



# A Project to Assess the Aquatic Life Use on Onion Creek

## Background

Oxygen, which dissolves in water, is essential for the survival of aquatic life. However, dissolved oxygen concentrations in the lower 10 miles of Onion Creek have been lower than the levels established to assure optimum conditions for aquatic life. While the amount of dissolved oxygen in water fluctuates naturally, various human activities can cause unusually or chronically low dissolved oxygen levels, which may harm fish and other aquatic organisms.

Texas defines a set of standards that are used to evaluate the quality of its streams, lakes, and bays. A *standard* consists of both:

- *a use*, such as a healthy environment for aquatic life, and
- *the criteria* by which attainment of the use is determined, such as levels of dissolved oxygen, or the abundance and diversity of aquatic organisms.

Because of recurring low levels of oxygen, the Texas Commission on Environmental Quality (TCEQ) identified Onion Creek as having an impaired aquatic life use. The assessment was based on data collected during a 10-year period by the TCEQ, the Lower Colorado River Authority (LCRA), and other agencies. The TCEQ's assessment was published in the *2000 Water Quality Inventory and List of Impaired Waters* [also known as the Clean Water Act Section 305(b) report and 303(d) List]. The TCEQ is required by law to take appropriate action to address all waters identified as impaired. The actions taken often affect area stakeholders—like local governments, businesses, organizations, and individuals.

The TCEQ's Total Maximum Daily Load (TMDL) Program is carrying out a project to determine how often oxygen concentrations are too low in Onion Creek, and whether the low levels are adversely affecting the fish and invertebrate species that live in the creek. The information gathered will be used to decide on the best course of action for managing the creek.

## Project Development

In October 2001, the TMDL Program hired Texas A&M University at Kingsville (A&M) to carry out the project. To verify whether the aquatic life use was impaired throughout Onion Creek, A&M staff:

- reviewed data that had been collected in the past in order to assess the current situation and to see what additional data might be needed,
- prepared a plan to assure the quality of the additional data that would be collected, and
- developed a monitoring plan to collect additional data over a two year period.

## Monitoring Activities

The monitoring plan calls for sampling of chemical, physical, and biological data throughout the entire Onion Creek watershed over three years. Sampling was conducted during the summers of 2002 and 2003. It is scheduled to conclude during the summer of 2004.

Five sampling stations were selected to provide representative data throughout the watershed (Figure 1). Project staff will collect data on:

- *field parameters*—information about the physical characteristics of the water in the creek, and
- *chemical parameters*—information about various substances that are commonly connected with low oxygen conditions.

The physical and chemical data that will be collected at each of the stations are shown in Table 1. All of these parameters will be monitored at least ten times at each of the stations. A copy of the most recent monitoring plan can be found on the TCEQ Web site (see address under “Contacts”).

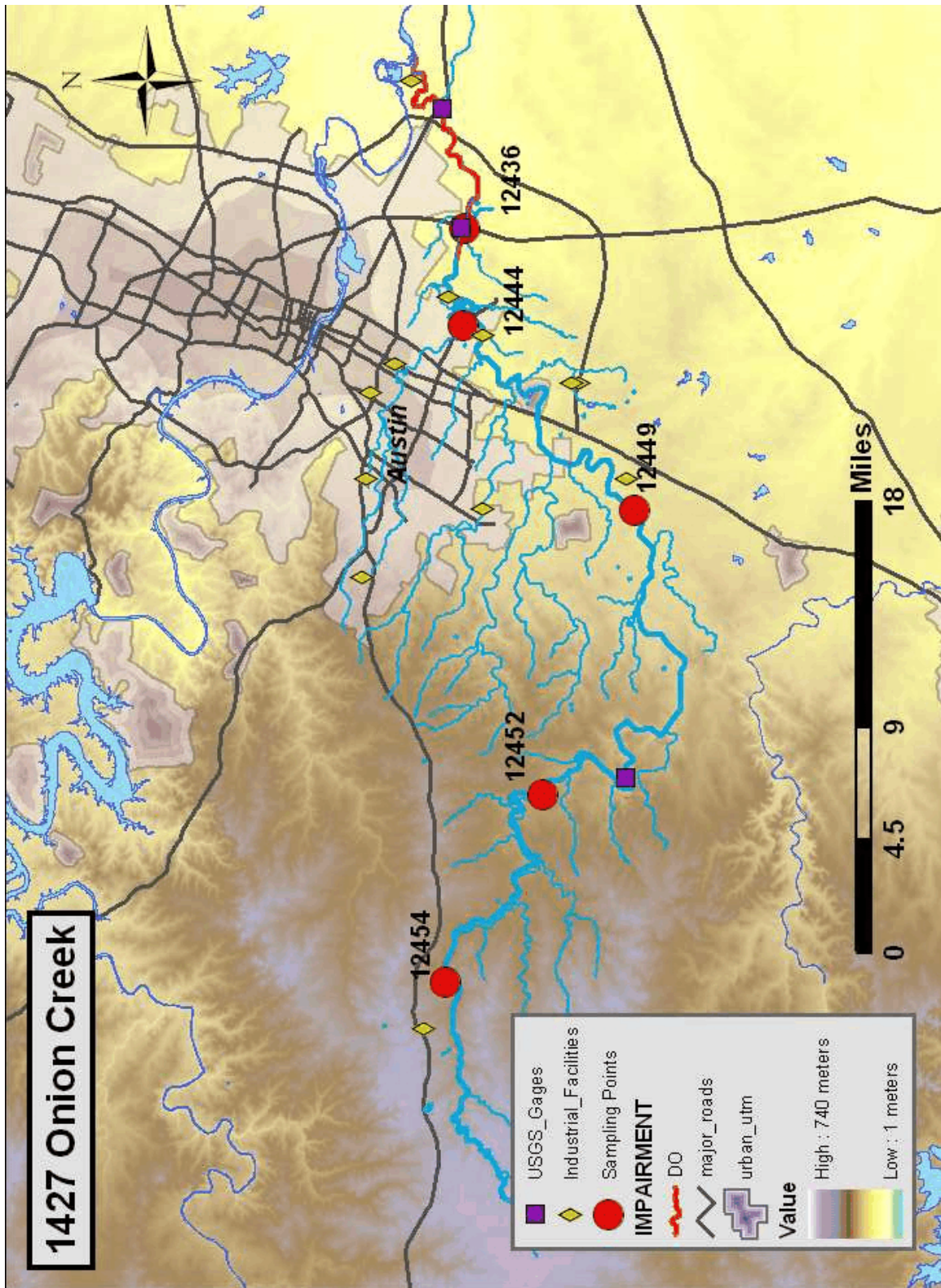
**Table 1. Field and chemical parameters being monitored in the Onion Creek watershed.**

Field Parameters	Chemical Parameters		
24 hour measurements	Alkalinity	Pheophytin A	Total Dissolved Solids
Dissolved oxygen	Ammonia	Orthophosphate	Total Kjeldahl Nitrogen
pH	Chloride	Orthophosphoro	Total Organic Carbon
Conductivity	Cholorophyll A	Total	Total Suspended Solids
Temperature	Nitrate+Nitritie	Sulfate	Volatile Suspended
<b>Flow</b>			

Project staff will also evaluate biological factors and the habitat for aquatic life in Onion Creek. To evaluate the habitat, staff will examine the physical characteristics of the creek, such as its depth, how much water flows through it and at what rates, the number and types of pools and shallow areas, and the nature of the stream bottom. In addition, staff will look at the composition and health of two biological communities:

- *benthics*, which are creatures that live on the bottom of the creek, and

Figure 1. Monitoring Stations on Onion Creek



- *nektons*, which are all free-swimming organisms—for this project, only fish species will be studied.

Evaluating benthic species, which are quite small, provides a measure of overall stream health and the condition of aquatic life; evaluating nektons indicates how different fish communities are affected by conditions in the water. Some species are more sensitive to unfavorable conditions than others, so a study of which species are present and how healthy they are can reveal a great deal about the quality of the water. Biological and habitat monitoring will be conducted at least three times at each of the stations.

## **Current Status**

As of October 2003, A&M collected field and chemical data twelve times and collected biological data three times at each of the stations. The Conrad Blucher Institute for Surveying Science will conduct the two sampling events scheduled for the summer of 2004.

## **Possible Outcomes**

During the summer of 2004, the TCEQ and the Conrad Blucher Institute will compile and analyze all the data collected. Based on that analysis, the TMDL Program will decide on the appropriate course of action by the end of summer, 2004. In making its decision, the TMDL Program will consider comments and advice from other water programs at the TCEQ and from affected stakeholders. Three outcomes are possible, as described in the following sections.

After deciding the appropriate course of action, the TCEQ will present its findings to the public, and will seek comment and contributions before proceeding.

## ***Remove Onion Creek from the List of Impaired Waters***

If it is found that levels of dissolved oxygen in the creek and the diversity of its biological communities indicate a healthy aquatic environment, Onion Creek would be removed from the list of impaired waters.

Before the creek can be removed from the list, the Surface Water Quality Monitoring Program at the TCEQ must review the project results and agree with the decision to remove Onion Creek from the list. The Monitoring Program's review would be done in association with its biennial assessment in 2006. That assessment will be published on the TCEQ's Web site as the *2006 Water Quality Inventory and 303(d) List*.

The public will have 30 days to comment on the findings of that assessment, and to provide additional information to support or challenge

its removal. The U.S. Environmental Protection Agency (EPA) must also approve removal of Onion Creek from the list of impaired waters.

### **Conduct a Use Attainability Analysis (UAA)**

Based on data collected in the 1980s, the TCEQ assigned a high aquatic life use to Onion Creek. The designation “high” means that the criteria by which the aquatic life use should be judged include high levels of dissolved oxygen and a diverse and abundant aquatic community, including the presence of some species that are sensitive to pollution.

If a change to a different designation appears to be justified, a use attainability analysis provides a mechanism to adjust the criteria by which the aquatic life use is judged. Other possible designations for the aquatic life use are exceptional, intermediate, limited, and none.

Using data collected during the project, the Surface Water Quality Standards Program at the TCEQ would determine whether changing the evaluation criteria is justified. The revised, site-specific criteria would then be proposed during the next triennial review of the *Surface Water Quality Standards*, probably in 2006.

The triennial review process includes a public comment period. Revised standards are subject to the approval of the EPA.

### **Prepare a TMDL and Implementation Plan**

If dissolved oxygen values and biological communities do not meet established criteria for the aquatic life use, and it appears that the current criteria are appropriate, the TCEQ will take action to restore water quality. To do that, the TCEQ must first develop a *total maximum daily load (TMDL)*. A TMDL:

- determines the maximum amount (or load) of a pollutant that a water body can receive and still both attain and maintain the standards set for its quality; and
- allocates this allowable load to point and nonpoint sources in the watershed.

The TMDL Program would develop a model of conditions in the watershed to determine what is causing the low levels of dissolved oxygen, and the reduction in pollution loads that is necessary to restore the high aquatic life use. Based on the TMDL, the Program would develop an implementation plan to reduce pollution to the allowable load limit.

An *implementation plan* describes the regulatory and voluntary activities necessary to achieve the pollutant reductions identified in the TMDL. The plan may include activities such as changes to permits for discharge of

wastewater to the creek, special projects, public education, and watershed-specific rule recommendations. The best strategies for each individual watershed are developed in cooperation with regional and local stakeholders.

If a TMDL is developed, a formal stakeholder group will be identified to provide advice and feedback throughout the entire process of developing the TMDL and implementation plan.

## Contacts

The Onion Creek project is part of a larger project for several streams that are listed as impaired because of low levels of dissolved oxygen or high concentrations of bacteria. Additional information about the project can be found on the TCEQ's Web site at:

*[www.tnrcc.state.tx.us/water/quality/tmdl/SC\\_bac\\_DOproject.html](http://www.tnrcc.state.tx.us/water/quality/tmdl/SC_bac_DOproject.html)*

Or contact the TCEQ project manager:

J. Andrew Sullivan  
P.O. Box 13087 MC 150  
Austin, TX 78711-3087  
Phone: (512) 239-4587  
Fax: (512) 239-1414  
email: [asulliva@tceq.state.tx.us](mailto:asulliva@tceq.state.tx.us)

To learn more about how the TCEQ measures and manages the quality of Texas surface waters, read *Clean Water for Texas: Working Together for Water Quality*, on the TCEQ Web site at:

*[www.tnrcc.state.tx.us/water/quality/tmdl/index.html#descriptions](http://www.tnrcc.state.tx.us/water/quality/tmdl/index.html#descriptions)*

## References

TCEQ 2002. *Guidance for Assessing Texas Surface and Finished Drinking Water Quality Data, 2002*. Surface Water Quality Monitoring Program.

TCEQ 2000. *Texas Surface Water Quality Standards*. Texas Administrative Code, Sections 307.1-307.10.