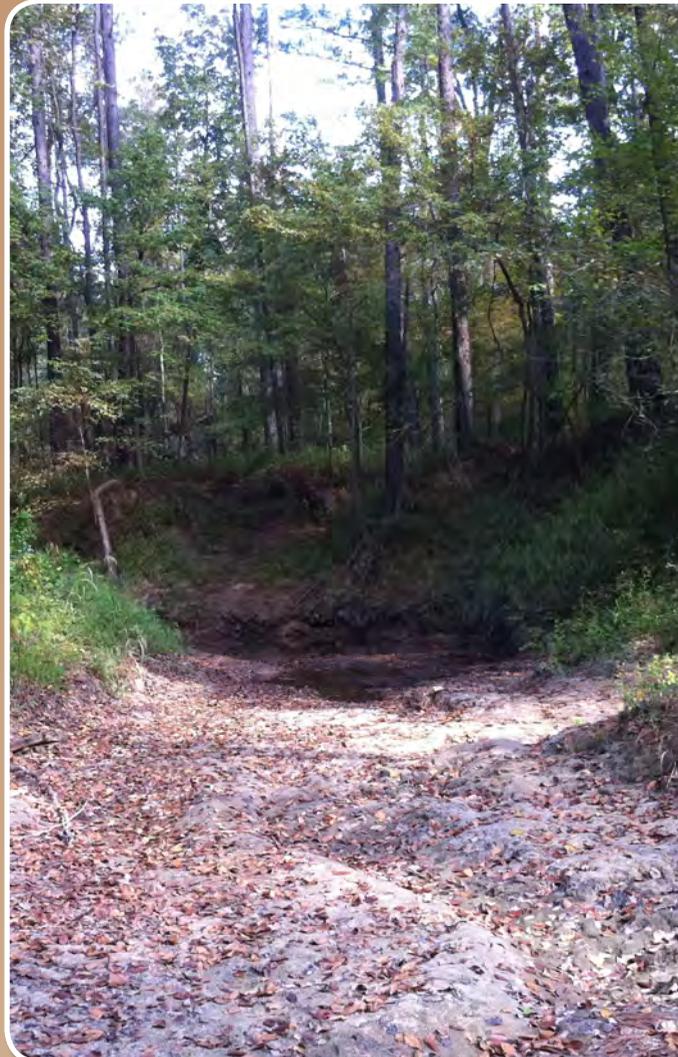


UPPER NECHES BASIN HIGHLIGHTS REPORT 2011

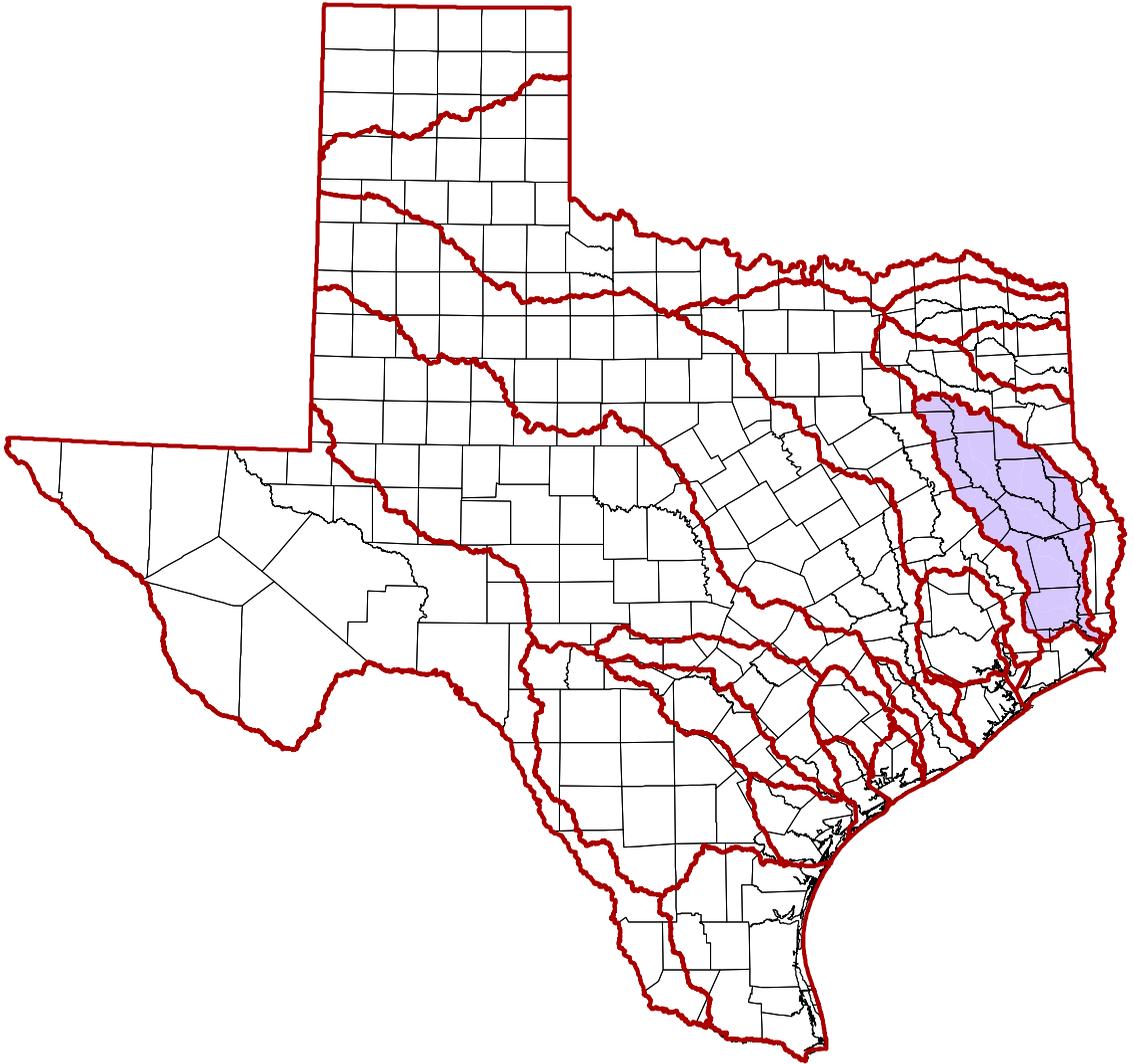


ANRA



ANGELINA & NECHES RIVER AUTHORITY

Neches River Basin



Introduction

About The Basin Highlights Report

This 2011 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 2011 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.

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.

Upper Neches Basin Highlights

Ongoing Drought Conditions

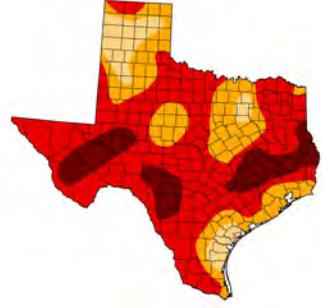
Throughout the past year, large portions of East Texas, including the Neches river basin, have been experiencing extreme drought conditions. The 2007-2009 statewide drought was one of the worst in Texas history, rivaling those experienced by the state in the early 1920s and through much of the 1950s. Before East Texas could properly recover from the 2007-2009 drought, a new drought began in early 2010. Examples of the effects of the drought can be seen in the rainfall records of most East Texas cities. Lufkin, which averaged 52.24 inches of rain per year from 1971-2000, saw only 30.59 inches of rain in 2010. Jacksonville also suffered, receiving only 16.21 inches, well below its historical average of 45.92 inches. San Augustine, which averaged 54.31 inches of rainfall per year, fared even worse, receiving only 12.01 inches in 2010.

U.S. Drought Monitor

April 19, 2011
Valid 7 a.m. EST

Texas

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	100.00	91.52	67.96	14.99
Last Week (04/12/2011 map)	0.00	100.00	97.94	86.43	60.57	10.03
3 Months Ago (01/18/2011 map)	23.28	76.72	51.41	25.62	7.30	0.00
Start of Calendar Year (12/29/2010 map)	7.89	92.11	69.43	37.46	9.59	0.00
Start of Water Year (10/01/2010 map)	75.57	24.43	2.43	0.99	0.00	0.00
One Year Ago (04/13/2010 map)	95.85	4.15	0.00	0.00	0.00	0.00



Intensity:
■ D0 Abnormally Dry ■ D3 Drought - Extreme
■ D1 Drought - Moderate ■ D4 Drought - Exceptional
■ D2 Drought - Severe

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

<http://drought.unl.edu/dm>



Released Thursday, April 21, 2011
Michael Brewer, National Climatic Data Center, NOAA

The ongoing drought has caused several streams that ANRA monitors to shrink to the level of small pools, but thus far has not produced a significant impact on the water quality measured.

The TCEQ is monitoring the situation and has issued a notice to water right holders stating that some junior water rights may have to be temporarily curtailed on a priority basis.

See <http://www.tceq.texas.gov/response/drought> for more information.



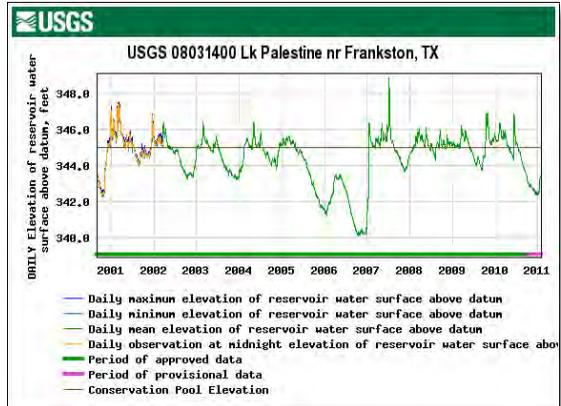
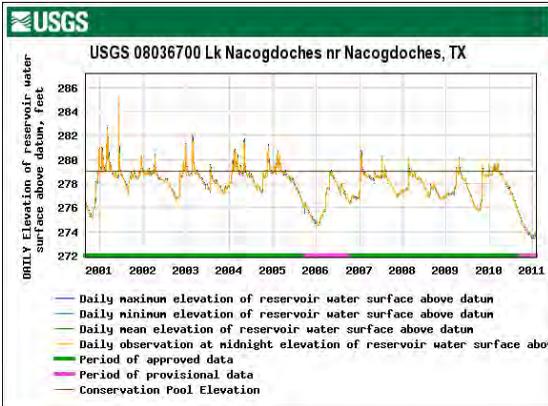
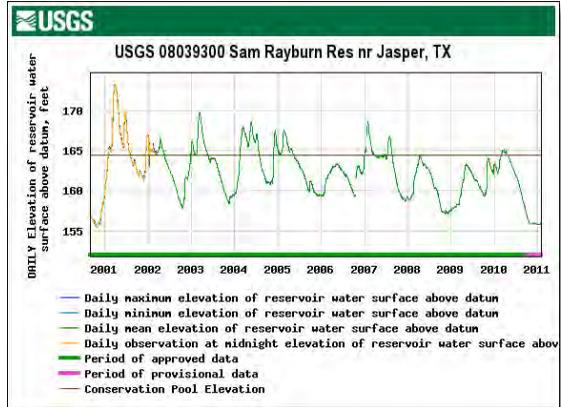
Marion's Ferry on Sam Rayburn Reservoir in March 2010

Upper Neches Basin Highlights

Area Lake Levels

Unsurprisingly, area lake levels have also been affected by the drought. According to USGS monitoring data, Sam Rayburn Reservoir levels have reached lows not seen since 2000, Lake Nacogdoches is currently experiencing its lowest levels ever recorded and Lake Palestine is approaching its lowest levels seen since 2006.

For more information see:
<http://waterdata.usgs.gov/tx/nwis/current/?type=lake>



Marion's Ferry on Sam Rayburn Reservoir in October 2010

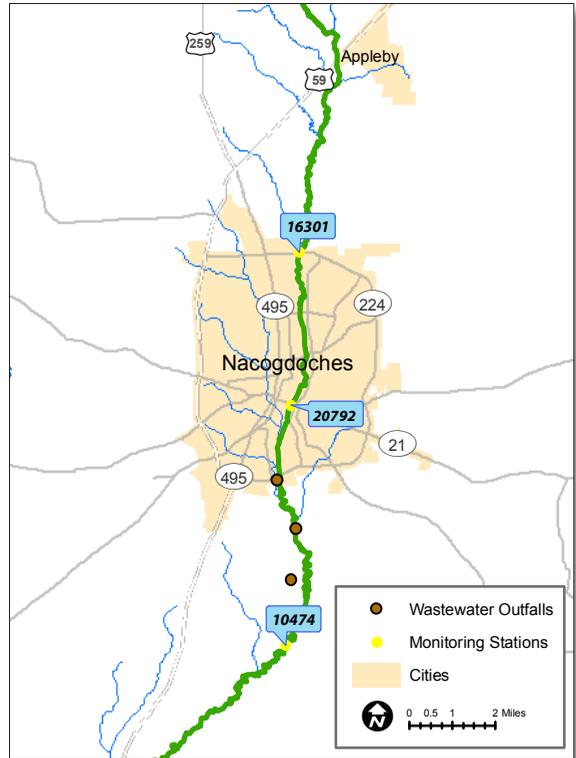
Upper Neches Basin Highlights

New Monitoring site: 20792 - La Nana at East Main St.

For FY 2011, a new monitoring station has been added to the Coordinated Monitoring Schedule. This site is located at SH 21 (East Main St). It will be monitored quarterly for Field Parameters, Conventional, Bacteria, and Flow.

Areas within La Nana Creek are impaired for nonsupport of contact recreational use. These areas were first listed on the 303 (d) list in the year 2000 due to elevated *E. coli* levels.

In previous years, monitoring has been performed at La Nana Creek at Loop 224 N and at CR 526 (south of Nacogdoches). We have added this additional monitoring site to assess the water quality within the middle assessment unit of the La Nana watershed. This site is located within the center of the City of Nacogdoches.



La Nana at East Main - Upstream

Water Quality Monitoring and Laboratory Analysis

Water Quality Monitoring in the Upper Neches Basin

In FY 2011, the Angelina & Neches River Authority monitors 26 sites quarterly for field, conventional parameters and bacteria, with an additional site being monitored bimonthly for bacteria. The City of Tyler has 4 monitoring stations within the Upper Neches Basin. 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.

Number of Sites Monitored In the Upper Neches River Basin						
Sampling Entity	Field	Conventional	Bacteria	Metals in Water	Aquatic Habitat	24-Hour DO
ANRA	26 quarterly		26 quarterly 1 bimonthly			
City of Tyler	4 quarterly		3 quarterly 1 monthly			
TCEQ	34 quarterly			9 quarterly 2 5X/year	2 annually	1 annually

For a listing of the stations monitored by ANRA and the City of Tyler, please refer to the table on page 10.

ANRA Environmental Laboratory

For water samples collected by ANRA and the City of Tyler, 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/



ANRA Environmental Laboratory

Classified Segments In the Upper Neches Basin

0604 Neches River

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. On the 2008 303 (d) list, one area is from SH 21 to US 84 was listed as impaired due to bacteria and lead in water. The first year this was listed was 2002, under category 5c. In the 2010 Draft Integrated Report, the listing meets the criteria and may be delisted for lead in water.



0605 Lake Palestine

Lake Palestine is an 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 2008 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 Draft 2010 Integrated Report, there are Chlorophyll-*a* concerns throughout the lake, as well as pH impairments.

0606 Neches River Above Lake Palestine

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.

Classified Segments In the Upper Neches Basin

0610 Sam Rayburn Reservoir

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.



0611 Angelina River Above Sam Rayburn



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.

0612 Attoyac Bayou

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.



Classified Segments In the Upper Neches Basin

0613 Lake Tyler/Lake Tyler East

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.

0614 Lake Jacksonville

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.

0615 Riverine Portion of Sam Rayburn Reservoir

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.

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.

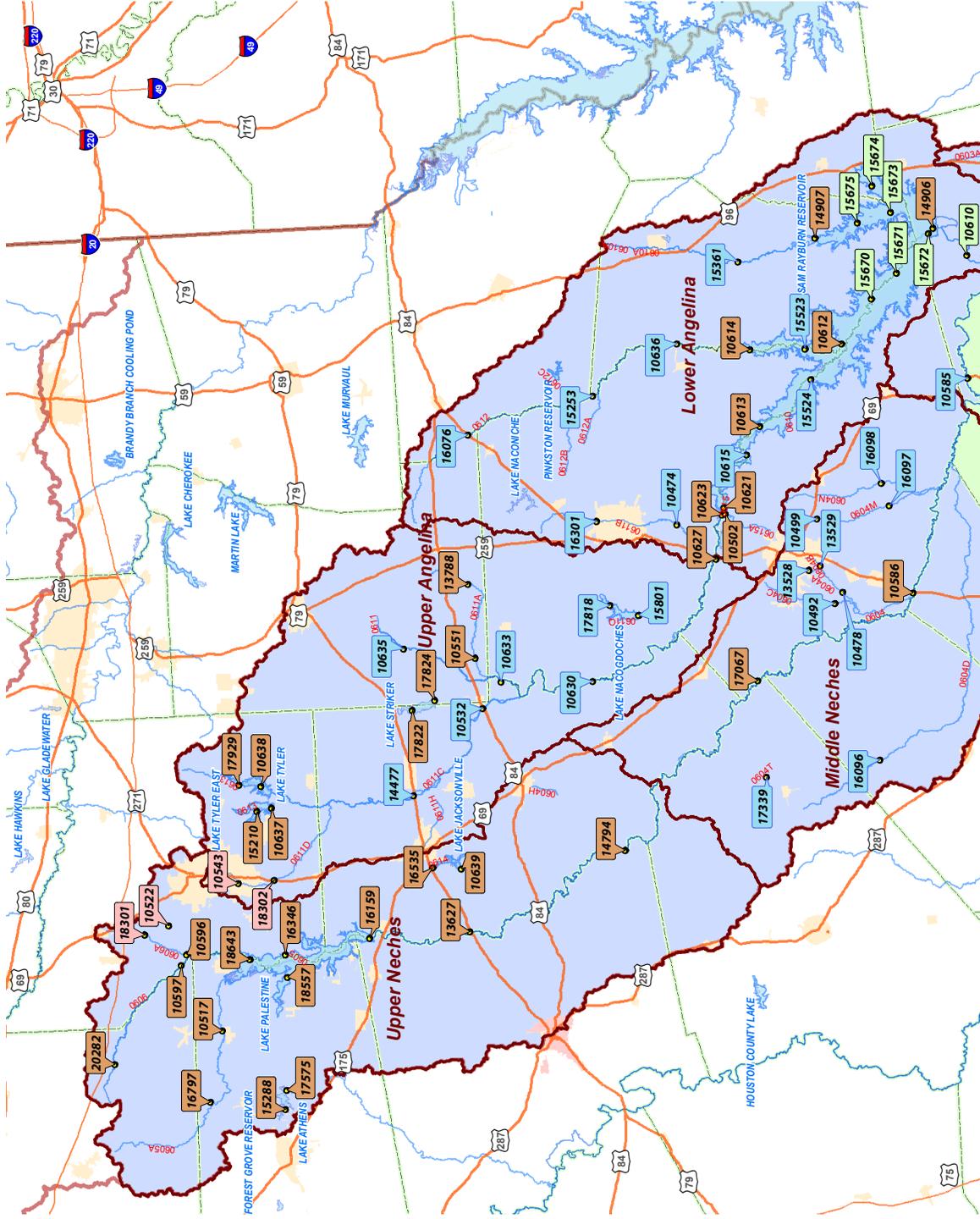
ANRA Monitoring Sites in the Upper Neches River Basin for FY 2011

ANRA Reported CRP Monitoring Stations In the Upper Neches River Basin by Segment

<i>Segment</i>	<i>Station ID</i>	<i>Station Name</i>	<i>Collected by</i>	<i>Frequency</i>	<i>Parameters</i>
0604	10585	Neches River At US 69	ANRA	Quarterly	F, C, B
0604A	13528	Cedar Creek At CR 1336	ANRA	Quarterly	F, C, B
0604A	10478	Cedar Creek At FM 2497	ANRA	Quarterly	F, C, B
0604B	13529	Hurricane Creek At SH 324	ANRA	Quarterly	F, C, B
0604C	10492	Jack Creek At FM 2497	ANRA	Quarterly	F, C, B
0604D	16096	Piney Creek At FM 358	ANRA	Quarterly	F, C, B
0604M	10499	Biloxi Creek At Angelina CR 216	ANRA	Bimonthly	F, B
0604M	16097	Biloxi Creek At FM 1818	ANRA	Quarterly	F, C, B
0604N	16098	Buck Creek At FM 1818	ANRA	Quarterly	F, C, B
0604T	17339	Lake Ratcliff	ANRA	Quarterly	F, C, B
0606A	18301	Prairie Creek At SH 110	City of Tyler	Quarterly	F, C, B
0606D	10522	Black Fork Creek At Smith CR 46	City of Tyler	Quarterly	F, C, B
0610	15524	Sam Rayburn Near Shirley Creek	ANRA	Quarterly	F, C, B
0610	15523	Sam Rayburn Adjacent To Alligator Cove	ANRA	Quarterly	F, C, B
0610	10615	Sam Rayburn At Marion's Ferry	ANRA	Quarterly	F, C, B
0610A	15361	Ayish Bayou At SH 103	ANRA	Quarterly	F, C, B
0611	10635	Angelina River At FM 1798	ANRA	Quarterly	F, C, B
0611	10633	Angelina River At SH 204	ANRA	Quarterly	F, C, B
0611	10630	Angelina River At SH 21	ANRA	Quarterly	F, C, B
0611B	16301	La Nana Bayou At Loop 224 North	ANRA	Quarterly	F, C, B
0611B	10474	La Nana Bayou At Nacogdoches CR 526	ANRA	Quarterly	F, C, B
0611B	20792	La Nana Bayou Upstream Of East Main	ANRA	Quarterly	F, C, B
0611C	14477	Mud Creek At US 79	ANRA	Quarterly	F, C, B
0611C	10532	Mud Creek At US 84	ANRA	Quarterly	F, C, B
0611D	18302	West Mud Creek East Of US 69	City of Tyler	Quarterly	F, C, B
0611D	10543	West Mud Creek Near Country Club	City of Tyler	Quarterly	F, C, B (Monthly)
0611Q	15801	Lake Nacogdoches In Main Pool	ANRA	Quarterly	F, C, B
0611Q	17818	Lake Nacogdoches Upper Lake	ANRA	Quarterly	F, C, B
0612	10636	Attoyac Bayou At SH 21	ANRA	Quarterly	F, C, B
0612	15253	Attoyac Bayou At SH 7	ANRA	Quarterly	F, C, B
0612	16076	Attoyac Bayou At US 59	ANRA	Quarterly	F, C, B

Parameter Codes: F = Field, C = Conventional, B = Bacteria (See pages 13-14 for a full description of the parameters)

Map of Monitoring Sites in the Upper Neches River Basin for FY 2011

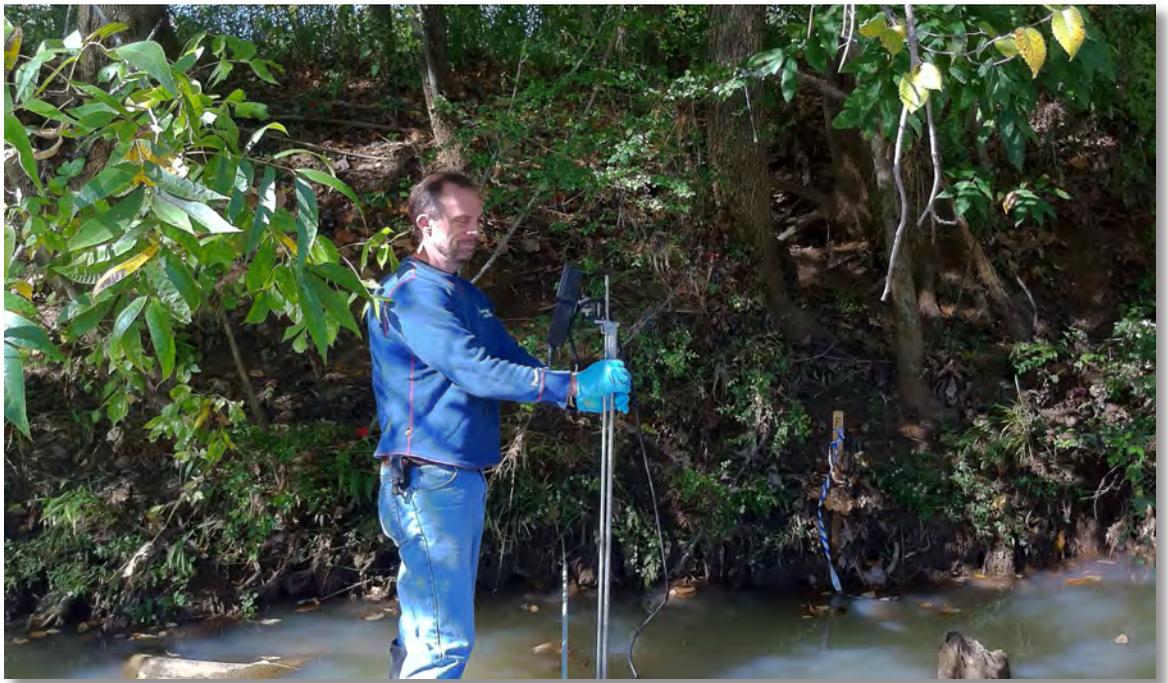


Water Quality Parameters

Parameters for quarterly monitoring

The following table lists parameters monitored by ANRA on a quarterly basis. For a full discussion of the parameters, including potential sources, please refer to the 2010 Upper Neches Basin Summary Report. The summary report can be found online at: http://www.anra.org/divisions/water_quality/crp/

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- <i>a</i> Pheophytin- <i>a</i> Sulfate Total Dissolved Solids (TDS) Total Nitrate+Nitrite Total Phosphorus Total Suspended Solids (TSS)	<i>E. coli</i>



ANRA staff member Mike Parrish measuring flow on La Nana Creek

Impaired Water Bodies in the Upper Neches Basin

Introduction to Texas Water Quality Standards

The Texas Surface Water Quality Standards establish explicit goals for the quality of streams, rivers, lakes, and bays throughout the state. The Standards 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.

The Standards identify designated uses for each water body. For example, drinking water supply, primary contact recreation (swimming), secondary contact recreation (boating), and aquatic life support, along with the scientific criteria to support those uses. There are general standards that cover the entire state, but if sufficient information is available for a given water body, then more specific standards may be created and applied to that water body.

Many of our state's water resources cannot currently meet their designated uses because of pollution problems from a combination of point sources, such as sewage treatment plant discharges, 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 evaluate the quality of water bodies throughout the state by measuring parameters such as dissolved oxygen, temperature, pH, dissolved minerals, toxic substances, and bacteria.

The Integrated Report

Every two years the TCEQ conducts a water quality assessment on all classified water bodies for which sufficient data were available and for unclassified water bodies where a pending regulatory need exists, or where new information may change the standards attainment status.

If the measured values for a water body are found to be consistently outside the criteria for its designated use, then that water body must be listed as impaired, which simply means that the water body is not supporting its designated uses.

When a water body is determined to be impaired, several things must happen. It must be listed on the 303(d) list. An investigation must be undertaken to discover what is preventing the water body from

Designated Uses

As defined in the *Texas Surface Water Quality Standards (TSWQS)*, a body of water can be assigned designated uses including aquatic life use, contact recreation, public water supply, and general use.

AQUATIC LIFE USE has criteria for dissolved oxygen, fish and macrobenthic community index, and acute and chronic substances.

GENERAL USE includes criteria for chloride, sulfate, total dissolved solids (TDS), pH, and temperature. General use nutrients like ammonia, nitrates, ortho- and total phosphorus, and chlorophyll-*a* are used to screen concerns for supported use of the waters.

PUBLIC WATER SUPPLY USE includes criteria for chlorides, sulfates, and TDS in drinking water.

CONTACT RECREATIONAL USE is assessed using criteria for bacteria indicators such as *E. coli* (freshwater) or *Enterococcus* (tidally influenced waters or marine waters).

Impaired Water Bodies in the Upper Neches Basin

supporting its designated uses or if the designated uses are inappropriate for the water body. Then steps must be taken to either remedy the problem, or to reevaluate which designated uses are appropriate for the water body in question.

The 303(d) list is a listing of Impaired water bodies. Section 303(d) of the Clean Water Act requires states to develop lists of impaired waters every two years in even-numbered years. 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.

Categoryization of Water Bodies on the 303 (d) List

Category	Description
1	Attaining all water quality standards and no use is threatened.
2	Attaining some water quality standards and no use is threatened; and insufficient data and information are available to determine if the remaining uses are attained or threatened.
3	Insufficient data and information are available to determine if any water quality standard is attained.
4	Water quality standard is not supported or is threatened for one or more designated uses but does not require the development of a TMDL.
4a	TMDL has been completed and approved by EPA.
4b	Other pollution control requirements are reasonably expected to result in the attainment of the water quality standard in the near future.
4c	Nonsupport of the water quality standard is not caused by a pollutant.
5	The water body does not meet applicable water quality standards or is threatened for one or more designated uses by one or more pollutants.
5a	A TMDL is underway, scheduled, or will be scheduled.
5b	A review of the water quality standards for the water body will be conducted before a TMDL is scheduled.
5c	Additional data and information will be collected before a TMDL is scheduled.

The Texas Integrated Report

Formerly called the "Texas Water Quality Inventory and 303(d) List," the Integrated Report evaluates the quality of surface waters in Texas, and provides resource managers with a tool for making informed decisions when directing agency programs.

The Texas Integrated Report describes the status of Texas' natural waters based on historical data. It identifies water bodies that are not meeting standards set for their use on the 303(d) list.

http://www.tceq.state.tx.us/compliance/monitoring/water/quality/data/wqm/305_303.html

Impaired Water Bodies in the Upper Neches Basin

How to Bring a Water Body Back into Compliance

In the Texas Surface Water Quality Standards, if there is not a site specific standard for a given water body, then the general statewide standards apply. If it is determined that the assigned designated uses for a water body are appropriate, then corrective action must be taken. We must determine what is causing the water body to fail to attain its designated uses, and methods to remedy the situation must be chosen. Multiple tools are available to facilitate improvement of the quality of a water body. 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 factors affecting the attainment of the use which may include physical, chemical, biological and economic factors. Or put more simply, a UAA is a study to determine if a water body is capable (within reason) of supporting a given use designation. If there is a general consensus among stakeholders and resource agencies that the water body has not been used for contact recreation in the past and will not be in the future, then the first step to removing the water body from the 303(d) list may be a Use Attainability Analysis (UAA).

Best Management Practices (BMPs) are structural or non-structural practices which are intended to minimize the impacts of development on surface and groundwater systems. One common type of BMP used to deal with agricultural runoff is the riparian forest buffer. A riparian forest buffer is a strip of forested land along the edges of a stream or river. The forested area slows the rate of the runoff and captures many of the pollutants before they can enter the stream. Buffers must be at least twenty-five feet wide and must be fenced off from pastures so that livestock will not trample the soil and cause erosion. In addition to treating waste from pastures and cropland, these buffers serve as wildlife habitat. In addition to riparian buffers, other agricultural BMPs include sinkhole protection, capping/plugging abandoned wells, wetland restoration, constructed wetlands, legume cover crop, and many others. Some agricultural BMPs are similar to stormwater BMPs, including surface water runoff impoundments and stormwater retention ponds.



Hurricane Creek, impaired for bacteria

Impaired Water Bodies in the Upper Neches Basin

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 to holistically address all of the sources and causes of impairments and threats to both surface and ground water resources within a watershed. Developed and implemented through diverse, well integrated partnerships, a WPP helps assure the long-term health of the watershed with strategies for protecting unimpaired waters and for restoring impaired waters.



Piney Creek, impaired for depressed DO

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 has been performed, discharge permits for any point sources associated with the water body may need to be modified to enforce more strict limitations on their output in order to allow for safe absorption of their discharge by the water body.

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 designated uses, and the water body can then be removed from the 303(d) list of impaired water bodies.

Sources and further information:

http://www.tceq.texas.gov/permitting/water_quality/wq_assessment/standards/WQ_standards_intro.html

<http://www.tceq.texas.gov/compliance/monitoring/water/quality/data/08twqi/twqi08.html>

<http://www.epa.gov/region6/water/npdes/tmdl/index.htm>

<http://water.me.vccs.edu/courses/CIV246/lesson13.htm>

<http://watershedplanning.tamu.edu/>

Impaired Water Bodies in the Upper Neches Basin

Numerous water bodies in the Upper Neches Basin are listed as impaired due to bacteria (*E. coli*). There are also concerns for mercury in fish tissue for several segments.

Impairments in the Upper Neches Basin (As listed in the 2010 Draft Texas integrated Report)

Segment	Segment Name	Impairment Description	Category
0604A	Cedar Creek (unclassified water body)	bacteria	5c
0604B	Hurricane Creek (unclassified water body)	bacteria	5b
0604C	Jack Creek (unclassified water body)	bacteria	5b
0604D	Piney Creek (unclassified water body)	depressed dissolved oxygen	5c
0604M	Biloxi Creek (unclassified water body)	bacteria depressed dissolved oxygen	5b 5c
0604T	Lake Ratcliff (unclassified water body)	mercury in edible tissue	5c
0605	Lake Palestine	pH	5a
0605A	Kickapoo Creek in Henderson County (unclassified water body)	bacteria depressed dissolved oxygen	5c 5c
0606	Neches River Above Lake Palestine	bacteria depressed dissolved oxygen zinc	5c 5c 5c
0606A	Prairie Creek (unclassified water body)	bacteria	5b
0610	Sam Rayburn Reservoir	mercury in edible tissue	5c
0610A	Ayish Bayou (unclassified water body)	bacteria	5b
0611	Angelina River Above Sam Rayburn Reservoir	bacteria	5b
0611A	East Fork Angelina River (unclassified water body)	bacteria	5c
0611B	La Nana Bayou (unclassified water body)	bacteria	5b
0611D	West Mud Creek (unclassified water body)	bacteria	5b
0612	Attoyac Bayou	bacteria	5b
0615	Angelina River/Sam Rayburn Reservoir	bacteria depressed dissolved oxygen impaired fish community mercury in edible tissue	5c 5c 5c 5c
0615A	Paper Mill Creek (unclassified water body)	bacteria	5c

Fish Consumption Advisory

On March 8, 2010 the Texas Department of State Health Services issued an advisory warning people to limit their consumption of flathead catfish, freshwater drum, gar, largemouth bass, spotted bass and white bass from the Neches River in seven counties in East Texas.

The advisory area encompasses a stretch of the Neches River and all contiguous waters in Angelina, Hardin, Houston, Jasper, Polk, Trinity and Tyler counties.

http://www.dshs.state.tx.us/seafood/PDF2/NewsReleases/ADV-41_NR_NechesR.pdf

Special Projects

Development of a Watershed Protection Plan for Attoyac Bayou

The Attoyac Bayou is one of many rural watersheds in the state listed as an impaired water body on the Texas Water Quality Inventory and 303(d) List due to high levels of *E. coli*. Three monitoring stations managed by the Angelina & Neches River Authority, the U.S. Geological Survey, and the Texas Commission on Environmental Quality have provided water quality data on the bayou for a number of years. Beginning in 2000, data collected for *E. coli* have consistently shown elevated *E. coli* levels that exceed the applicable Texas Water Quality Standards.

Studies done to understand bacteria and nutrient loading in the area seem to justify the Attoyac's impairment listing, but the limited flow data documented make it difficult to calculate loading rates and identify sources of *E. coli* contamination. *The Development of a Watershed Protection Plan for Attoyac Bayou* project is collecting additional water quality and streamflow data that will help to develop a better understanding of *E. coli* loadings in the water body. Local stakeholder input will further facilitate the accurate identification of *E. coli* sources in the watershed and help develop an effective watershed protection plan to restore water quality.

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 bacteria 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).



Attoyac Bayou at SH 7

Special Projects

Sampling Sites for the Attoyac Bayou Project

Stream Sampling Sites

10636 - Attoyac Bayou at SH 21
15253 - Attoyac Bayou at SH 7
20841 - Attoyac Bayou at FM 138
16073 - Attoyac Bayou at US 59
20842 - Attoyac Bayou at US 84
16083 - Waffelow Creek at FM 95
16084 - Terrapin Creek at FM 95
20843 - Naconiche Creek at FM 95
20844 - Big Iron Ore Creek at FM 354
20845 - West Creek at FM 2319

Wastewater Treatment Facility (WWTF) Sites

City of Garrison WWTF
Chireno ISD WWTF
Martinsville ISD WWTF
City of Center WWTF

Surface water samples collected by Stephen F. Austin State University are submitted to the ANRA Environmental Laboratory for analysis of the following parameters:

Ammonia-Nitrogen
Nitrate+Nitrite-Nitrogen
Total Phosphorus
Dissolved Orthophosphorus
Total Suspended Solids
E. coli

Stream samples are collected biweekly with WWTF samples being collected quarterly. All laboratory and field data is submitted to the Texas State Soil and Water Conservation Board and will ultimately be uploaded to TCEQ's Surface Water Quality Monitoring Information System (SWQMIS).

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 through a Clean Water Act, Section 319(h) grant from the U.S. Environmental Protection Agency.



ANGELINA & NECHES RIVER AUTHORITY



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

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.tceq.state.tx.us/compliance/monitoring/crp/
- Coordinated Monitoring Schedule** cms.lcra.org
- EPA's Surf Your Watershed** cfpub.epa.gov/surf/locate/index.cfm
- Attoyac Bayou WPP Project** attoyac.tamu.edu
- 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
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Angelina & Neches River Authority
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The screenshot shows the website for the Angelina & Neches River Authority. The header includes the ANRA logo, a navigation menu with 'About Us', 'Divisions', 'Recreation', 'Resources', and 'Bill Pay', and the text 'ANGELINA & NECHES RIVER AUTHORITY'. The main content area is titled 'Introduction to the Texas Clean Rivers Program' and includes sections for 'What is the Clean Rivers Program?', 'Why have a Clean Rivers Program?', and 'Where is the Upper Neches River Basin?'. There are also sections for 'CRP Partners' (featuring the Texas Stream Team logo) and 'Maps & Photos'. A sidebar on the right lists 'Clean Rivers Program' activities such as 'Introduction', 'Current Activities', 'Steering Committee Meetings & Events', 'Reports', 'Monitoring', 'Partners', 'Volunteer Monitoring', and 'Neches Basin Map (850 KB)'. Contact information for the Angelina & Neches River Authority is provided in the bottom right corner of the sidebar.



ANGELINA & NECHES RIVER AUTHORITY
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2011 Upper Neches Basin Highlights Report

The 2011 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.

