Angelina & Neches River Authority

2014 Basin Highlights Report

For the Upper Portion of the Neches River Basin

TCEQ

THE TEXAS CLEAN RIVERS PROGRAM

Angelina & Neches River Authority
P.O. Box 387 • Lufkin, TX 75902
936-632-7795 • 800-282-5634
www.anra.org • info@anra.org

ANRA

This Page Intentionally Blank

Table of Contents

This Page Intentionally Blank

Introduction

About The Basin Highlights Report

This 2014 Basin Highlights Report is intended to provide a brief overview of the previous year's events and ongoing programs in the upper and middle portions of the Neches River Basin that are relevant to the Clean Rivers Program (CRP).

For a more comprehensive look at the basin, please refer to the 2010 Basin Summary Report.

The 2014 Basin Highlights Report was prepared by the Angelina & Neches River Authority (ANRA) in cooperation with the Texas Commission on Environmental Quality (TCEQ) under the authorization of the Texas Clean Rivers Act.

About The Clean Rivers Program

The Texas Clean Rivers Act, enacted in 1991 by the Texas legislature, requires that each Texas River Basin conduct ongoing water quality assessments, integrating water quality issues using a watershed management approach. The Clean Rivers Program (CRP) implements the Clean Rivers Act through water quality monitoring, assessment, and public outreach. Currently, monitoring in the state of Texas includes over 1800 sites and regional water quality assessments within the 23 major river and coastal basins and their sub-watersheds.

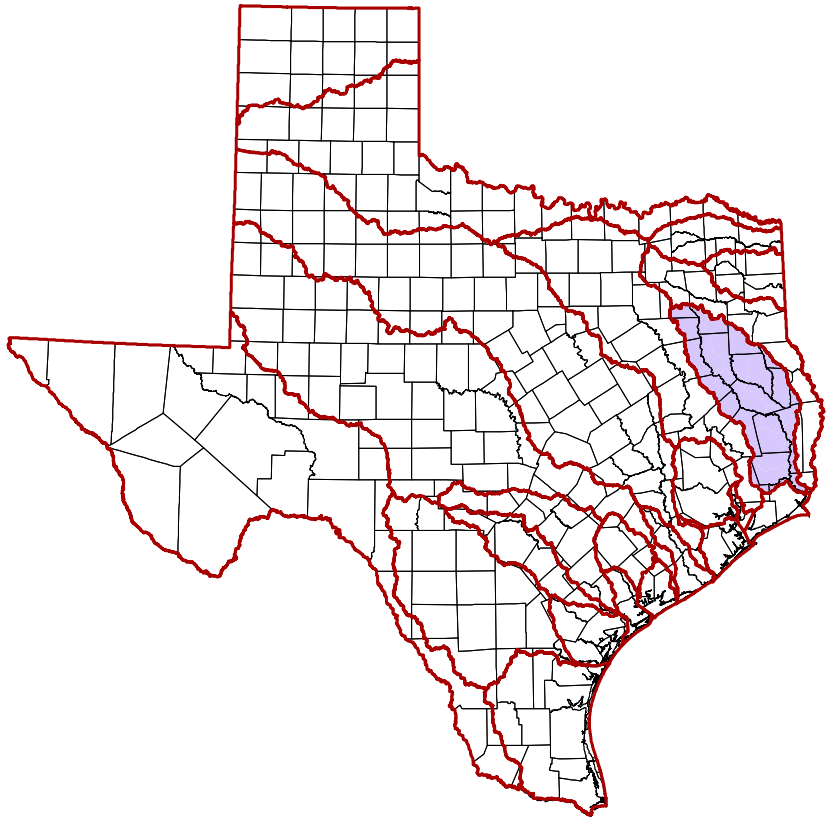
The mission of the CRP is to maintain and improve the quality of water within each river basin in Texas through an ongoing partnership involving the Texas Commission on Environmental Quality, river authorities, other agencies, regional entities, local governments, industry, and citizens. The program's watershed management approach will identify and evaluate water quality issues, establish priorities for corrective action, work to implement those actions, and adapt to changing priorities.

About The Angelina & Neches River Authority

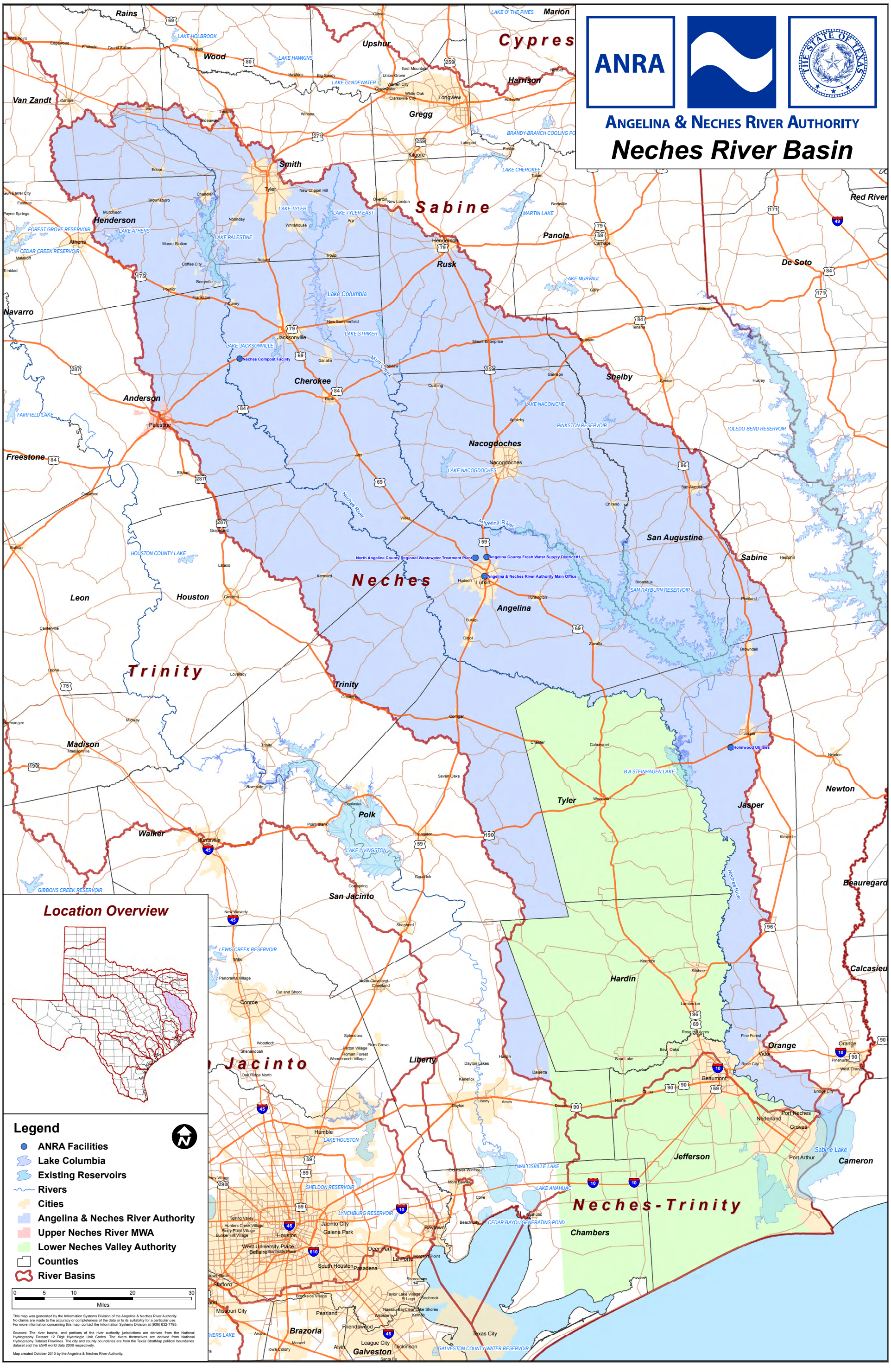
The Angelina & Neches River Authority was created in 1935 by the Texas legislature as a conservation and reclamation district. ANRA's office is located in Lufkin, Texas. ANRA's territorial jurisdiction consists of 8,500 square miles that lie wholly or in part of the following counties: Van Zandt, Smith, Henderson, Newton, Cherokee, Anderson, Rusk, Houston, Nacogdoches, San Augustine, Shelby, Angelina, Trinity, Sabine, Polk, Jasper, and Orange.

The Angelina & Neches River Authority (ANRA) has the responsibility for monitoring, protecting, and enhancing water resources in the Neches River Basin.

ANRA's functions in the basin include: water quality monitoring, drinking water and wastewater analysis, on-site sewage facility permitting, water and wastewater utilities, water resources development, regional wastewater/composting facilities and other regional planning efforts.



Map of the Neches Basin (including the proposed Lake Columbia)



This Page Intentionally Blank

Upper Neches Basin Highlights

New Monitoring Stations for FY 2014

Beginning in FY 2014, the Angelina & Neches River Authority Clean Rivers Program was able to add an additional 14 monitoring stations. This was possible due to the addition of automated equipment in the laboratory, as well as time and labor donated by other departments within ANRA to perform sample collection duties.

These additional monitoring stations, including the rationale behind these sites being chosen, are listed in the table below.

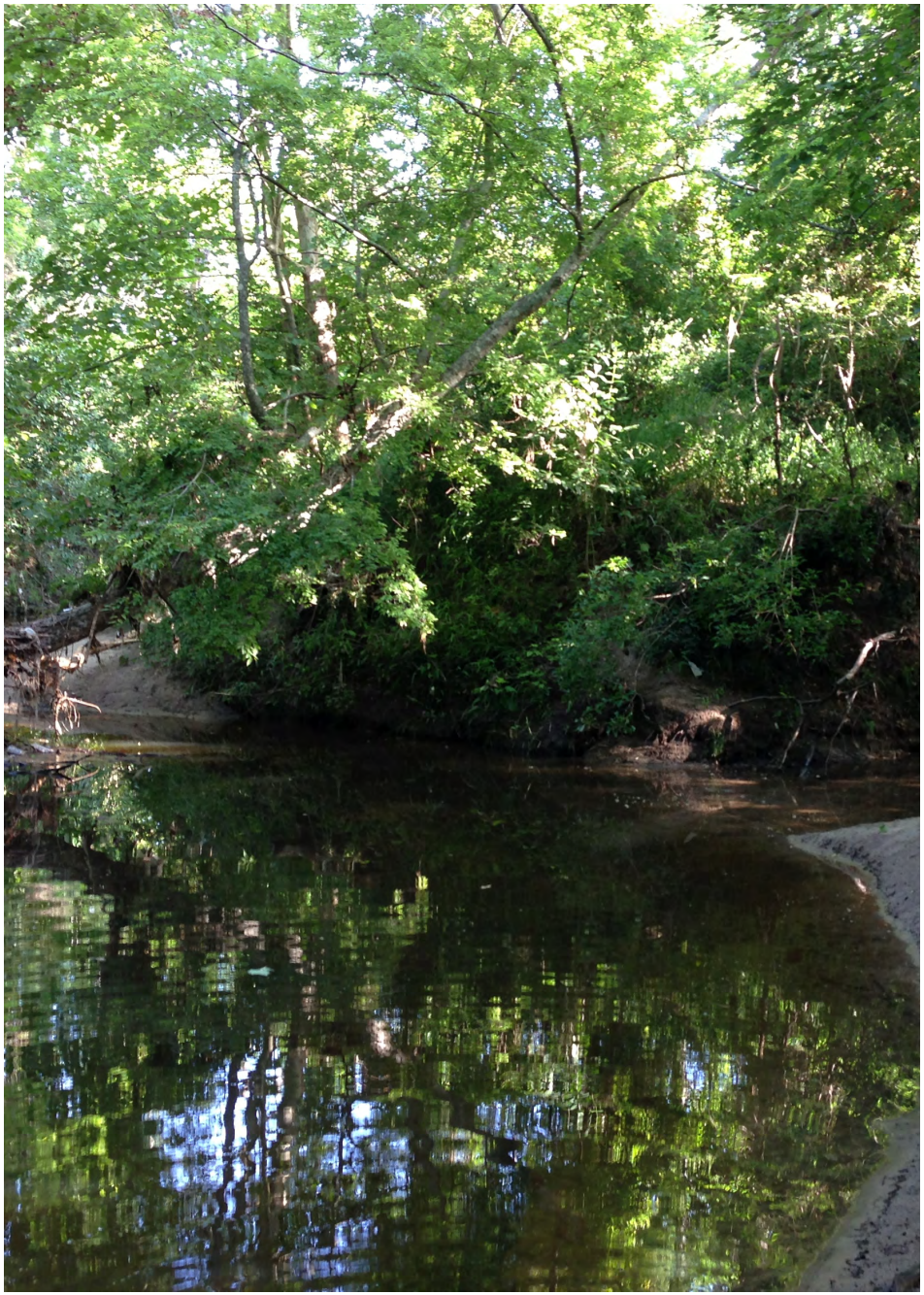
Site Description	Station ID	Waterbody ID	County	Historically Monitored (Y/N?)	Impaired (Y/N?)	Comments / Rationale for Addition
CEDAR CREEK AT ELLIS AVE IN LUFKIN	21434	0604A	Angelina	N	Y	Additional monitoring to address 303d listing. This monitoring station is located with within the Lufkin city limits, inside the loop.
CEDAR CREEK AT ST LOOP 287 IN LUFKIN	10479	0604A	Angelina	Y	Y	Additional monitoring to address 303d listing. This monitoring station is located with within the Lufkin city limits.
HURRICANE CREEK DOWNSTREAM OF KIWANIS PARK DRIVE	21433	0604B	Angelina	N	Y	Additional monitoring to address 303d listing. This monitoring station is located with within the Lufkin city limits, inside the loop.
HURRICANE CREEK AT ST LOOP 287 IN SOUTH LUFKIN	10487	0604B	Angelina	Y	Y	Additional monitoring to address 303d listing. This monitoring station is located with within the Lufkin city limits.
JACK CREEK AT FM 3150	10494	0604C	Angelina	Y	Y	This station provides a monitoring location between the monitoring stations at Jack Creek at SH 94 and Jack Creek at SH 103.
JACK CREEK AT SH 94	10493	0604C	Angelina	Y	Y	This site has been monitored previously, but not since 2000.
BAYOU CARRIZO AT SH 21	21432	610	Nacogdoches	N	N	Major tributary to Sam Rayburn - Never Monitored
AYISH BAYOU AT WEST COLUMBIA STREET IN CITY OF SAN AUGUSTINE	21431	0610A	San Augustine	N	Y	This monitoring station was added due to a lack of monitoring in assessment unit AU_02. This station provided easier access than Ayish at SH 147.
BOWLES CREEK AT CHEROKEE CR 4608/RUSK CR 4194	21429	0611R	Cherokee	N	N	Tributary to Striker Lake. Waterbody has been flagged for low pH in the past by TPWD during fish kill investigations. It is hoped that quarterly monitoring can help determine whether the low pH is intermittent and its source.
JOHNSON CREEK AT RUSK CR 476	21430	0611R	Rusk	N	N	Tributary to Striker Lake. Waterbody has been flagged for low pH in the past by TPWD during fish kill investigations. It is hoped that quarterly monitoring can help determine whether the low pH is intermittent and its source.
LAKE STRIKER NEAR DAM	17824	0611R	Rusk	Y	N	This site has been previously monitored by both ANRA and TCEQ. Monitoring of Striker Lake and Johnson and Bowles Creek is being done to determine potential causes of low pH issues. ANRA is taking over monitoring at this station to allow TCEQ to perform additional monitoring near the City of Tyler.
LAKE STRIKER UPPER LAKE	17822	0611R	Cherokee	Y	N	This site has been previously monitored by both ANRA and TCEQ. Monitoring of Striker Lake and Johnson and Bowles Creek is being done to determine potential causes of low pH issues. ANRA is taking over monitoring at this station to allow TCEQ to perform additional monitoring near the City of Tyler.
NACONICHE LAKE NEAR DAM	21435	612	Nacogdoches	N	N	Naconiche Lake has swim areas. Naconiche Creek is a tributary to Attoyac Bayou
WEST CREEK AT FM 2913	20845	0612F	Shelby	Y	Y	This station was previously monitored as part of the Attoyac Bayou WPP project.

New Monitoring Stations for FY 2014

Cedar Creek at Ellis Avenue (Monitoring Station 21434)

Cedar Creek at South Loop 287 (Monitoring Station 10479)

New Monitoring Stations for FY 2014



Hurricane Creek downstream of Kiwanis Park Drive (Monitoring Station 21433)

Hurricane Creek at South Loop 287 (Monitoring Station 10487)

New Monitoring Stations for FY 2014

Jack Creek at FM 3150 (Monitoring Station 10494)

Jack Creek at SH 94 (Monitoring Station 10493)

New Monitoring Stations for FY 2014

Bayou Carrizo at SH 21 (Monitoring Station 21432)

Ayish Bayou at West Columbia Street (Monitoring Station 21431)

New Monitoring Stations for FY 2014

Bowles Creek at Cherokee CR 4608/Rusk CR 4194 (Monitoring Station 21429)

Johnson Creek at Rusk CR 476 (Monitoring Station 21430)

New Monitoring Stations for FY 2014

Lake Striker Near Dam (Monitoring Station 17824)

Lake Striker Upper Lake (Monitoring Station 17822)

New Monitoring Stations for FY 2014

Naconiche Lake Near Dam (Monitoring Station 21435)

West Creek at FM 2913 (Monitoring Station 20845)

Fish Consumption Advisory

DSHS Issues Fish Consumption Advisory for Neches River

On January 27, 2014, the Texas Department of State Health Services (DSHS) issued a fish consumption advisory for portions of the Neches River Basin, including Sam Rayburn Reservoir and B.A. Steinhagen Reservoir. The advisory covers six species of fish caught between the State Highway 7 bridge west of Lufkin downstream to the U.S. Highway 96 bridge near Evadale, as well as both reservoirs. This advisory was issued after laboratory testing of fish tissue samples found elevated levels of mercury and dioxins.

DSHS recommends people limit or avoid consumption of these species as outlined in the table below because eating contaminated fish can be a health hazard.

Species Affected	Women of Childbearing Age and Children < 12	Women Past Childbearing Age and Adult Men
Blue catfish > 30 inches	**DO NOT EAT**	Two 8 oz. meals/month
Flathead catfish	**DO NOT EAT**	One 8 oz. meal/month
Gar (all species)	**DO NOT EAT**	One 8oz. meal/month
Largemouth bass > 16 inches	**DO NOT EAT**	Two 8 oz. meals/month
Smallmouth buffalo	**DO NOT EAT**	**DO NOT EAT**
Spotted bass > 16 inches	**DO NOT EAT**	Two 8 oz. meals/month

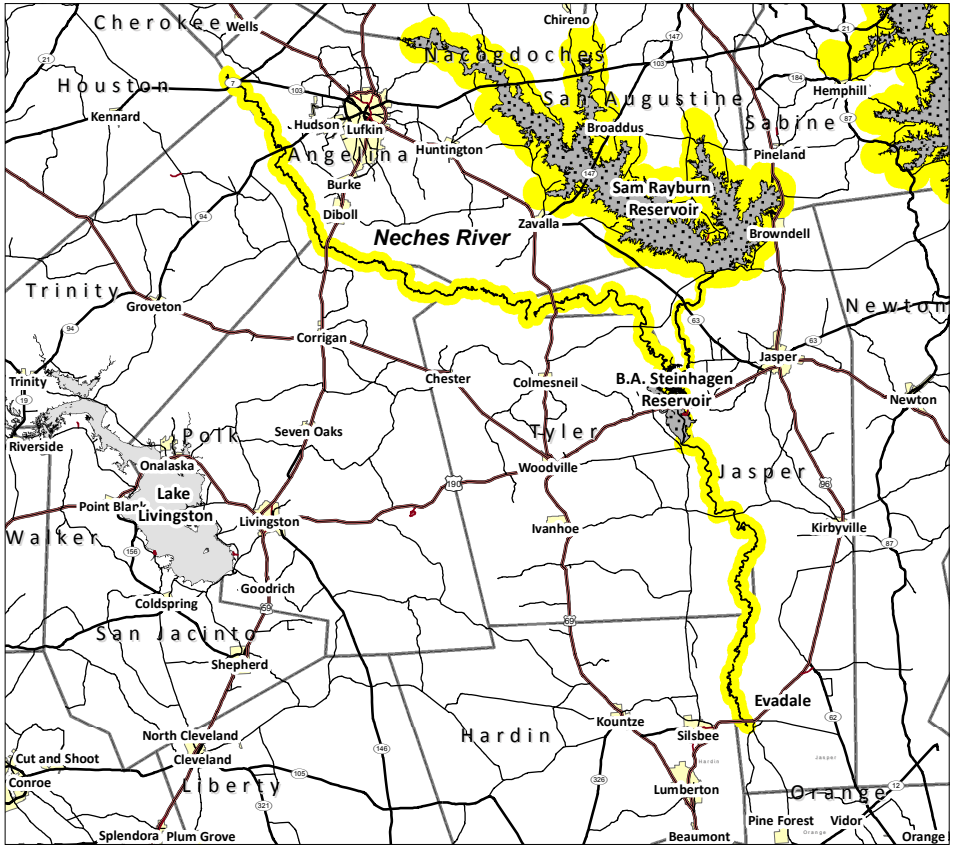
DSHS recommends children under 12 and women who are nursing, pregnant or who may become pregnant avoid eating the affected species because the nervous systems of unborn and young children are particularly susceptible to the health effects of toxins. Previous advisories for the Neches River area based on high mercury levels had recommended children limit consumption of particular fish. Recent testing prompted DSHS to recommend children under 12 not eat the affected fish at all.

Elevated levels of mercury and dioxins in fish do not pose a health risk for people swimming or participating in other water recreation activities.

Affected Counties: Angelina, Hardin, Houston, Jasper, Polk, Sabine, San Augustine, Trinity, and Tyler

Neches River

Angelina, Hardin, Houston, Jasper, Polk, Trinity, and Tyler Counties
ADV-51 Issued January 24, 2014, Rescinding ADV-41



Advisory Area:
The Neches River and all contiguous waters from the State Highway 7 Bridge west of Lufkin downstream to the U.S. Highway 96 Bridge near Evadale
Contaminants of Concern:
Dioxins and Mercury (Hg)

The fish consumption advisory (ADV-51) can be found online at the following website:

http://www.dshs.state.tx.us/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=8589985023

Water Quality Monitoring and Laboratory Analysis

Water Quality Monitoring in the Upper Portion of the Neches Basin

In FY 2014, the Angelina & Neches River Authority monitors 40 sites quarterly for field, conventional parameters and bacteria, with an additional site being monitored bimonthly for bacteria. The Texas Commission on Environmental Quality (TCEQ) also has a robust sampling program in the basin, with monitoring being conducted by both Region 5 (Tyler) and Region 10 (Beaumont) staff. The Lower Neches Valley Authority (LNVA), which monitors primarily in the lower portion of the basin, also monitors 6 stations in the upper portion.

Number of Monitoring Stations in the Upper Neches Basin

Sampling Entity	*Field*	*Conventional*	*Bacteria*	*Flow*	*Metals in Water*	*Metals in Sediment*
ANRA	40	40	41	31	0	0
TCEQ	36	36	36	13	1	6
LNVA	6	6	6	1	0	0

ANRA monitoring personnel collect both field and conventional parameters at monitoring stations, with stations being monitored on a quarterly basis. The following table lists the parameters that ANRA collects and monitors.

Parameters for Quarterly Monitoring

Field Parameters	*Conventional Parameters*	*Bacterial Parameters*
Dissolved Oxygen Days Since Last Significant Rainfall Flow Severity Instantaneous Stream Flow pH Present Weather Secchi Transparency Specific Conductance Total Water Depth Water Temperature	Ammonia-N Chloride Chlorophyll-*a* Pheophytin-*a* Sulfate Total Dissolved Solids (TDS) Total Nitrate+Nitrite Total Phosphorus Total Suspended Solids (TSS)	*E. coli*

Collection of a bucket grab sample from the bridge at Ayish Bayou at SH 103 (Monitoring Station 15361)

Field measurements are collected on-site by direct monitoring in the water body.

Field Parameters		
Parameter	**Potential Impacts**	**Possible Sources/Causes**
pH	pH is a measure of the acidity or basicity of an aqueous solution. Most aquatic organisms are adapted to live within a specific pH range. pH can also affect the toxicity of many substances, which generally increase in solubility as pH decreases. The ability of water to resist changes in pH (its buffering capacity) is essential to aquatic life.	pH can be affected by industrial and wastewater discharges, runoff, and accidental spills. Natural variation in seasons may also affect pH.
Dissolved Oxygen (DO)	DO is a measure of the amount of dissolved oxygen that is available in the water. DO is vital for aquatic organisms to live. Where DO is too low, aquatic organisms may have insufficient oxygen to live.	DO is temperature-dependent, with water being able to hold more dissolved oxygen at lower temperatures due to the solubility of gases increasing as the temperature decreases. The amount of oxygen present usually decreases with depth, rising temperatures, and with the oxidation of organic matter and pollutants. Bacteria and algal blooms may cause DO to decrease as decomposition of organic matter consumes oxygen in the water, resulting in hypoxic (low oxygen) areas.
Specific Conductance	Specific Conductance is the measure of the water's capacity to carry an electrical current and is indicative of the amounts of dissolved solids present in a water body.	Dissolved salt-forming substances such as sulfate, chloride, and sodium increase the conductivity of the water.
Temperature	Water temperature affects the oxygen content of the water (dissolved oxygen). Temperature also has an impact on cold-blooded animals.	Water temperature may be affected by alterations to the riparian zone, changes in ambient temperature, and discharges.
Flow	Flow is a measurement of the velocity of the water, measured in cubic feet per second (CFS). Flow combined with other parameters can be a good indicator of water quality.	Flow can be affected by both natural and man-made sources.

Flow measurement at La Nana Creek at East Main Street (Monitoring Station 20792)

Calibration of the multiprobe

Conventional parameters are also evaluated as part of the monitoring plan. During routine monitoring events, water samples are collected for laboratory analysis of conventional parameters. Conventional parameters include nutrients, minerals, and particulates. For routine monitoring stations, ANRA collects and analyzes samples for the following conventional parameters:

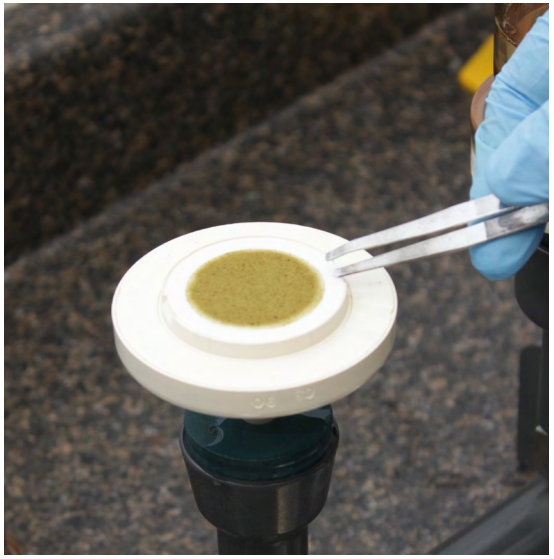
Conventional Parameters		
Parameter	**Potential Impacts**	**Possible Sources/Causes**
Ammonia-Nitrogen	Ammonia, which is produced from the breakdown of nitrogen-containing compounds, is found naturally in waters. In excess, algal blooms may occur. Elevated ammonia levels are indicative of organic pollution. These elevated levels can cause stress on aquatic organisms, as well as damage to tissue and gills.	Ammonia enters into a body of water via excretion of nitrogenous wastes, decomposition of plants and animals, and runoff. Ammonia is an ingredient in many fertilizers. It is also present in sewage, wastewater discharges, and storm water runoff.
Chloride	Chloride is one of the major inorganic ions in water and wastewater. It is an essential element for maintaining normal physiological functions in all organisms. Elevated chloride concentrations can adversely affect survival, growth, and/or reproduction of aquatic organisms.	An elevated chloride concentration can be indicative of natural or man-made pollution. Natural sources of chloride include the weathering and leaching of sedimentary rocks, soils, and salt deposits. Other possible sources include oil exploration and storage, sewage and industrial discharges, and landfill runoff.
Chlorophyll-*a*	Chlorophyll-*a* is an indicator of algal biomass in a water body. Increased concentrations indicate potential eutrophication or nutrient loading. Diurnal shifts in DO and pH resulting from increased photosynthesis and respiration can cause stress to aquatic organisms.	Chlorophyll-*a* is a photosynthetic pigment that plays a vital role in photosynthesis. It is found in most plants, cyanobacteria, and algae. When chlorophyll-*a* levels are consistently high or variable, this may be indicative of algal blooms.
Escherichia coli (E. coli)	*E. coli* is an indicator of fecal contamination. Fecal contamination is a health concern to the general public, and its presence indicates a risk for contact recreation. The presence of *E. coli* in the water indicates that pathogenic organisms may be present.	*E. coli* is abundant in the gastro-intestinal tract of warm-blooded animals. Elevated bacterial levels are indicative of a potential pollution problem. Reasons for the presence of fecal coliforms such as *E. coli* include failing septic systems, animal wastes, and inadequately treated sewage.
Nitrate + Nitrite-Nitrogen	Elevated levels of nitrite and nitrate can produce nitrite toxicity in fish ("brown blood disease") and methemoglobinemia ("blue baby syndrome") in infants by reducing the oxygen-carrying capacity of blood. In surface water, high levels of nitrates can lead to excessive growth of aquatic plants. High levels of nitrates are also indicative of human-caused pollution.	As part of the nitrogen cycle, nitrogenous compounds are converted from ammonia to nitrite and then to nitrate by bacterial and chemical processes. Potential sources include effluent discharges from wastewater treatment plants, fertilizers, and agricultural runoff.
Total Phosphorus	Phosphorus is essential to the growth of organisms, and is considered a growth-limiting nutrient. Elevated levels in water may stimulate the growth of photosynthetic aquatic macro- and microorganisms. Elevated phosphorus levels contribute to eutrophication and may cause algal blooms.	Phosphorus is commonly known as a man-made pollutant. It is present in industrial and domestic wastewater discharges, as well as agricultural and storm water runoff. It is a an ingredient in soaps and detergents, and is used extensively in the treatment of boiler waters. Phosphates are also used by some water supplies during treatment.
Total Dissolved Solids (TDS)	TDS, reported in mg/L, is a measure of the total dissolved particles in water. Typically, it is comprised of chlorides, sulfates, and other salt-forming anions. TDS is an important measure of drinking water quality.	TDS can occur naturally from dissolution of carbonate and salt deposits in rocks and soils. Other sources include agricultural and storm water runoff, effluent discharges from industrial and domestic wastewater treatment plants, and oil exploration.
Total Suspended Solids (TSS)	TSS, reported in mg/L, is a measure of the total suspended particles in water. High levels of TSS increase the turbidity of the water, reducing light penetration which subsequently decreases oxygen production by plants.	Elevated TSS can result from multiple point and non-point sources. Soil erosion and runoff are two primary sources.
Sulfate	Sulfate is essential for plant growth, and low levels (under 0.5 mg/L) can be detrimental to algal growth. Excessive levels of sulfate can form strong acids and change the pH of the water. Excessively high levels may be toxic to cattle and other animals. Sulfate can also affect drinking water quality.	Sulfate occurs in almost all natural waters due to an abundance of elemental and organic sulfur in the environment. It usually enters into water bodies by water passing over rock or soil containing minerals like gypsum, as well as runoff from agricultural lands, industrial discharges, and sewage treatment plant discharges. Sulfate can also enter water bodies from atmospheric deposition from such sources as burning fossil fuels.

ANRA Environmental Laboratory

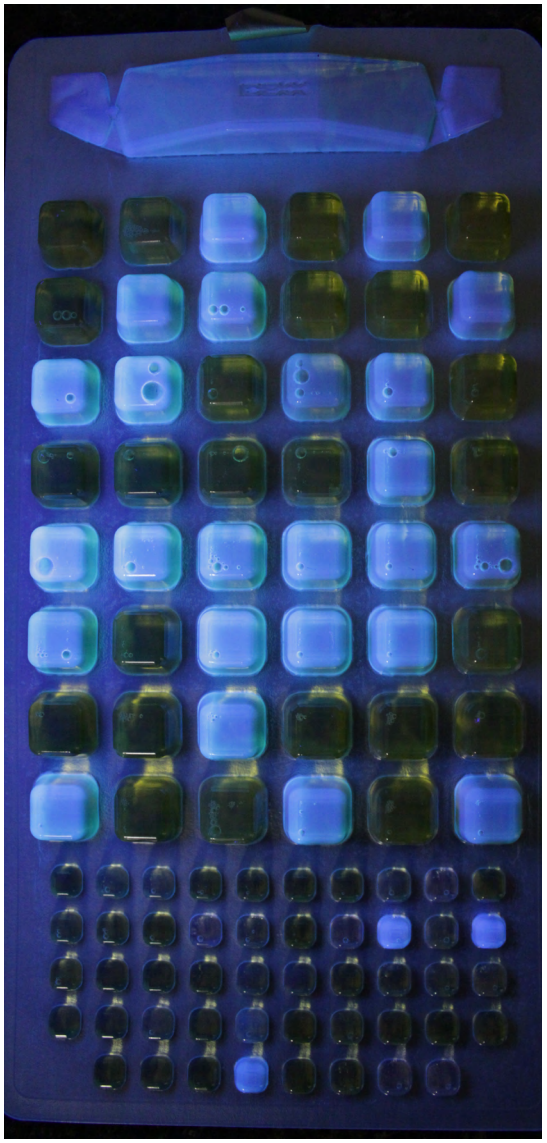
For water samples collected by ANRA, analysis of conventional parameters is performed by the ANRA Environmental Laboratory. The ANRA Environmental Laboratory is certified by the National Environmental Laboratory Accreditation Program (NELAP) for the chemical and microbiological analysis of potable and non-potable water. The laboratory performs analysis of drinking water, wastewater, and surface water samples for numerous entities and private individuals in the basin, including the Clean Rivers Program. For more information regarding analytical testing services and ANRA, please visit http://www.anra.org/divisions/water_quality/lab/

Preparation of samples for Total Phosphorus digestion

Analysis of Chloride by titration



Analysis of Total Suspended Solids (TSS)



Analysis of E. coli by IDEXX Colilert-18

New Laboratory Methods

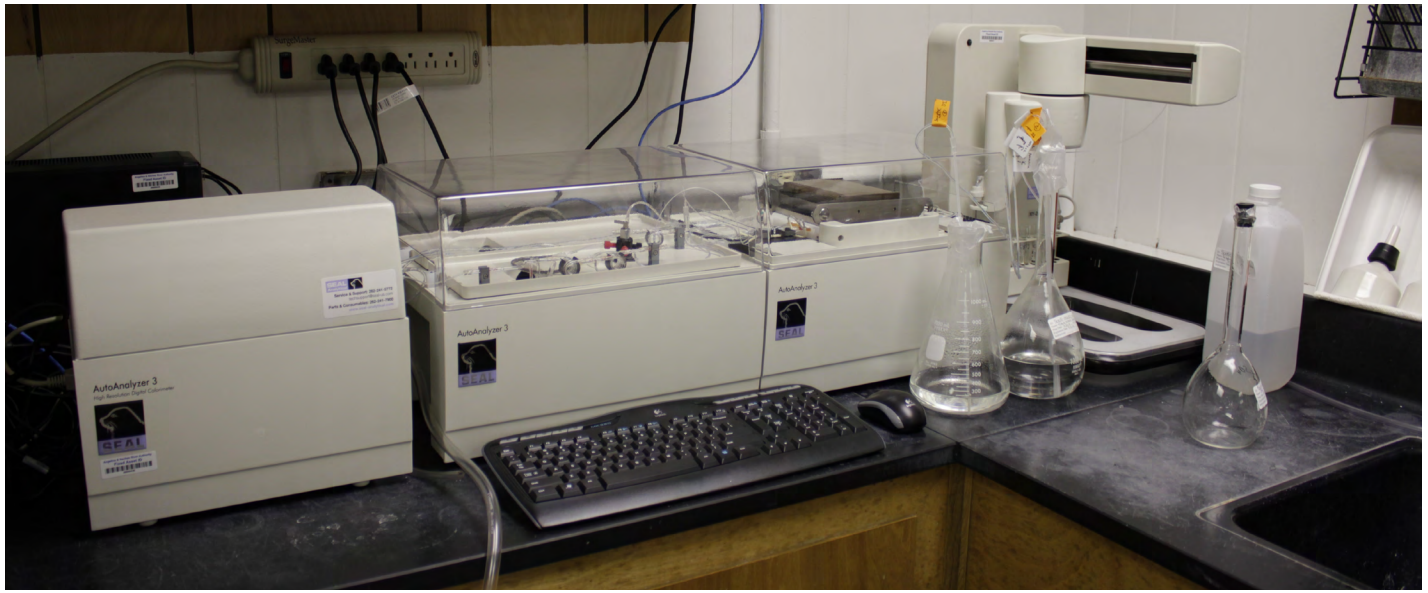
Beginning in FY 2014, The ANRA Environmental Laboratory began performing analyses for Total Phosphorus using an autoanalyzer. This equipment allows the laboratory to report data to a much lower limit of quantitation (currently 0.02 mg/L as P). Efficiencies gained by moving away from manual methods to automated equipment has allowed for a much higher throughput of samples. The addition of this equipment is one of the primary reasons that ANRA was able to increase the number of monitoring stations beginning this year.

The ANRA Environmental Laboratory is currently NELAP-accredited for Total Phosphorus and Nitrate+Nitrite-N using this equipment. Additional methods will be added in the future as needed.

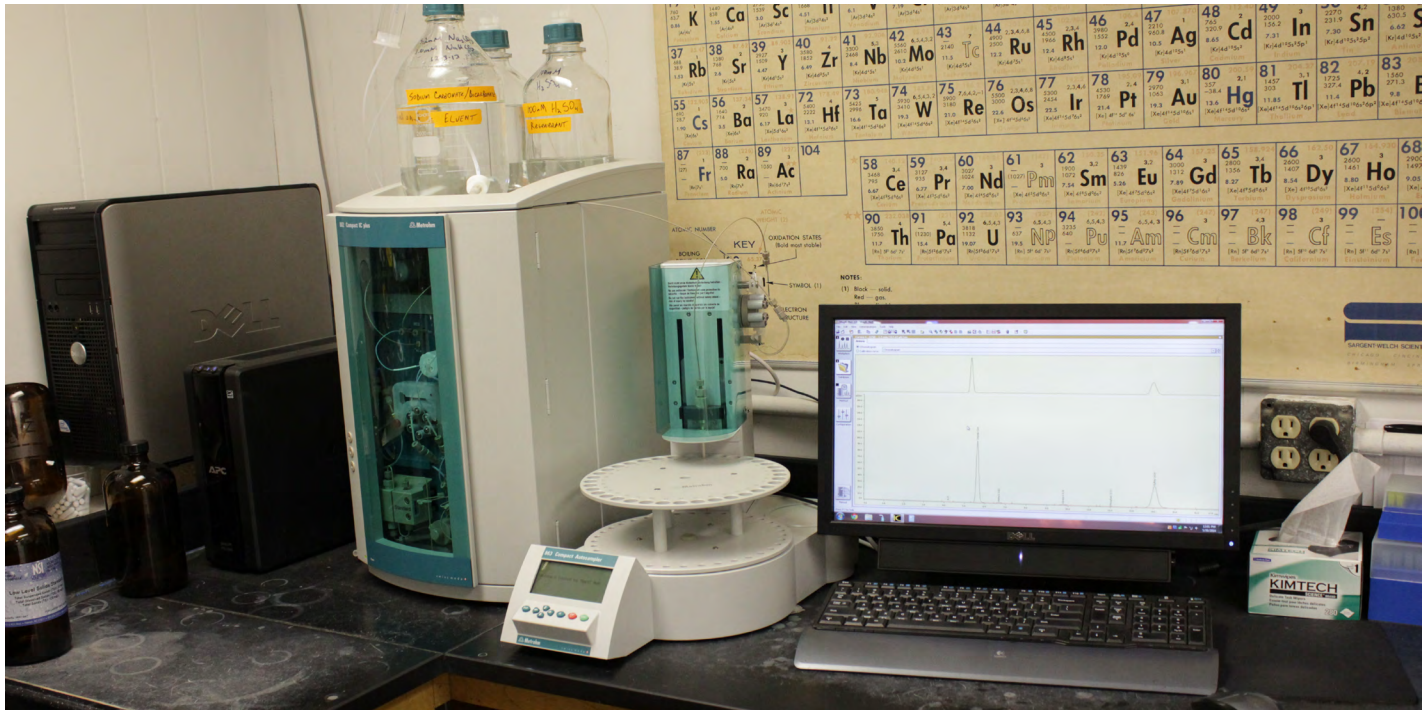
This equipment was partially funded by a grant from the TCEQ Clean Rivers Program.

As part of a Federal Clean Water Act Section 319 grant, the ANRA Environmental Laboratory was able to purchase an ion chromatograph for anion analysis. The equipment is to be used for analysis of water samples from an extensive monitoring program in the Attoyac Bayou watershed. The equipment will also be used to analyze samples collected under the Clean Rivers Program.

The ANRA Environmental Laboratory is currently in the process of preparing an amended NELAP application to add Nitrate-N, Nitrite-N, Chloride, Sulfate, and Orthophosphorus-P by EPA Method 300.0 to our scope of accreditation. It is anticipated that the accreditation process will be complete in time to begin analysis of these parameters using this method by the start of FY 2015.



SEAL AutoAnalyzer 3 for nutrient analysis



Metrohm Ion Chromatograph for Anion analysis

Texas Water Quality Standards

Texas Surface Water Quality Standards (TSWQS) are state rules adopted by the Texas Commission on Environmental Quality (TCEQ) that are designed to establish numerical and narrative goals for water quality throughout the state. TSWQS are developed to maintain the quality of surface waters in Texas so that they support public health and enjoyment, and protect aquatic life, consistent with the sustainable economic development of the state. TSWQS describe the physical, chemical, and biological conditions to be attained in waters in the state, as well as identifying uses and criteria associated with those uses. TSWQS also provide a basis on which the TCEQ regulatory programs [such as Permitting, Total Maximum Daily Load (TMDL), Non-Point Source (NPS), and Monitoring/Assessment] can establish reasonable methods to implement and attain the state's goals for water quality.

Section 304(a)(1) of the Federal Clean Water Act (CWA) requires development of criteria for water quality that accurately reflects the latest scientific knowledge. Criteria are based solely on data and scientific judgments on pollutant concentrations and environmental or human health effects. Section 304(a) also provides guidance to states and tribes in adopting water quality standards. Criteria are developed for the protection of aquatic life as well as for human health. Criteria are numerical numbers representing a specific use for the water body. For example, for high aquatic life use, the dissolved oxygen 24-hour minimum criteria is 3.0 mg/L. Impairments occur when water quality conditions do not meet assigned uses/criteria as defined in the TSWQS.

As defined in the TSWQS, a water body can be assigned specific uses including aquatic life, public water supply, and contact recreation use. Other uses, such as oyster waters, do not apply in the Upper Neches Basin. Designated uses typically have corresponding numerical criteria. There are general criteria that cover the entire state, but if sufficient information is available for a given water body, then site-specific standards may be developed and assigned to that water body.

Lake Nacogdoches (main pool)

Texas Water Quality Standards - Designated Uses

Aquatic Life Use (ALU) has corresponding 24-hour dissolved oxygen criteria. Water bodies have assigned/presumed ALU. ALU categories are exceptional, high, intermediate, limited, and minimal.

General Use criteria are used to protect overall water quality rather than a single specific use. Parameters used to gauge support for this use include chloride, sulfate, total dissolved solids (TDS), pH, and temperature. A water body is classified as Fully Supporting for general use if it meets all of these criteria. Parameters such as ammonia, nitrates, phosphorus, and chlorophyll-a are used in the assessment to screen for nutrient concerns.

Public water supply use includes criteria for chlorides, sulfates, and TDS in drinking water. Criteria for these parameters are set so that public water supplies are capable of treating and delivering water of acceptable quality.

Contact recreation use is assessed using criteria for bacteria indicators such as E. coli (for freshwater). Contact recreation use refers to the ability of the water body to support activities that involve physical contact with the water, such as swimming and wading. There are both primary and secondary contact recreation uses.

Primary contact recreation activities, such as swimming, are presumed to involve a significant risk of ingestion of water.

Secondary contact recreation activities, such as fishing, are presumed to involve a less significant risk of water ingestion than primary contact recreation due to limited body contact incidental to shoreline activity. The difference between secondary contact 1 and 2 are the frequency that the secondary contact recreation activities occur due to physical characteristics of the water body or limited public access.

Many of our state's water resources cannot currently meet their existing, designated, presumed, and attainable uses because of pollution problems from a combination of point sources, such as sewage treatment plants and industrial dischargers, and nonpoint sources, such as pollutants carried by rainfall runoff from forests, agriculture lands, abandoned mine lands, etc.

Through the Clean Rivers Program, the TCEQ and its partners continually help monitor and evaluate the quality of water bodies throughout the state by measuring parameters such as dissolved oxygen, temperature, pH, dissolved minerals, toxic substances, and bacteria.

Boat ramp on Sam Rayburn Reservoir at Shirley Creek

The Texas Integrated Report

The 303(d) list is a listing of impaired water bodies. The state must identify all water bodies where required pollution controls are not sufficient to attain or maintain applicable surface water quality standards. In Texas, this list is compiled by the TCEQ and is a part of the *Texas Integrated Report for Clean Water Act Sections 305(b) and 303(d)*, also known more simply as the *Texas Integrated Report*. This report is prepared by TCEQ and submitted to the US Environmental Protection Agency (EPA) every two years in even numbered years.

The *Texas Integrated Report* describes the condition of all surface water bodies that were evaluated for the assessment period. For the 2012 assessment, the TCEQ included data collected during a seven-year period (December 1, 2003 – November 30, 2010). The timeframe was extended to ten years, if needed, to attain the minimum number of data points needed for the assessment.

If the measured values for a water body are found to be consistently exceeding the criteria for its use, then that water body must be listed as impaired, which simply means that the water body is not supporting its use. When a water body is determined to be impaired, several things must happen:

- The water body must be listed on the 303(d) list.
- An evaluation must be undertaken to discover what is preventing the water body from supporting its use(s) or if the use(s) are inappropriate for the water body.
- Steps must then be taken to either remedy the problem, collect additional data or information, or to evaluate which uses are appropriate for the water body in question. These steps can include:
    - additional monitoring
    - development of a Total Maximum Daily Load (TMDL)
    - preparation of a Watershed Protection Plan (WPP)
    - a review of the water quality standards

The most recent version of the *Texas Integrated Report*, as well as draft reports and reports from previous years, can be found at the following website:

http://www.tceq.texas.gov/waterquality/assessment/305_303.html

Algae growth, Jack Creek at FM 2497 (Monitoring Station 10492)

Water Quality Impairments and Concerns in the Upper Neches Basin

Impairments and Concerns in the Upper Neches Basin (As listed in the 2012 Texas Integrated Report)			
Segment ID	***Segment Name***	***Impairment(s)***	***Concern(s)***
0604	Neches River Below Lake Palestine	Mercury in Edible Tissue	Ammonia, Chlorophyll-A, Mercury in Edible Tissue
0604A	Cedar Creek	Bacteria	Ammonia, Nitrate, Orthophosphorus, Total Phosphorus
0604B	Hurricane Creek	Bacteria	Ammonia, Depressed Dissolved Oxygen
0604C	Jack Creek	Bacteria	Ammonia, Depressed Dissolved Oxygen, Nitrate, Orthophosphorus, Total Phosphorus
0604D	Piney Creek	Depressed Dissolved Oxygen	Ammonia, Depressed Dissolved Oxygen
0604M	Biloxi Creek	Bacteria, Depressed Dissolved Oxygen	Ammonia, Total Phosphorus
0604N	Buck Creek	No Impairments	Ammonia
0604T	Lake Ratcliff	Mercury In Edible Tissue	No Concerns
0605	Lake Palestine	pH	Chlorophyll-A, Depressed Dissolved Oxygen, pH, Manganese in Sediment
0605A	Kickapoo Creek in Henderson County	Bacteria, Depressed Dissolved Oxygen	Ammonia, Chlorophyll-A, Depressed Dissolved Oxygen, Bacteria
0606	Neches River Above Lake Palestine	Bacteria, Depressed Dissolved Oxygen, pH	Nitrate, Orthophosphorus, Total Phosphorus, Depressed Dissolved Oxygen
0606A	Prairie Creek	Bacteria	Ammonia
0606D	Black Fork Creek	Bacteria	Ammonia
0610	Sam Rayburn Reservoir	Mercury in Edible Tissue	Ammonia, Arsenic in Sediment, Iron in Sediment, Manganese in Sediment
0610A	Ayish Bayou	Bacteria	Ammonia, Depressed Dissolved Oxygen
0611	Angelina River Above Sam Rayburn Reservoir	Bacteria	Ammonia, Bacteria, Depressed Dissolved Oxygen
0611A	East Fork Angelina River	Bacteria	Bacteria
0611B	La Nana Bayou	Bacteria	Ammonia, Bacteria, Depressed Dissolved Oxygen, Nitrate, Orthophosphorus, Total Phosphorus
0611C	Mud Creek	Bacteria	Ammonia, Bacteria, Depressed Dissolved Oxygen
0611D	West Mud Creek	Bacteria	Ammonia, Nitrate
0611Q	Lake Nacogdoches	No Impairments	Ammonia
0611R	Lake Striker	No Impairments	Ammonia
0612	Attoyac Bayou	Bacteria	Ammonia, Depressed Dissolved Oxygen
0615	Angelina River/Sam Rayburn Reservoir	Depressed Dissolved Oxygen, Impaired Fish Community, Mercury in Edible Tissue	Depressed Dissolved Oxygen, Orthophosphorus, Total Phosphorus
0615A	Paper Mill Creek	Bacteria	Depressed Dissolved Oxygen

Watershed Action Planning

The Watershed Action Planning (WAP) process, established in 2011, is the state's coordinated approach to develop, coordinate, and track action to address water quality issues. The WAP process coordinates planning and activities among numerous agencies and interested parties, including the TCEQ, the Texas State Soil and Water Conservation Board (TSSWCB), the Texas Clean Rivers Program (CRP) partners, and stakeholders from the watershed. The WAP process is a flexible approach that utilizes a range of strategy options for addressing impaired water bodies on the 303(d) List and other water quality issues and provides a framework that each program area, partner agency, and stakeholder can use for planning, budgeting, and implementing activities to address water quality issues. The WAP process can also be used to address potential water quality issues before they develop to the level of an impairment.

A major product of the WAP process, the **Watershed Action Planning Strategy Table**, is a comprehensive strategy for protecting and improving the quality of water bodies. This table lists:

- impaired and special interest water bodies
- the recommended strategies to improve water quality in impaired segments to protect water bodies of special interest
- the status of each strategy
- the lead agency and program for tracking each strategy

The Watershed Action Planning Strategy Table can be downloaded at the following location:

http://www.tceq.texas.gov/assets/public/implementation/water/wap/wap_allbasins.pdf

A critical aspect of the WAP process in input from stakeholders. The type of data and information to be gathered through local watershed discussions include:

- **Watershed Evaluation** – Develop and prepare watershed maps, land use classifications, and models, and identify data gaps and data acquisition projects.
- **Pollution Sources** - Identify potential point and non-point sources of pollution, evaluate pollution sources, identify pollution control practices, identify data gaps and data acquisition projects.
- **Water Quality Monitoring** - Identify water quality monitoring sites, identify water quality indicators, identify data gaps and data acquisition projects.
- **Watershed Stakeholders** - Identify key stakeholders, characterize stakeholder support, and identify issues of concern and watershed goals.
- **Public** – Characterize public support and identify issues of concern and watershed goals.
- **Watershed Planning Strategy** – Identify what option(s) (e.g. Use Attainability Analysis, Total Maximum Daily Load, Watershed Protection Plan, etc.) the public and local stakeholders recommend be considered to address each water quality issue.

Attoyac Bayou at SH 7 (Monitoring Station 15253)

Tools to Address Water Quality Issues

Multiple tools are available to address water quality issues. Use Attainability Analysis (UAA), Best Management Practices (BMPs), Watershed Protection Plans (WPPs) and Total Maximum Daily Loads (TMDLs) are some of these tools.

- A **Use Attainability Analysis (UAA)** is a structured scientific assessment of the characteristics (physical, chemical, or biological) of a water body. If there is a general consensus among stakeholders and resource agencies that a presumed or designated use may not be appropriate, then a UAA may be conducted to evaluate the appropriate use(s) for that water body. UAAs can also be used to develop site-specific uses. In Texas, there are two types of UAAs that are available tools to assess the appropriateness of a water body's presumed or designated use. These types of UAAs are Aquatic Life Use UAAs (ALU UAA) and Recreational UAAs (RUAA).
- **Best Management Practices (BMPs)** are structural or non-structural practices which are intended to minimize the impacts of development on water bodies. Nonpoint Source BMPs are used to reduce or control impacts to water bodies from nonpoint sources, most commonly by reducing pollutant loading. There are many types of BMPs to address specific needs and site characteristics. Categories of BMPs include:
    - Preventative Practices
    - Cleanup Practices
    - Erosion Control Practices
    - Sediment Control Practices
    - Runoff Control Practices
    - Channel Protection Practices
    - Habitat Restoration Practices
    - In-Stream Remediation Practices
    - Other BMPs (such as public education)
- **Watershed Protection Plans (WPPs)** are a voluntary, proactive approach to integrating activities and prioritizing implementation of BMPs. They address complex water quality problems that cross multiple jurisdictions with the goal of improving, restoring or maintaining water quality within a particular watershed. Through the WPP process, the State of Texas encourages stakeholders and local landowners to holistically address all of the sources and causes of impairments and threats to resources within a watershed. Developed and implemented through diverse, well integrated partnerships, a WPP helps assure the long-term health of a watershed with strategies for protecting unimpaired waters and for restoring impaired waters.
- A **Total Maximum Daily Load (TMDL)** is a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards. It is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. The calculation must include a margin of safety to ensure that the water body can be used for the purposes the State has designated. The calculation must also account for seasonal variation in water quality. Once a TMDL and TMDL Implementation Plan (I-Plan) has been developed, the TMDL will be put into action and pollutant loads will be reduced through regulatory and voluntary activities. For example, discharge permits for any point sources associated with the water body may need to be modified to include more strict limitations on their output in order to reduce the amount of pollution in their discharge.

These and other tools, along with public education and the diligent work of stakeholders, resource agencies, and volunteers can and do make a difference. The quality of a water body can be improved to a point where it is capable of supporting its use(s), and the water body can then be removed from the 303(d) list of impaired water bodies.

Illegal trash dump site, Angelina River at SH 204

Segments in the Upper Neches Basin

Classified & Unclassified Segments

For the purpose of managing Water Quality Standards, water bodies in the state are divided into classified and unclassified segments. A classified segment is a water body or portion of a water body that is individually defined in the Texas Surface Water Quality Standards. A segment is intended to have relatively homogeneous chemical, physical, and hydrological characteristics. A segment provides a basic unit for assigning site-specific standards and for applying water quality management programs of the agency. Classified segments may include streams, rivers, bays, estuaries, wetlands, lakes, or reservoirs. The classified segments are assigned four-digit numbers. The first two digits correspond to the major basin in which they are located. The last two digits distinguish individual segments within the particular basin.

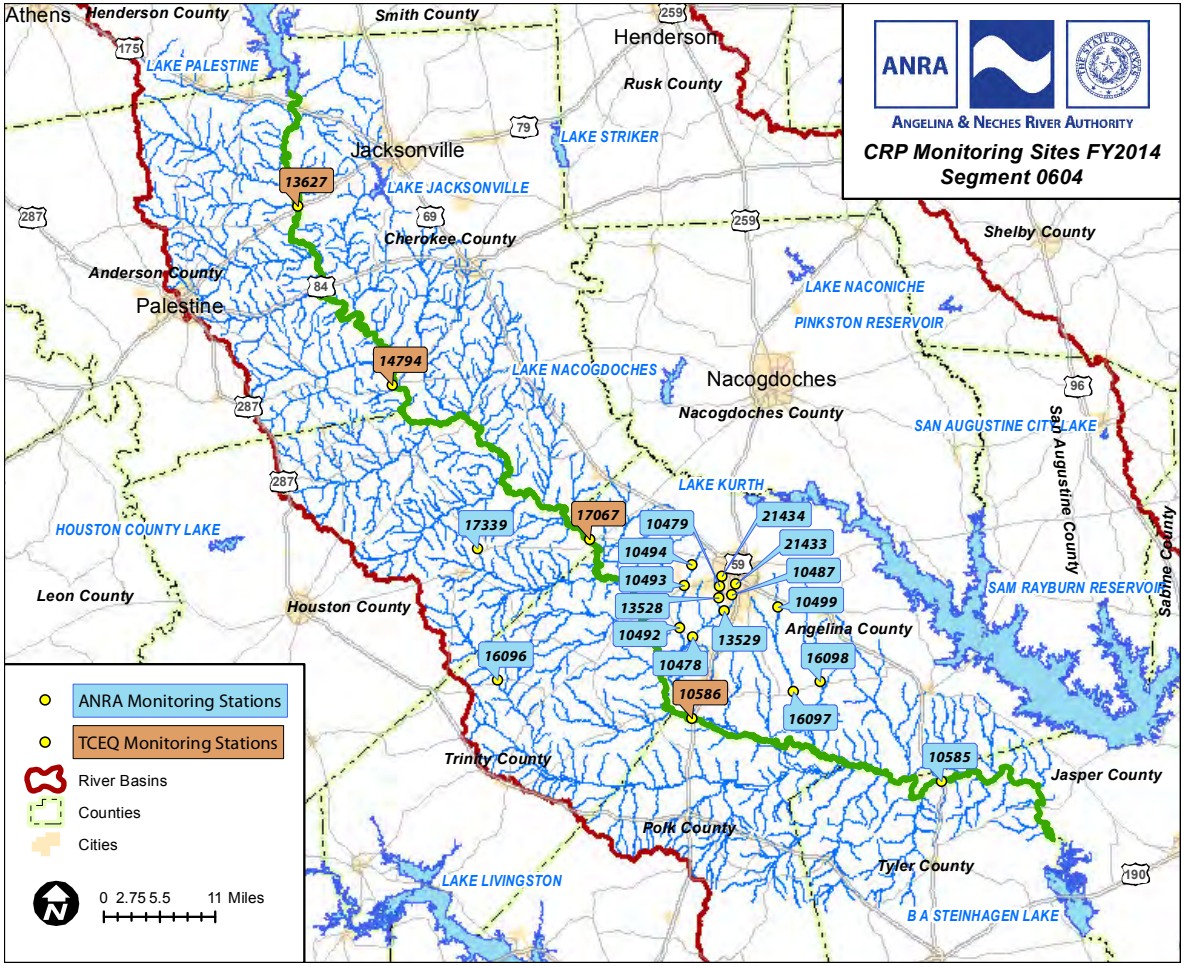
Because of the great extent of waters of the state, not all bodies of water are classified in the standards. For example, when managing a classified segment of the Neches River, it may be necessary to examine water quality in the tributaries that flow into that segment. Some of these tributaries may not be part of the classified segment system. When that happens, for management purposes, the tributary is assigned a unique tracking number that is referred to as an unclassified segment. This unclassified tributary will be designated with the number of the classified segment in whose watershed it is located, along with a letter; for instance, tributaries of Segment 0604 would be 0604A, 0604B, and so on. The same numbering system applies to unclassified lakes. In management activities, both classified and unclassified segments are referred to generically as water bodies.

Angelina River at SH 204 (Monitoring Station 10633)

Neches River Below Lake Palestine (Segment 0604)

This 231 miles-long freshwater stream extends from a point immediately upstream of the confluence of Hopson Mill Creek in Jasper/Tyler County to Blackburn Crossing Dam in Anderson/Cherokee County. Contact recreation, public water supply, general, and high aquatic life use are the designated uses for this segment. Segment 0604 was previously listed on the 303 (d) list for lead in water, but was delisted in 2010. On the 2012 303 (d) list, the segment is listed for mercury in edible tissue for all three assessment units.

Neches River at US 69 (Monitoring Station 10585)



Site Description	Station ID	Waterbody ID	Agency	Field	Conv	Bacteria	Flow
NECHES RIVER AT SH 294	14794	0604	TCEQ	4	4	4	4
NECHES RIVER AT SH 7	17067	0604	TCEQ	4	4	4	
NECHES RIVER AT US 59	10586	0604	TCEQ	4	4	4	4
NECHES RIVER AT US 69	10585	0604	ANRA	4	4	4	4
NECHES RIVER DOWNSTREAM LAKE PALESTINE	13627	0604	TCEQ	4	4	4	4
CEDAR CREEK AT ELLIS AVE IN LUFKIN	21434	0604A	ANRA	4	4	4	4
CEDAR CREEK AT FM 1336	13528	0604A	ANRA	4	4	4	4
CEDAR CREEK AT FM 2497	10478	0604A	ANRA	4	4	4	4
CEDAR CREEK AT ST LOOP 287 IN LUFKIN	10479	0604A	ANRA	4	4	4	4
HURRICANE CREEK DOWNSTREAM OF KIWANIS PARK DRIVE	21433	0604B	ANRA	4	4	4	4
HURRICANE CREEK AT FM 324	13529	0604B	ANRA	4	4	4	4
HURRICANE CREEK AT ST LOOP 287 IN SOUTH LUFKIN	10487	0604B	ANRA	4	4	4	4
JACK CREEK AT FM 2497	10492	0604C	ANRA	4	4	4	4
JACK CREEK AT FM 3150	10494	0604C	ANRA	4	4	4	4
JACK CREEK AT SH 94	10493	0604C	ANRA	4	4	4	4
PINEY CREEK AT FM 358	16096	0604D	ANRA	4	4	4	4
BILOXI CREEK AT ANGELINA CR216	10499	0604M	ANRA			6	6
BILOXI CREEK AT FM 1818	16097	0604M	ANRA	4	4	4	4
BUCK CREEK AT FM 1818	16098	0604N	ANRA	4	4	4	4
LAKE RATCLIFF WHERE NORTHWEST ARM OF LAKE JOINS MAIN BODY	17339	0604T	ANRA	4	4	4	

Cedar Creek at FM 2497 (Monitoring Station 10478)

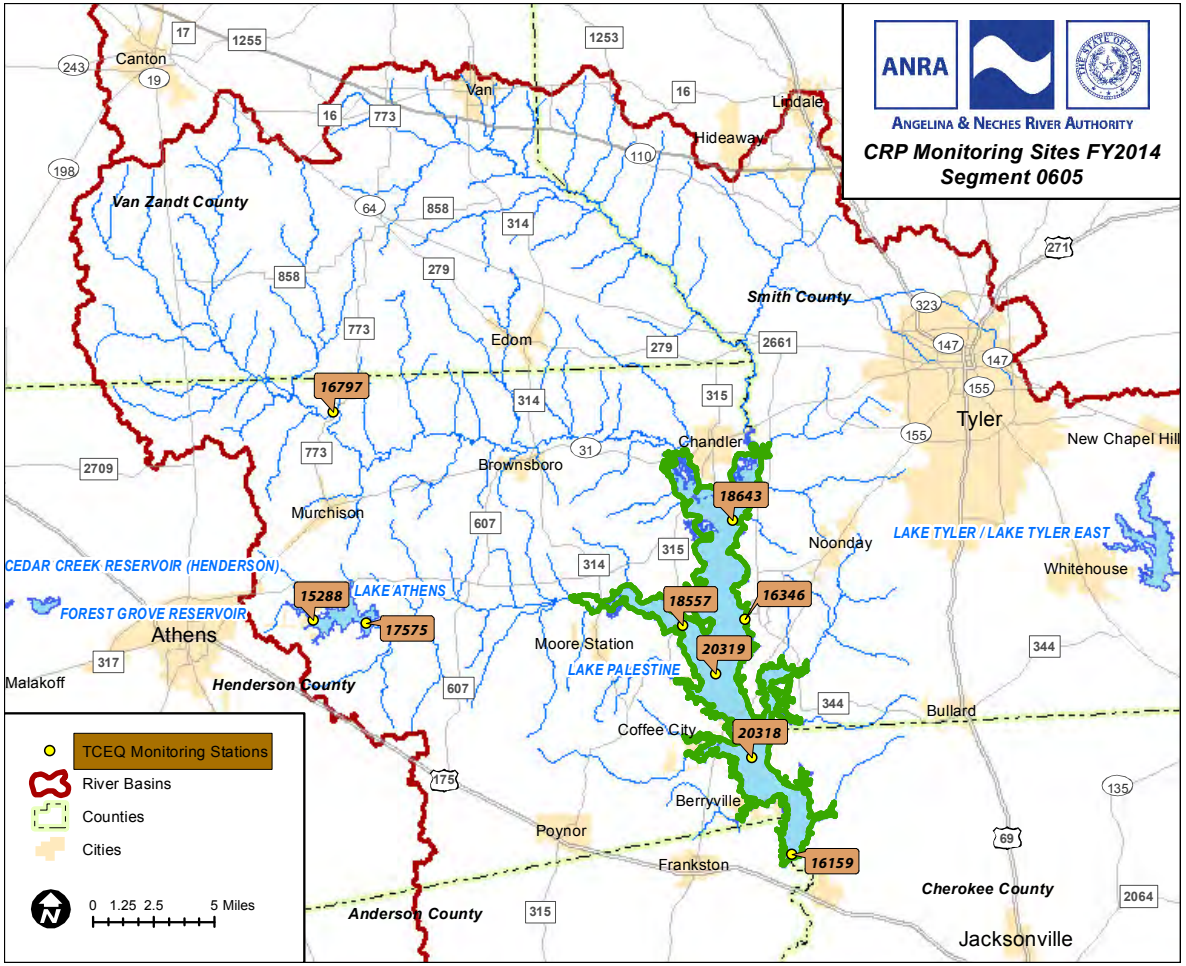
Lake Palestine (Segment 0605)

Lake Palestine is a 23,500-acre reservoir from the Blackburn Crossing Dam in Anderson/Cherokee County to a point 6.7 km (4.2 miles) downstream of FM 279 in Henderson/Smith County, up to normal pool elevation of 345 feet (impounds Neches River). It was impounded in 1962. Designated uses for this segment are general, public water supply, contact recreation, fish consumption, and high aquatic life use.

Lake Palestine is a popular angler site and houses several largemouth bass tournaments annually. Predominate fish species located within the lake include largemouth bass, spotted bass, white and hybrid striped bass, crappie, flathead and channel catfish, and sunfish. Vegetation within the reservoir is moderate in upper end and creek arms, especially near Kickapoo Creek. The upper lake is shallow and has heavy aquatic vegetation. Vegetation may include emergent, floating plants, and native submergent plants (TPWD, 2009).

There are several areas in Lake Palestine listed on the 2012 303 (d) due to nonsupport of general and public water supply use for pH levels. The first year listed was 2006. Areas of concern for pH levels are mid-lake near Tyler public water supply intake, flat creek arm, and the upper lake. Based upon the 2012 Integrated Report, there are Chlorophyll-*a* concerns throughout the lake, as well as pH impairments.

Lake Palestine at SH 315 bridge

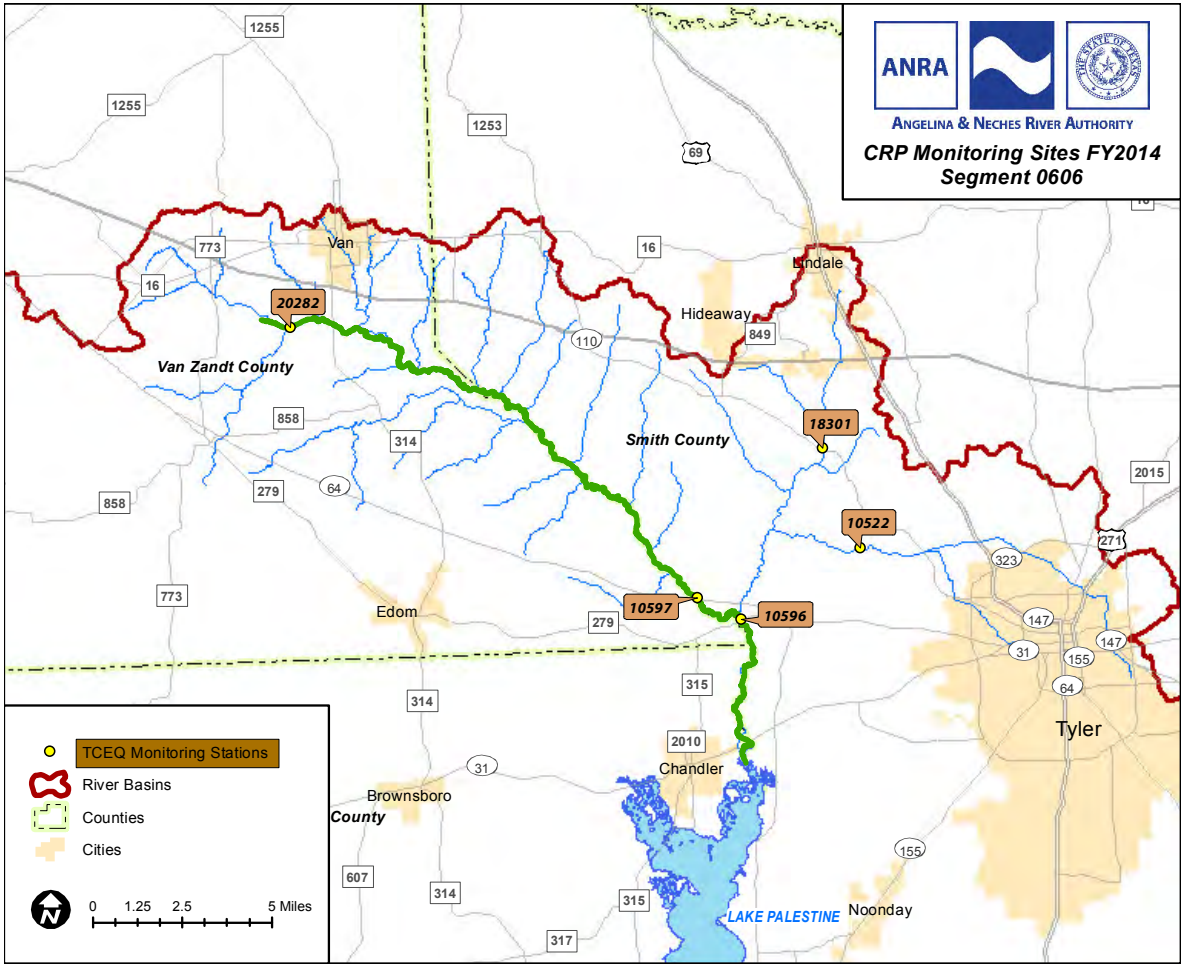


Site Description	Station ID	Waterbody ID	Agency	Field	Conv	Bacteria	Flow
LAKE PALESTINE BETWEEN FLAT BAY AND SH 155	20319	0605	TCEQ	4	4	4	
LAKE PALESTINE WEST OF EAGLES BLUFF COUNTRY CLUB	20318	0605	TCEQ	4	4	4	
LAKE PALESTINE AT DAM	16159	0605	TCEQ	4	4	4	
LAKE PALESTINE AT THE CITY OF TYLER RAW WATER INTAKE STRUCTURE	16346	0605	TCEQ	4	4	4	
LAKE PALESTINE IN FLAT BAY	18557	0605	TCEQ	4	4	4	
LAKE PALESTINE UPPER LAKE EAST SHORE	18643	0605	TCEQ	4	4	4	
KICKAPOO CREEK AT FM 773	16797	0605A	TCEQ	4	4	4	4
LAKE ATHENS DOWNSTREAM OF WATER TREATMENT PLANT INFLOW	15288	0605F	TCEQ	4	4	4	
LAKE ATHENS NEAR NORTHEAST END	17575	0605F	TCEQ	4	4	4	

Boat dock on Lake Palestine

Neches River Above Lake Palestine (Segment 0606)

This freshwater stream includes 27 miles from a point 6.7 km (4.2 miles) downstream of FM 279 in Henderson/ Smith County to Rhines Lake Dam in Van Zandt County. Aquatic life, general, contact recreation, and public water supply are the designated uses for this segment. There are several listings within this segment on the 303(d) list of impaired water bodies.



Site Description	Station ID	Waterbody ID	Agency	Field	Conv	Bacteria	Flow	Metal Water	Metal Sed
NECHES RIVER AT FM 279	10596	0606	TCEQ	4	4	4	4		
NECHES RIVER AT SH 64	10597	0606	TCEQ	4	4	4	4	5	
PRAIRIE CREEK AT SH 110	18301	0606A	TCEQ	4	4	4	4		
BLACK FORK CREEK AT SMITH CR 46	10522	0606D	TCEQ	4	4	4	4		

Neches River above Lake Palesine at SH 31

Sam Rayburn Reservoir (Segment 0610)

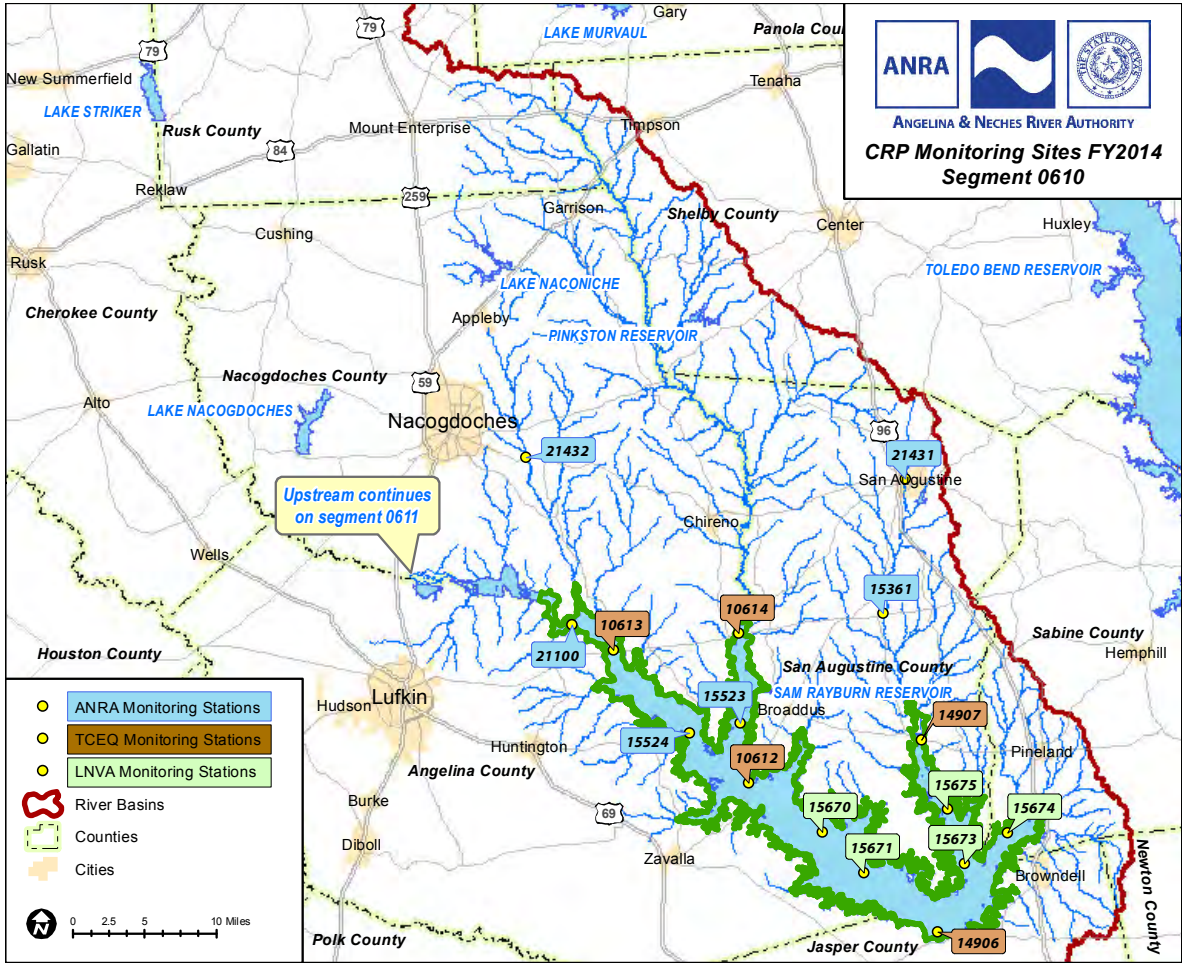
Sam Rayburn Reservoir includes 106,666 acres from Sam Rayburn Dam in Jasper County to a point 5.6 kilometers (3.5 miles) upstream of Marion's Ferry on the Angelina River Arm in Angelina/Nacogdoches County and to a point 3.9 km (2.4 miles) downstream of Curry Creek on the Attoyac Bayou Arm in Nacogdoches. Designated uses are general use, high aquatic life use, public water supply use, contact recreation, and fish consumption. Located around Sam Rayburn are various contact recreational areas including trails, campgrounds, boating ramps, marinas, designated swimming areas, and group areas. Multiple locations within Sam Rayburn Reservoir are listed on the 303 (d) list due to mercury (Hg) presence in edible fish tissue. All areas were first listed on the 303(d) list in 1996 and are currently under a 5c classification.

Sam Rayburn Reservoir near dam

Bald Eagle at Sam Rayburn Reservoir

Sample collection and preservation at Sam Rayburn Reservoir

Ayish Bayou at SH 103 (Monitoring Station 15361)

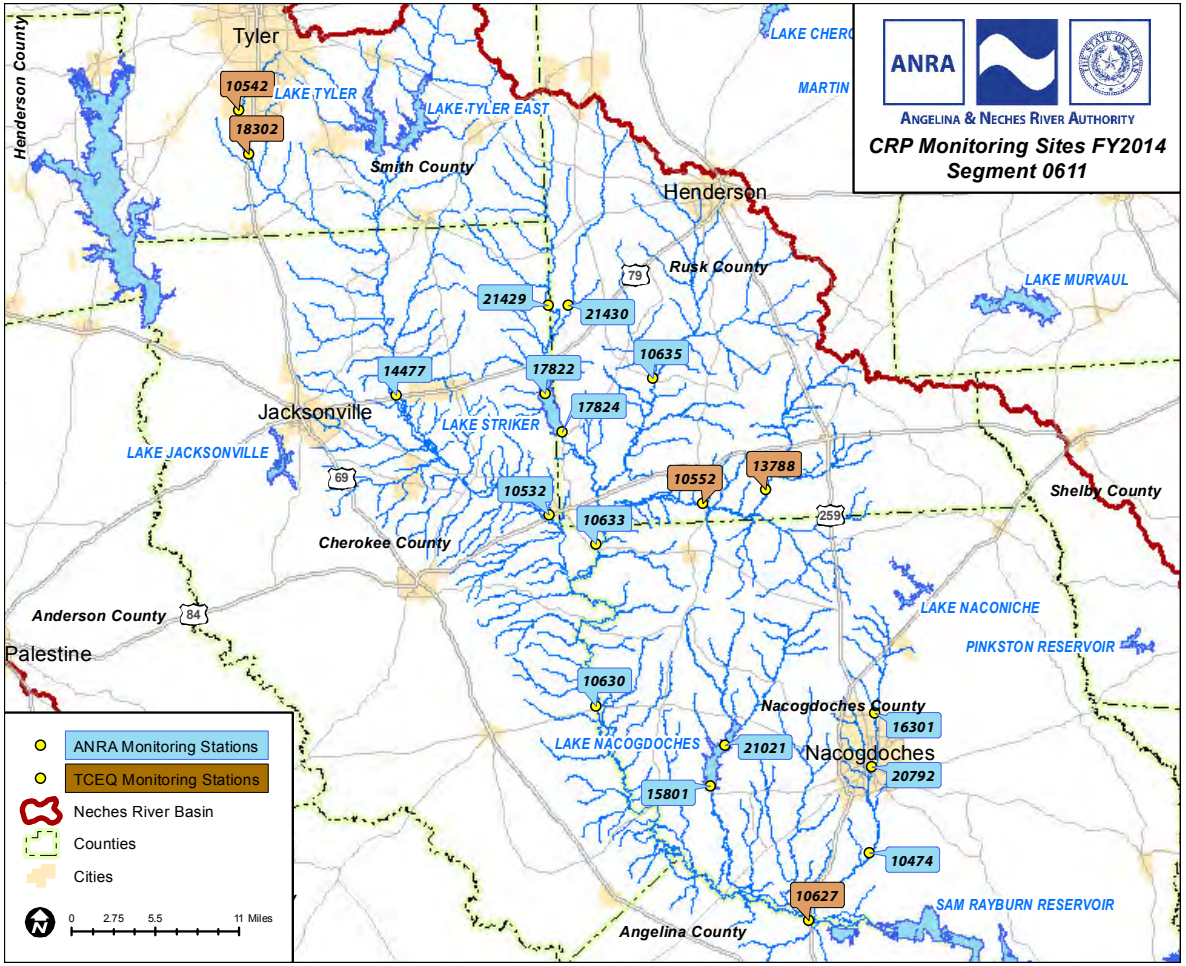


Site Description	Station ID	Waterbody ID	Agency	Field	Conv	Bacteria	Flow	Metal Water	Metal Sed
BAYOU CARRIZO AT SH 21	21432	0610	ANRA	4	4	4	4		
SAM RAYBURN RESERVOIR SHIRLEY CREEK	15524	0610	ANRA	4	4	4			
SAM RAYBURN RESERVOIR ALLIGATOR COVE	15523	0610	ANRA	4	4	4			
SAM RAYBURN RESERVOIR AT FM 83	14907	0610	TCEQ	4	4	4			
SAM RAYBURN RESERVOIR AT MAIN POOL	14906	0610	TCEQ	4	4	4			4
SAM RAYBURN RESERVOIR AT SH 103	10613	0610	TCEQ	4	4	4			
SAM RAYBURN RESERVOIR AT SH 147	10612	0610	TCEQ	4	4	4			4
SAM RAYBURN RESERVOIR MARIONS FERRY	21100	0610	ANRA	4	4	4			
SAM RAYBURN RESERVOIR USGS SITE AC	15673	0610	LNVA	4	4	4			
SAM RAYBURN RESERVOIR USGS SITE FC	15671	0610	LNVA	4	4	4			
SAM RAYBURN RESERVOIR USGS SITE GC	15670	0610	LNVA	4	4	4			
SAM RAYBURN RESERVOIR USGS SITE LC	15674	0610	LNVA	4	4	4			
SAM RAYBURN RESERVOIR USGS SITE MC	15675	0610	LNVA	4	4	4			
SAM RAYBURN RESERVOIR AT SH 103	10614	0610	TCEQ	4	4	4			
AYISH BAYOU AT SH 103	15361	0610A	ANRA	4	4	4	4		
AYISH BAYOU AT WEST COLUMBIA STREET	21431	0610A	ANRA	4	4	4	4		

Angelina River Above Sam Rayburn (Segment 0611)

This freshwater stream encompasses a length of 104 miles and extends from the Upper Angelina sub-basin to the Lower Angelina sub-basin. Segment 0611 originates from the aqueduct crossing 0.6 miles upstream of the confluence of the Paper Mill Creek in Angelina/Nacogdoches County to the confluence of Barnhardt Creek and Mill Creek at FM 225 in Rusk County. The designated uses for this segment include contact recreation, high aquatic life use, fish consumption use, public water supply use, and general use. This segment has two areas that are currently listed on the 303(d) list due to bacteria. The listings were placed on the 303(d) list in the year 2000 and are currently categorized as 5a (2008), indicating a total maximum daily load (TMDL) is underway or scheduled.

Angelina River at SH 21 (Monitoring Station 10630)



Site Description	Station ID	Waterbody ID	Agency	Field	Conv	Bacteria	Flow
ANGELINA RIVER UPSTREAM OF SH 204	10633	0611	ANRA	4	4	4	4
ANGELINA RIVER AT SH 21	10630	0611	ANRA	4	4	4	4
ANGELINA RIVER AT US 59	10627	0611	TCEQ	4	4	4	4
ANGELINA RIVER AT FM 1798	10635	0611	ANRA	4	4	4	4
EAST FORK ANGELINA RIVER AT RUSK CR 3218	13788	0611A	TCEQ	4	4	4	5
EAST FORK ANGELINA RIVER AT FM 225	10552	0611A	TCEQ	4	4	4	4
LA NANA BAYOU AT LOOP 224 NORTH	16301	0611B	ANRA	4	4	4	4
LA NANA BAYOU AT NACOGDOCHES CR 526	10474	0611B	ANRA	4	4	4	4
LA NANA BAYOU AT EAST MAIN STREET	20792	0611B	ANRA	4	4	4	4
MUD CREEK AT US 79	14477	0611C	ANRA	4	4	4	4
MUD CREEK AT US 84	10532	0611C	ANRA	4	4	4	4
WEST MUD CREEK AT US 69	18302	0611D	TCEQ	4	4	4	4
WEST MUD CREEK UPSTREAM FROM TYLER SOUTHSIDE WWTP OUTFALL	10542	0611D	TCEQ	4	4	4	4
LAKE NACOGDOCHES IN MAIN POOL NEAR DAM	15801	0611Q	ANRA	4	4	4	
LAKE NACOGDOCHES UPPER LAKE	21021	0611Q	ANRA	4	4	4	
BOWLES CREEK AT CHEROKEE CR 4608/RUSK CR 4194	21429	0611R	ANRA	4	4	4	4
JOHNSON CREEK AT RUSK CR 476	21430	0611R	ANRA	4	4	4	4
LAKE STRIKER NEAR DAM	17824	0611R	ANRA	4	4	4	
LAKE STRIKER UPPER LAKE	17822	0611R	ANRA	4	4	4	

Bridge crossing, Mud Creek at US 84 (Monitoring Station 10532)

Water moccasin, West Mud Creek (Monitoring Station 10542)

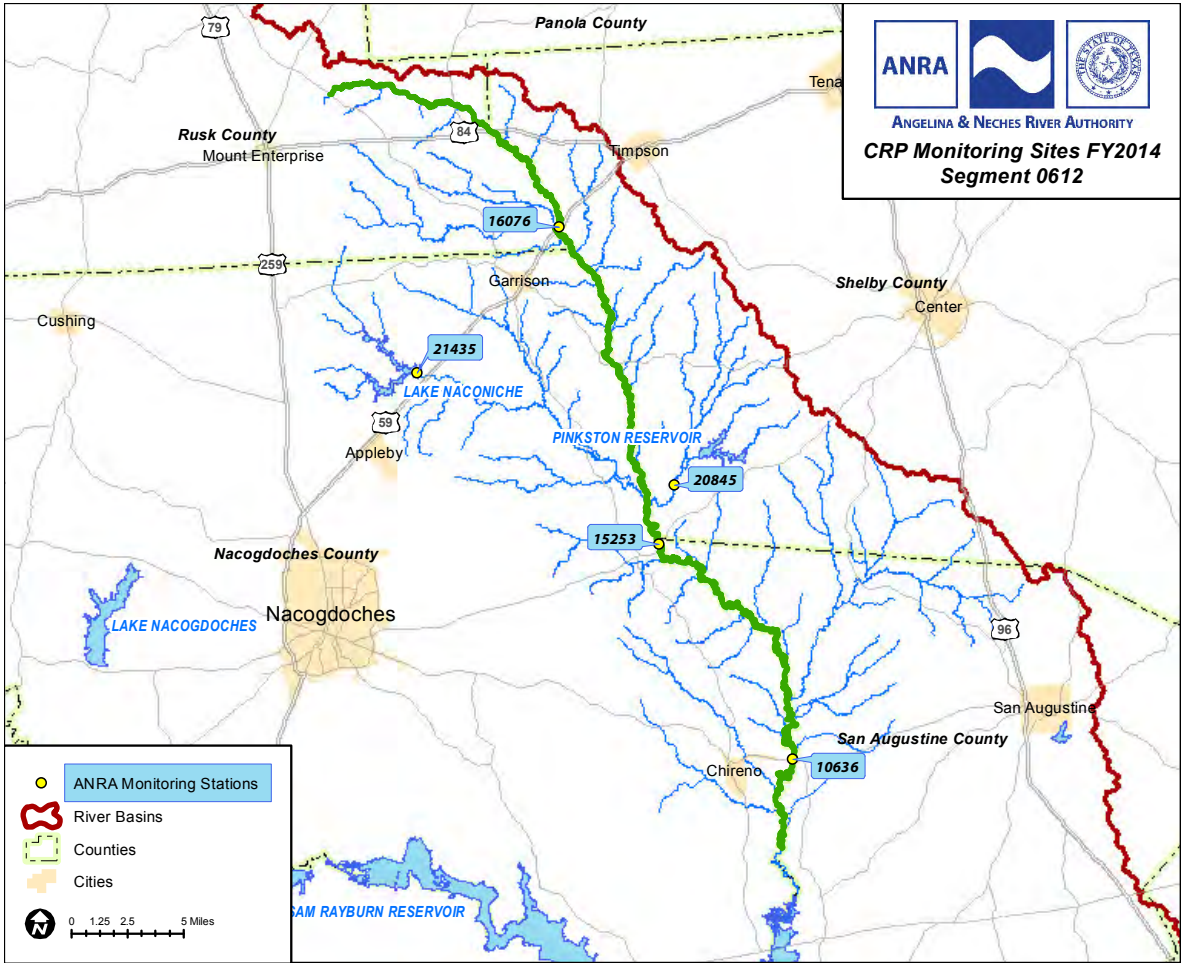
Attoyac Bayou (Segment 0612)

A freshwater stream measuring 81.7 miles in length from a point 3.9 km (2.4 miles) downstream of Curry Creek in Nacogdoches/San Augustine County to FM 95 in Rusk County. The designated uses for this segment include the following: high aquatic life, general, contact recreation, and public water supply. The area surrounding the watershed is managed for agricultural (cattle and poultry), silvicultural, recreational, and wildlife uses. The watershed contains many rural residents. This segment has three areas that are listed on the 303(d) list due to bacteria.

Attoyac Bayou at US 59 (Monitoring Station 16076)

Attoyac Bayou at SH 7 (Monitoring Station 15253)

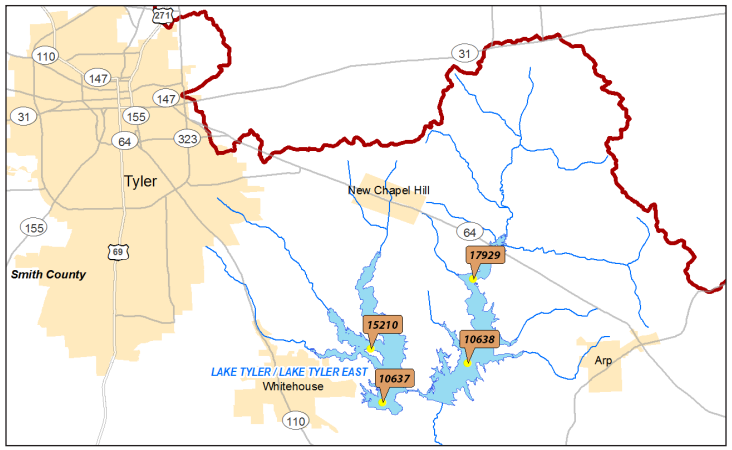
Cattle in field adjacent to Attoyac Bayou at US 59



Site Description	Station ID	Waterbody ID	Agency	Field	Conv	Bacteria	Flow
ATTOYAC BAYOU AT SH 21	10636	0612	ANRA	4	4	4	4
ATTOYAC BAYOU AT SH 7	15253	0612	ANRA	4	4	4	4
ATTOYAC BAYOU AT US 59	16076	0612	ANRA	4	4	4	4
NACONICHE LAKE NEAR DAM	21435	0612	ANRA	4	4	4	
WEST CREEK AT FM 2913	20845	0612F	ANRA	4	4	4	4

Mussel, Attoyac Bayou at SH 7 (Monitoring Station 15253)

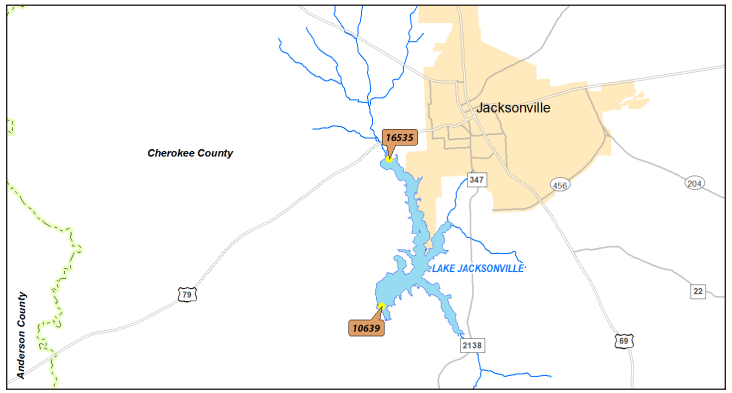
360 degree panorama of Attoyac Bayou at SH 7 (Monitoring Station 15253)



Lake Tyler/Lake Tyler East (Segment 0613)

Segment 0613 extends from Whitehouse Dam and Mud Creek Dam in Smith County up to the normal pool elevation of 375.38 feet. The reservoir impounds both Prairie Creek and Mud Creek. Lake Tyler West and East include a total of 4,880 acres. This segment is designated for high aquatic life use, general use, fish consumption use, public water supply use, and recreation use. Lake Tyler West and East were impounded in 1949 and 1966, respectively. The reservoir serves as a major source for water supply and recreational use. There are several park areas adjacent to the lakes. The lakes have a storage capacity of 15 billion gallons of water within the watershed. The maximum depth is forty feet.

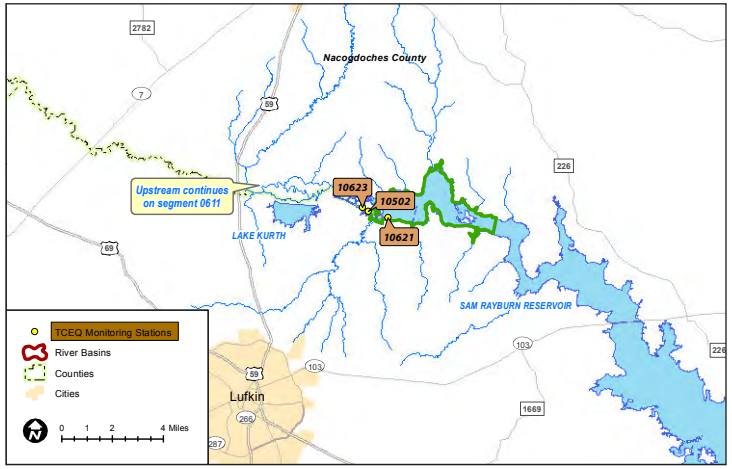
Site Description	Station ID	Waterbody ID	Agency	Field	Conv	Bacteria	Flow	Metal Water	Metal Sed
LAKE TYLER AT LANGLEY ISLAND	15210	0613	TCEQ	4	4	4			1
LAKE TYLER EAST AT DAM	10638	0613	TCEQ	4	4	4			1
LAKE TYLER EAST UPPER LAKE	17929	0613	TCEQ	4	4	4			1
LAKE TYLER MIDLAKE AT DAM	10637	0613	TCEQ	4	4	4			1



Lake Jacksonville (Segment 0614)

Segment 0614 is designated as a classified reservoir, Lake Jacksonville. The description of this lake includes from an area from Buckner Dam in Cherokee county up to a normal pool elevation of 422 feet (impounds Gum Creek). The reservoir is classified for public water supply use, high aquatic life use, general use, and contact recreation use.

Site Description	Station ID	Waterbody ID	Agency	Field	Conv	Bacteria	Flow
LAKE JACKSONVILLE UPPER LAKE	16535	0614	TCEQ	4	4	4	
LAKE JACKSONVILLE SOUTHWEST CORNER	10639	0614	TCEQ	4	4	4	



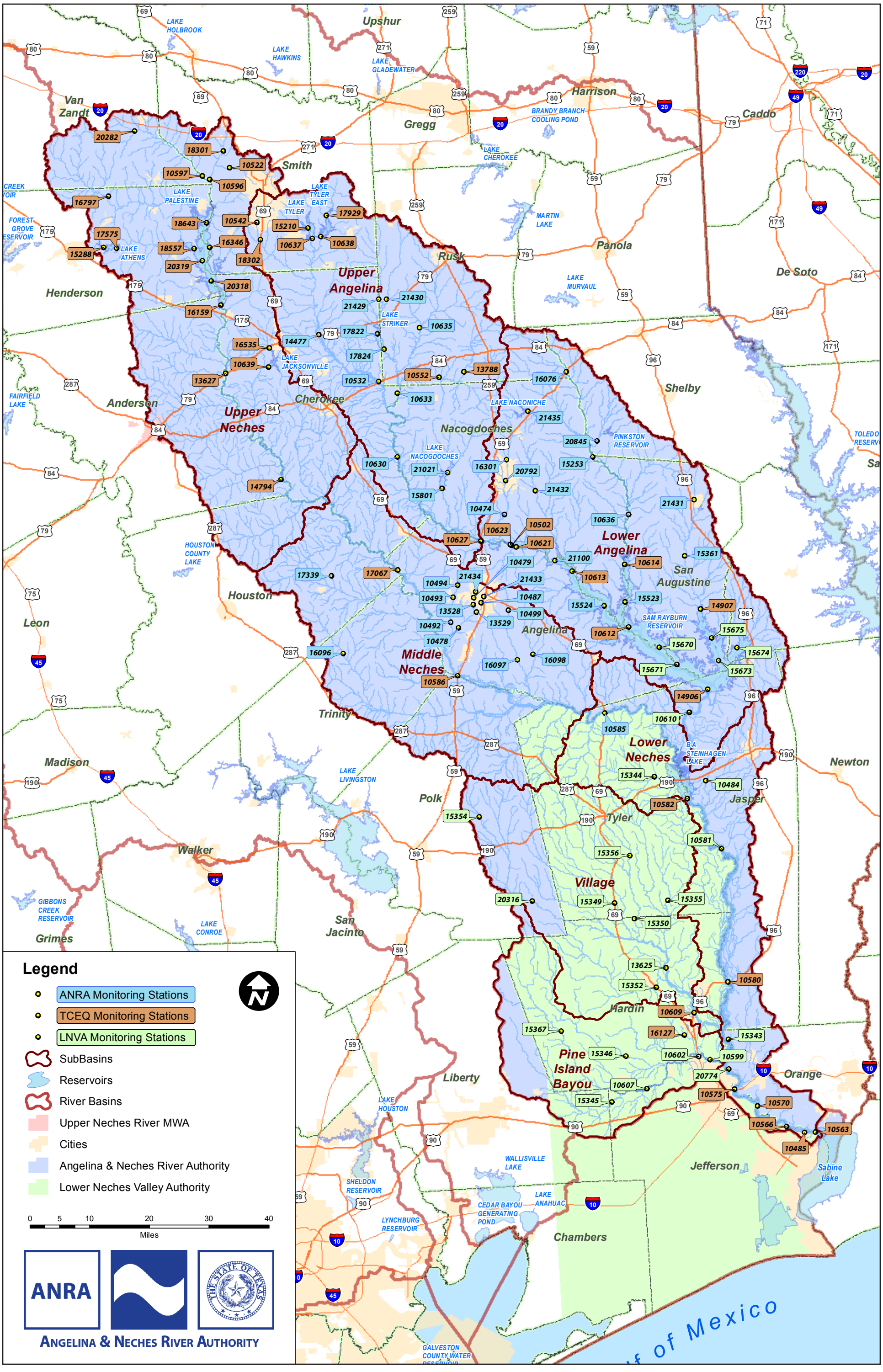
Riverine Portion of Sam Rayburn Reservoir (Segment 0615)

The riverine portion of Sam Rayburn Reservoir extends from a point 5.6 kilometers (3.5 miles) upstream of Marion's Ferry to a point 2.75 kilometers (1.71 miles) upstream of the confluence of Paper Mill Creek. The segment includes 5,068 acres. The designated uses for this segment include intermediate aquatic life use, contact recreation, general use, and public water supply.

Site Description	Station ID	Waterbody ID	Agency	Field	Conv	Bacteria	Flow
SAM RAYBURN RESERVOIR AT CONFLUENCE OF ANGELINA RIVER	10623	0615	TCEQ	4	4	4	
SAM RAYBURN RESERVOIR DOWNSTREAM OF CONFLUENCE WITH PAPER MILL CREEK	10621	0615	TCEQ	4	4	4	
PAPER MILL CREEK UPPER BIFURCATION CHANNEL	10502	0615A	TCEQ	4	4	4	

This Page Intentionally Blank

Map of Monitoring Stations in the Neches River Basin for FY 2014



This Page Intentionally Blank

Special Projects

Development of a Watershed Protection Plan for Attoyac Bayou

The Development of a Watershed Protection Plan for Attoyac Bayou project collected additional water quality and stream flow data to help develop a better understanding of *E. coli* loadings in the water body. Local stakeholder input helped facilitate the accurate identification of *E. coli* sources in the watershed. The project is currently in the process of developing an effective watershed protection plan to restore water quality.

In July 2010, Stephen F. Austin State University (SFASU) field personnel began collecting surface water samples and submitting them to the ANRA Environmental Laboratory for analysis of nutrients and bacteria.

A subset of samples was sent to Texas A&M University for bacterial source tracking analysis. Sampling was performed biweekly at 10 routine stations, quarterly at 4 wastewater treatment facilities, and at 2 sites, additional stormwater sampling occurs in response to rainfall events. Sampling was occasionally sporadic due to prolonged drought conditions. Laboratory and field data from the study was submitted to the TSSWCB for inclusion in the TCEQ's Surface Water Quality Monitoring Information System (SWQMIS).

As part of this project, a RUAA was conducted in 2012. Because very few signs of contact recreation were observed, it is possible that the segment may need to be reclassified from primary contact recreation to secondary contact recreation. If the segment is reclassified, the bacteria geometric means are below the current criterion for secondary contact recreation (630 MPN/100 mL). Following a reclassification, the segment should no longer be considered impaired for bacteria and would therefore be removed from the 303(d) list.

The Watershed Protection Plan is in the process of being developed and is currently in draft form.

Project Goals and Objectives

- To assess the current water quality conditions and impairments in the Attoyac Bayou watershed through targeted water quality sampling and analysis
- To conduct a watershed source survey and develop a comprehensive GIS inventory
- To analyze water quality data using Load Duration Curves and spatially explicit modeling
- To conduct bacterial source tracking and evaluate the sources of *E. coli* present in the watershed that are actually contributing to the Bayou's bacteria load
- To conduct a Recreational Use Attainability Analysis to determine the most appropriate water quality standard for the Attoyac Bayou
- To establish and provide direction for a stakeholder group that will serve as a decision making body in the assessment of the Attoyac Bayou and facilitate the development of a Watershed Protection Plan (WPP).

The project website includes links to download project documents, including the RUAA document and draft Watershed Protection Plan. For more information on the project, please visit the project website at http://attoyac.tamu.edu or contact:

Anthony Castilaw
Watershed Coordinator
Castilaw Environmental Services, LLC
936-559-9991
acastilaw@castilawenvironmental.com

PROJECT PARTNERS

The Development of a Watershed Protection Plan for Attoyac Bayou project is a collaborative effort by several partner agencies. Funding for the project is provided by the Texas State Soil and Water Conservation Board (TSSWCB) through a Clean Water Act, Section 319(h) grant from the U.S. Environmental Protection Agency (EPA).

Partner agencies for the project include the Texas Water Resources Institute (TWRI), AgriLife Research & Extension, Stephen F. Austin State University (SFASU), the Angelina & Neches River Authority, and Castilaw Environmental Services, LLC.

Recreational Use Attainability Analysis of Prairie Creek, Mud Creek, West Mud Creek, and Neches River Above Lake Palestine

Prairie Creek, Mud Creek, West Mud Creek, and the Neches River Above Lake Palestine are currently listed on the *Texas 303(d) List* due to elevated levels of *E. coli* bacteria. These creek have a presumed designated use of primary contact recreation. Based upon revisions to the TSWQS adopted by TCEQ in 2010, water bodies listed as impaired for bacteria are eligible for a standards review to determine if primary contact recreation is appropriate, or if a revision to the recreation use category is warranted.

Primary contact recreation is presumed for unclassified segments, and it is not known with certainty that recreational use is occurring in these waterbodies. The findings from an RUAA will provide information regarding the level of recreational use actually occurring in the waterbodies.

Through this project, which is funded through a Clean Water Act Section 319(h) Grant, the Texas State Soil and Water Conservation Board (TSSWCB) and the Texas Institute for Applied Environmental Research (TIAER) will work with local stakeholders for the data collection components of an RUAA, such as site selection and historical use surveys. At the end of this project, they will have adequate data that either supports the existing designated use (primary contact recreation) or supports a change in designated use (e.g., secondary contact recreation) for these segments.

Lake Sam Rayburn On-Site Sewage Facility (OSSF) Program Support and Attoyac Bayou OSSF Remediation

Through this project, ANRA will develop a database of On-Site Sewage Facilities (OSSFs) in the Control Zone Rayburn (CZR), the 2000-ft buffer zone around Sam Rayburn Reservoir, as well as the unincorporated portion of San Augustine County. The database will be used to track and map all permitted systems in the area immediately surrounding Sam Rayburn Reservoir, as well as the unincorporated portion of San Augustine County. This portion of the county includes a portion of the Attoyac Bayou watershed, a 303(d) listed waterbody impaired for bacteria.

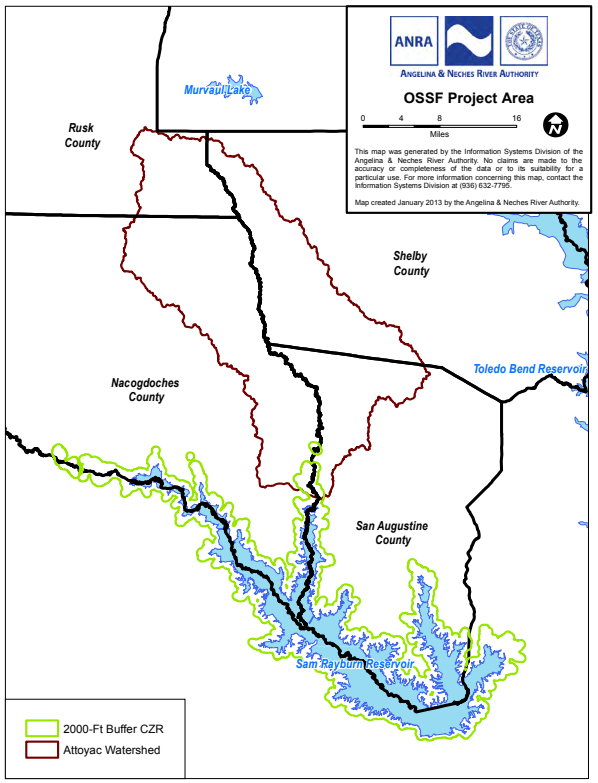
Failing or non-existent OSSFs in the area will be identified through a combination of database tracking of complaints and violations, field reconnaissance and inspections, and consultation with local officials. Funds from the project will be used to replace (in the case of failing systems) or install (in the case of non-existent systems) OSSFs in the portion of the Attoyac Bayou watershed located in San Augustine and Nacogdoches Counties. Replacement or installation of OSSFs will reduce potential sources of non-point source (NPS) pollution that may be contributing to the bacteria impairments in the watershed.

The database tracking and GIS mapping of permitted OSSFs in the watershed will provide a framework that ANRA can use in identifying candidates for future OSSF replacement or installation in additional or subsequent projects.

Surface water quality monitoring in the Attoyac Bayou watershed will be used to identify improvements in water quality following the replacement of failed or non-existent OSSFs, as well as monitoring effectiveness of BMPs established by the Attoyac Bayou Watershed Protection Plan. Water quality monitoring conducted under this project will test not only for bacteria but for nutrients as well, including parameters for which Attoyac Bayou and Sam Rayburn Reservoir have nutrient concerns.

Water quality data collected under this project will be routinely shared with the Attoyac Bayou Watershed Partnership, the group of stakeholders guiding the development of the Attoyac Bayou WPP. The data will also be collected under a TCEQ-approved QAPP, allowing the data to be uploaded to the TCEQ Surface Water Quality Monitoring Information System (SWQMIS), and thus making the data available to TCEQ for consideration in future water quality assessments.

The mapping and database components of this project began in FY 2014. OSSF replacement and surface water quality monitoring will be performed during FY 2015 and FY 2016.



Funding for the project is provided by the Texas Commission on Environmental Quality through a Clean Water Act, Section 319(h) grant from the U.S. Environmental Protection Agency (EPA).

Stakeholder Participation & Public Outreach

Public Information

The Angelina & Neches River Authority provides the public with information concerning water quality issues on our website (www.anra.org), which is updated frequently. The ANRA website provides public access to information on the Clean Rivers Program, current and historical Basin Summary and Basin Highlights reports, meeting agendas and minutes, maps, and water quality data. Numerous pamphlets, brochures, and other educational and informational literature on such topics as water quality, conservation, and on-site septic facilities are available to the public at ANRA's offices. ANRA supports the TPWD invasive species awareness campaign "Hello Giant Salvinia, Goodbye Texas Lakes" by making informational pamphlets available to the public.

Basin Steering Committee

The steering committee's role is advisory in nature and involves assistance with the review of local issues and creation of priorities for the Upper Neches river basin. Committee members assist with the review and development of work plans, reports, basin monitoring plans, allocation of resources, and basin action plans. CRP steering committee meetings are held annually each Spring. The committee is made up from a diverse group of stakeholders. One of the objectives of the CRP Long-Term Plan is to engage and inform stakeholders. The Steering Committee process gives stakeholders an opportunity to contribute their ideas and concerns through steering committee meetings, public meetings, and other forums. The process also allows for the communication of issues related to water quality so that priorities may be set which consider local, regional, state, and federal needs. The Steering Committee aids in increasing opportunities for citizens to identify pressing issues and concerns, contribute ideas to the CRP process, and functions to expand the public's role in water quality management issues.

Texas Stream Team

ANRA serves as the Texas Stream Team (formerly known as Texas Watch) regional partner for the Upper Neches Basin and provides training, monitoring kits, and replacement reagents to the volunteer monitors in the basin. ANRA supports a number of water quality monitors in the basin. The largest and most active group is comprised of members of the Greater Lake Palestine Council (GLPC). GLPC consists of a group of representatives from each Property Owner's Association surrounding Lake Palestine. The GLPC is concerned about protecting water quality in Lake Palestine and making other improvements in the area.

For more information on Texas Stream Team, please visit their website at

txstreamteam.rivers.txstate.edu

References and Links to Further Information

Additional Information and Resources

The Texas Clean Rivers Program

www.texascleanrivers.org

Coordinated Monitoring Schedule

cms.lcra.org

EPA's Surf Your Watershed

cfpub.epa.gov/surf/locate/index.cfm

USGS The National Map Streamer

nationalmap.gov/streamer

Attoyac Bayou Watershed Protection Plan Project

attoyac.tamu.edu

TIAER RUAA for Ten Creeks in the Red River and Neches River Basins

tiaer.tarleton.edu/ruaa/

Texas Stream Team

txstreamteam.rivers.txstate.edu

The Surface Water Quality Monitor

www.tceq.texas.gov/compliance/monitoring/water/newsletter.html

ANRA Website

The Angelina & Neches River Authority web page contains additional information on the activities of the river authority, including the Clean Rivers Program, the Environmental Laboratory, On-Site Sewage Facilities program, and water/wastewater utilities. ANRA's web site can be found at www.anra.org.

Contact Information

For more information on ANRA's Clean Rivers Program, please contact:

Brian Sims
Environmental Division Manager
Angelina & Neches River Authority
210 Lufkin Ave
Lufkin, TX 75901
Phone: 936-633-7527
Fax: 936-632-2564
Email: bsims@anra.org

Jeremiah Poling
Information Systems Coordinator
Angelina & Neches River Authority
210 Lufkin Ave
Lufkin, TX 75901
Phone: 936-633-7551
Fax: 936-632-2564
Email: jpoling@anra.org

This Page Intentionally Blank

2014 Upper Neches Basin Highlights Report

The 2014 Basin Highlights Report was prepared by the Angelina & Neches River Authority
in cooperation with the Texas Commission on Environmental Quality (TCEQ)
under the authorization of the Texas Clean Rivers Act.