

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

PUBLIC NOTICE¹

Revision – Public Comment Ending Period Extended to September 8th, 2014

July 10, 2014

Availability of Draft Bacterial and Turbidity TMDLs for the Lower North Canadian River/Deep Fork River Study Area

Proposed Modification to Incorporate Lower North Canadian/Deep Fork Study Area Bacterial and Turbidity TMDLs into Oklahoma’s Water Quality Management Plan

Request for Public Comments

Public Comment Period Ends on Monday, September 8, 2014



Little Wewoka Creek

(OK520500020090_00)

(Photo courtesy of the Oklahoma Conservation Commission)

The [Oklahoma Department of Environmental Quality \(DEQ\)](#) is seeking comments on a draft [Total Maximum Daily Load \(TMDL\)](#) report describing reductions of [bacteria](#) and [turbidity](#) needed to improve water quality in the Lower North Canadian/Deep Fork Study Area. This Study Area is in the east central portion of Oklahoma in the [Deep Fork](#) (USGS [HUC](#) 11100303) and [Lower North Canadian](#) (USGS HUC 11100302) watersheds. The Study Area covers portions of [Hughes](#), [Okfuskee](#), [Okmulgee](#), and [Seminole](#) counties.

DEQ is also proposing to incorporate these TMDLs into Oklahoma’s Water Quality Management Plan (208 Plan). The “**208 Factsheet Regarding Bacterial and Turbidity TMDLs in the Lower North Canadian/Deep Fork Study Area**” is attached. The full TMDL report can be found on-line at: www.deq.state.ok.us/WQDnew/tmdl/index.html.

Background: The [Federal Clean Water Act](#) requires states to develop [Water Quality Standards \(WQS\)](#)² which provide goals and pollution control targets for improving water quality where the standards are not met. The waterbodies where standards are not met are considered to be “[impaired](#).” Impaired waterbodies are listed on what is known as the 303(d) list, which refers to Section 303(d) of the [Clean Water Act](#). The plan to improve water quality for impaired waterbodies is

accomplished by establishing limits known as [Total Maximum Daily Loads \(TMDLs\)](#) for each pollutant not

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² A PowerPoint presentation on “Implementation of Water Quality Standards” can be found at the [Oklahoma Water Resources Board’s \(OWRB\)](#) website. It can be found at: www.owrb.ok.gov/supply/ocwp/pdf_ocwp/WaterPlanUpdate/waterscienceseminar/SmolenWQImplementation.pdf

meeting the standards. TMDLs set levels for pollutants that allow waterbodies to achieve their WQS for [beneficial uses](#). Beneficial uses include water for [drinking](#), recreation, aesthetics, agriculture, fishing, and swimming. The beneficial uses are all described in in the [Oklahoma Water Quality Standards \(OWQS\)](#) [Title 785, Chapter 45]. All waterbodies and their designated beneficial uses can be found in Appendix A of the OWQS. The assessment on whether the waterbodies are meeting their designated beneficial uses along with the current 303(d) list of impaired waterbodies is in a document entitled the “[Integrated Report](#)”. States are required to develop these Integrated Reports every two years. The assessment of all Oklahoma waterbodies for their beneficial uses can be found in [Appendix B \(Comprehensive Waterbody Assessment\)](#) of Oklahoma’s Integrated Report.

Beneficial Uses: The [designated beneficial uses](#) for the waterbodies in the Lower North Canadian/Deep Fork Study Area are:

- Aesthetics (AES)
- Agriculture (AG)
- Fish & Wildlife Propagation
 - ◆ Warm Water Aquatic Community Subcategory (WWAC)
 - ◆ Habitat Limited Aquatic Community (HLAC)
- Fish Consumption (FISH)
- Primary Body Contact Recreation (PBCR)
- Public & Private Water Supply (PPWS)
- Emergency Water Supply (EWS)

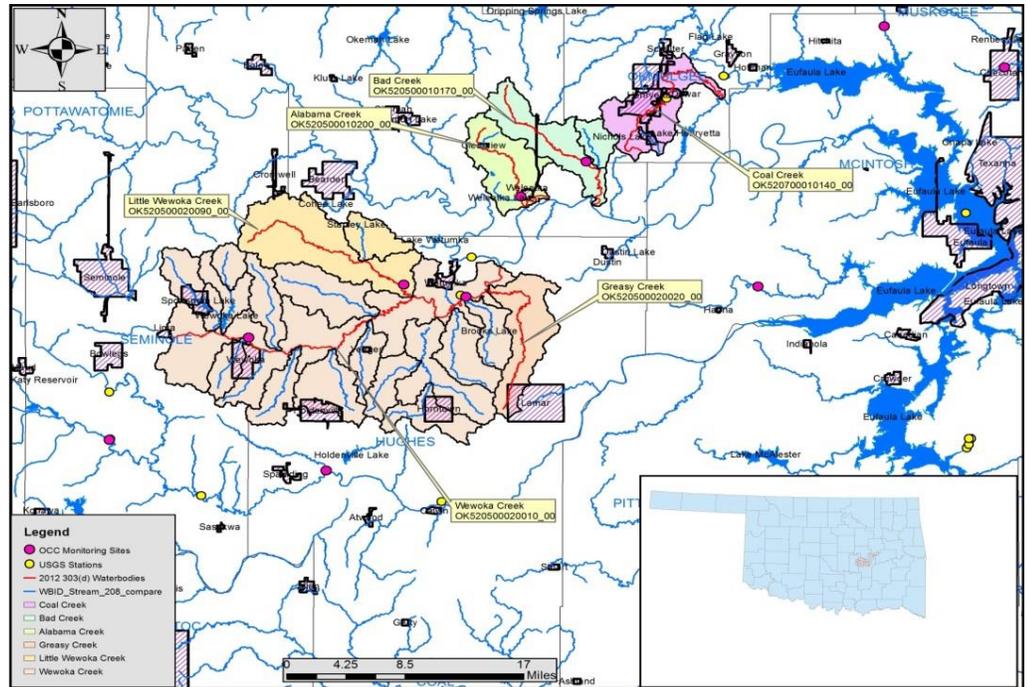


Table 1 is an assessment from Oklahoma’s [2012 Integrated Report](#) on whether or not the waterbodies in the Study Area met their designated beneficial uses. The designated beneficial uses addressed in the Lower North Canadian/Deep Fork TMDL Report were PBCR and WWAC:

Table 1: Assessed Beneficial Uses for Waterbodies in the Study Area

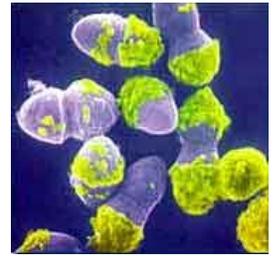
Waterbody Identification	Waterbody Name	AES	AG	WWAC	FISH	PBCR	PPWS	EWS
OK520500010170_00	Bad Creek	F	F	F	X	N	I	
OK520500010200_00	Alabama Creek	I	N	F	X	N	I	
OK520500020010_00	Wewoka Creek	F	N	HLAC	X	N	I	F
OK520500020020_00	Greasy Creek	F	F	N	X	I		
OK520500020090_00	Little Wewoka Creek	I	F	F	X	N	I	
OK520700010140_00	Coal Creek	I	X	N	X	X ³		F

F – Fully supporting that designated use; N – Not supporting that use; I – Insufficient information; X – Not assessed

³ Designated use is Secondary Body Contact Recreation but not assessed for that use.

Impairments:

- **Bacteria:** The PBCR beneficial use includes [swimming](#). If the PBCR beneficial use is not met, that means there is too much bacteria in that waterbody. Many types of bacteria are [pathogens](#) which are things that can cause disease in animals or plants. According to the OWQS, bacterial testing is done for [Escherichia coli](#) (*E. coli*) and [Enterococci](#). These are micro-organisms found in the intestines of humans and animals that may cause disease. They may be found in fecal matter entering waterbodies from sources such as sewage discharges, leaking septic tanks, or runoff from animal feedlots. Enterococci impairs 6,964 miles of streams in Oklahoma, and *E. coli* impairs 4,136 miles of streams.⁴



Enterococci
Photo courtesy of the
U.S. Dept. of Energy's
Lawrence Berkeley
National Laboratory

- **Turbidity:** The other beneficial use evaluated in this study was the WWAC subcategory of Fish and Wildlife Propagation. The WWAC subcategory evaluates whether the water quality and habitat are adequate to support a [climax](#) (fully-developed) fish community. [Turbidity](#) is one of the impairments that keeps waterbodies from attaining their WWAC beneficial use. Turbidity is a measure of the cloudiness of water and is one of the threats to the fish community. It is mostly caused by [suspended particles](#) such as [sediment](#), clay, silt, plankton, or microscopic organisms. Other factors such as true color, dissolved solids etc. may also affect turbidity. The suspended particles are generally referred to as Total Suspended Solids (TSS). Because turbidity cannot be expressed as a mass load, TSS is used as a surrogate for turbidity in this TMDL.



Erosion of Sugar Creek in
Caddo County (DEQ file photo)

Turbidity/TSS can affect fish by causing gill abrasion or fin rot. It can also impact aquatic biota by reducing habitat through the blanketing of fish spawning and feeding areas. In addition, it can eliminate sensitive food organisms or reduce sunlight penetration to aquatic plants, thereby impairing photosynthesis. Turbidity/TSS may add to the mechanical wear of water supply pumps and distribution systems, thus increasing water treatment costs. In addition, turbidity/TSS can provide a mechanism for the transport of pesticides or other toxic compounds. Thus, reductions in turbidity/TSS will improve water quality. Turbidity was found to be the cause of impairment for 2,775 miles of streams in Oklahoma.⁵

TMDL Study: The TMDL study evaluated six waterbodies in the Lower North Canadian/Deep Fork Study Area that DEQ designated as impaired in the [2012 Integrated Report 303\(d\) list](#) for nonsupport of the PBCR or WWAC beneficial uses. The criteria to determine if a stream is listed on the 303(d) list can be found in [Implementation of Oklahoma's Water Quality Standards](#) (Title 785, Chapter 46).

The Oklahoma WQS used to contain three bacterial indicators (fecal coliform, *E. coli* and Enterococci). In keeping with EPA's recommended [Recreational Water Quality Criteria for States](#), the Oklahoma WQS were revised on July 1, 2011 to contain only *E. coli* and Enterococci. No more fecal coliform TMDLs have been developed since then. The WQS for *E. coli* and Enterococci bacteria are listed in the *Assessment of Primary Body Contact Recreation support* [OAC 785:46-15-6(b-c)]. The PBCR season every year is May 1 – September 30.



E. coli
Photo courtesy of [USDA ARS](#)

The WQS for turbidity is listed under the *Protection of Fish and Wildlife Propagation* beneficial use (OAC 785:45-5-12(f)(7)). Turbidity, from other than natural sources, cannot

⁴ Table 6 of DEQ's [2012 Oklahoma Integrated Report](#).

⁵ Ibid

exceed 50 NTUs ([nephelometric turbidity units](#)) for streams with a WWAC beneficial use in 10% or more of the samples.⁶ This criterion applies only to seasonal base flow conditions. Turbidity levels are expected to be elevated during, and for several days after, a storm event. If a waterbody is impaired by a pollutant so that it is unable to meet its designated beneficial use, then the impairment is listed on the 303(d) list in the Integrated Report. Impaired waterbodies in this Study Area are shown in the half of **Table 2** with the blue-shaded header. An “x” indicates that the impaired waterbody is on the 303(d) list for Enterococci, *E. coli*, or turbidity.

Water quality monitoring is conducted to see whether or not the waterbodies are impaired. In Oklahoma, water quality monitoring is conducted by several different agencies including the [Oklahoma Conservation Commission](#) (OCC), the [Oklahoma Water Resources Board](#) (OWRB), and the [U.S. Geological Survey](#) (USGS). Between 2003 – 2010, 137 bacterial samples were collected for the waterbodies in the Study Area. Between 2009 – 2010, 24 turbidity samples were collected in the Study Area. For this study, the water quality data generated by all of these samples was analyzed to find out if the waterbodies in the Study Area were impaired for bacteria or turbidity thus necessitating a TMDL. The water quality data examined to make these determinations can be found in Appendix A of the “**2014 Lower North Canadian/Deep Fork Study Area Bacterial and Turbidity TMDL Report**”.

The results of the data analyses are also summarized in **Table 2**. An “x” in the half of the table with the yellow header indicates that sampling data showed the waterbody to be impaired for bacteria or turbidity. TMDLs were developed for these waterbodies.

Table 2: Assessed Impairments and Actual Impairments in the Study Area

WBID	Waterbody Name	Waterbody impairments from the 2012 303(d) List			TMDLs needed after sampling results analyzed		
		Enterococci	<i>E. coli</i>	Turbidity	Enterococci	<i>E. coli</i>	Turbidity
OK520500010170_00	Bad Creek		X			X	
OK520500010200_00	Alabama Creek	X	X		X	X	
OK520500020010_00	Wewoka Creek		X			X	
OK520500020020_00	Greasy Creek			X			Delist – no violation
OK520500020090_00	Little Wewoka Creek	X	X		X	X	
OK520700010140_00	Coal Creek			X			Delist – no violation

TMDLs:

A TMDL is a plan of action to reduce pollutant loads so that impaired waterbodies will be able to meet their beneficial uses. TMDLs calculate the maximum amount of a pollutant allowed to enter a waterbody so that the waterbody will be able to meet water quality standards for that particular pollutant. The TMDL report uses scientific data collection, analysis, and [water quality modeling](#) to determine the sources and amounts of the pollutants entering the waterbodies. Then the TMDL allocates loads to point sources (these are known as waste load allocation or WLA) and [nonpoint sources](#) (NPS) which are given a load allocation or LA.

The [National Pollutant Discharge Elimination System \(NPDES\) program](#) regulates point source discharges. The NPDES Program in Oklahoma, in accordance with an agreement between DEQ and EPA, is implemented via the Oklahoma Pollutant Discharge Elimination System (OPDES) Act [Title 252, Chapter 606 (<http://www.deq.state.ok.us/rules/606.pdf>)]. A point source is described as a “discernable, confined, and discrete conveyance from which pollutants are or may be discharged to surface waters.”



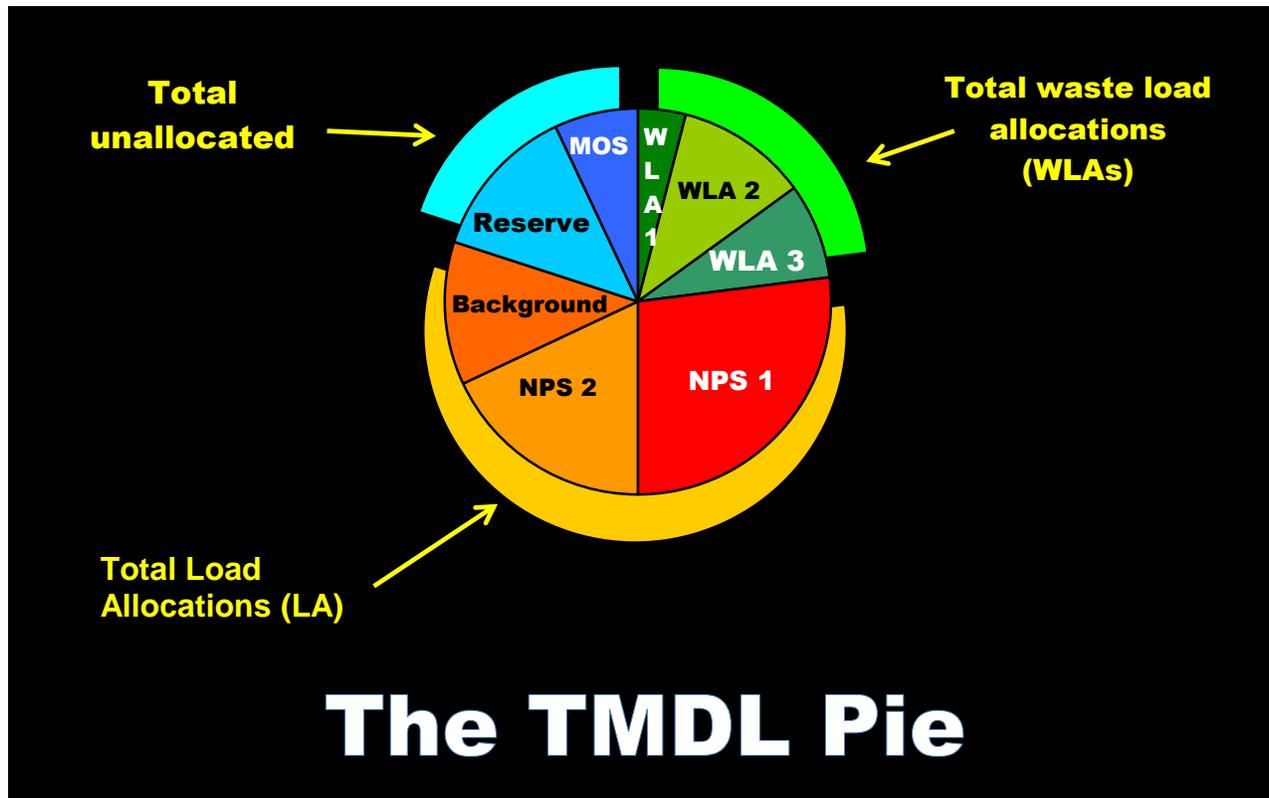
DEQ file photo of a point source discharge

⁶ OAC 785:46-15-4(b)(2): http://www.owrb.ok.gov/util/rules/pdf_rul/Chap46.pdf

These are usually, but not always, discharges from a pipe. TMDLs must provide WLAs for all NPDES regulated point sources. Nonpoint sources (NPS) are ones, like agricultural runoff, that cannot be identified as entering a waterbody at a single location.

An important part of TMDL analysis is the identification of all sources of pollutants (both point and nonpoint) in the watershed. Once identified, all contributing sources of the pollutants are allocated a portion of the allowable load. This usually requires a reduction in the amount of pollution the source is discharging in order to help the waterbody no longer be impaired. Natural background sources, seasonal variations, and a margin of safety (usually at least 10%) are all taken into account in the allocations. The TMDL equation is as follows:

$$\text{TMDL} = \text{WLA (waste load allocations from point sources)} + \text{LA (from nonpoint sources)} + \text{MOS (Margin of safety)}$$



Point Source Discharges in the Lower North Canadian/Deep Fork Study Area:

- **OPDES regulated municipal and industrial wastewater treatment facilities (WWTF):** There are six municipal and three industrial OPDES-permitted facilities that discharge wastewater to waters in the Lower North Canadian/Deep Fork Study Area. Two of the industrial facilities are inactive and the third discharges to the City of Henryetta. All of these facilities are listed in Table 3-1 of the TMDL report and displayed in Figure 3-1.
- **OPDES regulated stormwater discharges:** DEQ regulates stormwater discharges from Municipal Separate Storm Sewer Systems (MS4s), industrial sites, and construction sites. But DEQ's stormwater program does not include discharges from Indian Country lands, discharges related to oil & gas extraction, or discharges associated with agricultural purposes. Stormwater discharges occur only during or immediately following periods of rainfall and elevated flow conditions when the turbidity criteria do not apply. Because of this and because these facilities are permitted, they are not considered potential contributors to turbidity impairment. For details about DEQ's Stormwater Program, go to <http://www.deq.state.ok.us/WQDnew/stormwater/>

- ☛ **OPDES regulated stormwater discharges through Municipal Separate Storm Sewer Systems (MS4s):** Polluted stormwater runoff is commonly transported through MS4s, from which it is often discharged untreated into local waterbodies. Cities and towns in [urbanized areas](#) must use [Best Management Practices \(BMPs\)](#) to prevent harmful pollutants from being washed or dumped into local streams and lakes. MS4s outline these [BMPs](#) in their stormwater management program. They must also obtain an [MS4 Permit](#) from DEQ ([OKR04](#)). There aren't any MS4s in the Lower North Canadian/Deep Fork Study Area.



DEQ file photo of storm drain marker

- ☛ **Industrial Sites:** Stormwater run-off from industrial sites is regulated because stormwater from industrial facilities may come into contact with many different types of pollutants including process wastewater, equipment wash run-off, leaks from storage tanks, oil & gas from vehicles, pesticides & fertilizers, and sediment. [DEQ's Multi-Sector General Permit](#) (MSGP) authorizes the discharge of stormwater from industrial facilities. The determination of whether or not an industrial facility must obtain stormwater discharge permit coverage is based both on the facility's Standard Industrial Classification (SIC) code and whether or not the facility has the potential to contaminate stormwater. To find out which industries are covered, refer to Table 1-2 beginning on Page 3 of the MSGP ([OKR05](#)). To get an industrial stormwater permit, a [Notice of Intent](#) (NOI) must be filed with DEQ and the applicable application and annual permit fees must be paid. Also, a [stormwater pollution prevention plan \(SWP3\)](#) **must** be developed and implemented according to the requirements of this permit. There weren't any facilities in the Lower North Canadian/Deep Fork Study Area with MSGPs during the time of the study.



- **Rock, Sand, and Gravel Quarries:** [Stormwater](#) from rock, sand and gravel quarries in Oklahoma fall under the MSGP. But [wastewater](#) generated at quarries is regulated under [DEQ General Permit OKG950000](#). General Permit OKG950000 does not allow discharge of wastewater into Outstanding Resource Waters, High Quality Waters, Sensitive Public & Private Water Supplies, and Appendix B Waters [OAC 785:45-5-25(c)(2)]. This Permit does not allow discharge of wastewater into turbidity-impaired waters on Oklahoma's 303(d) list, but there aren't any rock, sand, or gravel quarries in the Study Area.
- ☛ **Construction Sites:** A [Construction General Permit \(OKR10\)](#) is required for any stormwater discharges associated with construction activities that result in land disturbance of equal to or greater than one (1) acre, or less than one (1) acre if they are part of a larger common plan of development or sale that totals at least one (1) acre. The permit also authorizes any stormwater discharges from support activities (e.g. concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, and borrow areas) that are directly related to a construction site that is required to have permit coverage, and is not a commercial operation serving unrelated different sites.

An authorization to discharge from DEQ must be received prior to beginning any construction activities with stormwater discharges. In order to receive this authorization, a [Notice of Intent \(NOI\)](#) must be filed with DEQ and the applicable application and annual permit fees must be paid. Also, a [stormwater pollution prevention plan \(SWP3\)](#) **must** be developed and implemented according to the requirements of the OKR10 permit. There was only one OKR10 permit for construction projects in the Lower North Canadian/Deep Fork Study Area during the time period when water samples were taken. This can be found in Table 3-2 of the TMDL report.

- **No-Discharge Facilities:** Certain municipal facilities are classified as no-discharge. These facilities are required to sign an affidavit of no discharge. For the purposes of these TMDLs, it is assumed that no-discharge facilities (such as towns with [total retention lagoons](#)) do not contribute to bacteria or TSS getting into the waterbodies. However, it is possible that the wastewater collection systems associated with these no-discharge facilities could be a source of bacteria, or that discharges from the wastewater plant may occur during large rainfall events that exceed the systems' storage capacities. The City of Henryetta's WWTF is the only no-discharge facility in the Lower North Canadian/Deep Fork Study Area. They have a land application site. It is located in the Coal Creek (OK520700010140_00) watershed which is not impaired.



DEQ file photo of land application

- **[Sanitary Sewer Overflows \(SSO\)](#) (SSO):** The sanitary sewer system is the network of underground pipes that carry wastewater from sinks, toilets, showers, bathtubs, and interior floor drains to the wastewater treatment plant where it is cleaned and treated before being discharged into local waterbodies. Although infrequent, [sanitary sewer overflows \(SSO\)](#) from wastewater collection systems can be a major source of harmful bacteria into streams. Most overflows are caused by blockage of sewer pipes by grease, tree roots, trash, and other debris that clog sewer lines; by sewer line breaks and leaks; by cross connections with storm sewers; excessive rain; and by inflow and infiltration of groundwater into sanitary sewers.



Photo courtesy of the City of Raleigh, NC

SSOs are a common result of the aging wastewater infrastructure around Oklahoma. Oklahoma has been ahead of other states and, in some cases EPA itself, in its handling of SSOs. Due to the widespread nature of the SSO problem, DEQ has focused its limited resources to first target SSOs that result in definitive environmental harm (such as fish kills) or lead to citizen complaints.⁷ All SSOs falling into these two categories are addressed through DEQ's formal enforcement process. While not all sewer overflows are reported, DEQ has some data. For example in the Lower North Canadian/Deep Fork Study Area between 2000 and 2013, 386 SSO occurrences were reported with amounts ranging from a minimal amount to 90,000 gallons. Details about these SSOs are summarized in Table 3-4 of the TMDL report with specific details in Appendix D.

- **NPDES regulated [Animal Feeding Operations \(AFOs\)](#):** The [Agricultural Environmental Management Services \(AEMS\)](#) is a program within the Oklahoma Department of Agriculture, Food and Forestry (ODAFF). Through regulations established by the Oklahoma [Concentrated Animal Feeding Operation \(CAFO\) Act](#), [Swine Feeding Operation \(SFO\) Act](#), and the [Poultry Feeding Operation \(PFO\) Registration Act](#), AEMS helps develop, coordinate, and oversee environmental policies and programs aimed at protecting the Oklahoma environment from pollutants associated with agricultural animals and their waste. This is done through the use of Best Management Practices ([BMPs](#)). BMPs include dikes, berms, terraces, ditches or other similar structures used to isolate animal waste from outside surface drainage. ODAFF is the NPDES-permitting authority for CAFOs and SFOs in Oklahoma under what ODAFF calls the [Agriculture Pollutant Discharge Elimination System \(AgPDES\)](#). PFOs are smaller animal feeding operations so they are not required to get NPDES permits. They are only required to register with ODAFF and follow [PFO rules](#). In the Lower North Canadian River/Deep Fork Study Area, there weren't any PFOs.

A CAFO is an [animal feeding operation](#) that confines and feeds 1,000 or more animal units for 45 days or more in a 12-month period. The [CAFO Rules](#) are designed to protect water quality through the use of BMPs. Except for a 25-year, 24-hour rainfall event, CAFOs are considered "no discharge" facilities and

⁷ For environmental complaints, go to: www.deq.state.ok.us/ECL/Snew/Complaints/onlncmpl.htm

are not considered a source of TSS loading. If not managed properly, CAFOs have the potential to cause serious impacts on water quality.⁸ Potential problems for CAFOs include possible animal waste discharges to State waterbodies and failure to properly operate wastewater lagoons. There are no CAFOs in the Lower North Canadian/Deep Fork River Study Area. However, according to ODAFF, there are 15 SFOs with 13,622 swine.



Photo courtesy of [Michigan State University](#).

An SFO is a lot or facility where swine kept for at least ninety (90) consecutive days or more in any twelve-month period. A “concentrated swine feeding operation” has a certain number of swine⁹ and either discharges its pollutants into nearby waterbodies through a ditch, flushing system or other constructed device, or the pollutants flow directly into waterbodies that flow through or come into direct contact with swine at the facility. SFOs are required to follow [Oklahoma SFO Rules](#) and develop a [Swine Waste Management Plan](#) to prevent swine waste from being discharged into surface or groundwater. This Plan includes the use of BMPs to prevent runoff & erosion.¹⁰ The Swine Waste Management Plan may include, but is not limited to, a

Comprehensive Nutrient Management Plan per NRCS guidance or Nutrient Management Plan per EPA guidance.

- **Section 404 Permits:** Because discharge of dredged or fill material in waters can be a significant source of impairments such as turbidity/TSS, [Section 404 of the Clean Water Act \(CWA\)](#) requires a permit from the [U.S. Army Corps of Engineers](#) (USACE) before discharging those materials into waters of the United States, including [wetlands](#). Activities regulated under this program include - but are not limited to - fill for development, water resource projects (such as dams and levees), infrastructure development (such as highways and airports) and mining projects. However, certain farming and forestry activities are exempt. Both USACE and EPA can take enforcement actions for violations of Section 404. Under Section 401 of the CWA, [DEQ](#) reviews and certifies that Oklahoma Water Quality Standards are protected.



Stones placed in Tahlequah Creek under a 401/404 project. (DEQ file photo)

[Nonpoint Sources of Discharges in the Lower North Canadian/Deep Fork Study Area](#)

Nonpoint sources include those sources that cannot be identified as entering the waterbody at a specific location. [Nonpoint sources](#) of pollutants are typically separated into [urban](#) and rural categories. Surface [storm runoff](#)¹¹ is an important source of loading in urban or residential settings with many [roads](#) and other

⁸ The United States Department of Agriculture’s (USDA) Natural Resources Conservation Service (NRCS) has a program where operators of Animal Feeding Operations/Confined Animal Feeding Operations (AFO/CAFO) can apply for financial assistance for the storage, treatment, and utilization of animal waste. This is a statewide process to address the water quality impacts of these facilities to the rivers and streams of the State. For more information, go to www.nrcs.usda.gov/wps/portal/nrcs/detail/ok/programs/financial/?cid=nrcs142p2_000482.

⁹ A [concentrated swine feeding operation](#) has at least 750 swine that each weighs over 25 kilograms (about 55 pounds), 3,000 weaned swine weighing under 25 kilograms, or 300 swine animal units. A swine animal unit is a unit of measurement for any swine feeding operation calculated by adding the following numbers: The number of swine weighing over twenty-five (25) kilograms, multiplied by four-tenths (0.4), plus the number of weaned swine weighing under twenty-five (25) kilograms multiplied by one-tenth (0.1)

¹⁰ [Swine Animal Waste Management Plan Requirements](#) [Title 35 (ODAFF), Chapter 17 (Water Quality), Subchapter 3 (Swine Feeding Operations)] can be found in 35:17-3-14.

¹¹ For information on how to reduce runoff after rainstorms, request the free DVD from EPA entitled “Reduce Runoff: Slow it Down, Spread it Out, Soak it in!” (EPA Publication #84211001) by calling them at 800-490-9198 or by ordering it from their webpage (www.epa.gov/nscep/). The DVD includes the video, “After the Storm”, which was co-produced by EPA and The Weather Channel. The “After the Storm” brochure (PDF) can be downloaded at <http://water.epa.gov/action/weatherchannel/index.cfm>.

[paved, impervious areas](#). In [rural settings](#)¹², the sources of bacteria may include runoff of manure applied to agricultural land, the runoff of farm animal wastes associated with the erosion of [sediments](#) in grazing fields, contributions from wildlife, and failing septic tanks. Some examples include:

- **Wildlife** – Disease-causing bacteria can be produced by all warm-blooded animals, including birds. Wildlife is naturally attracted to riparian corridors of streams and rivers. With direct access to the stream channel, wildlife can be a concentrated source of bacterial loading to a waterbody. Bacteria from wildlife are also deposited onto land surfaces, where they may be washed into nearby streams by rainfall runoff. It must be noted that no data are available in Oklahoma to estimate wildlife populations other than deer. A number of bacteria source tracking studies around the nation demonstrate that wild birds and mammals can represent a major source of the fecal bacteria found in streams. Currently there are insufficient data available to estimate populations and spatial distribution of wildlife and avian species by watershed. Consequently, it is difficult to assess the magnitude of bacterial contributions from wildlife species as a general category.

However, adequate data are available by county to estimate the number of deer by watershed. Using [Oklahoma Department of Wildlife Conservation](#) county data, the population of deer can be roughly estimated. By using this estimate and the percentage of the watershed area within each county, wild deer population can be calculated for each watershed. For the four watersheds in the Lower North Canadian/Deep Fork Study Area impaired for bacteria, this comes to about 3,686 deer. This is an average deer per acre rate ranging from 0.009 [Alabama Creek (OK520500010200_00)] to 0.011 [Bad Creek (OK520500010170_00), Wewoka Creek (OK520500020010_00), and Little Wewoka Creek (OK520500020090_00)]. At this minimal concentration, wildlife is considered to be a minor contributor of bacteria in those impaired watersheds.



Photo courtesy of [USDA ARS](#)

- **Farm Animals** - Agricultural [livestock grazing](#) in pastures deposit [manure](#) containing bacteria onto land surfaces. Detailed information is not currently available to describe or quantify the relationship between in-stream concentrations of bacteria and land application of manure from commercially raised farm animals. Despite the lack of specific data, land application of commercially raised farm animal manure is considered a potential source of bacterial loading into watersheds in the Lower North Canadian/Deep Fork Study Area for the purpose of these TMDLs. Examples of livestock activities that could result in bacteria getting into creeks, streams, and rivers include:



Processed manure from livestock operations such as poultry facilities: This manure is often applied to fields as fertilizer and can contribute to fecal bacterial loading into waterbodies if washed into streams by runoff. In Oklahoma, [poultry waste applicators must be certified](#).



Livestock grazing in pastures: Livestock deposit manure containing fecal bacteria onto land surfaces. These bacteria may be washed into waterbodies by storm runoff.



Direct access to waterbodies by livestock: Livestock standing in or crossing streams can provide a direct concentrated source of fecal bacteria and TSS into the



This cattle crossing keeps the cattle out of the stream except at the time of crossing.

Photo courtesy of [USDA NRCS](#)

¹² The Environmental Quality Incentives Program (EQIP) is a voluntary conservation program from the USDA NRCS that promotes agricultural production and environmental quality. Through EQIP, farmers and ranchers may receive financial and technical assistance to install or implement structural and management conservation practices on eligible agricultural land. To find out what programs are available, go to: www.nrcs.usda.gov/wps/portal/nrcs/detail/ok/programs/financial/?cid=nrcs142p2_000353 or contact your local [NRCS Field Service Center](#).

streams. In the four bacterially-impaired watersheds in the Lower North Canadian/Deep Fork Study Area, cattle (an estimated 34,783 head) generate the largest amount of fecal coliform and often have direct access to streams and tributaries. The estimated numbers of livestock by watershed are based on the USDA county agricultural census data. The estimated farm animal populations were derived by using the percentage of the watershed within each county. Refer to the full TMDL report for the estimated number of all agricultural animals (Table 3-8) as well as their daily fecal coliform production rates (Table 3-9).

- **Pets** - Bacteria from the feces of dogs and cats can be a potential source of in-stream bacteria when it is transported to streams by runoff from urban and suburban areas. On average nationally there are 1.7 dogs per household and 2.2 cats per household [American Veterinary Medical Association (2007)]. Based on these national averages, it is estimated that there are about 11,599 dogs and 15,011 cats in the four bacterially-impaired watersheds in the Lower North Canadian/Deep Fork Study Area.



- **Failing Septic Systems** – If a septic system is not working properly, then raw sewage - a concentrated source of bacteria - can go directly into streams. Bacterial loading from failing septic systems can be transported to streams in a variety of ways, including runoff from surface ponding or through groundwater. Bacteria-contaminated groundwater can also enter creeks through springs and seeps. It is estimated that there are 246 failing septic systems in the four bacterially-impaired watersheds in the Lower North Canadian/Deep Fork Study Area. Refer to the full TMDL report (Section 3.3.3) on how these numbers were calculated.

Summary of Possible Sources of Impairment:

- **Bacteria** - The health effects of bacteria should be a concern for the public who use these waterbodies for activities such as swimming, wading, or boating because some waterborne bacteria can cause serious human illness or disease. In the Lower North Canadian/Deep Fork Study Area, most of the bacteria appear to come from nonpoint sources. Of the four watersheds in the Study Area that are impaired with bacteria, two [Alabama Creek (OK520500010200_00) and Wewoka Creek (OK520500020010_00)] have continuous point source dischargers in them. However, available data suggests that the proportion of bacteria from those point sources is minor. There are three continuous point source dischargers in the Coal Creek watershed, but Coal Creek (OK520700010140_00) is not impaired for bacteria. Wewoka Creek (OK520500020010_00) watershed has 15 SFOs which could contribute bacteria. But SFOs are not allowed to discharge or allow the runoff of animal waste so they are not considered to be major sources of bacteria as long as they are in compliance with their Swine Waste Management Plans as outlined in the ODAFF SFO Rules. Therefore, nonpoint sources are most likely the cause of bacterial impairment in these watersheds.

Though most of the pathogens come from nonpoint sources, the specific sources from which the bacteria come cannot be determined without additional study. Of the four major nonpoint sources (wildlife, farm animals, failing septic systems, and domesticated dogs & cats), most of the fecal coliform load estimates from nonpoint sources to land surfaces appears to come from farm animals. Cattle, in particular, are thought to contribute the most to bacterial nonpoint source pollution because:

- 🐄 There are quite a few of them (34,783 in the Lower North Canadian/Deep Fork Study Area).
- 🐄 They produce a lot of fecal coliform.
- 🐄 They graze in fields where rain can result in runoff into nearby waterbodies.
- 🐄 Sometimes cattle are allowed to wade in creeks and streams that flow to waterbodies.

Table 3-14 of the TMDL report is an estimated percentage of fecal coliform load estimates from the four major nonpoint source categories that can contribute to the elevated bacterial concentrations found in these watersheds. It is estimated that commercially raised farm animals contribute 98.01% - 99.75% of the fecal coliform load estimates to land surfaces in these four watersheds.

- **Turbidity** – None of the watersheds in the Study Area was impaired for turbidity. Since no TMDLs were needed for any of the stream segments, none of the point sources needs a WLA. Little Wewoka Creek used to be impaired for turbidity, but the use of [BMPs restored its fish and wildlife propagation designated use](#).

TMDL Calculations:

The purpose of a TMDL is to identify sources of pollutants in a watershed and calculate the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards. The Lower North Canadian/Deep Fork Study Area contains waterbodies that are in violation of Oklahoma Water Quality Standards with respect to bacteria. The TMDL calculates the reduction in bacteria that would be needed in order for these streams to be in compliance with Oklahoma’s WQS. This was done using [load duration curves](#). The calculations include present and future sources as well as a margin of safety. For more information on how the TMDLs were developed, read Sections 4 & 5 and Appendix B of the TMDL report.

Recommendations:

After re-evaluating both bacterial and turbidity data following Oklahoma’s assessment protocol, six TMDLs were developed for the six streams in the Lower North Canadian/Deep Fork Study Area. **Table 3** is a summary of these TMDLs.

Table 3 Summary of Bacterial TMDLs in the Lower North Canadian/Deep Fork Study Area

Stream Name	Waterbody ID	Pollutant	TMDL (cfu/day)	WLA _{WWTF} (cfu/day)	WLA _{MS4} (cfu/day)	LA (cfu/day)	MOS (cfu/day)
Bad Creek	OK520500010170_00	<i>E. coli</i>	1.40E+10	0.00E+00	0.00E+00	1.26E+10	1.40E+09
Alabama Creek	OK520500010200_00	<i>E. coli</i>	1.10E+10	6.87E+08	0.00E+00	9.21E+09	1.10E+09
		ENT	2.88E+09	1.80E+08	0.00E+00	2.41E+09	2.88E+08
Wewoka Creek	OK520500020010_00	<i>E. coli</i>	6.78E+10	3.25E+09	0.00E+00	5.78E+10	6.78E+09
Little Wewoka Creek	OK520500020090_00	<i>E. coli</i>	1.19E+10	0.00E+00	0.00E+00	1.07E+10	1.19E+09
		ENT	3.13E+09	0.00E+00	0.00E+00	2.81E+09	3.13E+08

Table 4 indicates the amount that each pollutant will need to be reduced [Percent Reduction Goal (PRG)] in order for that waterbody to meet water quality standards and its designated beneficial uses:

Table 4 Percent Reduction Goal Needed for Waterbody to Meet Water Quality Standards

Waterbody ID	Waterbody Name	Required Reduction Rate	
		<i>E. coli</i>	ENT
OK520500010170_00	Bad Creek	20%	-
OK520500010200_00	Alabama Creek	11%	84%
OK520500020010_00	Wewoka Creek	32%	-
OK520500020090_00	Little Wewoka Creek	36%	79%

TMDLs include bacterial WLAs for point source dischargers. The WLAs are in **Table 5**.

Table 5 Bacterial Wasteload Allocations for OPDES-Permitted Facilities

Waterbody ID & Stream Name	Name	OPDES Permit No.	Dis-infection?	Design Flow (mg/d)	Wasteload Allocation (x10 ⁸ cfu/day)	
					<i>E. coli</i>	ENT
Alabama Creek OK520500010200_00	Weleetka PWA	OK0028525	No	0.144	6.87	1.8
Wewoka Creek OK520500020010_00	City of Wetumka	OK0032417	Yes	0.102	4.87	-
	City of Wewoka	OK0022659	Yes	0.580	27.7	-

Providing comments

- DEQ invites your comments. The comment period will be open for 45 days. The TMDL report is a draft document and is subject to change based on comments received during the public participation process.
- You may also request a public meeting in writing. If there is a significant degree of interest, DEQ will schedule a public meeting.
- All official comments for the record must be submitted either in writing or by e-mail before the end of the comment period. DEQ will prepare a responsiveness summary addressing all comments received. After evaluating comments received and making any necessary changes, the TMDL report will be submitted to EPA for final approval. The final results of the TMDL will be incorporated into Oklahoma’s Water Quality Management Plan.

Please submit your comments in writing to: Dr. Karen Miles, Water Quality Division, Oklahoma Department of Environmental Quality, P.O. Box 1677, Oklahoma City, OK 73101-1677; (405) 702-8192; E-mail: Water.Comments@deq.ok.gov

Comments must be received by 4:30 pm on Monday, September 8, 2014

Obtaining copies: You may view the full Lower North Canadian/Deep Fork Bacterial and Turbidity TMDL study by going to the DEQ website at: www.deq.state.ok.us/WQDnew/tmdl/index.html or by picking up copies at the DEQ main office, Water Quality Division, 707 North Robinson, Oklahoma City from 8:30 am – 5:00 pm. A document copying fee may apply.

You are receiving this notice because you are either on DEQ’s list to receive all public notices, or you requested notices about your watershed. In addition to proposed TMDL reports, DEQ’s Watershed Planning & Stormwater Permitting Section sends out public notices about proposed wasteload allocations (208s), proposed changes to the CPP or Integrated Report, 404 projects, 401 Certification requests, and stormwater permits.



If you would like to receive any or all of these public notices via e-mail, please send your e-mail address to Water.Comments@deq.ok.gov. Also, please let us know if you want to receive notices for the entire State or just for your [watershed](#).

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Impaired Waterbodies in the Lower North Canadian/Deep Fork TMDL Study Area:

Waterbodies that were indicated as impaired for bacteria or turbidity on Oklahoma’s 2012 [303\(d\) list](#), are designated with an “x” in the half of **Table 2** with a dark blue header. Bacterial water quality monitoring results from 2003 – 2010 (137 samples) and turbidity water quality monitoring results from 2009 – 2010 (24 samples) were examined to verify if these waterbodies were still impaired. The results of the data analyses are also summarized in **Table 2**. An “x” in the half of the table with the yellow header indicates that sampling data showed the waterbody to still be impaired for bacteria or turbidity. TMDLs were developed for these waterbodies.

Table 7: Assessed Impairments and Actual Impairments in the Study Area

WBID	Waterbody Name	Waterbody impairments from the 2012 303(d) List			TMDLs needed after sampling results analyzed		
		Enterococci	<i>E. coli</i>	Turbidity	Enterococci	<i>E. coli</i>	Turbidity
OK520500010170_00	Bad Creek		X			X	
OK520500010200_00	Alabama Creek	X	X		X	X	
OK520500020010_00	Wewoka Creek		X			X	
OK520500020020_00	Greasy Creek			X			Delist – no violation
OK520500020090_00	Little Wewoka Creek	X	X		X	X	
OK520700010140_00	Coal Creek			X			Delist – no violation

Possible Sources of Impairments:

Point sources - The point sources examined in the Lower North Canadian River/Deep Fork River TMDL Study Area were:

- OPDES-regulated [municipal](#) and [industrial wastewater treatment facilities](#) (WWTF) – There are six municipal and three industrial OPDES-permitted facilities that discharge wastewater to waters in the Lower North Canadian/Deep Fork Study Area. These facilities are listed in Table 3-1 and displayed in Figure 3-1 of the TMDL report.
- **OPDES regulated stormwater discharges:**
 - ☛ [Municipal Separate Storm Sewer Systems \(MS4s\)](#) - There aren’t any in the Study Area.
 - ☛ [Industrial Sites](#) – There weren’t any facilities in the Study Area with a [Multi-Sector General Permit \(MSGP\)](#).
 - Rock, Sand, and Gravel Quarries – Wastewater generated at quarries is regulated under [DEQ General Permit OKG950000](#). There aren’t any quarries in the Study Area.
 - ☛ [Construction Sites](#) - There was one DEQ-permitted construction site during the time period that water samples were taken in the Study Area.
- **No-Discharge Facilities** – In the Study Area, there was one no-discharge facility (Henryetta WWTF). For the purposes of these TMDLs, it is assumed that no-discharge facilities (such as towns with [total retention lagoons](#)) do not contribute bacteria or TSS into the waterbodies.
- **Sanitary Sewer Overflows (SSO):** In the Study Area between 2000 and 2013, 386 SSO occurrences were reported with amounts ranging from a minimal amount to 90 thousand gallons.
- **NPDES-regulated [Animal Feeding Operations \(AFOs\)](#)** –The Oklahoma Department of Agriculture, Food and Forestry (ODAFF) has been approved by EPA to issue NPDES permits in Oklahoma under what ODAFF calls the [Agriculture Pollutant Discharge Elimination System \(AgPDES\)](#). There are 15 [Swine Feeding Operations](#) (SFOs) with 13,622 swine in the Study Area. SFOs must follow [SFO rules](#) and develop a [Swine Waste Management Plan](#) to prevent swine waste from being discharged into surface or groundwater.

Nonpoint sources - The nonpoint sources examined in the Lower North Canadian River/Deep Fork River TMDL Study Area were:

- Wildlife – There are about 3,686 deer in the Study Area. They are thought to be a minor contributor of bacteria.
- Farm animals – There are an estimated 34,783 head of cattle in the Study Area. They are considered to be a major contributor of fecal coliform in the Study Area.
- Pets – There are an estimated 11,599 dogs and 15,011 cats in the Study Area. They are considered to be a minor contributor of bacteria in the Study Area.
- Failing Septic Systems – There are 246 failing septic systems in the Study Area which are considered to be a minor contributor of bacteria.

For details about each of these sources and their impact on the impairment of waterbodies in the Study Area, consult the full Lower North Canadian River/Deep Fork River Bacterial and Turbidity TMDL report at the following DEQ webpage: <http://www.deq.state.ok.us/WQDnew/tmdl/index.html>.

TMDLs:

Load duration curves were used to calculate six TMDLs (**Table 3**) for the six streams in the Lower North Canadian River/Deep Fork River Study Area.

Table 8 Summary of Bacterial TMDLs in the Lower North Canadian/Deep Fork Study Area

Stream Name	Waterbody ID	Pollutant	TMDL (cfu/day)	WLA _{WWTF} (cfu/day)	WLA _{MS4} (cfu/day)	LA (cfu/day)	MOS (cfu/day)
Bad Creek	OK520500010170_00	<i>E. coli</i>	1.40E+10	0.00E+00	0.00E+00	1.26E+10	1.40E+09
Alabama Creek	OK520500010200_00	<i>E. coli</i>	1.10E+10	6.87E+08	0.00E+00	9.21E+09	1.10E+09
		ENT	2.88E+09	1.80E+08	0.00E+00	2.41E+09	2.88E+08
Wewoka Creek	OK520500020010_00	<i>E. coli</i>	6.78E+10	3.25E+09	0.00E+00	5.78E+10	6.78E+09
Little Wewoka Creek	OK520500020090_00	<i>E. coli</i>	1.19E+10	0.00E+00	0.00E+00	1.07E+10	1.19E+09
		ENT	3.13E+09	0.00E+00	0.00E+00	2.81E+09	3.13E+08

Table 4 indicates the amount that each pollutant will need to be reduced [Percent Reduction Goal (PRG)] in order for that waterbody to meet water quality standards and its designated beneficial uses:

Table 9 Percent Reduction Goal Needed for Waterbody to Meet Water Quality Standards

Waterbody ID	Waterbody Name	Required Reduction Rate	
		<i>E. coli</i>	ENT
OK520500010170_00	Bad Creek	20%	-
OK520500010200_00	Alabama Creek	11%	84%
OK520500020010_00	Wewoka Creek	32%	-
OK520500020090_00	Little Wewoka Creek	36%	79%

TMDLs include bacterial WLAs for point source dischargers. The WLAs are in **Table 5**.

Table 10 Bacterial Wasteload Allocations for OPDES-Permitted Facilities

Waterbody ID & Stream Name	Name	OPDES Permit No.	Dis-infection?	Design Flow (mg/d)	Wasteload Allocation (x10 ⁸ cfu/day)	
					<i>E. coli</i>	ENT
Alabama Creek OK520500010200_00	Weleetka PWA	OK0028525	No	0.144	6.87	1.8
Wewoka Creek OK520500020010_00	City of Wetumka	OK0032417	Yes	0.102	4.87	-
	City of Wewoka	OK0022659	Yes	0.580	27.7	-

EPA Approval Date: Pending
Record Last Updated: 7/9/2014