples of alternative forms of assistance would be NRCS Environmental Quality Incentives Program (EQIP) funding, USFWS funding to protect critical habitat, or some similar program. For example, a watershed where the major source of sediment was due to dramatic channel incision as a result of channel straightening in the early 20th century might not be chosen over a watershed where a major source of sediment was channel instability and streambank erosion due to riparian degradation. Similarly, a watershed impaired by nutrients might be selected over a watershed impaired by metals.

- **Available partnerships**- watersheds where complementary pollutant reduction programs are ongoing or planned for a similar time frame would be selected over watersheds where collaboration is not as available.
- **Types of waterbodies impaired**- HUC 12 watersheds where the primary impaired waterbodies are lakes may be more challenging to address water quality impairments with remedial efforts than watersheds consisting primarily of streams. In most cases, efforts to reduce in-lake water quality impacts may be more appropriately implemented in subwatersheds that drain to the lake. In-lake efforts should only be attempted when significant efforts to reduce new loading to the lake have been implemented in the watershed. In the case of impaired lake watersheds, efforts will be made to identify the subwatersheds draining to that lake which contribute most significantly to lake water quality problems, and to monitor, educate, and implement in those watersheds.

Work in these priority watersheds will both restore impaired waterbodies and protect unimpaired waterbodies. The State plans to measure its success in working towards NPS program goals in these priority watersheds by systematically assessing water quality across the state and identifying impairments, causes, and sources as well as documenting streams where water quality is improving. This assessment process is defined elsewhere in the document. The State will then systematically develop remedial and protective strategies to implement and educate in these watersheds using tools described later in the document such as Local Watershed Advisory Groups, Watershed Based Plans, TMDLs and others. Finally, the State will evaluate the success of these programs with follow up monitoring. For ubiquitous pollutants the State's objective is to pursue education and support permitting programs for sources such as confined animal feeding operations (CAFOs), construction, and stormwater.

3.2 Nonpoint Source Working Group

The OCC tailored the mechanism by which guidance was received from the State to more effectively consider all aspects of NPS pollution and associated remediation or protection efforts. The NPS Working Group acts as a guiding entity for developing and directing the NPS programs. The NPS Working Group acts in a peer-review manner by providing input, opinions, and constructive criticism regarding the development and implementation of NPS policy and programs. The specific function of the group is divided into five purposes:

1. Assist in the revision of the NPS Management Program Plan;
2. Confirm the process of selecting priority watersheds;
3. Provide consensus in the planning of work in priority watersheds;
4. Develop in-state leadership regarding NPS issues; and
5. Promote consistency between State-State and Federal-State NPS policies.

The NPS Working Group is made up of more than 50 members from a variety of backgrounds, assembled to include a broad representation of State, federal, and local agencies as well as special interest entities, environmental groups, and Native American representatives in the process of directing NPS pollution management. A diverse and multifaceted group allows the numerous interests and perspectives involved with NPS pollution management to be instilled into the NPS program. This type of arrangement also staves off conflicts and political manipulation. When all interests are given an opportunity to participate, it is the responsibility of each organization to voice opinions and to assertively participate prior to any decision-making, rather than after the fact. Furthermore, when project funds are to be dedicated or a key decision is to be made, it is determined or decided based on the priorities established by the working group, not any one individual or agency.

Members are generally added to the Working Group as they request. Some groups have more than one participant; however, each group/agency only gets one vote in decision-making actions. Current membership includes the following organizations:

- ACOG
- American Electric Power
- American Farmers and Ranchers
- Bureau of Land Management
- Bureau of Reclamation
- Cherokee Nation
- City of Oklahoma City
- City of Tahlequah
- Corp. Comm.
- EPA
- Farm Services Agency
- Grand River Dam Authority
- INCOG
- Kickapoo Tribe
- Land Legacy
- Nature Conservancy
- NRCS
- ODAFF
- ODEQ
- ODOT
- ODWC
- OK Assoc. of Conservation Districts
- OK Attorney General's Office
- OK Independent Petroleum Association
- OK Municipal League
- OK Rural Water Association
- Oklahoma Cattlemen's Association
- Oklahoma Farm Bureau
- Osage Tribe
- OSEE
- OSU
- OU
- OWRB
- Pawnee Nation
- Poteau Valley Improvement Authority
- Save the Illinois River (STIR)
- Sierra Club
- USACE
- USFWS
- USGS

The NPS Working Group helps to incorporate sectors of NPS pollution not under the jurisdiction of OCC (silviculture, runoff from animal feeding operations, oil and gas production related, urban stormwater runoff, etc.) into the NPS program. The agencies responsible for other types of NPS pollution (described in 8. Roles, Responsibilities and Oversight) sit on the NPS Working Group, and their participation will facilitate implementation and education efforts, where appropriate, in priority watersheds.

3.3 Local Watershed Working Groups

Local working groups play an invaluable role in ensuring the success of a watershed based effort. One of the most successful types of local working group in Oklahoma has been a Watershed Advisory Group. The Watershed Advisory Group (WAG) is a locally-led steering group, made up of representatives of local industries and other watershed interests. The group size is kept to a minimum to ensure adequate, yet workable representation of interests and needs. Typical size is 10 to 15 members, made up of local citizens. It is important to emphasize that members of the WAG are not State or federal agency employees, but private citizens, producers, and local authorities. For instance, an ODAFF employee would not represent cattlemen's interests. Instead a local cattle producer, perhaps a member of the Cattlemen's Association, would represent cattlemen's interests. The local Conservation District Boards recruit the members in a further effort to ensure local interests are represented.

The main function of the WAG is to ensure that the NPS pollution reduction implementation program is a successful, workable program with respect to local needs and other local issues, while at the same time addressing the goals of the NPS Program. In fulfilling this role, the WAG is responsible for the following activities:

- Making recommendations to OCC staff and the conservation districts on which CPs should be used in the demonstration project;
- Selecting the cost-share rates to be used in the implementation of CPs;

Additional duties of WAG members that are developed to ensure the group operates successfully and that as many of the pertinent local interests are represented as possible include:

- Attend 70% of all regularly scheduled meetings and 50% of all special meetings;
- Work in cooperation with the conservation district boards in the watershed;
- Use the State and federal agencies for technical assistance to work with cooperators in the program;
- In cooperation with local sponsors, host public informational meetings concerning the §319 program addressing what is the program, what is offered, what cost-share is available, who is eligible, etc.;
- Coordinate with OCC staff for the funding of the §319 demonstration project using the Watershed Coordinator (OCC employee) who is the spokesperson and person responsible for the day-to-day activities that affect the operation and workings of the §319 demonstration project;
- Host or conduct annual tours of the demonstration areas in the watershed;
- Work through the conservation districts for distribution of cost-share payments;
- WAG vacancies are filled when WAG members make recommendations to the district board.

3.4 Watershed Modeling

Watershed modeling is a useful method of extrapolating limited information to an entire watershed. Land use, slope, and soils data is used to estimate locations in the watershed most likely to be responsible for the bulk of the pollutant loading. However, due to the very fact that modeling generally involves extrapolation and predictions about what might or should happen, outputs should be used and interpreted with caution. Modeling should only be used as an initial step to allocate resources, and never in the absence of real-world field data. Before the results of any model can be trusted, field data must be collected to verify its applicability and accuracy in predicting results specific to the area in question.

Because of the inherent complexities in modeling and the caution that must be used in interpreting its results, EPA has developed an extensive reference document with respect to watershed modeling. Watershed modeling of NPS pollution completed and endorsed by the OCC will follow the guidelines and procedures described in this document. The EPA's Office of Water has available online a Watershed Modeling Tools Module that lists guidelines for watershed modeling (United States Environmental Protection Agency, 2014). These guidelines include suggestions as to when a model can be useful and how to choose the best type of model for the particular application.

The STEPL model (TetraTech, 2018) is the most commonly used model in the Oklahoma NPS program. Although simplistic, it is commonly used to estimate load reduction resulting from NPS Program activities and reported each February in EPA's Grants Tracking and Reporting System. Recent evaluation of available watershed models to translate load reducation goals, understanding of sources of pollution, and

watershed data such as soils and landuse into watershed recommendations for implementation of conservation practices has suggested that the Soil and Water Assessment Tool (SWAT) is optimal for use by local conservation districts, NRCS and partners.

3.5 Total Maximum Daily Loads

Total Maximum Daily Loads (TMDLs) are one of the tools available to assess and reduce pollution to water resources. A TMDL is the total maximum allowable daily load that will protect water quality, yet allow development and land use in the basin. TMDLs are often required to address water quality problems identified on States' 303(d) lists. EPA mandates that States must address 303(d) listed streams within a given period of time. Recent lawsuits against EPA and various States over failure to address 303(d) lists have increased the emphasis on removing waterbody segments from the list. In order to be removed from the list, a TMDL or some other type of reparatory activity (i.e. Corp. Comm. adjacent pollution cleanups) must be completed. Development and Implementation of TMDLs are the most common means by which these problems are addressed. Waterbody segments may also be removed from the list if it is determined that the original listing was done in error, or current data on the segment does not support listing. Removal of segments from the list is subject to EPA approval.

In order to complete a TMDL for a given body of water, an accurate estimate of the current loading must be made, along with an estimate of what portion of that load is derived from point source, NPS, and background loading. The TMDL must then assign the allowable load from each of the different source categories. The allowable load is the load that optimizes water resource protection given available resources.

While estimating the portion of the load contributed by point sources is generally straightforward since those estimates are from a single location and based on readily available discharge flow and concentration records, or from available literature estimates specific to treatment type and population treated, estimating the NPS portion of the load is difficult and often requires considerable data. Types of data necessary include not only water quality/loading data, but also land use types, soil types, topography, weather patterns, etc. Estimates of the NPS portion of the load are commonly made using computer modeling that adds to the difficulty and uncertainty in forming the estimate.

The ODEQ is the State agency responsible for developing TMDLs in Oklahoma. This designation is appropriate as they are also the agency responsible for NPDES permitting of wastewater discharges across the State. The TMDL concept fits in appropriately with the determination of allowable loads for dischargers. Many other state agencies play a role in TMDL development, including INCOG, ACOG, OCC, ODAFF, to name a few. The OCC's role in the TMDL process is to assist ODEQ in determination of the NPS allocation of the loading, whether in the form of data collection and sharing or load estimation through modeling efforts. The OCC has land use and water quality data associated with NPSs of pollution from watersheds across the State.

A TMDL is of little consequence if it is not implemented. The TMDL merely suggests the allowable load necessary to protect the resource. Implementation of a TMDL requires development of some type of implementation plan, specifying how the pollutant load from point and nonpoint sources can be reduced or maintained. In Oklahoma, these implementation plans will generally be detailed in the Watershed Based Plans facilitated by OCC or other similar documents.

The TMDL process has become an integral part of water quality management in all States. Implementation of TMDLs to protect water quality will require implementation of NPS as well as point source load reductions. While point source reductions can be accomplished through regulatory avenues, NPS reductions often require voluntary action on the part of landowners and users. One of the best ways to ensure voluntary cooperation is to adequately represent local interests in the development of the TMDL by soliciting input from local citizens and agencies throughout the process. The most common means by which this is accomplished is through a period of public review. Unfortunately, it is difficult to ensure a truly public review. Most of the review is completed by State agencies, rather than by people directly affected by the TMDL.

The relationship between OCC and local conservation districts provides an avenue to address the problem of adequate public review. Input and review through a local conservation district or local working group is an integral part of NPS TMDL efforts completed by the OCC. Local input is included throughout the TMDL process, both during formulation of the TMDL and planning and implementation of the TMDL.

3.7 Watershed Based Plans

EPA §319 Guidance requires that before §319 dollars can be spent on implementation efforts to address nonpoint source pollution impairments or concerns, a watershed based plan (WBP) must be developed that EPA accepts as addressing nine required elements. These nine key elements describe the problem to be identified (cause of impairment and sources), effort needed to address the problem (amount of implementation of specific practices to achieve water quality standards support, water quality goals, and the load reduction that should come from those practices), cost of the effort in terms of financial and other resources, educational effort necessary to bring stakeholders to that table to solve the problem, a timetable that describes how the effort should progress, and a monitoring effort necessary to estimate program effectiveness (United States Environmental Protection Agency, 2008).

These WBPs utilize TMDLs, water quality modeling, local watershed advisory groups, partnerships, resources and other information related to a watershed to develop a roadmap to water quality success. Resources and efforts necessary to develop a WBP vary based on the complexity of the watershed and the budget of the plan developers. Some plans require more than one million dollars' worth of effort just to collect data, bring stakeholders together, and develop a plan, whereas achieving water quality success in other watersheds requires only education and conservation practices adopted by a few key landowners and a few thousand dollars invested. Oklahoma has developed several EPA-accepted nine-element plans; however, the majority of the Oklahoma Nonpoint Source Success Stories published on EPA's website were completed without the benefit of a watershed based plan. Planning happens in these watersheds, but it has not typically been drafted into a single document. In other words, Oklahoma recognizes that NPS water quality concerns are much more complicated in some watersheds than others and that the degree of complexity dictates the type of approach to be followed in addressing the problem.

Oklahoma will continue to draft full scale WBPs similar to those published on OCC's website:

http://www.ok.gov/conservation/Agency_Divisions/Water_Quality_Division/WQ_Reports/WQ_Reports_Watershed_Based_Plans/.

These plans will be developed following the prioritization for NPS watersheds assigned in the UWA. Full scale plans will be developed by the OCC and partners when the majority of the following criteria are met:

- sufficient environmental data identifying causes and sources exists to develop the plan;
- local stakeholder groups request a plan to help guide remediation and protection;
- causes and sources of impairment are such that they can be likely addressed by the resources and tools available to the program (when causes and sources have been successfully addressed in similar watersheds and therefore success is possible); *but*
- a TMDL, types of causes and sources, or some other intelligence suggests that impairments in a watershed will require significant tonnage of load reduction, a large degree of landowner cooperation, or when a strong point source impact is also likely. In other words, when the watershed or cause is complicated, such as nutrient reductions in a scenic river watershed.

At the same time, Oklahoma will also develop smaller scale nine element plans for simpler watersheds. The OCC will follow the prioritization in the UWA and work with partners to develop at least one to two small-scale watershed plans per year. These plans will be used for a variety of purposes including assisting with development of NRCS projects such as Local Emphasis Area, National Water Quality Initiative, or Regional Conservation Partnership Program projects, guiding the use of §319 implementation dollars in the watershed, or as the basis for any other type of remedial or protective effort in a watershed. These simpler plans will be developed by OCC and partners when the majority of the following criteria are met:

- sufficient environmental data exists to identify causes and sources;
- local stakeholder groups request a plan to help guide the remediation process; and
- causes and sources of impairment are such that they can be likely addressed by the resources and tools available to the program (when causes and sources have been successfully addressed in similar watersheds and therefore success is likely).

These abbreviated plans can serve as the impetus for a conservation implementation project; however, they can also be used to guide the process necessary when a watershed isn't quite ready for implementation. For instance, when a water quality problem or concern has been recognized, but little information exists on causes and sources, a plan could be drafted that identified the types, amount, cost of data collection, and perhaps water quality modeling that would be required to develop a full watershed based plan that was ready for conservation implementation. In the event a group of stakeholders are not able to reach a consensus on how to achieve success, additional information could be drafted into an abbreviated plan in an effort to develop a full implementation plan.

In other words, not every priority watershed identified by the Unified Watershed Assessment is ready for or needs the same type of watershed based plan. Using the principles outlined in this management plan and through annual workplans funded by the State and EPA, the Oklahoma NPS Program will determine the approach which it should reasonably apply to each UWA-identified priority watershed and develop a schedule to develop and implement watershed based plans.

3.8 Planning Strategies and Actions to Achieve NPS Program Goals

The State has identified a number of actions necessary to address the long- and short-term goals in the stepwise manner of assessment, prioritization and planning, education, and implementation. The planning-related strategies are detailed below and in Table 3:

- **Prioritize watersheds for planning and implementation**. The Oklahoma NPS program will revise and update the current Unified Watershed Assessment (UWA) specifically for NPS at least every five years as part of the update to the NPSMP. The prioritization system will set priorities which include protecting non-impaired waters as well as restoration of impaired waters. Use of the continually updated UWA priority list will focus NPS efforts in the same geographic areas as other water quality based State programs. This coordination of efforts results in a greater likelihood for protection and attainment of beneficial uses. This prioritization of NPS activities based on the UWA is accomplished by the NPS Working Group, and facilitated by the OCC.

- **Draft TMDLs, Watershed Based Plans (WBPs), and implementation plans to address pollutants in priority watersheds**. Annually, WBPs, TMDLs, and other implementation plans must be completed to initiate a process of remedying identified impairments within Oklahoma waterbodies. The State will partner with USDA and other partners to prioritize water quality-targeted NPS implementation efforts in two to ten NPS priority watersheds per year, based on available resources. The watersheds are addressed in order of their priority rating as determined by the NPS Working Group. TMDLs are the responsibility of ODEQ, although other agencies can assist in their development. ODEQ maintains a schedule to complete TMDLs for all streams on the 303(d) list, which is based in part off the UWA. WBP development is directed through OCC. WBPs have been approved in thirteen NPS priority watershed and are planned to be completed for the top ten eastern and western NPS priority watersheds (20 total) by 2026. Nonpoint source implementation plans are generally developed by the OCC. Implementation in two to ten NPS priority watersheds, which includes the implementation efforts of other programs such as EQIP and source water protection, is planned annually to address the top 20 (10 east and 10 west) NPS priority watersheds, will occur on an annual basis between 2020 and 2030.

- **Provide water quality and NPS related training for partners including tribes, federal, and State agencies, watershed groups and coordinators, etc.** The State will provide training for new and existing program partners on current methods and technologies in watershed management through seminars, symposiums, and various other training sessions. These training sessions will educate partners on successes and failures of other watershed programs.

- **Plan and implement annual workplans following the recommendations of the NPS Working Group and federal guidance to implement the goals outlined in this management program**. Annual work programs will effectively be amendments to this NPS management program. To achieve the program goals and objectives, the State will plan and develop annual §319 workplans on a biennial basis and seek other funding sources to control NPS pollution on a continual basis. This will generally be the responsibility of the OCC, although other State and federal agencies will participate in furthering the programs. In addition, the NPS Working Group will review and advise in development of these plans.

- **The OCC will continue to coordinate Oklahoma's NPS Working Group** to advise and assist in planning NPS programs in support of the State long-term goal of strong working partnerships

and collaboration with appropriate State, interstate, tribal, regional, and local entities (including conservation districts), private sector groups, citizen groups, and federal agencies to control NPS through 2029. The NPS Working Group will provide a forum to allow various agencies and programs to participate in and influence the State's NPS program. The NPS Working Group should also facilitate communication about and cooperation between NPS related efforts of various State, federal, and independent programs.

- **Oklahoma environmental agencies will execute water quality standards implementation plans within areas of their jurisdiction**. As per the requirements of State legislation to expedite and coordinate efforts to reduce water pollution in the State of Oklahoma, each State environmental agency shall have promulgated by July 1, 2001, a Water Quality Standards Implementation Plan for its jurisdictional areas of environmental responsibility in compliance with the Administrative Procedures Act. These plans should be the basis for additional NPS control activities within the State.

- **The State will conduct annual financial reviews of each project**. The State will provide efficient and effective management and implementation of the State's NPS program, including necessary financial management. This will generally be the responsibility of the OCC and OSEE.

- **The State will conduct program management as outlined in the annual Technical Support Work Program and each agency Quality Management Plan (QMP)**. The Technical Support Work Program is the responsibility of the OCC and QMPs are the responsibility of each State agency.

- **The State will prepare Annual §319 Reports and Semiannual Project Reports**, to be completed by the OCC and other cooperating agencies.

- **The NPS Program will contribute to federally-mandated State planning requirements including NPS components to UWA, 303(d) list, and EQIP planning**. This function is performed generally by the NPS Working Group, facilitated by the OCC.

- **The NPS Program will contribute to and assist with the OWRB's development of biological criteria, nutrient criteria, sediment criteria, and general improvements to water quality standards.** This will mainly be accomplished through cooperation between the OCC and OWRB, although other important sources of data include ODEQ, ODWC, and other agencies.

Table 3. Statewide or Programmatic Actions and Milestones to Achieve Goals.

Actions	Methods to Achieve Action	Projected Time Frame
Nonpoint Source Management Program	• Annual Review by EPA and NPS Working Group in the form of Annual Report to include summary of satisfactory progress	Formal Revision every five years- 2019, 2024, 2029
Nonpoint Source Assessment Report	• Rotating Basin Small Watershed Monitoring Program- Complete circuit of State every 5 years- approximately 250 sites dep. on available funds. • OWRB BUMP- Approximately 85 fixed sites and 25-30 rotating sites on rivers and streams. Also gathering quarterly information on 130 lakes on a five year cycle. • Additional Monitoring by various agencies and groups	Formal Revision every two years- 2020, 2022, 2024, 2026, 2028
Contribute to Revised and Updated 303(d) List	• The State will revise the 303(d) List according to federal and State requirements. Revision of the 303(d) list equates to more accurate representation of water quality threats and impairments in the State.	2020, 2022, 2024, 2026, 2028
Contribute to Revised and Updated UWA	• The NPS Working Group will review and update as necessary the UWA with each update of the NPSMP, based on the most recent version of the Integrated Report list of impaired waterbodies.	Formal review every five years- 2019, 2024, 2029- revision with significant changes in 303(d) list
Draft TMDLs for 303(d) Waters	• ODEQ prioritizes TMDLs for development based on UWA prioritization. ODEQ continues to make significant progress on TMDL development with over 624 completed TMDLs listed in the 2016 Integrated Report. The 2016 303(d) list defines a schedule of TMDLs for listed waterbodies ranging from 2018 – 2027.	2019- 2029
WQS Implementation Plan	• Each State environmentally agency is statutorily required to draft a Water Quality Standards Implementation Plan	2001
Support and Utilize the NPS Working Group	• OCC will coordinate the NPS Working Group to evaluate and advise on the direction of the NPS Program and to ensure better intra-agency cooperation and a more effective program.	Group will meet as necessary to address NPS issues.
Education Programs	• Promote education programs like Blue Thumb, Soil Health, OCES, and ODEQ's Sourcewater Protection Program • Supplement existing water quality programs with NPS specific programs • Improve partnership with NRCS to promote water-quality related education programs within EQIP priority areas.	Annually

Actions	Methods to Achieve Action	Projected Time Frame

Improving Data Accessibility and Sharing	• All OCC data is maintained in a single database and uploaded at least annually to STORET
	• OCC data will be available through internet in a user-friendly environment
	  • All OCC data is available through contact with a data manager
	  • OCC data will be combined with other national water quality data
		2019-2029
		• Web Accessibility by 2023
		• All OCC data annually updated in STORET

Utilize and Improve Oklahoma Water Quality Standards and Use Support Assessment Protocols	• OWRB's BUMP and other agency monitoring programs collect data to develop standards more appropriate to protect the State's Waters • Oklahoma will continue to develop Water Quality Standards to more appropriately address NPS pollutants (i.e. sediment, nutrient, and biological criteria) • Oklahoma environmental agencies worked together to develop Use Support Assessment Protocols to consistently define the quality of the State's waters	• Monitors approximately 84 streams annually, 68 major lakes in a 5 year rotation, and monitors groundwater related to quality and quantity issues.
Support and Research Developing Technology	• Continue to develop and demonstrate new methods to better address NPS pollution (nutrient export technology, waste processing and recycling, fluvial geomorphology for streambank restoration, etc.) • Continue to research new methods and activities other states are using to address NPS pollution. • Participate in TMDL and Oklahoma Water Quality Standards working groups.	• Incorporate new strategies whenever possible in demonstration programs (at least one program per year) • Attend and make presentations at no less than six national and regional conferences annually • Provide data, expertise, physical and financial assistance with development of OWQS.
Annual Reports and Semiannual Project Reports	• The State will conduct annual reviews of the overall program and each project. These reviews include satisfactory progress towards goals as well as financial review. • The State will prepare and submit semiannual progress reports to EPA summarizing activities pertaining to specific projects with regard to progress towards goals of the project.	• Annually through 2029 • Semi-annually through 2029.

- **The NPS program will include watershed planning and technical assistance to conservation districts and other entities for watershed planning and NPS control.** The OCC and NRCS will mainly provide this service, although other agencies including ODEQ, OWRB, ODAFF, Corp. Comm., OCES, GRDA, and ODWC provide valuable assistance.

3.9 NPS Program Planning Milestones

Specific milestones to assess program progress toward planning objectives and program overall goals include:

- In 2019, the State will complete a formal review and update as needed to the UWA prioritization based on the 2016 Integrated Report using input from the NPS Working Group.
  - Every subsequent two years (2020, 2022, 2024, 2026, 2028), the NPS Program will review the most recently approved Integrated Report and update the UWA when new data becomes available, when major changes have occurred in the number, or primary causes or sources of impaired waterbodies, or otherwise as some change in guidance requires an update.
- Each year, the NPS Program will draft or update one to two watershed based plans as prioritized by the UWA and as described previously in this section.
- At least every two years (2019, 2021, 2023, 2025, 2027, 2029), the State will submit two grant years' worth of workplans to EPA for consideration for §319 funding.
- Annually, the NPS program will produce a NPS Program annual report detailing significant accomplishments and progress toward NPSMP goals, which EPA can utilize to make a determination of satisfactory progress.
- Annually, the NPS program will exceed the §319 match requirements by at least 20%.

4. Component III: Nonpoint Source Program Education

4.1 Introduction

The Oklahoma Environmental Quality Act of 1993 (Title 27A) designates the OCC as the State of Oklahoma agency responsible for monitoring, evaluating and assessing streams and rivers impacted by NPS pollution. Title 27A also delegates the primary responsibility of coordinating environmental and natural resource education efforts to OCC. Other state and federal agencies, including OCES, NRCS, ODEQ, OWRB and GRDA, are actively involved in NPS pollution education across the state. Statewide efforts are coordinated through the Oklahoma Environmental Education Coordinating Committee, chaired by the OCC.

Education is an important component of most environmental protection programs, but effective public education is essential for programs that rely on volunteer cooperation to implement restoration or protection plans. Most waterbodies listed on the State of Oklahoma 303(d) list are impacted by NPS pollution. With a few exceptions, implementation of NPS projects relies on the voluntary cooperation of landowners to achieve management goals. As a result, education is a critical component of the State of Oklahoma Nonpoint Source Management Plan. The NPS education program is structured to fulfill the following objectives:

1. Connect local citizens to the watersheds in which they live by offering direct experience in and around local waterbodies.
2. Provide education about NPS pollution.
3. Provide education about specific actions individuals can take to reduce the impacts of NPS pollution.
4. Motivate individuals to take action to prevent or mitigate NPS pollution.
5. Tailor educational efforts to the needs and conditions of the local watershed.

These objectives are used to guide efforts in each focus area of the NPS education program.

4.2 Blue Thumb

Blue Thumb is OCC's NPS education program. The statewide Blue Thumb program supports conservation districts, municipalities, schools, tribes and other organizations in their efforts to protect local water resources. Blue Thumb staff provide educational outreach and train volunteers to monitor local streams. Conservation districts and other partners support the Blue Thumb program through donations of staff time, meeting spaces and other types of in-kind contributions.

Blue Thumb staff respond year-round to educational requests throughout the state. Staff or trained volunteers facilitate educational experiences in a wide variety of settings including, but not limited to, schools, universities, conservation districts, tribes and community groups. Educational outreach involves facilitating activities to provide NPS pollution education, staffing booths and exhibits, presenting at conferences, participating in camps, and leading outdoor experiences such as creek walks and bug collections. Blue Thumb also loans education equipment to groups and individuals.

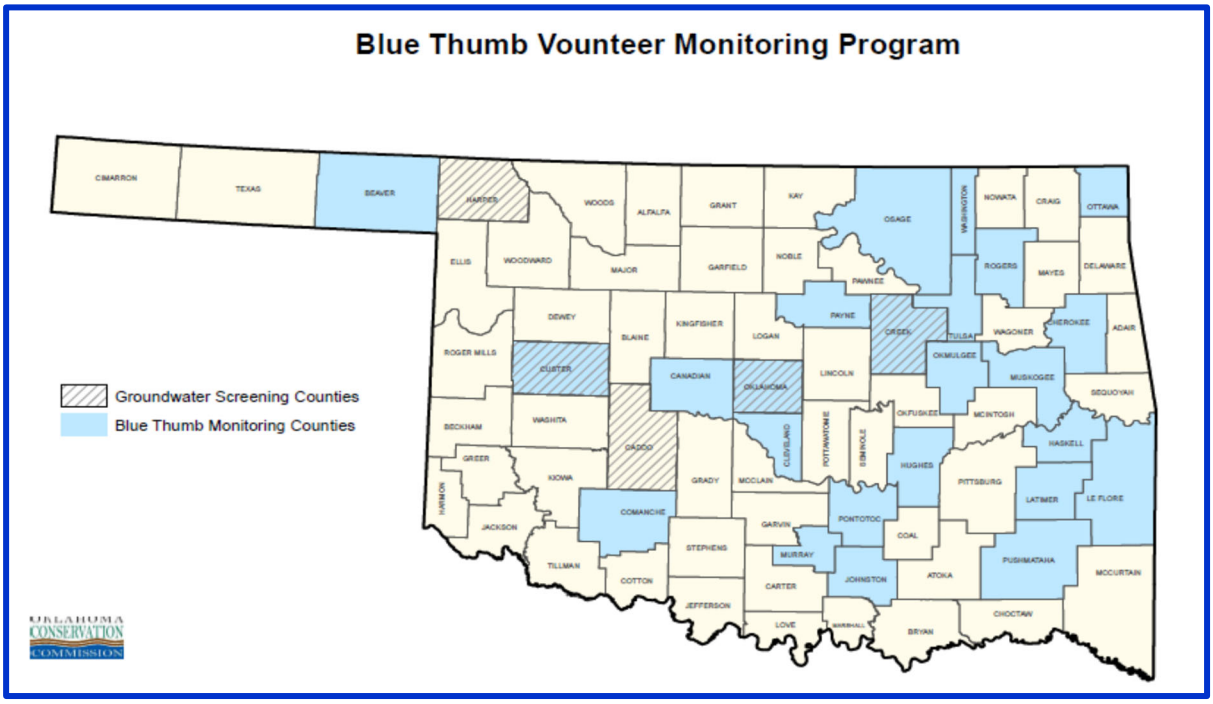

Figure 13. Counties with Blue Thumb Water Quality Education Programs.

Volunteer monitoring is another fundamental component of the Blue Thumb program. Volunteers complete rigorous training (a minimum of 16 hours with continuing education requirements) to become certified monitoring volunteers. Training includes instruction on sampling methodology, sample analysis, quality assurance procedures, safety precautions and data submission. The training also provides background on NPS pollution, aquatic ecology and best management practices to abate NPS pollution. Blue Thumb volunteers collect water quality data (e.g., temperature, dissolved oxygen, chloride, nitrate, ammonia, pH, orthophosphate) and qualitative ambient site conditions (e.g., canopy cover, stream site conditions, site weather) monthly at their designated sites. Benthic macroinvertebrate sampling is completed twice per year (summer and winter index periods); habitat assessments and fish collections are completed once every three to five years.

Chemical data collected by Blue Thumb volunteers are used for education and in agency reports. Chemical data are also used to report potential water quality problems to state and local authorities and may be used to monitor the success of implementation efforts. Volunteers also collect biological and habitat data in cooperation with Blue Thumb staff. Macroinvertebrate, fish and habitat data are collected according to agency SOPs; these data are included in the State of Oklahoma Integrated Report. They may also be used for TMDL development.

The Blue Thumb program encourages volunteers to analyze and interpret their own data. Each year the Quality Assurance Officer prepares data packages for sites with new fish data. Blue Thumb staff members review the data packages with volunteers, and encourage volunteers to analyze, summarize and interpret their data. The final product of this process is a written data interpretation. Volunteers may develop data interpretations independently, or work with Blue Thumb staff individually or during data evaluation workshops. All data interpretations are reviewed by the Quality Assurance Officer. The

data interpretations are used by the Blue Thumb program and by volunteers to communicate water quality issues to people who live and work in the watershed. The data interpretations are posted on the OCC website and are made available to conservation districts.

Figure 14. The Blue Thumb Program provides education about laboratory methods, stream health and how to reduce NPS pollution.

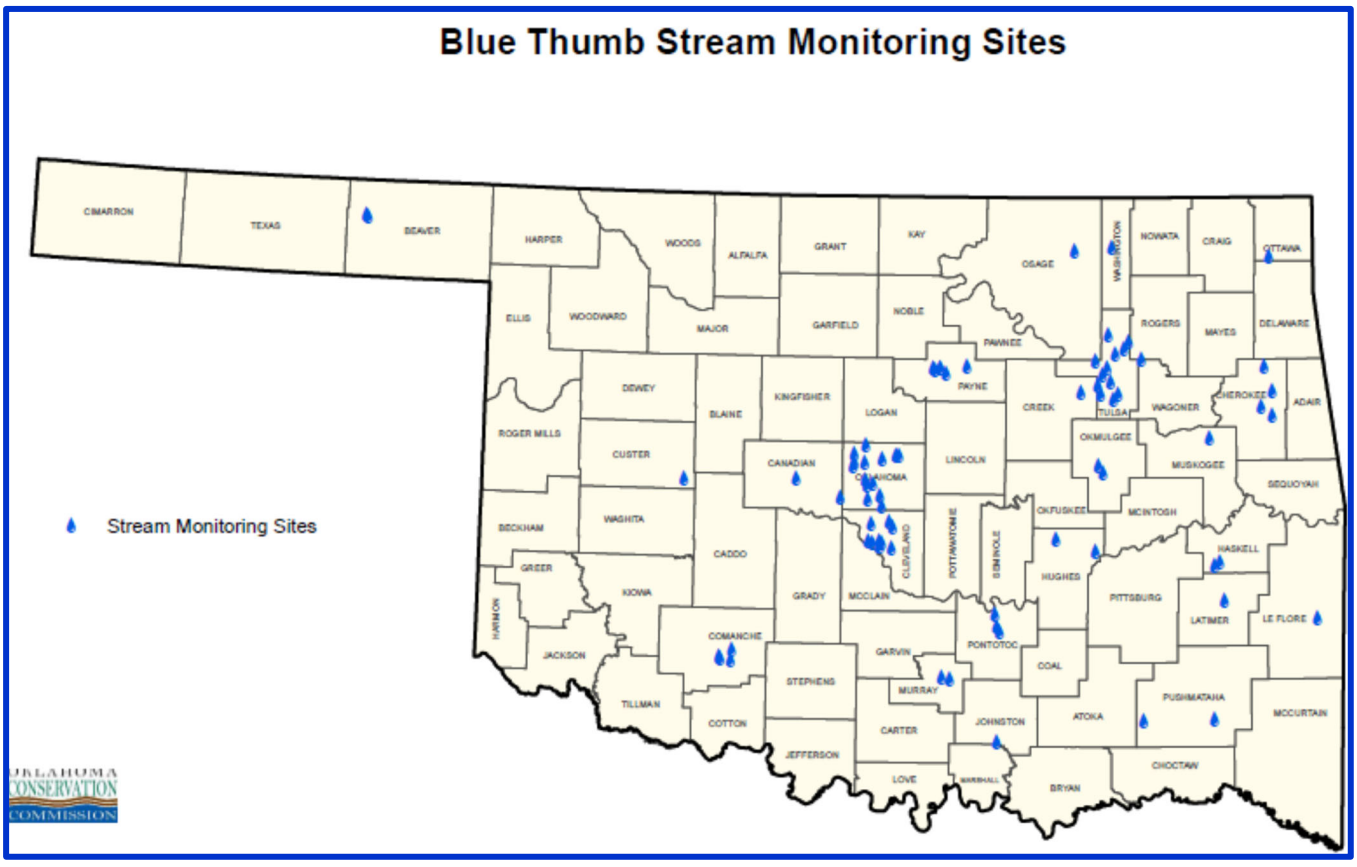

Figure 15. Actively Monitored Blue Thumb Sites

4.3 Project WET

In 2016 the Blue Thumb program assumed responsibility for the State of Oklahoma Project WET (Water Education for Teachers) Program. Project WET is a nationwide program that strives to provide water education to children, parents, teachers and community members. Project WET publishes a curriculum guide that offers educators 64 hands-on water activities for children K-12. The curriculum guide can be used in formal and informal educational settings, and most activities can be modified to meet the needs of any age level. Project WET curriculum guides are available to people who complete a Project WET workshop. Because Project WET training is embedded in the Blue Thumb training, everyone who completes the Stream Ecology and Education portion of the Blue Thumb training receives a Project WET curriculum guide.

4.4 Groundwater Protection Education

Interest in groundwater quality has grown across the state due to many factors ranging from drought and flooding to concern about the potential impacts of oil and gas activities. Blue Thumb provides groundwater education to conservation districts through groundwater screening events. In advance of a groundwater screening event, Blue Thumb staff provide sample bottles, instructions for sample collection, and information on groundwater protection to conservation districts. The districts promote the events and share information with interested citizens. Districts recruit volunteers to perform analyses during the groundwater screening event under the supervision of Blue Thumb staff. During a groundwater screening event, volunteers analyze private well water samples for alkalinity, chloride, nitrate, pH and sulfate. Data from groundwater screenings are presented to the well owner. When results suggest cause for concern, the well owner is encouraged to contact ODEQ for additional testing. Recent interest in private groundwater wells has surged due to spring flooding and concern about bacteria contamination. Because private wells are not regulated, the State of Oklahoma does not have a coordinated plan to provide education and support to private well owners when a localized event occurs that may impact the safety of private drinking water sources. In order to address this education gap, during 2020 Blue Thumb will recruit representatives from state agencies involved in groundwater management to serve on a committee to develop and implement coordinated educational outreach efforts in response to local groundwater issues.

4.5 Education in Priority Watersheds

Priority watersheds are watersheds which are impaired and in which restoration efforts are likely to be successful. In most cases, priority watersheds are watersheds identified in *State of Oklahoma Unified Watershed Assessment* (UWA) (2014). Watersheds in which the local community is actively involved in watershed protection or restoration may also be priority watersheds, even if these watersheds are not among the highest ranked Category I watersheds identified in the UWA.

Education efforts in priority watersheds are very specific to the watershed and are targeted to pave the way for successful implementation efforts. Education in a priority watershed usually occurs under the direction of a watershed advisory group made up of stakeholders and local decision makers. Stakeholder groups are diverse and vary between watersheds, but typically include landowners,

agricultural producers, industry representatives, state and federal partners and environmental groups. Depending on the location of the watershed, stakeholders may also include tribes, municipalities, public schools and universities. The watershed advisory group should be comprised of a small group of stakeholders committed to the successful implementation of BMPs. Blue Thumb can help watershed groups tailor their educational efforts to meet the goals and objectives of the group.

4.6 Strategies and Actions Necessary to Satisfy NPS Education Objectives

• **Continue to provide statewide water quality and NPS education.** Outreach and education will occur primarily through the Blue Thumb and Soil Health programs with assistance from partners such as ODEQ, OWRB, GRDA, OCES, NRCS, USGS, and others.

• **Continue to support a network of citizen scientists that collect water quality data on local streams.** Blue Thumb will continue to support volunteer monitors and seeks to expand the program into areas of the state with sparse monitoring coverage. Develop a network of Soil Health citizen scientists.

• **Continue to support a groundwater education program.** Blue Thumb will continue to educate private well owners through groundwater screening events. Beginning in 2020, Blue Thumb will facilitate an interagency committee to coordinate groundwater education efforts.

• **Develop a comprehensive wetlands education program.** The interagency Oklahoma Wetlands Technical Working Group has identified education as a critical component of water quality management in Oklahoma. Development of a wetland education program will be guided by the *Oklahoma Wetland Program Plan: 2020-2025*.

• **Improve public access to water quality data.** The OCC and other state agencies continue to strive to improve public access to water quality data. The OCC is making water quality data more accessible by importing water quality data into the Ambient Water Quality Monitoring System (AWQMS), improving interactive map viewers, and developing mobile applications to allow users to access, visualize and query data.

4.7 NPS Program Education Milestones

• Hold at least four Blue Thumb trainings annually.

• Maintain a network of at least 75 stream sites that are actively monitored by citizen scientists.

• Participate in an average of at least five NPS education and outreach events each month.

• Provide educational support and guidance to active watershed groups.

• Hold at least two groundwater screening events annually.

• Facilitate quarterly meetings of an interagency groundwater education committee in 2020 and as needed thereafter.

• Promote NPS education on social media platforms.

• Develop and support a network of Soil Health Champions who mentor agriculture producers in their area.

• Support conservation districts in the development of soil health demonstration farms and soil health education events.

• Coordinate with other partners to deliver soil health education state wide.

5. Component IV: Implementation to Address Nonpoint Source Impacts

The fourth component of Oklahoma's NPS Management is implementation. Implementation of remedial measures to reduce NPS pollution occurs through many mechanisms and programs. However, given the limited resources available to the NPS program, steps should be taken to ensure that it occurs when sufficient background information is available to support the efforts. One mechanism to ensure adequate background information is drafting watershed based plans as detailed in the previous section. Regardless of the mechanisms used to ensure adequate background information is available, the following conditions must be met prior to a watershed being "ready" for implementation:

- Causes of pollution must be identified;
- Sources of pollution, including their relative contribution, must be well understood;
- Remedial efforts to address the sources must have been demonstrated that can effectively address the problem given the watershed scale, degree of implementation necessary, and financial resources available (i.e. this type of problem has been addressed in other, similar circumstances, with similar resources); and
- Stakeholders who need to make a change in order for the program to be successful are receptive.

In other words, prioritization of watersheds for implementation should be based on the likelihood of a successful effort which either results in waterbodies which are no longer impaired or where progress is made toward delisting with a significant amount of pollutant load reduction. For instance, if we know how to solve the problem, but landowners aren't willing to participate, implementation should be delayed until participation is better assured. If the key to success is in-lake work (such as nutrient inactivation), but no work has been completed in the watershed to stop new nutrient loading, in-lake work should be post-poned until watershed work results in significant decreases in new loading.

The following section details the tools, actions, and strategies employed by Oklahoma's Implementation Programs.

5.1 Conservation Practices for the Control of NPS Pollution

Section 319(b) of the Clean Water Act requires each State to identify the conservation practices (CPs) that are used to control pollution for each NPS category. EPA defines CPs or Best Management Practices (BMPs) as:

"Schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. Best Management Practices also include treatment requirements, operating procedures, and practices to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage."

Simply put, CPs are the most effective and practical resource treatments to control or reduce NPS pollution for a given situation. There are three basic types of CPs: 1) practices that reduce the pollutants available for transport by the normal rainfall/runoff process (changes in management), 2) devices that

reduce the amount of pollutants in the runoff before it is discharged to a surface waterbody (structural practices), and 3) vegetative practices. In implementing CPs, economics and acceptability of practices must be considered in determining which practices are applicable.

In many cases, CPs may be all that are necessary to achieve the water quality goals. Management practices are usually the most economical practices to apply. If management practices are not adequate to achieve water quality goals, vegetative and structural practices may be needed. Generally, structural practices are the most expensive.

Conservation practices may be required by law in some circumstances. For instance, EPA requires an NPDES stormwater permit for all construction sites one acre and larger. This includes new and renovating industrial, commercial, rural agricultural business, residential, and oil and gas exploration and production sites in the State. Erosion controls and other CPs can be required in the permit. In another instance, the State of Oklahoma requires that, before poultry litter can be spread, soil testing must be performed and the litter applied based on soil phosphorus values.

Other State regulations that require CPs include:

- OWRB rule 785:45-5-10 (5) General Criteria (A) for Public and Private Water Supply (PPWS) sources, which states that "*The quality of the surface waters of the state which are designated as public and private water supplies shall be protected, maintained, and improved where feasible, so that the waters can be used as sources of public and private water supplies"*

- OWRB rule 785:45-5-25 (c)(6) Non-Point Source Discharges *Best management practices for control of non-point source discharges should be implemented in watersheds of waterbodies designated "ORW", "HQW", or "SWS" in Appendix A of this Chapter.* (SWS are sensitive water supplies; HQW are high quality waters; ORW are outstanding resource waters).

- OWRB rule 785:45-5-19(a) Aesthetics - *To be aesthetically enjoyable, the surface water of the state must be free from floating materials and suspended substances that produce objectionable color and turbidity*. This can include sediment, excess nutrients, and other pollutants.

- Corp. Comm. rule 165:10-7-4 *The Commission hereby adopts the State water quality standards established and promulgated by the OWRB,* which includes the above rules.

- Corp. Comm. rule 165:10-7-6 Protection of Municipal Water Supplies *The Commission, upon application of any municipality or other governmental subdivision, may enter into an order establishing special field rules within a defined area to protect and preserve fresh water and fresh water supplies*.

These regulations are very important parts of an overall program to protect Oklahoma's water resources, but they cannot function alone. Many voluntary efforts are necessary to further the results of these regulations. In addition, due to resource availability, it is often difficult to enforce these regulations. In other words, the regulations exist and are very useful in forwarding voluntary efforts, but few avenues exist through which they can actually be enforced. In many cases, this lack of direct enforceability is desirable because it fosters a better relationship between landowner and agency. Agencies can offer

assistance without threatening fines. This makes a landowner more likely to cooperate in areas where specific regulations do not necessarily exist.

It is difficult to separate out exactly how successful these regulations have been in furthering water resource protection against NPS pollution from other efforts. However, these regulations often provide agencies with the impetus and ability to develop programs that would have been difficult to get off the ground without them. For instance, OCC specifically considers high quality waters differently from other waters, and this consideration allows proactive programs to be developed rather than retroactive programs.

References to manuals and guides that describe CPs have been arranged in the following section. In most cases, different practices can be selected to solve a particular NPS problem. This flexibility improves the ability of these practices to accomplish the goal of improved water quality because it allows the planner to select practices most compatible with the operation under consideration.

This list represents a sample of current CPs described in state and federal publications ***but is not intended to be exclusive or comprehensive***. Newly developed CPs not specifically referenced in this document or CPs modified from other applications may be appropriate to include as an option in some implementation efforts. Selection of appropriate CPs for each project is made on a case-by-case basis based on causes, sources, land use, and proven efficiency of the CPs in question to address the specific water quality problem in similar situations. Conservation Practices that have not been previously demonstrated as effective cannot be funded with EPA §319 funds.

5.1.1 Conservation Practices (CPs) For Each Nonpoint Source Category

General Practices:

The following practices, generally applied as in referenced sources, are appropriate in nearly all types of landuses or sources, and to address multiple types of causes.

Figure 16. Riparian Area Livestock Exclusion.

- Riparian Area Protection through fencing and/or replanting of vegetation (USDA Natural Resources Conservation Service, 2019)
- Streambank protection or river restoration using natural channel design (Rosgen, 1996)
- Newbury Weirs or rock riffles (Newbury, 2008)
- Wetland restoration, construction, and/or protection for water quality treatment or improvement (United States Environmental Protection Agency, 2003), (United States Environmental Protection Agency, 2014)
- Education

Agriculture

Conservation practices used to reduce NPS pollution from agricultural lands generally follow standards and specifications described by NRCS in the Field Office Technical Guide (FOTG)

http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/fotg/ (USDA Natural Resources Conservation Service, 2019). These include:

Figure 17. Alternative water supply.

- Contour farming
- Cover crops
- Conservation tillage including no-till
- Terraces
- Diversions
- Grade stabilization structures
- Grassed waterways
- Vegetative filter or buffer strips
- Nutrient management
- Precision farming
- Soil testing
- Conversion of cropland to grass
- Animal waste storage and composting facilities
- Transport of waste materials outside of nutrient sensitive areas
- Grazing management and rotational grazing
- Livestock exclusion from critical, wetland, or riparian areas
- Stream crossings
- Alternative water supplies
- Heavy use area protection
- Livestock travel lanes and stream channel crossings
- Critical area plantings
- Pasture, hayland, and rangeland planting and seeding
- Windbreaks
- Odor treatment devices
- Other practices described in FOTG.

Silviculture

Conservation practices used in forestry are listed in ODAFF's Forestry Best Management Practice Guidelines for Water Quality Management in Oklahoma (Oklahoma Department of Agriculture, Food, and Forestry - Forestry Services, 2016). This document was last formally published in 2016. Additional guidelines are published on the ODAFF website at: http://www.forestry.ok.gov/waterpublications. Forestry BMPs are non-regulatory in nature but are implemented through landowner and logging contractor training and periodic compliance monitoring. Some of the principal CPs include:

- Streamside buffer and management zones
- Prescribed harvesting to limit water quality impacts
- Proper location, maintenance, and erosion control of log landings
- Logging road and skid trail location, design, and maintenance
- Location and management of stream crossings
- Revegetation of disturbed areas

- Limited harvest to protect steep slopes and other sensitive areas
- Use and maintenance of erosion control structures
- Others as recognized by ODAFF Forestry Services

Urban

Conservation practices that follow the principles of low impact development (LID) have some of the greatest benefits in urban settings. Many design and guidance manuals for these types of practices can be found on the EPA website at: https://www.epa.gov/green-infrastructure#guide (United States Environmental Protection Agency, 2019). EPA has also published the National Menu of Stormwater Best Management Practices (United States Environmental Protection Agency, 2019). Examples of LID and other conservation practices appropriate in urban and construction settings include:

Figure 18. Silt fencing at construction site.

- Bioretention cells and rain gardens
- Wetland stormwater detention structures
- Silt fences
- Grass swales
- Limited land clearing
- Daylighting of subsurface urban streams and naturalizing previously concreted urban streams.
- Curb insets
- Porous pavement
- Green roofs
- Yard and golf course fertilization based on soil testing
- Pet waste management
- Development of green space
- Limiting impervious areas
- Tree planting

Figure 19. Rain garden.

Road Construction and Maintenance

Numerous documents and manuals are published on the EPA website dealing with reducing NPS pollution from road construction and maintenance (United States Environmental Protection Agency, 2019). Some examples of these types of CPs include:

- Proper design of roads and ditches to minimize water quality impacts
- Use of water bars, revegetation, geotextile fabrics, and other devices to limit erosion on road surface and in drainage areas
- Proper sizing and maintenance of culverts
- Proper grading and general maintenance of unpaved roads

Recreation Management

The National Park Service published a 2007 report on CPs used at urban parks (National Park Service, 2007). USDA has published a guide on CPs for water quality on national forest system lands (United States Department of Agriculture Forest Service, 2012).

- Provide and maintain sanitation and restroom facilities
- Erosion control at facility and recreation sites
- Protect heavy use areas
- Provide information and education about water quality protection and conservation measures
- Close or limit access as conditions dictate
- Manage off-road vehicle use

Resource Extraction

The Oklahoma Corporation Commission and Oklahoma Cooperative Extension Service (OCES) published a CP manual in 2002 (Oklahoma Cooperative Extension Service , 2002). Alaska published a manual on CPs for gravel and rock extraction projects in 2012 (Alaska Department of Environmental Conservation, 2012). Louisiana has a similar manual, Recommended Best Management Practices for Gravel Mining (Louisiana Department of Environmental Quality, 2007). Penn State published a webpage listing information and links on oil and gas related CPs at: http://marcellusfieldguide.org/index.php/guide/best_management_practices_in_use/ (Penn State University, 2014). Some of these include the following types of CPs:

- Reclaim abandoned mine sites
- Maintain buffer zones along water courses
- Control runoff from or into mines
- Treat poor quality mine drainage
- Stabilize or relocate tailings
- Close pits
- Plug abandoned wells
- Implement spill prevention around storage tanks and other facilities
- Limit extraction or increase safeguards for extraction in water supply watersheds
- Proper design and maintenance of access roads

5.1.2 Conservation Practice Selection Criteria

There is no generic method by which these different control techniques can be ranked either qualitatively or quantitatively. Frequently, a single CP is not adequate to address a NPS problem and rather, a system of CPs is preferred. Site specific conditions determine which practices are best, and even whether a particular approach is appropriate. Key factors that influence the suitability of a particular CP include the following:

- Effectiveness at controlling pollutant of concern
- Technical feasibility

- Local acceptance
- Cost effectiveness
- Operation and maintenance considerations (ease, cost and reliability)
- Life of CP

In addition to the above considerations, CPs should be evaluated by experts for their suitability. Wherever possible, research should have been conducted to determine both the effectiveness for pollution control and the economics of implementation. In addition, the EPA Guidance Manual for Developing Best Management Practices should be utilized (United States Environmental Protection Agency, 1993) when selecting practices to address any given type of cause or source.

5.2 Conservation Practice (CP) Implementation Projects

Conservation Practice Implementation Projects serve dual purposes. The primary objective is to *implement* practices and programs that will reduce the impacts of NPS pollution and restore and protect the physical, chemical, and biological integrity of waters of the State. The second objective is educational— to *demonstrate* to landowners and land users practices that will protect and improve water quality and reduce the impacts of NPS pollution. It is critical to demonstrate that these specific efforts or practices are not only effective, but also that they can be successfully implemented without causing irreparable harm to industry, private property rights, or the state's overall economy. The projects, by definition, are implementation projects that install practices on a small scale (subwatershed) that can be applied on a large scale (whole watershed/large basin) to reduce impacts of NPS pollution. The project designs are based on information collected during diagnostic monitoring that describes the nature and suspected cause of the water quality problem, and to put practices in place that correct or reduce the impacts of NPS pollution.

The demonstrative nature of the projects and the general voluntary nature of CP implementation guarantee that they can only be successful if landowners and users are willing to implement and maintain the practices. This "buy-in" by local interests is sought through multiple avenues. The primary avenue to encourage landowners and users to implement and maintain practices is in how the projects are funded. Funding is provided to implement projects on a cost-share basis. Thus, the landowner and user must provide some initiative to fund the practice which increases the likelihood that they will maintain the practice.

The amount or percentage of cost-share incentive provided is another avenue through which local buy-in is sought. WAG members, conservation district board members, and other local sponsors work with OCC staff to prioritize the CPs that are needed to address the water quality issues in the watershed. Higher priority CPs receive higher percentage cost-share rates. For example, riparian areas, a high priority CP and also a hard sell to some landowners, have a higher cost-share rate than some form of pasture management like sprigging, a lower priority CP and more desirable to many landowners.

OCC CP implementation cost-share rates may or may not be similar to cost-share rates supported by other programs such as the NRCS Environmental Quality Incentives Program (EQIP). The local decision-makers (WAG, conservation district board, and other local sponsors) usually look at how well programs such as EQIP are accepted by the local citizens and which CPs are successfully implemented. The decision makers consider issues such as whether the CP failed to be implemented because the cost-share

percentage was too low or the program was perceived as too restrictive by the land user. The result of this comparison with other cost-share programs is that some percentages provided by OCC cost-share programs are higher than EQIP and some are lower. The local decision makers may also determine that more local ownership of the problems is necessary and thus cost-share percentages should be lower.

In order for a program to be acceptable and thus implemented by landowners, the practices suggested and available for funding must appear reasonable and worthwhile to local people. In other words, the practice must obviously benefit the landowner, and not just some stranger downstream who wants to fish. Therefore, another avenue through which local interest and needs are ensured is through the role of the WAG in determining which CPs will be funded. The WAG is given a list of NRCS CPs applicable to correct the problems particular to the watershed and presented with information from technical experts on the problems and causes in the watershed. They are also provided with information on how each CP works and which problems it is effective in solving. The WAG then determines which practices they feel should be supported with cost-share funds and at what percentages and recommends these to the OCC. The OCC is given final authority to fund practices or deny practices and set rates; however, the WAG has been selected to make informed, meaningful decisions, and OCC generally respects these decisions.

In addition, OCC contacts the district conservationists within the watershed to survey the needs for CP implementation based on their knowledge of the watershed. This information is used to assess the funding needed to implement practices and improve water quality in the watershed. The WAG's decisions regarding CPs to be funded and cost-share rates are also presented to the conservation district and are subject to their approval.

Beyond the local cooperation cultivated through the efforts of the WAG in determining which CPs to implement and what percentage of cost-share to be funded, further efforts to ensure proper implementation of CPs include:

- Design, layout, and approval of structural CPs is performed by NRCS technicians or approved technical service providers
- Project coordinator or representative makes visual inspection of nonstructural CPs (vegetative, incentive payments, etc.) before certification completion
- All materials and incentive payments will require receipts and completion statements from participants
- The project coordinator must sign off on all payments before submission to district board for processing payments
- An annual review and status inspection is completed to confirm participants are maintaining the CP for the life of the program.

The Oklahoma NPS Program has been implementing CP programs throughout its history. Examples of these CP projects include channel restoration projects where the stream channel is reshaped to a more natural configuration and native materials and vegetation are used to stabilize the banks. Other CP demonstration projects include subwatershed projects where landowners are offered cost-share incentives to put in CPs to protect water quality. Water quality is measured before and after implementation to show improvement due to installation of practices.

5.3 USEPA Section 319 Nonpoint Source Programs

The primary mechanism used by the Oklahoma NPS Program to fund and support implementation of nonpoint source efforts is the EPA Clean Water Act Section 319 Program. Without support from this EPA program, there would not be a NPS management program in Oklahoma, and of particular importance, an effective demonstration that voluntary programs to address water quality impairments can be successfully implemented. EPA §319 funding supports staffing, monitoring, planning, and until recently, had provided the sole source of funding for these efforts. State funding has combined with EPA funding to support implementation efforts, but certainly in the past, was most likely only provided on a continuing basis because it was necessary to provide required match for the EPA funds. Although §319 funding has significantly decreased in recent years, which limits what can be accomplished through the program, at least half of state-awarded funds are used towards implementation of EPA accepted watershed based plans to restore and protect waterbodies.

Due to the staffing, monitoring, education, and implementation efforts funded by EPA §319, Oklahoma's NPS program was able to demonstrate that voluntary programs could successfully remedy water quality problems. This demonstration led to greater understanding of the value for the program, including staffing and monitoring, which resulted in increased state funding for the program, even in times of state budget short-falls.

This NPSMP describes the processes which Oklahoma will utilize in order to devote EPA-awarded §319 funds toward nonpoint source water quality concerns in the state, including assessment, planning, education and implementation.

5.4 USDA Farm Bill Conservation Programs

Another one of the most significant efforts to address NPS water quality impairments is done through USDA Farm Bill Programs under the NRCS and Farm Services Agency (FSA). Oklahoma NRCS conservation programs annually are funded at a rate of seven to ten times that of the entire OK §319 program, which allows for a tremendous amount of conservation to go on the ground. Multiple layers of programs are available to help farmers and ranchers address resource needs, including programs that provide the technical and financial assistance to adopt farming practices that better protect resources such as the Environmental Quality Incentives Program, as well as programs that help producers continue to improve, such as the Conservation Stewardship Program. FSA oversees the Conservation Reserve Program and Conservation Reserve Enhancement Program through which millions of environmentally sensitive acres nationwide are retired from farming through long-term agreements which help protect soil, water, and wildlife resources.

The NRCS, FSA, and conservation districts, who help USDA deliver these programs, work cooperatively with the OCC and the NPS program in many different ways, ranging from prioritization, to sharing people and office resources, to coordinating programs and measuring success. The OK NPS program will continue to work cooperatively with USDA to achieve the best possible results with available USDA program resources.

5.5 State Revolving Fund (SRF) Funding for NPS Projects

Funding for various point source related pollution reduction projects such as wastewater treatment facility upgrades is more readily available than funding for NPS pollution reduction problems. Civic bonds and programs such as the State Revolving Fund (SRF) have provided organized groups with the means to reduce point source pollution. Nonpoint source pollution reduction program funding has been significantly more difficult to obtain because the activities that result in NPS pollution are generally dispersed over a wide area, involve a number of different land owners and may be difficult to distinguish. Funding for NPS pollution reduction activities has generally been limited to federal programs such as NRCS's EQIP and EPA's §319 funding. These sources are strictly limited by federal guidelines as per the strategy for prioritizing usage of these funds and the type of activities that can be funded.

Recognizing the success of the State Revolving Fund loan program for point source related pollution reduction activities and the scarcity of NPS funding, the State opted to develop a policy whereby a portion of the SRF could be available as low interest loans to be used for NPS pollution reduction activities. The language and requirements of the SRF program limit its applicability to organized groups with the capability to pay back the loan; therefore, private individuals are not able to utilize the program. However, this program can be especially useful for municipalities with stormwater runoff concerns and can also be useful to rural water districts with specific NPS concerns. The City of Tulsa has opted to utilize SRF funding for NPS-related projects by purchasing permanent easements to protect their water supply reservoir.

The State Revolving Fund Loan Program is managed by the OWRB. Current Oklahoma SRF funds are in high demand and are well-utilized by point source related interests. In addition, the existing state legislation hinders the usage of these funds for NPS-related efforts until all point source issues are resolved. However, the American Reinvestment and Recovery Act (ARRA) provided funds to SRF which could be used in the form of principal forgiveness loans, similar to grants. A number of green-infrastructure, NPS projects such as rain gardens, channel restoration, and green roofs were funded with these dollars in 2009. OWRB is open to some sort of program to continue this work, particularly in the watersheds of small municipal water supplies.

5.6 Strategies and Actions Necessary to Complete NPS Program Implementation Efforts

The State has identified a number of actions necessary to address the long- and short-term goals in the stepwise manner of assessment, planning, education, and implementation. The implementation-related strategies are detailed below:

- **Implement or demonstrate methods to remedy water quality problems associated with NPS pollution**. The State will implement programs to address identified NPS pollution problems and sources as identified in Watershed Based Plans, TMDLs, and implementation plans. Most watershed programs will require multiple years' resources. The State will initiate between two and ten NPS-focused water quality protection and restoration programs each year, depending on resources and current needs in the priority watersheds. These efforts will work towards reduction of NPS pollution and protection of beneficial uses in NPS impacted watersheds, and should allow

Oklahoma to produce at least one NPS success story annually for EPA's NPS Success Story website. This is generally the responsibility of the OCC and NRCS. However, assistance and partnerships with other agencies and groups is critical to program success.

- **The State will research and identify alternate funding sources to work towards the goals of the NPS Program.** For instance, the State will provide cost-share assistance funding for priority watersheds using State and federal funds. Many practices in a non-regulatory voluntary program necessary to control NPS pollution need substantial financial incentives to assure widespread implementation. The NPS program goal is to provide State funds for incentives within each priority watershed project. Inclusion of State-funded cost-share assistance ensures focus on priority watersheds at multiple levels, including landowner, local government, State agency, and State legislature. These State funds can be used to supplement and match federal funds from sources such as EQIP. These cost-share funds are generally given to the OCC to be administered through conservation districts, or through the OWRB to be administered through the State Revolving Loan Program. Other potential funding sources are detailed in Appendix A.

- **The NPS program will practices that stabilize streambanks as funding is available**. The program will also promote use of streambank stabilizing and stream channel naturalizing methods statewide to prevent further stream habitat degradation. The NPS program goal is to have these methods demonstrated statewide. State and federal agencies are frequently approached by private individuals who have streambank or ditch erosion concerns and are looking for a cost-effective means of reducing the problem. Multiple new projects spread across the State are a powerful educational tool to demonstrate the importance of riparian areas and further implementation projects in priority watersheds with streambank erosion concerns. The OCC will work with partners to implement these projects utilizing a variety of funding sources including private, §319, Oklahoma Department of Transportation (ODOT), and USDA funding.

- **Support nutrient management activities across the state**. The State has long supported and will continue to support programs and processes to incentivize the wise use of animal waste as a fertilizer or soil additive that include soil testing, animal waste product nutrient testing, and even transport out of nutrient sensitive watersheds. In addition, the State is facilitating optimal use of commercial fertilizers through nutrient management planning, precision agriculture, and soil grid sampling to support those activities.

- **Implement source reduction and wellhead protection programs to reduce groundwater pollution**. The §319 Program will coordinate with and supplement the ODEQ's and the Oklahoma Rural Water Association's source water protection programs to protect groundwater. This coordination will occur on an annual basis with selection of watersheds for §319-driven watershed workplans.

- **Implement source control programs**. Source control protection activities may be implemented as needed within individual watersheds or as excess funding becomes available. These programs focus on halting or preventing pollution at its point of origin rather than on reducing the impacts of pollution after it is already on the ground. Examples of source control programs include urban NPS education programs, programs to provide septic tank upgrades, cleanup of brine-contaminated soils, and litter export programs. Source control programs fall under the jurisdiction

of various agencies, depending upon the source. Agencies who may participate in these types of programs include OCC, ODEQ, OWRB, ODAFF, NRCS, OSEE, Corp. Comm., and any other pertinent agency.

- **The NPS program will evaluate and disseminate new NPS control practices**. OCC and NRCS will work integrally to develop and prioritize Conservation Practices to better address water quality as a resource concern. These efforts will specifically be undertaken on a watershed by watershed basis. This goal will mainly be a target of the OCC and NRCS programs, although other agency programs also incorporate this goal.

5.7 NPS Program Implementation Milestones

Specific milestones to assess program progress toward implementation objectives and program overall goals are:

- Oklahoma will contribute to the National §319 program by achieving at least 1.5% of the national goal for nitrogen, phosphorus, and sediment load reductions (based on the State receiving approximately 1.5% of the national program funding)
- Oklahoma will annually submit at least three NPS success stories to EPA.
- Implementation will occur in at least 20 impaired waterbody segments as listed on the impaired waterbodies list (2020, 2022, 2024, 2026, 2028, 2030)
- Install conservation practices in partnership with at least 100 cooperators, annually
- Annual implementation of conservation practices will include at least:
    - 20 critical area plantings
    - 35 grassed waterways
    - 100 alternative water supplies
    - 150 pasture or range management (seeding, planting, rotational grazing, etc.)
    - 20 terraces
    - 50 ponds
    - 100 tons of poultry litter transferred out of sensitive watersheds
    - 200 abandoned oil and gas extraction/exploration sites remediated

6. State and Federal Consistency

6.1 Federal Consistency Review

The Federal Consistency Provision in Section 319 of the Clean Water Act provides an opportunity to improve NPS management by promoting communication and cooperation between State and federal agencies. As a required task of the lead NPS pollution agency, the OCC is authorized to review federal activities for consistency with Oklahoma's NPS management program. The NPSMP forms the template to which all assistance and projects are compared. By referring to the specific goals, objectives, and authorities contained in Oklahoma's management program, federal programs can be evaluated to determine if they meet the direction of the State.

6.2 Program Review

The OCC will review and evaluate all federal financial assistance programs and development projects for their effect on water quality and consistency with the NPSMP. The review process involves two levels. The first level evaluates the federal program. The intent of this level of review is to determine if the federal program satisfies the components of the NPSMP. The frequency of the review varies depending on the dynamic nature of the program under review.

The program review process is completed using the following criteria:

- Meets the requirements of Section 319 of the Clean Water Act;
- Meets the OWQS;
- Is consistent with implementation schedule and projects identified in the §319 NPSMP;
- Identifies CPs or CP process;
- Identifies a process for onsite application of CPs; and
- Identifies a process for modification of CPs.

The second level of review addresses individual development projects. In order to evaluate a federal project, the appropriate State agency, depending on project content, should undertake the review process. As outlined in the Federal Consistency Guidance Document, the OCC will act as the single point of contact; however, other State agencies will review the project for content and consistency. Each reviewing agency will inform the OCC of the ultimate findings. To aid in the review process, a series of eight questions has been developed to act as a checklist for planned projects:

- Which NPS pollution activities are associated with the projects that are included in Oklahoma's NPSMP?
- Are there State approved CPs included for each NPS activity included?
- For NPS activities which do not have the approved conservation practices, are there practices identified that demonstrate a knowledgeable and reasonable effort to minimize resulting water quality impacts?
- What process, including feedback from water quality monitoring, exists for modifying the approved or specialized conservation practices in order to protect beneficial uses of water?
- What is the appropriate beneficial use of water for the waterbodies in the project area?

- Is the project consistent with the prioritization of watersheds as identified in the NPSMP?
- Have the water quality standards and criteria applicable to protecting the beneficial uses been identified?
- Does pre-project planning and design include an analysis of water quality resulting from implementation of the proposed activity sufficient to predict exceedance of water quality criteria for the beneficial use(s), or in the absence of such criteria, sufficient to predict the potential for beneficial use impairment?

In addition, State NPS programs must be consistent with federal and State guidelines. For instance, NPS implementation projects must carefully consider endangered species and or critical habitat in planning CPs. Federal programs have accompanying guidance, and federal funds must be used in accordance with those guidelines.

The State also has guidelines that define the direction and limitations of certain programs, either as outlined in statute, interagency memorandums of understanding, or as otherwise defined. Certain rights and jurisdictions must be considered prior to implementation projects, such as property rights of downstream or upstream individuals. In addition, prior to implementation activities in areas with known or likely historical significance, clearance must be obtained from the State Historical Department to ensure important historical areas are protected.

7. Other State Approved Plans and Programs with NPS Authorities

7.1 Continuing Planning Process (CPP)

The Continuing Planning Process (CPP) is required by the CWA Section 303 (e)(3)(A)-(H) and 40 CFR Section 130.5. The CPP is required to be updated on an annual basis and describes the water quality programs implemented within the State (Oklahoma Department of Environmental Quality, 2012). The document also describes present and planned water quality management programs and the strategy to be used by the State in conducting these programs. The CPP is the master water quality planning document for the State; it defines the process by which the Water Quality Management Plan (WQMP), or 208 Plan, is developed and implemented. The Statewide WQMP is the guiding document that describes the process used in identifying pollution sources and the implementation of programs for the abatement or prevention of water pollution in the State.

The CPP document is drafted by the ODEQ and is, in essence, a step up from this document. This document describes the NPS water quality management programs in the State while the CPP describes the process by which all State water quality programs interrelate. This document also provides the framework for incorporating the NPS Program into the State's overall Water Quality Program.

7.2 Oklahoma Water Quality Standards

The Oklahoma Water Resources Board (OWRB) is responsible for development of water quality standards to protect beneficial uses and aid in the prevention, control, and abatement of water pollution. Standards serve to establish water quality targets for specific waters and assist in the development of water quality based discharge permits which specify treatment levels required of municipal and industrial wastewaters. Oklahoma's Water Quality Standards are maintained by the OWRB and updated at least every three years. Water Quality Standards should assist in the development of plans to abate and prevent NPS pollution, not just provide the basis for developing point source permits.

Beneficial uses, specifically their identification, assessment, and protection, are vital to water quality standards implementation. Currently recognized beneficial uses include public and private water supply, fish and wildlife propagation, agriculture, primary body contact recreation (such as swimming), secondary body contact recreation (such as boating or fishing), navigation, fish consumption, and aesthetics. All uses receive equal protection, for each has its unique environmental and economic importance to Oklahoma. Equal protection for all beneficial uses is mandated by the federal Clean Water Act, and all State agencies strive to implement programs towards that end. Physical, chemical and biological data on Oklahoma's rivers, streams, and lakes are used to ascertain the condition of individual waters, determine appropriate present and future beneficial uses, and set realistic standards to protect them.

Through assignment of as many beneficial uses as are attainable, OWQS ensure that existing water quality is not unduly impacted. Science-based narrative and numerical criteria imposed in the Standards ensure attainment of beneficial uses, as well as limit waste and pollution of State waters. In waterbodies of quality greater than that required to protect beneficial uses (such as Scenic Rivers, municipal water supply lakes,

and waters possessing critical habitat for endangered species), the Standards' anti-degradation policy statement provides more stringent protection.

Although all of Oklahoma's surface waters receive broad protection through the Standards document, explicit protection is afforded to approximately 27,000 stream and river miles and 650,000 lake acres. Beneficial uses have also been assigned to all groundwaters of the state with a mean concentration of total dissolved solids of 10,000 mg/L or less.

The OWRB coordinates development of Water Quality Standards Implementation Protocols to ensure that standards are translated into permits and implementation plans in a consistent, clear and scientifically sound manner. As in development of the Standards document itself, an extensive public participation process is utilized to ensure that the State's water quality based permitting process strikes an appropriate balance between environmental protection and sound public policy.

7.3 Source Water Protection Plan

Source Water Protection is the responsibility of the ODEQ and the Oklahoma Rural Water Association. The following text was taken from ODEQ's website describing the Source Water Protection Program.

Amendments to the Safe Drinking Water Act required the development of a Source Water Assessment Program (SWAP) to analyze existing and potential threats to public drinking water quality in the state. Each SWAP assessment includes: delineation of the source water protection area, inventory of the contaminant sources within an area, determination of the susceptibility of the public water supply system to contamination, and release of the results to the public.

7.3.1 Delineation Procedures

Delineation of Surface Watershed Protection Areas

All surface water sources are delineated. The watershed is mapped using geographical information systems (GIS), and maps are provided to the system owner outlining the zones that should be protected. The watershed delineation map will show source, intake location, potential sources of contamination in the drainage, land use, and watershed boundary. The three protection zones are:

Zone A: 600 feet from the spillway elevation water level of source. The existing State Reservoir Sanitation Law specifies a protection zone of 600 feet around a non-municipal reservoir. An acceptable option for municipalities would be a larger, 660-foot zone that is authorized by condemnation statutes. This is a very critical zone and every effort should be made to achieve maximum protection within this zone. For river intakes this zone would be 600 feet from both sides of the streambank upstream to a restricting structure such as a dam.

Zone B: ½ mile from the spillway elevation water level of source. This is an intermediate protection zone, and priority should be given to implementation of controls that limit potential to the water supply source. For river intakes this zone would be ½ mile from both sides of the stream bank upstream to a restricting structure such as a dam.

Zone C: Remainder of the watershed to the headwaters.

Delineation of Wellhead Protection Area

The State of Oklahoma has an EPA-approved Wellhead Program. Using all available information sources, ODEQ delineates wellhead protection area and provides GIS maps outlining the zones that should be protected. The three protection zones are:

Zone A: 300-foot radius from the wellhead defined by regulation

Zone B: 1-year time of travel zone

Zone C: 10-year time of travel zone

7.3.2 Contamination Source Inventory Procedure

Once the protection areas have been delineated, additional GIS location information available such as permitted discharges, wastewater impoundments, landfills, and other potential sources of pollution are incorporated into draft maps to inventory potential pollution sites in the delineated area. Additional location data from other State agencies such as Corp. Comm., ODAFF, and OCC are included in the mapping process as this information becomes available. Information from federal agencies such as USGS or USDA may also be incorporated.

7.3.3 State Assessment Process

Following the completion of the source inventory, assessments of the delineated area are completed to determine susceptibility to contamination. This determination may be completed in conjunction with vulnerability analysis for monitoring relief.

Public participation in development of the plan is ensured through methods such as 1) informational workshops on the draft plan conducted for Oklahoma Rural Water Association, Oklahoma Municipal League, Water Pollution Control Federation, NCRS, County Extension Agents, Oklahoma Society of Environmental Health Professionals, and any other related groups; 2) draft plan distribution to all participants of the Wellhead Advisory Council; 3) public meeting before the Water Quality Council; or 4) a public meeting before the ODEQ Board.

Public participation in implementation is addressed by providing materials to the water system regarding the assembling of an implementation team, providing technical assistance and guidance to local implementation teams from Customer Service Division of ODEQ, and providing technical assistance to local teams with assistance from Oklahoma Rural Water Association.

7.4 State Pesticide Management

The following language was taken from the ODAFF webpage (https://www.ag.ok.gov/cps/pesticide.htm):

ODAFF Pesticides Section regulates the production, sale, distribution, transportation, or offering for sale of pesticides in Oklahoma. This includes registration, offering in an unadulterated form, and sale or use consistent with its labeling. This is accomplished by requiring that all pesticides marketed in Oklahoma be registered, have marketplace inspections, producer establishment inspections, restricted use pesticide dealer audits, label inspections, and sampling (Oklahoma Department of Agriculture, Food, and Forestry, 2019).

Oklahoma uses the Kelly computerized system of pesticide product registrations. Information on which pesticides (and manufacturers) are registered in Oklahoma can be accessed online through http://kellysolutions.com/ok/ (Kelly Registered Pesticides, 2015).

7.5 Oklahoma Energy Resources Board

The oil and gas industry is tremendously important to the economy of Oklahoma. It has been active since before statehood and reaches many parts of the state. Although the modern industry is regulated and works to maintain a minimal environmental impact, historically, many actions have had a lasting impact. The Oklahoma Energy Resources Board (OERB) was formed in 1993 by leaders in Oklahoma's oil and gas industry and the Oklahoma legislature. The OERB's mission is: "To use the strength of Oklahoma's greatest industry to improve the lives of all Oklahomans through education and restoration."

One of the most important functions of OERB programs is to clean up Oklahoma's orphaned and abandoned oil and gas well sites. This effort is funded through voluntary contributions paid by producers and royalty owners and has restored more than 16,000 orphaned and abandoned well sites to more natural conditions. These restorations involve removing contaminated soil, restoring natural land contours, removing concrete and metal structures, and revegetating sites to reduce erosion. To date, this program has invested more than $113 million in site restoration with all activities funded by the oil and gas industry (Oklahoma Energy Resources Board, 2019).

7.6 Wetland Management Plan

The following text in section 7.6 reflects Oklahoma's Comprehensive Wetlands Conservation Plan (OCWCP), a document developed primarily by the OCC, in cooperation with other State and federal agencies (Oklahoma Conservation Commission, 1996).

Oklahoma's Comprehensive Wetlands Conservation Plan provides the State with a focused strategy for identifying, understanding, managing, and enjoying one of Oklahoma's most versatile natural resources. The plan offers a comprehensive look at Oklahoma's wetlands and their future conservation needs. The plan identifies issues that are unresolved and the limitations on wetland data and science.

The need for a State wetlands strategy lies in the recognition that, in Oklahoma, wetland conservation and management are shared responsibilities among local, State, and federal agencies as well as conservation organizations, private corporations, landowners, and other interested groups. Individually, no agency or group has been given either the exclusive mandate or resources to adequately protect wetlands. Wetlands conservation and management are accomplished only through cooperative and continued efforts of these groups and individuals.

The plan emphasizes that through discussion, information exchange, cooperation, and sharing of resources a coordinated approach to wetland management can be accomplished. The plan recognizes that, without cooperation from private landowners, there is little hope of long-term success for wetland protection. The plan promotes a voluntary approach to wetland management that uses education, technical assistance, and incentives to bring the private sector into wetland management as a willing partner. The plan outlines 12 programmatic objectives and associated action items and identifies Oklahoma's goals for a comprehensive wetland strategy:

To Conserve, Enhance, and Restore the Quantity and Biological Diversity of all Wetlands in the State

In 2011, the Oklahoma Wetlands Working Group (OWWG) reviewed the OCWCP and projects that had been completed since its development in order to determine Oklahoma's progress in addressing the 12 programmatic objectives. The OWWG distilled this information into actions and activities that fall under the core elements for a wetland program defined by EPA (monitoring and assessment, regulation, voluntary restoration and protection, and water quality standards). These actions and activities were summarized into the Wetlands Program Plan (WPP) (Oklahoma Conservation Commission, 2013), a document used to guide and focus wetland-related activities within the State to ensure that programmatic goals were met and remained as the guiding document through 2018. The OWWG also developed a webpage to provide information about Oklahoma's Wetlands Programs https://www.ok.gov/wetlands/ (Oklahoma Conservation Commission, 2019). In 2019 the OWWG began a comprehensive review of the WPP to assess accomplishments of actions and activities listed in the 2013 plan and determine the needs of wetland management through 2025. A draft WPP has been completed and following necessary edits, should be approved and accepted by early 2020. Although the actions and activities have been updated, the original objectives have been retained.

7.6.1 Assessment of Wetland Issues

Definition of Wetlands

The plan recognizes that there are many definitions for wetlands used in the United States, but most are fundamentally alike and generally address the elements of hydrology, hydrophytic vegetation, and hydric soils. For a general definition of wetlands, the plan recommends that the State support the current EPA and the USACE wetland delineation procedures and definition:

> "Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." (33 CFR 328.3(b)) and (40 CFR 230.3(t)).

Functional Uses of Wetlands

Oklahoma's wetlands are a valuable natural resource that, if maintained and properly managed, can provide important benefits to the public and the environment. Wetland functions are directly beneficial to people and the integrity of the environment where they are found. The functions associated with

Oklahoma's wetlands include: water quality enhancement, reduction of flood impacts, biological productivity, groundwater influences, recreation, education, timber production, and agriculture production. The plan recommends a consistent statewide program to evaluate the quality and functions of wetlands and to monitor their condition.

Inventory of Wetlands

There are two predominant statewide wetland inventories in Oklahoma: the USFWS National Wetlands Inventory (NWI) and the NRCS's Wetland Inventory completed for the swampbuster provisions of the 1985 Farm Bill. The USFWS hosts the National Wetlands Inventory Mapper and the State is continually updating the accuracy of wetlands maps using modern technology and imagery and these mapping efforts are reflected in the interactive online NWI Mapper.

Standards for Beneficial Uses of Wetlands

Currently Oklahoma does not have wetland specific water quality standards; instead, default criteria for warm water streams apply. It is believed by some that these default criteria afford unachievable protections even in high quality wetlands, while some believe that these standards do not offer appropriate standards for the protections of wetlands. Between 2013 and 2015 the OWTWG developed draft Wetland water quality standards (WQS). As part of Oklahoma's permanent rulemaking process, the draft Wetland WQS were published in the Oklahoma Register in December 2014 and presented at an Oklahoma Water Resources Board (OWRB) public hearing in January 2015. However, in February 2015 consideration of the draft proposed Wetland WQS by the OWRB was indefinitely postponed. Thus, the default beneficial uses and associated criteria remain in place for Oklahoma's wetland waters. Further development and potential promulgation of wetland specific water quality standards remains an objective in 2020 WPP.

Measures to Ensure Protection of Property Rights of Landowners

Because the majority of Oklahoma wetlands are in private ownership, private landowners are the State's most important wetland managers. The success of wetland conservation and management in Oklahoma will ultimately be determined by private landowners. The plan's recommendation for ensuring that private landowners be willing partners with the State rests on education, technical assistance, and incentive programs. The success of the USFWS's Partners for Wildlife Program and USDA's Wetland Reserve program provides a solid foundation for the likelihood of this approach being successful.

Oklahoma currently has two pieces of legislation that attempt to address the issue of federal wetlands regulation in the State. This legislation, codified at 80 O.S. 1991, Section 1, Subsections C and D, deals with the issue of takings. No court cases testing this legislation have occurred since its passage.

7.6.2 Recommended Measures to Mitigate Wetland Losses

Successful mitigation of Oklahoma's wetlands losses will require a better characterization of wetland functions and a more thorough inventory of Oklahoma's wetland resources. The State must develop a more comprehensive monitoring system to track gains and losses of wetlands. In addition, the state

should assist the US Army Corps of Engineers as well as prospective mitigators as practicable. To this end, the OCC has developed the Restorable Wetlands Identification Protocol (RWIP), a GIS tool developed to locate suitable restoration sites for use in both voluntary restoration and for mitigation sites. In addition, through a cooperative effort, the Oklahoma Rapid Assessment for Wetlands has been developed and is being amended and validated through thorough data collection and analysis. The USACE and other key partners are included in the review and feedback to ensure usefuleness in mitigation guidance.

OCC is working toward a Memorandum of Understanding to assist the Oklahoma Department of Transportation with required mitigation due to disturbances of streams and wetlands.

8. Roles, Responsibilities and Oversight

The numerous state and federal agencies in Oklahoma are assigned specific areas of responsibility through federal and state statutes. These areas of responsibility with respect to pollution source codes are concisely, but not entirely, depicted for the main state agencies in Table 4 and with more detail in the following text. Each environmental agency in the State of Oklahoma has its responsibilities spelled out in statute. These responsibilities are detailed in the subsection titled Statutory Responsibilities. In addition, agencies and non-governmental organizations have been asked to contribute discussion of their relative roles in future NPS planning, education, and implementation programs. Entities have indicated available programs and resources. It is important to include sections in this discussion as one describes statutes and the other describes how those statues have been interpreted by the different agencies and incorporated into their programs.

Table 4. Agencies with Authorities Related to Specific Sources of Pollution.

Source	Agency(ies) with Authorities *	Agency(ies) with Regulatory Authorities	Source	Agency(ies) with Authorities*	Agency(ies) with Regulatory Authorities
Nonpoint Source	OCC, NRCS	ODAFF, ODEQ	Dredge Mining		ODM
Agriculture	OCC, NRCS	ODAFF	Petroleum Activities		Corp. Comm.
Non-irrigated Crops	OCC, NRCS	ODAFF	Mill Tailings	OCC	ODM,
Irrigated Crop	OCC, NRCS	ODAFF	Mine Tailings	OCC	ODM,
Specialty Crops (e.g. truck farming & orchards)	OCC, NRCS	ODAFF	Land Disposal (Runoff or Leachate from permitted areas)		ODEQ
Pasture Land	OCC, NRCS	ODAFF	Sludge		ODEQ
Range Land	OCC, NRCS	ODAFF	Wastewater		ODEQ
Feedlots-All Types	OCC, NRCS	ODAFF	Landfills		ODEQ
Aquaculture	ODAFF, ODWC	ODEQ	Industrial Lands		ODEQ
Animal Holding / Management	OCC, NRCS	ODAFF	On-Site Wastewater Systems	OCC	ODEQ
Silviculture	OCC, NRCS	ODAFF	Hazardous Waste		ODEQ
Harvesting, Restoration, Residue Management	OCC, NRCS	ODAFF	Hydromodification	OCC	USACE, ODEQ,
Forest Management	OCC, NRCS	ODAFF	Channelization	OCC	USACE, ODEQ
Road Construction /Maintenance		ODAFF, ODOT	Dredging		USACE
Construction		ODOT	Dam Construction	OCC, NRCS	USACE, OWRB
Highway/Road/Bridge		ODOT	Flow Regulation / Modification	NRCS	USACE
Land Development	OCC	ODEQ,	Bridge Construction		ODOT
Urban Runoff	OCC	ODEQ	Removal of Riparian Vegetation	OCC	
Storm Sewers (Other than end of pipe)		ODEQ	Streambank Modification / Destabilization	OCC	USACE

Source	Agency(ies) with Authorities *	Agency(ies) with Regulatory Authorities	Source	Agency(ies) with Authorities*	Agency(ies) with Regulatory Authorities
Combined Sewers		ODEQ	Atmospheric Deposition (and Acid Rain)		ODEQ
Surface runoff	OCC	ODEQ, ODAFF	Waste Storage / Storage Tank Leaks		ODEQ
Resource Extraction / Exploration / Devel.		Corp. Comm., ODM	Highway Maint. & Runoff		ODOT
Surface Mining		ODM	Spills	ODWC, OCC,	ODEQ, Corp. Comm.
Subsurface Mining		ODM	In-place Contam.s		ODEQ
Placer Mining		ODM			

*non regulatory authorities

8.1 Statutory Responsibilities

Title 27A of the Oklahoma Statutes defines the statutory roles and responsibilities of State environmental agencies (State of Oklahoma, 2019). Below is a summary of statutory jurisdiction and responsibilities for agencies with NPS-related authorities.

8.1.1 Each State environmental agency shall:

- Implement and enforce the laws and rules within its jurisdictional areas of responsibility;
- Utilize and enforce the OWQS;
- Seek to strengthen relationships between State, regional, local and federal environmental planning, development, and management programs;
- Facilitate cooperation with other State environmental agencies regarding programs to resolve environmental concerns;
- Cooperate with all State agencies and local or federal governmental entities to protect, foster, and promote the general welfare, and the environment and natural resources of this State;
- Have the authority to disseminate information and educate within their respective areas of environmental jurisdiction;
- Participate in hearings conducted by the OWRB for the consideration, adoption, or amendment of the OWQS, and be able to present written comments to OWRB at the same time staff recommendations are submitted for Board review and consideration.
- Develop a Water Quality Standards Implementation Plan for its jurisdictional areas of environmental responsibility by July 1, 2001. These plans should be reviewed at least every three

years to determine whether revisions to the plan are necessary. These plans describe the processes, procedures, and methodologies the State agency will utilize to ensure that programs within its jurisdictional areas of responsibility will comply with anti-degradation standards and lead to restoration, maintenance, and support of beneficial uses.

- Develop, implement, and utilize a complaint investigation and response process that will give all authorized State agencies the ability to investigate, mitigate, resolve, and respond to complaints in a timely manner.

8.1.2 The Secretary of Energy and Environment (OSEE)

The Secretary of Energy and Environment or successor cabinet position has the following jurisdictional areas of environmental responsibility:

- Powers and duties for environmental areas designated to such position by the Governor;

- The recipient of federal funds disbursed pursuant to the Federal Water Pollution Control Act. OSEE will disburse the funds to each State agency with environmental responsibilities based upon its statutory duties and responsibilities relating to environmental areas;

- Coordinate pollution control and complaint management activities of the State to avoid duplication of effort including the development of a common data base for water quality information for use by all State agencies and the public;

- Act on behalf of the public as trustee for natural resources under the federal Oil Pollution Act of 1990, the federal Comprehensive Environmental Response, Compensation and Liability Act of 1980, the federal Water Pollution Control Act, and any other federal laws providing that a trustee for the natural resources is to be designated. The Secretary is authorized to make claims against federal funds, receive federal payments, establish and manage a revolving fund in relation to duties, and to coordinate, monitor, and gather information from and enter into agreements with the appropriate State agencies with environmental responsibilities;

- Development and implementation of public participation procedures for development or modification of the federally required list of impaired waters (303(d) report), the water quality assessment (305(b) report), the NPS State assessment (§319 report), and the continuing planning process document.

- Coordinate monitoring lakes in the State of Oklahoma and identify those lakes which it determines to be eutrophic as defined by Oklahoma's Water Quality Standards.

8.1.3 Department of Environmental Quality

The Department of Environmental Quality shall have the following jurisdictional areas of environmental responsibility:

- All point source discharges of pollutants and storm water to waters of the State which originate from municipal, industrial, commercial, mining, transportation and utilities, construction, trade,

real estate and finance, services, public administration, manufacturing and other sources, facilities and activities, except those which fall under the responsibilities of ODAFF or Corp. Comm.;

- All NPS discharges and pollution except those that fall under the responsibilities of the ODAFF, the Corp. Comm., or the OCC; including commercial manufacturers of fertilizers, grain and feed products, and chemicals, and over manufacturing of food and kindred products, tobacco, paper, lumber, wood, textile mill, and other agricultural products; slaughterhouses, but not including feedlots at these facilities; and aquaculture and fish hatcheries, including, but not limited to, discharges of pollutants and storm water to waters of the state, surface impoundments, and land application of wastes and sludge, and other pollution originating at these facilities, and stormwater permits for facilities which store grain, feed, seed, fertilizer, and agricultural chemicals that are required by federal NPDES regulations to obtain a permit for storm water discharges.

- Technical lead agency for point source, NPS and storm water pollution control programs funded under Section 106 of the federal Clean Water Act, for areas within the Department's jurisdiction;

- Surface water and groundwater quality and protection and water quality certifications;

- Waterworks and wastewater works operator certification;

- Public and private water supplies;

- Underground injection control pursuant to the federal Safe Drinking Water Act and 40 CFR Parts 144 through 148, except for:

    - Class II injection wells,
    - Class V injection wells utilized in the remediation of groundwater associated with underground or aboveground storage tanks regulated by Corp. Comm.,
    - those wells used for the recovery, injection, or disposal of mineral brines as defined in the Oklahoma Brine Development Act regulated by Corp. Comm., and
    - any aspect of any CO_2 sequestration facility, including any associated CO_2 injection well, over which Corp. Comm. is given jurisdiction pursuant to the Oklahoma Carbon Capture and Geologic Sequestration Act;

- Air quality under the Federal Clean Air Act and applicable State law, except for indoor air quality and asbestos as regulated for worker safety by the federal Occupational Safety and Health Act and by Chapter 11 of Title 40 of the Oklahoma Statutes; including Air emissions from all facilities and sources subject to operating permit requirements under Title V of the Federal Clean Air Act as amended;

- Hazardous waste and solid waste, including industrial, commercial and municipal waste;

- Superfund responsibilities of the State under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and amendments thereto, except the planning requirements of Title III of the Superfund Amendment and Reauthorization Act of 1986;

- Radioactive waste and all regulatory activities for the use of atomic energy and sources of radiation except for the use of sources of radiation by diagnostic x-ray facilities and electronic products used for bomb detection by public safety bomb squads within law enforcement agencies of this state or within law enforcement agencies of any political subdivision of this state;

- Water, waste, and wastewater treatment systems including, but not limited to, septic tanks or other public or private waste disposal systems;

- Emergency response as specified by law;

- Environmental laboratory services and laboratory certification;

- Hazardous substances other than branding, package, and labeling requirements;

- Freshwater wellhead protection;

- Groundwater protection for activities subject to the jurisdictional areas of ODEQ;

- Utilization and enforcement of OWQS and Implementation documents;

- Environmental regulation of any entity or activity, and the prevention, control, and abatement of any pollution, not subject to the specific statutory authority of another State environmental agency;

- Development and maintenance of a computerized information system of water quality pursuant to Section 1-1-202 of OS 27A for its jurisdictional area of environmental responsibility;

- Transportation, discharge, or release of deleterious substances or solid or hazardous waste or other pollutants from rolling stock and rail facilities. The ODEQ shall not have any jurisdiction with respect to pipeline transportation of carbon dioxide;

- Point and nonpoint source discharges of pollutants and storm water to waters of the state from:
    - refineries, petrochemical manufacturing plants, and natural gas liquid extraction plants;
    - manufacturing of equipment and products related to oil and gas;
    - bulk terminals, aboveground and underground storage tanks not subject to the jurisdiction of Corp. Comm. pursuant to this subsection; and
    - other facilities, activities, and sources not subject to the jurisdiction of Corp. Comm. or ODAFF as specified by this section.

8.1.4 Oklahoma Water Resources Board

The OWRB shall have the following jurisdictional areas of environmental responsibility:

- Water quantity including water rights, surface water, and underground water, planning, and interstate stream compacts;
- Weather modification;
- Dam safety;
- Flood plain management;
- State water/wastewater loans and grants revolving fund and other related financial aid programs;
- Administration of the federal State Revolving Fund Program including, but not limited to, making application for and receiving capitalization grant awards, wastewater prioritization for funding, technical project reviews, environmental review process, and financial review and administration;
- Water well drillers/pump installers licensing;
- Technical lead agency for clean lakes eligible for funding under Section 314 or other applicable sections of the Federal Clean Water Act or other subsequent State and federal clean lakes programs; administration of a State program for assessing, monitoring, studying, and restoring Oklahoma lakes with administration to include receipt and expenditure of funds from federal, State, and private sources for clean lakes and implementation of a volunteer monitoring program to assess and monitor State water resources;
- Statewide water quality standards and their accompanying USAP, anti-degradation policy and implementation, and policies generally affecting OWQS application and implementation including mixing zones, low flows and variances or any modification or change thereof pursuant to Section 1085.30 of Title 82 of the Oklahoma Statutes;
- Groundwater protection for activities subject to the jurisdictional areas of environmental responsibility of the Board;
- Establishment and implementation of a statewide beneficial use monitoring program for waters of the State in coordination with the other State environmental agencies;
- Coordination with other State environmental agencies and other public entities of water resource investigations conducted by the USGS for water quality and quantity monitoring in the State;
- Development and submission of a report concerning the status of water quality monitoring in this State;

8.1.5 Oklahoma Department of Agriculture, Food, and Forestry (ODAFF)

The Oklahoma Department of Agriculture, Food, and Forestry shall have the following jurisdictional areas of environmental responsibility except as provided in other parts of this section:

- point source discharges and NPS runoff from agricultural crop production, agricultural services, livestock production, silviculture, feed yards, livestock markets and animal waste;
- Pesticide control;
- Forestry and nurseries;
- Fertilizer;
- Facilities that store grain, feed, seed, fertilizer and agricultural chemicals;
- Dairy waste and wastewater associated with milk production facilities;
- Groundwater protection for activities subject to the jurisdictional areas of environmental responsibility of the Department.
- Utilization and enforcement of Oklahoma Water Quality Standards and implementation documents;
- Stormwater discharges for activities subject to the jurisdictional areas of environmental responsibility of the Department;
- Licensing and inspections of aquaculture facilities for private commercial production of catfish, minnows, fingerlings, fish, frogs, or other aquatic species.
- Technical assistance to legally operating aquaculture facilities engaged in private commercial production of catfish, minnows, fingerlings, fish, frogs, and other aquatic species.

The State Board of Agriculture shall have the following powers, which shall be in addition to those given in other parts of this Code:

- Promulgate rules as the Board deems necessary, expedient, or appropriate to the performance, enforcement, or carrying out of any of the purposes, objectives, or provisions of this Code;
- Initiate and prosecute civil or criminal actions and proceedings when deemed necessary to enforce or carry out any of the provisions of this Code;
- Appoint authorized agents to make inspections or investigations and to perform other services for the Board or any division of ODAFF;

- Jurisdiction over all matters affecting animal industry and animal quarantine regulation;
- Stop-sale orders and quarantine regulations;
- Enter into cooperative agreements and coordinate with the federal government or any State, or any department or agency of either;
- Revoke or suspend for any period up to one year any license issued by ODAFF, when the Board finds that the holder of such license has violated any of the provisions of this Code or any rule of the Board;
- Jurisdiction over all matters affecting agriculture as contained and set out in this title, which have not been expressly delegated to another State or federal agency.
- Jurisdiction over the importation of exotic livestock. For purposes of this paragraph, the term "exotic livestock" means commercially raised animals of the families Bovidae, Cervidae, Antilocapridae, Ratites, and animals of the order Galliformes.

8.1.6 Corporation Commission (Corp. Comm.)

The Corporation Commission has exclusive jurisdiction, power and authority, it is its duty to promulgate and enforce rules, and issue and enforce orders governing and regulating:

- Conservation of oil and gas;
- Field operations for geologic and geophysical exploration for oil, gas and brine, including seismic survey wells, stratigraphic test wells, and core test wells;
- Exploration, drilling, development, producing, or processing for oil and gas on the lease site;
- Exploration, drilling, development, production, and operation of wells used in connection with the recovery, injection or disposal of mineral brines;
- Reclaiming facilities only for the processing of salt water, crude oil, natural gas condensate and tank bottoms or basic sediment from crude oil tanks, pipelines, pits, and equipment associated with the exploration, drilling, development, producing, or transportation of oil or gas;
- Underground injection control pursuant to the federal Safe Drinking Water Act and 40 CFR Parts 144 through 148, of Class II injection wells, Class V injection wells utilized in the remediation of groundwater associated with underground or aboveground storage tanks regulated by the Corp. Comm., and those wells used for the recovery, injection, or disposal of mineral brines as defined in the Oklahoma Brine Development Act, and any aspect of any CO_2 sequestration facility, including any associated CO_2 injection well, over which the Commission is given jurisdiction pursuant to the Oklahoma Carbon Capture and Geologic Sequestration Act. Any substance that the United States EPA allows to be injected into a Class II well may continue to be so injected;

- Tank farms for storage of crude oil and petroleum products located outside the boundaries of refineries, petrochemical manufacturing plants, natural gas liquid extraction plants, or other facilities subject to the jurisdiction of the ODEQ with regard to point source discharges;

- Construction and operation of pipelines and associated rights-of-way, equipment, facilities or buildings used in the transportation of oil, gas, petroleum, petroleum products, anhydrous ammonia or mineral brine, or in the treatment of oil, gas, or mineral brine during the course of transportation but not including line pipes in any natural gas liquids extraction plant, refinery, reclaiming facility other than those specified in this subsection, mineral brine processing plant, or petrochemical manufacturing plant;

- Handling, transportation, storage, and disposition of saltwater, mineral brines, waste oil, and other deleterious substances produced from or used in connection with the drilling, development, producing, and operating of oil and gas wells;

- Spills of deleterious substances associated with facilities and activities specified this subsection or associated with other oil and gas extraction facilities and activities;

- Subsurface storage of oil, natural gas, and liquefied petroleum gas in geologic strata;

- Groundwater protection for activities subject to the jurisdictional areas of environmental responsibility of the Commission;

- Utilization and enforcement of Oklahoma Water Quality Standards and implementation documents,

- When a deleterious substance from a Corp. Comm. regulated facility or activity enters a point source discharge of pollutants or storm water from a facility or activity regulated by the ODEQ, the ODEQ shall have sole jurisdiction over the point source discharge of the commingled pollutants and storm water from the two facilities or activities insofar as Department regulated facilities and activities are concerned;

- For purposes of the Federal Clean Water Act, any facility or activity which is subject to the jurisdiction of the Corp. Comm. and any other oil and gas extraction facility or activity which requires a permit for the discharge of a pollutant or storm water to waters of the United States shall be subject to the direct jurisdiction of the federal EPA and shall not be required to be permitted by the ODEQ or the Corp. Comm. for such discharge;

- Aboveground and underground storage tanks that contain antifreeze, motor oil, motor fuel, gasoline, kerosene, diesel, or aviation fuel and that are not located at refineries or at the upstream or intermediate shipment points of pipeline operations, including, but not limited to, tanks from which these materials are dispensed into vehicles, or tanks used in wholesale or bulk distribution activities, as well as leaks from pumps, hoses, dispensers, and other ancillary equipment associated with the tanks, provided that any point source discharge of a pollutant to waters of the United States during site remediation or the disposal of contaminated soil, media, or debris which is hazardous shall be regulated by the ODEQ; and

- The Petroleum Storage Tank Release Environmental Cleanup Indemnity Fund and Program and the Leaking Underground Storage Tank Trust Fund.

8.1.7 The Conservation Commission (OCC)

The Conservation Commission shall have the following jurisdictional areas of environmental responsibility:

- Soil conservation, erosion control, and NPS management except as otherwise provided by law;
- Monitoring, evaluation and assessment of waters to determine the condition of streams and rivers being impacted by NPS pollution. In this capacity, the OCC shall serve as the technical lead agency for NPS categories as defined in Section 319 of the Federal Clean Water Act or other subsequent federal or State NPS programs, except for activities related to industrial and municipal stormwater or as otherwise provided by State law;
- Wetlands strategy;
- Abandoned mine reclamation;
- Cost-share program for land use activities;
- Assessment and conservation plan development and implementation in watersheds of clean lakes, as specified by law;
- Complaint data management;
- Coordination of environmental and natural resources education;
- Federal upstream flood control program;
- Groundwater protection for activities subject to the jurisdictional areas of environmental responsibility of the Commission;
- Utilization of Oklahoma Water Quality Standards and Implementation documents; and
- Verification and certification of carbon sequestration pursuant to the Oklahoma Carbon Sequestration Enhancement Act. This responsibility shall not be superseded by the Oklahoma Carbon Capture and Geologic Sequestration Act.

8.1.8 Department of Mines

The Department of Mines shall have the following jurisdictional areas of environmental responsibility:

- Mining regulation;

- Mining reclamation of active mines; and
- Groundwater protection for activities subject to the jurisdictional areas of environmental responsibility of the Commission.

8.1.9 Department of Wildlife Conservation (ODWC)

The Department of Wildlife Conservation shall have the following jurisdictional areas of environmental responsibilities:

- Investigating wildlife kills;
- Wildlife protection and seeking wildlife damage claims; and
- Promulgation of rules to guide licensing of aquaculture facilities by ODAFF and inspection of aquaculture facilities.

8.1.10 Department of Public Safety

The Department of Public Safety shall have the following jurisdictional areas of environmental responsibilities:

- Hazardous waste, substances, and material transportation inspections as authorized by the Hazardous Materials Transportation Act; and
- Inspection and audit activities of hazardous waste and materials carriers and handlers as authorized by the Hazardous Materials Transportation Act.

8.2 NPS Working Group Member Roles and Responsibilities

Members of the NPS Working group were surveyed to assess their agency's responsibilities, available resources, and interest in NPS programs. The results of the surveys are seen in Appendix D.

9. Program and Financial Management

Each State agency working within the NPS program receiving federal funds through the EPA submits an annual Quality Management Plan following EPA QA/R-2: EPA Requirements for Quality Management Plans. QMPs are drafted by each agency and submitted for review and concurrence by the Oklahoma OSEE. The QMPs describe each agency's program management in detail.

Title 27A O.S. Supp. 1996, Section 1-2-101 provides that OSEE has jurisdictional areas of environmental responsibilities that include: powers and duties for environmental areas as designated by the Governor; recipient of CWA funds; and coordination of pollution control activities to avoid duplication of effort. The mission of OSEE is to enhance and protect Oklahoma's environment for the benefit of its citizens through effective administration of CWA funds granted to the State of Oklahoma and coordination and promotion of the State's environmental programs and endeavors.

The OSEE is the grant recipient of the CWA Section 319(h) funding for the State of Oklahoma. As the grant recipient, OSEE serves as liaison between EPA Region 6 and entities (State agencies, universities, etc.) receiving §319(h) funds. From inception of the grant, OSEE handles all communications with EPA, from submitting proposed work plans, negotiations of the final work plan, submittal of deliverables, and revisions to the work plans. OSEE also participates in the NPS Working Group.

Financial responsibilities include submittal of the grant application package, financial reports, disbursement of grant funds, and grant close-out. All procedures are outlined in the OSEE's Standard Operating Procedure document, which is revised every two years to stay current with changes in the State.

§319 grants implemented by the OCC are managed financially by the OCC comptroller. The following guidelines are used in managing those funds:

- All items charged against EPA §319 Grants must first be approved by WQ Director;
- Initials and task to be charged to must be placed on invoice for payment by WQ Director;
- Claim for payment is audited, processed, and approved by Comptroller. Appropriate task number is included with fund and account at time of processing;
- Expenditure summaries are queried at the end of each month, by task, and charged against the referenced §319 grant. A request for funds is then made;
- This summary and request for funds is reviewed by the WQ Director;
- All records and supporting documentation are maintained at the OCC office until disposition authorization is provided by the appropriate agency;
- All State and federal funds are audited yearly by the Oklahoma State auditor and inspector;

- The State cost-share program management is managed according to rules adopted by the OCC and on file with the Oklahoma Secretary of State.

The NPS program in Oklahoma has consistently relied on only a few sources of funding to finance its efforts. These have included 208 funds, §319(h) funds, 106 funds, and some state cost-share funds. However, a much broader array of funds are available than these few sources. Recent changes in program guidance has loosened up or otherwise increased funding opportunities such as SRF and EQIP education funding for more NPS-related issues. The State will increase its efforts to fund the NPS related efforts defined under this plan through additional sources such as EQIP, SRF, and confirmed annual state monies. Appendix A details the majority of funding sources available for water quality related programs.

10. Process to Evaluate and Update the Management Program Plan

The Nonpoint Management Program Plan serves as the guiding document for NPS pollution activities in the State. Consequently, having the ability to regularly review and revise the document is key to effective management. At a minimum, the EPA requires a thorough review and update every five years, which the OCC is committed to accomplish. This revision will be drafted by the OCC but reviewed, approved, and directed by the NPS Working Group, approved by and routed through OSEE to EPA for final approval. The review and revision will be based on success towards achieving long and short-term goals of the NPS Program. However, given the dynamic nature of NPS management, the OCC has incorporated several procedures to reevaluate and update the NPSMP more frequently.

The OCC annually reviews the NPS program and the progress made on achieving milestones outlined in the NPSMP. The progress of the NPS program is updated in the annual report. In addition, updates to the NPSMP may be made more frequently than every five years, when necessary to incorporate new activities and strategies. Work plans and Watershed Based Plans will also serve as supplements to the NPSMP. These documents refine the specific activities that are undertaken in a given year or in a specific watershed. More current detail is provided in these documents than is contained in the NPSMP. Furthermore, a progress report, in the form of the annual report, will be generated and submitted to partners for review and evaluation.

REFERENCES:

33 CFR 328.3(b). (n.d.). *Electronic Code of Federal Regulations Title 33: Navigation and Navigable Waters.* Retrieved 2014, from US Government Printing Office: http://www.nap.usace.army.mil/Portals/39/docs/regulatory/regs/33cfr328.pdf

40 CFR 230.3(t). (n.d.). *Electronic Code of Federal Regulations: Title 40 Protection of Environment Chapter 1 Subchapter H Part 230- Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material.* Retrieved 2014, from U.S. Government Printing Office: http://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title40/40cfr230_main_02.tpl

Alaska Department of Environmental Conservation. (2012, September). *Alaska DEC User's Manual: Best Management Practices for Gravel/Rock Aggregate Extraction Projects.* Retrieved 2014, from Alaska Department of Environmental Conservation: http://dec.alaska.gov/water/wnpspc/protection_restoration/bestmgmtpractices/docs/gravelrockextractionbmpmanual.pdf

American Forest Foundation. (2010). *Project Learning Tree: Empowering Educators, Inspiring Youth*. Retrieved 2014, from Project Learning Tree: https://www.plt.org/

Environmental Concern, Inc. (2008). *WOW! The Wonders of Wetlands*. Retrieved 2014, from Environmental Concern: http://www.wetland.org/education_wow.htm

Kelly Registered Pesticides. (2015). *Oklahoma Department of Agriculture, Food, and Forestry.* Retrieved 2014, from Kelly Registered Pesticides: http://kellysolutions.com/ok/

Louisiana Department of Environmental Quality. (2007). *Recommended Best Management Practices: Nonpoint Source Pollution: Sand & Gravel Mining Industry.* Retrieved 2014, from Private Landowner Network: http://www.privatelandownernetwork.org/pdfs/LouisianaRecommendedBMPs%20sand%20and%20gravel%20mining.pdf

National Park Service. (2007, March). *Best Management Practices Used at Urban Parks in National and International Locations.* Retrieved 2014, from United States Department of the Interior National Park Service: http://www.nps.gov/nationalmallplan/Documents/National%20Mall%20Plan%20-%20Best%20Management%20Practices%20Used%20at%20Urban%20Parks%20in%20National%20and%20International%20Locations.pdf

National Resources Conservation Service. (2013). Conservation Program Easement Data GIS Layer. Stillwater, OK: National Resources Conservation Service.

Newbury, R. (2008). *Designing Pool and Riffle Streams: Lectures and Exercises River Restoration NW Short Course 2008.* Retrieved 2014, from Army Corps of Engineers: http://chl.erdc.usace.army.mil/dirs/SSEP/DERRICK-STUFF/MANUALS-MODELS-GOOD%20STUFF/GRADE%20CONTROL%20&%20ERR/ROBERT%20NEWBURY%20ERR%20DESIGN%20NOTES-2011.pdf

Oklahoma Conservation Commission. (1996, July). *Oklahoma's Comprehensive Wetlands Conservation Plan.* Retrieved 2014, from Oklahoma Conservation Commission: http://www.ok.gov/conservation/documents/OK_Comprehensive_Wetlands_Conservation_Plan.pdf

Oklahoma Conservation Commission. (2006). *NPS Management Program 2006 Revision.* Retrieved 2014, from Oklahoma Conservation Commission Water Quality Division SOPs and Methods Reports :

http://www.ok.gov/conservation/Agency_Divisions/Water_Quality_Division/WQ_Reports/WQ_Reports_SOPs_and_Methods.html

Oklahoma Conservation Commission. (2006). *Water Quality Division WQ SOPs and Methods Reports NPS Management Program 2006 Revision.* Retrieved 2014, from Oklahoma Conservation Commission: http://www.ok.gov/conservation/Agency_Divisions/Water_Quality_Division/WQ_Reports/WQ_Reports_SOPs_and_Methods.html

Oklahoma Conservation Commission. (2013). *Oklahoma's Wetland Program Plan 2013-2018.* Retrieved 2014, from US EPA Office of Wetlands, Oceans and Watersheds: http://water.epa.gov/type/wetlands/upload/ok-cc-wpp.pdf

Oklahoma Conservation Commission. (2019). *Oklahoma Wetlands Program*. Retrieved 2014, from Oklahoma Wetlands Program: https://www.ok.gov/wetlands/

Oklahoma Conservation Commission. (2019). *WQ Watershed Based Plans.* Retrieved 2014, from Oklahoma Conservation Commission: http://www.ok.gov/conservation/Agency_Divisions/Water_Quality_Division/WQ_Reports/WQ_Reports_Watershed_Based_Plans/

Oklahoma Cooperative Extension Service . (2002, April). *Pollution Prevention at Exploration and Production Sites in Oklahoma.* Retrieved 2014, from http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-2253/E-940.pdf

(2019). *Oklahoma Department of Agriculture, Food & Forestry.*

Oklahoma Department of Agriculture, Food, and Forestry - Forestry Services. (2016). *Forestry Best Management Practice Guidelines for Water Quality Management in Oklahoma.* Retrieved 2014, from Oklahoma Forestry Services: http://www.forestry.ok.gov/Websites/forestry/images/documents/WaterQuality/Forestry%20BMP-3-16.pdf

Oklahoma Department of Agriculture, Food, and Forestry. (2019). *Pesticides.* Retrieved 2014, from Oklahoma Department of Agriculture, Food, and Forestry: https://www.ag.ok.gov/cps/pesticide.htm

Oklahoma Department of Environmental Quality. (2012). *Continuing Planning Process: 2012 Version.* Retrieved 2014, from Oklahoma Department of Environmental Quality: https://www.deq.ok.gov/wp-content/uploads/water-division/2012-OK-CPP.pdf

Oklahoma Department of Environmental Quality. (2012). *Water Quality in Oklahoma: 2012 Integrated Report* . Retrieved 2014, from Oklahoma Department of Environmental Quality: http://www.deq.state.ok.us/WQDnew/305b_303d/2012IRReport/2012%20IR%20document%20-%20Final.pdf

Oklahoma Department of Environmental Quality. (2014, 9 12). Public Water Supply Water Intakes and Wells GIS Layers. Okahoma City, OK: Oklahoma Department of Environmental Quality.

Oklahoma Department of Environmental Quality. (2016). *Water Quality in Oklahoma.* Retrieved 2014, from Oklahoma Department of Environmental Quality: 2016 Integrated Report: https://www.deq.ok.gov/wp-content/uploads/water-division/2016-Integrated-Report-and-Appendices.pdf

Oklahoma Department of Environmental Quality. (2019). *TMDLs & Water Quality Modeling*. Retrieved 2014, from Oklahoma Department of Environmental Quality: https://www.deq.ok.gov/water-quality-division/watershed-planning/tmdl/

Oklahoma Department of Wildlife Conservation. (2013, 10 23). ODWC State Threatened and Endangered Species Habitat GIS Layer. Oklahoma City, OK: Oklahoma Department of Wildlife Conservation.

Oklahoma Energy Resources Board. (2019). *OERB Well Site Clean Up.* Retrieved 2014, from Oklahoma Energy Resources Board: https://www.oerb.com/well-site-clean-up

Oklahoma Office of the Secretary of Environment. (1998, October 1). *State of Oklahoma Unified Watershed Assessment.* Retrieved 2014, from Oklahoma Department of Environmental Quality: https://www.deq.state.ok.us/WQDnew/pubs/uwa_final.pdf

Oklahoma Water Resources Board. (2011, 4 21). *OWRB Lakes.* Retrieved 2014, from Oklahoma Geographic Information Council GIS Digital Data Online: http://ogi.state.ok.us/ogi/search.aspx

Oklahoma Water Resources Board. (2011, 9 27). Surface Water Water Quality Standards Appendix B Areas GIS Layer. Oklahoma City, OK: Oklahoma Water Resources Board.

Oklahoma Water Resources Board. (2011). Surface Water Water Quality Standards Streams and Lakes GIS Layers. Oklahoma City, Oklahoma: Oklahoma Water Resources Board.

Oklahoma Water Resources Board. (2012). *The Oklahoma Comprehensive Water Plan.* Retrieved 2014, from Oklahoma Water Resources Board: http://www.owrb.ok.gov/supply/ocwp/ocwp.php

Oklahoma Water Resources Board. (2014). *Chapter 46: Implementation of Oklahoma's Water Quality Standards.* Retrieved 2014, from Oklahoma Water Resources Board: http://www.owrb.ok.gov/util/rules/pdf_rul/current/Ch46.pdf

Oklahoma Water Resources Board. (2014). *Oklahoma Water Quality Standards Chapter 45.* Retrieved 2014, from Oklahoma Water Resources Board: http://www.owrb.ok.gov/util/rules/pdf_rul/current/Ch45.pdf

Oklahoma Water Resources Board. (2017). *Status of Water Quality Monitoring in Oklahoma-Surface Water Monitoring Strategy Document.* Retrieved 2014, from Oklahoma Water Resources Board: http:https://www.owrb.ok.gov/quality/monitoring/StatusReport.pdf

Omernick, J. (2012). *Ecoregions of Oklahoma.* Retrieved 2014, from U.S. EPA Western Ecology Division: http://www.epa.gov/wed/pages/ecoregions/ok_eco.htm

Penn State University. (2014). *Best Management Practices.* Retrieved 2014, from Penn State Marcellus Shale Electronic Field Guide: http://marcellusfieldguide.org/index.php/guide/best_management_practices_in_use/

Project WET Foundation. (2014). *Water Education for Teachers*. Retrieved 2014, from Project WET: http://www.projectwet.org/

Rosgen, D. (1996). *Applied River Morphology.* Pagosa Springs, Colorado: Wildland Hydrology.

State of Oklahoma. (2019). *Oklahoma Statutes.* Retrieved 2014, from Oklahoma Legislature: http://www.oklegislature.gov/osstatuestitle.html

TetraTech. (2018, March 3). *StepL Models and Documentation.* Retrieved 2014, from United States Environmental Protection Agency, Office of Wetlands, Oceans, & Watersheds: http://it.tetratech-ffx.com/steplweb/models$docs.htm

United States Department of Agriculture. (2017). *2017 Census by State - Oklahoma.* Retrieved 2014, from USDA Census of Agriculture: https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Census_by_State/Oklahoma/

United States Department of Agriculture Forest Service. (2012, April). *National Best Management Practices for Water Quality Management on National Forest System Lands.* Retrieved 2014, from USDA Forest Service:

http://www.fs.fed.us/biology/resources/pubs/watershed/FS_National_Core_BMPs_April2012.pdf

United States Environmental Protection Agency. (1993, October). *Guidance Manual for Developing Best Management Practices (BMP).* Retrieved from EPA National Service Center for Environmental Publications: http://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=20004ARJ.txt

United States Environmental Protection Agency. (2003). *An Introduction and User's Guide to Wetland Restoration, Creation, and Enhancement.* Retrieved 2014, from United States Environmental Protection Agency: https://nepis.epa.gov/Exe/ZyPDF.cgi/P100EUJG.PDF?Dockey=P100EUJG.PDF

United States Environmental Protection Agency. (2008, March). *Handbook for Developing Watershed Plans to Restore and Protect our Waters.* Retrieved 2014, from US EPA Office of Wetlands, Oceans, and Watersheds: https://www.epa.gov/sites/production/files/2015-09/documents/2008_04_18_nps_watershed_handbook_handbook-2.pdf

United States Environmental Protection Agency. (2011). *A National Evaluation of the Clean Water Act Section 319 Program.* Retrieved 2014, from Office of Wetlands, Oceans and Watersheds Assessment & Watershed Protection Division, Nonpoint Source Control Branch: http://water.epa.gov/polwaste/nps/upload/319evaluation.pdf

United States Environmental Protection Agency. (2012, November). *Section 319 Program Guidance: Key Components of an Effective State Nonpoint Source Management Program.* Retrieved 2014, from USEPA Office of Wetlands, Oceans and Watersheds: http://water.epa.gov/polwaste/nps/upload/key_components_2012.pdf

United States Environmental Protection Agency. (2012). *What is Nonpoint Source Pollution?* . Retrieved 2014, from U.S. EPA Office of Wetlands, Oceans and Watersheds Protection Division, Nonpoint Source Control Branch: http://water.epa/gov/polwaste/nps/watis.cfm

United States Environmental Protection Agency. (2013). *303(d), 305(b) and Integrated Reporting Guidance*. Retrieved 2014, from US EPA Office of Wetlands Oceans and Watersheds: http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/guidance.cfm#reporting

United States Environmental Protection Agency. (2014, 8 3). *Section 319 Nonpoint Source Success Stories*. Retrieved 2014, from U.S. Environmental Protection Agency Office of Watersheds, Oceans, and Wetlands: http://water.epa.gov/polwaste/nps/success319/

United States Environmental Protection Agency. (2014). *Stormwater Wetland.* Retrieved 2014, from United States Environmental Protection Agency: http://water.epa.gov/polwaste/npdes/swbmp/Stormwater-Wetland.cfm

United States Environmental Protection Agency. (2014). *Watershed Academy Web Analysis and Planning Modules: Watershed Modeling.* Retrieved 2014, from United States Environmental Protection Agency Office of Wetlands, Oceans and Watersheds: http://cfpub.epa.gov/watertrain/pdf/modules/WshedModTools.pdf

United States Environmental Protection Agency. (2019). *Green Infrastructure*. Retrieved 2014, from United States Environmental Protection Agency: https://www.epa.gov/green-infrastructure#guide

United States Environmental Protection Agency. (2019). *National Menu of Stormwater Best Management Practices.* Retrieved 2014, from USEPA Office of Wetlands, Oceans, and Watersheds: https://www.epa.gov/npdes/national-menu-best-management-practices-bmps-stormwater-documents

United States Environmental Protection Agency. (2019). *Nonpoint SourceL Roads, Highways and Bridges.* Retrieved 2014, from USEPA Office of Wetlands, Oceans, and Watersheds: https://www.epa.gov/nps/nonpoint-source-roads-highways-and-bridges

United States Fish and Wildlife Service. (2013, 10 22). USFWS Threatened and Endangered Species GIS Layer. Tulsa, Oklahoma: United States Fish and Wildlife Service.

United States Geological Survey. (2006). *WaterbodiesHR--National Hydrography Dataset (NHD)-High-resolution.* Retrieved 2014, from United States Geological Survey: http://pubs.usgs.gov/ds/270/data/DVD-1/METADATA/WaterbodiesHR.htm

United States Geological Survey. (2019). *Oklahoma Water-Resources Projects*. Retrieved 2014, from USGS Oklahoma Water Science Center: https://www.usgs.gov/centers/ok-water/science/groundwater-modeling-oklahoma-water-science-center?qt-science_center_objects=0#qt-science_center_objects

USDA Natural Resources Conservation Service. (2019). *Field Office Technical Guide (FOTG).* Retrieved 2014, from USDA Natural Resources Conservation Service: http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/fotg/

APPENDIX A: Funding

Many funding sources are available to support programs and activities related to NPS pollution management in Oklahoma. Some of the funding sources include:

Abandoned Mine Land Reclamation Program (OSM) Provides for the restoration of eligible lands and waters mined and abandoned or left inadequately restored.

Clean Water Act §104(b)3 Research, Investigation, Training and Information (EPA) Grants to State agencies, Tribes, other public or nonprofit private agencies, institutions, organizations and individuals. The purpose of these grants is to conduct and promote the coordination and acceleration of research, investigations, experiments, training, demonstrations, surveys and studies relating to causes, effects, extent, prevention, reduction and elimination of pollution. Section 104(b)3 grant require a 5% match and can be utilized in the following areas:

National Pollutant Discharge Elimination System (NPDES) State Program: to support the watershed approach for projects involving NPDES permit activities, stormwater runoff and sludge treatment and disposal.

Groundwater: to study aquifer vulnerability.

Public Private Partnership (P3): to State or local agencies to perform a variety of activities that involve a cooperative effort on the part of the public agency or agencies and one or more private entities.

State Wetlands Development Grants: to States/Tribes to develop and refine new and/or existing wetlands programs. These grants require a 25% match.

Wetlands: to create and enhance wetlands and to develop educational programs

Clean Water Act §106 Water Pollution Control Program (EPA) Grants to State agencies and Tribes for work relating to ground and surface water. Primary areas of funding include: 1) to State/interstate agencies to assist them in administering for the prevention, reduction, and elimination of water pollution, including enforcement directly or through appropriate State law enforcement officers or agencies; 2) to help fund permitting, enforcement, monitoring and water quality standard activities; 3) to Tribes for the development of water quality standards and monitoring programs; and, 4) to be used basically for a State's base groundwater program (CSGWPP), wellhead protection and pesticides in groundwater.

Clean Water Act §205(m) and 601(a) Capitalization Grants for State Revolving Fund (SRF) (EPA) Grants to States to capitalize the SRF Loan Program to provide other assistance specified in Title VI to communities for the purpose of addressing wastewater treatment, NPS control and estuary protection needs. A 20% match is required with this program.

Clean Water Act §319(h) Nonpoint Source Implementation (EPA) Grants to designated State agencies to implement the State's NPS Management Program Plan to control NPS pollution. States may choose to grant funding to other entities for project implementation. A 40% match is required with this program.

Clean Water Act §604(b) Water Quality Management Planning Set-aside from a State's Title VI (State Revolving Loan) funds (EPA) Grants to States to carry out water quality management planning. The States must pass-through 40% of these funds to regional planning agencies, unless the Governor, in consultation with affected parties, determines that regional planning agency participation will not significantly assist the State in its water quality management planning efforts.

Clean Vessel Act Grant Program (USFWS) Provides financial support for development or improvement of marina sanitation facilities in order to maintain and improve water quality.

Conservation Reserve Program (CRP) (FSA) Provides annual payments and cost-share assistance to landowners to conserve and enhance soil and water resources, including wetland and wildlife habitat.

Conservation Reserve Enhancement Program (CREP) (FSA) An offshoot of the Conservation Reserve Program (CRP), the Conservation Reserve Enhancement Program (CREP) targets high-priority conservation issues identified by local, state, or tribal governments or non-governmental organizations. In exchange for removing environmentally sensitive land from production and introducing conservation practices, farmers, ranchers, and agricultural land owners are paid an annual rental rate. Participation is voluntary, and the contract period is typically 10–15 years, along with other federal and state incentives as applicable per each CREP agreement

Emergency Watershed Protection (NRCS) Provides technical and financial assistance to preserve life and property threatened by excessive erosion and flooding. Eligible activities include clearing debris from waterways, restoration of vegetation, and stabilization of banks.

Environmental Education Grants Program (EPA) Provides financial support for projects which design, demonstrate or disseminate environmental education practices, methods, or techniques.

Environmental Quality Incentive Program (NRCS) Provides technical, educational, and financial assistance to eligible farmers and ranchers to address soil, water, and related natural resource concerns on their lands in an environmentally beneficial and cost-effective manner.

Conservation Stewardship Program (CSP) (NRCS) Agricultural producers take additional steps to improve resource condition including soil quality, water quality, water quantity, air quality, and habitat quality, as well as energy. Participants receive either annual payments for installing new conservation activities and maintaining existing practices or and supplemental payments for adopting a resource-conserving crop rotation.

Conservation Innovation Grant (CIG) (NRCS) Under CIG, Environmental Quality Incentives Program funds are used to award competitive grants to non-Federal governmental or nongovernmental organizations, Tribes, or individuals. CIG enables NRCS to work with other public and private entities to accelerate technology transfer and adoption of promising technologies and approaches to address some of the Nation's most pressing natural resource concerns.

Regional Conservation Partnership Program (RCPP) (NRCS) Promotes coordination between NRCS and its partners to deliver conservation assistance to producers and landowners. NRCS provides assistance to producers through partnership agreements and through program contracts or easement agreements.

Five Star Restoration Challenge Grant Program (EPA) Provides support for community-based wetland and riparian restoration projects that build diverse partnerships and foster local natural resource stewardship.

Forest Stewardship Program (ODAFF) Management plans are designed to promote good land stewardship by helping rural landowners develop a multiple-use (grazing, timber management, reforestation, wildlife habitat enhancement, soil and water conservation and recreation) management strategy on their land. Forest Stewardship plans meet the conservation planning requirement of many financial assistance programs.

Oklahoma Cost-Share Program (OCC) Provides cost-share assistance for water quality benefits.

Oklahoma General Revenue Funds- Provides financial assistance to State agencies for water quality related programs.

Partners for Fish and Wildlife Conservation (USFWS) Provides technical and financial assistance to private landowners to voluntarily restore wetlands and other fish and wildlife habitats on their land. The program emphasizes the reestablishment of native vegetation and ecological communities for the benefit of fish and wildlife in concert with the needs and desires of private landowners.

Safe Drinking Water Act §1452 (a)(1)(B) Drinking Water State Revolving Fund (EPA) Grants to State for the purpose of establishing State loan funds for public water systems to finance the cost of complying with the National Primary Drinking Water regulations and to protect public health. A portion of the grant can be set aside for administrative expenses, State Drinking Water Program Management, Source Water Protection activities, small systems technical assistance, operator certification programs and capacity development activities.

Save Our Streams Program (Izaak Walton League of America) Provides support to protect and restore America's soil, woods, water, air, and wildlife.

Wetland Reserve Program (WRP) (NRCS) Provides payments and cost-share assistance to landowners for the restoration and protection of wetlands.

Wildlife Habitat Improvement Program (WHIP) (ODWC) Grants to develop, preserve, restore and manage wildlife habitat on private lands.

Wildlife Habitat Incentives Program (WHIP) (NRCS) Provides private landowners with technical and financial assistance to establish and improve fish and wildlife habitat.

APPENDIX B: Unified Watershed Assessment: 2014 Update

STATE OF OKLAHOMA

UNIFIED WATERSHED ASSESSMENT

2014 Update

PREPARED BY:

OKLAHOMA CONSERVATION COMMISSION
2800 N LINCOLN BLVD., SUITE 160
OKLAHOMA CITY, OK 73105

OKLAHOMA CONSERVATION COMMISSION

Introduction

In 1998 (Oklahoma Office of the Secretary of Environment, 1998) and again in 2006 (Oklahoma Conservation Commission, 2006), the State of Oklahoma prioritized its hydrologic unit code (HUC) 11 watersheds (approximately 50,000 acres) following strategies defined in the Clean Water Action Plan and developed and revised a Unified Watershed Assessment (UWA) framework through Oklahoma's Nonpoint Source (NPS) Working Group. For both efforts, the UWA utilized the most current approved 303(d) list of impaired streams (1998 and 2004 303(d) lists, respectively) as a foundation for the prioritization to better target Clean Water Act program efforts including TMDL development and NPS implementation. While the 1998 UWA ranked all HUC 11 watersheds, the 2006 UWA extended efforts to a subset known as Category I Watersheds - "Watersheds in need of Restoration", comprised of watersheds with the proportion of impaired waterbody miles greater than or equal to 25 percent.

In 2012, the OCC engaged the NPS Working Group in an effort to review the UWA ranking scheme and update as necessary to reflect changes in critical data (i.e. Oklahoma's latest integrated report, more readily available geographically-linked data, etc.) and better support the needs of multiple water quality programs. One of the most significant needs for this revision was to reduce the spatial framework from HUC 11 to HUC 12 (approx. 10,000 – 40,000 acres) to facilitate the alignment with desired watershed planning units that area small enough to have quicker results and to focus on less complex water quality problems that could be more easily solved. The 2014 UWA also prioritized all impaired waterbodies as defined in Oklahoma's 2012 Integrated Report, as opposed to just 303(d) listed waterbodies.

Method

Oklahoma's UWA ranking method involves computation of nine key metrics, which are then aggregated for ranking based on predetermined criteria. These metrics can be loosely aggregate into three primary categories including 1) severity of threat/impairment, 2) impact of threat/impairment on human health and natural resources, and 3) restoration potential. Data compilation, analysis, metric computation, and ranking were accomplished through use of Microsoft (MS) Access 2010l, MS Excel 2010, Minitab V14, Arcview 3.2a, and ArcGIS 10.1 for desktop. Metric input data and scores were generally determined using an integrated approach of GIS, spreadsheet, and database manipulations. All data used in the process were the most recent available at the time of ranking. Because Oklahoma has developed numerous TMDLs since the last UWA revision, the 2014 UWA includes all impaired waterbodies as defined in Oklahoma's 2012 Integrated Report (Oklahoma Department of Environmental Quality, 2012). Discussion of methods for specific metrics follows.

Severity of Threat/Impairment Metrics

Total Percent Impaired Waterbodies

One of the principal metrics for determination of watershed ranking priority is the percentage of impaired waterbodies per HUC 12. This calculation was accomplished in two phases; determination of proportion of stream miles impaired and determination of proportion of lakes (stream miles equivalence) impaired. The HUC 12 watersheds layer (USGS Watershed Boundary Dataset) was used in ArcGIS to clip a geospatial coverage of the impaired waterbodies from Oklahoma's 2012 Integrated Report (Oklahoma

Department of Environmental Quality, 2012) to facilitate aggregation of relevant data by watershed. Total impaired stream miles were calculated and compiled in the master metric computation sheet.

For lakes, the desire was to standardize the representation to stream mile equivalence. Previous UWAs used an area equivalency factor (1 m^2 lake area = 0.28618 meters stream length) to relate lake area to stream length. Because this appeared to excessively inflate lake representation and due to better technology and data availability, it was decided to determine the actual stream network underlying the lake footprint through GIS and use this stream length to represent lake equivalence. The OWRB lakes polygon layer (Oklahoma Water Resources Board, 2011) was used to clip National Hydrography Dataset high resolution (NHD hi-res.) flow lines (United States Geological Survey, 2006) for all major lakes in the state (major is categorized as those with waterbody identification numbers) to render the associated stream network. This layer was then associated with relevant GIS shapefiles through geoprocessing in ArcGIS to render "stream mile equivalence" totals for all impaired lakes, which were then compiled in the master metric computation sheet.

One of the major improvements to this UWA is the conversion of stream network representation to the NHD hi-res. layer. Previous UWAs used a reach file network which, due to digitization at differing spatial resolutions between counties, rendered a "patchwork quilt" of stream lines for the state. The switch to the NHD hi-res affords a very accurate and standardized representation of streams across the state. The HUC 12 layer was used to clip the NHD hi-res. flow line layer for the state, and the total segment lengths were summed to compute total network miles for each watershed. Total impaired stream miles and total impaired lake miles (stream-mile equivalence) were summed and divided by total network miles to render percent impaired.

The final metric score was determined based on predetermined percentiles of total percent impairment values. Due to the change to a much more refined spatial representation of stream miles in the NHD hi-res., percent watershed impairment values were drastically lower on average from previous UWAs (i.e., divisor of more miles means smaller percent impaired). It was decided that the previous break points for scoring were too high and an adjustment was made based on select percentiles (95^{th}, 75^{th}, 50^{th}, and 25^{th}) of total percent impairment. The point score for percent impaired waterbodies, with a maximum of 15, was calculated based on the resulting ranges shown in Table 1.

Pollutant Priority

In previous UWA efforts, the NPS Working Group rated threat/impairment cause codes using a pair-wise comparison matrix based on the importance of addressing each cause of impairment relative to Clean Water Act goals, their Agency/Program Mission, and the likelihood that a program could successfully address the sources of that pollutant. For this effort, the list was re-evaluated and amended to place an even greater emphasis on priority NPS pollutants. The group determined that phosphorus, turbidity, pathogens, and low dissolved oxygen (DO) were the pollutants that should receive the highest priority and therefore a score of 15 points per occurrence of each of those pollutants. Waterbodies impaired by toxics/bioassay, pesticides, and biocriteria received the next highest priority and therefore a score of 10 points per occurrence. Finally, waterbodies impaired by metals, ammonia, oil and grease, salts (chloride, total dissolved solids, and sulfates), taste and odor, and pH received the lowest priority with a score of 5 points per occurrence.

Relevant GIS data layers (2012 Integrated Report and HUC 12 layer) were geoprocessed in ArcGIS and then joined in MS Access to a combined impaired waters database (provided by Joe Long, ODEQ) to produce a final worksheet with total impaired waters and associated pollutant causes for each watershed. Points were assigned to impairment causes and then summed and multiplied by the total impaired waterbody miles for each waterbody. The individual impaired waterbody totals were then added together to reach a total for the entire watershed. Quartiles of the full distribution of watershed totals were determined. The pollutant priority score was then determined based on the quartile value as described in Table 1.

Potential for Impact on Human Health and Natural Resources

Public Water Supply

To assess potential of impact on human health, an estimate of public water supply (PWS) presence and demand was determined for all watersheds. ArcGIS was used to geoprocess PWS (Oklahoma Department of Environmental Quality, 2014) and HUC 12 layers to facilitate determination of both number of PWS intakes and population served per watershed. Scores were assigned based on criteria in Table 1 with each component comprising a maximum of 7.5 points.

Nutrient Limited Watersheds

Oklahoma's Water Quality standards provide for the recognition of lakes and reservoirs with particular potential for nutrient induced impairments. This recognition is known as Nutrient Limited Watersheds (NLW) and represents those lakes or reservoirs with a designated use that is adversely impacted by nutrients as indicated by a Trophic State Index for chlorophyll-a of 62 or greater. Because this designation conveys a distinct potential for impact by one of the nation's recognized priority pollutants, (i.e., nutrients), the NPS Working Group agreed to add this metric to the ranking process. A GIS layer of water quality standards designations (Oklahoma Water Resources Board, 2011) was used in ArcGIS to determine presence of NLWs in each watershed. Watersheds which contained NLWs were given 10 points.

Threatened and Endangered Species

Federally designated threatened and endangered aquatic species have been included in Oklahoma's UWA efforts as a metric reflecting potential for impact of water pollution on wildlife and associated areas of sensitive habitat. For this revision, the working group requested to include state-declared species. GIS layers of both federal (United States Fish and Wildlife Service, 2013) and state (Oklahoma Department of Wildlife Conservation, 2013) declared areas of sensitive habitat for threatened and endangered aquatic species were clipped with the HUC 12 layer in ArcGIS. Species were totaled for each watershed and scored in accordance with the criteria in Table 1.

Restoration Potential

The remaining metrics were developed with the intention of prioritizing watersheds with a high probability of restoration based on the belief that watersheds currently recognized as having higher than average quality waters might be more restorable. Therefore, HUC 12 watersheds were prioritized based

Table 1. Ranking Criteria and Associated Point Values for UWA Prioritization of Category I Watersheds.

RANKING CRITERIA		POINTS	15	10	5	3	0
Total Percent Impaired Waterbodies			≥34.6%	<34.6 to 17.8%	<17.8 to 12.1%	<12.1 to 8.1%	≥8.1%
Pollutant Priority			≥ 75th percentile	75th – 50th percentile	50th – 25th percentile	0-25th percentile	0
Federal & State T & E species in HUC			≥3	2	1		
Highest designated protected waterbody			Scenic R/ORW	HQW/SWS			
Nutrient Limited Watershed				YES			NO
USF&WS priority wetland present					YES		NO
App. B, % of HUC				≥33%	33 – 10%	10 – 0.01%	no appendix B areas
Conservation Program Extent (# or extent of programs)				≥ 4 programs Or ≥ 10% area	2-3 programs Or 10 – 5% area	1 program Or 5 – 0.01% area	No easement programs
# of PWS intakes in HUC (*points equal half of column value*)			≥4	3	2	1	0
# of PWS customers served in HUC (*points equal half of column value)*			≥100,000	99,999 - 10,000	9,999 - 1,000	999 - 1	0

on the presence of State-recognized waters of high quality or social importance such as Scenic Rivers, watersheds containing Appendix B areas, as listed in Oklahoma's Water Quality Standards (Oklahoma Water Resources Board, 2014), and presence of U.S. Fish and Wildlife Service (USFWS) priority wetland areas. In addition, consideration was given toward watersheds where a significant amount to conservation on private land had already occurred. Therefore, extent of ongoing conservation programs was also considered in prioritizing watersheds.

Highest Protected Waterbody

Oklahoma's water quality standards designate certain waters with particular limitations and remarks for additional protection. These include: Scenic Rivers, Outstanding Resource Waters (ORW), High Quality Waters (HQW), and Sensitive Water Supplies (SWS). The Working Group amended the scoring for this UWA to more strongly reflect the hierarchy of importance for these designations. The OWRB water quality standards layer was clipped with the HUC 12 layer in ArcGIS and the highest ranking designation determined for waterbodies contained in each watershed. Scores for each watershed were derived per criteria in Table 1, above.

Appendix B Areas

Appendix B is a section of Oklahoma's Water Quality Standards (Oklahoma Water Resources Board, 2014) that includes a list of waters of recreational and/or ecological significance and generally includes waters within or adjacent to national wildlife areas, national forests, state parks, and related areas. The higher percentage of Appendix B areas in a watershed, generally the fewer developed areas where sources of water pollution are likely to be concentrated. Thus, resources can be concentrated in smaller areas of the watershed with greater potential for success than if resources must be spread throughout the watershed. Because Appendix B waters generally occur in areas of focused natural resource management, watersheds containing Appendix B waters are also excellent candidates for protection.

A GIS layer of Appendix B areas (Oklahoma Water Resources Board, 2011) was clipped with the HUC 12 layer in ArcGIS and the total Appendix B area was determined for each watershed. Watersheds were then scored based on predetermined breakpoints in aeral coverage as detailed in Table 1, above.

Extent of Conservation Programs

An analysis of existing NPS Success Stories in Oklahoma (United States Environmental Protection Agency, 2014) suggests that many of these watersheds overlap with water quality-focused Natural Resources Conservation Service (NRCS) Local Emphasis Area (LEA) Projects and/or general conservation program focus. A Local Emphasis Area is a portion of the state where local entities have documented a resource concern that needs to be addressed and demonstrated that public interest in implementing practices to address the need was high. As a result, extra NRCS Environmental Quality Incentives Program (EQIP) dollars are made available to address the resource concerns of the watershed. The demonstration of public interest in solving a water quality problem in a water quality-related LEA suggests a greater potential for restoration.

Working group members supported inclusion of a measure of conservation program focus as an indicator of potential for restoration. Watersheds with a high concentration of water resources related conservation

easements and select conservation program initiatives were assumed to indicate both a landowner willingness to change management practices and thus potential for a quicker response toward water quality success.

To derive this metric, a GIS layer of conservation program easement data (National Resources Conservation Service, 2013) was joined with the HUC 12 layer in ArcGIS to produce a worksheet of total program area per watershed. The worksheet was then manually amended to include additional programs where information was available including the OCC's Conservation Reserve Enhancement Program (CREP), Land Legacy Easement Programs, and NRCS LEAs. Only conservation programs with potential for impact on water quality (e.g. Wetland Reserve Program (WRP), etc) were considered. Scoring was computed to reflect strength of both areal presence and number of initiatives/programs present in each watershed. Both aspects were scored in accordance with criteria detailed in Table 1. Scores for both aspects were combined only to the extent that a maximum of 10 total points for the metric was not exceeded (e.g., Watershed A has WRP program area of 7% and 5 conservation program initiatives; final score would be 10 pts).

USFWS Priority Wetlands

Oklahoma has been working on a project over the last couple of years to develop a method to incorporate wetland resources in its watershed based planning efforts. Oklahoma's Comprehensive Wetland Conservation Plan (Oklahoma Conservation Commission, 1996) includes as a part of its state wetland inventory a table of priority wetland areas identified by the USFWS for particular management focus. The information in this table was translated to GIS coverage and joined to the HUC 12 watershed layer using ArcGIS. Watersheds received a total of five points for presence of these areas (Table 1, above).

Final Category I Rank

While many different rankings could be computed, the working group settled on a particular level of percent impairment to highlight watersheds with most immediate need for water quality and conservation program action. This designation is referred to as a Category I watershed (Cat I). For the previous UWAs, Cat I watersheds were those with at least 25% of their waterbody miles impaired. With this revision, it was necessary to adjust this criterion to lower value of 17.8%, which is the 75th percentile of all impaired watersheds (see discussion, *Total Percent Impaired*, above).

Due to extreme lateral varibablity in ecosystem and hydrologic characteristics across the state and the fact that the majority of the highest quality waters are eastern in location, the working group asked to develop a separate ranking for eastern and western watersheds. To accommodate this, watersheds were aggregated into "East" or "West" groups based on location of the majority of the watershed area in relation to Interstate 35. To derive the final Category I rank for these, all metric scoring data were compiled into a single MS Excel worksheet and metric scores summed to compute a total score for each watershed. Total scores for watersheds with impairment percentage exceeding 17.8% were then ranked for each group using MS Excel's "RANK" function.

Results

Figure 1, Table 2, and Table 3 display the rankings for the top 50 Category I Watersheds in the eastern and western halves of the State. A spreadsheet summarizing the information used in the ranking process and the resulting priorities is included in the appendix of this report. Many watersheds received the same scores and therefore are tied in ranking.

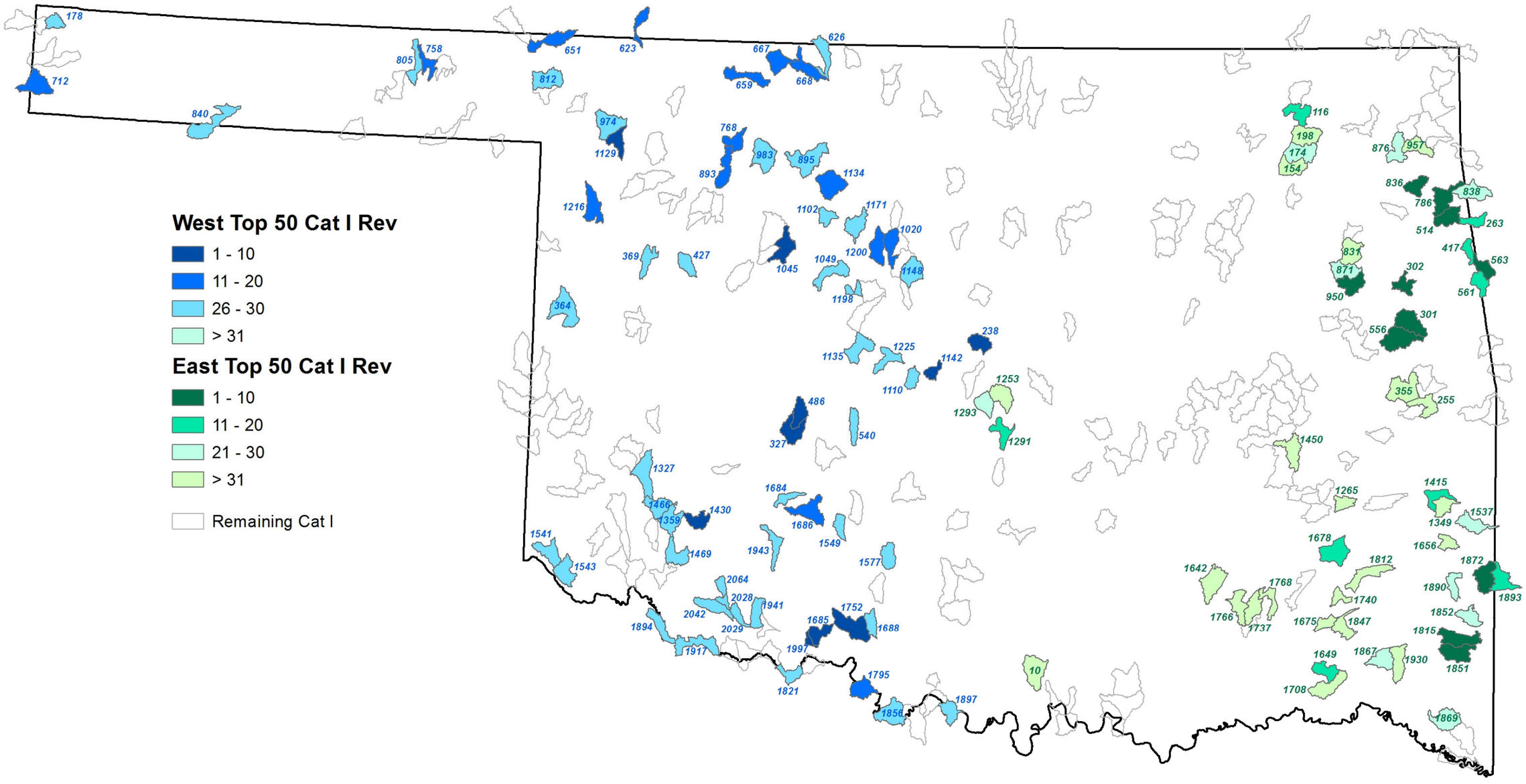

Figure 1. Draft UWA Rankings Based on 2012 Oklahoma Integrated Report (watershed numbers correspond to "Map ID #" in the tables below).

Table 2. Top Fifty UWA Ranked Eastern Watersheds (Based on draft 2004 303(d) List).

Map ID #	HUC12	Name	Category I Ranking	Eastern Watershed Ranking
950	110702090809	Lower Fort Gibson Lake Dam	1	1
1851	111401080306	Broken Bow Lake Dam	2	2
836	110702090311	Rattlesnake Creek-Eucha Lake	3	3
556	111101030907	Tenkiller Ferry Lake Dam	4	4
302	111101030804	City of Tahlequah-Illinois River	5	5
301	111101030906	Elk Creek-Tenkiller Ferry Lake	6	6
514	111101030504	Lower Flint Creek	7	7
1815	111401080305	Holly Creek Mountain Fork	7	7
1872	111401080202	Beech Creek-Cow Creek	7	7
563	111101030604	Upper Ballard Creek	10	10
786	110702090308	Spavinaw Creek Middle	10	10
1291	110902030108	Clear Creek	13	12
1415	111101050508	Wister Lake Dam	14	13
417	111101030605	Lower Ballad Creek	15	14
1649	111401050707	Hugo Lake	15	14
1678	111401050209	Sardis Lake	17	16
263	111101030502	Sager Creek	18	17
561	111101030702	Lower Fly Creek	18	17
116	110701030503	Overcup Bottoms-Oologah Lake	21	19
1893	111401080105	Cedar Creek-Mountain Fork	22	20
876	110702060406	Pensacola Dam-Lake O' The Cherokees	23	21
174	110701030507	Spencer Creek-Oologah Lake	24	22
1867	111401070306	Pine Creek Lake	24	22
1890	111401080207	Big Eagle Creek	24	22
1293	110902030103	Elm Creek	27	25
838	110702090306	Upper Spavinaw Creek	29	26
1537	111101050206	Lower Black Fork	29	26
1852	111401080303	Lower Buffalo Creek	29	26
1869	111401070406	Mud Creek-Rock Creek	29	26
871	110702090804	Middle Fort Gibson Lake	33	30
831	110702090803	Upper Fort Gibson Lake	34	31
355	111101040303	Pleasant Creek	35	32
1349	111101050502	Upper Holson Creek	35	32
1675	111401050506	Lower One Creek	35	32
1737	111401030504	Middle McGee Creek	35	32
1740	111401050501	Upper Cedar Creek	35	32

Map ID #	HUC12	Name	Category I Ranking	Eastern Watershed Ranking
1766	111401030503	Cat Creek-McGee Creek	35	32
1930	111401070307	Cypress Creek	35	32
957	110702060405	Woodward Hollow-Lake O' The Cherokees	43	39
1265	111101050403	Bandy Creek	43	39
255	111101040305	Robert S. Kerr Dam	45	41
1642	111401030304	Atoka Reservoir	45	41
1708	111401050708	Hugo Lake Dam	45	41
1812	111401070104	Black Fork Creek	45	41
10	111302100104	Lake Murray	50	45
1450	110902040607	Arrowhead State Park-Eufaula Lake	51	46
154	110701030508	Blue Creek-Oologah Lake	52	47
198	110701030505	Plum Creek-Oologah Lake	52	47
1253	110902030106	Upper Hog Creek	52	47
1656	111401050102	Billy Creek	52	47
1768	111401050602	Upper Tenmile Creek	52	47
1847	111401070108	Cloudy Creek	52	47

Table 3. UWA 50 Highest Ranked Western Watersheds.

Map ID #	HUC12	Name	Category I Ranking	Western Watershed Ranking
1752	111302080402	Waurika Lake-Beaver Creek	10	1
1430	111203030303	Tom Steed Reservoir	20	2
327	111303020508	Ft Cobb Reservoir-Cobb Creek	27	3
1129	111002030510	Lower Fort Supply Lake-Wolf Creek	35	4
1685	111302020309	Town of Temple-East Cache Creek	49	5
486	111303020507	Willow Creek	60	6
1142	111003010708	Lake Overholser-North Canadian River	64	7
1997	111302030610	Outlet West Cache Creek	66	8
1045	111003010503	111003010503-North Canadian River	73	9
238	111003030103	Arcadia Lake-Deep Fork of Canadian River	82	10
623	110400080611	110400080611-Cimarron River	84	11
651	110400080104	Stink Creek-Cimarron River	84	11
659	110600020402	Turkey Creek	84	11
667	110600030304	Middle Driftwood Creek	84	11
668	110600030306	Lower Driftwood Creek	84	11
712	111001010309	111001010309-North Canadian River	84	11

758	111001020606	Town of Floris-Beaver River	84	11
768	110500010508	110500010508-Cimarron River	84	11
893	110500010507	Gyp Creek-Ewers Creek	84	11
1020	110500020414	Outlet Turkey Creek	84	11
1134	110500020105	Lower Indian Creek	84	11
1200	110500020506	Preacher Creek-Turkey Creek	84	11
1216	111002030502	Buzzard Creek	84	11
1686	111302020209	Lake Ellsworth-East Cache Creek	84	11
1795	111302010105	Irving Corner-Red River	84	11
805	111001020603	111001020603-Beaver River	108	26
1466	111203030403	Quartz Mountain	108	26
2029	111302030305	111302030305-Deep Red Creek	108	26
1577	111303030401	Lake Humphreys	120	29
178	110400020204	Ester Canyon-Cimarron River	124	30
364	111303010206	Spring Creek Lake-Washita River	124	30
369	110902010309	Red Creek-Canadian River	124	30
427	110902010403	Lone Creek	124	30
540	111303020902	Stinking Creek	124	30
626	110600030409	Medicine Lodge River-Salt Fork Arkansas River	124	30
812	111002010510	City of Rosston-Beaver River	124	30
840	111001010805	111001010805-Beaver River	124	30
895	110500010609	Outlet Eagle Chief Creek	124	30
974	111002010610	Town of Fort Supply-Beaver River	124	30
983	110500010704	110500010704-Cimarron River	124	30
1049	110500020503	Upper Cooper Creek	124	30
1102	110500020304	Lower Deep Creek	124	30
1110	111003010704	Shell Creek	124	30
1135	111003010605	Sixmile Creek-North Canadian River	124	30
1148	110500021102	110500021102-Cimarron River	124	30
1171	110500020308	110500020309-Cimarron River	124	30
1198	110500020706	Upper Kingfisher Creek	124	30
1225	111003010702	Fourmile Creek-North Canadian River	124	30
1327	111203020410	Lake Altus-North Fork Red River	124	30
1359	111203030404	City of Warren-North Fork Red River	124	30
1469	111203030406	City of Headrick-North Fork Red River	124	30
1541	111301010305	Salt Valley-Sandy Creek	124	30
1543	111301010307	Town of Lincoln-Sandy Creek	124	30
1549	111302080203	Whiskey Creek	124	30
1684	111302020205	Tahoe Creek-East Cache Creek	124	30
1688	111302080305	Lower Dry Creek	124	30
1821	111301020305	McFarland Springs-Red River	124	30

1856	111302010211	Fleetwood Creek-Red River	124	30
1894	111301020103	Town of Fargo-Red River	124	30
1897	111302010508	Campbell Branch-Red River	124	30
1917	111301020107	Cowboy Springs-Red River	124	30
1941	111302030306	Brush Creek-Deep Red Creek	124	30
1943	111302030602	Upper Blue Beaver Creek	124	30
2028	111302030106	111302030106-Deep Red Creek	124	30
2042	111302030203	Upper Little Deep Red Creek	124	30
2064	111302030105	111302030105-Deep Red Creek	124	30

Literature Cited

National Resources Conservation Service. (2013). Conservation Program Easement Data GIS Layer. Stillwater, OK: National Resources Conservation Service.

Oklahoma Conservation Commission. (1996, July). *Oklahoma's Comprehensive Wetlands Conservation Plan.* Retrieved 2014, from Oklahoma Conservation Commission: http://www.ok.gov/conservation/documents/OK_Comprehensive_Wetlands_Conservation_Plan.pdf

Oklahoma Conservation Commission. (2006). *NPS Management Program 2006 Revision.* Retrieved 2014, from Oklahoma Conservation Commission Water Quality Division SOPs and Methods Reports : http://www.ok.gov/conservation/Agency_Divisions/Water_Quality_Division/WQ_Reports/WQ_Reports_SOPs_and_Methods.html

Oklahoma Department of Environmental Quality. (2012). *Water Quality in Oklahoma: 2012 Integrated Report* . Retrieved 2014, from Oklahoma Department of Environmental Quality: http://www.deq.state.ok.us/WQDnew/305b_303d/2012IRReport/2012%20IR%20document%20-%20Final.pdf

Oklahoma Department of Environmental Quality. (2013, 9 26). Public Water Supply Water Intakes and Wells GIS Layers. Okahoma City, OK: Oklahoma Department of Environmental Quality.

Oklahoma Department of Wildlife Conservation. (2013, 10 23). ODWC State Threatened and Endangered Species Habitat GIS Layer. Oklahoma City, OK: Oklahoma Department of Wildlife Conservation.

Oklahoma Office of the Secretary of Environment. (1998, October 1). *State of Oklahoma Unified Watershed Assessment.* Retrieved 2014, from Oklahoma Department of Environmental Quality: https://www.deq.state.ok.us/WQDnew/pubs/uwa_final.pdf

Oklahoma Water Resources Board. (2011, 4 21). *OWRB Lakes.* Retrieved 2014, from Oklahoma Geographic Information Council GIS Digital Data Online: http://ogi.state.ok.us/ogi/search.aspx

Oklahoma Water Resources Board. (2011, 9 27). Surface Water Water Quality Standards Appendix B Areas GIS Layer. Oklahoma City, OK: Oklahoma Water Resources Board.

Oklahoma Water Resources Board. (2011). Surface Water Water Quality Standards Streams and Lakes GIS Layers. Oklahoma City, Oklahoma: Oklahoma Water Resources Board.

Oklahoma Water Resources Board. (2014). *Oklahoma Water Quality Standards Chapter 45.* Retrieved 2014, from Oklahoma Water Resources Board: http://www.owrb.ok.gov/util/rules/pdf_rul/current/Ch45.pdf

United States Environmental Protection Agency. (2014, 8 3). *Section 319 Nonpoint Source Success Stories*. Retrieved 2014, from U.S. Environmental Protection Agency Office of Watersheds, Oceans, and Wetlands: http://water.epa.gov/polwaste/nps/success319/

United States Fish and Wildlife Service. (2013, 10 22). USFWS Threatened and Endangered Species GIS Layer. Tulsa, Oklahoma: United States Fish and Wildlife Service.

United States Geological Survey. (2006). *WaterbodiesHR--National Hydrography Dataset (NHD)-High-resolution.* Retrieved 2014, from United States Geological Survey: http://pubs.usgs.gov/ds/270/data/DVD-1/METADATA/WaterbodiesHR.htm

Appendix: Data Tables for Category I Watersheds

Category I Watersheds Raw Data Used in Scoring.

Map ID #	HUC 12 #	HUC 12 Name	Impaired Streams (m)	Impaired Lakes (m equiv.)	Total Impaired (miles)	% Impaired	PWS Intakes	PWS Population Served	Scenic River	ORW	HQW	SWS	NLW	Fed Listed T&E	Fed Candidate T&E	State T&E	Total T&E	USFWS Priority Wetland	Appendix B Acres	App B % of HUC12	# of LEAs	Total NRCS Easements	Total NRCS Easement (Acres)	NRCS Easements % of HUC	Other Conservation Programs	HUC Location
1239	110400011006	Carrizozo Cr.-Dry Cimarron Riv.	9415		26.9	5.85					HQW						0		78	0.23				0.00		West
101	110400020101	Upper Cold Springs Cr.	17326		46.4	10.77					HQW						0			0.00				0.00		West
61	110400020202	Upper Carrizo Cr.	21383	2706	78.7	14.97							NLW				0		600	2.24				0.00		West
178	110400020204	Ester Canyon-Cimarron Riv.	14675		41.9	9.12					HQW						0			0.00				0.00		West
615	110400070508	Crooked Cr.	8825		29.5	5.48								1	1		2			0.00				0.00		West
651	110400080104	Stink Cr.-Cimarron Riv.	28562		91.7	17.75								1	1		2			0.00				0.00		West
623	110400080611	Cimarron Riv.	6765		8.3	4.20								1	1		2			0.00				0.00		West
976	110500010402	Lower Traders Cr.	16744		58.1	10.40								1	1		2			0.00				0.00		West
893	110500010507	Gyp Cr.-Ewers Cr.	30471		99.4	18.93								1			1			0.00	1			0.00		West
768	110500010508	Cimarron Riv.	17140		20.7	10.65								1			1			0.00				0.00		West
895	110500010609	Outlet Eagle Chief Cr.	17526		49.4	10.89								1			1			0.00	1			0.00		West
983	110500010704	Cimarron Riv.	14328		15.3	8.90								1			1			0.00				0.00		West
1134	110500020105	Lower Indian Cr.	17477		19.4	10.86								1			1			0.00	1			0.00		West
1102	110500020304	Lower Deep Cr.	18277		45.1	11.36								1			1			0.00	1			0.00		West
1171	110500020308	Cimarron Riv.	10910		33.4	6.78								1			1	Clear Boggy		0.00	1			0.00		West
1081	110500020411	Buffalo Cr.	22475		62.2	13.97								1			1			0.00				0.00		West
1172	110500020413	Little Turkey Cr.	18223		20.4	11.32								1			1			0.00				0.00		West
1020	110500020414	Outlet Turkey Cr.	30331		36.0	18.85								1			1			0.00				0.00		West
1049	110500020503	Upper Cooper Cr.	29445		99.9	18.30								1			1			0.00				0.00		West
1200	110500020506	Preacher Cr.-Turkey Cr.	13862		22.8	8.61								1			1	Clear Boggy		0.00				0.00		West
1198	110500020706	Upper Kingfisher Cr.	17216		28.4	10.70											0			0.00				0.00		West
1227	110500020709	Dead Indian Cr.	51365		129.7	31.92											0			0.00				0.00		West
1170	110500020710	Middle Kingfisher Cr.	19133		60.5	11.89											0			0.00				0.00		West
1144	110500020712	Trail Cr.	23909		53.3	14.86											0			0.00				0.00		West
1180	110500020810	Outlet Cottonwood Cr.	17636		59.0	10.96											0			0.00				0.00		West
1207	110500021003	Upper Otter Cr.	18393		56.2	11.43											0			0.00				0.00		West
1106	110500021101	Cimarron Riv.	6548		17.0	4.07								1			1	Clear Boggy		0.00				0.00		West
1148	110500021102	Cimarron Riv.	16646		41.3	10.34								1			1	Clear Boggy		0.00				0.00		West
543	110500030102	Lake Carl Blackwell-Stillwater Cr.		34004	103.5	0.00						SWS					0			0.00				0.00		East
437	110500030103	Lake McMurtry		22688	77.7	0.00	2	39430				SWS					0			0.00				0.00		East
493	110500030107	Little Stillwater Cr.	22392		78.0	13.91											0			0.00				0.00		East
499	110500030508	Upper Salt Cr.		28803	89.4	0.00	1	3935									0			0.00				0.00		East
500	110500030509	Lower Salt Cr.-Cimarron Riv.		67693	84.0	0.00											0			0.00				0.00		East
669	110600010306	Lower Beaver Cr.		22822	52.5	0.00											0		4306	30.41		1	63	0.44		East
627	110600010501	Kaw Lake Dam		58909	89.8	0.00	2	41300									0			0.00				0.00		East
659	110600020402	Turkey Cr.	33420		99.4	20.77							NLW				0			0.00				0.00		West
667	110600030304	Middle Driftwood Cr.	37729		101.9	23.44							NLW				0			0.00				0.00		West

Map ID #	HUC 12 #	HUC 12 Name	Impaired Streams (m)	Impaired Lakes (m equiv.)	Total Impaired (miles)	% Impaired	PWS Intakes	PWS Population Served	Scenic River	ORW	HQW	SWS	NLW	Fed Listed T&E	Fed Candidate T&E	State T&E	Total T&E	USFWS Priority Wetland	Appendix B Acres	App B % of HUC12	# of LEAs	Total NRCS Easements	Total NRCS Easement (Acres)	NRCS Easements % of HUC	Other Conservation Programs	HUC Location
668	110600030306	Lower Driftwood Cr.	28817		68.0	17.91							NLW				0			0.00				0.00		West
626	110600030409	Medicine Lodge Riv.-Salt Fork Arkansas Riv.	21684		52.7	13.47							NLW				0			0.00				0.00		West
88	110600040205	Little Sandy-Sandy Cr.	11075		21.3	6.88							NLW				0			0.00				0.00		West
164	110600040406	Middle Crooked Cr.	27722		65.4	17.23											0			0.00	1			0.00		West
67	110600040407	Lower Crooked Cr.	17294		48.8	10.75											0			0.00	1	1	75	0.41		West
69	110600040606	Middle Pond Cr.	22700		64.1	14.11											0			0.00	1			0.00		West
92	110600040808	Tonkawa-Salt Fork Arkansas Riv.	22174		39.3	13.78											0	Deep Fork		0.00				0.00		East
210	110600040903	Lower Bois d' Arc Cr.	42921		132.0	26.67											0			0.00				0.00		East
822	110600050606	Rock Falls-Chikaskia Riv.	20587		63.7	12.79	1	9241									0			0.00	1			0.00		West
775	110600050702	Headwaters Bitter Cr.	7178		18.4	4.46											0			0.00	1			0.00		East
902	110600050704	Scatter-Bitter Cr.	42568		96.7	26.45											0			0.00	1	4	807	4.23		East
733	110600050707	Duck Cr.	56435		159.1	35.07											0			0.00	1	1	8	0.02		East
774	110600050708	City of Blackwell-Chikaskia Riv.	45859		89.6	28.50											0			0.00	1	1	116	0.52		East
897	110600060402	Black Bear Cr.	36334		89.9	22.58											0			0.00				0.00		West
826	110600060505	Upper Camp Cr.	17856	13473	107.0	19.47	1	150									0			0.00				0.00		East
702	110600060708	Waresha Cr.-Arkansas Riv.		43372	75.6	0.00											0		1728	7.37				0.00		East
703	110600060709	Mud Cr.-Arkansas Riv.		40611	91.3	0.00											0		417	1.68				0.00		East
221	110701030207	Claymore Cr.-Verdigris Riv.	1314		2.1	0.82									1	1	2			0.00				0.00		East
79	110701030309	Steamboat Mound-Verdigris Riv.	26859	2548	94.3	18.27	1	456							1	1	2		1911	8.08		1	213	0.90		East
116	110701030503	Overcup Bottoms-Oologah Lake	3429	42608	76.7	28.61	1	5566							1	1	2		8016	33.52		1	27	0.11		East
198	110701030505	Plum Cr.-Oologah Lake	26208	42780	92.6	42.87									1	1	2		3628	11.69				0.00		East
174	110701030507	Spencer Cr.-Oologah Lake	6933	50938	103.2	35.96	2	1964				SWS			1		1		3486	10.53				0.00		East
154	110701030508	Blue Cr.-Oologah Lake		36424	74.4	0.00	5	538606							1		1			0.00				0.00		East
1031	110701050104	Cat Cr.-Dog Cr.	23379		55.4	14.53											0			0.00		1	2	0.02		East
194	110701060408	Lower Copan Lake-Little Caney Riv.		25319	60.3	0.00	1	1159				SWS					0		3486	16.26				0.00		East
114	110701060706	Timberlake Cr.-Caney Riv.	26808		72.7	16.66									2		2			0.00		2	78	0.46		East
1992	110701070302	Lower Birch Cr.		30381	78.8	0.00						SWS					0			0.00				0.00		East
2053	110701070402	Flat Rock Cr.-Bird Cr.	28078		91.4	17.45											0			0.00				0.00		East
2038	110701070404	Ranch Cr.-Bird Cr.	33882		104.3	21.05						SWS					0			0.00				0.00		East
100	110702050605	Town Cr.-Neosho Riv.	648		0.4	0.40								1	2		3			0.00				0.00		East
922	110702060103	Fourmile Cr.	11343		29.1	7.05								1	2	1	4			0.00		1	90	0.46		East
921	110702060204	Ogeechee-Lake O' The Cherokees		56942	138.6	0.00									1	1	2		102	0.30				0.00		East
746	110702060301	Upper Honey Cr.	7438		18.0	4.62					HQW					2	2			0.00				0.00		East
789	110702060304	Lower Honey Cr.		14633	25.4	0.00	2	11732								2	2		46	0.40				0.00		East
920	110702060401	Wolf Cr.-Lake O' The Cherokees		47450	97.5	0.00	1	2800						1		2	3			0.00				0.00		East
788	110702060403	Lower Horse Cr.-Lake O' The Cherokees	1922	30529	64.8	20.16	2	3912								2	2		108	0.47				0.00		East
957	110702060405	Woodward Hollow-Lake O' The Cherokees		42180	56.8	0.00	2	733						1		2	3			0.00				0.00		East
876	110702060406	Pensacola Dam-Lake O' The Cherokees		41100	78.2	0.00	5	18565						1		2	3		32	0.13				0.00		East
139	110702071001	Fivemile Cr.	9278		31.5	5.77								2	2	1	5			0.00				0.00		East

Map ID #	HUC 12 #	HUC 12 Name	Impaired Streams (m)	Impaired Lakes (m equiv.)	Total Impaired (miles)	% Impaired	PWS Intakes	PWS Population Served	Scenic River	ORW	HQW	SWS	NLW	Fed Listed T&E	Fed Candidate T&E	State T&E	Total T&E	USFWS Priority Wetland	Appendix B Acres	App B % of HUC12	# of LEAs	Total NRCS Easements	Total NRCS Easement (Acres)	NRCS Easements % of HUC	Other Conservation Programs	HUC Location
159	110702071002	Willow Cr.-Spring Riv.	2498		4.6	1.55								2	2	1	5			0.00				0.00		East
175	110702071005	Flint Branch-Spring Riv.	17774	8562	83.2	16.36								2	2	1	5			0.00				0.00		East
708	110702090206	Lower Big Cabin Cr.	26183		82.8	16.27											0			0.00		1	3	0.01		East
838	110702090306	Upper Spavinaw Cr.	9257		23.2	5.75						SWS	NLW	1		2	3			0.00	1			0.00	CREP, Land Legacy	East
786	110702090308	Spavinaw Cr. Middle	33823		112.7	21.02						SWS	NLW	1		2	3		62	0.20	1			0.00	CREP, Land Legacy	East
836	110702090311	Rattlesnake Cr.-Eucha Lake		23706	64.6	0.00						SWS	NLW	1	1	2	4		2003	10.64	1	3	749	3.98	CREP, Land Legacy	East
915	110702090505	Little Saline	16903		53.9	10.50								1		2	3			0.00				0.00		East
997	110702090704	Mission Bend-Neosho Riv.	11711	1448	36.1	8.18							NLW		1		1			0.00				0.00		East
831	110702090803	Upper Fort Gibson Lake		44761	89.1	0.00	2	13550					NLW		1		1		1242	4.35				0.00		East
871	110702090804	Middle Fort Gibson Lake		37858	79.7	0.00	3	2385					NLW		1	1	2		7641	29.80				0.00		East
950	110702090809	Lower Fort Gibson Lake Dam		55595	84.6	0.00	4	47866			HQW		NLW		1	1	2		8830	34.78				0.00		East
224	110902010106	Lower Commission Cr.	17868		52.4	11.10								1			1		1485	9.24				0.00		West
369	110902010309	Red Cr.-Canadian Riv.	27967		72.6	17.38								1			1			0.00				0.00		West
427	110902010403	Lone Cr.	20924		69.6	13.00								1			1			0.00				0.00		West
274	110902010505	Squirrel Cr.-Canadian Riv.	44891		113.3	27.89								1			1			0.00				0.00		West
1298	110902020406	Outlet Canadian Sandy Cr.	37381		77.5	23.23								1			1			0.00				0.00		East
1511	110902020501	Willow Cr.	14428		48.2	8.97								1			1			0.00				0.00		East
1293	110902030103	Elm Cr.	19061	13736	80.2	20.38	1	621590				SWS	NLW				0			0.00				0.00		East
1253	110902030106	Upper Hog Cr.	24909		77.7	15.48						SWS	NLW				0			0.00				0.00		East
1291	110902030108	Clear Cr.		32908	62.5	0.00	3	146367				SWS	NLW				0		5842	29.10				0.00		East
1300	110902030204	Bruno Cr.	16456		32.9	10.23											0			0.00				0.00		East
1517	110902030311	Little Riv.	37770		98.3	23.47											0			0.00				0.00		East
1404	110902040104	Middle Mill Cr.	18825		51.3	11.70								1			1		532	5.17		1	20	0.19		East
1497	110902040105	Lower Mill Cr.		15156	45.4	0.00								1			1		2527	18.75				0.00		East
1405	110902040208	Eufaula Lake-Canadian Riv.		65094	143.8	0.00								1			1		9458	20.81	1	1	329	0.72		East
1408	110902040307	Cedar Cr.-Gains Cr.	30967		82.3	19.24											0	Deep Fork		0.00	1			0.00		East
1500	110902040308	Boiling Springs-Gains Cr.	18162		61.3	11.29											0	Deep Fork		0.00	1			0.00		East
1267	110902040309	Adamson-Gains Cr.	15654	5602	44.7	13.21	1	6888									0	Deep Fork	2525	21.24	1			0.00		East
1378	110902040602	Buffalo Cr.-Eufaula Lake		24785	51.5	0.00											0		693	4.26	1			0.00		East
1308	110902040606	Fin & Feather Lake-Eufaula Lake		71466	127.7	0.00	1	3353									0			0.00	1			0.00		East
1450	110902040607	Arrowhead State Park-Eufaula Lake		47340	75.2	0.00	1	220						1			1		2501	8.46	1			0.00		East
712	111001010309	North Canadian Riv.	20830		71.1	12.94					HQW						0			0.00				0.00		West
840	111001010805	Beaver Riv.	22528		36.6	14.00											0			0.00				0.00		West
932	111001020510	Beaver Riv.	31072		88.3	19.31											0			0.00				0.00		West
805	111001020603	Beaver Riv.	11153		36.8	6.93											0		4413	22.71		1	155	0.80		West
758	111001020606	Town of Floris-Beaver Riv.	12854		29.5	7.99											0		6592	41.41				0.00		West
761	111001020609	City of Beaver-Beaver Riv.	12380		40.0	7.69											0		1617	8.61				0.00		West
1068	111001040504	Sand Draw-Palo Duro Cr.	13751		39.7	8.54											0			0.00				0.00		West
718	111002010402	Kiowa Cr.	5612		16.1	3.49											0			0.00				0.00		West
723	111002010408	Kiowa Cr.	13591		28.3	8.45											0			0.00				0.00		West

Map ID #	HUC 12 #	HUC 12 Name	Impaired Streams (m)	Impaired Lakes (m equiv.)	Total Impaired (miles)	% Impaired	PWS Intakes	PWS Population Served	Scenic River	ORW	HQW	SWS	NLW	Fed Listed T&E	Fed Candidate T&E	State T&E	Total T&E	USFWS Priority Wetland	Appendix B Acres	App B % of HUC12	# of LEAs	Total NRCS Easements	Total NRCS Easement (Acres)	NRCS Easements % of HUC	Other Conservation Programs	HUC Location
968	111002010504	Upper Duck Pond Cr.	37792		46.5	23.48											0			0.00				0.00		West
812	111002010510	City of Rosston-Beaver Riv.	20272		48.9	12.60											0			0.00	1			0.00		West
934	111002010606	Beaver Riv.	10242		28.5	6.36											0			0.00				0.00		West
974	111002010610	Fort Supply-Beaver Riv.	27887		81.0	17.33											0		5397	15.24				0.00		West
1216	111002030502	Buzzard Cr.	16262		56.7	10.10						SWS	NLW				0			0.00				0.00		West
1129	111002030510	Lower Fort Supply Lake-Wolf Cr.	8928	9707	25.3	11.58						SWS	NLW				0		3385	17.73				0.00		West
1073	111003010105	Outlet Persimmon Cr.	21606		44.0	13.43											0			0.00				0.00		West
1044	111003010204	Boiling Springs Cr.-North Canadian Riv.	8364		7.8	5.20											0		788	2.48				0.00		West
1041	111003010205	Upper Indian Cr.	7856		14.9	4.88											0			0.00				0.00		West
1218	111003010206	Lower Indian Cr.	19587		37.9	12.17											0			0.00				0.00		West
1096	111003010304	Bent Cr.	17208		46.1	10.69											0			0.00				0.00		West
1193	111003010402	North Canadian Riv.	14181		45.9	8.81											0			0.00				0.00		West
1191	111003010404	North Canadian Riv.	10184		8.7	6.33											0			0.00	1			0.00		West
1099	111003010408	Lower Canton Lake	2512	15360	55.7	11.11											0		8710	20.12	1			0.00		West
1221	111003010501	Minnehaha Cr.	12689		38.3	7.88							NLW				0			0.00				0.00		West
1045	111003010503	North Canadian Riv.	21214		36.7	13.18							NLW				0		794	2.71				0.00		West
1135	111003010605	Sixmile Cr.-North Canadian Riv.	20510		70.8	12.74							NLW				0			0.00				0.00		West
1225	111003010702	Fourmile Cr.-North Canadian Riv.	16248	2887	46.7	11.89							NLW				0			0.00				0.00		West
1110	111003010704	Shell Cr.	15245		52.6	9.47							NLW				0			0.00				0.00		West
1142	111003010708	Lake Overholser-North Canadian Riv.	14480	2099	26.1	10.30	1	621590					NLW				0		52	0.46				0.00		West
1512	111003020105	Crooked Oak Cr.-North Canadian Riv.	38549		49.1	23.95											0			0.00				0.00		East
1438	111003020204	Kishketon Lake-North Canadian Riv.	31902		86.1	19.82											0			0.00				0.00		East
1255	111003020401	Magnolia Cr.-Wewoka Cr.	31250		96.4	19.42											0			0.00				0.00		East
1400	111003020405	City of Wewoka-Wewoka Cr.	27195		94.7	16.90	1	4257									0			0.00				0.00		East
1484	111003020409	Yeager Cr.-Wewoka Cr.	20119		70.0	12.50											0			0.00				0.00		East
1444	111003020505	Greasy Cr.	29778		75.3	18.50											0			0.00				0.00		East
1446	111003020611	Lake Wetumka-North Canadian Riv.	32898	4491	90.5	23.23	1	2221									0			0.00				0.00		East
1375	111003020701	Alabama Cr.	26537		70.9	16.49	1	1014				SWS					0			0.00				0.00		East
1494	111003020702	Bad Cr.	30606		86.1	19.02											0			0.00				0.00		East
1310	111003020707	North Canadian Riv.	41883		137.5	26.02	1	8248									0		1154	3.26				0.00		East
1451	111003020709	Eufaula Lake		30892	103.3	0.00											0		16	0.06				0.00		East
1312	111003020710	Eufaula Lake		72477	88.0	0.00											0		9855	38.31				0.00		East
1531	111003020712	Eufaula Lake		36697	54.5	0.00	2	7391									0			0.00				0.00		East
238	111003030103	Arcadia Lake-Deep Fork of Canadian Riv.	8166	23988	75.0	19.98	1	74668				SWS					0			0.00				0.00		West
594	111003030308	Lower Bellcow Cr.	13050	2726	53.8	9.80						SWS					0	Deep Fork		0.00		3	195	1.49		East
599	111003030708	Brawn's Cr.	22435		56.4	13.94											0			0.00				0.00		East
598	111003031004	Coal Cr.	34916		84.2	21.70											0		306	1.48				0.00		East
459	111003031009	Gentry Cr.	15513	7392	74.4	14.23											0			0.00				0.00		East
405	111003031010	Eufaula Lake		53138	99.9	0.00											0		11062	36.52				0.00		East
602	111003031011	Outlet Deep Fork of Canadian Riv.		70972	80.3	0.00	1	1325									0		1833	9.43				0.00		East

Map ID #	HUC 12 #	HUC 12 Name	Impaired Streams (m)	Impaired Lakes (m equiv.)	Total Impaired (miles)	% Impaired	PWS Intakes	PWS Population Served	Scenic River	ORW	HQW	SWS	NLW	Fed Listed T&E	Fed Candidate T&E	State T&E	Total T&E	USFWS Priority Wetland	Appendix B Acres	App B % of HUC12	# of LEAs	Total NRCS Easements	Total NRCS Easement (Acres)	NRCS Easements % of HUC	Other Conservation Programs	HUC Location
456	111101010111	Nickel Cr.	31295		87.0	19.45											0			0.00				0.00		East
349	111101010303	Harlow Cr.-Arkansas Riv.	26841		74.7	16.68											0			0.00				0.00		East
601	111101010304	Mooser Cr.-Arkansas Riv.	37265		67.2	23.16											0			0.00				0.00		East
1116	111101020102	Headwaters Elk Cr.	13825		45.9	8.59											0			0.00				0.00		East
1118	111101020303	Upper Cody Cr.	18597		62.7	11.56											0			0.00				0.00		East
1067	111101020307	Horseshoe Lake-Arkansas Riv.	17984		42.0	11.17											0		1495	10.47				0.00		East
1123	111101020312	Sand Cr.-Arkansas Riv.		48199	125.9	0.00											0		6253	17.46				0.00		East
263	111101030502	Sager Cr.	6682		14.3	4.15			SR	ORW			NLW		2	2	4			0.00	1			0.00	CREP	East
514	111101030504	Lower Flint Cr.	22621		77.4	14.06			SR	ORW			NLW		2	2	4			0.00	1			0.00	CREP	East
563	111101030604	Upper Ballard Cr.	5365		6.3	3.33			SR	ORW			NLW		2	3	5			0.00	1			0.00	CREP	East
417	111101030605	Lower Ballad Cr.	14405		35.2	8.95			SR	ORW			NLW		2	3	5			0.00	1			0.00	CREP	East
561	111101030702	Lower Fly Cr.	6992		21.2	4.34			SR	ORW			NLW			3	3			0.00	1			0.00	CREP	East
302	111101030804	City of Tahlequah-Illinois Riv.	17687		59.9	10.99	1	18431	SR	ORW			NLW		2	1	3	Illinois River		0.00	1			0.00	CREP	East
301	111101030906	Elk Cr.-Tenkiller Ferry Lake		36913	110.6	0.00	7	22715			HQW		NLW			1	1		2327	6.84	1			0.00	CREP	East
556	111101030907	Tenkiller Ferry Lake Dam	5695	54413	120.5	37.35	10	20406			HQW		NLW			1	1		7898	19.34	1			0.00	CREP	East
358	111101040105	Lower Sallisaw Cr.	14481	7383	74.6	13.59					HQW					2	2			0.00				0.00		East
510	111101040108	Little Sallisaw Cr.	5631	17171	66.1	14.17										2	2			0.00				0.00		East
413	111101040205	Sansbois Cr.	17154		39.6	10.66											0			0.00	1	1	152	1.33		East
353	111101040213	Pruit Valley-Sansbois Cr.	13497	1921	53.2	9.58						SWS					0			0.00	1			0.00		East
509	111101040216	Hancock Mountain		32197	49.6	0.00											0			0.00	1			0.00		East
355	111101040303	Pleasant Cr.		75346	145.7	0.00										2	2		15799	36.65	1			0.00		East
255	111101040305	Robert S. Kerr Dam		53671	69.4	0.00										2	2		672	2.87	1			0.00		East
262	111101040407	Missing Branch-Lee Cr.	13748		37.3	8.54			SR	ORW						2	2			0.00				0.00		East
261	111101040507	Webster Branch-Lee Cr.	4654		11.3	2.89			SR	ORW						2	2			0.00				0.00		East
515	111101040609	Cherokee Chute-Arkansas Riv.	26840		74.4	16.68										2	2		198	0.72	1	1	62	0.23		East
1537	111101050206	Lower Black Fork	39462		87.5	24.52					HQW		NLW			1	1		11001	44.34	1			0.00		East
1265	111101050403	Bandy Cr.	15070	2994	50.0	11.22	1	7675				SWS	NLW				0			0.00	1			0.00		East
1412	111101050409	Pigeon Cr.-Fourche Maline	33243		110.0	20.66							NLW				0			0.00	1	1	160	0.59		East
1349	111101050502	Upper Holson Cr.	8526	19895	67.8	17.66							NLW			1	1		3764	19.61	1			0.00		East
1415	111101050508	Wister Lake Dam		39273	57.5	0.00	1	40010					NLW			1	1		2949	15.82	1			0.00		East
1385	111101050904	Cedar Cr.-Poteau Riv.	18014		50.3	11.19										1	1			0.00	1			0.00		East
1956	111202020303	Cave Cr.	21827		51.4	13.56											0			0.00				0.00		West
2060	111202020405	Spring Branch-Turkey Cr.	12264		34.6	7.62											0			0.00				0.00		West
2059	111202020408	Town of Olustee-111202020408	18515		45.5	11.50											0			0.00				0.00		West
1934	111202020503	Borders Lake	51870		124.0	32.23											0			0.00				0.00		West
1936	111202020504	Salt Fork Red Riv.	21610		67.7	13.43											0			0.00				0.00		West
1356	111203020107	North Fork Red Riv.	4495		4.6	2.79											0			0.00				0.00		West
1323	111203020210	Murtaugh Cr.-Sweetwater Cr.	1817		2.4	1.13											0			0.00				0.00		West
1462	111203020213	Freezeout Cr.-Sweetwater Cr.	24623		72.3	15.30											0			0.00				0.00		West
1505	111203020304	North Fork Red Riv.	16050		25.5	9.97											0			0.00				0.00		West

Map ID #	HUC 12 #	HUC 12 Name	Impaired Streams (m)	Impaired Lakes (m equiv.)	Total Impaired (miles)	% Impaired	PWS Intakes	PWS Population Served	Scenic River	ORW	HQW	SWS	NLW	Fed Listed T&E	Fed Candidate T&E	State T&E	Total T&E	USFWS Priority Wetland	Appendix B Acres	App B % of HUC12	# of LEAs	Total NRCS Easements	Total NRCS Easement (Acres)	NRCS Easements % of HUC	Other Conservation Programs	HUC Location
1420	111203020306	Turkey Cr.	30295		68.4	18.82											0			0.00				0.00		West
1387	111203020307	Cat Cr.-North Fork Red Riv.	22936		40.1	14.25											0			0.00				0.00		West
1422	111203020401	Sand Cr.	21004		24.6	13.05											0			0.00				0.00		West
1463	111203020407	Lake Cr.	21372		57.9	13.28											0			0.00				0.00		West
1467	111203020409	North Fork Red Riv.	25956		63.5	16.13											0			0.00	1			0.00		West
1327	111203020410	Lake Altus-North Fork Red Riv.	14341	13681	62.0	17.41											0		10647	29.76	1			0.00		West
1246	111203030107	Trail Cr.	14595		49.5	9.07											0			0.00				0.00		West
1430	111203030303	Tom Steed Reservoir		25825	40.3	0.00	2	31643				SWS					0		11173	57.79	1			0.00		West
1466	111203030403	Quarts Mountain	23230		43.9	14.43											0		1376	5.61	1			0.00		West
1359	111203030404	City of Warren-North Fork Red Riv.	24854		69.0	15.44											0			0.00	1			0.00		West
1469	111203030406	City of Headrick-North Fork Red Riv.	19280		64.3	11.98											0			0.00	1			0.00		West
1243	111203030502	Headwaters Stinking Cr.	15466		38.5	9.61											0			0.00				0.00		West
1325	111203030507	North Fork Red Riv.	10867		25.2	6.75											0			0.00	1	1	35	0.22		West
1976	111203040108	Lower North Elm Cr.	19378		67.4	12.04											0			0.00				0.00		West
1935	111203040207	Station Cr.	17001		35.8	10.56											0			0.00				0.00		West
2062	111203040208	Sleepy John Cr.-Elm Fork Red Riv.	20813		65.2	12.93											0			0.00				0.00		West
1541	111301010305	Salt Valley-Sandy Cr.	16560		37.7	10.29											0			0.00	1			0.00		West
1543	111301010307	Town of Lincoln-Sandy Cr.	20544		45.2	12.77											0			0.00	1			0.00		West
1894	111301020103	Town of Fargo-Red Riv.	25541		18.2	15.87											0			0.00				0.00		West
1917	111301020107	Cowboy Springs-Red Riv.	38193		27.8	23.73											0			0.00				0.00		West
1874	111301020205	Augur Cr.-Red Riv.	15242		32.1	9.47											0			0.00				0.00		West
1839	111301020206	Curtis Cr.-Red Riv.	14844		44.4	9.22											0			0.00				0.00		West
1918	111301020303	Goat Island-Red Riv.	14614		36.7	9.08											0			0.00				0.00		West
1821	111301020305	McFarland Springs-Red Riv.	19796		18.2	12.30											0			0.00				0.00		West
1919	111301020307	Pumpkin Ridge-Red Riv.	11092		9.9	6.89											0			0.00				0.00		West
1795	111302010105	Irving Corner-Red Riv.	21392		36.3	13.29											0			0.00	1			0.00		West
1856	111302010211	Fleetwood Cr.-Red Riv.	40089		67.5	24.91											0			0.00				0.00		West
1778	111302010314	Mud Cr.	11149		32.8	6.93											0			0.00				0.00		West
1796	111302010502	Panther Cr.-Red Riv.	14403		27.6	8.95											0			0.00				0.00		West
1797	111302010504	Village Cr.-Red Riv.	9667		25.5	6.01											0			0.00		1	416	1.89		West
1897	111302010508	Campbell Branch-Red Riv.	18943		14.8	11.77											0			0.00				0.00		West
1684	111302020205	Tahoe Cr.-East Cache Cr.	27025		71.8	16.79						SWS					0			0.00				0.00		West
1686	111302020209	Lake Ellsworth-East Cache Cr.		42406	140.5	0.00						SWS					0			0.00				0.00		West
1685	111302020309	Town of Temple-East Cache Cr.	32373		103.9	20.12	1	1146				SWS					0			0.00	1	3	167	0.86		West
2064	111302030105	Deep Red Cr.	12788		41.9	7.95											0			0.00	1			0.00		West
2028	111302030106	Deep Red Cr..	11880		23.3	7.38											0			0.00	1			0.00		West
2042	111302030203	Upper Little Deep Red Cr.	31018		70.0	19.27											0			0.00	1			0.00		West
2029	111302030305	Deep Red Cr.	20130		46.1	12.51											0			0.00	1	2	149	1.24		West
1941	111302030306	Brush Cr.-Deep Red Cr.	26024		85.3	16.17											0			0.00	1			0.00		West
1982	111302030402	Unnamed Tributary	15737		51.2	9.78											0			0.00		1	353	3.42		West

Map ID #	HUC 12 #	HUC 12 Name	Impaired Streams (m)	Impaired Lakes (m equiv.)	Total Impaired (miles)	% Impaired	PWS Intakes	PWS Population Served	Scenic River	ORW	HQW	SWS	NLW	Fed Listed T&E	Fed Candidate T&E	State T&E	Total T&E	USFWS Priority Wetland	Appendix B Acres	App B % of HUC12	# of LEAs	Total NRCS Easements	Total NRCS Easement (Acres)	NRCS Easements % of HUC	Other Conservation Programs	HUC Location
1943	111302030602	Upper Blue Beaver Cr.	29492		81.6	18.33											0		3893	19.42	1			0.00		West
1997	111302030610	Outlet West Cache Cr.	14565		19.2	9.05											0			0.00	1	2	260	5.08		West
1549	111302080203	Whiskey Cr.	16531		54.7	10.27						SWS					0			0.00				0.00		West
1548	111302080302	Willow Cr.	25342		57.7	15.75											0			0.00	1			0.00		West
1688	111302080305	Lower Dry Cr.	18179		58.8	11.30											0			0.00	1			0.00		West
1752	111302080402	Waurika Lake-Beaver Cr.		63448	138.6	0.00	4	147890				SWS					0		6938	16.11	1	1	85	0.20		West
10	111302100104	Lake Murray		45228	126.0	0.00	1	11000				SWS					0		19024	52.76				0.00		East
17	111302100304	Delaware Bend-Red Riv.		27722	66.4	0.00											0		14	0.05				0.00		East
37	111302100305	Fobb Bottom-Red Riv.		5647	13.3	0.00											0		4780	20.19				0.00		East
11	111302100505	Denison Dam-Red Riv.		54903	60.9	0.00											0			0.00				0.00		East
364	111303010206	Spring Cr. Lake-Washita Riv.	41465		139.4	25.77											0		6643	15.75				0.00		West
317	111303010405	Middle Cyclone Cr.	12926		35.7	8.03											0			0.00				0.00		West
424	111303010504	Hammon Junction-Washita Riv.	25372		67.0	15.77											0			0.00				0.00		West
572	111303020306	Middle Rainy Mountain Cr.	13346		38.9	8.29											0			0.00	1			0.00		West
486	111303020507	Willow Cr.	14862	2004	37.7	10.48						SWS	NLW				0		595	2.83				0.00		West
327	111303020508	Ft Cobb Reservoir-Cobb Cr.		24204	40.5	0.00	1	6995				SWS	NLW				0		6977	25.66				0.00		West
381	111303020711	Public Service Res. #3-Washita Riv.	28776		85.3	17.88											0			0.00				0.00		West
329	111303020803	McCarty Cr.-Little Washita Riv.	21164	1392	72.9	14.02											0			0.00				0.00		West
540	111303020902	Stinking Cr.	18237		48.7	11.33							NLW				0			0.00				0.00		West
1725	111303030105	Dry Cr.-Washita Riv.	33043		107.7	20.53											0			0.00				0.00		West
1633	111303030112	Happy Hollow Cr.-Washita Riv.	18613		59.5	11.57											0			0.00				0.00		West
1610	111303030310	Wolf Cr.-Washita Riv.	28593		58.2	17.77											0			0.00				0.00		East
1577	111303030401	Lake Humphreys	9563	11299	62.6	12.96	1	29700				SWS					0			0.00				0.00		West
1693	111303030407	Sandy Bear Cr.-Wildhorse Cr.	52894		166.0	32.87											0			0.00				0.00		West
1661	111303030502	Lower Salt Cr.	27469		94.6	17.07											0			0.00				0.00		West
1554	111303030701	Headwaters Caddo Cr.	69373		140.7	43.11											0			0.00				0.00		West
1925	111303040304	Newberry Cr.-Washita Riv.	7441	40072	161.8	29.52											0			0.00				0.00		East
1802	111303040305	Rock Cr.-Washita Riv.		43435	123.6	0.00											0		1634	4.30				0.00		East
1642	111401030304	Atoka Reservoir		66897	144.6	0.00	2	4614				SWS					0		3370	9.40	1			0.00		East
1766	111401030503	Cat Cr.-McGee Cr.		29669	84.0	0.00						SWS					0		14375	57.59	1			0.00		East
1737	111401030504	Middle McGee Cr.	2545	31456	96.7	21.13						SWS					0		13502	56.11	1			0.00		East
1647	111401030505	Lower McGee Cr.	4972	9064	32.4	8.72	1	3396				SWS					0		2764	26.64	1			0.00		East
1656	111401050102	Billy Cr.	14237		47.8	8.85								3		1	4		11502	82.84	1			0.00		East
1678	111401050209	Sardis Lake		46953	85.2	0.00	1	3307				SWS		3			3			0.00	1			0.00		East
1593	111401050404	Lower Pine Cr.	37751		66.9	23.46								3			3			0.00	1			0.00		East
1740	111401050501	Upper Cedar Cr.	16779		42.3	10.43					HQW			3			3		1793	15.10	1			0.00		East
1675	111401050506	Lower One Cr.	21406		48.6	13.30					HQW			3			3		2694	20.47	1			0.00		East
1768	111401050602	Upper Tenmile Cr.	30950		72.2	19.23								3			3			0.00	1			0.00		East
1649	111401050707	Hugo Lake		47144	72.5	0.00								3			3		9035	44.81	1			0.00		East
1708	111401050708	Hugo Lake Dam		48799	113.5	0.00								3			3		1825	5.89	1			0.00		East

Map ID #	HUC 12 #	HUC 12 Name	Impaired Streams (m)	Impaired Lakes (m equiv.)	Total Impaired (miles)	% Impaired	PWS Intakes	PWS Population Served	Scenic River	ORW	HQW	SWS	NLW	Fed Listed T&E	Fed Candidate T&E	State T&E	Total T&E	USFWS Priority Wetland	Appendix B Acres	App B % of HUC12	# of LEAs	Total NRCS Easements	Total NRCS Easement (Acres)	NRCS Easements % of HUC	Other Conservation Programs	HUC Location
26	111401060403	Norwood Cr.	25527		73.5	15.86										1	1		5906	19.86	2	2	2165	7.28		East
47	111401060407	Whitaker Bend Cut off-Red Riv.	37003		39.6	22.99										1	1			0.00	1	2	520	2.06		East
1812	111401070104	Black Fork Cr.	40301		98.2	25.04					HQW			1			1		490	1.69	1			0.00		East
1847	111401070108	Cloudy Cr.	33327		81.1	20.71					HQW			1			1		3008	14.27	1			0.00		East
1867	111401070306	Pine Cr. Lake		51405	104.7	0.00					HQW			1		1	2		2764	11.24	1			0.00		East
1930	111401070307	Cypress Cr.	33287		99.9	20.68					HQW			3	1	1	5			0.00	1			0.00		East
1869	111401070406	Mud Cr.-Rock Cr.	28420		82.1	17.66					HQW			3	1	1	5		151	0.49	2			0.00		East
1893	111401080105	Cedar Cr.-Mountain Fork	4738		6.5	2.94			SR	ORW		SWS		1	1	1	3		1086	4.21	1			0.00		East
1872	111401080202	Beech Cr.-Cow Cr.	47284		124.6	29.38			SR	ORW		SWS		1	1	1	3		14889	48.31	1			0.00		East
1890	111401080207	Big Eagle Cr.	22849		65.5	14.20			SR	ORW		SWS		1	1	1	3			0.00	1			0.00		East
1852	111401080303	Lower Buffalo Cr.	23677		79.2	14.71						SWS		1	1	1	3		14388	72.56	1			0.00		East
1815	111401080305	Holly Cr. Mountain Fork		46782	111.7	0.00						SWS		1	1	1	3		21605	67.07	1			0.00		East
1851	111401080306	Broken Bow Lake Dam		59846	105.7	0.00	1	15375				SWS		1	1	1	3		18543	60.55	1			0.00		East

All Category I Watershed Rankings.

Map ID #	HUC 12 #	HUC 12 Name	% Impaired Score	Pollutant Priority Score	PWS Score	Highest Protected Waterbody Score	NLW Score	Federal and State T&E Score	USFWS Priority Wetland Score	App B % of HUC Score	Conservation Program Score	HUC Location	HUC12 Rank	Category I Rank	East Category I Rank	West Category I Rank
1239	110400011006	Carrizozo Creek-Dry Cimarron River	10	5	0.0	10	0	0	0	3	0	West	360	174	1	143
101	110400020101	Upper Cold Springs Creek	10	5	0.0	10	0	0	0	0	0	West	421	187	2	143
61	110400020202	Upper Carrizo Creek	10	5	0.0	0	10	0	0	3	0	West	360	174	3	143
178	110400020204	Ester Canyon-Cimarron River	10	10	0.0	10	0	0	0	0	0	West	267	124	4	143
615	110400070508	110400070508-Crooked Creek	10	5	0.0	0	0	10	0	0	0	West	421	187	5	143
651	110400080104	Stink Creek-Cimarron River	10	15	0.0	0	0	10	0	0	0	West	172	84	6	143
623	110400080611	110400080611-Cimarron River	15	10	0.0	0	0	10	0	0	0	West	172	84	7	143
976	110500010402	Lower Traders Creek	10	5	0.0	0	0	10	0	0	0	West	421	187	7	143
893	110500010507	Gyp Creek-Ewers Creek	10	15	0.0	0	0	5	0	0	5	West	172	84	7	143
768	110500010508	110500010508-Cimarron River	15	15	0.0	0	0	5	0	0	0	West	172	84	148	1
895	110500010609	Outlet Eagle Chief Creek	10	10	0.0	0	0	5	0	0	5	West	267	124	10	143
983	110500010704	110500010704-Cimarron River	15	10	0.0	0	0	5	0	0	0	West	267	124	10	143
1134	110500020105	Lower Indian Creek	15	10	0.0	0	0	5	0	0	5	West	172	84	12	143
1102	110500020304	Lower Deep Creek	10	10	0.0	0	0	5	0	0	5	West	267	124	13	143
1171	110500020308	110500020309-Cimarron River	10	5	0.0	0	0	5	5	0	5	West	267	124	14	143
1081	110500020411	Buffalo Creek	10	10	0.0	0	0	5	0	0	0	West	421	187	14	143
1172	110500020413	Little Turkey Creek	15	5	0.0	0	0	5	0	0	0	West	421	187	16	143
1020	110500020414	Outlet Turkey Creek	15	15	0.0	0	0	5	0	0	0	West	172	84	17	143
1049	110500020503	Upper Cooper Creek	10	15	0.0	0	0	5	0	0	0	West	267	124	17	143
1200	110500020506	Preacher Creek-Turkey Creek	15	10	0.0	0	0	5	5	0	0	West	172	84	148	2
1198	110500020706	Upper Kingfisher Creek	15	15	0.0	0	0	0	0	0	0	West	267	124	19	143
1227	110500020709	Dead Indian Creek	10	15	0.0	0	0	0	0	0	0	West	421	187	20	143
1170	110500020710	Middle Kingfisher Creek	10	15	0.0	0	0	0	0	0	0	West	421	187	21	143
1144	110500020712	Trail Creek	10	15	0.0	0	0	0	0	0	0	West	421	187	22	143
1180	110500020810	Outlet Cottonwood Creek	10	10	0.0	0	0	0	0	0	0	West	581	242	22	143
1207	110500021003	Upper Otter Creek	10	10	0.0	0	0	0	0	0	0	West	581	242	22	143
1106	110500021101	110500021101-Cimarron River	10	5	0.0	0	0	5	5	0	0	West	421	187	148	3
1148	110500021102	110500021102-Cimarron River	10	10	0.0	0	0	5	5	0	0	West	267	124	25	143
543	110500030102	Lake Carl Blackwell-Stillwater Creek	10	10	0.0	10	0	0	0	0	0	East	267	124	26	143
437	110500030103	Lake McMurtry	10	5	7.5	10	0	0	0	0	0	East	252	118	26	143
493	110500030107	Little Stillwater Creek	10	5	0.0	0	0	0	0	0	0	East	845	273	26	143
499	110500030508	Upper Salt Creek	10	10	4.0	0	0	0	0	0	0	East	505	231	26	143
500	110500030509	Lower Salt Creek-Cimarron River	15	15	0.0	0	0	0	0	0	0	East	267	124	30	143
669	110600010306	Lower Beaver Creek	10	10	0.0	0	0	0	0	5	3	East	360	174	31	143
627	110600010501	Kaw Lake Dam	15	15	7.5	0	0	0	0	0	0	East	156	80	148	4
659	110600020402	Turkey Creek	10	15	0.0	0	10	0	0	0	0	West	172	84	32	143
667	110600030304	Middle Driftwood Creek	10	15	0.0	0	10	0	0	0	0	West	172	84	32	143
668	110600030306	Lower Driftwood Creek	10	15	0.0	0	10	0	0	0	0	West	172	84	32	143

Map ID #	HUC 12 #	HUC 12 Name	% Impaired Score	Pollutant Priority Score	PWS Score	Highest Protected Waterbody Score	NLW Score	Federal and State T&E Score	USFWS Priority Wetland Score	App B % of HUC Score	Conservation Program Score	HUC Location	HUC12 Rank	Category I Rank	East Category I Rank	West Category I Rank
626	110600030409	Medicine Lodge River-Salt Fork Arkansas River	10	10	0.0	0	10	0	0	0	0	West	267	124	32	143
88	110600040205	Little Sandy-Sandy Creek	10	5	0.0	0	10	0	0	0	0	West	421	187	32	143
164	110600040406	Middle Crooked Creek	10	10	0.0	0	0	0	0	0	5	West	421	187	32	143
67	110600040407	Lower Crooked Creek	10	10	0.0	0	0	0	0	0	8	West	360	174	32	143
69	110600040606	Middle Pond Creek	10	10	0.0	0	0	0	0	0	5	West	421	187	39	143
92	110600040808	Town of Tonkawa-Salt Fork Arkansas River	15	15	0.0	0	0	0	5	0	0	East	172	84	39	143
210	110600040903	Lower Bois d' Arc Creek	10	10	0.0	0	0	0	0	0	0	East	581	242	41	143
822	110600050606	Rock Falls-Chikaskia River	10	5	4.0	0	0	0	0	0	5	West	505	231	41	143
775	110600050702	Headwaters Bitter Creek	10	5	0.0	0	0	0	0	0	5	East	581	242	41	143
902	110600050704	Scatter-Bitter Creek	10	15	0.0	0	0	0	0	0	8	East	214	108	41	143
733	110600050707	Duck Creek	10	15	0.0	0	0	0	0	0	8	East	214	108	148	5
774	110600050708	City of Blackwell-Chikaskia River	10	15	0.0	0	0	0	0	0	8	East	214	108	45	143
897	110600060402	110600060402-Black Bear Creek	10	3	0.0	0	0	0	0	0	0	West	961	286	46	143
826	110600060505	Upper Camp Creek	10	5	3.0	0	0	0	0	0	0	East	711	265	47	143
702	110600060708	Waresha Creek-Arkansas River	15	10	0.0	0	0	0	0	3	0	East	360	174	47	143
703	110600060709	Mud Creek-Arkansas River	10	10	0.0	0	0	0	0	3	0	East	509	233	47	143
221	110701030207	Claymore Creek-Verdigris River	15	3	0.0	0	0	10	0	0	0	East	360	174	47	143
79	110701030309	Steamboat Mound-Verdigris River	10	15	3.0	0	0	10	0	3	3	East	95	58	47	143
116	110701030503	Overcup Bottoms-Oologah Lake	15	15	4.0	0	0	10	0	10	3	East	30	21	47	143
198	110701030505	Plum Creek-Oologah Lake	15	15	0.0	0	0	10	0	5	0	East	86	52	53	143
174	110701030507	Spencer Creek-Oologah Lake	15	15	5.0	10	0	5	0	5	0	East	34	24	53	143
154	110701030508	Blue Creek-Oologah Lake	10	15	15.0	0	0	5	0	0	0	East	86	52	148	6
1031	110701050104	Cat Creek-Dog Creek	10	15	0.0	0	0	0	0	0	3	East	360	174	55	143
194	110701060408	Lower Copan Lake-Little Caney River	10	10	4.0	10	0	0	0	5	0	East	133	68	55	143
114	110701060706	Timberlake Creek-Caney River	10	15	0.0	0	0	10	0	0	3	East	140	73	55	143
1992	110701070302	Lower Birch Creek	10	15	0.0	10	0	0	0	0	0	East	172	84	148	7
2053	110701070402	Flat Rock Creek-Bird Creek	10	10	0.0	0	0	0	0	0	0	East	581	242	58	143
2038	110701070404	Ranch Creek-Bird Creek	10	15	0.0	10	0	0	0	0	0	East	172	84	148	8
100	110702050605	Town Creek-Neosho River	15	3	0.0	0	0	15	0	0	0	East	214	108	59	143
922	110702060103	Fourmile Creek	10	3	0.0	0	0	15	0	0	3	East	256	121	60	143
921	110702060204	Ogeechee-Lake O' The Cherokees	10	15	0.0	0	0	10	0	3	0	East	140	73	60	143
746	110702060301	Upper Honey Creek	10	3	0.0	10	0	10	0	0	0	East	214	108	60	143
789	110702060304	Lower Honey Creek	15	5	7.5	0	0	10	0	3	0	East	119	65	60	143
920	110702060401	Wolf Creek-Lake O' The Cherokees	10	15	4.0	0	0	15	0	0	0	East	95	58	60	143
788	110702060403	Lower Horse Creek-Lake O' The Cherokees	10	10	5.0	0	0	10	0	3	0	East	140	73	148	9
957	110702060405	Woodward Hollow-Lake O' The Cherokees	15	15	4.0	0	0	15	0	0	0	East	65	43	65	143
876	110702060406	Pensacola Dam-Lake O' The Cherokees	10	15	12.5	0	0	15	0	3	0	East	33	23	65	143
139	110702071001	Fivemile Creek	10	5	0.0	0	0	15	0	0	0	East	267	124	65	143
159	110702071002	Willow Creek-Spring River	10	3	0.0	0	0	15	0	0	0	East	360	174	65	143

Map ID #	HUC 12 #	HUC 12 Name	% Impaired Score	Pollutant Priority Score	PWS Score	Highest Protected Waterbody Score	NLW Score	Federal and State T&E Score	USFWS Priority Wetland Score	App B % of HUC Score	Conservation Program Score	HUC Location	HUC12 Rank	Category I Rank	East Category I Rank	West Category I Rank
175	110702071005	Flint Branch-Spring River	10	10	0.0	0	0	15	0	0	0	East	172	84	65	143
708	110702090206	Lower Big Cabin Creek	10	15	0.0	0	0	0	0	0	3	East	360	174	65	143
838	110702090306	Upper Spavinaw Creek	10	3	0.0	10	10	15	0	0	5	East	43	29	71	143
786	110702090308	Spavinaw Creek Middle	10	10	0.0	10	10	15	0	3	5	East	15	10	72	143
836	110702090311	Rattlesnake Creek-Eucha Lake	10	15	0.0	10	10	15	0	5	10	East	4	3	148	10
915	110702090505	Little Saline	10	5	0.0	0	0	15	0	0	0	East	267	124	73	143
997	110702090704	Mission Bend-Neosho River	10	5	0.0	0	10	5	0	0	0	East	267	124	148	11
831	110702090803	Upper Fort Gibson Lake	10	15	7.5	0	10	5	0	3	0	East	55	34	148	11
871	110702090804	Middle Fort Gibson Lake	10	10	7.5	0	10	10	0	5	0	East	52	33	148	11
950	110702090809	Lower Fort Gibson Lake Dam	15	15	12.5	10	10	10	0	10	0	East	1	1	148	11
224	110902010106	Lower Commission Creek	10	5	0.0	0	0	5	0	3	0	West	509	233	148	11
369	110902010309	Red Creek-Canadian River	10	15	0.0	0	0	5	0	0	0	West	267	124	148	11
427	110902010403	Lone Creek	10	15	0.0	0	0	5	0	0	0	West	267	124	148	11
274	110902010505	Squirrel Creek-Canadian River	10	5	0.0	0	0	5	0	0	0	West	581	242	148	11
1298	110902020406	Outlet Canadian Sandy Creek	10	15	0.0	0	0	5	0	0	0	East	267	124	148	11
1511	110902020501	Willow Creek	10	10	0.0	0	0	5	0	0	0	East	421	187	148	11
1293	110902030103	Elm Creek	10	15	9.0	10	10	0	0	0	0	East	40	27	148	11
1253	110902030106	Upper Hog Creek	10	15	0.0	10	10	0	0	0	0	East	86	52	148	11
1291	110902030108	Clear Creek	10	15	12.5	10	10	0	0	5	0	East	18	13	148	11
1300	110902030204	Bruno Creek	10	3	0.0	0	0	0	0	0	0	East	961	286	148	11
1517	110902030311	110902030311-Little River	10	3	0.0	0	0	0	0	0	0	East	961	286	148	11
1404	110902040104	Middle Mill Creek	10	10	0.0	0	0	5	0	3	3	East	256	121	74	143
1497	110902040105	Lower Mill Creek	10	5	0.0	0	0	5	0	5	0	East	421	187	74	143
1405	110902040208	Eufaula Lake-Canadian River	10	15	0.0	0	0	5	0	5	8	East	97	60	74	143
1408	110902040307	Cedar Creek-Gains Creek	10	15	0.0	0	0	0	5	0	5	East	172	84	74	143
1500	110902040308	Boiling Springs-Gains Creek	10	15	0.0	0	0	0	5	0	5	East	172	84	74	143
1267	110902040309	Adamson-Gains Creek	10	10	4.0	0	0	0	5	5	5	East	133	68	74	143
1378	110902040602	Buffalo Creek-Eufaula Lake	10	15	0.0	0	0	0	0	3	5	East	214	108	74	143
1308	110902040606	Fin & Feather Lake-Eufaula Lake	15	15	4.0	0	0	0	0	0	5	East	133	68	74	143
1450	110902040607	Arrowhead State Park-Eufaula Lake	15	15	3.0	0	0	5	0	3	5	East	84	51	74	143
712	111001010309	111001010309-North Canadian River	10	15	0.0	10	0	0	0	0	0	West	172	84	148	26
840	111001010805	111001010805-Beaver River	15	15	0.0	0	0	0	0	0	0	West	267	124	148	26
932	111001020510	111001020510-Beaver River	10	15	0.0	0	0	0	0	0	0	West	421	187	148	26
805	111001020603	111001020603-Beaver River	10	15	0.0	0	0	0	0	5	3	West	214	108	83	143
758	111001020606	Town of Floris-Beaver River	10	15	0.0	0	0	0	0	10	0	West	172	84	83	143
761	111001020609	City of Beaver-Beaver River	10	15	0.0	0	0	0	0	3	0	West	360	174	83	143
1068	111001040504	Sand Draw-Palo Duro Creek	10	15	0.0	0	0	0	0	0	0	West	421	187	83	143
718	111002010402	111002010402-Kiowa Creek	10	3	0.0	0	0	0	0	0	0	West	961	286	83	143
723	111002010408	111002010408-Kiowa Creek	10	5	0.0	0	0	0	0	0	0	West	845	273	83	143

Map ID #	HUC 12 #	HUC 12 Name	% Impaired Score	Pollutant Priority Score	PWS Score	Highest Protected Waterbody Score	NLW Score	Federal and State T&E Score	USFWS Priority Wetland Score	App B % of HUC Score	Conservation Program Score	HUC Location	HUC12 Rank	Category I Rank	East Category I Rank	West Category I Rank
968	111002010504	Upper Duck Pond Creek	15	10	0.0	0	0	0	0	0	0	West	421	187	83	143
812	111002010510	City of Rosston-Beaver River	10	15	0.0	0	0	0	0	0	5	West	267	124	90	143
934	111002010606	111002010606-Beaver River	10	5	0.0	0	0	0	0	0	0	West	845	273	91	143
974	111002010610	Town of Fort Supply-Beaver River	10	15	0.0	0	0	0	0	5	0	West	267	124	148	29
1216	111002030502	Buzzard Creek	10	5	0.0	10	10	0	0	0	0	West	172	84	92	143
1129	111002030510	Lower Fort Supply Lake-Wolf Creek	15	10	0.0	10	10	0	0	5	0	West	56	35	92	143
1073	111003010105	Outlet Persimmon Creek	10	10	0.0	0	0	0	0	0	0	West	581	242	92	143
1044	111003010204	Boiling Springs Creek-North Canadian River	15	3	0.0	0	0	0	0	3	0	West	565	241	148	30
1041	111003010205	Upper Indian Creek	10	5	0.0	0	0	0	0	0	0	West	845	273	148	30
1218	111003010206	Lower Indian Creek	10	10	0.0	0	0	0	0	0	0	West	581	242	148	30
1096	111003010304	Bent Creek	10	10	0.0	0	0	0	0	0	0	West	581	242	148	30
1193	111003010402	111003010402-North Canadian River	10	5	0.0	0	0	0	0	0	0	West	845	273	148	30
1191	111003010404	111003010404-North Canadian River	15	3	0.0	0	0	0	0	0	5	West	509	233	148	30
1099	111003010408	Lower Canton Lake	10	5	0.0	0	0	0	0	5	5	West	421	187	148	30
1221	111003010501	Minnehaha Creek	10	3	0.0	0	10	0	0	0	0	West	509	233	148	30
1045	111003010503	111003010503-North Canadian River	15	10	0.0	0	10	0	0	3	0	West	140	73	148	30
1135	111003010605	Sixmile Creek-North Canadian River	10	10	0.0	0	10	0	0	0	0	West	267	124	148	30
1225	111003010702	Fourmile Creek-North Canadian River	10	10	0.0	0	10	0	0	0	0	West	267	124	148	30
1110	111003010704	Shell Creek	10	10	0.0	0	10	0	0	0	0	West	267	124	148	30
1142	111003010708	Lake Overholser-North Canadian River	15	5	9.0	0	10	0	0	3	0	West	107	64	148	30
1512	111003020105	Crooked Oak Creek-North Canadian River	15	15	0.0	0	0	0	0	0	0	East	267	124	148	30
1438	111003020204	Kishketon Lake-North Canadian River	10	15	0.0	0	0	0	0	0	0	East	421	187	148	30
1255	111003020401	Magnolia Creek-Wewoka Creek	10	10	0.0	0	0	0	0	0	0	East	581	242	148	30
1400	111003020405	City of Wewoka-Wewoka Creek	10	5	4.0	0	0	0	0	0	0	East	706	264	148	30
1484	111003020409	Yeager Creek-Wewoka Creek	10	10	0.0	0	0	0	0	0	0	East	581	242	148	30
1444	111003020505	Greasy Creek	10	15	0.0	0	0	0	0	0	0	East	421	187	148	30
1446	111003020611	Lake Wetumka-North Canadian River	10	15	4.0	0	0	0	0	0	0	East	354	173	148	30
1375	111003020701	Alabama Creek	10	15	4.0	10	0	0	0	0	0	East	133	68	148	30
1494	111003020702	Bad Creek	10	15	0.0	0	0	0	0	0	0	East	421	187	148	30
1310	111003020707	111003020707-North Canadian River	10	15	4.0	0	0	0	0	3	0	East	253	119	148	30
1451	111003020709	111003020709-Eufaula Lake	10	10	0.0	0	0	0	0	3	0	East	509	233	148	30
1312	111003020710	111003020710-Eufaula Lake	15	15	0.0	0	0	0	0	10	0	East	120	66	148	30
1531	111003020712	111003020712-Eufaula Lake	15	10	5.0	0	0	0	0	0	0	East	267	124	148	30
238	111003030103	Arcadia Lake-Deep Fork of Canadian River	10	10	6.5	10	0	0	0	0	0	West	163	82	148	30
594	111003030308	Lower Bellcow Creek	10	3	0.0	10	0	0	5	0	3	East	256	121	148	30
599	111003030708	Brawn's Creek	10	5	0.0	0	0	0	0	0	0	East	845	273	148	30
598	111003031004	Coal Creek	10	10	0.0	0	0	0	0	3	0	East	509	233	148	30
459	111003031009	Gentry Creek	10	15	0.0	0	0	0	0	0	0	East	421	187	148	30
405	111003031010	111003031010-Eufaula Lake	10	15	0.0	0	0	0	0	10	0	East	172	84	148	30

Map ID #	HUC 12 #	HUC 12 Name	% Impaired Score	Pollutant Priority Score	PWS Score	Highest Protected Waterbody Score	NLW Score	Federal and State T&E Score	USFWS Priority Wetland Score	App B % of HUC Score	Conservation Program Score	HUC Location	HUC12 Rank	Category I Rank	East Category I Rank	West Category I Rank
602	111003031011	Outlet Deep Fork of Canadian River	15	15	4.0	0	0	0	0	3	0	East	158	81	148	30
456	111101010111	Nickel Creek	10	5	0.0	0	0	0	0	0	0	East	845	273	148	30
349	111101010303	Harlow Creek-Arkansas River	10	10	0.0	0	0	0	0	0	0	East	581	242	148	30
601	111101010304	Mooser Creek-Arkansas River	10	15	0.0	0	0	0	0	0	0	East	421	187	148	30
1116	111101020102	Headwaters Elk Creek	10	5	0.0	0	0	0	0	0	0	East	845	273	148	30
1118	111101020303	Upper Cody Creek	10	15	0.0	0	0	0	0	0	0	East	421	187	95	143
1067	111101020307	Horseshoe Lake-Arkansas River	10	3	0.0	0	0	0	0	5	0	East	711	265	95	143
1123	111101020312	Sand Creek-Arkansas River	10	15	0.0	0	0	0	0	5	0	East	267	124	95	143
263	111101030502	Sager Creek	10	3	0.0	15	10	15	0	0	5	East	26	18	95	143
514	111101030504	Lower Flint Creek	10	10	0.0	15	10	15	0	0	5	East	11	7	95	143
563	111101030604	Upper Ballard Creek	15	3	0.0	15	10	15	0	0	5	East	15	10	95	143
417	111101030605	Lower Ballad Creek	10	5	0.0	15	10	15	0	0	5	East	20	15	95	143
561	111101030702	Lower Fly Creek	10	3	0.0	15	10	15	0	0	5	East	26	18	95	143
302	111101030804	City of Tahlequah-Illinois River	10	5	6.5	15	10	15	5	0	5	East	7	5	95	143
301	111101030906	Elk Creek-Tenkiller Ferry Lake	10	15	12.5	10	10	5	0	3	5	East	10	6	95	143
556	111101030907	Tenkiller Ferry Lake Dam	10	15	12.5	10	10	5	0	5	5	East	6	4	95	143
358	111101040105	Lower Sallisaw Creek	10	5	0.0	10	0	10	0	0	0	East	172	84	95	143
510	111101040108	Little Sallisaw Creek	10	5	0.0	0	0	10	0	0	0	East	421	187	107	143
413	111101040205	111101040205-Sansbois Creek	10	15	0.0	0	0	0	0	0	8	East	214	108	148	67
353	111101040213	Pruit Valley-Sansbois Creek	10	5	0.0	10	0	0	0	0	5	East	267	124	148	67
509	111101040216	Hancock Mountain	15	10	0.0	0	0	0	0	0	5	East	267	124	148	67
355	111101040303	Pleasant Creek	10	15	0.0	0	0	10	0	10	5	East	56	35	148	67
255	111101040305	Robert S. Kerr Dam	15	15	0.0	0	0	10	0	3	5	East	67	45	148	67
262	111101040407	Missing Branch-Lee Creek	10	3	0.0	15	0	10	0	0	0	East	140	73	148	67
261	111101040507	Webster Branch-Lee Creek	10	3	0.0	15	0	10	0	0	0	East	140	73	108	143
515	111101040609	Cherokee Chute-Arkansas River	10	5	0.0	0	0	10	0	3	8	East	164	83	108	143
1537	111101050206	Lower Black Fork	10	3	0.0	10	10	5	0	10	5	East	43	29	108	143
1265	111101050403	Bandy Creek	10	10	4.0	10	10	0	0	0	5	East	65	43	108	143
1412	111101050409	Pigeon Creek-Fourche Maline	10	15	0.0	0	10	0	0	0	8	East	97	60	108	143
1349	111101050502	Upper Holson Creek	10	15	0.0	0	10	5	0	5	5	East	56	35	108	143
1415	111101050508	Wister Lake Dam	15	15	6.5	0	10	5	0	5	5	East	19	14	108	143
1385	111101050904	Cedar Creek-Poteau River	10	5	0.0	0	0	5	0	0	5	East	421	187	148	73
1956	111202020303	Cave Creek	10	10	0.0	0	0	0	0	0	0	West	581	242	148	73
2060	111202020405	Spring Branch-Turkey Creek	10	15	0.0	0	0	0	0	0	0	West	421	187	148	73
2059	111202020408	Town of Olustee-111202020408	10	15	0.0	0	0	0	0	0	0	West	421	187	148	73
1934	111202020503	Borders Lake	10	15	0.0	0	0	0	0	0	0	West	421	187	148	73
1936	111202020504	111202020504-Salt Fork Red River	10	15	0.0	0	0	0	0	0	0	West	421	187	148	73
1356	111203020107	111203020107-North Fork Red River	15	3	0.0	0	0	0	0	0	0	West	711	265	148	73
1323	111203020210	Murtaugh Creek-Sweetwater Creek	15	3	0.0	0	0	0	0	0	0	West	711	265	148	73

Map ID #	HUC 12 #	HUC 12 Name	% Impaired Score	Pollutant Priority Score	PWS Score	Highest Protected Waterbody Score	NLW Score	Federal and State T&E Score	USFWS Priority Wetland Score	App B % of HUC Score	Conservation Program Score	HUC Location	HUC12 Rank	Category I Rank	East Category I Rank	West Category I Rank
1462	111203020213	Freezeout Creek-Sweetwater Creek	10	15	0.0	0	0	0	0	0	0	West	421	187	148	73
1505	111203020304	111203020304-North Fork Red River	15	3	0.0	0	0	0	0	0	0	West	711	265	148	73
1420	111203020306	Turkey Creek	10	10	0.0	0	0	0	0	0	0	West	581	242	148	73
1387	111203020307	Cat Creek-North Fork Red River	15	5	0.0	0	0	0	0	0	0	West	581	242	148	73
1422	111203020401	Sand Creek	15	3	0.0	0	0	0	0	0	0	West	711	265	148	73
1463	111203020407	Lake Creek	10	10	0.0	0	0	0	0	0	0	West	581	242	148	73
1467	111203020409	111203020409-North Fork Red River	10	5	0.0	0	0	0	0	0	5	West	581	242	148	73
1327	111203020410	Lake Altus-North Fork Red River	10	10	0.0	0	0	0	0	5	5	West	267	124	148	73
1246	111203030107	111203030107-Trail Creek	10	5	0.0	0	0	0	0	0	0	West	845	273	148	73
1430	111203030303	Tom Steed Reservoir	15	10	7.5	10	0	0	0	10	5	West	29	20	148	73
1466	111203030403	Quarts Mountain	10	15	0.0	0	0	0	0	3	5	West	214	108	148	73
1359	111203030404	City of Warren-North Fork Red River	10	15	0.0	0	0	0	0	0	5	West	267	124	148	73
1469	111203030406	City of Headrick-North Fork Red River	10	15	0.0	0	0	0	0	0	5	West	267	124	148	73
1243	111203030502	Headwaters Stinking Creek	10	15	0.0	0	0	0	0	0	0	West	421	187	148	73
1325	111203030507	111203030507-North Fork Red River	10	10	0.0	0	0	0	0	0	8	West	360	174	148	73
1976	111203040108	Lower North Elm Creek	10	5	0.0	0	0	0	0	0	0	West	845	273	148	73
1935	111203040207	Station Creek	10	5	0.0	0	0	0	0	0	0	West	845	273	148	73
2062	111203040208	Sleepy John Creek-Elm Fork Red River	10	15	0.0	0	0	0	0	0	0	West	421	187	148	73
1541	111301010305	Salt Valley-Sandy Creek	10	15	0.0	0	0	0	0	0	5	West	267	124	148	73
1543	111301010307	Town of Lincoln-Sandy Creek	10	15	0.0	0	0	0	0	0	5	West	267	124	148	73
1894	111301020103	Town of Fargo-Red River	15	15	0.0	0	0	0	0	0	0	West	267	124	148	73
1917	111301020107	Cowboy Springs-Red River	15	15	0.0	0	0	0	0	0	0	West	267	124	148	73
1874	111301020205	Augur Creek-Red River	10	15	0.0	0	0	0	0	0	0	West	421	187	148	73
1839	111301020206	Curtis Creek-Red River	10	15	0.0	0	0	0	0	0	0	West	421	187	148	73
1918	111301020303	Goat Island-Red River	10	15	0.0	0	0	0	0	0	0	West	421	187	115	143
1821	111301020305	McFarland Springs-Red River	15	15	0.0	0	0	0	0	0	0	West	267	124	115	143
1919	111301020307	Pumpkin Ridge-Red River	15	10	0.0	0	0	0	0	0	0	West	421	187	115	143
1795	111302010105	Irving Corner-Red River	15	15	0.0	0	0	0	0	0	5	West	172	84	115	143
1856	111302010211	Fleetwood Creek-Red River	15	15	0.0	0	0	0	0	0	0	West	267	124	115	143
1778	111302010314	111302010314-Mud Creek	10	15	0.0	0	0	0	0	0	0	West	421	187	115	143
1796	111302010502	Panther Creek-Red River	10	10	0.0	0	0	0	0	0	0	West	581	242	115	143
1797	111302010504	Village Creek-Red River	10	10	0.0	0	0	0	0	0	3	West	509	233	115	143
1897	111302010508	Campbell Branch-Red River	15	15	0.0	0	0	0	0	0	0	West	267	124	115	143
1684	111302020205	Tahoe Creek-East Cache Creek	10	10	0.0	10	0	0	0	0	0	West	267	124	115	143
1686	111302020209	Lake Ellsworth-East Cache Creek	10	15	0.0	10	0	0	0	0	0	West	172	84	115	143
1685	111302020309	Town of Temple-East Cache Creek	10	15	4.0	10	0	0	0	0	8	West	81	49	115	143
2064	111302030105	111302030105-Deep Red Creek	10	15	0.0	0	0	0	0	0	5	West	267	124	148	105
2028	111302030106	111302030106-Deep Red Creek	10	15	0.0	0	0	0	0	0	5	West	267	124	127	143
2042	111302030203	Upper Little Deep Red Creek	10	15	0.0	0	0	0	0	0	5	West	267	124	148	106

Map ID #	HUC 12 #	HUC 12 Name	% Impaired Score	Pollutant Priority Score	PWS Score	Highest Protected Waterbody Score	NLW Score	Federal and State T&E Score	USFWS Priority Wetland Score	App B % of HUC Score	Conservation Program Score	HUC Location	HUC12 Rank	Category I Rank	East Category I Rank	West Category I Rank
2029	111302030305	111302030305-Deep Red Creek	10	15	0.0	0	0	0	0	0	8	West	214	108	148	106
1941	111302030306	Brush Creek-Deep Red Creek	10	15	0.0	0	0	0	0	0	5	West	267	124	148	106
1982	111302030402	111302030402 Unnamed Tributary	10	15	0.0	0	0	0	0	0	3	West	360	174	148	106
1943	111302030602	Upper Blue Beaver Creek	10	10	0.0	0	0	0	0	5	5	West	267	124	128	143
1997	111302030610	Outlet West Cache Creek	15	15	0.0	0	0	0	0	0	10	West	120	66	128	143
1549	111302080203	Whiskey Creek	10	10	0.0	10	0	0	0	0	0	West	267	124	128	143
1548	111302080302	Willow creek	10	3	0.0	0	0	0	0	0	5	West	711	265	128	143
1688	111302080305	Lower Dry Creek	10	15	0.0	0	0	0	0	0	5	West	267	124	148	110
1752	111302080402	Waurika Lake-Beaver Creek	10	15	15.0	10	0	0	0	5	8	West	15	10	148	111
10	111302100104	Lake Murray	10	10	6.5	10	0	0	0	10	0	East	83	50	148	111
17	111302100304	Delaware Bend-Red River	10	10	0.0	0	0	0	0	3	0	East	509	233	148	111
37	111302100305	Fobb Bottom-Red River	10	3	0.0	0	0	0	0	5	0	East	711	265	148	111
11	111302100505	Denison Dam-Red River	15	15	0.0	0	0	0	0	0	0	East	267	124	148	111
364	111303010206	Spring Creek Lake-Washita River	10	15	0.0	0	0	0	0	5	0	West	267	124	148	111
317	111303010405	Middle Cyclone Creek	10	10	0.0	0	0	0	0	0	0	West	581	242	148	111
424	111303010504	Hammon Junction-Washita River	10	15	0.0	0	0	0	0	0	0	West	421	187	148	111
572	111303020306	Middle Rainy Mountain Creek	10	5	0.0	0	0	0	0	0	5	West	581	242	148	111
486	111303020507	Willow Creek	10	10	0.0	10	10	0	0	3	0	West	97	60	148	111
327	111303020508	Ft Cobb Reservoir-Cobb Creek	15	10	4.0	10	10	0	0	5	0	West	40	27	148	111
381	111303020711	Public Service Reservoir #3-Washita River	10	15	0.0	0	0	0	0	0	0	West	421	187	148	111
329	111303020803	McCarty Creek-Little Washita River	10	5	0.0	0	0	0	0	0	0	West	845	273	148	111
540	111303020902	Stinking Creek	10	10	0.0	0	10	0	0	0	0	West	267	124	148	111
1725	111303030105	Dry Creek-Washita River	10	15	0.0	0	0	0	0	0	0	West	421	187	148	111
1633	111303030112	Happy Hollow Creek-Washita River	10	15	0.0	0	0	0	0	0	0	West	421	187	148	111
1610	111303030310	Wolf Creek-Washita River	10	15	0.0	0	0	0	0	0	0	East	421	187	132	143
1577	111303030401	Lake Humphreys	10	5	6.5	10	0	0	0	0	0	West	255	120	132	143
1693	111303030407	Sandy Bear Creek-Wildhorse Creek	10	5	0.0	0	0	0	0	0	0	West	845	273	132	143
1661	111303030502	Lower Salt Creek	10	10	0.0	0	0	0	0	0	0	West	581	242	132	143
1554	111303030701	Headwaters Caddo Creek	10	10	0.0	0	0	0	0	0	0	West	581	242	132	143
1925	111303040304	Newberry Creek-Washita River	10	15	0.0	0	0	0	0	0	0	East	421	187	132	143
1802	111303040305	Rock Creek-Washita River	10	15	0.0	0	0	0	0	3	0	East	360	174	138	143
1642	111401030304	Atoka Reservoir	10	15	5.0	10	0	0	0	3	5	East	67	45	148	127
1766	111401030503	Cat Creek-McGee Creek	10	15	0.0	10	0	0	0	10	5	East	56	35	148	127
1737	111401030504	Middle McGee Creek	10	15	0.0	10	0	0	0	10	5	East	56	35	148	127
1647	111401030505	Lower McGee Creek	10	5	4.0	10	0	0	0	5	5	East	133	68	148	127
1656	111401050102	Billy Creek	10	5	0.0	0	0	15	0	10	5	East	86	52	148	127
1678	111401050209	Sardis Lake	10	15	4.0	10	0	15	0	0	5	East	25	17	139	143
1593	111401050404	Lower Pine Creek	15	3	0.0	0	0	15	0	0	5	East	140	73	139	143
1740	111401050501	Upper Cedar Creek	10	5	0.0	10	0	15	0	5	5	East	56	35	139	143

Map ID #	HUC 12 #	HUC 12 Name	% Impaired Score	Pollutant Priority Score	PWS Score	Highest Protected Waterbody Score	NLW Score	Federal and State T&E Score	USFWS Priority Wetland Score	App B % of HUC Score	Conservation Program Score	HUC Location	HUC12 Rank	Category I Rank	East Category I Rank	West Category I Rank
1675	111401050506	Lower One Creek	10	5	0.0	10	0	15	0	5	5	East	56	35	148	132
1768	111401050602	Upper Tenmile Creek	10	15	0.0	0	0	15	0	0	5	East	86	52	148	132
1649	111401050707	Hugo Lake	15	15	0.0	0	0	15	0	10	5	East	20	15	148	132
1708	111401050708	Hugo Lake Dam	10	15	0.0	0	0	15	0	3	5	East	67	45	148	132
26	111401060403	Norwood Creek	10	10	0.0	0	0	5	0	5	5	East	172	84	148	132
47	111401060407	Whitaker Bend Cut off-Red River	15	15	0.0	0	0	5	0	0	8	East	97	60	148	132
1812	111401070104	Black Fork Creek	10	15	0.0	10	0	5	0	3	5	East	67	45	148	132
1847	111401070108	Cloudy Creek	10	10	0.0	10	0	5	0	5	5	East	86	52	148	132
1867	111401070306	Pine Creek Lake	10	15	0.0	10	0	10	0	5	5	East	34	24	148	132
1930	111401070307	Cypress Creek	10	10	0.0	10	0	15	0	0	5	East	56	35	142	143
1869	111401070406	Mud Creek-Rock Creek	10	10	0.0	10	0	15	0	3	5	East	43	29	142	143
1893	111401080105	Cedar Creek-Mountain Fork	15	3	0.0	15	0	15	0	3	5	East	31	22	142	143
1872	111401080202	Beech Creek-Cow Creek	10	10	0.0	15	0	15	0	10	5	East	11	7	142	143
1890	111401080207	Big Eagle Creek	10	10	0.0	15	0	15	0	0	5	East	34	24	148	141
1852	111401080303	Lower Buffalo Creek	10	3	0.0	10	0	15	0	10	5	East	43	29	148	141
1815	111401080305	Holly Creek Mountain Fork	10	15	0.0	10	0	15	0	10	5	East	11	7	146	143
1851	111401080306	Broken Bow Lake Dam	15	15	6.5	10	0	15	0	10	5	East	3	2	146	143

APPENDIX C: Changes from 2002 303(d) List

2002 303(d) List as the Benchmark

Many comparisons are made in this report between the status of water quality in the most recently approved 303(d) list (2016) and the status as reported in the 2002 303(d) list. This comparison was established both at the national level for the nonpoint source program, as well as the state level. For many years after 2002, the National Program recognized 2002 as the appropriate benchmark for comparison, and therefore the state kept track of progress compared to that report as well.

The 2002 303(d) list was the first of its kind in Oklahoma to contain assessments from the statewide ambient monitoring programs, developed in the late 1990s, which are still the cornerstone of water quality monitoring in Oklahoma today. Although standards and assessment protocols continue to be updated, many of the methods, criteria, and sites remain the same as in 2002.

2002 is also a good baseline for the Nonpoint Source Program, because it represents a 303(d) list that was largely developed prior to many major changes in both the National NPS Program, as well as Oklahoma's NPS Program. Funding levels increased after 2002, the program became more outcomes-focused, and the Oklahoma NPS Management Program organized itself around it current vision, mission, and strategies at approximately that time.

Although national program measures of success have evolved to include benchmarks beyond 2002, it still sets a strong benchmark for the assessment, planning, education, and implementation programs in Oklahoma's NPS Management Program.

Perhaps with the next major revision of the NPSMP, Oklahoma might add additional benchmarks to its assessment of progress, but its likely that the benchmarks would be additive rather than replacements.

002 303(d) Listed Waterbodies			2004 303(d) Pathogen Impairments	2016 Impairments	Changes Between 2002 and 2016 Summarized										
OKWBID	NAME	Impairments			No action	# TMDLs Developed for 2002 impairments	NPS TMDLs Developed	WBPs	Success Stories	Waterbody Fully Delisted	# Parameters Delisted	Parameters Delisted	DO, N or P or Chlor a Delisted	Turbidity Delisted	Pathogens Delisted
OK120400010070_00	Webbers Falls Lake	turbidity		turbidity	1						0				
OK120400010260_00	Arkansas River	pathogens		not listed		1	entero			1	1	pathogens			1
OK120400020030_00	Dirty Creek, South Fork	DO		benthic macro., Enterococcus, DO, sulfates		1	entero				0				
OK120410010080_00	Arkansas River	TDS, pathogens	Enterococcus	not listed		1	entero			1	1	TDS			
OK120410010190_00	Bixhoma Lake	DO		not listed						1	1	DO	1		
OK120410010210_00	Haikey Creek	pesticides, pathogens	E. coli	benthic macro, diazinon, E. coli, fish bio, DO		1	e coli				0				
OK120420010010_00	Arkansas River	lead	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, turbidity		1	entero				1	lead			
OK120420010030_00	Posey Creek	pesticides		not listed						1	1	pesticides			
OK120420010050_00	Joe Creek	pesticides, cause unknown		benthic Macro							1	pesticides			
OK120420010060_00	Fred Creek	pesticides, pathogens	E. coli	benthic macro, E. coli, fish bio							1	pesticides			
OK120420010070_00	Mosser Creek	pesticides, pathogens	E. coli	benthic macro, E. coli, fish bio							1	pesticides			
OK120420010090_00	Crow Creek	pesticides, cause unknown, pathogens	E. coli	benthic macro, E. coli, fish bio, DO				1			1	pesticides			
OK120420020160_00	Childres Creek	chlorides, TDS		chloride							1	TDS			
OK121300010010_00	Bird Creek	lead, DO, turbidity, pathogens	Enterococcus	Enterococcus, E. coli		2	entero e coli				3	lead, DO, turbidity	1	1	
OK121300010060_00	Ranch Creek	pathogens	E. coli	E. coli		1	e coli				0				
OK121300010150_00	Delaware Creek	pesticides, chlorides, pathogens	Enterococcus, E coli	benthic macro, Enterococcus					1		3	pesticide, chloride, e coli			1
OK121300020080_00	Candy Creek	turbidity, pathogens	Total Fecal Coliform	not listed						1	2	fecal and total coli			1
OK121300030010_00	Bird Creek	turbidity, pathogens	Enterococcus, Total Fecal Coliform	not listed						1	2	fecal and total coli, turbidity		1	1
OK121300030040_00	Birch Lake	DO		DO, turbidity	1						0				
OK121300030200_00	Clear Creek	pathogens	Total Fecal Coliform	not listed						1	1	total fecal coli			1
OK121300030230_00	Pawhuska Lake	DO		not listed						1	1	DO	1		
OK121300030300_00	Bluestem Lake	DO, turbidity		turbidity							1	DO	1		
OK121300030320_00	Bird Creek, North	turbidity, pathogens	Total Fecal Coliform	not listed						1	2	total fecal coli, turbidity		1	1
OK121300040080_00	Skiatook Lake	DO		mercury	1						1	DO	1		
OK121300040280_00	Hominy Creek	chlorides, TDS, turbidity, pathogens	Enterococcus, Total Coliform, Total Fecal Coliform	chloride, Enterococcus, TDS		1	entero				1	turbidity		1	
OK121300040330_00	Hominy Municipal Lake	DO		not listed						1	1	DO	1		
OK121400010010_10	Caney River	lead, turbidity, pathogens		Enterococcus, lead		1	entero				1	turbidity		1	
OK121400010090_00	Rabb Creek	turbidity	Total Fecal Coliform	not listed						1	1	turbidity		1	
OK121400010270_00	Curl Creek	pathogens	Enterococcus, E coli	Enterococcus, DO		1	entero		1		1	e coli			1
OK121400010300_00	Hogshooter Creek	DO, cause unknown, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, E. coli, DO		2	entero e coli		1		1	cause unknown			

002 303(d) Listed Waterbodies			2004 303(d) Pathogen Impairments	2016 Impairments	Changes Between 2002 and 2016 Summarized										
OKWBID	NAME	Impairments			No action	# TMDLs Developed for 2002 impairments	NPS TMDLs Developed	WBPs	Success Stories	Waterbody Fully Delisted	# Parameters Delisted	Parameters Delisted	DO, N or P or Chlor a Delisted	Turbidity Delisted	Pathogens Delisted
OK121400020090_00	Hudson Lake	DO		not listed						1	1	DO	1		
OK121400020140_00	Little Caney River (Caney Creek)	turbidity	Enterococcus	Enterococcus, turbidity		2	turbidity				0				
OK121400030170_00	Buck Creek	pathogens	Enterococcus, E coli	benthic macro, Enterococcus, DO							1	E coli			1
OK121400040010_00	Sand Creek	pathogens	Enterococcus, E. coli, Total Coliform, Total Fecal Coliform	Enterococcus, turbidity		2	entero e coli				1	Ecoli			1
OK121400040050_00	Buck Creek	turbidity		not listed						1	1	turbidity		1	
OK121500010200_00	Verdigris River	lead, turbidity, pathogens	Enterococcus	Enterococcus, turbidity		2	entero				1	lead			
OK121500020090_00	Bull Creek	DO, turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, DO		3	entero e coli turbidity		1		2	e coli, turbidity		1	1
OK121500020150_00	Adams Creek	pathogens	E. coli	benthic macro, E. coli	1						0				
OK121500020260_00	Verdigris River	lead		Enterococcus, turbidity		2	entero turbidity				1	lead			
OK121500020360_00	Dog Creek	DO, cause unknown, pathogens	Enterococcus, E. coli, Total Fecal Coliform	benthic macro, Enterococcus, E. coli, DO		3	entero ecoli DO				1	cause unknown			
OK121500020390_00	Cat Creek	DO, cause unknown, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, E. coli, fish bio, DO, sulfates		1	DO				0				
OK121500030010_00	Verdigris River	lead, pathogens	Enterococcus	Enterococcus		1	Entero				1	lead			
OK121500040010_00	Dog Creek	DO, turbidity		fish bio., DO, pH							1	turbidity		1	
OK121510010020_00	Oologah Lake	turbidity		DO, turbidity	1						0				
OK121510010040_00	Spencer Creek	sulfates, TDS		sulfates, TDS	1						0				
OK121510010110_00	Campbell Creek	sulfates		sulfates, TDS	1										
OK121510010120_00	Plumb Creek	sulfates, TDS		chloride, sulfates, TDS	1										
OK121510010130_00	Lightning Creek	sulfates, TDS, pathogens	E. coli	sulfates, TDS							1	E coli			1
OK121510010140_00	Panther Creek	sulfates, TDS		sulfates, TDS	1						0				
OK121510020010_00	Verdigris River	lead, turbidity, pathogens	Enterococcus	Enterococcus, lead		1	entero				1	turbidity		1	
OK121510020050_00	California Creek	DO	Enterococcus	Enterococcus, DO		1	entero		1		0				
OK121510030010_00	Big Creek	pathogens	Enterococcus, E. coli, Total Coliform	Enterococcus					1		1	E coli			1
OK121600010050_00	Fort Gibson Lake	turbidity		DO							1	turbidity		1	
OK121600010060_00	Ranger Creek	pathogens	Enterococcus, E coli	Enterococcus		2	entero, ecoli		1		1	E coli			1
OK121600010100_00	Fourteenmile Creek	pathogens	Enterococcus, E coli	Enterococcus		1	entero		1		1	E coli			1
OK121600010430_00	Chouteau Creek	DO, turbidity, pathogens	Enterococcus, E. coli, Total Coliform, Total Fecal Coliform	Enterococcus, DO		2	entero ecoli				2	E coli, turbidity		1	1
OK121600020050_00	Chimney Rock Lake	DO		not listed						1	1	DO	1		
OK121600020070_00	Little Saline Creek	pathogens	Enterococcus, E coli	Enterococcus		1	entero ecoli				1	E coli			1
OK121600030020_00	Lake O' the Cherokees	DO		lead, DO				1			0				
OK121600030090_00	Drowning Creek	DO, turbidity, pathogens	Enterococcus, E coli	Enterococcus, E. coli		2	entero ecoli	1			2	DO, turbidity	1	1	

002 303(d) Listed Waterbodies			2004 303(d) Pathogen Impairments	2016 Impairments	Changes Between 2002 and 2016 Summarized										
OKWBID	NAME	Impairments			No action	# TMDLs Developed for 2002 impairments	NPS TMDLs Developed	WBPs	Success Stories	Waterbody Fully Delisted	# Parameters Delisted	Parameters Delisted	DO, N or P or Chlor a Delisted	Turbidity Delisted	Pathogens Delisted
OK121600030160_00	Horse Creek	DO, pH, turbidity, pathogens	E. coli, Total Fecal coliform	ammonia, chloride, E. coli, DO, pH		1	ecoli	1			1	turbidity		1	
OK121600030180_00	Fly Creek	pathogens	Total Fecal Coliform	not listed				1		1	1	total fecal			1
OK121600030190_00	Little Horse Creek	DO, pathogens	Enterococcus, E. coli, Total Fecal Coliform	benthic macro, Enterococcus, E. coli, DO		2	entero ecoli	1			0				
OK121600030320_00	Whitewater Creek	DO		not listed				1		1	1	DO	1		
OK121600030340_00	Cave Springs Branch	chlorides, sulfates, TDS, cause unknown, pathogens	E. coli, Total Fecal coliform	E. coli, TDS		2	entero ecoli	1			3	chlorides, sulfates, cause unknown			
OK121600030440_00	Elk River	pathogens	Enterococcus	not listed		1	entero	1		1	1	enterococcus			1
OK121600030445_00	Honey Creek	pathogens	Enterococcus	Enterococcus, E. coli		2	entero ecoli	1	1		1	e coli			1
OK121600030510_00	Sycamore Creek	pathogens	Enterococcus, E coli	Enterococcus		1	entero	1			1	E coli			1
OK121600040040_00	Hudson Creek	DO, turbidity		DO, turbidity		1	turbidity	1			0				
OK121600040060_00	Tar Creek	lead	Enterococcus	benthic macro, lead		1	entero	1			0				
OK121600040130_00	Cow Creek	DO, turbidity, pathogens	Total Fecal Coliform	DO, turbidity		1	turbidity	1			1	total fecal			1
OK121600040170_00	Fourmile Creek	DO, turbidity, pathogens	Total Fecal Coliform	DO				1			2	turbidity, total fecal		1	1
OK121600040200_00	Russell Creek	DO, pathogens	Total Fecal Coliform	DO, sulfates							1	total fecal			1
OK121600050020_00	Spavinaw Lake	phosphorus, DO		chlorophyll-a, DO, phosphorus		1	phos	1			0				
OK121600050070_00	Eucha Lake (Upper Spavinaw)	phosphorus, DO		chlorophyll-a, DO, phosphorus		1	phos	1			0				
OK121600050160_00	Beaty Creek	pathogens	Enterococcus, E coli	Enterococcus		1	entero	1	1		1	E coli			1
OK121600060010_00	Big Cabin Creek	turbidity		sulfates							1	turbidity		1	
OK121600060080_00	Little Cabin Creek	pathogens	Enterococcus, E coli	Enterococcus, DO		2	entero, e coli		1		1	e coli			1
OK121600060200_00	Bull Creek	sulfates, TDS, DO, turbidity, pathogens	E. coli, Total Fecal coliform	chloride, DO, sulfates, TDS							2	e coli, turbidity		1	1
OK121600060240_00	Pawpaw Creek	sulfates, TDS, DO, pathogens	E. coli, Total Fecal coliform	DO, sulfate, TDS	1						1	E coli			1
OK121600070010_00	Spring River	lead, zinc, turbidity	Enterococcus	lead, turbidity	1						1	zinc			
OK121610000050_00	Pryor Creek	DO, pathogens	Enterococcus, E coli	not listed		1	entero			1	3	DO, Entero, E coli,	1		1
OK121610000090_00	Pryor Creek	DO, turbidity	E. coli	DO, turbidity		1	turbidity		1						
OK121700020020_00	Tenkiller Ferry Lake	phosphorus, DO		DO, phosphorus				1			0				
OK121700020110_00	Chicken Creek	cause unknown		fish bio.				1			0				
OK121700030010_00	Illinois River	phosphorus, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, phosphorus				1	1		1	e coli			1
OK121700030040_00	Tahlequah Creek (Town Branch)	pathogens		E. coli				1			0				
OK121700030280_00	Illinois River	phosphorus		Enterococcus, phosphorus, turbidity				1			0				
OK121700030350_00	Illinois River	phosphorus, turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	phosphorus				1	1		2	entero, e coli, turbidity		1	1

002 303(d) Listed Waterbodies			2004 303(d) Pathogen Impairments	2016 Impairments	Changes Between 2002 and 2016 Summarized										
OKWBID	NAME	Impairments			No action	# TMDLs Developed for 2002 impairments	NPS TMDLs Developed	WBPs	Success Stories	Waterbody Fully Delisted	# Parameters Delisted	Parameters Delisted	DO, N or P or Chlor a Delisted	Turbidity Delisted	Pathogens Delisted
OK121700040010_00	Caney Creek	turbidity, pathogens	Enterococcus	benthic macro, Enterococcus, E. coli				1			1	turbidity		1	
OK121700050010_00	Illinois River, Baron Fork	phosphorus, pathogens	Enterococcus, E. coli, Total Fecal Coliform	phosphorus				1	1		1	e coli, entero			1
OK121700060010_00	Flint Creek	phosphorus, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, phosphorus				1	1		1	e coli			1
OK121700060090_00	Sager Creek	nitrate, pathogens		benthic macro, Enterococcus, sed./silt.				1			1	nitrates	1		
OK220100010010_40	Poteau River	copper, lead, turbidity		cadmium, copper, lead, selenium, silver, turbidity	1						1	copper			
OK220100010050_00	New Spiro Lake	DO		chlorophyll-a, DO, pH				1			0				
OK220100020020_00	Wister Lake	phosphorus		chlorophyll-a, mercury, pH, phosphorus, turbidity		1				0					
OK220100020060_00	Cedar Lake	DO, pH		mercury, DO, pH	1						0				
OK220100030010_00	Brazil Creek	chlorides, TDS, DO, turbidity, pathogens	E. coli	Enterococcus		1	entero				5	chloride, TDS, DO, turbidity, E coli	1	1	1
OK220100040020_00	Fourche Maline Creek	lead, DO, pathogens	Enterococcus	Enteroccoccus, lead, DO		1	entero				0				
OK220100040050_00	Red Oak Creek	sulfates, TDS, DO, pH, turbidity		DO, pH							3	sulfates, TDS, turbidity		1	
OK220100040100_00	Lloyd Church Lake (Wilburton City)	DO, pH, turbidity		mercury, pH, turbidity							1	DO	1		
OK220100040150_00	Wayne Wallace Lake	DO		mercury, DO, pH	1						0				
OK220200020020_00	Robert S. Kerr Lake	turbidity		turbidity	1						0				
OK220200030040_00	Brushy Creek Lake	DO, pH		chlorophyll-a, pH, turbidity							1	DO	1		
OK220200030120_00	Stilwell City Lake	DO		DO, turbidity	1						0				
OK220200040010_40	Sans Bois Creek	DO, turbidity, pathogens		Enterococcus, E. coli, DO		2	entero ecoli				1	turbidity		1	
OK220200040030_00	John Wells Lake (Stigler)	DO		not listed						1	1	DO	1		
OK220200040050_00	Sans Bois Creek, Mountain Fork	pH, pathogens	E. coli	E. coli		1	e coli				0				
OK220600010070_00	Longtown Creek	DO, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, DO		2	entero ecoli				1	E coli			1
OK220600010100_20	Mill Creek	DO, pH, turbidity, pathogens	Total Fecal Coliform	Enterococcus, DO, pH		1	entero		1		2	E coli, total coliform, turbidity		1	1
OK220600010119_10	Canadian River	sulfates, TDS, turbidity	Enterococcus	Enterococcus, fish bio, sed/silt., turbidity		3	entero E coli, turbidity				2	sulfates, TDS			
OK220600010150_00	Pond Creek	chlorides, TDS		not listed						1	2	chloride, TDS			
OK220600020030_00	McAlester Lake	pH		not listed						1	1	pH			
OK220600020050_00	Talawanda 2 Lake	DO, pH		mercury, pH							1	DO	1		
OK220600020060_00	Talawanda 1 Lake	DO, pH		pH							1	DO	1		
OK220600030010_00	Brushy Creek	DO, pH, turbidity, pathogens	Enterococcus, Total Fecal Coliform	Enterococcus, lead, oil and grease, turbidity		1	entero				2	DO, pH	1		

002 303(d) Listed Waterbodies			2004 303(d) Pathogen Impairments	2016 Impairments	Changes Between 2002 and 2016 Summarized										
OKWBID	NAME	Impairments			No action	# TMDLs Developed for 2002 impairments	NPS TMDLs Developed	WBPs	Success Stories	Waterbody Fully Delisted	# Parameters Delisted	Parameters Delisted	DO, N or P or Chlor a Delisted	Turbidity Delisted	Pathogens Delisted
OK220600030010_10	Brushy Creek	DO, pH, turbidity, pathogens		Enterococcus, DO, pH		2	entero ecoli				1	turbidity		1	
OK220600030050_00	Peaceable Creek	DO, pH, turbidity, pathogens	Total Coliform, Total Fecal Coliform	Enterococcus, DO		2	entero ecoli				3	total, fecal coli, pH, turbidity		1	1
OK220600040010_00	Gaines Creek	DO, pH, pathogens		DO, pH							1	pathogens			1
OK220600040030_00	Beaver Creek	DO, pH, turbidity, pathogens	E. coli, Total Fecal coliform	E. coli, oil and grease, DO, pH, turbidity		1	e coli				0				
OK220600040040_00	Pit Creek	sulfates, TDS, DO, pH		DO, pH, sulfates, TDS	1						0				
OK310800010050_00	Texoma Lake, Washita River Arm, Upper	DO		chloride, DO	1						1	DO	1		
OK310800010051_00	Old Channel (of Washita)	chlorides		chloride	1						0				
OK310800010240_00	Oil Creek	pathogens	Total Coliform, Total Fecal Coliform	Enterococcus, DO	1						1	total and fecal coli			1
OK310800020010_00	Washita River	turbidity, pathogens	Enterococcus, Total Fecal Coliform	Enterococcus, lead		1	entero				1	turbidity		1	
OK310800020040_00	Sand Branch	turbidity, pathogens	Total Fecal Coliform	turbidity		1	turbidity				1	total fecal			1
OK310800020190_00	Chigley Sandy Creek	pathogens	Total Fecal Coliform	Enterooccus, fish bio		2	entero ecoli				1	total fecal			1
OK310800030010_06	Caddo Creek	chlorides, TDS		chloride, TDS	1						0				
OK310800030070_00	Ardmore City Lake (City)	DO		not listed						1	1	DO	1		
OK310800030120_00	Site # 18 Lake	DO, pH, turbidity		not listed						1	3	DO, pH, turbidity	1	1	
OK310800030140_00	Jean Neustadt Lake	DO, pH		not listed						1	2	DO, pH	1		
OK310800030265_00	Briar Branch	chlorides, TDS		chloride							1	TDS			
OK310800030280_00	Pruitt Branch	chlorides, TDS		chloride							1	TDS			
OK310800030290_00	Russell Pretty Branch, Trib A!	chlorides, TDS		chloride, TDS	1						0				
OK310810010010_10	Washita River	TDS, turbidity, pathogens	Enterococcus	Enterococcus, turbidity		2	entero, turbidity				1	TDS			
OK310810010020_00	Wildhorse Creek	chlorides, TDS		Enterococcus, E. coli							2	chloride, TDS			
OK310810010090_00	Rush Creek	chlorides, TDS		chloride, Enterococcus, E. coli							1	TDS			
OK310810010186_00	RC Longmire Lake	DO		turbidity							1	DO	1		
OK310810020010_00	Washita River	TDS		Enterococcus, lead, turbidity		1	entero				1	TDS			
OK310810020170_00	Roaring Creek	turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, E. coli, DO		2	entero ecoli				1	turbidity		1	
OK310810020200_00	Laflin Creek	pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, E. coli, fish bio		2	entero ecoli				0				
OK310810020260_00	Stealy Creek!	TDS		chloride							1	TDS			
OK310810030010_00	Wildhorse Creek	chlorides, TDS		chloride, Enterococcus, fish bio		1	entero				1	TDS			
OK310810030130_00	Countyline Creek	chlorides, TDS		chloride							1	TDS			
OK310810030135_00	Pernell School Creek!	TDS		not listed						1	1	TDS			
OK310810030140_00	unn Pernell Creek, North	chlorides, TDS		chloride							1	TDS			
OK310810030145_00	unn Pernell Creek	chlorides, TDS		chloride							1	TDS			

002 303(d) Listed Waterbodies			2004 303(d) Pathogen Impairments	2016 Impairments	Changes Between 2002 and 2016 Summarized										
OKWBID	NAME	Impairments			No action	# TMDLs Developed for 2002 impairments	NPS TMDLs Developed	WBPs	Success Stories	Waterbody Fully Delisted	# Parameters Delisted	Parameters Delisted	DO, N or P or Chlor a Delisted	Turbidity Delisted	Pathogens Delisted
OK310810040010_00	Wildhorse Creek	TDS		not listed						1	1	TDS			
OK310810040015_00	West County Line Creek	chlorides, TDS		chloride							1	TDS			
OK310810040030_00	Black Bear Creek	TDS		not listed						1	1	TDS			
OK310810040050_00	Fuqua Lake	turbidity		turbidity	1						0				
OK310810040140_00	Wildhorse Creek	TDS		benthic macro, Enterococcus, E. coli		3	entero ecoli turbidity		1		1	TDS			
OK310810050010_00	Rush Creek	chlorides, TDS		fish bio.							2	chloride, TDS			
OK310810050040_00	Murray Creek	sulfates, TDS		not listed						1	2	TDS, sulfates			
OK310810050070_00	Unnamed Tributary	chlorides		not listed						1	1	chloride			
OK310810050110_00	Rush Creek, Trib D!	chlorides, TDS		not listed						1	2	chloride, TDS			
OK310820010030_00	Bitter Creek	turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, E. coli		2	entero ecoli				1	turbidity		1	
OK310820010170_00	Jack Hollow Creek	sulfates, TDS		sulfates							1	TDS			
OK310820010230_00	Jack Hollow Creek, Trib A!	sulfates, TDS		not listed						1	2	sulfates, TDS			
OK310820020010_00	Little Washita River	pathogens	Enterococcus, Total Fecal Coliform	Enterococcus, DO, sulfates		1	entero				0				
OK310820020020_00	Rock Creek	sulfates, TDS		not listed						1	2	sulfates, TDS			
OK310820020060_00	Bills Creek, East	sulfates, TDS		not listed						1	2	sulfates, TDS			
OK310820020080_00	Bills Creek, West	sulfates, TDS		sulfates							1	TDS			
OK310820020090_00	Little Rush Creek	chlorides, sulfates, TDS		not listed						1	3	chloride, sulfates, TDS			
OK310820020100_00	Charlie Creek	sulfates, TDS		not listed						1	2	sulfates, TDS			
OK310820020110_00	McCarty Creek	chlorides, sulfates, TDS		chloride, sulfates, TDS	1						0				
OK310820020120_00	Chetonia Creek	sulfates, TDS		not listed						1	2	sulfates, TDS			
OK310820020140_00	Allen's Lake	chlorides, sulfates, TDS		chloride							2	sulfates, TDS			
OK310830010010_00	Washita River	turbidity, pathogens	Enterococcus	Enterococcus, fish bio, sed/silt.		1	entero				1	turbidity		1	
OK310830030010_00	Washita River	turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	chloride, Enterococcus, fish bio, sulfates, TDS		3	entero ecoli turbidity				2	e coli, total fecal, turbidity		1	1
OK310830030010_10	Washita River	turbidity, pathogens		fish bio.		3	entero ecoli turbidity				2	pathogens, turbidity		1	1
OK310830030190_00	Beaver Creek	sulfates		DO, sulfates, TDS		1	entero				0				
OK310830030230_00	Barnitz Creek, West	sulfates, turbidity, pathogens	Enterococcus	Enterococcus, E. coli, fish bio, sulfates, TDS		1	entero				1	turbidity		1	
OK310830060020_00	Fort Cobb Lake	phosphorus		chlorophyll-a, turbidity		2	chlorophyll phosphorus	1			1	phosphorus	1		
OK310830060030_00	Willow Creek	pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, E. coli		2	entero ecoli	1			0				
OK310830060040_00	Lake Creek	DO, turbidity, cause unknown		not listed				1	1	1	3	DO, turbidity, cause unknown	1	1	
OK310840010010_00	Washita River	turbidity, pathogens	Enterococcus, Total Fecal Coliform	Enterococcus, E. coli, fish bio, lead, DO, sed./silt., turbidity		3	entero ecoli turbidity				1	turbidity		1	

002 303(d) Listed Waterbodies			2004 303(d) Pathogen Impairments	2016 Impairments	Changes Between 2002 and 2016 Summarized										
OKWBID	NAME	Impairments			No action	# TMDLs Developed for 2002 impairments	NPS TMDLs Developed	WBPs	Success Stories	Waterbody Fully Delisted	# Parameters Delisted	Parameters Delisted	DO, N or P or Chlor a Delisted	Turbidity Delisted	Pathogens Delisted
OK310840010060_00	Quartermaster Creek	sulfates, turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	benthic macro, Enterococcus, E. coli, fish bio, sulfates, TDS		1	entero ecoli				1	turbidity		1	
OK310840020010_00	Washita River	turbidity		turbidity		1	turbidity				0				
OK311100010190_20	Red River	chlorides, sulfates, turbidity, pathogens	Enterococcus	Enterococcus, lead, selenium, turbidity		2	entero turbidity				2	chlorides, sulfates			
OK311100020010_00	Hickory Creek	pathogens	Enterococcus	Enterococcus	1						0				
OK311100020090_00	Murray Lake, Anadarche Creek Arm, West	DO		DO	1						0				
OK311100030010_00	Walnut Bayou	DO, pathogens	Enterococcus	not listed						1	2	entero, DO	1		1
OK311100040010_00	Mud Creek	DO, turbidity, pathogens	Enterococcus, Total Fecal Coliform	Enterococcus, lead, DO, turbidity		2	entero turbidity				0				
OK311100040060_00	Fox Branch	chlorides		not listed						1	1	chloride			
OK311100040080_00	Mud Creek, West, Lower	DO, turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, E. coli, DO, turbidity		3	entero ecoli turbidity				0				
OK311200000010_00	Red River	selenium, chlorides, sulfates, TDS, turbidity	Enterococcus	chloride, Enterococcus, selenium, sulfates, TDS, turbidity		2	entero turbidity				0				
OK311200000060_00	Cow Creek	TDS, turbidity, pathogens	Enterococcus	Enterococcus, E. coli, turbidity		3	entero ecoli turbidity				1	TDS			
OK311200000080_00	Dry Creek	chlorides, DO, turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, E. coli, DO, turbidity		1	turbidity				1	chloride			
OK311200000110_00	Clarity Creek	oil and grease		lead, oil and grease	1						0				
OK311200000120_00	Willow Creek	oil and grease		oil and grease	1						0				
OK311210000030_00	Walker Creek	chlorides, TDS		chloride							1	TDS			
OK311210000050_00	Little Beaver Creek	TDS		Enterococcus, E. coli, TDS		3	entero ecoli turbidity	1			0				
OK311210000140_00	Whisky Creek	sulfates, pathogens	Enterococcus, E coli	Enterococcus, E. coli		2	entero ecoli				1	sulfates			
OK311210000150_00	Cottonwood Creek	sulfates, turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, E. coli, sulfates		2	entero ecoli				1	turbidity		1	
OK311300010020_00	Cache Creek, East	turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, E. coli, selenium, turbidity		3	entero ecoli turbidity				0				
OK311300010080_00	Walters Lake (Boyer)	turbidity		chlorophyll-a, turbidity	1						0				
OK311300020034_00	Ninemile Creek, middle branch	sulfates		not listed						1	1	sulfates			
OK311300030070_00	Tahoe Creek	turbidity, pathogens	E. coli	E. coli, oil and grease, sulfates		1	entero				1	turbidity		1	
OK311310010010_00	Red River	selenium, chlorides, sulfates, TDS, turbidity, pathogens	Enterococcus, Total Fecal Coliform	chloride, chromium, Enterococcus, E. coli, mercury, sed./silt, sulfates, TDS, turbidity		1	entero				0				

002 303(d) Listed Waterbodies					Changes Between 2002 and 2016 Summarized										
OKWBID	NAME	Impairments	2004 303(d) Pathogen Impairments	2016 Impairments	No action	# TMDLs Developed for 2002 impairments	NPS TMDLs Developed	WBPs	Success Stories	Waterbody Fully Delisted	# Parameters Delisted	Parameters Delisted	DO, N or P or Chlor a Delisted	Turbidity Delisted	Pathogens Delisted
OK311310020010_00	Cache Creek, West	lead, chlorides, sulfates, TDS, turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, E. coli, TDS, turbidity		3	entero ecoli turbidity				3	lead, chloride, sulfate			
OK311310020060_00	Blue Beaver Creek	pathogens	Enterococcus	Enterococcus							0				
OK311310030050_00	Brush Creek	chlorides, sulfates, TDS, DO, turbidit, pathogens	Enterococcus, E. coli, Total Fecal Coliform	chloride, Enterococcus, E. coli, oil and grease, DO, sulfates, TDS, turbidity		3	entero ecoli turbidity				0				
OK311500010020_10	Red River, North Fork	selenium, chlorides, TDS, turbidity, pathogens	Enterococcus	benthic macro, chloride, Enterococcus, E. coli, selenium, TDS		2	entero turbidity				1	turbidity		1	
OK311500010050_00	Stinking Creek	chlorides, sulfates, turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	chloride, Enterococcus, E. coli, nitrates, sulfates, turbidity		3	entero ecoli turbidity				0				
OK311500010110_00	Tepee Creek	chlorides, DO turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	chloride, Enterococcus, E. coli, sulfates, TDS		2	entero ecoli		1		2	DO, turbidity	1	1	
OK311500020040_00	Otter Creek, West	DO, turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, E. coli		2	entero ecoli				2	DO, turbidity	1	1	
OK311500030010_00	Elk Creek	pathogens	Enterococcus	benthic macro, Enterococcus, selenium, turbidity		3	entero ecoli turbidity				0				
OK311500030040_00	Little Elk Creek	DO, turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	benthic macro, Enterococcus, E. coli					1		2	DO, turbidity	1	1	
OK311510010010_00	Red River, North Fork	pathogens	Enterococcus	not listed		2	entero turbidity			1	1	Enterococcus			1
OK311510010090_00	Timber Creek	TDS		benthic macro, Enterococcus, E. coli, DO		3	entero ecoli turbidity				1	TDS			
OK311510020060_00	Turkey Creek	pathogens	Enterococcus, Total Fecal Coliform	Enterococcus		1	entero					total fecal			
OK311600010040_00	Sandy Creek (Lebos)	chlorides, TDS, turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	chloride, Enterococcus, fish bio, selenium, sulfates, TDS, turbidity		2	entero turbidity				1	E coli			1
OK311600020010_00	Red River, Salt Fork	selenium, turbidity, pathogens	Enterococcus, Total Fecal Coliform	chloride, Enterococcus, lead, selenium, sulfates, TDS, turbidity		2	entero ecoli				0				
OK311600020010_10	Red River, Salt Fork	selenium, turbidity, pathogens		Enterooccus, fish bio		1	entero				2	selenium, turbidity		1	
OK311600020110_00	Bitter Creek	pesticides, turbidity, pathogens	Enterococcus	DDT, toxaphene		2	entero turbidity				2	entero, turbidity		1	1

002 303(d) Listed Waterbodies			2004 303(d) Pathogen Impairments	2016 Impairments	Changes Between 2002 and 2016 Summarized										
OKWBID	NAME	Impairments			No action	# TMDLs Developed for 2002 impairments	NPS TMDLs Developed	WBPs	Success Stories	Waterbody Fully Delisted	# Parameters Delisted	Parameters Delisted	DO, N or P or Chlor a Delisted	Turbidity Delisted	Pathogens Delisted
OK311600020140_00	Cave Creek	pathogens	Enterococcus, E coli	Enterococcus, E. coli, sulfates		2	entero ecoli				0				
OK311800000010_00	Red River, Elm Fork	selenium, pathogens	Enterococcus, E. coli, Total Fecal Coliform	benthic macro, chloride, Enterococcus, E. coli, fish bio, lead, selenium		2	entero ecoli				0				
OK311800000070_00	Deer Creek	turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, E. coli, sulfates, turbidity		3	entero ecoli turbidity				0				
OK311800000130_00	Fish Creek	chlorides, sulfates, DO, turbidity, pathogens	Enterococcus, Total Fecal Coliform	chloride, enterococcus, fish bio, sulfates, TDS		1	entero		1		2	DO, turbidity	1	1	
OK410100010010_10	Red River	TDS		Enterococcus, lead							1	TDS			
OK410200010200_00	Little River	zinc, DO, turbidity		DO							2	zinc, turbidity		1	
OK410210020020_00	Pine Creek Lake	pH		lead, mercury, DO, pH	1						0				
OK410210020140_00	Little River	copper, lead, pH, turbidity, pathogens	Enterococcus	copper, lead, pH, silver, turbidity, zinc		2	entero, turbidity				1	entero			1
OK410210040010_00	Little River, Mountain Fork	lead, pathogens	Enterococcus	lead, silver		1	entero				2	lead, entero			
OK410210050020_00	Broken Bow Lake	pH		cadmium, mercury, DO, pH	1						0				
OK410210060010_00	Little River, Mountain Fork	lead, pH, turbidity		lead, silver, turbidity, zinc							1	pH			
OK410210080010_00	Glover River	lead, DO, pathogens	Enterococcus	lead, silver		1	entero		1		2	entero, DO		1	1
OK410300010040_00	Raymond Gary Lake	DO, pH		not listed						1	2	DO, pH	1		
OK410300020020_00	Hugo Lake	turbidity		mercury, pH, turbidity	1						0				
OK410300020220_00	Ozzie Cobb Lake	DO, pH		mercury, pH							1	DO	1		
OK410300030010_20	Kiamichi River	lead, pathogens	Enterococcus	not listed		1	entero			1	0				
OK410300030210_00	Dumpling Creek	pH, turbidity, pathogens	Total Fecal Coliform	pH							2	total fecal, turbidity		1	1
OK410300030270_00	Tenmile Creek	DO, pH, turbidity, pathogens	Total Coliform	benthic macro, DO, pH		1	entero				2	total coli, turbidity		1	1
OK410300030580_00	Pine Creek	pH		pH	1						0				
OK410310010010_00	Kiamichi River	copper, lead		lead, silver							1	copper			
OK410310010070_00	Dry Creek	sulfates, TDS, pathogens	E. coli	not listed						1	3	sulfate, TDS, E coli			1
OK410310010220_00	Carl Albert Lake	DO, pH		mercury, pH							1	DO	1		
OK410310010230_00	Talihina Lake	turbidity		turbidity	1						0				
OK410310020010_10	Kiamichi River	lead, pH		lead, pH, silver, zinc	1						0				
OK410310030090_00	Bolen Creek	chlorides, sulfates, TDS, pH, turbidity, pathogens	E. coli, Total Fecal coliform	pH, sulfates, TDS							3	chloride, e coli, turbidity		1	1
OK410400010010_20	Red River	chlorides, sulfates, TDS, pathogens	Enterococcus, Total Fecal Coliform	Enterococcus		1	entero				3	chloride, sulfates, TDS			

002 303(d) Listed Waterbodies			2004 303(d) Pathogen Impairments	2016 Impairments	Changes Between 2002 and 2016 Summarized										
OKWBID	NAME	Impairments			No action	# TMDLs Developed for 2002 impairments	NPS TMDLs Developed	WBPs	Success Stories	Waterbody Fully Delisted	# Parameters Delisted	Parameters Delisted	DO, N or P or Chlor a Delisted	Turbidity Delisted	Pathogens Delisted
OK410400010070_00	Muddy Boggy Creek	lead, turbidity, pathogens	Enterococcus, Total Fecal Coliform	Enterococcus, E. coli, turbidity		2	entero turbidity				1	lead			
OK410400030010_00	Clear Boggy Creek	lead, turbidity, pathogens	Enterococcus, Total Fecal Coliform	Enterococcus, lead, sed/silt.		1	turbidity				1	turbidity		1	
OK410400040170_00	Lake Creek	arsenic, chromium, lead, chlorides, TDS		chloride							4	arsenic, chromium, lead, TDS			
OK410400050270_10	Muddy Boggy Creek	DO, turbidity	Enterococcus	Enterococcus, E. coli, lead, turbidity		2	entero turbidity				1	DO	1		
OK410400060010_30	Muddy Boggy Creek	chlorides, TDS, pH		chloride, pH							1	TDS			
OK410400070020_00	McGee Lake	DO		mercury, DO, pH	1						0				
OK410400080020_00	Atoka Lake	turbidity		lead, mercury, pH, turbidity	1						0				
OK410600010010_00	Blue River	pathogens	Enterococcus	Enterococcus, E. coli		1	entero				0				
OK410700000230_00	Eastman Creek	turbidity, pathogens		not listed						1	2	pathogens, turbidity		1	1
OK520500010110_00	Canadian River, North	lead, turbidity, pathogens	Enterococcus, Total Fecal Coliform	not listed		2	entero turbidity			1	3	lead, turbidity, entero		1	1
OK520500010170_00	Bad Creek	chlorides, DO		benthic macro, Enterococcus, DO		1	entero		1		1	chloride			
OK520500010200_00	Alabama Creek	chlorides, TDS		chloride, Enterococcus, DO					1		1	TDS			
OK520500010242_00	Clearview Creek	chlorides, TDS		chloride, TDS	1						0				
OK520500010270_00	Wetumka City Lake	turbidity		Enterococcus, mercury							1	turbidity		1	
OK520500010280_00	Flat Rock Creek	DO		not listed						1	1	DO	1		
OK520500020010_00	Wewoka Creek	chlorides, turbidity, cause unknown, pathogens	E. coli, Total Fecal coliform	benthic macro, Enterococcus, turbidity		2	entero turbidity		1		2	chlorides, e coli			1
OK520500020020_00	Greasy Creek	DO, pH, turbidity		DO, pH							1	turbidity		1	
OK520500020027_00	Cheyarha Creek East	chlorides, TDS		chloride							1	TDS			
OK520500020090_00	Little Wewoka Creek	turbidity		Enterococcus					1		1	turbidity		1	
OK520500020230_00	Carter Creek	chlorides, TDS		chloride, TDS	1						0				
OK520500020240_00	Wewoka Creek	nitrate, sulfates		cadmium							2	nitrates, sulfates	1		
OK520500020250_00	Magnolia Creek	chlorides, TDS		chloride							1	TDS			
OK520500020260_00	Salt Cedar Creek	chlorides, TDS		chloride, TDS	1						0				
OK520500020260_20	Salt Cedar Creek	chlorides, TDS		chloride, TDS	1						0				
OK520510000010_00	Canadian River, North	lead, turbidity, pathogens	Enterococcus, Total Fecal Coliform	Enterococcus, fish bio., pH, turbidity		2	entero turbidity				1	lead			
OK520510000050_00	Sand Creek	chlorides, TDS		not listed						1	2	chloride, TDS			
OK520510000095_00	Turkey Creek, Trib A!	chlorides, TDS		chloride							1	TDS			
OK520510000100_00	Turkey Creek	chlorides, TDS, turbidity		chloride, DO, TDS							1	turbidity		1	
OK520510000105_00	Earlsboro Creek	chlorides, TDS		chloride							1	TDS			
OK520510000110_00	Canadian River, North	lead, TDS, pH, turbidity, pathogens	Enterococcus	not listed		2	entero turbidity			1	5	lead, TDS, entero, pH, turbidity		1	1

002 303(d) Listed Waterbodies			2004 303(d) Pathogen Impairments	2016 Impairments	Changes Between 2002 and 2016 Summarized										
OKWBID	NAME	Impairments			No action	# TMDLs Developed for 2002 impairments	NPS TMDLs Developed	WBPs	Success Stories	Waterbody Fully Delisted	# Parameters Delisted	Parameters Delisted	DO, N or P or Chlor a Delisted	Turbidity Delisted	Pathogens Delisted
OK520510000220_00	Tecumseh Lake	turbidity		turbidity	1						0				
OK520510000300_00	Shawnee 2 Lake (North 2)	DO		turbidity							1	DO	1		
OK520520000010_00	Canadian River, North	pH, turbidity, pathogens	Enterococcus, Total Fecal Coliform	dieldrin, enterococcus, e. coli, turbidity		1	entero				1	pH			
OK520520000070_00	Crutcho Creek	pathogens	Enterococcus, E coli	Enterococcus, E. coli, DO	1						0				
OK520520000090_00	Crutcho Creek	oil and grease		oil and grease	1						0				
OK520520000150_00	Crooked Oak Creek	chlorides, TDS, DO, turbidity, pathogens	Enterococcus, E. coli, Total Coliform, Total Fecal Coliform	chloride, Enterococcus, E. coli, oil and grease, DO		1	ecoli				2	TDS, turbidity		1	
OK520520000240_00	Mustang Creek	pathogens	E. coli	E. coli, DO		1	ecoli				0				
OK520520000260_00	Overholser Lake	turbidity		sulfates, turbidity				1			0				
OK520530000010_10	Canadian River, North	turbidity, pathogens	Enterococcus	Enterococcus		1	entero	1	1		1	turbidity		1	
OK520530000030_00	Shell Creek	DO, turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, E. coli, DO		2	entero ecoli	1			1	turbidity		1	
OK520530000080_00	El Reno Lake	turbidity		turbidity	1						0				
OK520600010010_00	Canadian River	sulfates, TDS, turbidity, pathogens	Enterococcus	Enterococcus, TDS		1	entero				2	sulfates, turbidity		1	
OK520600010060_00	Factory Creek	pathogens	Enterococcus, E. coli, Total Coliform, Total Fecal Coliform	E. coli		1	ecoli				0				
OK520600020010_00	Canadian River	sulfates, TDS		pH							2	sulfates, TDS			
OK520600020050_00	Bebee Creek	TDS, oil and grease		not listed						1	2	TDS, oil and grease			
OK520600020170_00	Julian Creek	chlorides, TDS, pathogens	E. coli, Total Fecal coliform	chloride, E. coli							1	TDS			
OK520600020205_00	Red Spring's Creek	TDS		TDS	1						0				
OK520600030030_00	Spring Brook	turbidity, pathogens	Total Coliform, Total Fecal Coliform	not listed						1	2	pathogens, turbidity		1	1
OK520610010010_00	Canadian River	TDS, pH, turbidity, pathogens	Enterococcus	not listed		1	entero			1	4	TDS, entero, pH, turbidity		1	1
OK520610010080_00	Willow Creek	pesticides, turbidity, pathogens	E. coli, Total Fecal coliform	chlorpyrifos		1	ecoli				2	e coli, turbidity		1	1
OK520610010180_00	Bishop Creek	pesticides, pathogens		benthic macro, chlorpyrifos							1	pathogens			1
OK520610020120_00	Buggy Creek	turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	benthic macro, Enterococcus, E. coli, sulfates, TDS		2	entero ecoli				1	turbidity		1	
OK520610020150_00	Canadian River	sulfates, TDS, pathogens	Enterococcus	not listed		1	entero			1	3	sulfate, TDS, pathogens			1
OK520610020165_00	Trib8	arsenic, chromium, chlorides, TDS		arsenic, chromium							2	chloride, TDS			
OK520610030080_00	Walnut Creek, North Fork	turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, E. coli, turbidity		2	entero ecoli				0				
OK520620010010_00	Canadian River	pathogens		not listed						1	1	pathogens			1
OK520620010100_00	American Horse Lake	DO		not listed						1	1	DO	1		

002 303(d) Listed Waterbodies					Changes Between 2002 and 2016 Summarized										
OKWBID	NAME	Impairments	2004 303(d) Pathogen Impairments	2016 Impairments	No action	# TMDLs Developed for 2002 impairments	NPS TMDLs Developed	WBPs	Success Stories	Waterbody Fully Delisted	# Parameters Delisted	Parameters Delisted	DO, N or P or Chlor a Delisted	Turbidity Delisted	Pathogens Delisted
OK520620010120_00	Bear Creek	pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, E. coli		2	entero ecoli				0				
OK520620020010_00	Canadian River	sulfates, TDS, pathogens	Enterococcus	chloride		2	entero, e coli				3	sulfate, TDS, entero			1
OK520620020060_00	Flanders Creek	sulfates, TDS		sulfates							1	TDS			
OK520620020070_00	Fiddlers Creek	sulfates, TDS		sulfates							1	TDS			
OK520620020080_00	Squirrel Creek	sulfates, TDS		sulfates							1	TDS			
OK520620020090_00	Trail Creek	sulfates, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, sulfates, TDS		2	entero ecoli				1	E. coli			1
OK520620030010_00	Canadian River	sulfates	Enterococcus	chloride, Enterococcus, sulfates	1						0				
OK520620030020_00	Lone Creek	sulfates, TDS, pathogens	Enterococcus, E coli	Enterococcus, E. coli, sulfates, TDS		2	entero ecoli				0				
OK520620030050_00	Red Trail Creek	sulfates, turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, E. coli, sulfates		2	entero ecoli				1	turbidity		1	
OK520620030110_00	Red Creek	sulfates, pathogens	Enterococcus, E coli	Enterococcus, E. coli, sulfates		2	entero ecoli				0				
OK520620040050_00	Hackberry Creek	sulfates, pathogens	Enterococcus, E coli	Enterococcus, E. coli, sulfates, TDS		2	entero ecoli				0				
OK520620050160_00	Commission Creek	pathogens	Enterococcus, E coli	Enterococcus		2	entero ecoli		1		1	E coli			1
OK520620060010_00	Deer Creek	sulfates, TDS, pathogens	Enterococcus, E coli	Enterococcus, E. coli		2	entero ecoli				2	sulfate, TDS			
OK520620060070_00	Little Deer Creek	sulfates, TDS		not listed						1	2	sulfate, TDS			
OK520620060080_00	Horse Creek	sulfates		not listed						1	1	sulfate			
OK520700010110_00	Grave Creek	chlorides		chloride	1						0				
OK520700010180_00	Henryetta Lake	pH		lead, turbidity							1	pH			
OK520700020010_00	Canadian River, Deep Fork	turbidity, pathogens	Enterococcus	fish bio.		2	entero turbidity				2	entero, turbidity		1	1
OK520700020040_00	Okmulgee Lake	DO		DO	1						0				
OK520700020080_00	Adams Creek	DO		DO	1						0				
OK520700020150_00	Salt Creek	chlorides, DO		chloride, DO	1						0				
OK520700020155_00	Begger Creek	chlorides, TDS		chloride, TDS	1						0				
OK520700020200_00	Nuyaka Creek	DO, turbidity		benthic macro, E. coli, DO, turbidity	1						0				
OK520700030020_00	Walnut Creek	turbidity		turbidity	1						0				
OK520700030270_00	Hilliby Creek	cause unknown		fish bio.	1						0				
OK520700040010_00	Canadian River, Deep Fork	lead, pathogens	Enterococcus	Enterococcus		2	entero turbidity				1	lead			
OK520700040220_00	Prague Lake	DO		mercury							1	DO	1		
OK520700040370_00	Meeker Lake	turbidity		mercury, turbidity	1						0				
OK520700050060_00	Chandler Lake	DO		chlorophyll-a, turbidity							1	DO	1		
OK520700050080_00	Bellcow Creek, North	oil and grease	Enterococcus	oil and grease							0				
OK520700050140_00	Captain Creek	turbidity, pathogens	E. coli	not listed						1	2	pathogens, turbidity		1	1
OK520700050200_00	Opossum Creek	turbidity		turbidity		1	turbidity				0				
OK520700050250_00	Chandler Lake, NW Trib!	oil and grease		oil and grease	1						0				
OK520700060010_00	Little Deep Fork Creek	turbidity		fish bio.							1	turbidity		1	
OK520700060050_00	Browns Creek	DO		DO	1						0				

002 303(d) Listed Waterbodies			2004 303(d) Pathogen Impairments	2016 Impairments	Changes Between 2002 and 2016 Summarized										
OKWBID	NAME	Impairments			No action	# TMDLs Developed for 2002 impairments	NPS TMDLs Developed	WBPs	Success Stories	Waterbody Fully Delisted	# Parameters Delisted	Parameters Delisted	DO, N or P or Chlor a Delisted	Turbidity Delisted	Pathogens Delisted
OK520700060130_10	Little Deep Fork Creek	turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, E. coli, turbidity		1	turbidity				0				
OK520700060140_00	Catfish Creek	chlorides, TDS, turbidity		chloride, TDS, turbidity		1	turbidity				0				
OK520700060210_00	Spring Creek, West	chlorides, TDS		chloride, TDS	1						0				
OK520710010030_00	Coon Creek	pesticides		chlorpyrifos	1						0				
OK520710020030_00	Spring Creek	pathogens	E. coli	benthic macro, E. coli							0				
OK520710020060_00	Canadian River, Deep Fork	pathogens	Enterococcus, E. coli, Total Coliform, Total Fecal Coliform	Enterococcus, E. coli	1						0				
OK520800010010_00	Little River	lead, selenium, turbidity, pathogens	Enterococcus, Total Fecal Coliform	Enterococcus, turbidity		1	entero				2	lead, selenium			
OK520800010050_00	Bird Creek	pH, cause unknown		benthic macro, chloride							1	pH			
OK520800010055_00	Kight Creek	chlorides, TDS		chloride, TDS	1						0				
OK520800010060_00	Cudjo Creek	chlorides, TDS		chloride, pH, TDS	1						0				
OK520800010062_00	Bear Cub Creek	pH		pH	1						0				
OK520800010090_00	Little River	chlorides, TDS		chloride							1	TDS			
OK520800030010_00	Salt Creek	chlorides		benthic macro, chloride, Enterococcus, TDS	1						0				
OK520800030070_00	Bruno Creek	chlorides, TDS		chloride, TDS	1						0				
OK520800030080_00	Popshego Creek	chlorides, TDS		barium, chloride, TDS	1						0				
OK520800030120_00	Blacksmith Creek	chlorides, TDS		chloride, TDS	1						0				
OK520810000020_00	Thunderbird Lake	DO, turbidity		chlorophyll-a, DO, turbidity		3	DO, turbidity, chlora	1			0				
OK520810000100_00	Elm Creek	TDS, pathogens	E. coli	E. coli, TDS, turbidity				1			0				
OK520810000130_00	Stanley Draper Lake	turbidity		mercury, turbidity				1			0				
OK520810000175_00	Moore Creek	chlorides, TDS		TDS							1	chloride			
OK620900010170_10	Cimarron River	turbidity, pathogens		Enterococcus, fish bio., lead, pH, turbidity		2	entero turbidity				1	total fecal coli			1
OK620900010180_00	Lagoon Creek	turbidity, pathogens	Enterococcus, E coli	Enterococcus		2	entero ecoli		1		2	e coli, turbdiity		1	1
OK620900010220_00	Buckeye Creek	turbidity, pathogens	Total Fecal Coliform	not listed						1	2	total fecal coli, turbidity		1	1
OK620900010290_00	Euchee Creek	pH, turbidity, pathogens	Enterococcus	Enterococcus		3	entero ecoli turbidity		1		2	pH, turbidity, E coli	1	1	
OK620900020050_00	Council Creek	turbidity, pathogens	E. coli, Total Fecal coliform	Enterococcus, turbidity		3	entero ecoli turbidity				1	e coli			1
OK620900020120_00	Cushing Lake	turbidity		mercury, turbidity	1						0				
OK620900030010_00	Cimarron River	sulfates, turbidity, pathogens	Enterococcus	Enterococcus, lead		2	entero turbidity				2	sulfates, turbidity		1	
OK620900030260_00	Beaver Creek, West	turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, E. coli, turbidity		1	turbidity				0				
OK620900040050_00	Little Stillwater Creek	nitrate		nitrates				1			0				
OK620900040270_00	Stillwater Creek	DO, turbidity		not listed				1		1	0				

002 303(d) Listed Waterbodies			2004 303(d) Pathogen Impairments	2016 Impairments	Changes Between 2002 and 2016 Summarized										
OKWBID	NAME	Impairments			No action	# TMDLs Developed for 2002 impairments	NPS TMDLs Developed	WBPs	Success Stories	Waterbody Fully Delisted	# Parameters Delisted	Parameters Delisted	DO, N or P or Chlor a Delisted	Turbidity Delisted	Pathogens Delisted
OK620900040280_00	Carl Blackwell Lake	turbidity		chlorophyll-a, mercury, turbidity				1			0				
OK620910010010_00	Cimarron River	pathogens	Enterococcus, Total Fecal Coliform	Enterococcus, E. coli, turbidity		1	entero				0				
OK620910020010_00	Cimarron River	selenium, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, E. coli, selenium		2	entero ecoli				0				
OK620910020270_00	Elm Creek	turbidity, pathogens	Enterococcus, E coli	Enterococcus, E. coli, sulfates, turbidity		3	entero ecoli turbidity				0				
OK620910030010_00	Skeleton Creek	turbidity, pathogens	E. coli, Total Fecal coliform	Enterococcus, oil and grease, selenium, turbidity		3	entero ecoli turbidity				1	e coli			1
OK620910030040_00	Otter Creek	turbidity, pathogens	Enterococcus	Enterococcus		2	entero ecoli		1		1	turbidity		1	
OK620910030240_00	Skeleton Creek	pathogens	Enterococcus	not listed						1	1	entero			1
OK620910040010_20	Cottonwood Creek	turbidity, pathogens	Enterococcus, E coli	Enterococcus, E. coli, turbidity		3	entero ecoli turbidity		1		0				
OK620910040080_00	Liberty Lake	DO		chlorophyll-a, Enterococcus, turbidity		1	chlorophyll				1	DO	1		
OK620910040100_00	Chisholm Creek	turbidity, pathogens	Enterococcus	benthic macro, nitrates							2	entero, turbidity		1	1
OK620910040120_00	Deer Creek	pesticides, turbidity, pathogens	Enterococcus, E coli	Enterococcus, E. coli, turbidity		3	entero ecoli turbidity				1	pesticides			
OK620910050010_00	Kingfisher Creek	turbidity, pathogens	Enterococcus, E coli	Enterococcus, E. coli, DO		3	entero ecoli turbidity				1	turbidity		1	
OK620910050020_00	Trail Creek	DO, turbidity, pathogens	Enterococcus, E coli	Enterococcus, E. coli, DO		2	entero ecoli				1	turbidity		1	
OK620910060010_00	Turkey Creek	turbidity, pathogens	Enterococcus, Total Fecal Coliform	Enterococcus, E. coli		2	entero turbidity	1	1		1	turbidity		1	
OK620910060020_00	Little Turkey Creek	DO, turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus		2	entero turbidity	1			3	e coli, DO, turbidity	1	1	1
OK620910060030_00	Buffalo Creek	DO, turbidity, pathogens	Total Fecal Coliform	DO, turbidity		1	turbidity	1			1	fecal			1
OK620910060110_00	Clear Creek	turbidity, pathogens	Total Fecal Coliform	turbidity				1			1	fecal			1
OK620920010010_00	Cimarron River	turbidity, pathogens	Enterococcus, E coli	Enterococcus, E. coli, turbidity		3	entero ecoli turbidity				0				
OK620920010080_00	Cottonwood Creek	pH, turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	sulfates, turbidity		1	turbidity				3	entero, e coli, pH			1
OK620920010130_00	Griever Creek	pathogens	Enterococcus, E coli	benthic macro, Enterococcus, E. coli, sulfates		1	entero				0				
OK620920020010_00	Cimarron River	chlorides		chloride, Enteroccus, E. coli, fish bio, mercury, selenium, TDS		1	ecoli				0				
OK620920020170_00	Traders Creek	pathogens	Enterococcus	Enterococcus, sulfates	1						0				

002 303(d) Listed Waterbodies			2004 303(d) Pathogen Impairments	2016 Impairments	Changes Between 2002 and 2016 Summarized										
OKWBID	NAME	Impairments			No action	# TMDLs Developed for 2002 impairments	NPS TMDLs Developed	WBPs	Success Stories	Waterbody Fully Delisted	# Parameters Delisted	Parameters Delisted	DO, N or P or Chlor a Delisted	Turbidity Delisted	Pathogens Delisted
OK620920030010_00	Cimarron River	pathogens	Enterococcus, E. coli, Total Fecal Coliform	benthic macro, Enterococcus, selenium		2	entero ecoli				0				
OK620920040170_00	Lojo creek	sulfates		not listed						1	1	sulfates			
OK620920050010_00	Buffalo Creek	turbidity, pathogens	Enterococcus, E coli	Enterococcus		2	entero ecoli				2	e coli, turbidity		1	1
OK620920050060_00	Selman Creek	sulfates		not listed						1	1	sulfate			
OK620920050070_00	Little Buffalo Creek	sulfates		not listed						1	1	sulfate			
OK620930000010_00	Cimarron River	selenium, chlorides, TDS, pathogens	Enterococcus, E. coli, Total Fecal Coliform	benthic macro, Enterococcus, selenium		1	entero				3	chloride, TDS, e coli			1
OK621000010010_30	Arkansas River, Salt Fork	turbidity, pathogens		Enterococcus, turbidity		2	entero turbidity				0				
OK621000010060_00	Bird's Nest Creek	chlorides, TDS		not listed						1	2	chloride, TDS			
OK621000020130_00	Spring Creek	turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, E. coli							1	turbidity		1	
OK621000030010_00	Bois d' Arc Creek	sulfates, turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	benthic macro, Enterococcus, DO, turbidity		2	entero ecoli		1		2	ecoli, sulfate			1
OK621010010160_00	Arkansas River, Salt Fork	selenium, turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, E. coli, turbidity		3	entero ecoli turbidity				1	selenium			
OK621010010230_00	Turkey Creek	sulfates, TDS, turbidity, pathogens	Enterococcus, E coli	Enterococcus, E. coli, sulfates, TDS		3	entero ecoli turbidity		1		1	turbidity		1	
OK621010010240_00	Boggy Creek	sulfates, TDS		sulfates							1	TDS			
OK621010010270_00	Yellowstone Creek	sulfates, turbidity, pathogens	Enterococcus, E coli	Enterococcus, sulfates, TDS		1	entero		1		2	turbidity, E coli		1	1
OK621010020010_00	Sandy Creek	turbidity, pathogens	Enterococcus, E. coli, Total Coliform, Total Fecal Coliform	Enterococcus		2	entero ecoli		1		2	e coli, turbidity		1	1
OK621010030080_00	Capron Creek, North	sulfates		sulfates	1						0				
OK621100000010_10	Chikaskia River	lead, turbidity, pathogens	Enterococcus, Total Fecal Coliform	Enterococcus, turbidity		3	entero ecoli turbidity				1	lead			
OK621100000030_00	Duck Creek	sulfates, TDS, turbidity, pathogens	Enterococcus, E coli	Enterococcus, E. coli							3	sulfate, TDS, turbidity		1	
OK621100000033_00	Duckling Creek	chlorides, sulfates, TDS		not listed						1	3	chloride, sulfates, TDS			
OK621100000100_00	Bitter Creek	chlorides, sulfates, TDS, turbidity, pathogens	Enterococcus, E coli	Enterococcus, DO, sulfates, TDS		3	entero ecoli turbidity		1		3	chloride, e coli, turbidity		1	1
OK621100000130_00	Scatter Creek	chlorides, sulfates, TDS		chloride, sulfates							1	TDS			
OK621200010020_00	Keystone Lake	turbidity		turbidity	1						0				
OK621200010200_00	Arkansas River	turbidity, pathogens	Enterococcus	Enterococcus		2	entero turbidity				1	turbidity		1	
OK621200010400_00	Gray Horse Creek	turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, E. coli		3	entero ecoli turbidity		1		1	turbidity		1	
OK621200020020_00	Doga Creek	pH, turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, DO		3	entero ecoli turbidity		1		3	pH, turbidity, E coli		1	1

002 303(d) Listed Waterbodies			2004 303(d) Pathogen Impairments	2016 Impairments	Changes Between 2002 and 2016 Summarized										
OKWBID	NAME	Impairments			No action	# TMDLs Developed for 2002 impairments	NPS TMDLs Developed	WBPs	Success Stories	Waterbody Fully Delisted	# Parameters Delisted	Parameters Delisted	DO, N or P or Chlor a Delisted	Turbidity Delisted	Pathogens Delisted
OK621200030010_00	Black Bear Creek	lead, unknown toxicity, turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, turbidity		3	entero ecoli turbidity				3	lead, E coli, unknown toxicity			1
OK621200030040_00	Camp Creek	pathogens	Total Fecal Coliform	not listed						1	1	fecal			1
OK621200030396_00	Lucien Creek	chlorides, sulfates, TDS		chloride							2	sulfate, TDS			
OK621200040040_00	Fairfax Lake	DO		chlorophyll-a							1	DO	1		
OK621200050010_00	Red Rock Creek	turbidity	E. coli	Enterococcus, DO, turbidity		3	entero ecoli turbidity				0				
OK621210000010_00	Arkansas River	sulfates, TDS, turbidity, pathogens	Enterococcus, Total Fecal Coliform	not listed						1	4	sulfate, tds, entero, turbidity		1	1
OK621210000020_00	Kaw Lake	turbidity		mercury, turbidity	1						0				
OK720500010010_00	Canadian River, North	turbidity, pathogens	Enterococcus	Enterooccus, fish bio, sed/silt.		1	entero				1	turbidity		1	
OK720500010150_00	Persimmon Creek	turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus		1	entero				2	e coli, turbidity		1	1
OK720500020010_00	Beaver River (North Canadian)	pathogens	Enterococcus	Enterococcus, E. coli, lead, DO		1	entero				0				
OK720500020070_00	Clear Creek	pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus		2	entero ecoli		1		1	e coli			1
OK720500020130_00	Kiowa Creek	turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, E. coli, fish bio.		2	entero ecoli				1	turbidity		1	
OK720500020140_00	Beaver River (North Canadian)	pathogens	Enterococcus	benthic macro, chloride, Enterococcus, fish bio, lead, sed./silt.		1	entero				0				
OK720500020290_00	Beaver River (North Canadian)	selenium, chlorides, TDS, pathogens	Enterococcus, E. coli, Total Fecal Coliform	benthic macro, chloride, Enterococcus, E. coli, fish bio, DO, sed./silt, selenium, sulfates, TDS		4	entero ecoli chloride, TDS				0				
OK720500020300_00	Clear Creek	DO	Enterococcus	DO		1	entero		1		0				
OK720500020450_00	Beaver River (North Canadian)	chlorides, sulfates, TDS, pathogens	Enterococcus, E. coli, Total Fecal Coliform	chloride, Enterococcus, E. coli, fish bio, sed./silt, sulfates, TDS		5	entero ecoli, chloride, sulfate, TDS				0				
OK720500020500_00	Palo Duro Creek	selenium, chlorides, sulfates, TDS, DO, turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, E. coli, DO, selenium, sulfates, TDS, turbidity		3	turbidity, sulfate, TDS,				1	chloride			
OK720500030010_00	Wolf Creek	turbidity, pathogens	Enterococcus, E coli	Enterococcus		1	entero		1		2	ecoli, turbidity		1	1
OK720500030080_00	Buzzard Creek	pathogens	E. coli	not listed						1	1	ecoli			1
OK720510000190_00	Beaver River (North Canadian)	pathogens	Enterococcus, E coli	Enterococcus, E. coli		2	entero ecoli				0				
OK720510000275_00	Currumpa Creek	DO	Enterococcus, E. coli, Total Fecal Coliform	ammonia, DO	1						0				

002 303(d) Listed Waterbodies			2004 303(d) Pathogen Impairments	2016 Impairments	Changes Between 2002 and 2016 Summarized										
OKWBID	NAME	Impairments			No action	# TMDLs Developed for 2002 impairments	NPS TMDLs Developed	WBPs	Success Stories	Waterbody Fully Delisted	# Parameters Delisted	Parameters Delisted	DO, N or P or Chlor a Delisted	Turbidity Delisted	Pathogens Delisted
OK720900000010_00	Cimarron River	pathogens	E. coli	E. coli	1						0				
OK720900000180_00	Cimarron River	turbidity, pathogens	Enterococcus, E. coli, Total Fecal Coliform	Enterococcus, DO, sulfates		1	entero				2	ecoli, turbidity		1	1
OK720900000200_00	Carrizo Creek, South	DO		DO	1						0				
OK720900000280_00	Carrizo Creek, North	pH		not listed						1	1	pH			
	# of waterbody/Impairment pairs on 303d List	1524		11,005	360	199		46	44	70	421		45	96	93
	% change from 2002				83%	46%		11%	10%	16%	28%		39%	55%	42%

APPENDIX D: Nonpoint Source Working Group Roles, Resources and NPS Management Program Interests

NPS Working Group Roles and Responsibilities

Members of the NPS Working group were surveyed to assess their agency's responsibilities, available resources, and interest in NPS programs. The results of the surveys are seen below.

Cherokee Nation

a. Organization Constituency: The Cherokee Nation has global membership and includes the Native American Tribal Government.

b. Organization Goals / Mission with Regard to NPS Control: The Cherokee Nation works in cooperation with State agencies to address NPS control.

c. Current / Planned Programs to Control NPS: Currently, the Cherokee Nation has no programs to control NPS pollution, but is trying to remain current regarding State and federal regulations and programs.

d. Resources Available to Control NPS: Funding for environmental projects is extremely limited, but the Cherokee Nation maintains a staff of eighteen Environmental Specialists with varied environmental expertise and experience.

e. Organization Role in Planning NPS Watershed Projects: The Cherokee Nation is the lead agency for the Inter-Tribal Environmental Council and would like to be notified about NPS watershed projects statewide to keep the Native American Tribes in Oklahoma informed about environmental issues.

f. Principle Concerns and Priorities Regarding NPS Sources: The Cherokee Nation's NPS priorities are in the northeast region of the State where they hold jurisdictional boundaries, but the Cherokee Nation would try to address the entire State regarding NPS because of its leadership role with the Inter-Tribal Environmental Council.

Oklahoma Water Resources Board (OWRB)

a. Agency Responsibility/Authority: OWRB is responsible for promulgating Oklahoma's Water Quality Standards (OWQS) (OAC 785:45-46). OWRB is the designated State agency for assessing, monitoring, studying, and restoring Oklahoma's lakes (O.S. 82 § 1085.29). OWRB is responsible for defining eutrophic waterbodies (SB 1170) and for identifying "Nutrient-Limited Watersheds" and "Nutrient-Vulnerable Groundwater" (SB 1170 and 1175). OWRB is responsible for establishment and implementation of a statewide beneficial use monitoring program for waters of the state in coordination with the other state environmental agencies, and for development and submission of a report concerning the status of water quality monitoring in this state pursuant to Section 1-1-202 of this title.

b. Agency Goals / Mission with Regard to NPS Control: The mission of the OWRB is to protect and manage the waters of the State to ensure that all Oklahomans have adequate quantities of good water.

c. Current / Planned Programs to Control NPS: OWRB currently has regulatory programs to develop protocols for determining attainment of assigned beneficial uses of water. OWRB is also working on mandates related to identification of "Nutrient-Limited Watersheds" and "Nutrient-Vulnerable Groundwater" and defining eutrophic waterbodies in the OWQS. All of the initiatives mentioned are statewide in scope and involve the environmental State agencies in planning and implementation. OWRB plans to implement criteria for NPS in OAC 785:46.

d. Resources Available to Control NPS: OWRB has the Water Quality Programs Division, which works to promote and implement OWQS and works with the Planning and Management Division to protect groundwater quality. OWRB has staff expertise available to deal with lake assessments, intensive lake studies, and inlake restoration to address NPS impacts. OWRB continues to work with other State agencies to design and implement a statewide monitoring program to assess attainment of beneficial uses of water. The OWRB conducts to Beneficial Use Monitoring Program (BUMP) with an express aim of determining beneficial use support status. Funding to conduct monitoring on lakes across the State is needed to document NPS impacts. Funding is also required to document beneficial use impacts on waters across Oklahoma, and a standardized protocol for documentation purposes needs to be continually refined and evaluated.

e. Agency Role in Planning NPS Watershed Projects: OWRB should be involved in planning watershed projects which consider OAC 785:45 and OAC 785:46 and should be consulted as necessary to determine how the rules mentioned apply to a project. OWRB should also be involved in the planning and implementation of any project which involves in-lake work to be performed or whose purpose or justification for implementing the project was based on lake water quality impairments or whose success will be measured on improvements to lake water quality. OWRB requests to be involved in any projects which involve lake implementation or implementation of BMPs to improve lake water quality.

f. Principle Concerns and Priorities Regarding NPS Sources: OWRB priority watersheds regarding NPS include Lakes Eucha/Spavinaw, Oklahoma City municipal lakes and their watersheds, Tenkiller/Illinois River, Grand Lake, Lake Wister, Broken Bow Lake, and Lake Oologah.

Oklahoma Department of Environmental Quality (ODEQ)

a. Agency Responsibility/Authority: ODEQ has environmental authority concerning aquaculture and fish hatcheries, fertilizer and ag chemical manufacturers, slaughterhouses, and agricultural product storage facilities. ODEQ is also responsible for all point source discharges, surface water and groundwater protection, underground injection, water, waste, and wastewater treatment systems (O.S. 27A § 1-3-101). ODEQ shall establish, implement, amend, and enforce the Water Quality Management Plan (O.S. 27A § 2-6-103). ODEQ is also responsible for developing a wellhead protection program and groundwater protection education program (O.S. 27A § 2-6-310.2, 3). ODEQ also has powers and duties in addition to those required by law (O.S. 82 § 1085.75). ODEQ also assists with maintaining and improving water quality and in preventing and eliminating the pollution of waters within the "scenic river area" (O.S. 82 § 1457).

b. Agency Goals / Mission with Regard to NPS Control: ODEQ is dedicated to providing quality service to the people of Oklahoma through comprehensive environmental protection and management programs. These programs are designed to assist the people of the State in sustaining a clean, sound

environment and in preserving and enhancing the natural surroundings where Oklahomans live. ODEQ will accomplish its mission through regulatory and nonregulatory means to achieve a balance that sacrifices neither economic growth nor environmental protection. ODEQ will focus on community-based customer services and nonregulatory approaches, maintenance of a responsive, accurate and timely environmental complaints process and emergency response system, and compliance activities to maintain or improve environmental quality.

c. Current / Planned Programs to Control NPS: ODEQ's current programs that assist in controlling NPS pollution include the Stormwater Program, Source Water Program, Wellhead Program, Review/Certification of 404 Permits, and Construction Standards/Inspections of On-site Systems. ODEQ plans to expand the Stormwater Program to apply to smaller sites and towns.

d. Resources Available to Control NPS: ODEQ has two Stormwater Engineers (FTEs) available to assist with NPS pollution control.

e. Agency Role in Planning NPS Watershed Projects: ODEQ is responsible for establishing TMDLs and should be consulted accordingly for NPS watershed projects. ODEQ should also be involved from the beginning of the planning of any watershed project addressing waters included on the 303(d) list.

f. Principle Concerns and Priorities Regarding NPS Sources: ODEQ priorities regarding NPS include waterbodies on the 303(d) list, Illinois River/Lake Tenkiller Watershed, and Poteau River/Lake Wister Watershed. ODEQ is also concerned about the actual NPS identification and control methods.

Oklahoma Department of Agriculture – Water Quality Services Division (ODAFF-WQSD)

a. Agency Responsibility/Authority: ODAFF-WQSD is responsible for CAFOs (Title 2 O.S. § 9-201 *et seq*., see SB 1175) with constitutional authority for livestock issues (Okla. Const. Art. 6 § 31), and poultry feeding operations from the Registered Poultry Feeding Operations Act (Title 2 O.S., § 10-9.1 *et seq.*, see SB 1170)

b. Agency Goals / Mission with Regard to NPS Control: ODAFF-WQSD goal is to achieve an ideal environment for CAFOs in which the needs for agricultural production and new jobs are properly balanced with the need for clean air and clean water.

c. Current / Planned Programs to Control NPS: Currently, ODAFF-WQSD performs CAFO licensing and poultry feeding operation registration, which require animal waste management plans. ODA-WQSD also requires certification for commercial and private poultry waste application.

d. Resources Available to Control NPS: ODAFF-WQSD conducts inspections and advises how one can come into compliance, but there is no funding or in-kind contribution available through this agency. Funding is needed to assist facilities that are in violation and cannot afford to come into compliance.

e. Agency Role in Planning NPS Watershed Projects: ODAFF-WQSD should be involved in planning and consulted regarding any and all NPS watershed projects that involve animal feeding operations.

e. Principle Concerns and Priorities Regarding NPS Sources: ODAFF-WQSD feels the NPS Workgroup needs to address watershed issues and specific sources that involve animal feeding operations.

Oklahoma Department of Agriculture – Forestry Services Division (OFS)

a. Agency Responsibility/Authority: OFS is responsible for instituting a broad program of education and action in the protection, reforestation, harvesting and wise use of forests and their products throughout Oklahoma, which includes the conservation of soil, water, and wildlife (O.S. 2, Article 16 § 16-3). OFS also administers the silviculture BMPs, identifies silviculturally related NPS pollution and cooperates with landowners and the timber industry to address water quality issues. OFS's primary concern is to make landowners, loggers, the forest industry and other users of Oklahoma's forestlands more aware of the need to protect water quality during their activities so that problems are prevented and mitigation needs are minimized.

b. Agency Goals / Mission with Regard to NPS Control: OFS's goal is to minimize the impact of forestry activities on water quality, as well as to use forestry practices, such as tree planting, to help solve water-related environmental problems.

c. Current / Planned Programs to Control NPS: Currently, OFS manages a statewide comprehensive program of actions to prevent NPS problems related to forestry activities and to increase the use of forestry practices to help solve water related problems with the cooperation of landowners and forestry industry. These programs include the forestry BMPs (being revised in 2014), landowner technical assistance, development of forest management plans (which also address water quality), education and training to raise awareness of NPS, BMP compliance monitoring (last conducted in 2010), demonstrations of water quality management, logger "tailgate" sessions, riparian forest area restoration, logger certification in cooperation with the Arkansas Timber Producers Association and complaint resolution.

OFS plans to fill the Water Quality Forester vacancy in 2014, and to emphasize landowner and logger education using customized educational support materials. OFS plans to increase forest industry contacts and raise awareness of the forestry BMP program. OFS will initiate another BMP Compliance Monitoring project in 2015, using the protocol adopted by the southern States. OFS will participate in state-level or regional planning efforts.

d. Resources Available to Control NPS: OFS has one forester assigned to all aspects of the forest water quality program (position is vacant but approved for filling in 2014). There are fourteen field foresters available to assist landowners and other agencies with forestry aspects of watershed planning projects. OFS has access to the USDA Forest Service regional water quality specialist and specialists in other States, through the Southern Group of State Foresters Water Resources Committee, to help address local water quality issues. Demonstration road BMPs are also available for workshops, tours, or other educational endeavors. OFS contributes $70,000 in State resources directly to the forest water quality program and may apply for federal competitive grant funding as opportunities permit. Other resources that support Oklahoma's forestry BMP program include logger training offered by the Arkansas Timber Producers Association, collaboration with the Oklahoma Forestry Association and Oklahoma Woodland Owners Association, a network of professional foresters in the state as well as the Forestry BMP Committee. The State's program complements forest certification programs adopted by the forest industry

and corporate landowners, including the Sustainable Forestry Initiative and Tree Farm where BMP compliance is a high priority. The OSU Extension Forester also provides educational program support (position vacant since July 1, 2013).

e. Agency Role in Planning NPS Watershed Projects: OFS is available to consult with other agencies on watershed projects where forestry practices may be contributing to NPS problems, and where forestry practices (such as tree planting and forest road improvements) can provide part of the solution to other environmental problems.

f. Principle Concerns and Priorities Regarding NPS Sources: OFS priorities regarding NPS are watersheds in the eastern third of Oklahoma, which offer commercial forestry opportunities, so the impacts of timber harvesting and forest road practices on water quality can be minimized. Interests include managing stream corridors, restoring riparian forest areas, and controlling erosion. OFS's principle concern involves making landowners, loggers and the industry more aware of the need to protect water quality in order to minimize their impacts on the state's water resources.

Oklahoma Corporation Commission (Corp. Comm.)

a. Agency Responsibility/Authority: Corp. Comm. regulates oil and gas exploration and production, related activities, and pipelines. Corp. Comm. also regulates retail underground and aboveground storage tanks (OAC 165:25, part 15, subchapter I).

b. Agency Goals / Mission with Regard to NPS Control: Corp. Comm.'s mission regarding NPS control is to prevent pollution, and to see that it gets cleaned up to a level which does not put the public at risk when it does occur.

c. Current / Planned Programs to Control NPS: Corp. Comm.'s current NPS program is regulatory, with rules about how oil and gas related material should be properly handled and disposed of. The program also includes guidelines for responsible party (RP) leak and spill cleanup for oil and gas products and brine, when a responsible party can be located.

If funding becomes available, Corp. Comm. plans to locate all petroleum and brine impacted waterbodies in the State and initiate soil and water remediation as feasible.

d. Resources Available to Control NPS: The resources and personnel available for NPS control at Corp. Comm. are limited. State funding is available to plug a portion of the known problem wells, and for enforcement of current rules, but no funds are allocated for location or cleanup of sites without responsible parties. Any NPS control program must be implemented into current regulatory activities, using the present personnel, unless additional funds become available. Some federal funds from the OPA 90 fund are being made available for plugging and cleanup activities near Lake Oolagah. Otherwise, for the rest of the State, Corp. Comm. has no federal or State funds, and the OERB Voluntary Cleanup Fund has sufficient monies to clean up only part of the many surface sites. Activities at other abandoned and historical sites will have to wait until funding and personnel become available.

e. Agency Role in Planning NPS Watershed Projects: Corp. Comm. requests that they be consulted for all NPS watershed projects in oil and gas producing areas, when pollution from retail storage tanks is suspected, and when sources are related to their regulatory activities.

f. Principle Concerns and Priorities Regarding NPS Sources: Corp. Comm.'s priorities regarding NPS are watersheds in oilfield areas.

Office of the Secretary of Energy and Environment (OSEE)

a. Agency Responsibility/Authority: OSEE has the authority to receive and disburse Clean Water Act funds, including §319 funds. OSEE also has the authority to coordinate all pollution control activities of the State, including NPS activities (O.S. 27A § 1-2-101.2, 3).

b. Agency Goals / Mission with Regard to NPS Control: OSEE takes very seriously the "fishable/swimmable" goal of the Clean Water Act and will work diligently to ensure that the NPS Management Program strives for this goal through a combination of voluntary and, when necessary, regulatory approaches. As the grant recipient for all Clean Water Act funds, and as the agency charged with coordinating all pollution control activities for the State, OSEE will work with the OCC to ensure that all NPS control activities meet appropriate State and federal guidance and priorities. OSEE will also cooperate with other State environmental agencies to ensure that agencies are performing tasks within their clear areas of jurisdictional authority.

c. Current / Planned Programs to Control NPS: N/A.

d. Resources Available to Control NPS: Funds are primarily provided by the Clean Water Act grant program.

e. Agency Role in Planning NPS Watershed Projects: As the Clean Water Act grant administrator and coordinator of all pollution control activities; OSEE should be kept informed of all §319 activities. OSEE will remain involved in all §319(h) activities. Additionally, OSEE will coordinate with the OCC prior to the implementation of any changes in scope or direction with regard to Oklahoma's NPS Management Program. As the lead agency for Oklahoma's UWA and WRAS efforts, OSEE will work with the OCC to ensure that the State's watershed restoration priorities are addressed in the NPS Management Program. OSEE will also work with the OCC to coordinate §319 Assessment activities with Oklahoma's other water quality monitoring programs, as outlined in Oklahoma's Water Quality Monitoring Strategy.

f. Principle Concerns and Priorities Regarding NPS Sources: The major priority for OSEE is to substantiate the State's 303(d) list. The State's NPS program could assist in this effort by assessing those stream segments identified as having NPS impacts for which no supporting documentation can be found.

National Resource Conservation Service (NRCS)

a. Agency Responsibility/Authority: The Natural Resources Conservation Service (NRCS) is the U.S. Department of Agriculture's principal agency for providing conservation technical assistance to private landowners, conservation districts, tribes, and other organizations.

b. Agency Goals / Mission with Regard to NPS Control: NRCS's mission is to provide leadership in a partnership effort to help people conserve, improve, and sustain natural resources and the environment.

c. Current / Planned Programs to Control NPS: NRCS delivers conservation technical and financial assistance through voluntary conservation programs which provide technical and financial assistance statewide. These programs include Conservation Technical Assistance, Environmental Quality Incentives Program, Conservation Stewardship Program, Agricultural Conservation Easement Program, Healthy Forests Reseve Program, Watershed Protection and Flood Prevention Operations, NRCS also provides the Conservation Reserve Program in conjunction with the Farm Service Agency.

d. Resources Available to Control NPS: NRCS provides technical assistance to all 77 counties of Oklahoma with natural resource conservation planning and application. NRCS also provides financial assistance associated with their current programs.

e. Agency Role in Planning NPS Watershed Projects: NRCS requests that they are notified of all planned watershed projects, and will assist with planning the projects if funding is available.

f. Principle Concerns and Priorities Regarding NPS Sources: NRCS requests assistance with identifying areas impaired by nutrients.

Storm Water Quality Management (SWQM), City of Oklahoma City

a. Agency Responsibility/Authority: Oklahoma City (OKC) is permitted with the State of Oklahoma as a Phase I Municipal Separate Storm Sewer System Permit (MS4). OKC is one of two Phase I individual permits in the State. Phase I permits are those communities required to permit their storm water discharges and have a population of 250,000 or greater. Storm Water Quality Management Division of the Public Works Department (SWQM) is responsible for the City's storm water programs which contribute to a comprehensive storm water management program. Major components of the City's storm water program include the Federal and State mandated National Pollutant Discharge Elimination System (NPDES) Program provisions including engineering and plan review services for both public and private Construction projects; maintenance of drainage channels, inlets, and of other storm water drainage facilities; education and outreach programs; collection of household hazardous waste; roadway operation and maintenance; pesticide herbicide and fertilizer outreach; pollution complaint and spill response; industrial permitting and inspection; floatable debris management and monitoring; Total Maximum Daily Load (TMDL) reductions; and various monitoring components. The current storm water fee structure was adopted in 1995. The storm water utility fee was adopted in response to an immediate need to fund the NPDES Program. At that time, the NPDES Program was in the initial development and early implementation phase. Currently, all of the major components required by the NPDES Program have been implemented, including the construction and operation of the Oklahoma City Household Hazardous Waste Collection facility. On September 28, 1999 the Oklahoma City Council passed storm water quality ordinances which required owners, developers, contractors and/or facility operators to obtain a Storm

Water Discharge Permit for construction or specific industrial activities based on 1992 Clean Water Act guidelines.

b. Agency Goals / Mission with regard to NPS Control: The goal of SWQM is to provide inspections, enforcement, water quality assessments, public outreach, and household hazardous waste services to citizens, businesses, and government agencies so they can comply with the Clean Water Act and enjoy a safe and clean environment.

c. Current/ Planned Programs to Control NPS: SWQM is permitted through the Oklahoma Department of Environmental Quality (ODEQ).
The permit conditions include fifteen major components:

- Storm Water Management Program annual review;
- New and re-development plan review;
- Flood control projects and structural controls projects for drainage improvements;
- Construction site runoff permitting, inspecting and enforcement;
- Industrial and High Risk runoff permitting, auditing and enforcement;
- Household Hazardous Waste Collection Facility;
- Public Outreach to businesses, schools and the general public;
- Roadway Operation and Maintenance including curb inlet cleaning and street sweeping;
- Pesticide, Herbicide and Fertilizer application annual training and public outreach;
- Pollution complaint and spills response program for citizen complaints and hazardous spills clean up;
- Floatable debris monitoring and removal program;
- Wet weather analytical monitoring program;
- Priority Based Monitory program;
- Illicit Discharge Detection and Elimination program; and
- Other Supporting Permit conditions and documents.

d. Resources Available to Control NPS: The SWQM twenty-eight staff members are trained in erosion control, industrial inspections, hazardous material handling and spill responses, water quality monitoring, chemical analysis, storm water sampling and public outreach. The NPS programs are funded by the enterprise fund, which is a drainage utility fee, based on water meter size which allows a budget of $3,000,000 annually. Storm water quality management includes multiple obligations partially or wholly implemented by other Departments and Divisions within Oklahoma City. SWQM is the collaborating Division which provides oversight, collaboration, summarization and reporting of all permit related activities. The Storm Water Quality Management Plan provides details regarding the other participating Departments.

e. Agency Role in Planning NPS Watershed Projects: Oklahoma City provides a technical review role for NPS construction projects in OKC including review of relevant engineering construction plans for drainage and permit compliance. Oklahoma City can also provide water quality monitoring support and a collaborative platform between City Departments and NPS projects. Oklahoma City develops and monitors programs and projects which comply with federal, state and local water quality regulations.

f. Principle Concerns and Priorities Regarding NPS Sources: TMDL allocations related to NPS jurisdiction are a principle concern. As a first step in reducing both point and nonpoint source pollution, education, community involvement and outreach efforts are a top priority. Oklahoma City will continue to cooperate and communicate with regard to NPS education, outreach and monitoring in Oklahoma City.

United States Geological Survey (USGS)

a. Agency Responsibility/Authority: USGS is one of the federal agencies that will carry out the actions of the Clean Water Action Plan to meet the goals of the plan. USGS will play a leadership role in monitoring, modeling, and assessing pollutant transport of nitrogen and phosphorus. USGS will also play an active role in more than 30 additional actions.

b. Agency Goals / Mission with Regard to NPS Control: N/A

c. Current / Planned Programs to Control NPS: N/A

d. Resources Available to Control NPS: USGS resources consist of technical assistance by providing data and scientific expertise in planning and evaluating the effectiveness of NPS controls. Data and reports are published and publicly available. Limited Federal Matching funds are available to partially finance USGS support of State and Tribal programs.

e. Agency Role in Planning NPS Watershed Projects: USGS may be contacted to provide information to aid NPS watershed projects. USGS may be able to provide published reports and data and can cooperate in data collection, particularly water-quality sampling during stormwater runoff and ground-water sampling. USGS also can interpret NPS impact on groundwater through the use of specialized chemical analyses to determine age and source of contaminants and application of numerical models. USGS can determine frequency of high flow events and threshold of data collection activities, and develop TMDL models.

f. Principle Concerns and Priorities Regarding NPS Sources: USGS interests are statewide, but are particularly critical in basins crossing State lines and in basins with Indian interests.

Association of Central Oklahoma Governments (ACOG)

a. Agency Responsibility/Authority: ACOG is responsible for controlling NPS pollution and water quality (PL 92-500v, § 208 and 40 CFR, part 126). This responsibility is given via administrative actions (40 CFR, part 131.2).

b. Agency Goals / Mission with Regard to NPS Control: ACOG's primary mission regarding NPS is developing the NPS component of TMDLs for municipal dischargers. ACOG's water quality studies within their planning region include a NPS component. ACOG also studies urban stormwater runoff and rural NPS impacts on surface water quality.

c. Current / Planned Programs to Control NPS: Currently, ACOG does not have any NPS control projects. ACOG is concluding a major TMDL project on the Canadian River from Minco to Purcell to define permit limits for municipal dischargers.

d. Resources Available to Control NPS: ACOG does not perform NPS control or demonstration projects, but they do perform water quality studies to assess impacts of NPS and BMP effectiveness. Funding for these studies will primarily be from 604(b) grants.

e. Agency Role in Planning NPS Watershed Projects: ACOG is the Watershed Management Planning Agency for the ACOG Region and should be informed about all watershed programs and activities within the ACOG region. ACOG should also be consulted and invited to participate in NPS watershed projects in this region.

f. Principle Concerns and Priorities Regarding NPS Sources: ACOG's highest priority is the protection of surface and groundwater resources in their region. The Garber-Wellington aquifer is a major emphasis of the ACOG program for more than thirty years. Using BMPs to protect groundwater supplies and surface water supplies is an ongoing concern of this agency.

Another priority for ACOG is urban stormwater NPS and the anticipated impacts of Phase Two stormwater regulations on ACOG member cities.

Indian Nations Council of Government (INCOG)

a. The Clean Water Act authorized the formation of planning areas by Governors for the purpose of ensuring attainment of Clean Water Act goals. In 1974 INCOG was designated as the planning agency for Creek, Osage, Tulsa and parts of Rogers and Wagoner counties and is one of 11 Substate Planning Districts in Oklahoma. As the Water Quality Management Planning Agency for this region, INCOG should be informed of all watershed programs and activities, consulted with, and invited to participate in proposed and ongoing environmental efforts.

b. INCOG's Environmental and Engineering Services Division interacts with state agencies and the federal government to help local governments and county officials manage their water (and other environmental) resources. INCOG offers technical advice, assists in planning and regulatory compliance, conducts pollutant source tracking and water quality studies to assist in 303(d) impairment determinations, evaluates environmental impacts and conducts watershed studies to evaluate point and nonpoint sources of runoff.

c. INCOG coordinates the activities of the Green Country Stormwater Alliance (GCSA). Approximately half of all municipal separate storm sewer system (MS_4) permit holders in Oklahoma are members of GCSA. The goal of GCSA is to assist members in their efforts to reduce stormwater pollutants and comply with permit requirements through education, training and technical support.

d. INCOG has an active education and outreach program intended to promote sustainable growth and development while encouraging the implementation of beneficial environmental programs. This is accomplished by hosting and assisting with workshops, conferences and through speaking engagements. INCOG personnel serve on a number of state and other environmental committees and boards

e. INCOG is very active in stormwater management, both urban and rural, point and nonpoint. Our goal is to help educate municipal and county personnel, developers, builders, consultants, land owners

and the general public about the benefits of healthy streams and riparian systems. In addition, INCOG promotes the use of low impact development (LID) best management practices (BMP).

f. A few of the more recent projects INCOG has completed or is currently working on are:

1. Shell Lake Watershed Study
2. Dog Creek Watershed Study
3. Delaware Creek Water Quality Monitoring and Dissolved Oxygen Assessment
4. Regional 303(d) Water Quality Monitoring Study
5. Arkansas River Regional Water Quality Monitoring Study
6. Arkansas River Pre-Modeling Low Flow Water Quality Monitoring and Assessment
7. Bird Creek Bacterial Source Tracking Surrogate and Turbidity Studies
8. Bird Creek Regional Water Quality Monitoring Study
9. Total Maximum Daily Load (TMDL) for the Arkansas River and Haikey Creek
10. TMDL for Bird Creek, Coal Creek and Ranch Creek
11. Wasteload Allocation Studies for Bird Creek, Verdigris River and Hominy Creek
12. Assisted in developing and funding multiple rain gardens
13. Compilation of Low Impact Development (LID) resources and information
14. LID and Urban Water Quality Education and Outreach
15. Low Impact Development and Water Quality presentations for a number of organizations

City of Tulsa

a. The City of Tulsa is a local government with interests in providing safe, quality drinking water for northeast Oklahoma residents.

b. Organization Goals / Mission with Regard to NPS Control: Tulsa's mission is to implement source water protection projects, programs and activities to ensure meeting the long-term goal of protecting and enhancing drinking source water for the City of Tulsa's Water Supply Section and the City of Jay, Oklahoma.

c. Current / Planned Programs to Control NPS: Currently, Tulsa has several programs to control NPS pollution

- *Spavinaw Watershed Riparian Protection Initiative (SWRPI)* – Established in 2008 by the Tulsa Metropolitan Utility Authority (TMUA) and Land Legacy, the program targets key watershed properties, develops an outreach and education program, acquires permanent conservation easements, and monitors conditions to effectively document progress – all in an effort to protect and enhance drinking source water quality, and to preserve working agriculture lands within the Eucha/Spavinaw Watershed. Primary funding source is TMUA with additional funding from USDA, EPA and other grant sources.
- *Eucha/Spavinaw Lake Area Environmental Management Program* – Implements in-lake and lake area BMPs.
- *Eucha/Spavinaw Watershed Monitoring Program* – Since 1974, monitor water quality of Lake Eucha, Spavinaw Lake and their tributaries. Extensive on-going monitory began in 1997 to support model development that can support both on-going assessment and management planning.
- *Estimation of Nutrient Loads in the Eucha-Spavinaw Basin, Northeastern, Oklahoma* – Conduct storm runoff event sampling events, compile and update City of Tulsa and USGS total nitrogen and phosphorus levels at five (5) Lake Eucha tributary sites to estimate nutrient loading to Lake Eucha.

d. Resources Available to Control NPS: Tulsa has environmental monitoring and ODEQ certified laboratory services. The services provide monitoring, investigating, sampling, testing, and analyzing streams, groundwater, surface water, and stormwater. Tulsa also has a staffed Source Water Protection Program as well as a lake environmental staff, both experienced in lake/reservoir and watershed management.

e. Organization Role in Planning NPS Watershed Projects: Tulsa would like to participate in NPS watershed projects through the NPS pollution work group. Tulsa requests to be consulted during the initial planning phase of a project if the watershed has similar problems to Tulsa's or if the project includes drinking source water watersheds and/or lakes.

f. Principle Concerns and Priorities Regarding NPS Sources: Tulsa's principle concerns are (1) nutrient loading to its key source water lakes, Lake Eucha, Spavinaw Lake, and Oologah Lake, and (2) drinking water taste and odor issues.

Oklahoma Attorney General (OAG)

a. Agency Responsibility/Authority: OAG has the authority to prosecute violations of Environmental Quality Code, Injunction (O.S. 27A § 3-2-504). OAG is responsible for providing legal services to the OCC, Directors of Conservation Districts, and the Department of Mines (O.S. 27A § 3-2,3-103 and 45 § 43/769). OAG must also prosecute civil/criminal actions on behalf of State administration and represent State agencies (O.S. 74 § 18b and §201).

b. Agency Goals / Mission with Regard to NPS Control: N/A

c. Current / Planned Programs to Control NPS: N/A

d. Resources Available to Control NPS: OAG is available to provide legal advice to agencies undertaking NPS control programs and to provide representation in cases where legal action is necessary.

e. Agency Role in Planning NPS Watershed Projects: No response- missing page.

f. Principle Concerns and Priorities Regarding NPS Sources: No response- missing page.

Oklahoma Department of Wildlife Conservation (ODWC)

a. Agency Responsibility/Authority: ODWC has authority to investigate violations of O.S. 29 § 7-401 and § 7-401a, and O.S. 27.

b. Agency Goals / Mission with Regard to NPS Control: ODWC's mission as stated in our agency's Strategic Plan is to manage Oklahoma's wildlife resources and habitat to provide scientific, educational, aesthetic, economic and recreational benefits for present and future generations of hunters, anglers, and others who appreciate wildlife, with the goal of conserving, sustaining, enhancing, and protecting fish and wildlife resources, habitat, and biodiversity.

c. Current / Planned Programs to Control NPS: ODWC has programs underway in its Wildlife Division to restore wetlands and in its Fisheries Division to protect fisheries from the impacts of NPS pollution. The Natural Resources Section conducts environmental reviews for impacts to wildlife as well as fish and wildlife kill investigations.

d. Resources Available to Control NPS: None specifically available to target NPS pollution only.

e. Agency Role in Planning NPS Watershed Projects: No response - missing page Participation in NPS Working Group and assistance with NPS projects related to ODWC's authority.

f. Principle Concerns and Priorities Regarding NPS Sources: No response - missing page.

Oklahoma Department of Transportation (ODOT)

a. Agency Responsibility/Authority: ODOT is required to comply with NEPA rules and regulations including, OWQS, §§ 404/401 of the CWA, and any requirements for NPDES on State user discharge.

b. Agency Goals / Mission with Regard to NPS Control: The mission of ODOT is to provide a safe, economical, effective, and environmentally sound transportation network for the people, commerce, and communities of Oklahoma.

c. Current / Planned Programs to Control NPS: Currently, ODOT operates under the "Standardized Specifications for Highway Construction", which contains descriptions and procedures for reducing sediment runoff from construction sites.

d. Resources Available to Control NPS: ODOT incorporates controls for NPS pollution into each design plan and all construction projects, with funding from federal or State sources.

e. Agency Role in Planning NPS Watershed Projects: ODOT requests to be informed about the workings and goals for NPS projects, and ODOT should be consulted when they affect or will be affected by a NPS project.

f. Principle Concerns and Priorities Regarding NPS Sources: N/A

Kickapoo Tribe of Oklahoma, Department of Environmental Programs

a. Agency Responsibility/Authority: See below

b. Agency Goals / Mission with Regard to NPS Control: The goals of the Tribe's NPS program will include (1) educational outreach to the tribal community and to local farmers and ranchers; (2) networking and collaboration with other water quality specialists, and (3) the selection and implementation of structural BMPs to address documented NPS pollution problems.

c. Current / Planned Programs to Control NPS: Below is a summary of objectives the Tribe hopes to accomplish:

- Increase public awareness through community education programs highlighting nonpoint source pollution.
- Partner with the Oklahoma State University (OSU) Extension Service, the Shawnee Field Office of the Natural Resources Conservation Service (NRCS), and the Shawnee Field Office of the Bureau of Indian Affairs (BIA) to provide educational outreach to local farmers and ranchers regarding voluntary BMPs to reduce nonpoint source pollution.
- Begin monitoring Horseshoe Oxbow Lake, several unnamed tributaries in the Lower North Canadian River, and Captain Creek and Quapaw Creek in the Deep Fork Watershed.
- Work with municipalities and neighboring tribes to develop watershed plans for the most impaired tributaries in both watersheds.
- Map major stormwater discharge points that are subject to National Pollutant Discharge Elimination System permits.
- Partner with local organizations to implement appropriate BMPs to address NPS pollution.
- Monitor water quality after the installation of BMPs and compare to water quality data collected before implementation of BMPs.

d. Resources Available to Control NPS: Because the Tribe has control over only a small portion of land within the tribal jurisdiction, and for the reason that tribal waters are influenced by the upstream Oklahoma City metropolitan area, education will be a primary and continual goal of the Tribe's NPS program.

e. Agency Role in Planning NPS Watershed Projects: The Kickapoo Department of Environmental Programs will collaborate with other water quality specialists within the area and with other agencies regarding development of NPS watershed based plans, sharing of water quality data, and coordination of education efforts.

f. Principle Concerns and Priorities Regarding NPS Sources: The *Nonpoint Source Assessment Report for the Kickapoo Tribe of Oklahoma* (Bond, 2012) indicated that the two most important source codes for nonpoint source pollution within the jurisdiction are agriculture and urban runoff. The most prevalent subcategories for agriculture involve livestock production. Surface runoff is the most prevalent category for urban runoff. It is important to note that the tribal jurisdiction is

directly downstream from the Oklahoma City metropolitan area and is negatively impacted from several categories of permitted discharges included municipal wastewater treatment plant discharges, municipal stormwater discharges, and industrial discharges.

Pawnee Nation

a. Agency Responsibility/Authority: The Pawnee Nation Department of Environmental Conservation and Safety (DECS) is the lead department for the Pawnee Nation to address all water quality and nonpoint source pollution issue within their jurisdiction. The Pawnee Nation has Treatment in the Same Manner as a State (TAS) authorization for Clean Water Act Programs, 106 Water Pollution Control, 401 and 404 NPDES and water quality certification, 303(c) water quality standards and §319 Nonpoint source pollution. The Pawnee Nation coordinates with the USEPA Region 6 as well as other Federal and State agencies to implement program objectives and goals.

b. Agency Goals / Mission with Regard to NPS Control: The overall goal is the implementation of the Pawnee Nation Nonpoint Source Management program which is to protect and restore water quality, watershed conditions, wetlands, aquatic and riparian habitat within Pawnee Indian Country as outlined in the Pawnee Nation Nonpoint Source Management Plan. Achievement of these goals will help ensure designated use attainability and availability of non-polluted groundwater and surface water for municipal, recreational, cultural, and habitat purpose. The objective is to integrate the nonpoint source program into the overall environmental program for the protection of the environment and natural resources.

c. Current / Planned Programs to Control NPS:
The Pawnee Nation has developed a watershed based plan for the Black Bear Creek and coordinated with the NRCS for implementation within the National Water Quality Initiative.
The current program is focused on the restoration of deteriorating riparian areas along Black Bear Creek and its tributaries by planting trees to reestablish those riparian areas.

d. Resources Available to Control NPS: The Pawnee Nation has established the Natural Resource Protection Act that includes chapters addressing Natural Resource Protection Policy, Aquatic Buffers, Water Quality Standards and Pollution Discharges among others. The Tribe utilizes federal and tribal match resources to implement their NPS management plan.

e. Agency Role in Planning NPS Watershed Projects: The Pawnee Nation takes an active role in planning activities in watershed projects and is willing to become more involved with the State planning process as to coordinate activities. Although there are few Tribal Nations at this time with NPS programs in Oklahoma, Tribes can be a resource for planning, expertise and assisting within their watersheds.

f. Principle Concerns and Priorities Regarding NPS Sources: Black Bear Creek and its tributaries are the principle concern of the Pawnee Nation. The impacts to the watershed include agriculture runoff, oil and gas exploration and operations and construction activities. With the Pawnee Nation being located downstream of many of the impacts, especially oil and gas, the Tribe has in the past and is open for the future to work with all stakeholders within the watershed. Also, Education is integrated into the Tribe's activities by participating in outdoor classrooms and conservation fairs in Pawnee and Payne counties as well as assisting and participating with other tribes.

Nongovernmental Organizations Interests and Responsibilities

Land Legacy

a. Organization Constituency: Land Legacy is an Oklahoma-based nonprofit conservation organization established in part to conserve land for people, including watershed protection and river corridor protection, through the acquisition of conservation easements. TPL's work is undertaken in all venues form wilderness areas to inner city areas. TPL serves as both partner and problem solver for public agencies with which it works.

b. Organization Goals / Mission with Regard to NPS Control: Land Legacy's goal is to create riparian buffers along Spavinaw Creek and its tributaries through the acquisition of conservation easements.

c. Current / Planned Programs to Control NPS: In partnership with the Tulsa Metropolitan Utility Authority, the EPA, the USDA Natural Resources Conservation Service, and other partners, Land Legacy is acquiring conservation easements from willing landowners to protect open lands and create riparian buffers along Spavinaw Creek and its tributaries.

d. Resources Available to Control NPS: Land Legacy provides expertise and experience in real estate transactions, and on the ground negotiation for acquisition of conservation easements to aid in NPS pollution control. Land Legacy can act quickly and effectively in coordination with its agency partners to implement those land conservation measures and efforts that will accomplish the agencies' goals and objectives.

e. Organization Role in Planning NPS Watershed Projects: Land Legacy stands ready to work with partner agencies to identify properties that are important to NPS work and pursue their protection through the acquisition of voluntary conservation easements. Land Legacy is experienced in negotiating with landowners in conservation easement acquisitions to reach NPS goals.

f. Principle Concerns and Priorities Regarding NPS Sources: N/A

Oklahoma Farmers Union (OFU)

a. Organization Constituency: The membership of the OFU is both rural and urban, with 113,000 members. OFU is affiliated with the National Farmers Union and interests include insurance, farm, and rural issues.

b. Organization Goals / Mission with Regard to NPS Control: The goal of the OFU is to strengthen the family farm, which includes a voluntary approach to NPS control.

c. Current / Planned Programs to Control NPS: Currently, OFU does not have any programs other than §319 programs in place to control NPS pollution. OFU does have a youth education program, which could possibly be used to inform about NPS pollution.

d. Resources Available to Control NPS: OFU is county organized, which could be used as a resource for gathering information. OFU does not have funding to control NPS pollution.

e. Organization Role in Planning NPS Watershed Projects: OFU would like to be notified of all proposed NPS watershed projects in order to keep their members informed.

f. Principle Concerns and Priorities Regarding NPS Sources: OFU is concerned that control of NPS pollution will become a regulatory program, private property rights will be overlooked, and stringent regulations will be placed on agriculture and rural citizens.

Oklahoma Farm Bureau (OKFB)

a. Organization Constituency: Oklahoma Farm Bureau (OKFB), a general farm organization with about 100,000 member families, is the voice of agriculture in Oklahoma. OKFB represents farmers and ranchers with operations of all sizes and who raise a wide variety of crops and livestock. OKFB is a true grassroots organization, with members in all of Oklahoma's 77 counties. OKFB derives its policy positions directly from its members.

b. Organization Goals / Mission with Regard to NPS Control: OKFB's goal is protecting farmers and ranchers' private property rights. OKFB's mission is one of monitoring land use issues including implementation of voluntary conservation practices to counteract NPS pollution, educating the members about NPS issues, and taking action to protect the rights of landowners.

c. Current / Planned Programs to Control NPS: OKFB doesn't directly have programs to control NPS. However, many of OKFB's members serve on their local conservation district boards.

d. Resources Available to Control NPS: OKFB can be an information source regarding NPS to its members through the *Perspective* newsletter, OKFB website and twitter. Also, OKFB can be a source of information at county, district and statewide membership meetings.

e. Organization Role in Planning NPS Watershed Projects: OKFB would like to see the state organization notified and county Farm Bureaus invited when local watershed planning is initiated so all may be involved in the watershed restoration process.

f. Principle Concerns and Priorities Regarding NPS Sources: OKFB is concerned that agriculture is unfairly blamed for pollution to the waters of the State. OKFB wants to make sure the agencies with water jurisdiction use the same standards and scientific data to determine what the water quality problems are and where they are coming from. OKFB wants to ensure that bacteria from wildlife are not attributed to livestock when source assessments are made. OKFB wants problems to be communicated to landowners when agriculture is a known problem so they may voluntary implement conservation practices to improve water quality, if they wish to do so.

Oklahoma Municipal League (OML)

a. Organization Constituency: OML is a statewide organization of municipal governments, which currently includes 439 cities and towns.

b. Organization Goals / Mission with Regard to NPS Control: OML's mission is to keep city and town officials informed and educated about NPS control.

c. Current / Planned Programs to Control NPS: Currently, OML does not have any programs to control NPS, but they plan to use their publication to notify municipal officials of activities and of any informational/educational materials and opportunities regarding NPS.

d. Resources Available to Control NPS: N/A

e. Organization Role in Planning NPS Watershed Projects: OML can help to keep municipal officials informed about NPS activities and forward recommendations on their behalf.

f. Principle Concerns and Priorities Regarding NPS Sources: OML requests to be informed about NPS control activities. OML is also particularly concerned about any unfunded mandates

Sierra Club, Oklahoma Chapter

a. Organization Constituency: Sierra Club is a national grassroots organization with 2,300 members in the Oklahoma Chapter. Sierra Club's interests are to convert concern about the health of the environment into effective environmental action and promote public environmental education.

b. Organization Goals / Mission with Regard to NPS Control: Sierra Club's mission with regard to NPS control is to see that water quality management is performed properly to ensure the health of present and future generations.

c. Current / Planned Programs to Control NPS: The Sierra Club, Oklahoma Chapter publishes a bimonthly newsletter, funded by local members, which concentrates on public education of NPS and other environmental concerns. Sierra Club, National has awarded grants for public environmental education the last two years to the Oklahoma Chapter for efforts in water quality education, focusing on CAFOs.

d. Resources Available to Control NPS: Sierra Club can provide volunteers statewide, who will provide time, labor, and expertise in the NPS programs.

e. Organization Role in Planning NPS Watershed Projects: Sierra Club requests to be consulted and involved in all levels of planning for NPS watershed projects so their volunteers can be informed and utilized to the fullest extent.

f. Principle Concerns and Priorities Regarding NPS Sources: Sierra Club's priority watersheds are the impaired HUC watersheds. Sierra Club requests that communication with local, State, and federal agencies remain open, honest, and forthcoming to meet their goal of public education and volunteer participation.

The Nature Conservancy (TNC)

a. Organization Constituency: TNC is a non-profit international conservation organization.

b. Organization Goals / Mission with Regard to NPS Control: TNC's mission is to preserve biological diversity, so NPS pollution must be controlled to preserve aquatic diversity.

c. Current / Planned Programs to Control NPS: TNC does not have any current NPS control programs, but they plan to initiate a community-based conservation program on the Blue River Watershed. This program is not yet funded, but it will build a local coalition of citizens, landowners, corporations, conservation groups, and State and federal agencies to address key issues, increase awareness, and create a conservation plan for key portions of the watershed.

d. Resources Available to Control NPS: None

e. Organization Role in Planning NPS Watershed Projects: TNC requests to be informed about all watershed projects, but they will only participate in projects within their current or future project areas.

f. Principle Concerns and Priorities Regarding NPS Sources: TNC's watershed priorities are the Blue River, Illinois River and Canadian River with concerns regarding sedimentation and nutrient inputs.

Poteau Valley Improvement Authority

a. Agency Responsibility/Authority: The Poteau Valley Improvement Authority is a State of Oklahoma-chartered trust whose mission is to provide safe, clean, and adequate water supply to the residents of LeFlore and adjacent counties.

b. Agency Goals / Mission with Regard to NPS Control: Lake Wister is the water supply for PVIA. The Lake Wister watershed covers approximately one-half of the Poteau River watershed. As a part of protecting the water supply source and as stewards of the natural resources of the region, PVIA supports efforts in watershed restoration in the Wister watershed.

c. Current / Planned Programs to Control NPS: A one-year HUC-12 scale subwatershed water quality sampling program will begin in fall 2014. A two-year lake modeling effort began in summer 2014. The lake model will develop quantitative goals for nutrients and sediment entering Lake Wister from the watershed. HUC-12 sampling will identify the source areas to be targeted to meet load reduction goals. A Watershed-Based Plan will be developed utilizing the results of these two projects.

d. Resources Available to Control NPS: PVIA has modest financial resources available, as well as the ability to provide in-kind services. For watershed restoration activities, PVIA funds would be used to leverage resources available from other sources.

e. Agency Role in Planning NPS Watershed Projects: PVIA seeks partnerships with other organizations and agencies in the Lake Wister Watershed to cooperatively plan and support watershed restoration projects.

f. Principle Concerns and Priorities Regarding NPS Sources: Current regulatory structures and incentives are inadequate to achieve water quality standards.

Public Service Company of Oklahoma

a. Agency Responsibility/Authority: The ODEQ has regulatory authority over our NPDES permits and air permits for our power plants which include limitations on our cooling tower "drift". While Drift is not a permit limitation or specific condition it can be sited as a non-permitted discharge, if it is allowed to accumulate and cause run-off.

b. Agency Goals / Mission with Regard to NPS Control: We are not allowed to have any unpermitted discharges.

c. Current / Planned Programs to Control NPS: Cooling towers are designed and equipped with "drift eliminators" to control.

d. Resources Available to Control NPS: N/A

e. Agency Role in Planning NPS Watershed Projects: N/A

f. Principle Concerns and Priorities Regarding NPS Sources: For industry the concern is to have any unpermitted discharge off the facility property.

University of Oklahoma Health Sciences Center Department of Occupational and Environmental Health (OUHSC-OEH)

a. Agency Responsibility/Authority: OUHSC-OEH has no jurisdiction over water quality or NPS.

b. Agency Goals / Mission with Regard to NPS Control: OUHSC-OEH has no agency goals or mission regarding NPS control.

c. Current / Planned Programs to Control NPS: OUHSC-OEH has no current or planned programs to control NPS.

d. Resources Available to Control NPS: OUHSC-OEH has no resources to control NPS.

e. Agency Role in Planning NPS Watershed Projects: OUHSC-OEH would be willing to participate in designing a plan for NPS watershed projects.

f. Principle Concerns and Priorities Regarding NPS Sources: OUHSC-OEH is particularly concerned with nonpoint sources that effect human exposures to pollutants, through drinking water and recreational exposures.

Oklahoma Water Resources Center (OWRC), Oklahoma State University

a. Organization Constituency: The Oklahoma Water Resources Center (water@okstate.edu, http://water.okstate.edu), part of the Oklahoma Cooperative Extension Service, Oklahoma Agricultural Experiment Station, and College of Agricultural Sciences and Natural Resources at Oklahoma State University provides science-based, community-supported solutions for the state's pressing water quantity and quality challenges through internal expertise and external collaborations. OWRC serves as a gateway

to a national network of water institutes as well as to interdisciplinary partnerships with Oklahoma State University departments, other universities, and various water resources organizations. OWRC was designated as the water resources research institute for the state in 1965 and is one of 54 National Institutes for Water Resources.

b. Organization Goals / Mission with Regard to NPS Control: The Oklahoma Water Resources Center is working to 1) improve water quality through development, implementation and evaluation of watershed-based plans, conventional and innovative water quality monitoring techniques and technologies, and best management practices; 2) ensure future water needs are met via improved agricultural and urban water use efficiency and treatment and beneficial use of wastewaters; and 3) enhance education, outreach, and stakeholder involvement in water resources management.

c. Current / Planned Programs to Control NPS: Current OWRC programs include watershed planning; assessing virtual fencing technology for improving grazing management and reducing NPS runoff from grazinglands; quantifying nutrient, *E. coli*, and sediment runoff concentrations and loadings from a variety of land uses and land covers; assessing background loading from wildlife and other natural sources; assessing the impacts of grazing and other management practices on runoff volume and pollutant concentrations; and developing remote sensing technologies and techniques for detecting and responding to harmful algal blooms.

d. Resources Available to Control NPS: In addition to its national network of water resources research institutes, OWRC provides access to over 80 water faculty at OSU providing needed research, assessment, and education programs related to NPS management.

e. Organization Role in Planning NPS Watershed Projects: The OWRC has extensive experience with stakeholder engagement, watershed assessment, and the development and implementation of NPS watershed projects.

f. Principle Concerns and Priorities Regarding NPS Sources: Priorities include working closely with agricultural producers and organizations to address NPS, working with key watershed stakeholders to develop and implement plans to improve water quality, and develop needed education and outreach programs to improve water resources management.

Oklahoma Cooperative Extension Service (OCES), Oklahoma State University

a. Organization Constituency: OCES, an agency of the OSU Division of Agriculture and Natural Resources, is an outreach education agency with a statewide network of professional educators, trained volunteers, and county offices. It provides high-quality, relevant education to improve the lives of people, businesses, and communities across Oklahoma. With educators in each of the 77 counties in Oklahoma and a system of subject-matter specialists at 10 locations around the state plus Stillwater, OCES provides science-based educational programs to help Oklahomans solve local issues and concerns, promote leadership and manage resources wisely. Extension education encompasses the broad areas of agriculture and natural resources, community economic development, family and consumer sciences, and youth development programs such as 4-H.

b. Organization Goals / Mission with Regard to NPS Control: As part of the National Water Quality Program, OCES addresses the eight water management topics and issues listed on the *National Extension Water Outreach Education* web site (http://wateroutreach.uwex.edu/sitemap.cfm). These topics and issues include animal waste management, drinking water and human health, environmental restoration, nutrient and pesticide management, pollution assessment and prevention, water conservation and agricultural water management, water policy and economics, and watershed management.

c. Current / Planned Programs to Control NPS: The OCES has many NPS water quality extension/education projects and programs.

Forage & Pasture Management. Education of Oklahoma farmers, ranchers, and landowners about proper grazing helps protect the state's waterways from contamination originating from livestock grazing operations. Resources are provided for anyone interested in forage production and pasture management via this program and at http://www.forageandpasture.okstate.edu/.

OSU Botanic Garden. In addition to beautiful and water-wise plantings, the OSU Botanic Garden has several demonstration sites including riparian areas, stream channel rehabilitation site, wetlands, an Onsite Wastewater Treatment System, a Mesonet station, and Low Impact Development installations such as rainwater harvesting systems, pervious pavement, and bioretention cells. Visit botanicgarden.okstate.edu.

Oklahoma Master Gardener Program. Master Gardener Program is a volunteer training program conducted by OCES. Through 60 hours of instruction, participants learn about landscape design, composting, organic and earth-kind gardening, flowers and ornamentals, vegetables, fruits and nuts, pollinators, soil improvement, lawn care, smart irrigation, tree care, pruning, insect and disease control, plant science, and more. Following training, volunteers provide 60 hours of public service assisting the Master Gardener Program. Visit http://www.hortla.okstate.edu/outreach/mg for more information.

Oklahoma Master Naturalist Program. The mission of the Oklahoma Master Naturalist Program is to educate and develop a dedicated volunteer force that provides education, outreach, and service for the beneficial management of natural resources and natural areas in the state of Oklahoma. To earn Master Naturalist certification, participants complete five workshops, 30 hours of volunteer service, and 16 hours of advanced training. Once trained, Master Naturalists provide 20 volunteer service hours and obtain 16 hours of advanced training each year. More info can be found at https://okmasternaturalist.wixsite.com/website.

Pesticide Disposal. Oklahoma Department of Agriculture, Food and Forestry is funding a yearly program to collect and properly dispose of unwanted pesticides that farmers, commercial applicators, or dealers have. Visit pested.okstate.edu.

Precision Nutrient Management. This program provides producer friendly information about nutrient management, fertilizer use, and precision fertilizer application. Visit http://npk.okstate.edu/.

Soil and Water Conservation/Management. Conservation and proper management of our soil and water resources is critically important for the long-term economic sustainability of Oklahoma. This program provides information on soil processes and characteristics that impact crop productivity, soil quality, soil carbon storage, water availability and water conservation. Visit http://soilwater.okstate.edu/.

Soil, Water and Forage Analytical Laboratory (SWFAL). SWFAL provides valuable information that helps citizens protect and utilize their soil, water, animal manure, and forage resources efficiently and effectively. Visit www.soiltesting.okstate.edu.

Stream Trailer Program. Stream stewardship to avoid bank erosion and other problems is taught using six stream trailers housed in different locations across the state. The stream hydrology trailer program raises awareness of the importance of proper riparian management to reduce stream channel erosion and adverse downstream sediment impacts. Visit streamtrailer.okstate.edu/welcome.

Think Water (Indoor/Outdoor Water Conservation). The Oklahoma City Utilities Department has partnered with the OSU Extension Service and the Department of Horticulture and Landscape Architecture to promote conservation through proper outdoor watering and drought-tolerant landscaping. Visit thinkwater.okstate.edu.

Waste Management. OCES provides guidance on proper management of waste including Manure Utilization, Municipal Solid Waste, and Poultry Waste Management Education. Additionally, the OSU Waste Management YouTube Channel provides virtual tours of manure and waste handling technologies.

d. Resources Available to Control NPS: The extensive education and outreach provided across the state by OCES is a major resource for addressing NPS.

e. Organization Role in Planning NPS Watershed Projects: PCES role in planning NPS watershed projects lies in its engagement and education of stakeholders.

f. Principle Concerns and Priorities Regarding NPS Sources: N/A

Oklahoma Agricultural Experiment Station (OAES), Oklahoma State University

a. Organization Constituency: The Oklahoma Agricultural Experiment Station (OAES) at OSU is Oklahoma's premier research agency in agriculture and natural resources. Through the land grant University System, OAES participates in regional and national water quality projects to solve water quality problems and demonstrate technology to control NPS pollution.

b. Organization Goals / Mission with Regard to NPS Control: The OAES conducts research for the purpose of developing new knowledge to address the needs of Oklahoma. OAES research focuses on agriculture, natural resources, rural economies and social issues.

c. Current / Planned Programs to Control NPS: The OAES is currently conducting research in a number of areas related to NPS pollution including: water conservation and drought management, weather-based agricultural decision support tools, irrigation strategies and management, no-till agricultural practices, nutrient management and transport mechanisms, nutrient enrichment status of lotic systems, onsite wastewater treatment, animal waste management, pollution control technologies, pond management, watershed modeling, ecohydrology, environmental flows, ecosystem services, stream ecology, fisheries conservation, landscape irrigation and turfgrass, and stormwater management.

d. Resources Available to Control NPS: N/A

e. Organization Role in Planning NPS Watershed Projects: OAES maintains expertise in model development and implementation, remote sensing, monitoring, assessment of best management practices, and GIS analysis, all of which are critical to watershed planning efforts.

f. Principle Concerns and Priorities Regarding NPS Sources: N/A

The University of Oklahoma (OU)

a. Agency Responsibility/Authority: None

b. Agency Goals / Mission with Regard to NPS Control: None

c. Current / Planned Programs to Control NPS: OU currently does not have any NPS programs, but there is a proposal for an environmental education project to address NPS.

d. Resources Available to Control NPS: OU has research expertise in the areas of water quality and wetlands to aid NPS control.

e. Agency Role in Planning NPS Watershed Projects: OU has an interest in watershed projects and are willing to aid with planning NPS watershed projects.

f. Principle Concerns and Priorities Regarding NPS Sources: N/A

Oklahoma Association of Conservation Districts

a. Organization Constituency: The Oklahoma Association of Conservation Districts is a State organization made up of the 88 local conservation districts and their 445 district directors who are public officials. OACD is affiliated with the National Association of Conservation Districts (NACD) which is a national association of over 3000 conservation districts. The purpose of the association is to promote conservation in the State and provide assistance to local conservation districts. The association provides education and training opportunities for district directors, sponsors statewide conservation programs and events, provides awards for outstanding conservation activities, and participates in the legislative process to advance the cause of conservation in the State.

b. Organization Mission or Goals: Conservation districts are one of the principal delivery systems for implementing NPS management practices. OACD has supported efforts to increase both State and federal funding for NPS management programs over the past 25 years. OACD advocates a voluntary approach to NPS management that provides landowners and land-users with education, technical assistance, and financial assistance.

c. NPS categories of authority /interest:

Interest		Authority	
900	Domestic Waste Water lagoons	1000	Agriculture
1700	Aquaculture	1100	

2300	Road Construction /Maintenance		Non-irrigated Crop
3000	Construction	1200	Production Irrigated Crop
3100	Highway/Road/Bridge	1300	Production
4100	Nonindustrial (permitted)	1400	Specialty Crops
4200	Industrial permitted	1500	Pasture Land
4300	Other urban runoff	1600	Range Land
5000	Resource Extraction	1800	Animal Operations
5100	Surface Mining		Animal
5200	Subsurface Mining	1900	Holding/Management
5300	Placer Mining	2000	Manure Lagoon
5400	Dredge Mining	2100	Silviculture
5500	Petroleum Activities	2200	Harvesting, Restoration,
5600	Mill Tailings	3200	Residue Management
5700	Mine Tailings	4000	Forest Management
6000	Land Disposal (Runoff or Leachate from permitted areas)	6100	Land Development
6200	Wastewater	7550	Urban Runoff
6300	Landfills	7600	Sludge
6400	Industrial Land Treatment		Habitat Modification
6500	On-Site Wastewater Systems (septic Tanks)	7700	Removal of Riparian
6600	Hazardous Waste	7800	Vegetation
6700	Septage disposal		Streambank
7000	Hydromodification	8800	Modification/Destabilization
7100	Channelization		Drainage/Filling of wetlands
7200	Dredging		Upstream Impoundment
7300	Dam Construction		
7400	Flow Regulation/Modification		
7500	Bridge Construction		
7900	Marinas		
8000	Other		
8100	Atmospheric Deposition		
8200	Waste Storage/Storage Tank Leaks		
8300	Highway Maintenance and Runoff		
8400	Spills		
8500	In-place Contaminants		
8600	Natural		
8700	Recreational Activities		
9000	Source Unknown		

d. Current Programs to Control NPS: OACD works cooperatively with the OCC and local conservation districts in sponsoring educational, training and field demonstrations that promote improved NPS management techniques. OACD has promoted the establishment of a statewide conservation cost-share program to address water quality and soil erosion needs in Oklahoma. In 1998 the State legislature authorized a cost-share program and provided 1.75 million dollars of funding.

e. Planned Programs to Control NPS: OACD will continue to work cooperatively with the OCC and local conservation districts to promote educational and training opportunities on NPS management on a

statewide basis. OACD intends to promote continuing funding for the State cost-share program that will provide funds to districts to address local priorities and funds to address NPS problems in impaired watersheds.

f. Resources Available to Control NPS: OACD will continue to promote NPS control through education and training of conservation district directors. This should improve the ability of local conservation district boards to carry out NPS programs.

g. Organization Role in Planning NPS Watershed Projects: OACD, as a statewide organization would like to review data and provide input on the selection of priority watersheds. Local conservation districts should individually be involved in the planning and implementation of watershed projects.

h. Principle Concerns and Priorities Regarding NPS Sources: Sediment control and nutrient management on agriculture lands are of greatest interest to OACD.