Northeast Texas Municipal Water District

Cypress Creek Basin Highlights Report

Texas Clean Rivers Program

This report was prepared by Water Monitoring Solutions, Inc. for the Northeast Texas Municipal Water District in cooperation with the Texas Commission on Environmental Quality

2013

Our Mission:

The mission of NETMWD is to protect the water quality in the Cypress Basin and to provide a sufficient supply of water to Northeast Texas.

Texas Commission on Environmental Quality

Water Monitoring Solutions

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Texas Clean Rivers Program

The Clean Rivers Program (CRP) is a water quality monitoring, reporting, planning and coordination 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 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 CRP, NETMWD submits its Basin Highlights Report to the TCEQ. The TCEQ and CRP partners 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 CRP, biologists and field staff collect surface water samples, field parameters, conduct special projects, and measure flow at sites throughout the Cypress Creek Basin. Other entities participating in the Cypress Creek Basin CRP include the following:

Clean Rivers Project Partners	
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	Franklin County Water District
U. S. Steel Tubular Products, Inc.	City of Marshall
AEP SWEPCO	Luminant
City of Longview	Texas Forest Service

BECOME INVOLVED:

Interested in becoming a stakeholder and being contacted about meetings and program updates?

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NETMWD contracts with Water Monitoring Solutions, Inc. to fulfill specific tasks of the CRP.

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Caddo Lake Institute

http://www.caddolakeinstitute.us/

Water Monitoring Solutions

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 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).

Water Quality Parameters

1. **Field Parameters** generally include those parameters collected using a multi-parameter sonde (or meter): dissolved oxygen, conductivity, pH and temperature. Stream flow and Secchi disk depth are measured and general field observations are recorded, and photos are often taken. 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 dissolved oxygen level. All aerobic aquatic species require a minimum dissolved oxygen 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 pH levels below 4 (the acidity of orange juice) or above 12 (the pH of ammonia) are lethal to all fish.

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. Dissolved solids in the water can also affect the ability of aquatic organisms to absorb ions and nutrients needed for survival impacting the ecosystem diversity.

• **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 Data Are Used

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

- Aquatic life use
- Contact recreation
- Public water supply
- Fish consumption and General Use

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*

These data collected are used to compile the Texas Integrated Report (IR). The IR is prepared every even-numbered year by the TCEQ and is an evaluation of the quality of surface water throughout Texas. The report identifies parameters in water bodies which do not meet water quality criteria. The report is a tool used for decision making, planning, reporting, and coordinating monitoring efforts among multiple entities in a basin. At the time of this publication, the 2012 Integrated Report has been approved by TCEQ and submitted to the EPA for approval.

Table 1: *Texas Water Quality Standards for the Cypress Creek Basin - Appendix A Site Specific Uses and Criteria for Classified Segments*

Cypress Creek Basin		Uses			Criteria						
Segment ID	Segment Name	Recreation	Aquatic Life	Domestic Water Supply	Cl^{-1} (mg/L)	SO_4^{-2} (mg/L)	TDS (mg/L)	Dissolved Oxygen (mg/L)	pH Range (SU)	Indicator Bacteria[1] (#/100ml)	Temp (°F)
0401	Caddo Lake	PCR	H	PS	50	50	200	5.0	5.5-9.0	126	90
0402	Big Cypress Creek Below Lake O' the Pines	PCR	H	PS	100	50	300	5.0	5.5-8.0	126	93
0403	Lake O' the Pines	PCR	H	PS	80	50	300	5.0	6.0-8.5	126	93
0404	Big Cypress Creek Below Lake Bob Sandlin	PCR	I		100	100	500	4.0	6.0-8.5	126	90
0405	Lake Cypress Springs	PCR	H	PS	100	100	500	5.0	6.0-8.5	126	93
0406	Black Bayou[2]	PCR	H	PS	80	50	300	≤5.0[3]	5.5-8.0	126	90
0407	James' Bayou[2]	PCR	H	PS	100	50	300	≤5.0[3]	5.5-8.0	126	90
0408	Lake Bob Sandlin	PCR	H	PS	50	65	150	5.0	6.5-9.0	126	90
0409	Little Cypress Bayou (Creek)	PCR	H	PS	100	50	300	≤5.0[3]	5.5-8.5	126	90
0410	Black Cypress Bayou (Creek)	PCR	H		50	50	200	≤5.0[3]	5.5-8.0	126	90

1 The indicator bacteria for freshwater is *E. coli.*

2 Segments 0406 and 0407 are intermittent streams with perennial pools.

3 A 24-hour average dissolved oxygen criterion of 5.0 mg/L is the upper bounds if the following indicated dissolved oxygen equation predicts dissolved oxygen values that are higher than 5.0 mg/L. When the 24-hour average dissolved oxygen is predicted to be lower than 1.5 mg/L, then the dissolved oxygen criterion is set as 1.5 mg/L. When the 24-hour average dissolved oxygen criterion is greater than 2.0 mg/L, the corresponding 24-hour minimum dissolved oxygen criterion should be 1.0 mg/L less than the calculated 24-hour average. When the 24-hour average dissolved oxygen criterion is less than or equal to 2.0 mg/L, the corresponding 24- hour minimum dissolved oxygen criterion should be 0.5 mg/L less than the calculated 24-hour average criterion. When stream flow is below 0.1 cfs, then 0.1 cfs is the presumed flow that should be used in the equation. This equation supersedes Table 4 in §307.7(b)(3)(A) of this title.

DO = 12.11 - 0.309 T + 1.05 logQ - 1.02 logWS where DO = 24-hour average dissolved oxygen criterion;
T = temperature in degrees Celsius, Q = flow in cfs, WS = watershed size in square kilometers (up to 1000 kilometers)

** - Items in red remain under review and are pending approval by the USEPA*

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. This watershed, which includes several reservoirs, originates in the southern part of Hopkins and Franklin Counties and flows south 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.

The Cypress Creek Basin has a diverse ecology. 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.

Water quantity is being studied throughout the state of Texas including the Cypress Creek Basin. Recent studies in the Basin include the Caddo Lake Watershed Protection Plan, the Lake O' the Pines Total Maximum Daily Load Study, the Assessment of Contact Recreation Use Impairments and Watershed Planning for Big Cypress Creek and Tributaries (Hart and Tankersley Creeks). These studies, along with reports like this one, help the TCEQ, CRP partners, and informed citizens prioritize the monitoring needs of the Cypress Creek Basin in order to maintain water quality.

Did you know…

that the Northeast Texas Municipal Water District entered into its first contract to supply water to a power plant in 1960?

In addition to partner input, monitoring in the Cypress Creek Basin is also prioritized upon the Segments/Assessment Units with parameters shown on the *Texas §303(d) List* and where there are concerns for screening levels or near-nonattainment. Some stations have been sampled for many years and remain on the sampling schedule in order to evaluate historical trends.

Figure 1: *Cypress Creek Basin Watersheds*

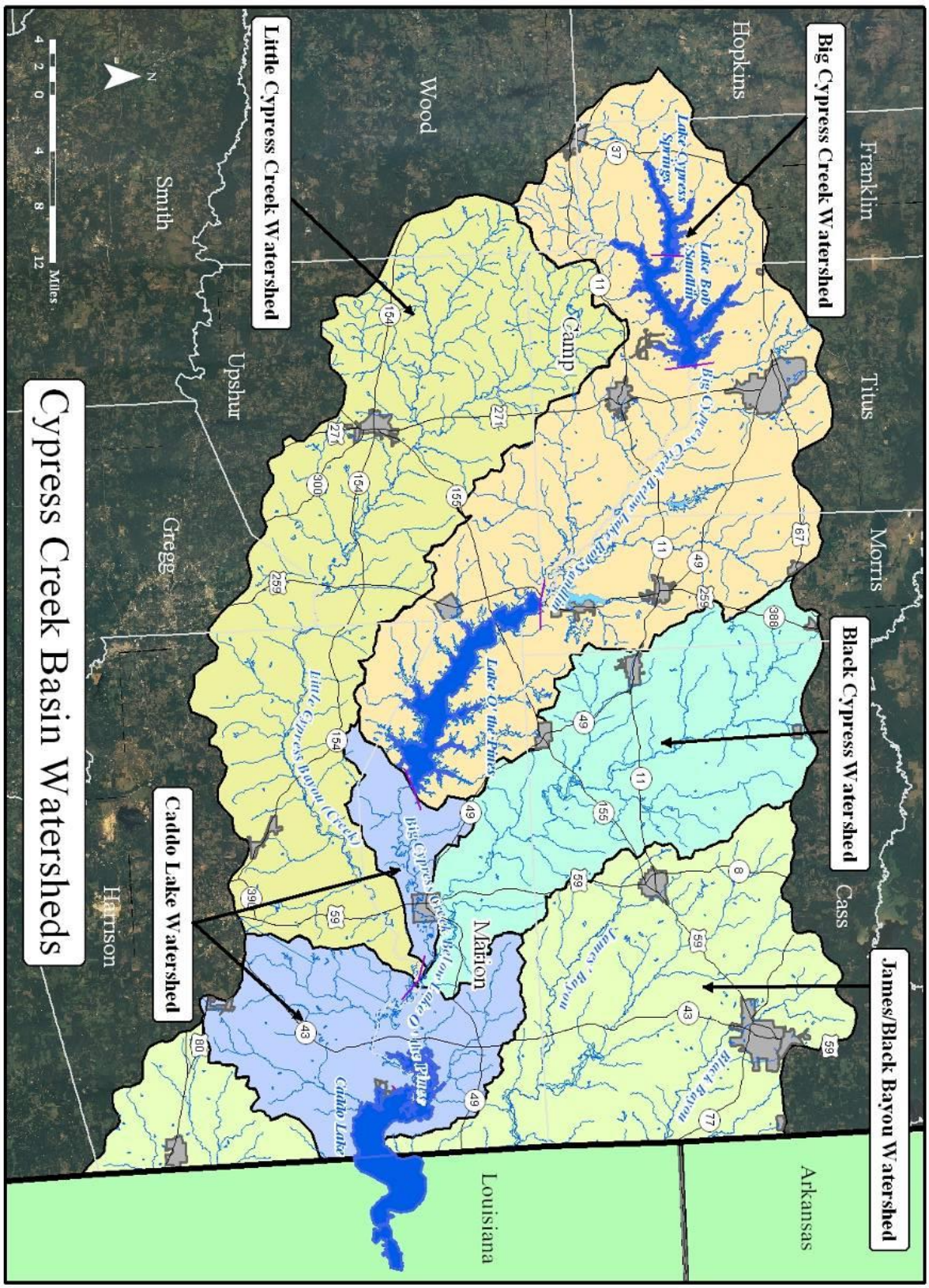


Table 2: *2012 Texas Integrated Report, §303(d) Listing of Impairments and Concerns*

Segment ID	Segment Name	Parameter
0401	Caddo Lake	Low dissolved oxygen pH Mercury in edible fish tissue Ammonia* Iron in sediment* Manganese in sediment*
0401A	Harrison Bayou (unclassified water body)	Low dissolved oxygen Bacteria*
0402	Big Cypress Creek below Lake O' the Pines	Low dissolved oxygen pH Mercury in edible fish tissue Impaired macrobenthics*
0402A	Black Cypress Bayou (unclassified water body)	Low dissolved oxygen Bacteria Chlorophyll *a** Copper in water Mercury in edible fish tissue
0402B	Hughes Creek (unclassified water body)	Low dissolved oxygen*
0402E	Kelley Creek (unclassified water body)	Low dissolved oxygen*
0403	Lake O' the Pines	Low dissolved oxygen* Nitrate*
0404	Big Cypress Creek below Lake Bob Sandlin	Bacteria Low dissolved oxygen* Nitrate* Orthophosphorus* Total Phosphorus*
0404A	Ellison Creek Reservoir (unclassified water body)	PCB's in edible tissue Toxicity in sediment Cadmium in sediment* Iron in sediment* Lead in sediment* Manganese in sediment* Nickel in sediment* Zinc in sediment*
0404B	Tankersley Creek (unclassified water body)	Bacteria Ammonia* Impaired Habitat* Nitrate* Orthophosphorus* Total Phosphorus*
0404C	Hart Creek (unclassified water body)	Bacteria Low dissolved oxygen* Nitrate*

Table 2, continued: *Current Texas Integrated Report, §303(d) Listing of Impairments and Concerns*

Segment ID	Segment Name	Parameter
0404E	Dry Creek (unclassified water body)	Nitrate*
0404N	Lake Daingerfield (unclassified water body)	Mercury in edible fish tissue
0404J	Prairie Creek (unclassified water body)	Low dissolved oxygen*
0405	Lake Cypress Springs	pH Chlorophyll *a**
0405A	Big Cypress Creek (unclassified water body)	Bacteria*
0405B	Panther Creek (unclassified water body)	Impaired Habitat*
0406	Black Bayou	Low dissolved oxygen Bacteria
0407	James' Bayou	Low dissolved oxygen pH Bacteria Impaired fish community*
0407A	Beach Creek (unclassified water body)	Bacteria* Low DO*
0407B	Frazier Creek (unclassified water body)	Low dissolved oxygen*
0408C	Brushy Creek (unclassified water body)	Impaired Habitat* Impaired macrobenthics*
0409	Little Cypress Bayou (Creek)	Low dissolved oxygen Bacteria
0409B	South Lilly Creek (unclassified water body)	Bacteria
0409E	Clear Creek (unclassified water body)	Impaired Habitat* Impaired macrobenthics*

** - Parameter listed as a concern for screening level or near non-attainment*

Figure 2: *Big Cypress Creek at US 259*

Segment Review

Figure 3: *Locations and descriptions of all 2013 sampling stations in the Cypress Creek Basin*

This section of the 2013 Basin Highlights Report contains a description of the parameters not supporting the water body's designated use or parameters that are of concern for not meeting their designated use in the Cypress Creek Basin. If the impairment is being addressed with further study, the latest available information is included. Finally, if a segment is currently being monitored, the parameters being collected along with the frequency of sampling are included.

Category 5a - A TMDL is underway, scheduled, or will be scheduled.

Category 5b - A review of the water quality standards for this water body will be conducted before a TMDL is scheduled.

Category 5c - Additional data and information will be collected before a TMDL is scheduled.

Segment 0400: Paw Paw and Cross Bayous

Paw Paw and Cross Bayous are located in an area below Caddo Lake where drainage is directed to the State of Louisiana, and do not contribute to the water quality of the Cypress Creek Basin. There are no USGS gage stations on these segments.

Paw Paw and Cross Bayous have no listings for water quality issues within the Cypress Creek Basin. The water flowing from this portion of the watershed drains into Louisiana.

There were no CRP monitoring stations in this segment in Fiscal Year 2013.

Segment 0401: Caddo Lake

Caddo Lake is impounded by Caddo Dam in Caddo Parish, Louisiana, and extends into Harrison and Marion Counties in Texas. The largest tributary to Caddo Lake is Big Cypress Creek through which Caddo Lake receives runoff from Little Cypress Creek, Black Cypress Bayou, and Big Cypress Creek watersheds. The Caddo Lake Watershed covers approximately 330 square miles and includes Caddo Lake and the segment of Big Cypress Creek below Lake O' the Pines Ferrell's Bridge Dam (Segment 0402). This watershed consists mainly of forested hills with limited urban development. Thought to have been formed behind a log jam in the Red River, Caddo Lake was one of the largest natural lakes in the South before it was dammed in 1914. The upper half of Caddo Lake is shallow and swamp-like. These characteristics have helped to produce an ecosystem more diverse than that of other reservoirs in the State of Texas.

Caddo Lake remains on the *2012 Texas §303(d) List* for low dissolved oxygen levels throughout the lake, mercury in edible fish tissue, and low pH. Data are being collected for dissolved oxygen and mercury prior to scheduling a TMDL. Proposed changes to standards for this segment remain under review by the EPA to examine whether pH levels are naturally occurring conditions in the water body.

There are also concerns for ammonia in water, iron in sediment, and manganese in sediment in Clinton Lake, however, no metals sediment sampling is presently scheduled.

Figure 4: *Caddo Lake at Turtle Shell*

Caddo Lake Watershed Protection Plan

The development of a Watershed Protection Plan (WPP) is an alternative to the TMDL process for solving water quality issues. The WPP is a strategic plan for management, monitoring, and protection of Caddo Lake designed to help minimize pollutants in this watershed. The focus of this effort is to protect the water quality and aquatic life of Caddo Lake. The key to attaining this goal is the identification of contamination sources and the creation of workable voluntary management practices.

Stakeholder involvement is an integral part of this process which will take several years to develop. This voluntary effort is being led by basin stakeholders, with NETMWD as the watershed coordinator. Although federal, state, and local organizations are actively participating in its preparation and implementation, this plan relies heavily on volunteers.

The main concerns for Caddo Lake have been identified by stakeholders as management of invasive aquatic vegetation, the restoration water quality, and water availability. A comprehensive data analysis was completed in 2008 leading to identification of nutrients and bacteria as primary water quality concerns that could be addressed through the WPP process. An intensive watershed and lake water quality modeling project was begun to evaluate existing conditions and future management measures that can address concerns.

Three workgroups have been formed and each workgroup has identified its main area of concern. These workgroups address stakeholders concerns and to develop the Caddo Lake WPP. The stakeholder recommendations will be integrated into a comprehensive WPP for Caddo Lake. In addition, outreach and education activities designed to promote participation in the current effort to develop the plan are being conducted.

The Physical Concerns Workgroup has raised funds for the Giant Salvinia Rapid Response plan, developed and distributed an invasive aquatic plant identification guide specific to Caddo Lake, and held a clean-up day at Caddo Lake. The group helped develop an Aquatic Vegetation Management Plan for Caddo Lake which is updated by Texas Parks and Wildlife Department annually. The TPWD Aquatic Vegetation Management Plan is currently being implemented by Cypress Valley Navigation District.

Since inception of this project, several special studies have been performed to help with the development of the WPP: the Caddo Lake Water and Nutrient Budget Study and the Caddo Lake Watershed Sediment Study were completed 2006 - 2007. In 2009, additional lake sediment sampling was conducted by TCEQ to characterize nutrient conditions in Caddo Lake. Also in 2009, the depth of the lake was mapped in remote or uncharted areas. At the same time properties of rooted lake vegetation were measured. These studies will help characterize flow patterns throughout the lake as well as water quality conditions.

Stakeholder and workgroup meetings were conducted to inform stakeholders on progress and to solicit input on basin and lake conditions. This valuable input was incorporated into the water quality modeling efforts.

Sub-segment 0401A: Harrison Bayou (unclassified water body)

Segment 0401A (Harrison Bayou) is a tributary of Caddo Lake. The sub-segment extends parallel to SH 43 and to the Louisiana border.

Harrison Bayou remains on the *2012 Texas §303(d) List* for low dissolved oxygen, although low dissolved oxygen levels are possibly indicative of natural conditions in Caddo Lake. Bacteria levels remain a concern in this sub-segment. Two samples were used to assess habitat. The concern for habitat was removed in 2012.

NETMWD is currently collecting quarterly water quality samples for conventional parameters, field parameters, and flow in this reach.

Sub-segment 0401B: Kitchen Creek (unclassified water body)

Kitchen Creek, an unclassified water body, is a tributary of Caddo Lake. The stream crosses SH 49 near Smithland and drains into Clinton Lake east of Goat Island.

There were no impairments or concerns for this tributary. All parameters assessed were found to fully support their designated use, and there are currently no concerns in this reach. Future monitoring may be included for assessment purposes.

Segment 0402: Big Cypress Creek below Lake O' the Pines

This portion of Big Cypress Creek is generally wide and deep and supports heavy recreational use including boating and camping activities. The Texas Parks and Wildlife Department has placed this segment within the target area for the recovery of the state threatened paddlefish, and identified an area of over five thousand acres east of the City of Jefferson as containing priority bottomland hardwood forest dominated by cypress-tupelo swamps.

Parameters on the *Texas §303(d) List* include depressed dissolved oxygen, mercury in edible fish tissue, and low pH. Concerns are documented in the *2012 Texas Integrated Report* for an impaired aquatic insect community. This segment is primarily sampled by the TCEQ Tyler Regional Office. The Caddo Lake Institute continues monthly monitoring for field parameters on Big Cypress Creek at Caddo Lake State Park.

Sub-Segment 0402A: Black Cypress Creek (Bayou)

Black Cypress Bayou is a perennial stream and the segment boundaries are from the confluence with Big Cypress in Marion County up to FM 250 in Cass County. This sub-segment is currently under EPA review for a status change from an unclassified water body to a classified water body. If approved by the EPA, Black Cypress Bayou will be identified as a classified segment 0410.

Black Cypress Bayou (402A) is listed as impaired for low dissolved oxygen, bacteria, copper in water, and mercury in edible fish tissue. Concerns are documented for the same parameters throughout the watershed in addition to chlorophyll *a*. Black Cypress Creek at US 59 (10245) is on the monitoring schedule for 24-hour dissolved oxygen four times a year by NETMWD. The TCEQ regional office samples quarterly for conventional parameters, bacteria, field parameters, and flow.

Sub-segment 0402B: Hughes Creek (unclassified water body)

Sub-segment 0402E: Kelly Creek (unclassified water body)

These are tributaries to Black Cypress Bayou and water quality parameters collected here will characterize conditions prior to entering Black Cypress Bayou.

Decreasing dissolved oxygen levels in Hughes Creek (402B) and Kelley Creek (402E) are a concern. At present, quarterly field parameters are being collected. Diel dissolved oxygen monitoring may be considered in the future.

Sub-segment 0402C: Haggerty Creek (unclassified water body)

Sub-segment 0402D: Flat Creek (unclassified water body)

The above sub-segments were not assessed in the *2012 Texas Integrated Report*. No new listings are proposed for these water bodies in the current assessment.

Did you know…

that the Northeast Texas Municipal Water District was formed in 1953 to be the local sponsor of Lake O' the Pines?

Segment 0403: Lake O' the Pines

Lake O' the Pines provides water for eight cities and towns, numerous rural water districts, steel manufacturer and electricity generators. The lake is an important resource to the timber industry and to agricultural enterprises such as the poultry industry, dairies, cattle operations, and for irrigation. Boating and fishing for trophy bass, catfish, and crappie lure large numbers of recreational users to the watershed each year.

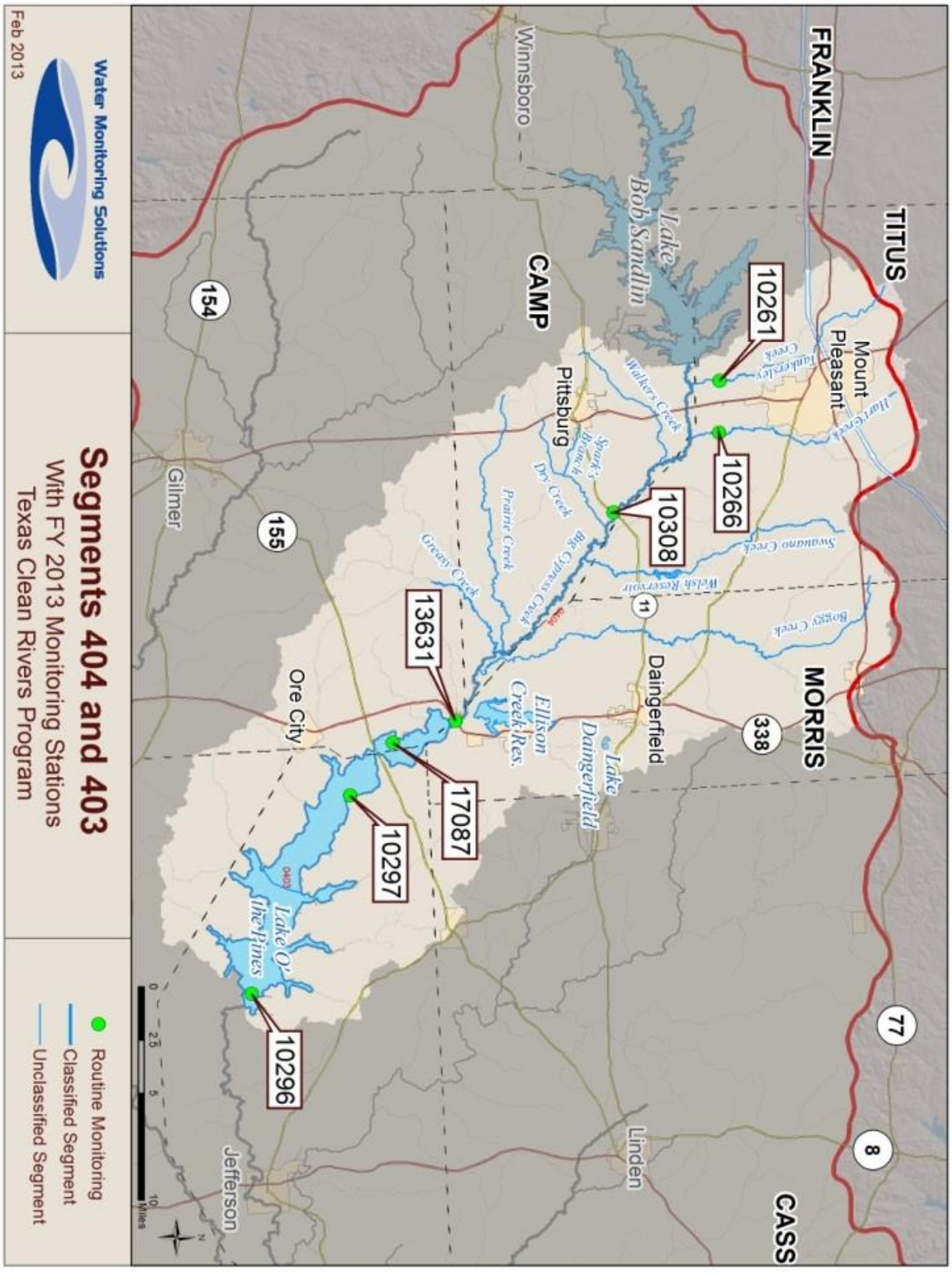
The Lake O' the Pines (Cypress Creek Basin Segment 403) was listed on the *Texas §303(d) List* in 2000 for depressed dissolved oxygen. The TCEQ adopted "*One Total Maximum Daily Load for Dissolved Oxygen in Lake O' the Pines, Segment 403*" and the TMDL was approved by the EPA on June 7, 2006. It was determined that the low dissolved oxygen in Lake O' the Pines resulted from high nutrient levels. Phosphorus was identified as the limiting factor in the reservoir, so the Lake O' the Pines Implementation Plan (I-Plan) was developed to reduce phosphorus loading into Lake O' the Pines and was approved on July 9, 2008.

Stakeholder meetings composed of citizens, local, county, and state entities, local industries, etc. were held throughout the project. All milestones were developed by individuals with an interest in improving water quality based on the information available at the time.

The I-Plan detailed priority controls in the Lake O' the Pines watershed that include descriptions of the control measures, responsible parties were identified, and a schedule was created. Also included were the goals to measure, track, evaluate, and report progress. The scope of the I-Plan included an adaptive approach to phosphorus reduction allowing for updates that may later be identified in the project.

Watershed stakeholders specified actions to reduce non-point source contributions, like stormwater runoff. Technical and financial programs were created for agricultural producers; and local/county programs were created for on-site sewage facilities, marine

Figure 5: *Segment 404 Big Cypress Creek above Lake O' the Pines and 403: Lake O' the Pines*



sanitation, and education. Loading from point sources were addressed through the limitation of phosphorus in discharges from wastewater facilities.

Phosphorus reduction may be accomplished with the modification of wastewater permits. The NETMWD has completed permit amendments with all parties involved and permit modifications have been finalized.

Project workgroups, facilitated by Texas A&M AgriLife met January 9 and 10, 2013 at the NETMWD headquarters in Hughes Springs. The groups assessed the I-Plan status as of November 2012. Changes may be proposed based on feedback from those meetings to ensure project resources remain focused toward improving the water quality in Lake O' the Pines. Sampling in Lake O' the Pines was discussed at the 2013 Coordinated Monitoring Meeting in addition to future workgroup meetings. Water quality monitoring is scheduled to begin sometime this fiscal year. Monitoring will quantify the effectiveness of control measures.

There are concerns for low dissolved oxygen and elevated nitrate levels in Lake O' the Pines added to the IR in 2012.

Segment 0404: Big Cypress Creek below Lake Bob Sandlin

Urban concentrations in this segment include the Cities of Mount Pleasant, Pittsburg, Daingerfield, and Hughes Springs. A majority of the intensive poultry operations within the Cypress Basin are located in this area. This segment also has the most urban development in the Cypress Creek Basin.

Nearby uplands are used for livestock grazing and hay production. Vegetation within this area ranges from areas cleared for agriculture to dense forests. Post oak and blackjack oak constitute the dominant climax canopy vegetation, but loblolly and shortleaf pine are also common. The bottomland forest is the most mesic habitat in eastern Texas; the dense vegetation is generally comprised of water oak, willow oak, sweet gum, black gum, and birch primarily vegetated by a mixture of oak woodland and prairie. The floodplain contains numerous sloughs and depressions that tend to hold water following flood events, is heavily wooded and contains widespread forested wetlands.

Big Cypress Creek drains much of the western Cypress Creek Basin, a predominantly rural watershed of rolling wooded hills with regional elevations of 200 to 800 feet MSL. Stream flow in Big Cypress Creek is influenced by releases from Lake Bob Sandlin upstream.

This segment is listed as impaired for bacteria and has concerns for low dissolved oxygen, nitrate, orthophosphorus, and total phosphorus.

Sub-segment 0404A: Ellison Creek Reservoir (unclassified water body)

The entire Ellison Creek Reservoir is on the *Texas §303(d) List* for PCBs in fish tissue and sediment toxicity since 2006. The Texas Department of State Health Services has issued a fish consumption advisory for PCB's in fish tissue for all species of fish within the reservoir.

The *2012 Texas Integrated Report* lists Ellison Reservoir with concerns for screening levels for cadmium, iron, lead, manganese, nickel, and zinc all in sediment, not in the water column.

Elevated polychlorinated biphenyls, better known as PCB's in edible fish tissue and toxicity in sediment are on the *2012 Texas 303(d) List*.

Sub-segment 0404B: Tankersley Creek (unclassified water body)

Tankersley Creek (0404B) arises in Titus County northwest of the City of Mount Pleasant. The creek flows in a southeasterly direction for approximately two miles before it enters Tankersley Lake, which impounds Tankersley Creek about two miles northwest of Mount Pleasant. Downstream of the spillway of the 150-acre impoundment, stream flow is to the south for a distance of about eight miles to the confluence of Tankersley Creek with Big Cypress Creek at the Titus-Camp county line. Tankersley Creek is an unclassified water body in the Cypress Creek Basin and is the major tributary to Big Cypress Creek in the study area.

Tankersley Creek remains listed as impaired for bacteria loading. This was addressed in the Texas State Soil and Water Conservation Board study entitled Assessment of Contact Recreation Use Impairments and Watershed Planning for Big Cypress Creek and Tributaries. For more information, please go to: http://www.tsswcb.texas.gov/en/managementprogram/BGCYBAC.

There are concerns for screening levels for ammonia, nitrate, orthophosphorus, and total phosphorus. A sample is being collected quarterly for conventionals, field parameters, flow, and bacteria at the most downstream site on Tankersley Creek at FM 3417. An additional concern is documented for an impaired riparian habitat.

Sub-segment 0404C: Hart Creek (unclassified water body)

Hart Creek (0404C), also an unclassified water body, rises 4.5 miles north of Mount Pleasant in central Titus County and runs southeast for twelve miles to its confluence with Big Cypress Creek, six miles southeast of Mount Pleasant in central Titus County. The stream is intermittent in its upper reaches and flows in a generally southeast direction. It receives surface drainage from Hayes Creek and Evans Creek, small tributaries near the eastern city limits of Mount Pleasant and south of New Mount Pleasant Lake. Downstream from this point, Hart Creek carries overland flow for a distance of approximately 6.5 miles before discharging into Big Cypress Creek at the Titus-Camp county line. Near its confluence the terrain changes to a more level bottomland in the floodplains of Big Cypress Creek. The soils are sandy along the creek's upper reaches and loamy along its middle and lower reaches. The area was originally heavily wooded, with pines and various hardwoods predominating. The City of Mt. Pleasant WWTP outfall on Hart Creek is located below Highway 49 and above SE 12 (CR 4550) east of the Mt. Pleasant Regional Airport.

Hart Creek remains listed as impaired for bacteria levels. This was also addressed in the study mentioned in the Tankersley Creek section. There are concerns for screening levels for depressed dissolved oxygen and nitrate. A sample is being collected quarterly for conventionals, field parameters, flow, and

Did you know…

that the Northeast Texas Municipal Water District's first water treatment plant was named in honor of Homer N. Tanner, Jr; who was hired as the Executive Director in 1965, and that he served 22 years in that capacity?

bacteria at the most downstream site on Hart Creek at Titus County Road SE 12.

Concerns for low dissolved oxygen levels and nitrate also exist on Hart Creek.

Assessment of Contact Recreation Use Impairments and Watershed Planning for Big Cypress Creek and Tributaries (Hart and Tankersley Creeks)

The Assessment of Contact Recreation Use Impairments and Watershed Planning for Big Cypress Creek and Tributaries (Hart and Tankersley Creeks) was a project funded by the Texas State Soil and Water Conservation Board which commenced in June 2009 and was completed in August 2011. Several public meetings were held to discuss the project scope, design, progress, preliminary findings, and to solicit stakeholder input on activities in the watershed.

A review of the historical data showed that much of the bacteria data for Big Cypress Creek, Tankersley Creek, and Hart Creek were collected during a storm event or within a couple of days of an event. Removal of the event-based data yielded substantial reductions in the geometric mean and the percent of single sample exceedances at most stations. The bacteria source survey identified many contributors of possible sources of bacteria. Non-point sources included livestock, pets, wildlife, sludge application fields, and on-site septic systems. There are two point sources in the study area: the City of Mount Pleasant WWTP located in Hart Creek and the Pilgrim's Pride Corporation Southwest WWTP in Tankersley Creek.

Preliminary monitoring data showed that bacteria geometric means exceeded the state standard at all stream stations in the study area. Monitoring data showed that the treatment plants were not significant sources of E. coli loading and that storm event results showed that the majority of the loading came from non-point sources. The preliminary results of BST analysis and SELECT modeling supported these findings. Both BST analysis and SELECT modeling showed that the highest levels of bacterial contributions came from wildlife and livestock, and that loading from humans and poultry were not significant sources. Preliminary results of the Comprehensive RUAA found no evidence of primary contact recreation occurring within the study area. Interviews with landowners, public officials, game wardens and stakeholders at public meetings supported these findings.

Several workshops, programs, and public education opportunities have been organized to educate the public about what the impairment is and ways to help reduce bacteria loading in the basin.

The results of this report are under review by the Texas State Soil and Water Conservation Board. All data discussed in this report have been presented at public meetings and those

Figure 6: *Tankersley Creek at FM 3417*

presentations are available to the public on the project website: http://bcc.tamu.edu/.

Sub-segment 0404D: Welsh Reservoir (unclassified water body)

Welsh Creek extends from the Titus County Dam up to normal pool level located between Mt. Pleasant and Daingerfield. Welsh Reservoir impounds Swauano and Justiss Creeks. No concerns were identified for this sub-segment.

Sub-segment 0404E: Dry Creek (unclassified water body)

Dry Creek enters Big Cypress Creek from the west bank, flowing past Pittsburg in northeast Camp County. The *2012 Texas Integrated Report* lists this stream as a concern for screening level for Nitrate-Nitrogen. This sub-segment is not currently being sampled, and the assessment is based on a limited number of samples. Sampling may be considered in the future, but no changes are under consideration for Dry Creek at this time.

Sub-Segment 0404F: Sparks Branch (unclassified water body)

Sparks Branch was assessed for dissolved oxygen grab sample minimum and criterion in the *2006 Texas Water Quality Inventory*. It was again assessed in the 2012 Texas Integrated Report, and no concerns were identified. The assessment was based on limited data, so sampling may be considered in the future.

Sub-segment 0404I: Boggy Creek (unclassified water body)

There are no concerns or impairments listed in the *2012 Texas Integrated Report* for this sub-segment. It was assessed for 24-hour dissolved oxygen maximum and average concentrations. No changes are proposed for Boggy Creek in the current assessment; however, additional data are recommended for assessment purposes. The Lake O' the Pines I-Plan workgroup identified this watershed for possible monitoring to determine any potential impacts on loading into the lake.

Sub-segment 0404J: Prairie Creek (unclassified water body)

Prairie Creek flows on the southern border of Camp County before its confluence with Big Cypress Creek near US 259. The creek remains on the *2012 Texas Integrated Report* for near non-attainment of the 24-hour dissolved oxygen average and minimum criteria. No changes are proposed for Prairie Creek in the current assessment; however, the Lake O' the Pines I-Plan workgroup identified this watershed for possible monitoring to determine any potential impacts on loading into the lake.

Sub-segment 0404K: Walkers Creek (unclassified water body)

Walkers Creek generally runs east to west in Camp County, about 3 miles north of Pittsburg. This sub-segment currently lists no concerns or impairments in 2012 Texas Integrated Report. Additional sampling may be recommended for 24-hour dissolved oxygen due to a limited data set for assessment.

Sub-segment 0404L: Swauano Creek (unclassified water body)

Swauano Creek runs southwest of Cookville in southeast Titus County. The upper reach is intermittent and flows approximately nineteen miles to its confluence with Big Cypress Creek. There are no concerns or impairments listed in

the *2012 Texas Integrated Report*. No changes are proposed for Swauano Creek in the current assessment; however, sampling may be recommended for future assessment purposes.

Sub-segment 0404M: Greasy Creek (unclassified water body)

Greasy Creek begins approximately two miles north of Cox in Upshur County. It extends southeast for approximately four miles before its confluence with Big Cypress Creek. There are no concerns or impairments listed in the *2012 Texas Integrated Report* for this sub-segment and no changes are proposed; however, additional sampling may be recommended for assessment purposes.

Sub-segment 0404N: Lake Daingerfield (unclassified water body)

Lake Daingerfield is an eighty acre reservoir which was completed in 1935 as a Civilian Conservation Corps project. This segment was identified as having a concern for the screening level of mercury in fish tissue and DSHS has issued a fish consumption advisory. No changes are proposed for the current assessment on this water body.

Sub-segment 0404O: Dragoo Creek

The drainage area for Dragoo Creek includes sections above Interstate 30 west of Mt. Pleasant to the northwest border of the Tankersley Creek watershed. One site was included in the Assessment of Contact Recreation Use Impairments and Watershed Planning for Big Cypress Creek and Tributaries. During assessment, these data were determined not to be temporally representative of the creek, and so no impairments or concerns could be accurately determined. There are no immediate plans to sample here; however, potential water quality impacts on Tankersley Creek could bring consideration for future sampling.

Sub-segment 0404P: Unnamed Tributary to Tankersley Creek

Sub-segment 0404Q: Unnamed Tributary to Tankersley Creek

Sub-segment 0404R: Unnamed Tributary to Dragoo Creek

The above water bodies are all unclassified and are new sub-segments in the Tankersley Creek watershed as of the 2012 assessment period. Data support listing them as impaired water bodies for their bacteria single sample levels and geometric mean; however, these data were not assessed as they were determined to be targeted for specific conditions and not temporally representative.

Figure 7: *Black Bayou at SH 43*

Segment 0405: Lake Cypress Springs

Lake Cypress Springs is located near the headwaters of Big Cypress Creek in the Northwestern portion of the Cypress Basin. The reservoir is located in Franklin County, south of the City of Mount Vernon. Lake Cypress Springs is regulated by the Franklin County Water District and is a popular recreational reservoir with many new homes constructed on the lakefront in recent years. The watershed is primarily rural with some agricultural activity including dairy operations, poultry farms, cow/calf operations, and hay meadows.

Lake Cypress Springs is listed as impaired for pH. There are concerns for near nonattainment of criteria for dissolved oxygen in the upper 2600 acres of the water body and a concern for chlorophyll *a* was added in the *2012 IR*. The TCEQ Tyler Regional Office is currently sampling at three locations in the reservoir. These are routine stations with historical records for trend analysis and are being sampled each quarter.

Sub-segment 0405A: Big Cypress Creek (unclassified water body)

Big Cypress Creek originates in Hopkins County near the Franklin County line and flows southeast into Lake Cypress Springs. There is a concern for near nonattainment of bacteria. In response to this concern, samples are currently being collected quarterly for bacteria, field parameters, and flow (when wadeable) on Big Cypress Creek at SH 37, north of Winnsboro.

Sub-segment 0405B: Panther Creek (unclassified water body)

Panther Creek rises near Purley in Franklin County. The stream, which is intermittent in its upper reaches, originally ran southeast for 6.5 miles to its confluence with Big Cypress Creek before Lake Cypress Springs was impounded in 1970. There is a concern for impaired habitat listed for this sub-segment. No changes are proposed for the current assessment period.

Sub-segment 0405C: Blair Creek (unclassified water body)

Blair Creek rises eight miles southwest of Mount Vernon and flows south for three miles to Lake Cypress Springs. There are no concerns or impairments listed in the *2012 Texas Integrated Report* for this sub-segment and no changes are proposed for the current assessment period.

Segment 0406: Black Bayou

The Black Bayou Watershed is located in the piney-woods region of East Texas in Cass, Marion and Harrison counties. The watershed is predominately forested hills. The area typically consists of wide, flat, heavily wooded bottom lands along the major streams, with sandy clay upland hills that are dissected by small intermittent streams. The soils of the Black Bayou watershed floodplain are fine, sandy loam soils that are considered moderately to slowly permeable.

Black Bayou is on the *2012 Texas §303(d) List* for bacteria, and depressed dissolved oxygen. An impairment for pH was removed in 2012. Quarterly sampling is being conducted by the TCEQ Tyler Regional Office, and biological monitoring is being conducted by the NETMWD.

Biological monitoring in the Cypress Creek Basin has been prioritized to support a special study since Fiscal Year 2010. During the Cypress Creek Basin Coordinated Monitoring Meeting held on April 26, 2012, biological monitoring was

reviewed again for the basin. One proposed strategy being considered to address impairments in the biological communities of this basin is conducting Aquatic Life Monitoring (ALM). ALM includes a data collection effort focusing on the fish and aquatic insect communities, water quality, flow, and habitat assessment at one location. These data would be used to determine if the water body is currently meeting the criteria for its designated use.

Two biological monitoring sites were added to the Coordinated Monitoring Schedule: Black Bayou at SH 43 just south of Atlanta (Station #10318), and at Cass County Road 4659 (Station #10314), north of McLeod. Monitoring is scheduled twice during Fiscal Year 2013 for fish, aquatic insects, flow, water quality, and habitat. Sampling was conducted at SH 43 in September and October 2012. Preliminary findings of the September sample indicate a healthy thriving ecosystem; however, there were changes in flow from rainfall for sampling in October. Water levels were noticeably higher and the NETMWD project staff observed fewer fish and less diversity.

Figure 8: *NETMWD staff, TPWD Biologist, and WMS Biologist sample fish on Black Bayou.*

Black Bayou at Cass County Road 4659 was evaluated for biological monitoring; however, the stream was intermittent with pools and after seeking guidance from TCEQ, the project team determined that the stream characteristics did not accurately represent ambient conditions, sampling will be rescheduled.

Segment 0407: James' Bayou

Continuous and well developed riparian woodlands cover a large portion of James' Bayou. The watershed consists predominately of forested hills with wide, flat, heavily wooded bottom lands along the major streams. James' Bayou has three permitted dischargers including one municipal wastewater treatment plant, a timber company, and a Texas Department of Transportation rest stop.

During discussion at the 2012 Coordinated Monitoring Meeting, questions regarding the flow status of James Bayou at CR 1775 (Station #10321) occurred. Field personnel observed that the station was often intermittent with perennial pools. The meeting participants agreed not to add 24-hour dissolved oxygen monitoring at that site and inform the TCEQ

Water Quality Standards Group of the observed flow status. If the stream is designated as intermittent with perennial pools, it will not be subject to the same criteria as perennial streams.

James' Bayou is listed as impaired for bacteria in the upper segment, low pH in the lower segment, and low dissolved oxygen throughout the segment. A concern for an impaired fish community was added for James' Bayou in 2012. The upper 25 miles were delisted for low pH indicating the stream is meeting its designated use. Samples for 24-hour dissolved oxygen, bacteria, field parameters, and flow are being collected by NETMWD personnel.

Sub-segment 0407A: Beach Creek (unclassified water body)

Beach Creek originates three miles northwest of Linden in central Cass County and flows southeast for seven miles to its mouth on Iron Ore Lake, near Linden. The stream is intermittent in its upper and middle reaches. Concerns for bacteria and low dissolved oxygen were included in the *2012 IR* for this sub-segment.

Sub-segment 0407B: Frazier Creek (unclassified water body)

Frazier Creek, an unclassified tributary to James' Bayou, serves as an Ecoregion reference stream in this watershed since it has a relatively low level of human disturbance. Frazier Creek water is soft, with low levels of dissolved solids, alkalinity and hardness. It tends to exhibit lower nutrient, chlorophyll-a, and bacterial loads than either James' or Black Bayous. In addition, dissolved oxygen concentrations in Frazier Creek are consistently adequate to support a high aquatic life use. The *2012 Texas Integrated Report* shows a concern for low dissolved oxygen in the upper segment of the creek, however, no sampling is scheduled in this sub-segment for Fiscal Year 2013.

Segment 0408: Lake Bob Sandlin

Lake Bob Sandlin is located below the Franklin County and Lake Monticello Dams. The reservoir is located southwest of Mount Pleasant in portions of Franklin and Titus Counties. Lake Bob Sandlin is a popular recreational and fishing lake. The reservoir is regulated by the Titus County Freshwater Supply District #1. In recent years, there has been a large amount of development with many new homes constructed along the lakefront.

Lake Bob Sandlin was assessed in the 2012 IR in the *2012 Texas Integrated Report*, but no impairments or concerns were identified. No changes were proposed for this water body in the current assessment period. Quarterly routine monitoring at three sites is on the schedule for Fiscal Year 2013. These are being collected by the TCEQ Tyler Regional Office.

Sub-segment 0408A: Lake Monticello (unclassified water body)

Lake Monticello is approximately eight miles southwest of Mount Pleasant in Titus County. This water body was not assessed and was not included in the *2012 Texas Integrated Report*. No changes are proposed for this water body in the current assessment period.

Sub-segment 0408B: Andy's Creek (unclassified water body)

Andy's Creek, also known as Anders Creek, rises five miles southeast of Mount Vernon in Franklin County and runs southeast for six miles

to its mouth on Lake Bob Sandlin. There are no concerns or impairments listed in the *2012 Texas Integrated Report* for this sub-segment and there are no proposed changes in the current assessment period.

Sub-segment 0408C: Brushy Creek (unclassified water body)

Brushy Creek originates north of Winnsboro in Franklin County and is joined by the South Fork of Brushy Creek, which rises six miles southeast of Winnsboro in Wood County. The South Fork runs northeast for six miles, briefly forming part of the Wood-Franklin county line. This segment listed as a concern in the *2012 Texas Integrated Report* for impaired habitat and aquatic insect community.

Sub-segment 0408D: Blundell Creek (unclassified water body)

Blundell Creek originates three miles south of Mount Vernon in Franklin County. The stream is intermittent in its upper and middle reaches. There are no concerns or impairments listed in the *2012 Texas Integrated Report* for this sub-segment and no changes are proposed for the current assessment period.

Segment 0409: Little Cypress Bayou (Creek)

Little Cypress Creek Watershed is located south of the Lake O' the Pines and forms much of the southern boundary of the Cypress Creek Basin. Little Cypress Creek joins Big Cypress Creek east of the City of Jefferson. The majority of land use within the watershed consists of forest land, wetland and a small amount of agricultural land. Little Cypress Creek tends to exhibit long periods of low flow interrupted by runoff events that result in flooding of its broad, heavily wooded floodplain.

This segment is included in the *2012 Texas 303(d) List* for low dissolved oxygen levels and elevated bacteria counts. Bacteria were first added for this segment in 2006. This reach was delisted for concerns to the benthic macroinvertebrate community in 2012.

Sampling in the segment for Fiscal Year 2013 is primarily conducted by the TCEQ Tyler Regional Office. The NETMWD is scheduled to collect 24-hour dissolved oxygen samples at US 259 four times in Fiscal Year 2013.

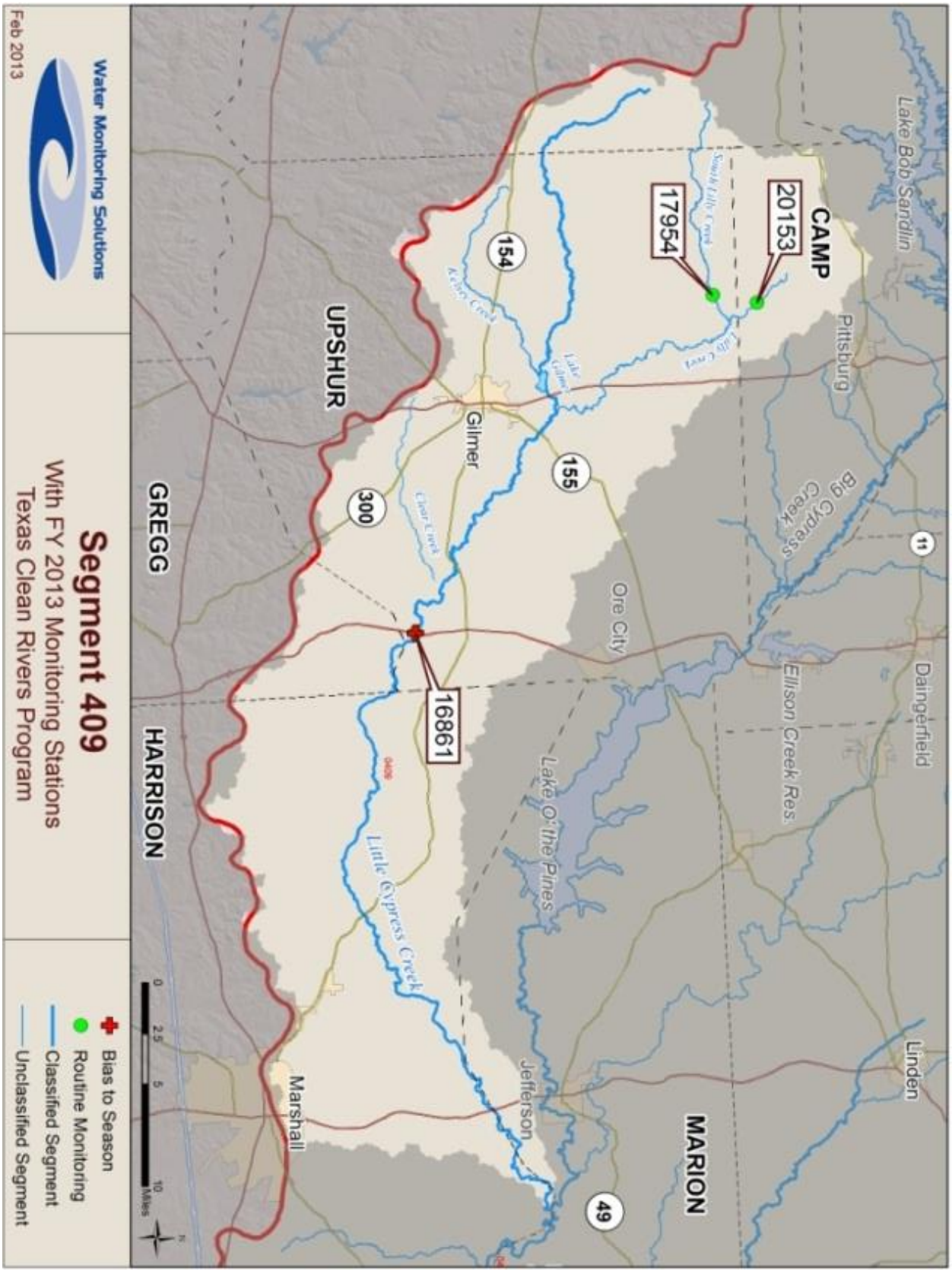
Sub-segment 0409A: Lilly Creek (unclassified water body)

Lilly Creek originates two miles west of Pine in Camp County and flows southeast for nine miles to its confluence with Little Cypress Creek. This segment was not assessed in 2012, but sampling is scheduled at FM 556 in Fiscal Year 2013 for quarterly conventionals, bacteria and field parameters. Flow will be measured when the station is wadeable.

Sub-segment 0409B: South Lilly Creek (unclassified water body)

South Lilly Creek is a major tributary of Lilly Creek and the sub-segment extends from its confluence with Lilly Creek to approximately two miles west of FM 1647 in Upshur County. South Lilly Creek is included in the *2012 303(d) List* for not meeting the bacteria criterion. The NETMWD is collecting quarterly samples on South Lilly Creek at FM 2454 for bacteria, field parameters, and flow (when wadeable).

Figure 9: *Segment 409: Little Cypress Creek*



Sub-segment 0409D: Lake Gilmer (unclassified water body)

Lake Gilmer is located in central Upshur County. This AU was assessed for dissolved oxygen, nutrients, and bacteria. There are no concerns or impairments listed for this sub-segment. The TCEQ Tyler Regional Office is conducting routine monitoring quarterly. No changes are proposed for Lake Gilmer in the current assessment period.

Sub-segment 0409E: Clear Creek (unclassified water body)

Clear Creek is a tributary to Little Cypress Creek and originates approximately two miles south of Gilmer and enters Little Cypress Creek approximately one mile below SH 154. This sub-segment was assessed in the *2012 Texas Integrated Report* and identified concerns for impaired habitat and aquatic insect community. The assessment was conducted on samples collected in 2006.

Figure 10: *Little Cypress Creek at US 259*

Fish Consumption Advisories

The Texas Department of State Health Services monitors fish in the state for the presence of contaminants and alerts the public through bans or advisories when consumption may pose a threat to human health. These warnings are based on the collection and analysis of fish samples for long lasting contaminants found in fish tissue, such as PCBs, pesticides, and/or heavy metals (e.g., mercury). Fish consumption advisories and bans are issued where tissue testing indicates a potential threat to public health.

Lake Daingerfield

The Texas Department of State Health Services issued a fish consumption advisory in 2002 for Lake Daingerfield due to mercury levels in fish tissue. The consumption advisory is for largemouth bass: adults should limit consumption to no more than two 8-ounce meals per month, and children should limit consumption to no more than two 4-ounce meals per month. There is no advisory for catfish consumption. The DSHS also continues to monitor mercury levels in fish from Lake Daingerfield.

Caddo Lake and Big Cypress Creek

In 1995, the Texas Department of State Health Services issued a fish consumption advisory for Caddo Lake and Big Cypress Creek in Marion County due to mercury in fish tissue. The consumption advisory is for largemouth bass and freshwater drum: adults should limit consumption to no more than two 8-ounce meals per month, and children should limit consumption to no more than two 4-ounce meals per month combined for both species. This is a Category 5c water body, so additional data are being collected prior to scheduling a TMDL.

Ellison Creek Reservoir

In December, 2005, a fish consumption advisory was issued for all fish species taken from Ellison Creek Reservoir due to high levels of PCBs. The DSHS recommends that no fish should be consumed from this reservoir. A DSHS risk characterization conducted in August 2007 based, were based on ten additional crappie samples obtained in November 2006. The samples yielded the resulting addendum, one-half to one meal per week consumption of crappie. The DSHS has decided to maintain the "no consumption" advisory for all species of fish in Ellison Creek Reservoir. Other states with similar results have interpreted data to support a fish consumption advisory of two meals per month for specific fish species.

All fish consumption advisories remain in effect until rescinded or modified in writing regardless of the effective date.

TEXAS Department of State Health Services

http://www.dshs.state.tx.us/

Aquatic Vegetation in Caddo Lake

Since the discovery of Giant Salvinia in 2006, a variety of measures have been implemented in order to control and eradicate this and other invasive plants. Control measures have included application of herbicides, physical barrier installation, introduction of weevils, individual plant removal, and public outreach/education.

TPWD has made presentations to stakeholders on invasive aquatic vegetation and led training sessions to help volunteers recognize and dispose of Giant Salvinia. Floating signs have been placed around the lake in order to educate anglers and boaters on identifying the plant and inspecting motor intakes before leaving launch areas.

Figure 11: *Aquatic vegetation on Caddo Lake*

Methods of biological control have included the introduction of weevils. Ideally, the weevils will reproduce in sufficient numbers to control the plant population. For weevils to be successful at reducing Giant Salvinia in Caddo Lake, they will have to survive winters and increase their populations dramatically. Severe flooding and uncommonly low temperatures have put their survival at risk. This process is estimated to take a minimum of five years before any significant reduction in Giant Salvinia can be measured. Survival surveys in the near future will provide needed updates to the weevil population.

The threat does not end with Caddo. Giant Salvinia has the capability of riding on boat trailers to other lakes throughout the basin and causing similar problems. Findings were documented in a section of Lake O' the Pines where it was contained by the TPWD, NETMWD, and the US Army Corps of Engineers. The TPWD and NETMWD continue to monitor the reservoir for new infestations.

Environmental Flows Study

Environmental flow is the amount of flow in a river required to maintain the ecological system in the lake, river and flood plain. Senate Bill 3, which passed during the 2007 legislative session, assures adequate flows for ecological purposes.

The environmental flows study is being used to determine which flow regime and the amount of water that is required for the downstream environment to persist over time, while continuing to provide quality habitat. The ultimate goal of the project is to determine how much water is needed to maintain the ecological health of Caddo Lake and its tributaries as habitat for animals and plants, while supplying adequate water for human needs such as drinking water, flood control, and recreation.

A study was completed by the USGS to prioritize important biological indicators that will be used to evaluate the effectiveness of prescribed environmental flows for Big Cypress Bayou, Black Cypress Bayou, and Little Cypress Creek. The USGS and NETMWD collected biological data and associated physical habitat data to observe baseline conditions for understanding changes in the aquatic biological community as a result of the selected environmental flows. Recent drought conditions have caused a delay in efforts to accurately assess the effects of flows prescribed. Please visit http://www.caddolakeinstitute.us/docs/flows/10.15.12_meeting/Cypress%20USGS%20Summary%20of%20Fiindings.pdf for more details and preliminary findings.

EPA Approval of Texas Surface Water Quality Standards Revisions

The assessment process allows for the opportunity to review water quality standards to determine if a water body's designated use may or may not be the most appropriate. These observations may be based on attributes of a water body and its naturally occurring conditions. On June 30, 2010, the TCEQ adopted revised surface water quality standards, subject to EPA review and approval. On June 29, 2011 the EPA Director of the Water Quality Protection Division issued a letter to the Deputy Director of the TCEQ Office of Water indicating that the EPA's review was not entirely complete; however, several provisions were reviewed and the EPA decisions are shown in Appendix A. The changes, along with the complete description of each revision were added to the Texas Register on July 16, 2010 and then entered into the Texas Administrative Code.

The changes to the Surface Water Quality Standards shown in Appendix A are only those that are related to the Cypress Creek Basin. Some changes will also help to reclassify segments and assessment designations in the Basin. For a full list of approvals, disapprovals, and cases where no action was taken, and also information regarding revisions in areas potentially impacting sensitive and endangered species, please contact the TCEQ to inquire.

Get Involved with the Texas Clean Rivers Program!

The main focus of the Cypress Creek Basin public outreach effort is the encouragement of public involvement concerning the Clean Rivers Program (CRP) and other basin activities. Your involvement is important to the development and support of the program. Gathering recommendations and concerns from the public is an important aspect of the CRP program. You can get involved through steering committee meetings and volunteer activities.

If you are already a member of the CRP Steering Committee, it is important that you attend the annual CRP Steering Committee meeting and participate in the open exchange of information about the basin.

If you are interested in participating on the CRP Steering Committee, Caddo Lake Watershed Protection Plan, or are interested in receiving information about surface water quality issues within the Cypress Creek Basin, please contact Northeast Texas Municipal Water District at 903-639-7538 or visit the web site: www.netmwd.com.

Our goal is to provide readily accessible information about local environmental issues to the public, which we hope will encourage citizens of our basin to get involved. Questions or comments concerning any information found on the website are always welcome and should be directed to Northeast Texas Municipal Water District at 903-639-7538.

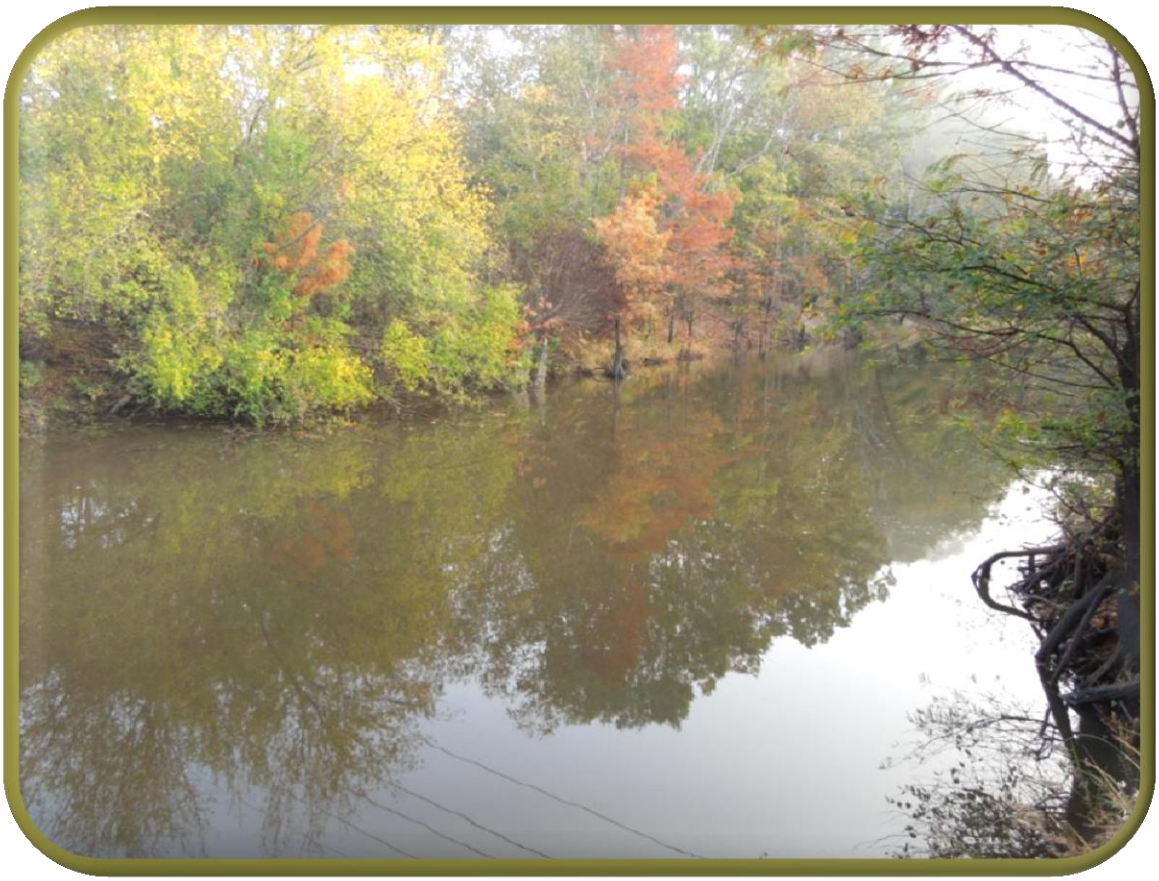


Figure 12: *Black Cypress Bayou at US 59*

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TDSHS. Fish and Shellfish Consumption Advisory, ADV-12. (November 2, 1995).

TDSHS. Fish and Shellfish Consumption Advisory, ADV-22. (March 13, 2002).

TDSHS. Fish and Shellfish Consumption Advisory, ADV-29. (December 28, 2005)

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Appendix A:

Texas Surface Water Quality Standards Revisions

EPA Approval of Texas Surface Water Quality Standards Revisions

Part I – Revisions that EPA is Approving

- §307.1 General Policy Statement
- §307.2 Description of Standards
- §307.3 Definitions and Abbreviations
- §307.4 General Criteria
    - Sub-sections §307.4(j)(1) and (2) – Aquatic recreation were expanded to include secondary contact recreation 1 and 2 uses. "A primary contact recreation is assumed for all water bodies. For intermittent streams (with or without perennial pools), non-tidal wetlands, and unclassified perennial freshwater streams and rivers, a presumed secondary contact recreation1 use may be applied if several characteristics exist, including minimum conditions established in §307.4(j)(2)(B)(i)-(ii)."
- §307.5 Antidegredation
- §307.6 Toxic Materials
    - Sub-section §307.6(d) – Specific numerical human health criteria. Table 2 – Criteria in Water for Specific Toxic Materials
    - Sub-section §307.6(e) – Total Toxicity
- §307.7 Site Specific Uses and Criteria
    - Sub-section §307.6(b)(1) – Recreation "The narrative provision was modified to include four categories of recreational uses and is approved. Under item (b)(1)(A) Freshwater, the following revisions are approved:
        - The contact recreation use was renamed as primary contact recreation use and the single sample criterion was revised to 399 colonies/100 ml (E. coli);
        - a secondary contact recreation 1 use and a geometric mean criterion of 630 colonies/100 ml (geometric mean) and secondary contact recreation 2 use and geometric mean criterion of 1030 colonies/100 ml (geometric mean).
        - In addition, the geometric mean criterion for the noncontact recreation use was revised to 2,060 colonies/100 ml and is approved. For highly saline inland water bodies, enterococci criteria are established at the same risk levels as used for E. coli criteria and are approved.

      Under item (b)(1)(B) Saltwater, the following revisions are approved: the contact recreation use was renamed as the primary contact recreation use and the single sample criterion was revised to 104 colonies/100 ml (enterococci); a secondary contact recreation 1 use and a geo metric mean criterion of 175 colonies/100 ml (enterococci) was added; and, the

geometric mean criterion for noncontact recreation was revised to 350 colonies/100 ml. Language requiring consistency with the Beaches Environmental Assessment and Coastal Health Act of 2000 (Beach Act) was added.

Language regarding the transition from sampling of fecal coliform as an indicator criteria was modified in item (b)(1)(C) to only allow this approach for assessment of recreation uses in high saline inland waters where enterococci is now the applicable indicator and is approved. A limit of two years (from the time of adoption of the 2010 WQS) for use of fecal coliform data was added to this provision. A fecal coliform criterion (geometric mean) was added for the secondary contact recreation 1 and 2 uses. The single sample criterion for fecal coliform under the noncontact recreation use was removed. Language allowing the use of fecal coliform data to assess recreation uses in segments with an oyster waters use was removed."

  - Sub-section §307.6(b)(2) – Domestic Water Supply
- §307.9 – Determination of Standards Attainment
  - Sub-section §307.9(e)(3) – Bacteria "The requirement for use of the single sample criterion for standards attainment determinations was removed and is approved."
- Appendix A – Site-specific Uses and Criteria for Classified Segments
- Appendix B – Sole-source Surface Drinking Water Supplies
- Appendix C – Segment Boundary Descriptions
- Appendix D – Site-Specific Uses and Criteria for Unclassified Water Bodies
- Appendix G – Site-specific Recreational Uses and Criteria for Unclassified Water Bodies

Part II – Revisions that EPA is Approving, Subject to ESA Consultation

- Appendix A – Site-specific Uses and Criteria for Classified Segments
- Appendix D – Site-Specific Uses and Criteria for Unclassified Water Bodies

Part III – Revisions that EPA is Disapproving

- §307.6 Toxic Materials
  - Sub-section §307.6(d) Specific numerical human health criteria.

Table 2 – Criteria in Water for Specific Toxic Materials

"EPA is disapproving the revised human health criterion of 0.7 mg/kg or 700 µg/kg (measured in fish tissue) for mercury. In 2001, EPA published an updated CWA recommendation for methyl-mercury to protect human health. TCEQ adopted a less stringent mercury criterion of 0.7 mg/kg (in fish tissue), as this is the same value used by the Texas Department of State Health Services (DSHS) to issue fish consumption advisories. …EPA does not find Texas' adopted criterion

of 0.7 mg/kg to be scientifically defensible. Although TCEQ may choose to adopt a criterion different from EPA's national recommendation, TCEQ must demonstrate that the State's criterion is scientifically defensible and protective of human health."

- §307.9 Determination of Standards Attainment
  - Sub-Section §307.9(s)(3) Bacteria "[…]. Samples must not include extreme hydrologic conditions such as very high flows and flooding immediately after heavy rains. The high-flow exemption applies for a 24-hour period following the last measured or estimated determination that extreme hydrologic conditions exist. A high-flow exemption applies during either of the following hydrologic conditions:
    - (A) freshwater stream flow that exceeds the 90th percentile flow using historical records for the nearest United States Geological Survey (USGS) or International Boundary and Water Commission (IBWC) gage, as found on the USGS or IBWC websites for many Texas gages, or by calculating the percentile flow for small freshwater streams without gages using statistical corrections to account for relative watershed size; or,
    - (B) an estimated flow severity index of flood or an equivalent category. This applies to tidal and freshwater streams.

The portion of the revised provision at §307.9(e)(3), shown immediately above, is not consistent with the implementing regulation at 40 CFR §131.5(a)(2) and §131.11(a). Because the revised provision would mean that water quality criteria would not apply, or be in effect during the high flow period, the criteria would not protect the designated and presumed recreational uses.4

Under the high flow exemption described in Texas' revised regulation, there is no assurance that primary contact recreation activities such as swimming or whitewater kayaking, canoeing and rafting would not occur under these high flow conditions. Furthermore, in smaller streams, recreational activities may be more likely during high flow events and therefore bacteria water quality criteria should apply.

EPA is disapproving the above language in §307.9(e)(3) because the revised provision fails to comply with the federal regulation at 40 CFR §131.5(a)(2) and §131.11(a)."

Part IV – Revisions that are Not Water Quality Standards Under the CWA

- §307.6 Toxic Materials
  - §307.6(e) Total Toxicity
- Appendix B – Low-Flow Criteria