FY 2017 Cypress Creek Basin Highlights Report

Texas Clean Rivers Program

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Executive Summary

The Clean Rivers Program (CRP) was created by the Texas Legislature in 1991 under the Texas Clean Rivers Act. The Clean Rivers Program is a water quality monitoring, reporting, planning, and coordinating 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 CRP for the Cypress Creek Basin.

The Basin Highlights Report is required under the CRP to provide a concise overview of water quality conditions and issues throughout the Cypress Creek Basin for years between publications of the Basin Summary Report. As a participant in the CRP, the NETMWD submits the Cypress Creek Basin Highlights Report to the TCEQ. This report is used to assist the TCEQ and CRP partners 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 and field parameters, conduct special projects, and measure flow at sites throughout the Cypress Creek Basin. The Cypress Creek Basin CRP collaborates with the following entities:

- Caddo Lake Institute
- Pilgrim's Pride Corporation
- Texas Parks and Wildlife Department
- East Texas Baptist University
- U.S. Steel Tubular Products, Inc.
- AEP SWEPCO
- City of Longview
- US Army Corps of Engineers
- Titus Co. Fresh Water Supply District #1
- United States Geological Survey
- Franklin County Water District
- City of Marshall
- Luminant
- Texas Forest Services

The majority of this report focuses on the *2014 Texas Integrated Report of Surface Water Quality* and updates to listings and concerns in the Cypress Creek Basin.

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Acknowledgements

We would like to thank the following for their contribution to the FY 2017 Cypress Creek Basin Highlights Report:

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- Richard Lowerre Caddo Lake Institute
  Summary Report on the Fifth Workshop on Environmental Flows for the Caddo Lake Watershed and Cypress Creek Basin

- Tim Bister Texas Parks and Wildlife Department
  Invasive Species Control Activities in 2016

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, and Black Cypress Bayou.

The 6,000 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 serves as the boundary line that separates Camp County from Titus and Morris Counties, in addition to dividing Upshur from Morris County.

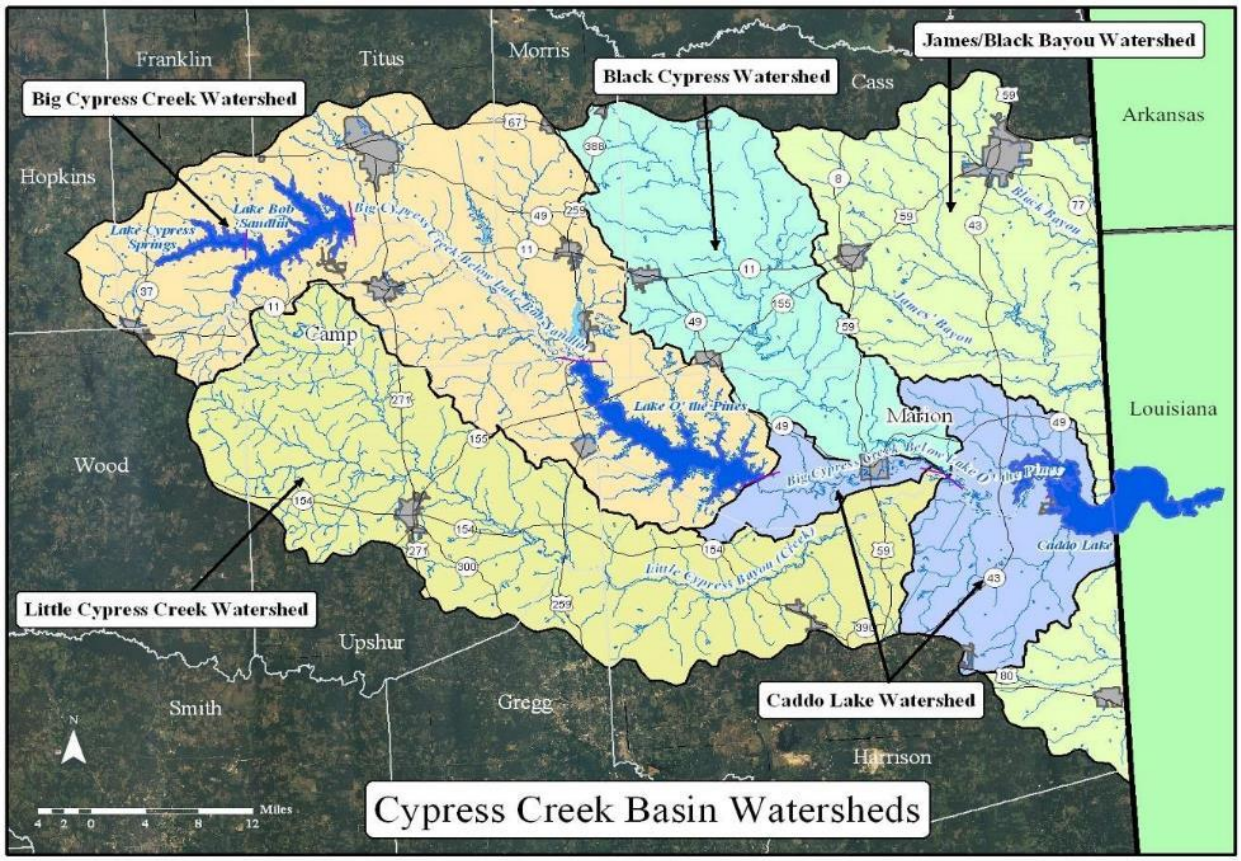

Figure 1: Map of the Cypress Creek Basin watersheds

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.

Record Rainfall in Cypress Creek Basin

The 38-year average rainfall recorded at Lake Bob Sandlin Ft. Sherman Dam was 52.1 inches. In 2015, 74.9 inches of rain was measured, making it the second wettest year recorded at this station. The record amount of rainfall led to the first discharges from Lake Bob Sandlin in nearly five years along with the greatest amount of releases on record at 280,283 acre-feet.

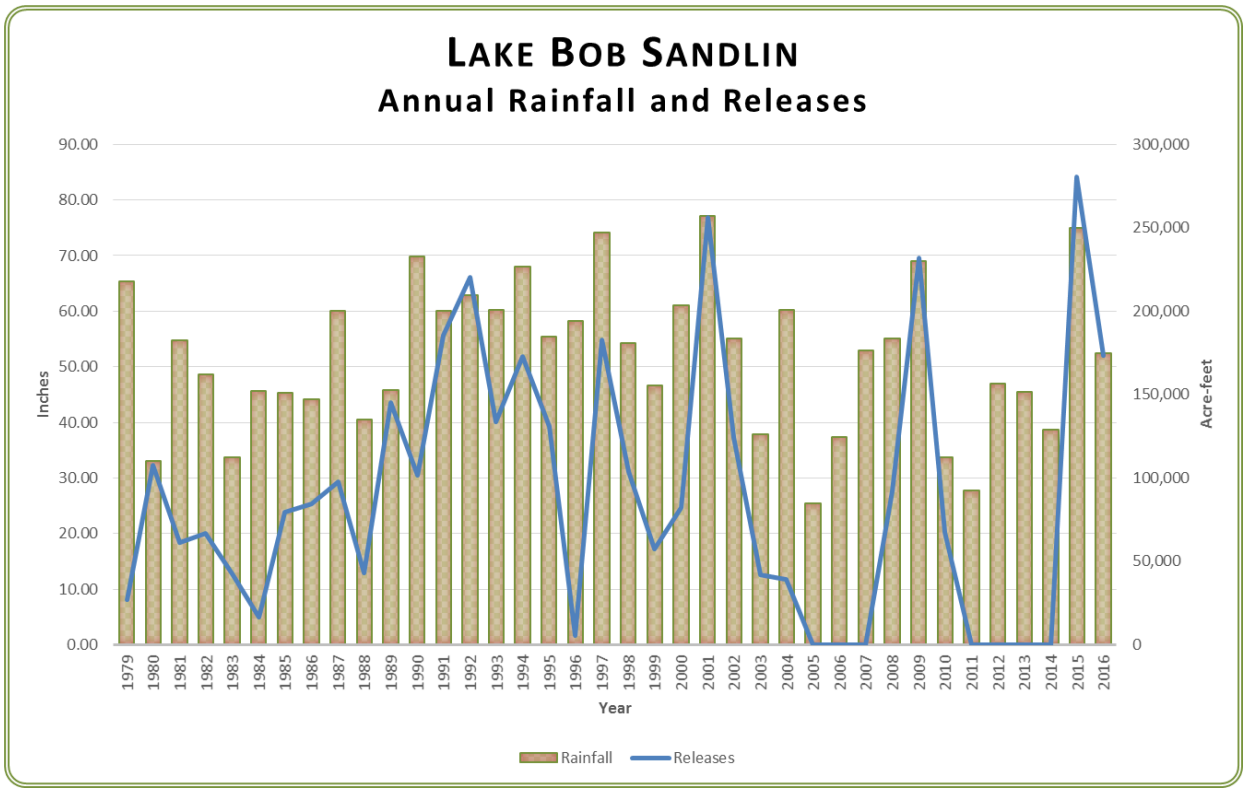

Figure 2: Annual Rainfall and Releases from Lake Bob Sandlin

Based upon the amount of rainfall received through April, 2016 was on pace to be another record year. Heavy rainfall in March and April caused extensive flooding throughout the Cypress Creek Basin. In fact, almost 10% (17,165 acre-feet) of all of the water released from Lake Bob Sandlin in 2016 occurred on April 30. Through April, 150,000 acre-feet of the total 173,652 acre-feet had been released. However, the area received little rainfall during the summer and fall months, and there were no releases after July 5, 2016.

Lake O' the Pines National Water Quality Initiative Phase I Update

Lucas Gregory, Texas Water Institute

In 2014, the USDA Natural Resources Conservation Service's Lake O' the Pines National Water Quality Initiative (NWQI) program began. The Texas A&M AgriLife Research, Texas Water Resources Institute subsequently began efforts to monitor and assess the effects of conservation practices implemented through this program on water quality. Water Monitoring Solutions, Inc. and Hoffman Environmental, Inc. are providing local runoff event monitoring support.

A total of 10 sites are in the study area (2 sub-basin, 4 farm scale, and 4 field scale). Water samples collected are processed to determine nutrient, sediment, and bacteria concentrations. Runoff and stream flow volume are also recorded to allow annual loadings to be calculated for each parameter. Management practice scenarios vary by site, but are intended to reduce offsite nutrient, bacteria, and sediment loads from the treated area compared to untreated areas (Figure 2). Runoff samples from the farm and field sites are collected following rain events large enough to produce a reasonable amount of runoff. Samples are collected for each

Site ID	NRCS Prescribed Management Scenarios	Watershed Area (acres)
1A	Forage Planting, Litter Application, Prescribed Grazing	1
1B	Cover Crop, Litter Application, Prescribed Grazing	4.56
2A	Silvopasture Establishment, Forest Stand Improvement, Prescribed Grazing	1.15
2B	Silvopasture Establishment, Forest Stand Improvement, Prescribed Grazing	9.34
3A	Forest Site Preparation, Tree/Shrub Establishment, Forest Stand Improvement	0.7
3B	Cover Crop, Prescribed Grazing	4.63
4A	Forest Site Preparation, Natural Revegetation (control site)	1.05
4B	Continuous Grazing (control site)	2.92
Boggy Creek	Pasture Planting, Litter Application, Prescribed Grazing, Cover Crop, Silvopasture Establishment, Waste Treatment, Pond, Incinerator, Herbaceous Weed Control, Forage Planting, Fencing, Forest Site Preparation, Tree/Shrub Establishment, Forest Stand Improvement	~50,000
Prairie Creek	Forest Site Preparation, Tree/Shrub Establishment, Forest Stand Improvement	~18,000

Figure 3: Monitoring Station Descriptions for the Lake O' the Pines NWQI

0.05 inches of runoff produced over the watershed area. Instream samples are collected at flow-paced intervals and are typically retrieved bi-weekly. Monitoring began in January 2016 and is ongoing. Farm and field scale sites produced between 4 and 14 samples, depending on site characteristics and storm severity. Boggy and Prairie Creeks both went dry during the summer and produced only 20 samples.

Data collected are preliminary at this point and do not completely demonstrate the effects of management practices prescribed and implemented as some management practices were being installed when monitoring began. Several sampling issues also occurred because of extreme rain events. Measured bacteria, nutrient, and sediment concentrations and loads varied greatly between sampling events. Site-specific occurrences (management, rain event magnitude, and timing since management change) appeared to cause much of the variation. Annual orthophosphorus and total phosphorus loadings (Figure 3) varied considerably between the sampling sites. Monitoring at all sites will continue into the future and analysis including future data will provide a more representative evaluation of results expected from prescribed management measures. Results will be used to compare management effects on runoff water quality within this study and will add to the body of knowledge regarding nutrient, bacteria, and sediment production in various agricultural related scenarios.

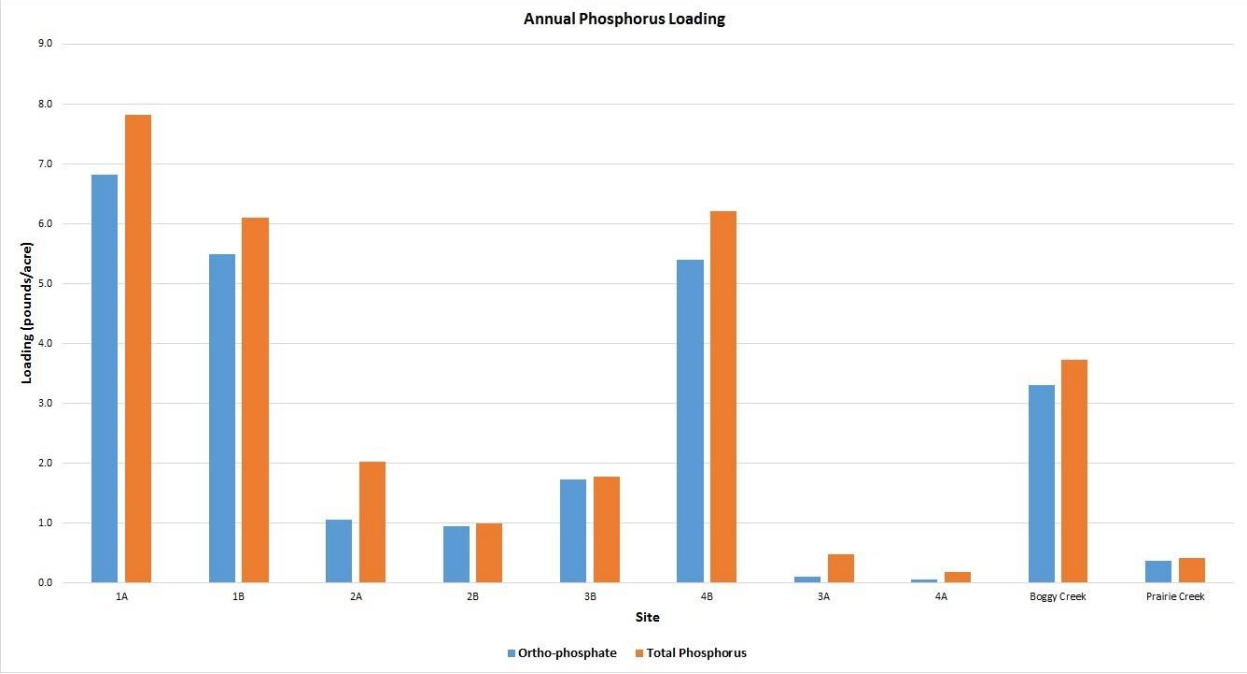

Figure 4: Annual Phosphorus Loading at each NWQI Station

LAKE O' THE PINES TMDL IMPLEMENTATION

Lake O' the Pines was listed on the *Texas §303(d) List* in 2000 for depressed dissolved oxygen (DO). The TCEQ adopted "*One Total Maximum Daily Load for Dissolved Oxygen in Lake O' the Pines, Segment 0403*" in 2006. It was determined that the low DO in Lake O' the Pines resulted from high nutrient levels and phosphorus was identified as the limiting factor in the reservoir. 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 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 that included descriptions of the control measures, responsible parties, and timeline along with 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.

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

Phosphorus reduction is being accomplished by using a Total Phosphorus Load Agreement (TPLA) between NETMWD and the entities who have WWTP outfalls in the Lake O' the Pines watershed. The Pilgrims Pride WWTP went through an extensive upgrade process in order to achieve this goal. Overall, the WWTPs in the basin discharged well below the annual Total Phosphorus allocations in 2015 by approximately 40%.

TPLA TOTAL PHOSPHORUS TRACKING

2015 Phosphorus Discharge (Pounds)

WWTP	Annual Allocation	Actual Discharge	Variance
Daingerfield	510	536	26
Lone Star	4,050	3,060	(990)
Mt. Pleasant	2,180	2,198	18
Omaha	260	164	(96)
Ore City	1,000	615	(385)
Pilgrims	53,200	29,490	(23,710)
Pittsburg/Dry Creek	570	140	(430)
Pittsburg/Sparks Branch	1,780	1,613	(167)
Total	**63,550**	**37,816**	**(25,734)**

FIGURE 5: 2015 TPLA WWTP Total Phosphorus Discharged (in pounds)

Summary Report on the Fifth Workshop on Environmental Flows for the Caddo Lake Watershed and Cypress Creek Basin

Richard Lowere, Caddo Lake Institute

Background: The Environmental Flows Project was initiated in 2004 by the Caddo Lake Institute, the Nature Conservancy (TNC), the U.S. Army Corps of Engineers (USACE), and the Northeast Texas Municipal Water District (NETMWD).

The Process: Based on the consensus of 40 scientists and the stakeholders who attended the 2004 orientation meeting, the Project was started using the methodology developed for the Sustainable Rivers Program of the Nature Conservancy and USACE together with the recommendations developed by the National Academy of Sciences for the State of Texas. The process has also been adjusted to be consistent with the environmental flows work under two Texas laws promoting such protection of environmental flows, Senate Bill 2 in 2001 and Senate Bill 3 in 2007.

Goals and Work to Date: The Project seeks to assure adequate environmental flows to sustain the ecological, recreational, and economic values of rivers, streams, and lakes in the Caddo Lake watershed and larger Cypress River Basin. All of the objectives of the Project have been met or are well underway.

1. Development of a Consensus Set of Flow Regimes: Scientists and stakeholders were asked to develop a set of recommendations for the environmental flow regimes for certain rivers and streams, with the objective of also applying them, where possible, to other streams in the basin. In three workshops held between 2005 to 2008, draft recommendations for flow regimes were developed for Big, Little and Black Cypress Bayou and for Caddo Lake. Revisions and a consensus set of flow regimes were adopted at the 2011 Workshop. **The participants at the 2016 Workshop reconfirmed those recommendations.**

Figure 6: Cypress trees in Caddo Lake

2. State Recognition of the Recommended Flow Regimes: The Project has pursued two options 1) the adoption of the Recommendations as the "environmental flow standards" for the Cypress River Basin by the Texas Commission on Environmental Quality or 2) the inclusion of the Recommendations as the environmental water goals in the regional water plan for Northeast Texas and the state water plan. **This second option was obtained with the adoption of the 2016 regional and 2017 state water plan.**

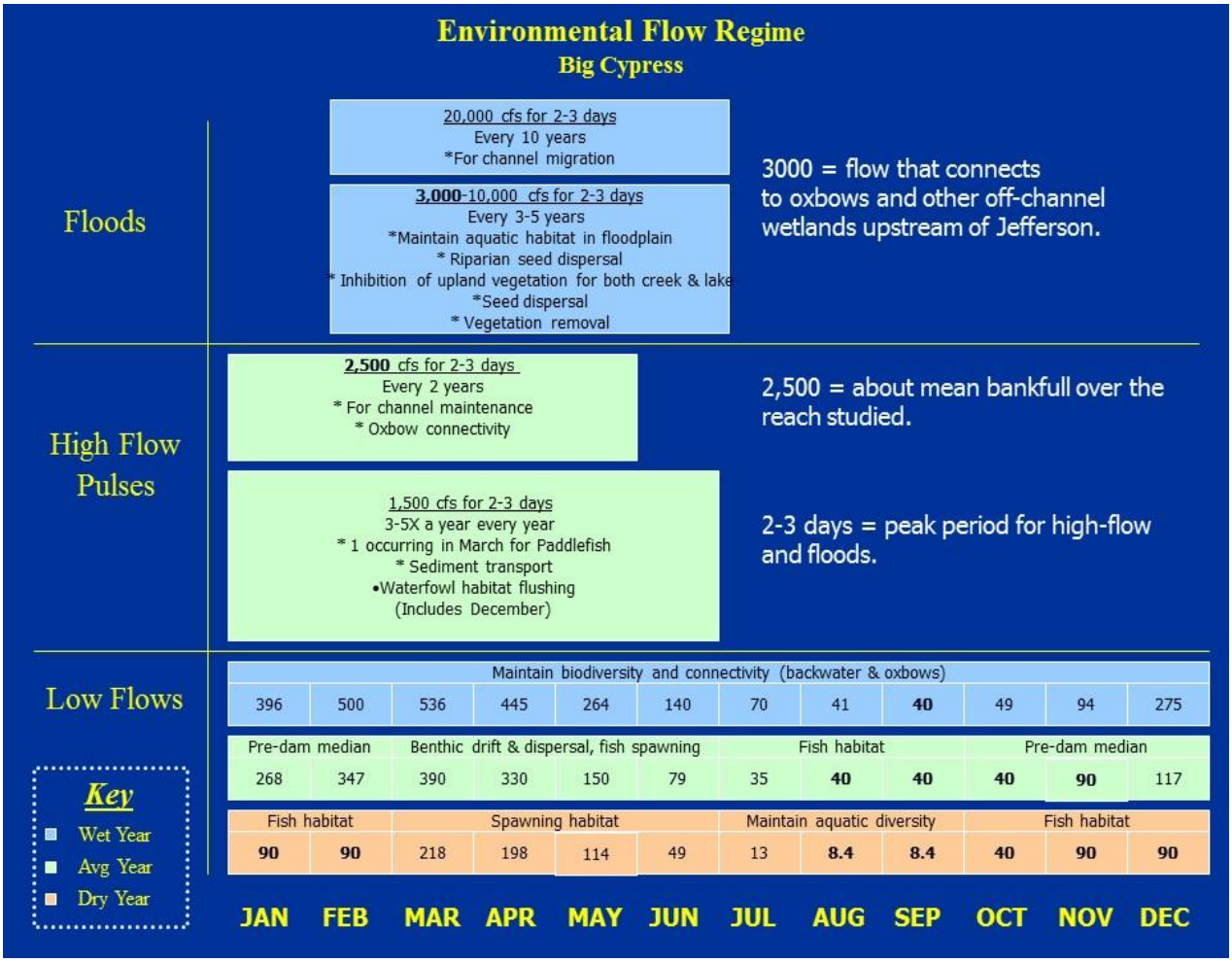

Figure 7: Environmental Flow Regime Recommendations for Big Cypress Creek

3. Changes in the Operations of Lake O' the Pines: To assure that the flow regimes for Big Cypress Bayou could be met, the Project worked with USACE and NETMWD on possible changes in the operations of Lake O' the Pines. In 2011 these agencies agreed to an experimental program of releases to allow CLI and others to monitor changes and help determine the value of the releases for the flow regimes. They also agreed to consider a possible increase in storage of water in Lake O' the Pines. From 2012 to 2016, CLI and others carried out monitoring and other research to verify the value of the releases. **At the 2016 Workshop, USACE and NETMWD agreed**

to a formal addendum to the official USACE Water Control Plan for the Lake to provide the releases needed to meet the recommended flow regimes downstream to Caddo Lake, when water is available. They also agreed to work toward an extension of the seasonal pool at the Lake that could provide as much as 20,000 acre feet of additional water for release downstream during certain periods.

4. Adaptive Management: To evaluate the long-term benefits of the flow regimes and make adjustments as needed based on such evaluations, the Project sought to establish and maintain a long-term monitoring program. At the 2011 Workshop, a draft monitoring plan for Big Cypress Bayou was developed and began to evaluate the releases from Lake O' the Pines. **At the 2016 Workshop, a more detailed work plan was developed to expand monitoring in the watershed for future consideration of Project participants, possibly at a workshop in 2021.**

Details on the history and reports of this Project are available at www.caddolakeinstitute.us

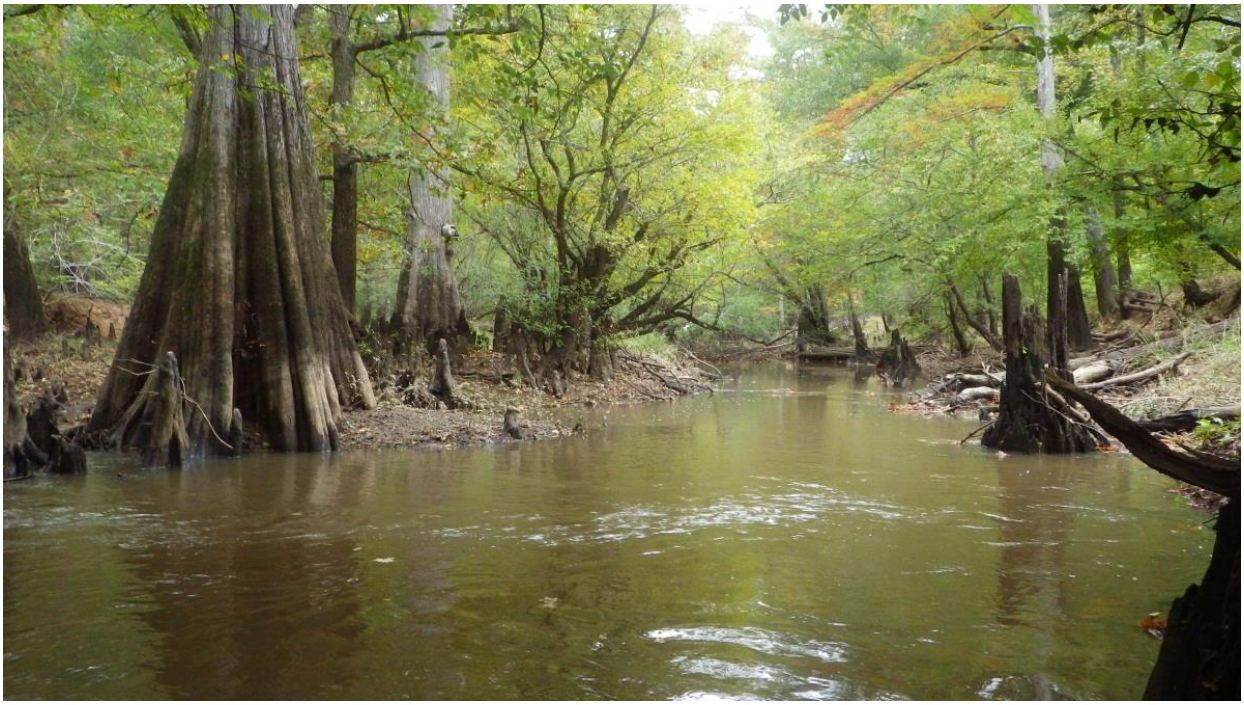

FIGURE 8: Big Cypress Bayou below Lake O' the Pines ***(Photo courtesy of Sarah Robertson, TPWD, River Studies Program)***

Invasive Species

The effects of invasive aquatic plant species on the water quality and aesthetics of Cypress Creek Basin were the primary topic of the *2016 Cypress Creek Basin Highlights Report.* Invasive species have been of great concern for stakeholders over the years, especially in Caddo Lake. Professionals, volunteers, and researchers have worked tirelessly to reduce populations and prevent the spread of invasive species throughout the basin.

Invasive Aquatic Plant Species of Concern

Four of the five statewide invasive species of greatest concern, as determined by the TCEQ, are found within the Cypress Creek basin. Non-native plants can cause drastic changes in existing ecosystems that may result in extensive ecological and economic damage. Once identified as a problem species, the offending organism is labeled as an invasive species. Across the State of Texas, invasive species are a large problem for resource management, including our water supplies.

The invasive species that are of the greatest concern in the basin are:

- Giant Salvinia
- Alligatorweed
- Water Hyacinth
- Hydrilla

Figure 9: *Salvinia molesta* (Giant Salvinia)
Source: TPWD

Figure 11: *Hydrilla verticillata* (Hydrilla)
Source: http://aquaplant.tamu.edu/

Figure 10*: Alternanthera philoxeroides* (Alligatorweed)
Source: http://aquaplant.tamu.edu/

Figure 12*: Eichhoria crassipes* (Water Hyacinth)
Source: http://aquaplant.tamu.edu/

Another invasive species of concern across Texas is zebra mussels (*Dreissena polymorpha*). **Zebra mussels** have not been found in any of the lakes in the Cypress Creek Basin; however, zebra mussel DNA has been detected in both Caddo Lake and Lake Bob Sandlin. Current literature suggests that the chemical makeup of the water in the basin will not sustain large populations of zebra mussels; however, it was once widely believed that zebra mussels were limited only to the cold waters of northern lakes and would never be a concern in the south. The best course of action is to prevent the introduction of zebra mussels into the watershed.

Figure 13: Colony of Zebra Mussels

Figure 14: TPWD Boat Inspection Campaign Advertisement

What Can You Do?

Water bodies in the Cypress Creek Basin are amongst the most beautiful in Texas, attracting boaters and recreational users to its reservoirs throughout the year. Unfortunately, boats are one of the most common ways invasive species are spread from one reservoir to another. Once an invasive plant enters a new ecosystems that is suitable for its growth, the plant spreads rapidly and out-competes local, native vegetation which can lead to disastrous consequences.

Under Texas law, owners are required to remove harmful plants and animals from boats, watercraft, and trailers before leaving the vicinity of a waterbody. TPWD provides useful resources on their website with topics ranging from how to properly clean your recreational equipment to a complete list of prohibited aquatic organisms available at: www.tpwd.texas.gov and www.texasinvasives.org

Invasive Species Control Activities in 2016

Tim Bister, Texas Parks and Wildlife Department

Lake Cypress Springs

Alligatorweed is present in Lake Cypress Springs. An estimated 8 acres was documented during TPWD's 2016 annual survey. Alligatorweed flea beetles have been released in the past to help control the plant. Hydrilla was not detected during the 2016 survey, but it has been present in the past. The presence of triploid (non-reproducing) grass carp has prevented hydrilla regrowth.

Lake Monticello

Nine acres of hydrilla was present in Lake Monticello during August 2016. Water hyacinth coverage has increased to 63 acres in the reservoir. Herbicide treatments were conducted by Luminant and TPWD to reduce the amount of plants. During winter 2015/2016, high water events flushed water hyacinth from upper areas or the lake, where it was generally contained. The spread of plants to the lower end of the reservoir resulted in the escape of water hyacinth through the dam gates from Lake Monticello to Lake Bob Sandlin. Luminant has deployed floating booms at different locations in Lake Monticello to help minimize further spread of water hyacinth from the upper end of the reservoir.

Lake Bob Sandlin

Even though water hyacinth entered Lake Bob Sandlin from Lake Monticello, Titus County Freshwater Supply District No. 1 officials physically removed every plant they discovered. Their efforts were successful in eliminating plants from the reservoir. TPWD was unable to detect any water hyacinth on Lake Bob Sandlin during their 2016 annual vegetation survey. Alligatorweed is present in Lake Bob Sandlin. Alligatorweed flea beetles were released during 2015 to help control the plant. Individual homeowners have submitted aquatic vegetation treatment proposals to treat alligatorweed (herbicide or physical removal) in localized areas. Hydrilla was detected in low levels during the 2016 survey.

Lake Welsh

Hydrilla and alligatorweed are present in the reservoir, but have not required any treatment.

Gilmer Reservoir

Hydrilla coverage was estimated at 282 acres during TPWD's 2016 survey. Conditions during the early part of 2015 (higher water levels and turbidity) suppressed hydrilla growth in the reservoir,

but plants were found growing in most of the traditional areas. The depth contours of Gilmer Reservoir usually restrict hydrilla growth to about 10 feet deep. This results in hydrilla coverage along the shoreline, but does not restrict boater access.

Lake O' the Pines

Water hyacinth coverage declined from 363 acres in 2015 to 178 acres in 2016. This reduction was largely due to a 400 acre herbicide treatment contracted by U.S. Army Corps of Engineers and Northeast Texas Municipal Water District. High water levels during 2016 suppressed hydrilla growth, but it is expected to return. Alligatorweed flea beetles have been released in the past to help control this species.

Caddo Lake

Giant salvinia, water hyacinth, hydrilla, and crested floating heart are the primary species of concern at Caddo Lake. Giant salvinia has been the priority for invasive species management. There were 4,943 acres of giant salvinia observed during the September 2016 Caddo Lake aquatic vegetation survey. This is an increase from the 2,840 acres observed in September 2015. Herbicide contractors sprayed over 4,200 acres of giant salvinia in 2016. Texas Parks and Wildlife Department (TPWD) released 263,400 adult giant salvinia weevils in Caddo. An additional 146,500 weevils were released by the Caddo Biocontrol Alliance. Water hyacinth and hydrilla did not require any treatment on Caddo Lake in 2016. First discovered in 2014, crested floating heart has been monitored and effectively treated with herbicide in 2016. Further monitoring of crested floating heart locations and herbicide treatment will be necessary in the future.

Figure 15: Herbicide Application in Caddo Lake

ELLISON CREEK RESERVOIR (LAKE LONE STAR)

Hydrilla coverage was reduced from 38 acres in 2015 to 4 acres in 2016. This is a result of a shoreline homeowner group that organized to hire a contractor to conduct herbicide treatment of hydrilla in the reservoir. Water hyacinth was discovered by TPWD during their routine aquatic invasive species survey. Plants were removed by hand and treated with herbicide in hopes of eradication. TPWD met with concerned lake homeowners to discuss the water hyacinth infestation. TPWD encouraged residents to form a "Shoreline Watch" approach to help monitor the reservoir for any further water hyacinth. Alligatorweed was estimated at 13 acres.

Figure 16: Company Contracted to Treat the Hydrilla Infestation

Figure 17: Boat ramp affected by Hydrilla

Sandy Duke, NETMWD Board of Director, was instrumental in organizing the homeowners group. A company was contracted to treat 37 acres on the Lone Star Side of the reservoir at a cost of $995 per acre. Hydrilla was mainly located under the surface of the lake this year except in shallow spots where it could be seen floating to top of the water. The treatment was a success and rid the area of Hydrilla.

Fish Consumption Advisories

The Texas Department of State Health Services (DSHS) 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 polychlorinated biphenyl concentrations (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. All fish consumption advisories remain in effect until rescinded or modified in writing regardless of the effective date.

Ellison Creek Reservoir

ADV-58 Issued September 29, 2016, Rescinding ADV-29 Issued December 28, 2005

In December, 2005, a fish consumption advisory was issued for all fish species taken from Ellison Creek Reservoir due to high levels of PCBs. In 2014, the DSHS performed another study to investigate any potential change in fish tissue contamination. The recent study examined fish tissue for the presence and concentrations of environmental toxicants that, if eaten, potentially could affect human health negatively. Results of the 2014 survey indicated that PCB and dioxin concentrations in channel catfish, common carp, flathead catfish, hybrid striped bass, largemouth bass, spotted gar, sunfish, and white bass continued to exceed DSHS guidelines for protection of human health. Although confidence in the conclusions for many species of fish is limited by the small sample size adding uncertainty to the conclusions, the data suggest that regular or long-term consumption of channel catfish, common carp, flathead catfish, hybrid striped bass, largemouth bass, spotted gar, sunfish, and white bass may result in adverse systemic health effects. Therefore, consumption of these species pose an apparent risk to human health.

DSHS recommends that people should not consume common carp and hybrid striped bass from Ellison Creek Reservoir. In addition, women under 50 and children under 12, or who weigh less than 75 pounds should not consume channel catfish, common carp, flathead catfish, hybrid striped bass, spotted gar, sunfish, and white bass and only consume up to one four-ounce meal per month of largemouth bass.

Women over 50 and males 12 and older may consume up to one eight-ounce meal per month of channel catfish, flathead catfish, spotted gar, or sunfish and up to two eight-ounce meals per month of largemouth bass or white bass.

The DSHS also advised TPWD to continue not stocking hybrid striped bass because hybrid striped bass bioaccumulate significant concentrations of PCBs that pose apparent hazards to public health. Note that the TPWD discontinued stocking hybrid striped bass following the issuance of the Ellison Creek Reservoir fish consumption advisory in 2005.

TEXAS DEPARTMENT OF STATE HEALTH SERVICES

FISH AND SHELLFISH CONSUMPTION ADVISORY

ADV-58

This advisory is issued as a result of sampling of Ellison Creek Reservoir. Fish samples collected from Ellison Creek Reservoir indicate the presence of dioxins and PCBs at concentrations exceeding health assessment guidelines established by the Texas Department of State Health Services. Consumption of fish from Ellison Creek Reservoir may pose a threat to human health.

COUNTIES: Morris

AREA: Ellison Creek Reservoir

CONSUMPTION ADVISORY:

Contaminants of Concern	Species	Women of childbearing age and children < 12[1]	Women past childbearing age and males 12 and older[2]
Dioxins and PCBs	Channel catfish	**DO NOT EAT**	1 meal/month
	Common carp	**DO NOT EAT**	**DO NOT EAT**
	Flathead catfish	**DO NOT EAT**	1 meal/month
	Hybrid striped bass	**DO NOT EAT**	**DO NOT EAT**
	Largemouth bass	1 meal/month	2 meals/month
	Spotted gar	**DO NOT EAT**	1 meal/month
	Sunfish Spp. (Bluegill, Green, Redbreast)	**DO NOT EAT**	1 meal/month
	White bass	**DO NOT EAT**	2 meals/month

[1] A meal is four ounces of fish.
[2] A meal is eight ounces of fish.

This advisory shall remain in effect until rescinded or modified in writing.

Issued this 29th day of September, 2016

John Hellerstedt, M.D.
Commissioner

Figure 18: ADV-58 Fish Consumption Advisory for Ellison Creek Reservoir

In addition to Ellison Creek Reservoir, samples have been collected for PCB analysis in streams and reservoirs throughout the basin. The TCEQ SWQMIS database showed that 9 fish tissue samples were collected between 1987 and 2006 in Big Cypress Creek & Lake O' the Pines. Only one fish tissue sample had a detectable amount of PCBs. That sample was collected in 1987 in Big Cypress Creek at US 259. None of the 46 fish samples collected in Lake Cypress Springs in 2004 had PCBs above detectable limits. There were also no detectable amounts of PCBs in tissues from the 46 fish samples collected in 2003 from Lake Gilmer.

However, PCBs have been detected in water and sediment samples.

- PCBs were above detection limits at stations located around Caddo Lake in water and sediment samples collected from 1977 – 1988.
- PCBs were detected in water and sediment samples from Big Cypress Creek at SH 43 from samples collected in 1974 – 1977.

- PCBs were identified in the sediment samples collected near the Lake O' the Pines dam in 1974-1975 and in sediment samples in the headwaters (US 259 area) in 1992 – 1995.
- No PCBs have been detected in the following segments and sub-segments:
  0404D (Welsh Reservoir) 0406 (Black Bayou) 0407B (Frazier Creek)
  0408A (Lake Monticello) 0410 (Black Cypress Bayou)

Lake Daingerfield

DSHS issued a fish consumption advisor 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 2 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 DSHS 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 to no more than two 4-ounce meals per month for combined both species. This is a Category 5c water body, so additional data are being collected prior to scheduling a TMDL.

Figure 19: Fish Consumption Advisory Sign

Of Note From Around the Basin

The American paddlefish has inhabited Caddo Lake and its watershed as well as other rivers and bayous of the Mississippi River Basin for over 300 million years, since before the time of dinosaurs. Paddlefish are now rarely found in any rivers in Texas. Where it does survive, it can grow to seven feet, weigh 200 pounds and live for 30 years. It is a filter feeder, capturing plankton on its gill strainers as it swims with its mouth open.

In 2011, the US Army Corps of Engineers and NETMWD agreed to revise some of its operations at Lake O' the Pines to provide variable flow regimes in Big Cypress Bayou. In exchange, CLI agreed to perform several sets of experiments to evaluate the benefits of the new release patterns. The Paddlefish work is one of those experiments.

Paddlefish were released in Big Cypress Bayou at Jefferson and in Caddo Lake on May 18, 2016 with 300 individuals being released at each location. Thirty-one of the fish released at Caddo Lake were implanted with radio transmitters so that researchers can track their movements. Additional monitoring towers have been installed to better track their movements in the lake and to determine whether they will utilize Caddo Lake or follow the currents upriver towards Lake O’ the Pines.

Figure 20: Joy Nicholopoulos, Deputy Director of the Southwest Region of the U S Fish and Wildlife Service releasing a Paddlefish

While on a site visit to the Sanders Oxbow to identify spawning bars, a shale outcropping with gravel at the opening to the oxbow was observed. The field trip was made while the gates at Lake O' the Pines were open to release 6 cubic feet per second (cfs) of water. Leakage at the gates was noticed and around 30 cfs was measured downstream of the dam.

Figure 21: Shale outcropping at Sanders Oxbow

An accident occurred on December 23, 2016 on the US 259 bridge at Lone Star involving a truck and trailer which broke through the concrete railing, stopping at the headwaters of Lake O' the Pines. USACE, TCEQ and TXDOT oversaw the accident cleanup. The cargo appeared to be mostly unused lids for 5 gallon pails. About 100 gallons of diesel fuel spilled from the truck's fuel tanks. Most of the fuel soaked into the mud beside the main stream channel. Due to the location of the wreck, the contaminated soil was not removed.

Figure 22: Truck accident on US259 at Lone Star

After a large storm event in December 2015, heavy stream flow caused a thick mat of Giant Salvinia to accumulate into the Carters Lake area of Caddo Lake. The salvinia amassed at a bottleneck of trees along Boat Road R and piled into mats in excess of 1 foot thick. The mats were virtually impenetrable even by mud boat.

Figure 23: Giant Salvinia in Carters Lake area of Caddo Lake

This picture of an Alligator Snapping Turtle that was foul hooked on a trotline at Caddo Lake in the spring of 2016 caused quite a sensation on the internet. The weight was estimated at close to 100 pounds. Catching an Alligator Snapping Turtle on Caddo Lake is not a rare event; although, they are not usually this large. The turtle was released unharmed after the photo was taken.

Figure 24: Alligator Snapping Turtle from Caddo Lake

An exceptionally large alligator was taken on private property adjoining Caddo Lake in May 2016 during Texas Spring Alligator Season. The alligator was approximately 13.2 feet in length and weighed 900 pounds. Catching an alligator this large from Caddo Lake is so rare that the local television station reported the story: http://www.kctv5.com/story/32118234/man-catches-huge-alligator-on-caddo-lake

Figure 25: Large Alligator from Caddo Lake

WATER QUALITY

Monitoring, data collection, and analysis are the basis for maintaining good water quality within the Cypress Creek Basin. These activities are coordinated by the NETMWD through the TCEQ CRP. Other entities participating in monitoring within the Cypress Creek Basin include Water Monitoring Solutions, Inc. (WMS), Caddo Lake Institute (CLI), Franklin County Water District (FCWS), Titus County Freshwater Supply District #1, 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

Field Parameters generally include those parameters collected using a multi-parameter sonde, such as dissolved oxygen, conductivity, pH, and temperature. Stream flow and water transparency are measured while field observations are recorded. Photographic records are maintained for future reference. These data provide information about the physical and chemical water quality characteristics at the site that are used to evaluate water quality.

Dissolved Oxygen (DO) indicates the amount of oxygen available to organisms in the water. Factors such as higher water temperature and the presence of organic materials can reduce the dissolved oxygen concentration. All aerobic aquatic organisms 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 (acidity of orange juice) or above 12 (basicity of ammonia) are lethal to all fish.

Conductivity is a measure of the capability of water to pass an electric current which serves as an indicator of the concentration of dissolved ions in the water. The Cypress Creek Basin watersheds tends to have a low conductance, so significant increases in conductivity may serve as an indicator that polluting discharges have entered the water.

Conventional parameters are chemical components in water that typically require laboratory analysis. These parameters generally include nutrients, chlorophyll, 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 organic matter. During this process, oxygen concentrations can decrease below the levels 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.

Bacteria - *Escherichia coli* (*E. coli*) are used as an indicator of recent fecal matter contamination and that pathogens dangerous to human beings may potentially be present in the water.

Stream Flow is a measurement of the volume of water flowing through a cross-section of the stream. Flow is reported in cubic-feet per second and is commonly measured in wadeable streams using an acoustic Doppler velocity meter. Flow may also be reported from a nearby USGS gage.

How data are used

The State of Texas classifies segments into designated "use" categories: Aquatic Life Use, Contact Recreation, Public Water Supply, Fish Consumption, and General Use. A water body may have multiple designated uses. Standards have been established which include criteria to ensure that surface water bodies meet their designated use(s). Water bodies designated for contact recreation have criteria to protect the public from waterborne pathogens. Surface water designated for public water supply have standards to ensure the water body is suitable as a source for public water supply. Similarly, standards assigned for fish consumption are designated to protect the public from consumption of toxins that may be stored in fish tissue. The State has developed physical, chemical, and bacteriological standards and screening levels to determine if a segment meets its designated uses. Below are lists of parameters used to evaluate water quality:

Standards Criteria	**Screening Levels**
Dissolved Oxygen	Ammonia-Nitrogen
Temperature	Nitrate – Nitrogen
Chloride	Total Phosphorus
pH	Chlorophyll *a*
Total Dissolved Solids	
E. coli	

Data collected are used to compile the *Texas Integrated Report of Surface Water Quality* (IR). The IR is an evaluation of the quality of surface water throughout Texas. Prepared in even-number years, the report identifies water bodies which do not meet water quality criteria and/or screening levels. The report is a tool used for decision making, planning, reporting, and coordinating monitoring efforts. The *2014 Texas Integrated Report of Surface Water Quality* has been approved by the EPA and can be accessed at:
http://www.tceq.texas.gov/waterquality/assessment/305_303.html.

New listings for the Cypress Creek basin include Segment 0404 for Sulfate; 0405A for depressed Dissolved Oxygen; and 0407 for impaired fish and benthic communities. Bacteria has been removed from the *2014 Texas §303 (d) List* for Segment 0406 Assessment Unit 01; however, bacteria remained on the list for Assessment Unit 02. A complete listing of impairments and concerns in the Cypress Creek Basin are shown in Figures 26 and 27.

2014 Texas §303(d) List				
Segment	**Parameter**	**Assessment Unit**	**Category**	**Listed**
0401	Depressed Dissolved Oxygen	02, 03, 05, 07	5C	2000
	Mercury in Edible Tissue	01, 02, 03, 05, 07	5C	1996
	pH	03	5C	1996
0401A	Depressed Dissolved Oxygen	01	5C	2000
0402	Depressed Dissolved Oxygen	02	5C	2010
	Mercury in Edible Tissue	01, 02, 03, 04	5C	1998
	pH	01	5C	2000
0404	Bacteria	02	5B	2002
	Sulfate	01, 02	5C	**2014**
0404A	PCB in Edible Tissue	01	5A	2006
	Toxicity in Sediment	01	5C	2006
0404B	Bacteria	01	5B	2000
0404C	Bacteria	01	5B	2006
0404N	Mercury in Edible Tissue	01	5C	2002
0405	pH	02, 03	5C	2012
0405A	**Depressed Dissolved Oxygen**	01	5C	**2014**
0406	Bacteria	02	5C	2006
	Depressed Dissolved Oxygen	01, 02	5C	2002
0407	Bacteria	02	5C	2006
	Depressed Dissolved Oxygen	01, 02	5C	2000
	Impaired Fish Community	01	5C	**2014**
	Impaired Macrobenthic Community	01	5C	**2014**
	pH	01	5C	2008
0409	Bacteria	02, 04	5C	2006
	Depressed Dissolved Oxygen	01, 02, 03	5C	2000
0409B	Bacteria	01	5C	2006
0402A/ 0410	Copper in water	01, 03	5C	2010
	Depressed Dissolved Oxygen	01, 02, 03, 05	5C	2000
	Mercury in Edible Tissue	03	5C	2000

Figure 26: Table of Impairments from the *2014 Texas Integrated Report* for the Cypress Creek Basin

2014 Texas Integrated Report - Table of Concerns

Segment	Assessment Unit(s)	Bacteria	Benthics	Depressed DO	Metals	Chl. *a*	NH_3	NO_3	Total P	Habitat
0401	02, 03, 05, 07			CS						
	01				CS*					
	07								CS	
0401A	01	CN								
0402	02			CS						
	03		CN							
0402A/ 0410	05	CN								
	01, 03				CN**					
	03, 04			CS						
0403	02, 03, 04					CS				
	04			CS				CS		
0404	01			CN		CS				
	02							CS	CS	
0404A	01				CS*[1]					
0404B	01						CS		CS	CS
0404C	01							CS		
0404E	01							CS		
0404J	01			CN						
0404N	01				CS*[2]					
0405	02, 03					CS				
0405A	01	CN		CS						
0405B	01									CS
0406	01			CS						
	02			CS		CS				
0407	01	CN								CS
	02		CN							
0407B	02			CS						
0408C	01									CS
0409	01			CN						
0409A	01	CN		CS						
0409E	01		CN							CS

FIGURE 27: Table of Concerns from the *2014 Texas Integrated Report* for the Cypress Creek Basin

CN - Concern for near-nonattainment of the TSWQS based on numeric criteria

CS - Concern for water quality based on screening levels

* iron in sediment

*[1] Cd, Fe, Pb, Mn, Ni, Zn in sediment

** copper in water

*[2] mercury in edible tissue

The following maps show the sites being monitored by the NETMWD and CLI during FY 2016, followed by a map of the TCEQ monitoring locations. These stations were selected to meet data needs through the CRP Coordinated Monitoring process.

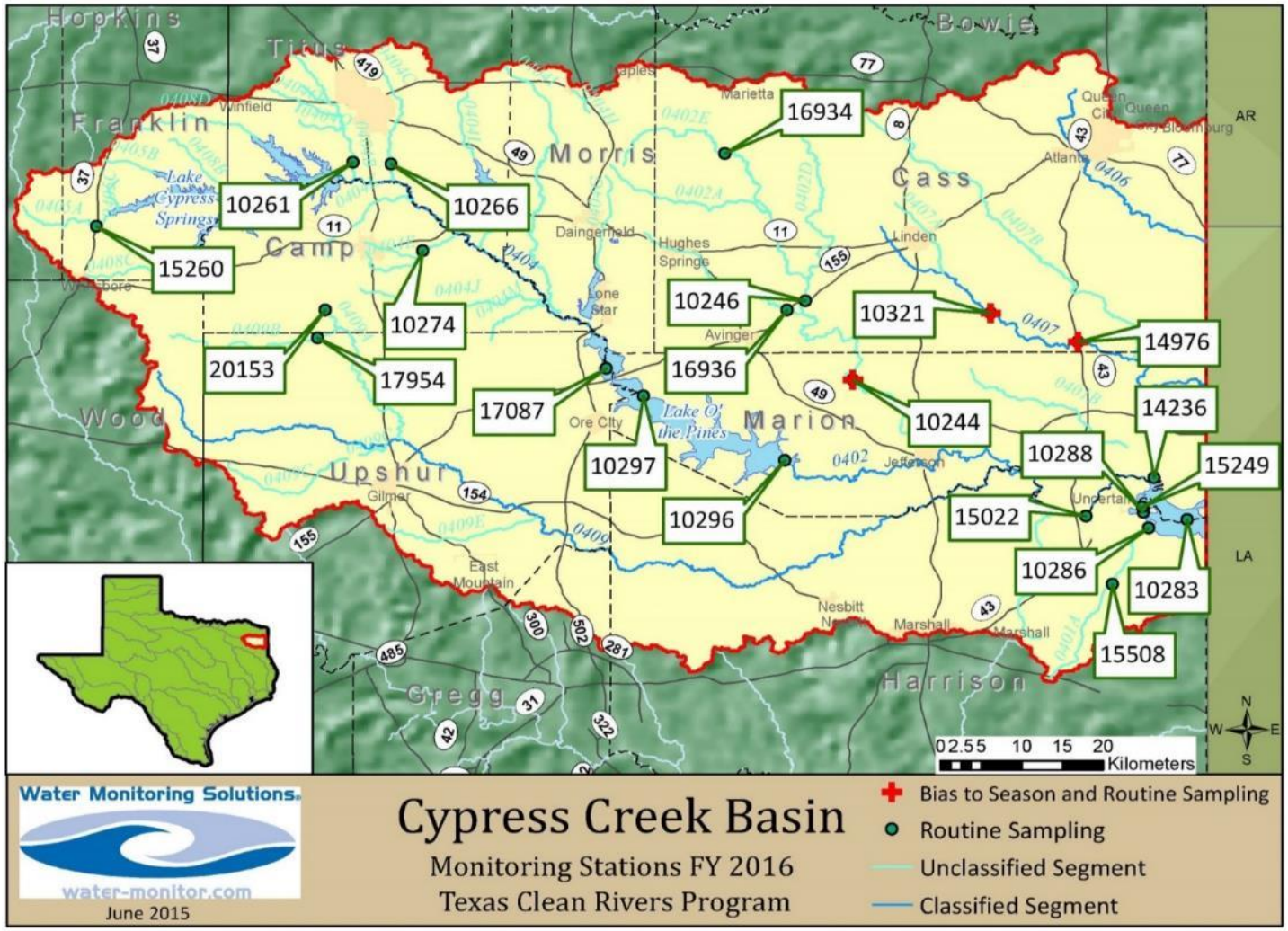

FIGURE 28: Map of the FY 2016 Cypress Creek Clean Rivers Program Monitoring Stations

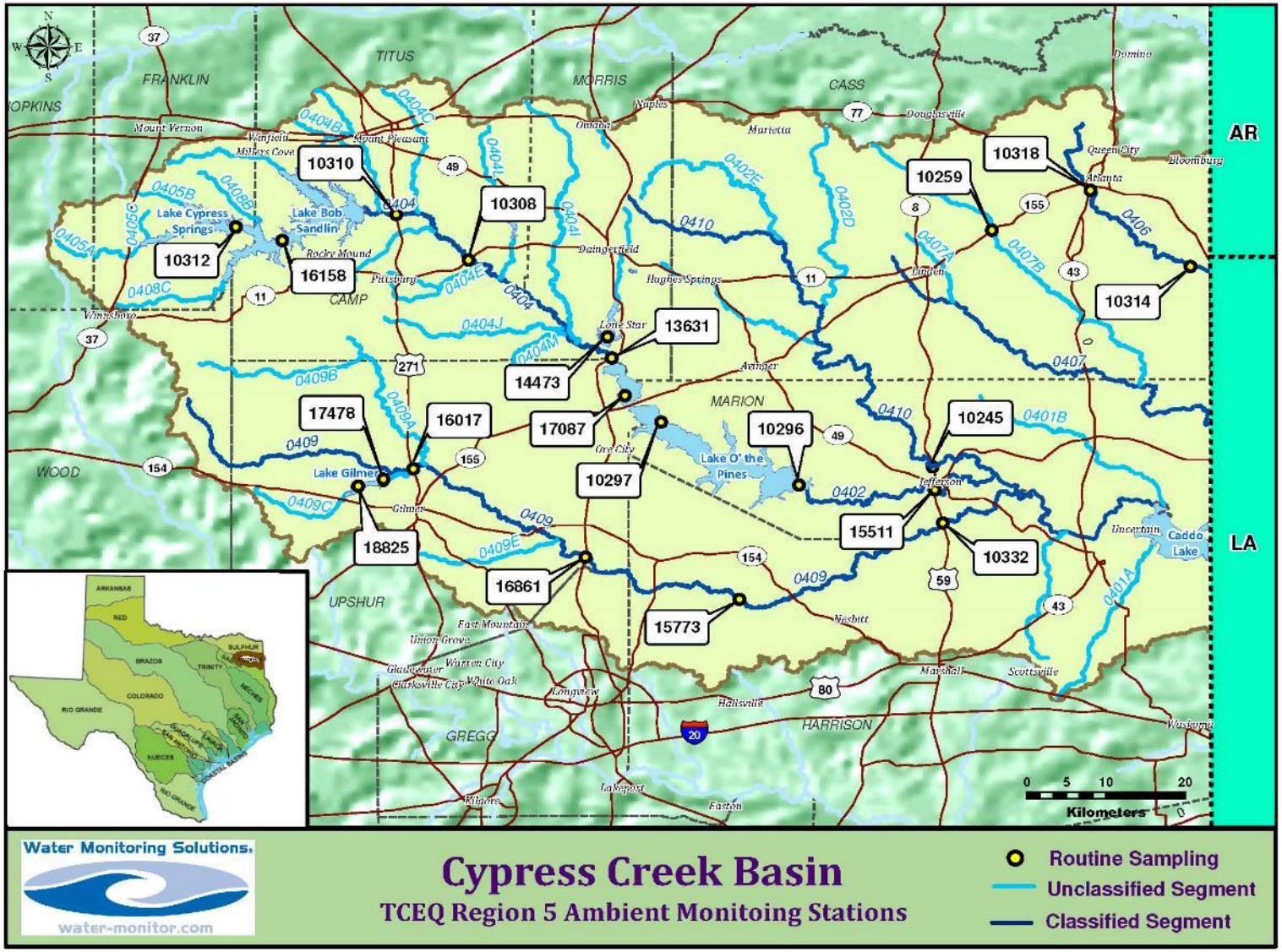

Figure 29: Map of the FY 2016 TCEQ Region 5 Monitoring Stations

Assessment Discussion

0401 – Caddo Lake

Caddo Lake is impounded by Caddo Dam in Caddo Parish, Louisiana and extends into Harrison and Marion Counties in Texas. Caddo Lake receives runoff primarily from Little Cypress Creek, Black Cypress Bayou, and Big Cypress Creek watersheds. The Caddo Lake watershed is 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 and these characteristics have helped to produce a diverse ecosystem.

Extensive flooding of the area around Caddo Lake occurred in March 2016. The peak level occurred on March 15 at 180.03 feet MSL (Mean Sea Level). This was the highest crest since 1966. Caddo Lake impounds about 27,000 surface acres of water when the level is at 168.5 feet MSL, which is the lake level when water will begin to flow over the spillway at Mooringsport. When Caddo crested at 180.03 feet, almost 53,000 surface acres were inundated. Caddo Lake storage capacity at 168.5 feet is approximately 147,000 acre-feet. By August 2016, 3,432,772 acre-feet flowed over the spillway. This was enough water to fill Caddo Lake more than 23 times!

Figure 30: Flooding around Caddo Lake

While there is a regional perception that much of the Caddo Lake flooding was caused by releases from Lake O' the Pines, the dam is constructed to only release a maximum of 3,000 cfs (cubic feet per second) of flow from the Ferrell's Bridge Dam. Three other tributaries flow uncontrolled into Caddo Lake and account for approximately 65% of the water that enters Caddo. Two of these streams, Little Cypress Creek and Black Cypress Bayou flowed in excess of 37,000 cfs at their crests into Caddo Lake. The flow rate of these streams was more than twelve times the amount of water released from Lake O' the Pines. These high flow rates were also concentrated in an eight- to nine-week period, whereas the releases from Lake O' the Pines were spread out over six months.

Caddo Lake remains on the *2014 Texas §303(d) List* for low dissolved oxygen levels and mercury in edible fish tissues throughout the lake, and low pH in the Goose Prairie arm. There are concerns for iron in sediment and total phosphorus. The concern for ammonia from previous years has been removed since laboratory analysis showed low concentrations over the course of several years. Five stations were monitored monthly by CLI in Segment 0401 for field parameters in FY 2016: 10286, 10288, 14236, 10283, and 15249. Quarterly conventional samples were collected at 10283 and 15249. No metals in sediment sampling is presently scheduled.

0401A – Harrison Bayou

Harrison Bayou (Segment 0401A) is a tributary of Caddo Lake. The segment extends parallel to SH 134 and to the Louisiana border. Harrison Bayou remains on the *2014 Texas §303(d) List* for low dissolved oxygen, although it is possibly indicative of natural conditions. Bacteria have been added to the 2014 *Texas Integrated Report* as a concern for non-attainment of standards. Station 15508 is sampled quarterly for conventional parameters, field parameters, and bacteria. Bacteria sampling was added in FY 2016 in response to this concern.

0401B – Kitchen Creek

Kitchen Creek is an unclassified water body and 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. Since there are no impairments or concerns, no monitoring was conducted in this segment in FY 2016.

0402 - Big Cypress Creek (Bayou) below Lake O' the Pines

Segment 0402 is the portion of Big Cypress Creek that flows between Ferrell's Bridge Dam and Caddo Lake. This segment is generally deep, wide, 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 *2014 Texas §303(d) List* include low pH, mercury in edible tissue, and depressed dissolved oxygen. Station 15511 is sampled quarterly by TCEQ Region 5 for conventional, bacteria, field parameters, and flow. CLI monitors monthly for field parameters and flow on Big Cypress Creek at Caddo Lake State Park (station 15022).

Figure 31: City of Jefferson during the Flood of 1945

0402B – 0402E

Segments 0402B – 0402E are tributaries to Black Cypress Bayou and include Hughes Creek (0402B), Haggerty Creek (0402C), Flat Creek (0402D), and Kelley Creek (0402E). No concerns or impairments were shown for these segments. Stations 16936 (Hughes Creek at SH 155) and 16934 (Kelley Creek at FM 250) are being sampled quarterly for field parameters and stream flow. Note that Segment 0402D was not assessed in the *2014 Texas Integrated Report*.

Note: *Black Cypress Bayou (formerly Segment 0402A) is now designated as Segment 0410 and is discussed at the end of this chapter*

0403 – Lake O' the Pines

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

Lake O' the Pines was created by the construction of the Ferrell's Bridge Dam on Big Cypress Bayou. The reservoir was created for flood control after the historic flooding of the City of Jefferson in 1945 and was authorized by the Flood Control Act of 1946. The lake has a total drainage area of 850 square miles with a normal conservation pool of 230 feet MSL. Discharges from the two gates in the control structure vary from a minimum of 5 cfs to a maximum of 3,000 cfs. The storage capacity at 228.5 MSL (Conservation Pool Level) is approximately 254,000 acre-feet.

Despite the historic flooding in 2015 and early 2016, Lake O' the Pines performed its primary function and prevented the City of Jefferson from flooding. Through controlled water releases, over one million acre-feet of water was discharged from the lake between January and August 2016 which was enough water to fill Caddo Lake almost 7 times.

Figure 32: Lake O' the Pines near the Dam

Lake O' the Pines was listed on the *Texas §303(d) List* in 2000 for depressed dissolved oxygen which lead to the development of the TMDL Implementation Plan discussed in detail in a previous section. Sampling in Lake O' the Pines is conducted quarterly by TCEQ Region 5 at four stations for conventional, bacteria, and field parameters.

0404 – Big Cypress Creek

Figure 33: Big Cypress Creek at SH 11 (10308)

Urban populations in this segment include Mount Pleasant, Pittsburg, Daingerfield, and Hughes Springs. A majority of the intensive poultry operations within the Cypress Creek Basin are located within this watershed. Big Cypress Creek drains much of the western Cypress Creek Basin, a predominantly rural watershed of rolling wooded hills. Stream flow in Big Cypress Creek is influenced directly by releases from Lake Bob Sandlin. Segment 0404 is listed as impaired for bacteria and sulfate. Sulfate was added to the *Texas §303(d) List* in 2014. Concerns for screening levels for chlorophyll *a*, nitrate, and total phosphorus are shown in the IR. TCEQ Region 5 monitors stations 10308 (Big Cypress Creek at SH 11) and 10310 (Big Cypress Creek at US 271) each month for conventional, bacteria, flow, and field parameters. Station 13631 (Big Cypress Creek at US 259) is monitored quarterly for conventional, bacteria, and field parameters.

0404A – Ellison Creek Reservoir

Ellison Creek Reservoir is on the *2014 Texas §303(d) List* for PCBs in fish tissue and sediment toxicity. More details on the Texas Department of State Health Services fish consumption advisory for PCBs in fish tissue are available in Fish Advisory Section of this report. The *2014 Texas Integrated Report* lists Ellison Reservoir with concerns for screening levels for cadmium, iron, lead, manganese, nickel, and zinc in sediment. TCEQ Region 5 monitors station 14473, located at the dam, quarterly for metals in water and field parameters quarterly.

0404B – Tankersley Creek

Tankersley Creek arises in Titus County northwest of the city of Mount Pleasant. The stream flows in a southeasterly direction for approximately two miles before it enters Tankersley Lake, which impounds Tankersley Creek. Downstream of the impoundment, the stream flows 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 is listed as impaired for bacteria. An intensive bacteria monitoring study was performed in 2009 - 2011 through the *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 and total phosphorous. Samples are being collected quarterly for conventional, field parameters, flow, and bacteria at station 10261 (Tankersley Creek at FM 3417).

0404C – Hart Creek

Hart Creek, an unclassified water body, rises 4.5 miles north of Mount Pleasant and runs southeast for twelve miles to its confluence with Big Cypress Creek. It receives surface drainage from Hayes Creek and Evans Creek, small tributaries east of Mount Pleasant. The soils are sandy along the stream'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 SH 49 and above County Road 4550.

Hart Creek remains listed as impaired for bacteria. This stream was also intensively monitored in the study previously discussed. There are concerns for nitrate shown in the 2014 *Texas Integrated Report*. Samples are being collected quarterly for conventional, field parameters, flow, and bacteria at station 10266 (Hart Creek at County Road 4550).

0404D – Welsh Reservoir

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 segment.

0404E – Dry Creek

Dry Creek enters Big Cypress Creek from the west bank, flowing past Pittsburg in northeast Camp County. The *2014 Texas Integrated Report* lists this stream as a concern for screening levels for nitrate. Station 10274 (Dry Creek at McMinn Road) was added to the monitoring schedule in FY 2016. Quarterly samples are collected for conventionals, bacteria, field parameters, and flow.

0404F – Sparks Branch

Sparks Branch was not assessed in the *2014 Texas Integrated Report*. In 2006 and 2012, it was assessed for dissolved oxygen grab sample minimum and criterion with no concerns being identified. The assessment was based on limited data and sampling may be considered in the future.

0404J – Prairie Creek

Prairie Creek flows on the southern border of Camp County before its confluence with Big Cypress Creek near US 259. The stream remains on the *2014 Texas Integrated Report* with a concern for 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 reservoir. The Texas Water Resources Institute has recently begun a study in this watershed and will be collecting samples on a monthly basis.

0404K – Walkers Creek

Walkers Creek is located in Camp County, about 3 miles north of Pittsburg. There are no concerns or impairments in *2014 Texas Integrated Report*.

0404N – Lake Daingerfield

Lake Daingerfield is an eighty-acre reservoir which was completed in 1935 as a Civilian Conservation Corps project. This segment is listed on the *Texas §303(d) List* for non-support and concern for the screening level of mercury in fish tissue. DSHS has issued a fish consumption advisory for mercury which is discussed in Fish Advisory Section of this report.

0404O – Dragoo Creek

Dragoo Creek was not assessed in the *2014 Texas Integrated Report*. One site was sampled as part of the *Assessment of Contact Recreation Use Impairments and Watershed Planning for Cypress Creek and Tributaries*. During assessment, these data were determined not to be temporally representative of the stream, so no impairments or concerns could be accurately determined.

0405 – Lake Cypress Springs

Lake Cypress Springs is located near the headwaters of Big Cypress Creek in the northwestern portion of the Cypress Creek 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, poultry, cow/calf operations, and hay meadows.

The Franklin County Dam has a fixed spillway structure, which means that when the level of the lake exceeds the normal conservation pool of 378 feet MSL, water flows over the spillway and exits the reservoir. Being a fixed structure also means that Franklin County Water District cannot open gates to release water more quickly during flood events. Heavy rainfall in the area in December 2015 caused extensive flood damage to property surrounding the lake. The lake level peaked at 383.8 feet MSL on December 28, 2015.

Lake Cypress Springs is listed as impaired for pH and has concerns for chlorophyll *a*. TCEQ Region 5 samples quarterly for conventional, bacteria, and field parameters at three locations in the reservoir.

Figure 34: Flooding on Lake Cypress Springs in December 2015

0405A – Big Cypress Creek Above Lake Cypress Springs

Big Cypress Creek was added to the *2014 Texas §303(d) List* for depressed dissolved oxygen. The *2014 Texas Integrated Report* also shows a concern for bacteria. A concern for impaired habitat found in previous reports has been removed. Sampling at station 15260 (Big Cypress Creek at SH 37) continues in FY 2016 for conventional, bacteria, field parameters, and flow.

0405B – Panther Creek

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 it confluence with Big Cypress Creek before Lake Cypress Springs was impounded in 1970. Panther Creek is listed in the 2014 *Texas Integrated Report* with a concern for impaired habitat. No sampling is presently scheduled in this sub-segment.

0406 – Black Bayou

The Black Bayou Watershed is located in the piney-woods region of East Texas in Cass and Marion 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 intermitted streams. The soils of the Black Bayou watershed floodplain are fine, sandy loam soil that are considered moderately to slowly permeable.

Figure 35: Black Bayou at SH 43 (10318)

The upper assessment unit of Black Bayou is on the *2014 Texas §303(d) List* for bacteria while the entire segment is listed for depressed dissolved oxygen. The lower assessment unit meets standards and was removed from the list in the 2014 assessment. There is a concern for chlorophyll *a* in the upper portion of the segment. Quarterly sampling for conventionals, bacteria, field parameters, and flow is being conducted by the TCEQ Region 5 at stations 10314 (Black Bayou at Cass CR 4659) and 10318 (Black Bayou at SH 43).

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 is listed for bacteria, depressed dissolved oxygen, pH, impaired fish community, and impaired macrobenthic community. There is also a concern for screening level for an impaired Habitat in the lower Assessment Unit. Samples for 24-hour dissolved oxygen, bacteria, field parameters, and flow are being collected by WMS. Biological monitoring was conducted at station 14976 (Jims Bayou at SH 43) in response to the new biological listings and habitat concern. The results of FY 2016 biological monitoring are shown in the table below. Fish, benthic macroinvertebrates, and habitat quality all scored Intermediate, except for the fish community during the August sampling event which scored in the High category. Another round of biological monitoring is scheduled for FY 2017.

Parameter	June 16	Aug 2
Fish - IBI	37 (Int.)	42 (High)
Benthos - RBA	22 (Int.)	28 (Int.)
Habitat - HQI	15 (Int.)	15 (Int.)
Flow (cfs)	17	0.12

Figure 36: 2016 Biological Monitoring Results

Figure 37: Seine Haul on June 6, 2016

Figure 38: Electroshocking on August 2, 2016

0407B – Frazier Creek

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. There is a concern for screening level of dissolved oxygen in Frazier Creek in the *2014 Texas Integrated Report*. TCEQ monitors station 10259 (Frazier Creek at US 59) quarterly for field parameters, bacteria, and flow.

0408 – Lake Bob Sandlin

Lake Bob Sandlin is located immediately below Lake Cypress Springs and Lake Monticello. The reservoir is a popular recreational and fishing lake. The reservoir is regulated by the Titus County Freshwater Supply District #1. In recent years, many new homes have been constructed along the lakefront.

Figure 39: Water Released from the Fort Sherman Dam at Lake Bob Sandlin

Extensive flooding throughout the watershed occurred in 2015 through the spring of 2016. A record amount of water was released from the Fort Sherman Dam in 2015 at more than 280,000 acre-feet. An additional 150,000 acre-feet was released by the end of April 2016. This amount of water could fill Lake Bob Sandlin more than twice.

No impairments or concerns were identified in the *2014 Texas Integrated Report*. Quarterly samples are being collected at three stations by TCEQ Region 5.

0408A – Lake Monticello

Lake Monticello is approximately eight miles southwest of Mount Pleasant in Titus County. There are no concerns or impairments shown in the *2014 Texas Integrated Report*. No sampling was conducted in Lake Monticello in FY 2016.

0408C – Brushy Creek

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. The *2014 Texas Integrated Report* shows a concern for screening level for an impaired Habitat.

0409 – Little Cypress Bayou (Creek)

The Little Cypress Creek watershed is located south of Lake O' the Pines, forms much of the southern boundary of the Cypress Creek Basin, and joins Big Cypress Creek east of Jefferson. The majority of land use within the watershed consists of forest, 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 *2014 Texas §303(d) List* for low dissolved oxygen and elevated bacteria counts. Sampling in the segment is conducted by the TCEQ Region 5. Quarterly conventional, bacteria, field parameters, and flow were collected at four sites at stations 10332, 15773, 16017, and 16861.

0409A – Lilly Creek

Lilly Creek originates two miles west of Pine in Camp County and flows southeast for nine miles to its confluence with Little Cypress Creek. Concerns for depressed DO and bacteria are shown in the 2014 *Texas Integrated Report*. Quarterly sampling was conducted at station 20153 (Lilly Creek at FM 556) for conventional, bacteria, and field parameters.

Figure 40: Lilly Creek at FM 556 (20153)

0409B – South Lilly Creek

South Lilly Creek is a tributary of Lilly Creek and extends from its confluence with Lilly Creek to approximately two miles west of FM 1647 in Upshur County. South Lilly Creek has a Nonsupport in the *2014 Texas §303(d) List* for bacteria. WMS collected quarterly samples at station 17954 (South Lilly Creek at FM 2425) for bacteria, field parameters, and flow (when the stream is wadeable).

0409D – Lake Gilmer

Lake Gilmer is located in central Upshur County and has no concerns or impairments. Quarterly monitoring is conducted by TCEQ Region 5 at stations 17478 and 18825 for conventionals, bacteria, and field parameters.

0409E – Clear Creek

Clear Creek is a small stream located in Upshur County and is a tributary to Little Cypress Creek. The *2014 Texas Integrated Report* shows a concern for non-attainment for impaired benthic community along with a concern for screening level of an impaired habitat.

0410 – Black Cypress Creek (Bayou) / Formerly 0402A

Figure 41: Black Cypress Bayou at US 59 (10245)

Black Cypress Bayou is an unclassified water body with segment boundary beginning at the confluence with Big Cypress Creek up to FM 250. This segment is designated as 0402A in the *2014 Texas Integrated Report* as an unclassified water body. Beginning with the next Integrated Report, the stream will become a classified water body, and the segment number will change to 0410.

Black Cypress Bayou is listed as impaired for low dissolved oxygen, bacteria, copper in water, and mercury in edible fish tissue. Four diel monitoring events were performed at station 10245 (Black Cypress Creek at US 59) in FY 2016 by WMS. Quarterly samples for conventional, bacteria, field parameters, and flow are being collected by TCEQ Region 5.

Get Involved in Your Watershed

The Cypress Creek Basin encourages public involvement in 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. 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 the Northeast Texas Municipal Water District at 903-639-7538 or visit their 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.

Interested in becoming a stakeholder and attending meetings and program updates?

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FIGURE 42: Giant Salvinia Warning Sign

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