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PUBLIC NOTICE

May 16, 2011

- **AVAILABILITY OF DRAFT BACTERIA TMDL FOR THE LOWER BIRD CREEK AREA WATERSHED**

- **REQUEST FOR PUBLIC COMMENTS**

Public Comment Period Ends: June 30, 2011

The Oklahoma Department of Environmental Quality (DEQ) is seeking comments on a draft report describing pathogen reductions needed to improve water quality in the Lower Bird Creek Study Area (USGS HUC 11070107) in the Bird Creek watershed. The Federal Clean Water Act requires DEQ to develop plans with goals and pollution control targets for improving water quality where minimum standards are not met. This is accomplished by establishing limits known as Total Maximum Daily Loads (TMDLs) for each pollutant exceeding the standards. TMDLs set levels for pollutants that allow waterbodies to achieve their beneficial uses. Beneficial uses include water for drinking, recreation, aesthetics, irrigation, fishing, and swimming. The primary body contact recreation (i.e. swimming) beneficial use of the Lower Bird Creek Study Area was evaluated for excess pathogens. These pathogenic bacteria include fecal coliform, *Escherichia coli* (*E. coli*), and enterococci. These bacteria are found in the intestines of humans and animals and may get into streams as a result of the overflow of domestic sewage or non-point sources of human and animal waste.

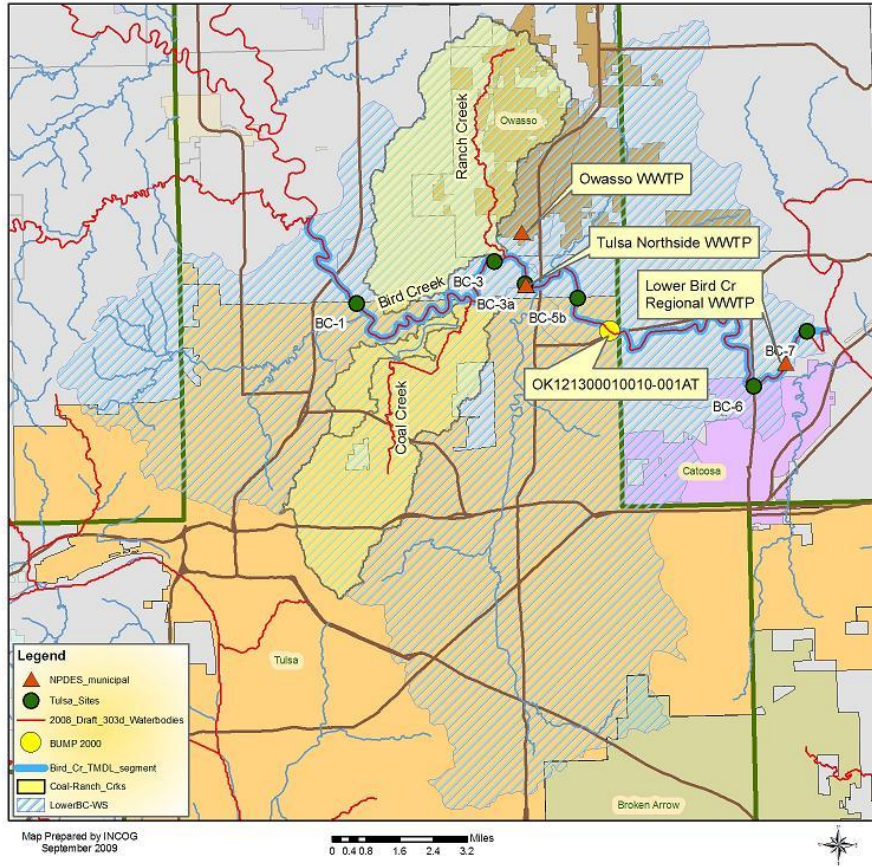
The watershed in this TMDL report is located mainly in Tulsa County in northeastern Oklahoma with parts of the watershed in Osage and Rogers Counties. The TMDL study in the Lower Bird Creek Study Area focused on three waterbodies that DEQ placed in Category 5 of the 2008 Integrated Report [303(d) list]¹ for nonsupport of primary body contact recreation (PBCR). These three waterbodies are:

- Lower Bird Creek (OK121300010010_00)
- Coal Creek (OK121300010090_00)
- Ranch Creek (OK121300010060_00)

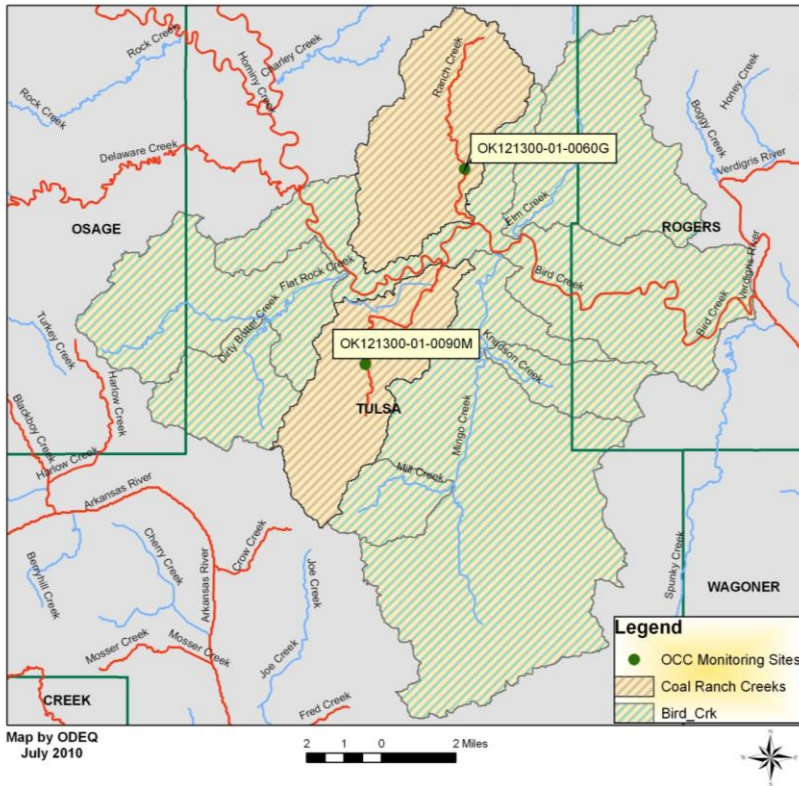


¹ http://www.deq.state.ok.us/wqdnew/305b_303d/2008_integrated_report_app_c_303d_list.pdf

Lower Bird Creek Bacteria TMDL Watershed



Coal and Ranch Creek Watersheds



Study

From 2003 to 2009, data for this study was collected from a variety of sources. This included data from 97 samples from 2 Oklahoma Conservation Commission Water Quality Monitoring (WQM) stations on Coal Creek and Ranch Creek, the Oklahoma Water Resources Board's (OWRB) Beneficial Use Monitoring Program (BUMP) Bird Creek site (only from 2006), and Bird Creek monitoring data from the City of Tulsa (fecal coliform only). This data was gathered during the primary contact recreation season (May 1st to September 30th) to determine if there were violations of water quality standards for bacteria in the three waterbodies in the Lower Bird Creek Study Area. The criteria to determine if a stream is listed on the 303(d) list can be found in Title 785, Chapter 46 of the Oklahoma Administrative Code.² Screening levels for bacteria are listed in the *Assessment of Primary Body Contact Recreation support* (OAC 785:46-15-6(c-e)).

Of the waterbodies sampled, all three were found to be in violation of water quality standards for *E-coli*, thus requiring a TMDL. Lower Bird Creek was also impaired with fecal coliform and enterococci. (See the following table.)



E-Coli

Photo courtesy of USDA ARS

Waterbodies Requiring TMDLs for Not Supporting Primary Contact Recreation Use

WQM Station	Waterbody ID	Waterbody Name	Indicator Bacteria		
			FC	<i>E. coli</i>	ENT
OK121300010010-001AT	OK121300010010_00	Bird Creek (Lower)	X	X	X
OK121300-01-0090M	OK121300010090_00	Coal Creek		X	
OK121300-01-0060G	OK121300010060_00	Ranch Creek		X	

ENT = enterococci; FC = fecal coliform

TMDLs

A TMDL document uses scientific data collection and analysis to determine the amount and source of each pollutant entering the system, and allocates pollutant loads to each source at levels that would ultimately restore water quality to meet clean water standards. A TMDL is the amount of each pollutant a waterway can receive and not violate water quality standards. A TMDL takes into account the pollution from all sources.

An important part of TMDL analysis is the identification of individual sources of pollutants in the watershed that affect pathogens and the amount of loading contributed by each source. Under the Clean Water Act, sources are classified as either point or non-point sources. The National Pollutant Discharge Elimination System (NPDES) program³ 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.



DEQ file photo of a point-source discharge

² http://www.owrb.ok.gov/util/rules/pdf_rul/Chap46.pdf

³ EPA NPDES home page: <http://cfpub.epa.gov/npdes/index.cfm>

Most of the pollution in these watersheds comes from non-point source pollution (NPS). Non-point sources are widespread sources that cannot be identified as entering a waterbody at a single location. These include wildlife, various agricultural activities, livestock, domesticated animals, bacteria from land application fields, urban runoff, bacteria from failing septic systems, and bacteria from domestic pets.

Point Source Discharges

Point source discharges are single, identifiable, and localized, like discharges from a pipe. Point source discharges can be described by three broad subcategories: 1) NPDES regulated municipal and industrial wastewater treatment facilities (WWTF); 2) NPDES regulated industrial and municipal stormwater discharges; and 3) NPDES regulated Concentrated Animal Feeding Operations (CAFOs). A TMDL must provide Waste Load Allocations (WLAs) for all NPDES regulated point sources. Non-point sources are widespread sources that cannot be identified as entering a waterbody at a single location. For the purposes of this TMDL, all sources of pollutant loading not regulated by NPDES permits are considered non-point sources. The TMDL must provide a Load Allocation (LA) for these sources.

- **NPDES regulated municipal and industrial wastewater treatment facilities:** There are three continuous municipal WWTF point source dischargers and sixteen industrial point source dischargers in the Study Area. These facilities have permit limits equal to the water quality standard so they do not contribute to the impairment. However, they could be a source of bacteria if the disinfection unit is not properly maintained, if the facility is of poor design, or if flow rates are above the disinfection capacity.
- **NPDES regulated industrial and municipal storm water discharges:** Stormwater runoff is commonly transported through Municipal Separate Storm Sewer Systems (MS4s), from which it is often discharged untreated into local waterbodies. To prevent harmful pollutants from being washed or dumped into an MS4, cities and towns must obtain a NPDES permit and develop a stormwater management program. There is one MS4 Phase I stormwater permittee in the Study Area [City of Tulsa as a co-permittee with the Oklahoma Transportation Authority (OTA) and the Oklahoma Department of Transportation (ODOT)]. As a Phase I permittee, they must have an approved stormwater management program in which they are required to address a variety of water quality-related issues, including roadway runoff management, municipally-owned operations, and hazardous waste treatment.

In the Study Area there are also four entities⁴ who are small Phase II MS4 permittees. These Phase II permittees must also develop stormwater management programs that are designed to reduce discharges of pollutants to the “maximum extent practicable”. This is done through the implementation of best management practices (BMPs) and must address the following six minimum control measures:

1. Public Education and Outreach,
2. Public Participation/Involvement,
3. Illicit Discharge Detection and Elimination,
4. Construction Site Runoff Control,
5. Post- Construction Runoff Control, and
6. Pollution Prevention/Good Housekeeping.

4 Catoosa, Owasso, Broken Arrow, and Tulsa County

- **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). Its goal is to help develop, coordinate, and oversee environmental policies and programs aimed at protecting the Oklahoma environment from pollutants associated with agricultural animals and their waste.⁵ According to ODAFF, there are no NPDES permitted CAFOs in the Lower Bird Creek Study Area.

- **Sanitary sewer overflows (SSO):** Although infrequent, sanitary sewer overflows (SSO) from wastewater collection systems can be a major source of harmful bacteria in streams. SSOs have existed since the introduction of separate sanitary sewers. Most overflows are caused by blockage of sewer pipes by grease, tree roots, 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 Knoxville (TN)
Engineering Department
Stormwater Engineering Division

In the Lower Bird Creek Study Area, there were 923 known SSO occurrences, ranging from 2 to over 8 million gallons, reported between October 2004 and October 2009. (For details see Appendix B of the Lower Bird Creek Study Area TMDL Report).

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 in these two categories are addressed through DEQ's formal enforcement process. A Notice of Violation (NOV) is first issued to the owner of the collection system, and a Consent Order (CO) is negotiated between the owner and DEQ to establish a schedule for necessary collection system upgrades to eliminate future SSOs.

Non-Point Sources

Non-point sources include those sources that cannot be identified as entering the waterbody at a specific location. Non-point sources of pollutants are typically separated into urban and rural categories. Surface storm runoff is an important source of loading in urban or residential settings with high amounts of paved, impervious areas. In rural settings, the sources of bacteria may include runoff of manure applied to agricultural land, the runoff of 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 bacteria loading to a waterbody. Bacteria from wildlife are also deposited onto land surfaces, where they may be washed into nearby streams by rainfall runoff.

⁵ <http://www.oda.state.ok.us/aems.htm>

⁶ For environmental complaints, go to: <http://www.deq.state.ok.us/ECLsnew/Complaints/onlncmpl.htm>



Photo courtesy of USDA NRCS

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 bacteria 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, a wild deer population can be calculated for each watershed. For the Lower Bird Creek Study Area, this comes to about 903 deer. This is an average

deer per acre rate ranging from 0.006-0.008. At this minimal concentration, wildlife is considered to be a minor contributor of bacteria in the watersheds.

It must be noted that while no data are available to estimate populations and fecal loading of wildlife 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.

- **Agricultural Animals** - Agricultural livestock grazing in pastures deposit manure containing bacteria onto land surfaces. Detailed information is not 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, for the purpose of these TMDLs, land application of commercially raised farm animal manure is considered a potential source of bacteria loading to watersheds in the Lower Bird Creek Study Area.

Examples of livestock activities that can contribute to bacteria sources include:

- ✓ Processed manure from livestock operations such as poultry facilities: This manure is often applied to fields as fertilizer and can contribute to fecal bacteria loading to waterbodies if washed into streams by runoff.
- ✓ Livestock grazing in pastures: Livestock deposit manure containing fecal bacteria onto land surfaces. These bacteria may be washed into waterbodies by runoff.
- ✓ Direct access to waterbodies by livestock: Livestock standing in or crossing streams can provide a direct concentrated source of fecal bacteria in the streams. In the Lower Bird Creek Study Area, cattle (an estimated 8262 head) generate the largest amount of fecal coliform and often have direct access to streams and tributaries with most of these being in the Ranch Creek watershed. (Refer to the full TMDL report for the estimated number of all agricultural animals as well as their daily fecal coliform production rates.)



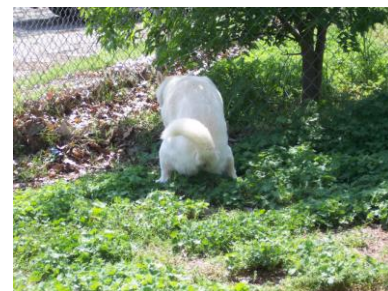
This cattle crossing keeps the cattle out of the stream except at the time of crossing.

Photo courtesy of USDA NRCS

- **Failing Septic Systems** – If a septic system is not working properly, then raw sewage - a concentrated source of bacteria - can go directly into streams. Bacteria 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 494 failing septic systems in the Lower Bird Creek Study Area. Refer to the full TMDL report (Section 3.2.3) on how these numbers were calculated.

- 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)]. This means there are about 367,197 dogs and 475,197 cats in the Lower Bird Creek Study Area. In the more urbanized areas, like the Coal Creek watershed, domestic pets are considered to be a major source of bacteria.



In the entire Lower Bird Creek Study Area, pets and commercially raised farm animals are estimated to be the primary contributors of bacteria to land surfaces with pets being slightly more significant.

Conclusions and Recommendations

The Lower Bird Creek Study Area is in violation of Oklahoma Water Quality Standards with respect to pathogens. The TMDL calculations of a reduction in bacteria that would be needed in order for these streams to be in compliance with Oklahoma’s WQS were derived using load duration curves. The calculations include present and future sources as well as a margin of safety. Most of the pathogens come from non-point sources, though it is not known which sources these are specifically from without additional study. The health effects of pathogens should be a concern for the public who uses these waterways for activities such as swimming, wading, or boating. This is because some waterborne pathogenic bacteria can cause serious human illness or disease.

In order to meet water quality standards for swimming (Primary Body Contact Recreation), the levels of pathogens must be reduced by the following amounts:

TMDL Percent Reductions Required to Meet Water Quality Standards for Impaired Waterbodies in the Lower Bird Creek Study Area

WQM Station	Waterbody ID	Waterbody Name	Percent Reduction Required*				
			FC	EC		ENT	
			Instant-aneous	Instant-aneous	Geo-mean	Instant-aneous	Geo-mean
OK121300010010-001AT	OK121300010010_00	Bird Creek (Lower)	64.1%	79.1%	44.8%	94.4%	82.6%
OK121300-01-0090M	OK121300010090_00	Coal Creek		44.8% [†]	58.6%		
OK121300-01-0060G	OK121300010060_00	Ranch Creek		85.3%	32.8% [†]		

* Selection of the appropriate Percent Reduction Goal for each bacteria indicator for each waterbody is denoted by the **bold** text

[†] Because these two values are either equal to or smaller than that for the Lower Bird Creek for *E. Coli*, the more restrictive load reduction goal of 44.8% for the Lower Bird Creek will apply to these two tributaries.

Providing comments

The comment period will be open for 45 days. If you have any concerns regarding these proposed limits, 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: Karen.Miles@deq.ok.gov

Comments must be received by close of business on June 30, 2011

You may also request a public meeting in writing. If there is a significant degree of interest, the Department of Environmental Quality will schedule a public meeting. After evaluating comments received and making any necessary changes, the modification will be submitted to EPA for final approval. The final results of the TMDL will be incorporated into Oklahoma's Water Quality Management Plan.

Obtaining copies

You may view the study this TMDL was based on by going to the DEQ website at:
<http://www.deq.state.ok.us/WQDnew/tmdl/index.html>

OR

Pick up copies of the studies at the DEQ office, Water Quality Division, 707 North Robinson, Oklahoma City from 7:30 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 about changes in this watershed or you are located downstream in the watershed where changes have been recommended.



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