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OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

PUBLIC NOTICE

February 14, 2014

Availability of Draft Bacterial and Turbidity TMDLs for the Lower Neosho River Watershed

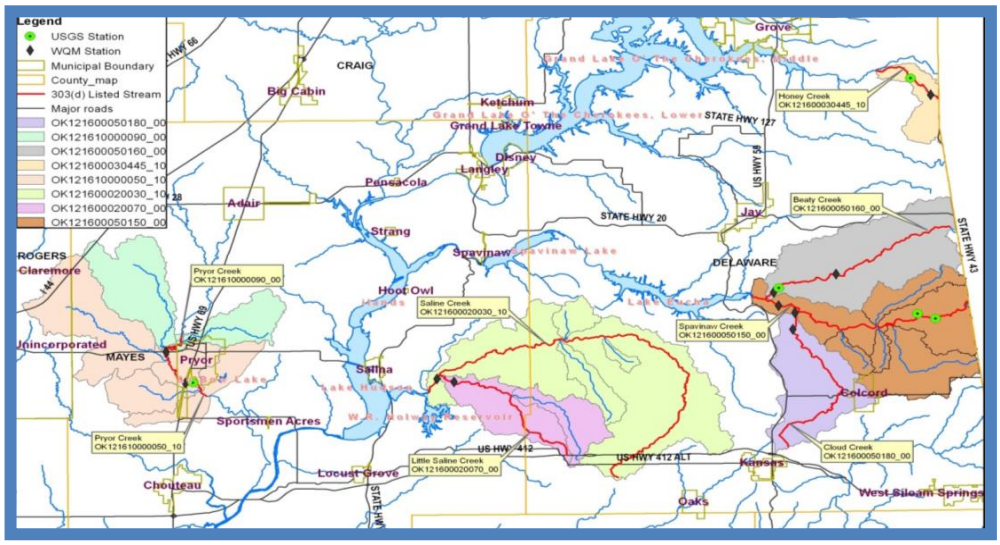
Proposed Modification to Incorporate Lower Neosho River Bacterial and Turbidity TMDLs into Oklahoma's Water Quality Management Plan

Request for Public Comments

Public Comment Period Ends on March 31, 2014

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 Neosho River Study Area. This Study Area is in the northeastern portion of Oklahoma in the Lower Neosho (USGS HUC 11070209) and Grand Lake O' The Cherokees (USGS HUC 11070206) watersheds. The Study Area is in Delaware and Mayes counties with a very small part located in Rogers County.

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 Neosho River Study Area is attached. The full TMDL report can be found on-line at the following DEQ web site: www.deq.state.ok.us/WQDnew/tmdl/index.html.



Background: The Federal Clean Water Act requires states to develop Water Quality Standards (WQS)[1] 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 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.

Beneficial Uses: The designated beneficial uses for the waterbodies in the Lower Neosho River Study Area are Aesthetics (AES), Agriculture (AG), Fish & Wildlife Propagation-Cool Water Aquatic Community Subcategory (CWAC), Fish & Wildlife Propagation-Warm Water Aquatic Community Subcategory (WWAC), Fish Consumption (FISH), Primary Body Contact Recreation (PBCR), Secondary Body Contact Recreation (SBCR), Public & Private Water Supply (PPWS), HQW – High Quality Waters, SWS – Sensitive Public & Private Water Supply.

The following table is the assessment from Oklahoma's 2010 Integrated Report on whether or not these waterbodies met their designated beneficial uses. The assessment of all Oklahoma waterbodies for their beneficial uses can be found in Appendix B (Comprehensive Waterbody Assessment) of Oklahoma's Integrated Report. The designated beneficial uses addressed in the Lower Neosho River TMDL Report were PBCR, WWAC, and CWAC.

Waterbody Identification	Waterbody Name	AES	AG	CWAC	WWAC	FISH	PBCR	SBCR	PPWS	Other
OK121600020030_10	Saline Creek	F	F	F		F	N		F	
OK121600020070_00	Little Saline Creek	F	I	F		X	N		I	
OK121600030445_10	Honey Creek	I	I	F		X	N		X	HQW
OK121600050150_00	Spavinaw Creek	F	I	F		X	N		I	SWS
OK121600050160_00	Beaty Creek	F	I	F		X	N		I	HQW
OK121600050180_00	Cloud Creek	I	I	F		X	N		X	SWS
OK121610000050_10	Pryor Creek	I	F		N	X	N		I	
OK121610000090_00	Pryor Creek	F	F		N	X		N		

(F = Fully supporting that designated use; N = Not supporting that use; I = Insufficient information; X= Not assessed)

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

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

1 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: http://www.owrb.ok.gov/supply/ocwp/pdf_ocwp/WaterPlanUpdate/watersciencesseminar/SmolenWQImplementation.pdf

from animal feedlots. Enterococci impairs 6,964 miles of streams in Oklahoma, and *E. coli* impairs 4,136 miles of streams.[2]

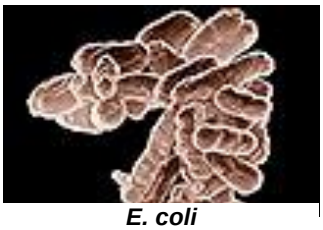
- **Turbidity:** The other beneficial uses evaluated in this study were the WWAC and CWAC subcategories of Fish and Wildlife Propagation. The WWAC and CWAC subcategories evaluate whether the water quality and habitat are adequate to support a climax (fully-developed) fish community. Turbidity is one of the impairments that keeps waterbodies from attaining their WWAC and CWAC beneficial uses. 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.

Photo courtesy of USDA NRCS

  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.[3]

TMDL Study: The TMDL study evaluated eight waterbodies in the Lower Neosho River Study Area that DEQ designated as impaired in the 2010 Integrated Report 303(d) list for nonsupport of the PBCR, WWAC, and/or CWAC 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 785:45-5-16(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 exceed 10 NTUs (nepholometric turbidity units) for streams with a CWAC beneficial use and cannot exceed 50 NTUs in streams with a WWAC beneficial use in 10% or more of the samples.[4] 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 following table under the yellow header. An "**x**" indicates that the waterbody is on the 303(d) list as impaired with Enterococci, *E. coli*, or turbidity.

2 Table 6 of DEQ's 2012 Oklahoma Integrated Report.

3 Table 6 of DEQ's 2012 Oklahoma Integrated Report.

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

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 2000 – 2010, 732 bacterial samples were collected for the waterbodies in the Study Area. Between 1999 – 2001, 20 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 Neosho River Study Area Bacterial and Turbidity TMDL Report**".

The results of the data analyses are also summarized in the following table. An "**x**" in the part of the table with the blue header indicates that the sampling data showed that the waterbody was still found to be impaired for bacteria or turbidity so a TMDL was developed.

WBID	Waterbody Name	Waterbody Impairments from the 2010 303(d) List			TMDLs needed after sampling results analyzed		
		Enterococci	*E. coli*	Turbidity	Enterococci	*E. coli*	Turbidity
OK121600020030_10	Saline Creek	X			X		
OK121600020070_00	Little Saline Creek	X			X		
OK121600030445_10	Honey Creek	X	X		X		
OK121600050150_00	Spavinaw Creek	X			X		
OK121600050160_00	Beaty Creek	X			X		
OK121600050180_00	Cloud Creek	X			X		
OK121610000050_10	Pryor Creek	X	X		X	X	
OK121610000090_00	Pryor Creek		X	X			X

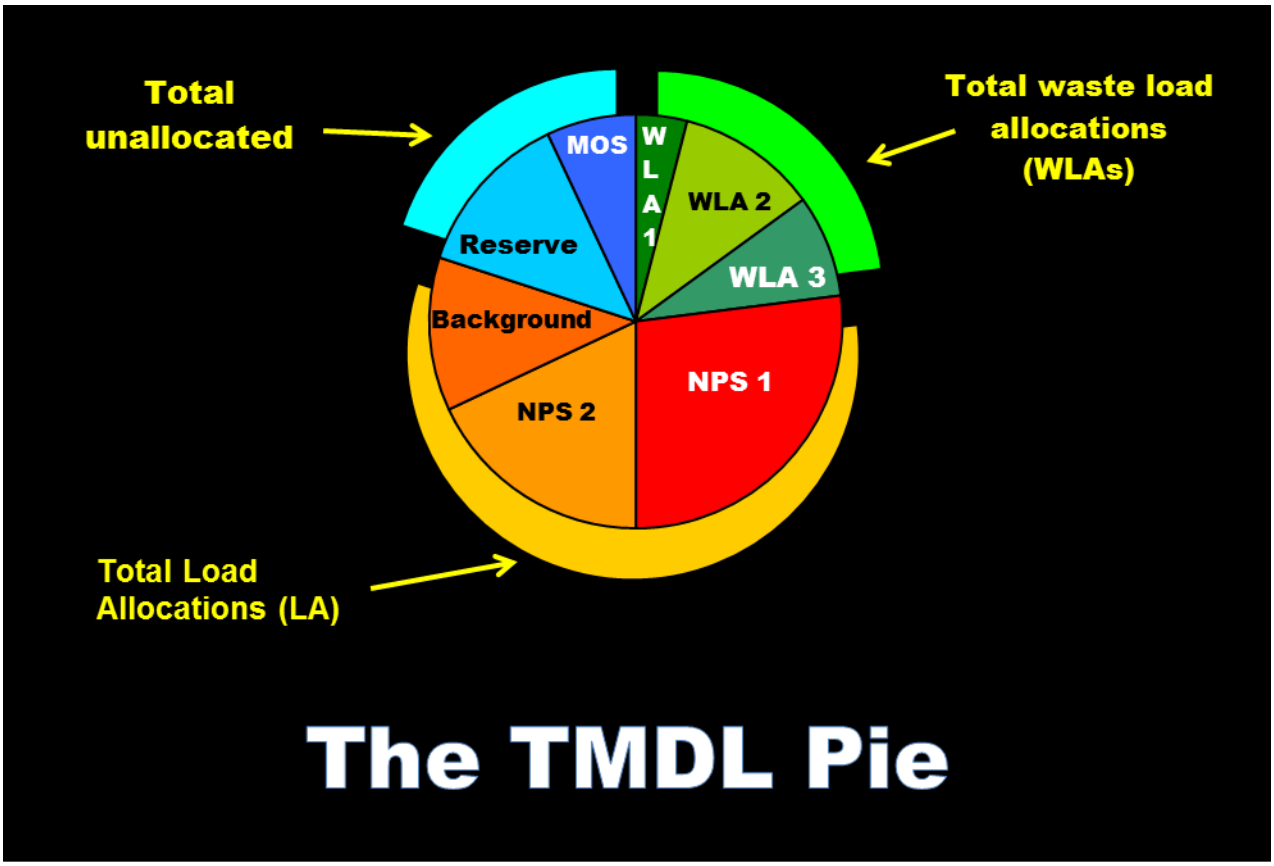
TMDLs: A TMDL is a plan of action to reduce pollutant loads so that impaired waterbodies will be able to meet their beneficial uses. TMDLs calculate the maximum amount of a pollutant allowed to enter a waterbody so that the waterbody will be able to meet water quality standards for that particular pollutant. 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. A point source is described as a "discernable, confined, and discrete conveyance from which pollutants are or may be discharged to surface waters." 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.

DEQ file photo of a point source discharge

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:

TMDL = WLA (waste load allocations from point sources) **+ LA** (from nonpoint sources) **+ MOS** (Margin of safety)



Point Source Discharges in the Lower Neosho River Study Area:

- **NPDES regulated municipal and industrial wastewater treatment facilities (WWTF):** There is one municipal NPDES-permitted facility that discharges wastewater to waters in the Lower Neosho River Study Area. It is the City of Pryor Creek WWTF which discharges into Pryor Creek (OK121610000050_10).

- **NPDES 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/

  - **NPDES 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). The Lower Neosho River watershed does not have any MS4s.

- **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 aren't any industrial stormwater facilities with MSGPs in the Lower Neosho River watershed.

- **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 one OKR10 permit for a construction project in the Lower Neosho River watershed during the time period when water samples were taken.

- **Rock, Sand, and Gravel Quarries:** Operators of rock, sand, and gravel quarries in Oklahoma are regulated with a general permit issued by DEQ (OKG950000). The general permit does not allow discharge of wastewater to turbidity-impaired waters on Oklahoma's 303(d) list. This is the case if a TMDL has not been performed or the result of the TMDL indicates that discharge limits more stringent than 45 mg/l for TSS are required. There aren't any rock, sand, or gravel quarries in the Study Area.

- **No-Discharge Facilities:** Certain municipal plants are classified as no-discharge facilities. 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. There are two[5] no-discharge facilities in the Lower Neosho River watershed.

5 Colcord WWTF and Kenwood - Cherokee Nation WWTF

- **Sanitary Sewer Overflows (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.[6] 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 Neosho River watershed between 1990 and 2012, 54 SSO occurrences were reported with amounts ranging from 0 to 40,000 gallons.

- **NPDES regulated Concentrated Animal Feeding Operations (CAFOs):** 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.

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 Best Management Practices (BMPs). BMPs include dikes, berms, terraces, ditches or other similar structures used to isolate animal waste from outside surface drainage. Except for a 25-year, 24–hour rainfall event, CAFOs are considered "no discharge" facilities. If not managed properly, CAFOs have the potential to cause serious impacts on water quality.[7] Potential problems for CAFOs include possible animal waste discharges to State waterbodies and failure to properly operate wastewater lagoons. CAFOs are not considered a source of TSS loading.

6 For environmental complaints, go to: www.deq.state.ok.us/ECLSnew/Complaints/onlncmpl.htm

7 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.

According to ODAFF, there is 1 CAFO and 69 PFOs (in all the watersheds except for the two Pryor Creek segments) in the Study Area. The CAFO, with a maximum of 40 swine and 420 dairy cows, is in the Saline Creek watershed (OK121600020030_10) in Delaware County. Regulated CAFOs operate under NPDES and State permits issued and overseen by ODAFF. In order to comply with this TMDL, the permits and associated management plans of any CAFOs in the Study Area must be reviewed. Further actions must be implemented to reduce bacterial loads and achieve progress toward meeting the specified reduction goals.

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. There are about 6,228,250 birds in the 69 PFOs in the Study Area. On Little Saline Creek in Mayes County, there is one PFO with 60,000 broilers. All the rest of the PFOs - with over six million birds - are in Delaware County. The list of registered PFOs can be found in Table 3-6 of the TMDL report.

- **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.

Nonpoint Sources:

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[8] is an important source of loading in urban or residential settings with many roads and other paved, impervious areas. In rural settings[9], 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.

Photo courtesy of USDA NRCS

8 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.

9 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, contact your local NRCS Field Service Center or go to: www.nrcs.usda.gov/wps/portal/nrcs/detail/ok/programs/financial/?cid=nrcs142p2_000353.

Currently there is 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. From 2005 to 2009 for the seven watersheds in the Lower Neosho River watershed impaired for bacteria, this comes to about 3,176 deer. This is an average deer per acre rate ranging from 0.004 [Honey Creek (OK121600030445_10)] to 0.018 [Saline Creek (OK121600020030_10), Little Saline Creek (OK121600020070_00), and Cloud Creek (OK121600050180_00)]. At this minimal concentration, wildlife is considered to be a minor contributor of bacteria in those impaired watersheds.

- **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 Neosho River watershed 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 streams. In the seven bacterially-impaired watersheds in the Lower Neosho River watershed, cattle (an estimated 32,406 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 2007 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 3-11) as well as their daily fecal coliform production rates (Table 3-12).

- **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 12,485 dogs and 16,159 cats in the seven bacterially-impaired watersheds in the Lower Neosho River watershed.

- **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 386 failing septic systems in the seven bacterially-impaired watersheds in the Lower Neosho River watershed. Refer to the full TMDL report (Section 3.3.4) 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 Neosho River watershed, only Pryor Creek (OK121610000050_10) has a continuous point source discharger that may contribute bacteria. Though available data suggests that bacteria from the Pryor Creek WWTF is minor, they will be given a WLA. Most of the bacteria in Pryor Creek appears to come from nonpoint sources. There is 1 CAFO and 2 PFOs (1 with 60,000 broilers and 1 with 20,000 breeders) which could possibly result in some bacteria in the Little Saline Creek watershed. There are 67 PFOs with over 6 million birds in all of the remaining watersheds except for Pryor Creek.[10] But PFOs 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 Nutrient Management Plans and Animal Waste Management Plans as outlined in the ODAFF PFO Rules. Therefore, nonpoint sources are most likely the cause of bacterial impairment in these watersheds.

  Though most of the bacteria comes from nonpoint sources, the specific sources from which the bacteria comes cannot be determined without additional study. Of the four major nonpoint sources (livestock, pets, deer, septic tanks), 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 many more cattle than other farm animals (dairy cows, horses, goats, hogs/pigs, and ducks/geese) in the Study Area (see Table 3-11 of the TMDL report).
  - Cattle produce much more fecal coliform than other animals.
  - They graze in fields where rain can result in runoff into nearby waterbodies.
  - Cattle are sometimes allowed to wade in creeks and streams that flow to waterbodies.

  Table 3-15 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 94.78% - 98.5% of the fecal coliform load estimates to land surfaces in these 7 watersheds.

- **Turbidity** - Pryor Creek (OK121610000090_00) is the only stream segment in this report which requires a turbidity TMDL. Since there aren't any point source dischargers in that sub-watershed, that means that all of the turbidity is from nonpoint sources. But it is difficult to know the exact cause of turbidity impairment in the Pryor Creek sub-watershed. Cattle grazing in the field can result in sediment from erosion. Sediment loading of streams can also originate from natural erosion processes. This includes weathering of soil, rocks, and uncultivated land; geological abrasion; and other natural phenomena. There is insufficient data available to quantify contributions of TSS from these natural processes. TSS or sediment loading can also occur under non-runoff conditions as a result of anthropogenic activities in riparian corridors which cause erosive conditions. There isn't enough data to know how much of the turbidity in the impaired waterbodies is naturally-occurring and how much is from other sources.

10 Pryor Creek segments OK121610000050_10 and OK121610000090_00 do not have any PFOs.

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 Neosho River watershed contains waterbodies that are in violation of Oklahoma Water Quality Standards with respect to bacteria and/or turbidity. The TMDL calculates the reduction in bacteria and turbidity 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, see the TMDL report – especially Sections 4 and 5.

Recommendations:

After re-evaluating both bacterial and turbidity data following Oklahoma's assessment protocol, nine TMDLs and one WLA were developed for the eight streams in the Lower Neosho River watershed. The following table 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:

WBID	Waterbody Name	These impairments must be reduced by the following amounts in order to meet water quality standards.		
		Enterococci	*E. coli*	Turbidity
OK121600020030_10	Saline Creek	48%	-------	-------
OK121600020070_00	Little Saline Creek	65%	-------	-------
OK121600030445_10	Honey Creek	74%	-------	-------
OK121600050150_00	Spavinaw Creek	37%	-------	-------
OK121600050160_00	Beaty Creek	67%	-------	-------
OK121600050180_00	Cloud Creek	59%	-------	-------
OK121610000050_10	Pryor Creek	83%	4%	-------
OK121610000090_00	Pryor Creek	-------	-------	56%

The TMDL for Pryor Creek (OK121610000050_10) includes a bacterial WLA for the Pryor Creek WWTF.

Waterbody ID & Waterbody Name	NPDES Permit No.	Name	Disinfection?	Design Flow (mg/d)	EC Wasteload Allocation (cfu/day)	ENT Wasteload Allocation (cfu/day)
OK121610000050_10 Pryor Creek	OK0040479	City of Pryor Creek Municipal Utilities Authority	Yes	1.67	7.97E+09	2.09E+09

Spavinaw Creek/Beaty Creek Watershed Implementation Projects:

For examples of what is currently being done to decrease bacteria in the Spavinaw Creek and Beaty Creek watersheds, go to the following website:

www.ok.gov/conservation/documents/2009_3_24%20Spavinaw%20Beaty%20Fact%20Sheet.pdf

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, March 31, 2014

Obtaining copies: You may view the full Lower Neosho River 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.

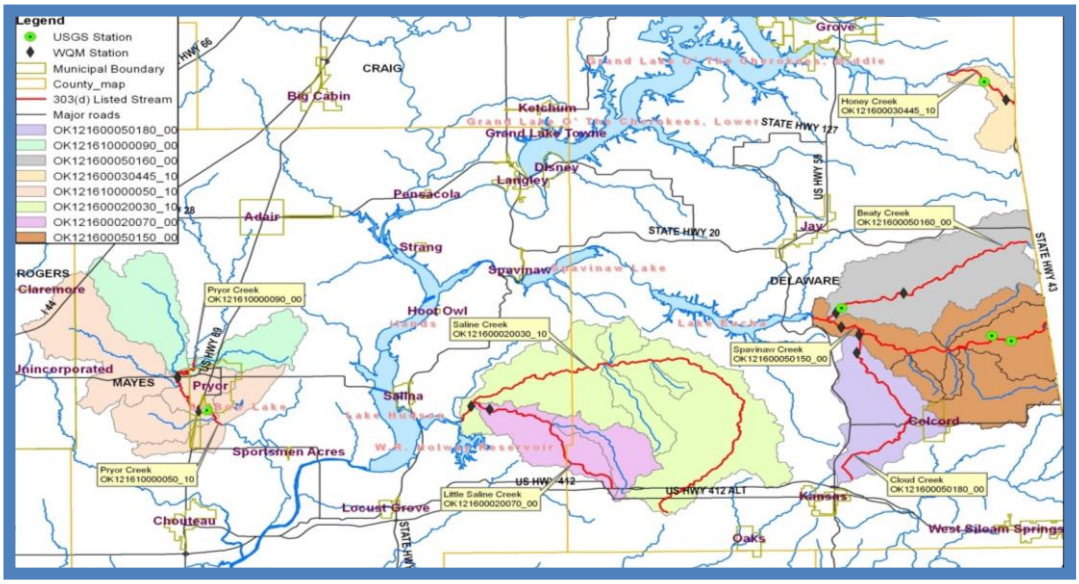
If you would like to receive any or all of these public notices via e-mail, please send your e-mail address to Water.Comments@deq.ok.gov. Also, please let us know if you want to receive notices for the entire State or just for your watershed.

By receiving PDF public notices via e-mail, you will help save money and the environment by reducing the amount of paper we use to mail them. In addition to helping the environment, you will be able to click on helpful FYI hyperlinks.

Note to newspapers: This notice is for your information only. **Do not publish in the legal section or as a legal notice.**

208 FACTSHEET FOR BACTERIAL AND TURBIDITY TMDLs in the LOWER NEOSHO WATERSHED

Watershed: The Lower Neosho Watershed TMDL Study Area is located in the northeastern part of Oklahoma in the Lower Neosho (USGS HUC 11070209) and Grand Lake O' The Cherokees (USGS HUC 11070206) watersheds. The Study Area is in Delaware and Mayes counties with a very small part located in Rogers County.



Beneficial Uses in this Study Area:

According to the Oklahoma Water Quality Standards, the designated beneficial uses for the waterbodies in the Lower Neosho River Study Area are Aesthetics (AES), Agriculture (AG), Fish & Wildlife Propagation-Cool Water Aquatic Community Subcategory (CWAC), Fish & Wildlife Propagation-Warm Water Aquatic Community Subcategory (WWAC), Fish Consumption (FISH), Primary Body Contact Recreation (PBCR), Secondary Body Contact Recreation (SBCR), Public & Private Water Supply (PPWS), HQW – High Quality Waters, SWS – Sensitive Public & Private Water Supply. The designated beneficial uses addressed in the Lower Neosho Watershed Study Area were WWAC, CWAC, and PBCR. The table below is the assessment from Oklahoma's 2010 Integrated Report on whether or not these waterbodies met these beneficial uses.

Waterbody Identification	Waterbody Name	CWAC	WWAC	PBCR	SBCR	Other
OK121600020030_10	Saline Creek	F		N		
OK121600020070_00	Little Saline Creek	F		N		
OK121600030445_10	Honey Creek	F		N		HQW
OK121600050150_00	Spavinaw Creek	F		N		SWS
OK121600050160_00	Beaty Creek	F		N		HQW
OK121600050180_00	Cloud Creek	F		N		SWS
OK121610000050_10	Pryor Creek		N	N		
OK121610000090_00	Pryor Creek		N		N	

(F = Fully supporting that designated use; N = Not supporting that use)

Impaired Waterbodies in this Study Area:

Waterbodies that were shown as impaired with bacteria or turbidity on Oklahoma's 2010 303(d) list, are designated with an "**x**" in the part of the following table with a yellow header:

WBID	Waterbody Name	Waterbody Impairments from the 2010 303(d) List			TMDLs needed after sampling results analyzed		
		Enterococci	*E. coli*	Turbidity	Enterococci	*E. coli*	Turbidity
OK121600020030_10	Saline Creek	X			X		
OK121600020070_00	Little Saline Creek	X			X		
OK121600030445_10	Honey Creek	X	X		X		
OK121600050150_00	Spavinaw Creek	X			X		
OK121600050160_00	Beaty Creek	X			X		
OK121600050180_00	Cloud Creek	X			X		
OK121610000050_10	Pryor Creek	X	X		X	X	
OK121610000090_00	Pryor Creek		X	X			X

Bacterial water quality monitoring results from 2000 – 2010 and turbidity water quality monitoring results from 1999 - 2001 were examined to verify if these waterbodies were still impaired. An "**x**" in the area of this table with the blue header indicates that those waterbodies were found to still be impaired for bacteria or turbidity. TMDLs were developed for these waterbodies.

Possible Sources of Impairments:

Point sources - The point sources examined in this Study Area were:

- NPDES regulated municipal and industrial wastewater treatment facilities (WWTF) – The City of Pryor Creek WWTF is the only NPDES-permitted facility that discharges wastewater to waters in the Study Area.
- NPDES regulated stormwater discharges
  - Municipal Separate Storm Sewer Systems (MS4s) - There aren't any in the Study Area.
  - Industrial Sites - There aren't any industrial facilities with Multi-Sector General Permits 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.
- Rock, Sand, and Gravel Quarries – There aren't any in the Study Area
- NPDES regulated Concentrated Animal Feeding Operations (CAFOs) – There is 1 CAFO with 40 swine & 420 dairy cows and 69 PFOs (Poultry Feeding Operations) with over 6.2 million birds in the Study Area.
- No-Discharge Facilities – There are two municipal no-discharge facilities in the Study Area.
- Sanitary Sewer Overflows (SSO) and – There were 54 reported SSO occurrences and in the Study Area with amounts ranging from 0 to 40,000 gallons.

Nonpoint sources - The nonpoint sources examined in this Study Area were:

- Wildlife – There are about 3,176 deer in the Study Area. This is thought to be a minor contributor of bacteria.
- Farm animals – There are an estimated 32,406 head of cattle in the Study Area. This is thought to be a major contributor of fecal coliform in the Study Area.
- Pets – There are an estimated 12,485 dogs and 16,159 cats in the Study Area. They are considered to be a minor contributor of bacteria in the Study Area.
- Failing Septic Systems – There are 386 failing septic systems in the Study Area which is 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 TMDL report at the following DEQ webpage: http://www.deq.state.ok.us/WQDnew/tmdl/index.html.

TMDLs: The TMDLs were calculated using load duration curves. Nine TMDLs and one WLA were developed for the eight streams in the Lower Neosho Watershed Study Area. The following table 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:

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EPA Approval Date: Pending
Record Last Updated: 02/13/2014