PUBLIC NOTICE

July 5, 2013

Availability of Draft Chlorophyll-a TMDLs
for Lake Lawtonka, Waurika Lake, and Lake Ellsworth

Proposed Modification to Incorporate Lake Lawtonka, Waurika Lake, and Lake Ellsworth Chlorophyll-a TMDLs into Oklahoma’s Water Quality Management Plan

Request for Public Comments

Public Comment Period Ends on Monday, August 19, 2013

The Oklahoma Department of Environmental Quality (DEQ) is seeking comments on a draft Total Maximum Daily Load (TMDL) report entitled “Chlorophyll-a TMDL Report for Lakes Lawtonka, Waurika, and Ellsworth”. This report describes the reductions in total nitrogen (TN), and total phosphorus (TP) needed to achieve compliance with water quality standards for chlorophyll-a thus improving water quality in the Lake Lawtonka, Waurika Lake, and Lake Ellsworth watersheds.

DEQ is also proposing to incorporate these TMDLs into Oklahoma’s Water Quality Management Plan (208 Plan). The “208 Factsheet Regarding Chlorophyll-a TMDLs in the Lake Lawtonka, Waurika Lake, and Lake Ellsworth Watershed” is attached. The full Lake Lawtonka, Waurika Lake, and Lake Ellsworth TMDL report can be found on-line at: http://www.deq.state.ok.us/WQDnew/tmdl/index.html.

Background: The Federal Clean Water Act requires states to develop Water Quality Standards (WQS) which provide goals and pollution control targets for improving water quality where minimum standards are not met. The waterbodies where these minimum 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 exceeding 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, irrigation, fishing, and swimming. All waterbodies and their designated uses can be found in Oklahoma’s Integrated Report.
Watershed: This TMDL Study Area is in southwestern Oklahoma in the Upper Red River Sub-basin (HUC 1113). Lake Lawtonka (Oklahoma Waterbody ID: OK311300040070_00) and Lake Ellsworth (OK311300030020_00) are located in the Cache watershed (USGS HUC 11130202). Waurika Lake (OK311210000020_00) is in the Northern Beaver watershed (USGS HUC 11130208).

- Lake Lawtonka is a 2398-acre reservoir in Comanche County that was impounded in 1905 to serve as a recreational lake and municipal water supply for the City of Lawton. Medicine Creek, which is 17.71 miles long, is the primary tributary flowing into Lake Lawtonka. Between 2002 and 2011, Lake Lawtonka chlorophyll-a samples averaged 17.5 µg/L. Between 1998 and 2011 in Lake Lawtonka, TN levels averaged approximately 0.66 mg/L and TP levels averaged 0.03 mg/L.

- Lake Ellsworth is a 5112-acre reservoir in Comanche and Caddo counties that impounded East Cache Creek in 1962 to serve as a recreational lake and municipal water supply for the City of Lawton. Other tributaries flowing into Lake Ellsworth include Chandler Creek (10.5 miles long) and Tony Creek (5.7 miles long). Between 2002 and 2009, Lake Ellsworth chlorophyll-a samples averaged 12.2 µg/L. Between 1998 and 2011 in Waurika Lake, TN levels averaged approximately 0.81 mg/L, and TP levels averaged 0.09 mg/L.

- Waurika Lake is a 10,100-acre lake in Cotton, Jefferson, and Stephens counties. It was first impounded in 1977 by the U.S. Army Corp of Engineers (USACE) and primarily serves as a recreational lake and municipal water supply for the Town of Waurika. Its other purposes include flood control, irrigation, and fish & wildlife. Beaver Creek (46.9 miles long) and Little Beaver Creek (39.5 miles long) are the primary tributaries flowing to Waurika Lake. Between 2002 and 2008, Waurika Lake chlorophyll-a samples averaged 13.4 µg/L. Between 1998 and 2011 in Lake Ellsworth, TN levels averaged approximately 0.83 mg/L, and TP levels averaged 0.07 mg/L.

Beneficial Uses and Impairments: According to Oklahoma’s 2010 Integrated Report, the Public and Private Water Supply (e.g. drinking water) beneficial use (Appendix B) for all three of the lakes in the Study Area is impaired [303(d) list in Appendix C] for chlorophyll-a. According to Oklahoma’s Water Quality Standards (WQS) [Appendix A.3 of Title 785, Chapter 45 of the Oklahoma Administrative Code], these lakes are also considered to be Sensitive Water Supply (SWS) [785:45-5.25(c)(4)(A)] lakes. The SWS designation means that conditions are present that make these public and private water supply lakes more susceptible to pollution. As a result, the WQS require that the water quality of SWS lakes must be maintained and protected [785:45-3-2(c)].

According to the 2010 Integrated Report, the Fish & Wildlife Propagation-Warm Water Aquatic Community (WWAC) Subcategory beneficial use in Waurika Lake is impaired for turbidity. In Lake Ellsworth, the Fish & Wildlife Propagation-Warm Water Aquatic Community (WWAC) Subcategory beneficial use is impaired for turbidity and dissolved oxygen (DO), and the Primary Body Contact Recreation (PBCR) beneficial use is impaired for Enterococcus. These water quality issues will be addressed in a future study.

The Public and Private Water Supply designated use, as outlined in the Oklahoma WQS, limits the amount of chlorophyll-a allowed in SWS lakes to 10.0 µg/L [785:45-5.10(7)]. Since there are no specific WQS for nitrogen and phosphorus (also referred to as nutrients), this TMDL provides a numeric limit on nutrients needed to reach the chlorophyll-a standard. Elevated levels of chlorophyll-a means that too much algae is growing in the lakes. Too much algae (eutrophication) means there is a high concentration of nutrients, especially nitrogen and phosphorus, in the lakes. Eutrophication can cause surface scum, poor water clarity, and noxious odors. It can affect the taste of drinking water as well as increase the costs of treating the water. Algae in drinking water can also interact with disinfectants (chlorine) to produce carcinogenic trihalomethanes, some of which can be
**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 lakes and allocates pollutant loads to those sources at levels that would ultimately restore water quality to meet clean water standards. The TMDL allocates loads to point sources (these are known as waste load allocation or WLA) and nonpoint sources (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. Nonpoint sources (NPS) are ones, like agricultural runoff, that cannot be identified as entering a waterbody at a single location.

In a TMDL, all contributing sources of the pollutants (point and nonpoint sources) are identified, and they are allocated a portion of the allowable load that usually requires a reduction in their pollution discharge 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 Lawtonka/Ellsworth/Waurika Watersheds:** Point source discharges are single, identifiable, and localized, like discharges from a pipe. TMDLs must provide WLAs for all NPDES regulated point sources.

- **NPDES regulated municipal and industrial wastewater treatment facilities:** There are no municipal or industrial wastewater facilities discharging into the Lawtonka/Ellsworth/Waurika watersheds.

- **No-Discharge Facilities:** For the purposes of these TMDLs, it is assumed that pollution from no-discharge facilities [such as municipal or industrial wastewater treatment facilities (WWTF) with total retention lagoons] does not contribute sediment, organic matter, or nutrients into streams in the Lawtonka/Ellsworth/Waurika watersheds. However, it is possible that the wastewater collection systems associated with no-discharge facilities could be a pollutant source or that discharges from the wastewater facilities may occur during large rainfall events that exceed the systems’ storage capacities. There are currently six no-discharge (aka total retention or land application) facilities in the Waurika Lake\(^1\) watershed and one no-discharge facility in the Lake Ellsworth\(^2\) watershed. More information about these facilities can be found in Table 3-1 of the Chlorophyll-a Total Maximum Daily Load Report for Lake Lawtonka, Waurika Lake, and Lake Ellsworth. Given the small size of the wastewater collection systems of these no-discharge facilities, the amount of nutrients entering the lakes from those systems would be minimal.

- **NPDES regulated Concentrated Animal Feeding Operations (CAFOs):** 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 Act is designed to protect water quality by using Best Management Practices (BMPs) (such as dikes, berms, terraces, ditches or other similar structures) to prevent animal waste from reaching the water. CAFOs are considered “no discharge” facilities. There is just one CAFO in the Lake Lawtonka/Ellsworth/Waurika Study Area, and it is located downstream of Waurika Lake. As a result, this CAFO is not thought to contribute to nutrient loading in the Lawtonka/Ellsworth/Waurika watersheds.

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1. Elgin WWTF, Sterling WWTF, Marlow-West WWTF, Marlow-Northwest Lagoon, Shiflett Transport Services Maintenance, and Battison Auto Center.
2. Fletcher WWTF
• **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 the discharges from Indian Country lands, discharges related to oil & gas extraction, or discharges associated with agricultural purposes. There are no NPDES-regulated stormwater MS4 discharges in the Lake Lawtonka/Ellsworth/Waurika watersheds. For details about DEQ’s Stormwater Program, go to [http://www.deq.state.ok.us/WQDnew/stormwater/](http://www.deq.state.ok.us/WQDnew/stormwater/).

• **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. **Sanitary sewer overflows** from wastewater collection systems can be a major source of harmful bacteria and other pollutants 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.

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 come from citizen complaints. 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 between 2003 and 2012 in the Lake Lawtonka/Ellsworth/Waurika watersheds, non-discharging facilities reported 10 overflows ranging from 200 to 150,000 gallons. A summary of these can be found in Table 3-2 of the TMDL report. Given the small size of the wastewater collection systems of these no-discharge facilities and the low occurrence of reported overflows, the amount of nutrients into Lakes Lawtonka/Ellsworth/Waurika from SSOs is considered to be negligible.

**Nonpoint Sources:** Nonpoint 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.** Many nutrients from nonpoint sources get into waterbodies through polluted runoff.

Almost all nutrient loading to the Lake Lawtonka/Ellsworth/Waurika watersheds comes from nonpoint sources. Nutrient sources in rural watersheds originate from soil erosion, agricultural fertilization, residues from mowing and harvesting, leaf litter, and **fecal waste deposited** in the watershed by livestock. Causes of soil erosion can include natural causes such as flooding and wind, construction activities, **vehicular traffic,** and agricultural activities. Other sources of nutrient loading in a watershed include atmospheric deposition, failing onsite wastewater disposal (OSWD) systems, and fecal matter deposited in the watershed by wildlife and pets.

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3 For information on how to reduce runoff after rainstorms, request the free DVD, “Reduce Runoff: Slow it Down, Spread it Out, Soak it in!” (EPA Publication #84211001) from the National Service Center for Environmental Publications at their webpage ([http://www.epa.gov/nscep/](http://www.epa.gov/nscep/)) or call them at 800-490-9198. 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](http://water.epa.gov/action/weatherchannel/index.cfm).
Nonpoint sources of nutrients may include:

- Agriculture (e.g., fertilized soils, manure application)
- Urban runoff (e.g., lawns, roads & highways)
- Grazing livestock
- Failing Septic Systems (source of nutrients)
- Domestic pets

**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. Given the lack of in-stream water quality data and pollutant source data available to quantify nutrient and sediment loading directly from the tributaries of Lake Lawtonka, Waurika Lake, and Lake Ellsworth, the Soil and Water Assessment Tool (SWAT), which is a basin-scale watershed loading model, was used to develop nonpoint source loading estimates. Major components of SWAT include weather, hydrology, soil temperature and properties, plant growth, nutrients, and land management. These estimates from SWAT were used to quantify the nutrient contributions to each lake from agricultural, forest, and range management activities. For more information, see Sections 3.2 and Appendix C of the Chlorophyll-a TMDL Report for Lakes Lawtonka, Waurika, and Ellsworth.

It is necessary to establish a linkage between the external loading of nutrients and the waterbody response in terms of lake water quality conditions, as evaluated by chlorophyll-a concentrations. The water quality linkage analysis was performed using the BATHTUB reservoir water quality model. BATHTUB is a USACE model designed to simulate eutrophication in reservoirs and lakes. BATHTUB has been cited as an effective tool for reservoir and lake water quality assessment and management, particularly where data are limited. The model incorporates several empirical equations of nutrient settling and algal growth to predict steady-state water column nutrient and chlorophyll-a concentrations based on waterbody characteristics, hydraulic characteristics, and external nutrient loadings. The BATHTUB models for each Lake were run under average existing conditions, and calibrated to measure in-lake water quality conditions (based on 2002-2011 data) using phosphorus and nitrogen calibration factors. For more information about how BATHTUB was used in this study, see Section 4 of the Chlorophyll-a TMDL Report for Lakes Lawtonka, Waurika, and Ellsworth.

**Recommendations:** The following table summarizes the percent reduction goals for nutrient loading established for each lake.

<table>
<thead>
<tr>
<th>Lake</th>
<th>Chlorophyll-a In-lake Target (μg/L)</th>
<th>Percent Reduction</th>
<th>Maximum Allowable Load (kg/yr)*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total Phosphorus</td>
</tr>
<tr>
<td>Lake Lawtonka</td>
<td>10</td>
<td>55%</td>
<td>3,240</td>
</tr>
<tr>
<td>Waurika Lake</td>
<td>10</td>
<td>40%</td>
<td>28,320</td>
</tr>
<tr>
<td>Lake Ellsworth</td>
<td>9</td>
<td>45%</td>
<td>14,900</td>
</tr>
</tbody>
</table>

*a Loads do not include atmospheric deposition
These maximum allowable loads for both nitrogen and phosphorus include an inherent margin of safety.

### TMDLs for Chlorophyll-a Expressed in Kilograms of Total Phosphorus and Nitrogen Per Day

<table>
<thead>
<tr>
<th>Waterbody Name</th>
<th>Waterbody ID</th>
<th>Nutrient</th>
<th>TMDL</th>
<th>WLA</th>
<th>LA</th>
<th>MOS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake Lawtonka</td>
<td>OK3113000400070_00</td>
<td>Total Phosphorus</td>
<td>31.3</td>
<td>0</td>
<td>31.3</td>
<td>Implicit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total Nitrogen</td>
<td>236.7</td>
<td>0</td>
<td>236.7</td>
<td>Implicit</td>
</tr>
<tr>
<td>Waurika Lake</td>
<td>OK311210000020_00</td>
<td>Total Phosphorus</td>
<td>272.6</td>
<td>0</td>
<td>272.6</td>
<td>Implicit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total Nitrogen</td>
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<td>Lake Ellsworth</td>
<td>OK311300030020_00</td>
<td>Total Phosphorus</td>
<td>151.3</td>
<td>0</td>
<td>136.2</td>
<td>15.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total Nitrogen</td>
<td>1,323</td>
<td>0</td>
<td>1,191</td>
<td>132</td>
</tr>
</tbody>
</table>

### 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, August 19, 2013

**Obtaining copies:** You may view the full Lake Lawtonka, Waurika Lake, and Lake Ellsworth TMDL study by going to the DEQ website at: [http://www.deq.state.ok.us/WQDnew/tmdl/index.html](http://www.deq.state.ok.us/WQDnew/tmdl/index.html) or pick up copies of the study 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 about changes in this watershed or you are located downstream from the watershed where changes have been recommended. This notice is for informational purposes only; it is not to be published in the legal section of newspapers.

If you are receiving this notice in error, are getting multiple notices, or do not want to receive future notices, please let us know. If you are receiving this in paper form, please help save money and the environment by receiving the notice in PDF format via e-mail. In addition to helping the environment, you will be able to click on helpful FYI hyperlinks. Just send your e-mail address to Water.Comments@deq.ok.gov.
208 FACTSHEET REGARDING CHLOROPHYLL-a TMDLs in the LAKE LAWTONKA, WAURIKA LAKE, and LAKE ELLSWORTH WATERSHEDS

Watershed: This TMDL Study Area was in southwestern Oklahoma in the Upper Red River Sub-basin (HUC 1113). Lake Lawtonka (OK311300040070_00) and Lake Ellsworth (OK311300030020_00) are located in the Cache watershed (USGS HUC 11130202). Waurika Lake (OK311210000020_00) is in the Northern Beaver watershed (USGS HUC 11130208).

Beneficial Uses and Impairments: This TMDL study was done because the Public and Private Water Supply beneficial use for all three of these lakes is impaired because of elevated chlorophyll-a levels.

Point Source Discharges in the Lawtonka/Ellsworth/Waurika Watersheds: There are no municipal or industrial wastewater facilities, CAFOs, or NPDES-regulated stormwater dischargers in the Lawtonka/Ellsworth/Waurika watersheds. There are currently six no-discharge facilities in the Waurika Lake\(^4\) watershed and one no-discharge facility in the Lake Ellsworth\(^5\) watershed. More information about these facilities can be found in Table 3-1 of the Chlorophyll-a Total Maximum Daily Load Report for Lake Lawtonka, Waurika Lake, and Lake Ellsworth. Between 2003 and 2012 in the Lake Lawtonka/Ellsworth/Waurika watersheds, non-discharging facilities reported 10 sanitary sewer overflows (SSOs) ranging from 200 to 150,000 gallons. A summary of these can be found in Table 3-2 of the TMDL report. Given the small size of the wastewater collection systems of these no-discharge facilities and the low occurrence of reported SSOs, the amount of nutrients into Lakes Lawtonka/Ellsworth/Waurika is considered to be negligible. Since the amount of nutrients from point sources is considered to be negligible, then almost all nutrient loading to the Lake Lawtonka/Ellsworth/Waurika watersheds must come from nonpoint sources.

Recommendations: The TMDL models used in this Study were SWAT (to develop nonpoint source loading estimates) and BATHTUB (which simulates eutrophication in reservoirs and lakes). The following table summarizes the percent reduction goals for nutrient loading established for each lake.

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**EPA Approval Date:** Pending  
**Record Last Updated:** 07/01/2013