Texas Clean Rivers Program

2010 Cypress Creek Basin Highlights Report

Prepared by

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for the

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in cooperation with the Texas Commission on Environmental Quality

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Table of Contents

List of Tables

List of Figures

Texas Clean Rivers Program

The Clean Rivers Program (CRP) is a water quality monitoring, assessment, and public outreach program administered by the Texas Commission on Environmental Quality (TCEQ) and funded by state collected fees. The Northeast Texas Municipal Water District (NETMWD) coordinates the Clean Rivers Program for the Cypress Creek Basin. The CRP was created by the Texas Legislature in 1991 under the Texas Clean Rivers Act.

The Basin Highlights Report is an annual report required under that program. The purpose of the report is to provide a concise overview of water quality conditions and issues throughout the Cypress Creek Basin for the most recent 12-month period beginning September 1 and ending August 31.

As a participant in the Texas Clean Rivers Program, NETMWD submits its annual Basin Highlights Report to the Texas Commission on Environmental Quality (TCEQ). The TCEQ and CRP partners, including NETMWD, then use this report and others submitted throughout the State to develop and prioritize programs that will:

- *protect the quality of healthy waterbodies and*
- *improve the quality of impaired waterbodies*

Under the Texas Clean Rivers Program, biologists and field staff collect surface water samples, field parameters and measure flow at sites throughout the Cypress Creek Basin. Other entities participating in the Cypress Creek Basin Clean Rivers Program include the following:

Caddo Lake Institute

Northeast Texas Community College

Pilgrim's Pride Corporation

Titus Co. Fresh Water Supply District #1

Texas Parks and Wildlife Department

United States Geological Survey

East Texas Baptist University

U. S. Steel Tubular Products, Inc.

Luminant

AEP SWEPCO

City of Marshall

City of Longview

Franklin County Water District

NETMWD contracts with Water Monitoring Solutions, Inc. to fulfill the sampling and reporting requirements of the CRP.

Major Watersheds of the Cypress Creek Basin

- **Big Cypress Creek**
- **Black Cypress Bayou**
- **James/Black Bayou**
- **Little Cypress Creek**
- **Caddo Lake**

What is a segment?

Figure 1: Cypress Creek Basin Watersheds

TCEQ has divided the Cypress Creek Basin into nine classified segments. A segment is a section of a river, creek, or stream that has relatively similar chemical, physical, and hydrological characteristics. As the environmental agency for the State of Texas, TCEQ has determined how rivers and their tributaries are divided into segments. The data in this report are organized and presented by segment. All Cypress Creek Basin watersheds are shown on the map below, and the water quality of each segment is discussed in the Water Quality Data Review Section of this report.

Water Quality Monitoring

Monitoring, data collection, and analysis are the basis for maintaining good water quality within the Cypress Creek Basin. Within a cooperative program directed by the Northeast Texas Municipal Water District (NETMWD) these activities are an integral part of the State's Clean Rivers Program (CRP), which is administered by the Texas Commission on Environmental Quality (TCEQ). Other entities participating in monitoring within the Cypress Creek Basin include the Water Monitoring Solutions, Inc. (WMS), Caddo Lake Institute (CLI), Franklin County Water District (FCWD), the City of Marshall, Texas Parks and Wildlife Department (TPWD), the Jeffersonian Institute, Northeast Texas Community College, and the United States Geological Survey (USGS).

Types of Monitoring

TCEQ new Monitoring Type Codes became effective on September 1, 2007. Sampling types are categorized below.

BE	Biased Event – Monitoring targeted toward a specific event (e.g., fish kill, spill)
BF	Biased Flow – Monitoring targeted toward certain flow conditions (e.g., runoff event)
BS	Biased Season – Monitoring targeted toward a certain time of year (e.g., season or index period)
QA	Quality Assurance – QA Samples
RT	Routine – Monitoring not intentionally targeted toward any environmental condition or event.

Additional monitoring codes for continuous data collection can be found in the *TCEQ Surface Water Quality Monitoring Data Management Reference Guide* (January 2010).

Water Quality Parameters

1. **Field Parameters** generally include those parameters collected using a multi-parameter sonde: dissolved oxygen, conductivity, pH and temperature. Stream flow and Secchi disk depth are measured and general field observations are recorded. These data provide information about the physical and chemical water quality characteristics at the site and are used in evaluating water quality.

   • **Dissolved Oxygen (DO)** indicates the amount of oxygen available in the water. Factors such as higher water temperatures and the presence of organic materials can reduce the DO level. All aerobic aquatic species require a minimum DO concentration to survive.

   • **pH** is a measure of the acidity or basicity of a solution. Different species of fish can tolerate a variety of pH ranges, but all fish die if the pH is below 4 (the acidity of orange juice) or above 12 (the pH of ammonia).

2. **Conventional Parameters** are chemical and biological components in water that typically require laboratory analysis. These parameters generally include nutrients, bacteria, chlorophyll-*a*, total dissolved solids, total suspended solids, hardness, alkalinity and chlorides.

   • **Nutrients** include nitrate, nitrite, ammonia and phosphorus. High concentrations of nutrients can cause excessive algal growth, taste and odor problems in drinking water, and human health issues. When algae die, bacteria consume oxygen while decomposing it. During this process, oxygen can decrease to a level below the amount required for fish survival, resulting in the occurrence of fish kills.

   Elevated Ammonia concentrations adversely affect fish and invertebrate reproductive capacity and can become toxic. High levels of nitrates and nitrites can produce Nitrite Toxicity, or "brown blood disease," in fish. This disease reduces the ability of blood to transport oxygen throughout the body.

   • **Total Dissolved Solids (TDS) -** High total dissolved solids may affect the aesthetic quality of the water. High total dissolved solids in the environment can also affect the permeability of ions in aquatic organisms.

   • **Bacteria** include *Escherichia coli (E. coli)*. Although bacteria alone may not be harmful to human beings, their presence is an indicator of recent fecal matter contamination and that pathogens dangerous to human beings may be present.

How are these data used?

The State of Texas classifies segments into four general “use” categories:

- Aquatic life use
- Contact recreation
- Public water supply
- General fish consumption

These categories are called designated uses, and each water body may have multiple designated uses. The State has also established standards which include criteria to ensure that surface water bodies meet their designated use or uses. For instance, surface water bodies designated for aquatic life use have criteria designed to protect aquatic species. Water bodies designated for contact recreation have criteria to protect the public from certain pathogens. Surface water designated for public water supply is suitable as a source for a public water supply system. Similarly, standards assigned for fish consumption are designed to protect the public from consumption of toxins that can be stored in the tissue of fish.

The State has developed physical, chemical, and bacteriological standards for each segment within the basin. There are specific criteria for each of the following parameters in order for the segments to meet their designated uses:

- Dissolved Oxygen (DO)
- Sulfate
- Temperature
- Chloride
- pH
- Conductivity (TDS)
- Bacteria (*E. coli*)

The State has also developed screening criteria for the following parameters:

- Ammonia-Nitrogen
- Nitrate – Nitrogen
- Orthophosphate
- Total Phosphorus
- Chlorophyll-*a*

The Cypress Creek Basin

A basin, also called a drainage area, catchment, or watershed, is an area of land that drains its surface and subsurface water to a common point. For the Cypress Creek Basin, that common point is Caddo Lake.

All of the land area within the Cypress Creek Basin drains primarily from the northwest to the southeast and eventually feeds into Caddo Lake. Note that before entering Caddo Lake, some surface water first enters from smaller sub-watersheds through tributaries, or streams at the upstream end of the basin. The major tributaries that drain into Caddo Lake include Big Cypress Creek, Little Cypress Creek, James Bayou, Harrison Bayou, Kitchen Creek, and Black Cypress Bayou.

The 6000 square mile Cypress Creek Watershed extends upstream from Caddo Lake at the Texas-Louisiana state border, to the westernmost extreme of the Cypress Creek Basin, near Winnsboro, TX. This watershed, which includes several reservoirs, is formed in the southern part of Hopkins and Franklin Counties and flows eastwardly into Camp, Titus, Morris, Marion, and Harrison Counties. Big Cypress Creek is the boundary line between Camp and Titus, Camp and Morris, and Morris and Upshur counties.

Big Cypress Creek, above Lake O' the Pines, is intermittent in its headwaters. The stream runs through flat to rolling terrain surfaced by sandy and clay loams that support water-tolerant hardwoods, conifers, and grasses. Big Cypress Bayou flows into Caddo Lake through a jungle-like bottomland where cypress trees are common.

The navigable waters of Big Cypress Bayou contributed to the rise of the City of Jefferson as a commercial center prior to the railroads. Between 1842 and 1872, the town was a principal port in Texas, serving as a distribution point for much of North and East Texas. Once the railroads arrived in the early 1870s, river traffic declined. Since World War II, Big Cypress Creek has been dammed to form a series of reservoirs including Lake Cypress Springs, Lake Bob Sandlin, Monticello Reservoir and Lake O' the Pines.

Common Parameters of Concern

E. coli bacteria are indicators of recent input of fecal matter that may contain pathogens harmful to human health. People should not swim in waters with high bacteria counts since they may come in contact with or ingest these pathogens. All warm blooded animals contain *E. coli* in their fecal matter. Common sources of fecal bacteria include improperly treated effluent, malfunctioning septic systems, livestock and wildlife.

Mercury in edible fish tissue is a common listing in basins throughout the eastern half of Texas. Low pH increases methyl-mercury making mercury available for uptake into aquatic organisms throughout the food chain. Bioaccumulation of mercury in the edible tissues of many fish species to the point of becoming a human health concern has prompted the Department of State Health Services (DSHS) to issue fish consumption advisories around the basin.

Nutrients (ammonia-nitrogen, nitrate-nitrogen, orthophosphorus and total phosphorus) are essential for aquatic life. However, elevated concentrations of nutrients can cause excessive growth in aquatic plants and may lead to algae blooms. Bloom conditions may cause low dissolved oxygen concentrations, can lead to fish kills, and decreased species diversity within a water body. The main sources of nutrient pollution within the basin are improperly treated effluent, malfunctioning septic systems, and agricultural non-point sources. Some nutrient loading may also be naturally occurring through biotic decomposition, groundwater accretions, and mineralization.

Many East Texas waters have a naturally low pH and limited buffering capacity (alkalinity). The pH can also be reduced by acidic industrial run-off or discharges and acid rain. The long-term effect, if any, of low pH on the ecology and biota of the watershed is currently undetermined.

Figure 2: Hughes Creek at SH 155 (16936)

Basin Health Overview