



## Improving Water Quality in the Lake O' the Pines A Project to Protect the Aquatic Life Use

In 2000, 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.

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](#)<sup>1</sup>, available on our website or in print.

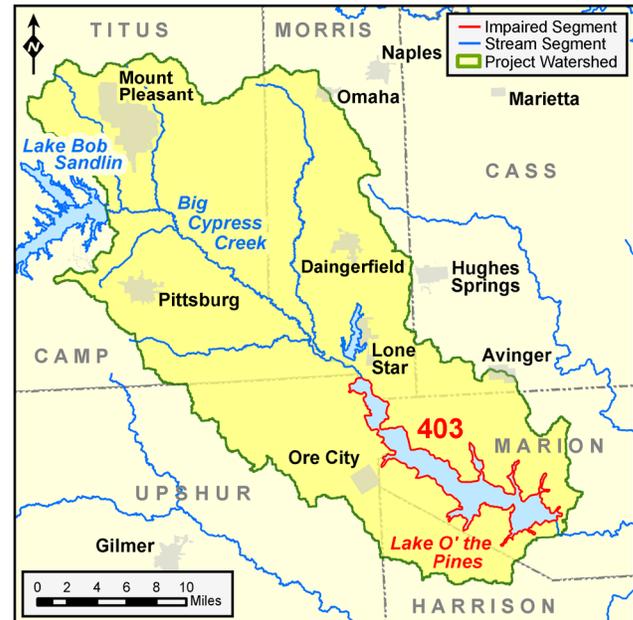
### Lake O' the Pines Watershed

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 Table 1. Estimates were based on modeling results and other analyses. The estimated loadings agree well with the observed concentrations of total phosphorus in the reservoir.

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.

<sup>1</sup> <https://www.tceq.texas.gov/publications/gi/gi-351>

**Table 1. Loadings to Lake O' the Pines**

| 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                     |

### Implementation Plan

On completion of the TMDL, the project partners developed an implementation plan (I-Plan) for the TMDL in coordination with stakeholders and the Cypress Creek Basin Steering Committee. The I-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 regulated dischargers, on-site sewage systems, houseboats, and water quality monitoring.

TCEQ approved the stakeholder-driven I-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 was led by the Northeast Texas Municipal Water District (NETMWD), in partnership with stakeholders in the region.

After five years of implementation, the Texas Water Resources Institute (TWRI) worked with stakeholders to evaluate their original I-Plan and revise it. Work began on the review in September 2012. In 2014, stakeholders completed a revision to the original I-Plan to continue their efforts in improving local water quality.

### Water Quality Status

Assessment in 2018 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<sup>2</sup>](#) on the NETMWD website.

### Public Participation

An existing stakeholder forum was used to involve stakeholders in the original TMDL and I-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 the 2012 review of the I-Plan and its progress.

### For More Information

E-mail to [tmdl@tceq.texas.gov](mailto:tmdl@tceq.texas.gov) or call 512-239-6682. Or visit the project webpage at:

[www.tceq.texas.gov/waterquality/tmdl/nav/19-lakepines/19-lakepines.html](http://www.tceq.texas.gov/waterquality/tmdl/nav/19-lakepines/19-lakepines.html)

### Project Dates

**TCEQ Adoption of TMDL:** April 12, 2006

**EPA Region 6 Approval:** June 7, 2006

**TCEQ Approval of I-Plan:** July 9, 2008

### Project Highlights

- 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 TCEQ to revise or obtain permits to comply with the TMDL and implementation plan.
- Stakeholders prepared a revision to the original implementation plan in 2014.
- Assessment in 2018 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 (see link under "For More Information").

<sup>2</sup> <https://www.netmwd.com/basin-highlight-report>