



Improving Water Quality in the Lake O' the Pines A TMDL for Dissolved Oxygen

In 2000, the TCEQ found that dissolved oxygen levels in Lake O' the Pines were lower than the range optimal for supporting fish and other aquatic species. Oxygen, which dissolves in water, is essential for the survival of aquatic life. While the amount of dissolved oxygen in water fluctuates naturally, human activities can cause unusually or chronically low dissolved oxygen levels.

The TCEQ conducted a total maximum daily load project to determine the measures necessary to restore water quality in Lake O' the Pines. The goal of a TMDL is to determine the amount (or load) of a pollutant that a body of water can receive and still support its designated uses. The allowable load is then allocated among categories of sources within the watershed, and stakeholders work with the state to develop measures that reduce pollutant loads.

Learn more about water quality standards and monitoring, and TMDLs by reading *Preserving and Improving Water Quality*, available on our website at www.texas.gov/goto/tmdl/.

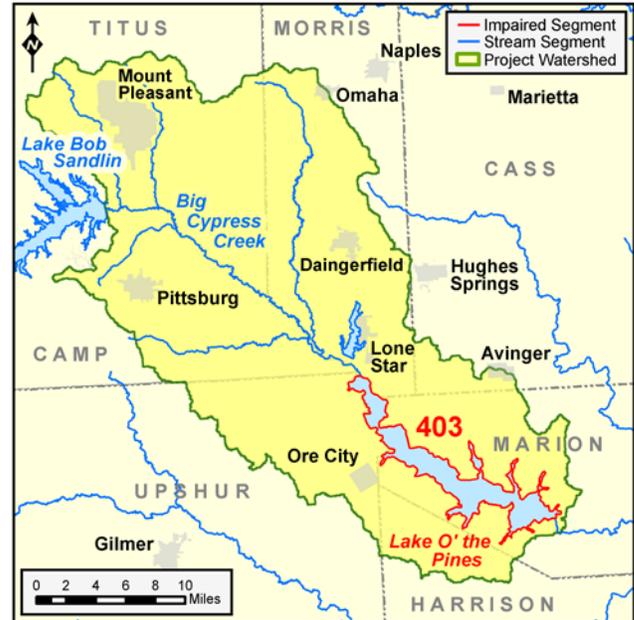
Lake O' the Pines Watershed

Lake O' the Pines and its primary tributary, Big Cypress Creek, are located in the Cypress Creek Basin. The headwaters of Big Cypress Creek originate in southeast Hopkins County. Below Lake Bob Sandlin, the creek, which forms the county line between Titus and Camp Counties, flows southeast to Lake O' the Pines.

The watershed is characterized by gently rolling wooded hills and broad, frequently flooded, densely vegetated stream bottoms. Post oak savannah is predominant in the western portion of the basin, while piney woods are common in the eastern portion.

Lake O' the Pines, along with other water bodies in its watershed, is extremely important to the surrounding region. The lake is the source of drinking water for eight cities and towns, numerous rural water districts, and several steel manufacturing and electric generating companies.

The lake is also an important resource to the timber industry and to agricultural enterprises such as the poultry industry, dairies, cattle operations, and for irrigation. Recreation and tourism are significant sources of income for residents of the watershed. Boating and fishing for trophy bass, catfish, and crappie lure large numbers of recreational users each year.



Summary of TMDL Results

The TMDL concluded that low dissolved oxygen concentrations in Lake O' the Pines result from photosynthesis and respiration of aquatic plants in the reservoir, rather than from inflowing, oxygen-demanding materials. The distribution of dissolved oxygen throughout Lake O' the Pines depends on the interplay of the lake's physical properties and the biological processes of photosynthesis and respiration.

The TMDL estimated loadings of nutrients to Lake O' the Pines as shown in the table below. Estimates were based on modeling results and other analyses. The estimated loadings agree well with the observed concentrations of total phosphorus in the reservoir.

Source	Total Phosphorous (kg/year)
Background NPS Load	18,200
Anthropogenic NPS Load	94,800
Anthropogenic Point Source Load	61,900
Total Anthropogenic Loads	156,700
Total Loads	174,900

To minimize the probability of algal blooms, a reduction of total phosphorus concentrations is required. To achieve the target concentration, it is estimated that the total maximum daily load of total phosphorus should be 87,200 kilograms/year. Existing point and nonpoint source loadings should be reduced by approximately 55 percent.

Implementation Plan

On completion of the TMDL, the project partners developed an implementation plan for the TMDL in coordination with stakeholders and the Cypress Creek Basin Steering Committee. The implementation plan guides activities to meet the pollutant reduction goals established in the TMDL. To address specific areas of activity, stakeholders established work groups for agriculture, wastewater facilities and other permitted facilities, on-site sewage systems, houseboats, and water quality monitoring.

The TCEQ approved the stakeholder-driven implementation plan on July 9, 2008. Key elements of the plan included amending point source permits through either a group permit or individual permits, performance measures for reducing nonpoint source pollution, and a monitoring program to verify the effectiveness of the management strategy. Execution of the implementation plan is being led by the Northeast Texas Municipal Water District (NETMWD), in partnership with stakeholders in the region.

Assessment in 2010 indicated that dissolved oxygen concentrations remain below the criteria for support of aquatic life in the upper 3,700 acres of the lake. Find the latest reported assessment of the lake in the *Cypress Creek Basin Highlights Report* on the NETMWD website at <www.netmwd.com/basinreportsmaps.html>.

The Texas Water Resources Institute (TWRI) worked with stakeholders to evaluate the implementation plan and revise it as appropriate. TWRI began work on the review in September 2012, and coordinated stakeholder involvement in the review. In 2014, stakeholders prepared a revision to the original implementation plan to continue their efforts in improving local water quality.

Public Participation

An existing stakeholder forum was used to involve stakeholders in TMDL and implementation plan development. The steering committee of the watershed's Clean Rivers Program partner, the Northeast Texas Municipal Water District, meets regularly to discuss water management issues for the Cypress Creek Basin. The steering committee includes representatives from state and federal agencies, cities, industries, citizen groups, local governments, universities, water districts, agriculture groups, and other water user groups.

TWRI coordinated stakeholder involvement in a review of the implementation plan and its progress.

For More Information

Contact one of the following people, or visit the project websites at:

<www.tceq.state.tx.us/goto/tmdl/>
and <www.netmwd.com>

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TCEQ Adoption of TMDL: April 12, 2006

EPA Region 6 Approval: June 7, 2006

TCEQ Approval of Plan: July 9, 2008

Project Highlights

- The TCEQ, EPA, and representatives permitted dischargers met on February 10, 2009 to discuss the permitting strategy. After discussion, the point source dischargers opted to pursue a group permit.
- Permitted facilities are working with the Wastewater Permitting section at the TCEQ to revise or obtain permits to comply with the TMDL and implementation plan.
- Assessment in 2010 indicated that dissolved oxygen concentrations remain below the criteria for support of aquatic life in upper 3700 acres of the lake. Find the latest reported assessment of the lake in the *Cypress Creek Basin Highlights Report* on the NETMWD website at <www.netmwd.com/basinreportsmaps.html>
- Stakeholders prepared a revision to the original implementation plan in 2014.

Visit our website at: <www.tceq.texas.gov/goto/tmdl/>