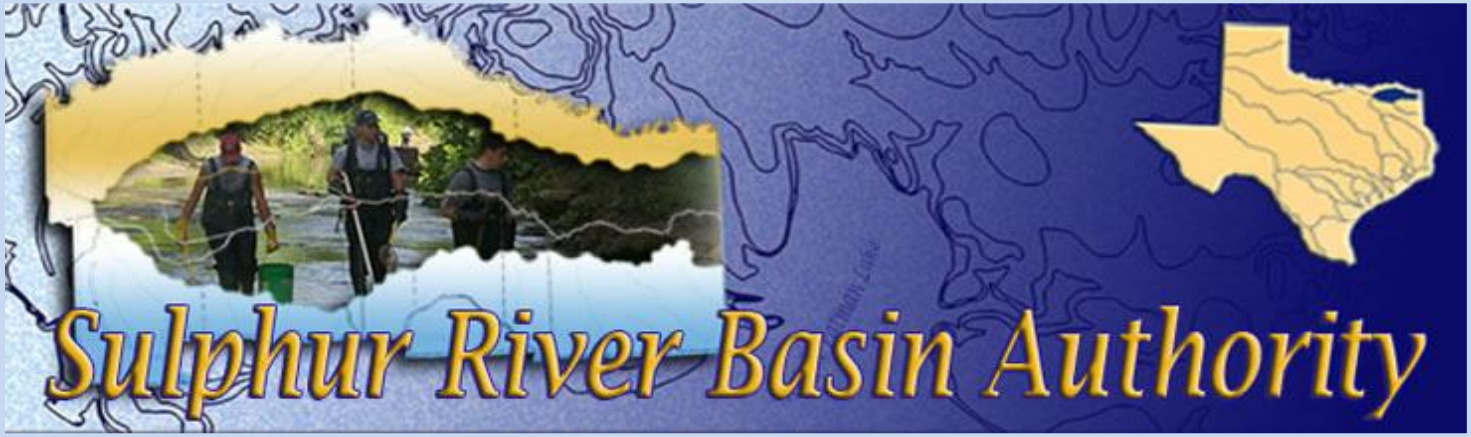


Sulphur River Basin Highlights Report, FYs 2009-2010

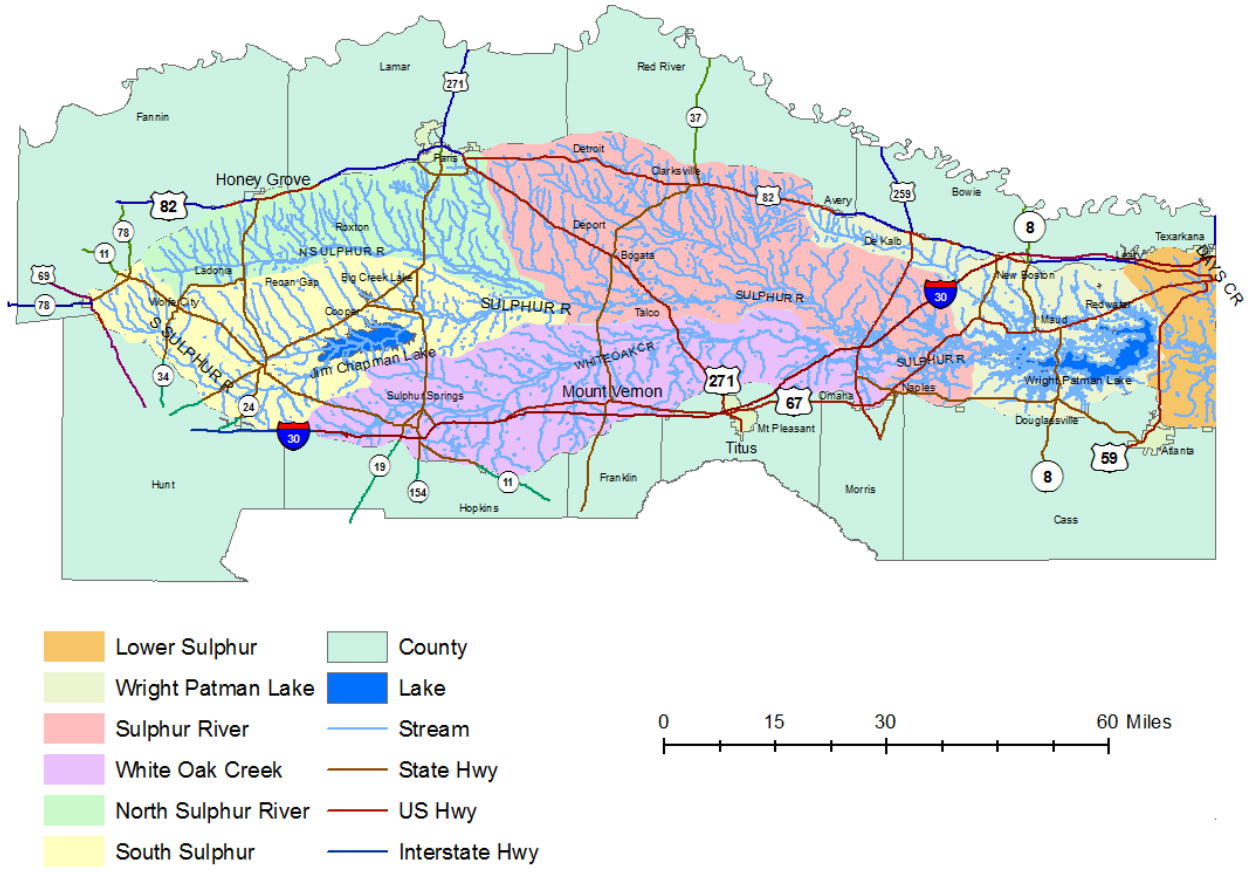
Prepared in Cooperation with the
Texas Commission on Environmental Quality
Under the Authorization of the Texas Clean Rivers Act

Sulphur River Basin Clean Rivers Program Highlights Report, FYs 2009-2010

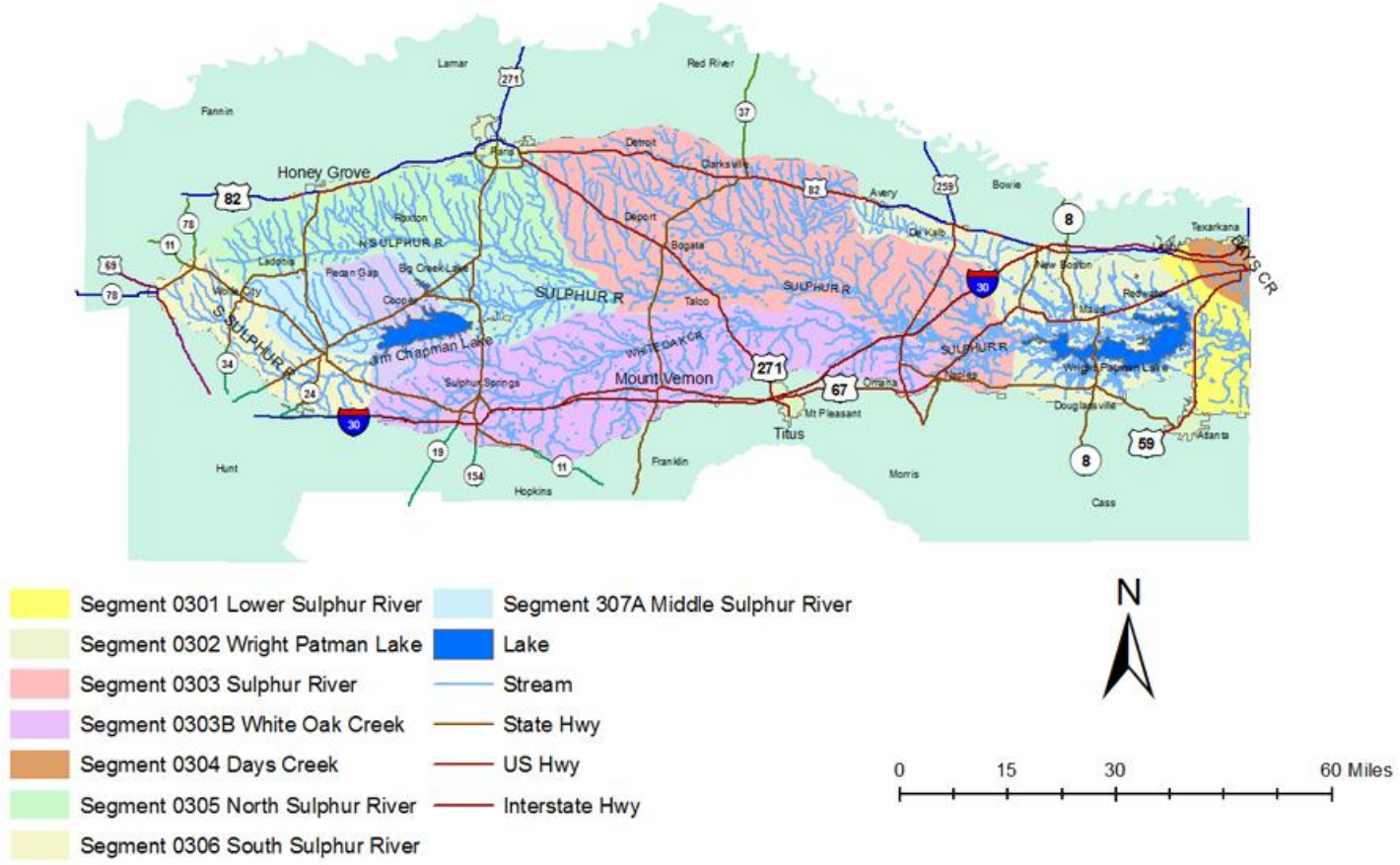
Introduction

The Clean Rivers Program (CRP) is a water quality monitoring, assessment, and public outreach program administered by the Texas Commission on Environmental Quality (TCEQ), which is funded by state-collected fees. The Sulphur River Basin Authority (SRBA) coordinates the Clean Rivers Program for the Sulphur River Basin. Utilizing a watershed management approach, SRBA and TCEQ are working together to identify and evaluate water quality issues and establish priorities for any needed actions. Assisting the Sulphur River Basin Authority with the FYs 2009-2010 planning, data collection, analysis, and reporting of water quality data were the SRBA Steering Committee members, Texarkana College, TCEQ, and the United States Geological Survey (USGS). The goal of these cooperative efforts is to achieve continuing evaluation and supervision of water quality in the basin by providing appropriate, accurate, and up-to-date data. Monitoring efforts represent a large component of the CRP, providing the raw data and information required to address any concerns regarding water quality issues in the basin. The Sulphur River Basin is divided into six watersheds or areas: North Sulphur River Watershed, Sulphur River Watershed, Wright Patman Lake Watershed, Lower Sulphur River Watershed, White Oak Creek Watershed, and South Sulphur River Watershed. A map showing the location of each of these watersheds can be found within this report on page 3. The streams within the basin are broken down into connected portions referred to as "segments". Each of these segments is in one or occasionally two watersheds. A map showing the location of each segment can be found within this report on page 4. A detailed discussion of each of these watersheds can be found in Part I: Sulphur River Basin Highlights Report, FY 2008-2009 available at www.sulphurr.org.

Sulphur River Basin Watersheds



Sulphur River Basin Segments



2009 Sulphur River Basin Highlights

Basin Water Conditions:

The rainfall for the Sulphur River Basin has been plentiful in 2009. The total number of inches measured by the Corps of Engineers at Wright Patman Lake, WPL, is 65.29 inches. October had the largest rainfall on record of 17.62 inches. The ground in the basin is saturated and additional rain results in substantial runoff. From the middle of October through much of December, the pool level on WPL has been elevated above 240 ft and the gated release has been near 10,000 cubic feet per second (approximately the maximum release rate allowed). The normal conservation pool elevation is 220.6 feet above sea level (November-March). At the maximum pool level for November, 247.8 ft, WPL held over 143 million acre-feet of water as compared to a little over 200 thousand at the normal pool level. Jim Chapman Lake, JCL, is located eighty-five miles to the west of WPL on South Sulphur River. Like WPL, JCL is also maintained by the Corps of Engineers. The total rainfall reported was 62.92 with 16.36 inches of rain in October. The gated release for JCL was elevated for much of the fall and the normal pool level (440 ft) was exceeded during much of October and November (Maximum, 444.12 ft). The top of the flood control pool is 446.2 ft (440,673 ac-ft). The data for both WPL and JCL can be found at the Corp of Engineers Fort Worth District Website using the link, http://www.swf-wc.usace.army.mil/cgi-bin/rcshtml.pl?page=Hydrologic.

Regional Water Plan:

The Texas Water Development Board, TWDB, is responsible for long-range planning and water project financing for Texas. Every five years the board submits the state water plan, which details the state water needs into the foreseeable future (until 2050 in this case). The state water plan is developed using input from 16 planning groups or regions. Within TWDB guidelines, each regional planning group reviews water use projections and water availability in dry or drought-of-record conditions. When a water need is identified, the planning groups recommend water management strategies to meet the need. The groups that currently impact the planning for the Sulphur River Basin are Region D and Region C. The Sulphur Basin lies primarily in Region D (Northeast Texas). The Sulphur River headwaters, both North and South Sulphur River, are in Fannin County, which is in Region C. Region C (Greater Dallas-Fort Worth Metroplex) is in north central Texas and has proposed the construction of Marvin Nichols Reservoir. The Region D planning group did not include any new development of water resources and is opposed to the Marvin Nichols Reservoir being included in any regional water plan or the 2007 State Water Plan. This was due in part to the negative impact of the reservoir project on the timber industry, including the destruction of tens of thousands of acres of bottomland hardwood forests. Texas regional water

plans are mandated by law to protect the state's agricultural, natural, and water resources. Region D is now researching additional ways to supply water to other regions of the state that will not include the economic impact of building a new dam. One possible alternative studied by the United States Corps of Engineers is to increase the yield of Wright Patman Reservoir. Increasing the lake level is supported by the Texarkana Water Department and lake managers. The Region C plan calls for the implementation of Marvin Nichols Reservoir by 2030. It also calls for conversion of some Wright Patman Lake flood storage to conservation storage by 2040.

Another state water plan will not be completed until 2012. In July of 2008, Report 370 was released by the TWDB which detailed the results of the Reservoir Site Protection Study. The study dealt with the identification of sites of unique value for constructing reservoirs that the planning groups or TWDB recommend for protection under Texas Water Code, Section 16.051(g). Four of the sixteen sites recommended for protection are in the Sulphur River Basin. The sites are detailed in the following table:

Reservoir	Counties	Yield (ac-ft/yr)	Unit Cost of Water ($/ac-ft/yr)
Marvin Nichols IA	Red River and Titus	602,000	$61
Parkhouse I	Delta and Hopkins	122,000	$174
Parkhouse II	Delta and Lamar	144,300	$107
Ralph Hall	Fannin	32,940	$430

Marvin Nichols IA and Parkhouse II reservoirs represent the lowest cost water available on the proposed protection list. The four sites collectively represent more than sixty percent of water on the proposed protection list. The 2007 State Water Plan and Reservoir Site Protection Study can be found on the websites, http://www.twdb.state.tx.us/wrpi/swp/swp.htm and http://www.twdb.state.tx.us/publications/reports/GroundWaterReports/GWReports/R370_ReservoirSite.pdf.

Water Quality Monitoring

Monitoring, data collection, and analysis are the basis for maintaining good water quality within the Sulphur River Basin. These activities are an integral part of the Clean Rivers Program (CRP), a cooperative program administered by the Texas Commission on Environmental Quality (TCEQ), and directed by the Sulphur River Basin Authority (SRBA). Other entities participating in monitoring within the Basin are Texarkana College and the United States Geological Survey (USGS). The monitoring program described is conducted under both the FY 2008-09 and the FY 2010-11 Quality Assurance Project Plans (QAPP) for the Surface Water Quality Monitoring Project for the Sulphur River Basin. The QAPP is used to plan, organize and define the quality assurance process for the program. Quality assurance is an integrated system of management activities that ensures that data generated is of the type and quality needed for its uses. Those uses include planning, assessment, and water quality management. Elements of the program that are controlled by the QAPP include measurement and performance specifications, appropriate methods, field and laboratory quality control, data management, and verification and validation of the data. Additionally, oversight of the laboratory quality system and process of corrective actions are described in the QAPP. The current QAPP is available for review on the SRBA webpage.

There are five basic types of monitoring which occur in our basin: 1) Routine, 2) Systematic, 3) Flow, 4) Diel (24-hour studies), and 5) Special Studies. Each type of monitoring includes specific sets of parameters or measurements that are recorded or analyzed.

Routine monitoring is used to expand and maintain the water quality database. Its focus is to improve our ability to follow trends and to identify water quality changes in the major watersheds. Routine monitoring sites are usually studied over a number of years.

Systematic monitoring is used to investigate known concerns or to survey areas in the basin that have little or no information about water quality. The results are used to direct future monitoring efforts. Systematic monitoring stations are typically placed on the smaller, unclassified streams that would not normally be evaluated during routine monitoring. Biological monitoring is a key factor used in the selection of systematic sampling sites.

Flow monitoring is utilized to support permitted discharger actions. Typically the stream flow is measured monthly for a period of one or more years.

Diel sampling or diurnal studies involve multiple field measurements conducted over a 24-hour period, using an electronic multi-parameter probe. This type of sampling usually records dissolved oxygen, temperature, conductivity, and pH measurements. Diel sampling is frequently scheduled for areas where dissolved oxygen levels are a concern.

Special studies are additional water monitoring projects designed to address a specific concern or to provide additional information

needed as a result of a previous monitoring effort or a current issue. The focus of these studies has been the improvement of water quality within a basin, and documentation of both current and historical watershed conditions.

Biological Studies In addition to the standard station monitoring, biological and habitat evaluations are performed twice a year at selected stream stations. These studies are used to evaluate the stream's aquatic community and determine its appropriate "aquatic life use". A narrative rating system is used to evaluate stream biology and habitat. The categories are "exceptional", "high", "intermediate", and "limited". Biological parameters for all the sites studied are usually ranked in order of best quality to poorest. The top five percent are designated as "exceptional" and the lowest five percent are referred to as "limited". The remaining ninety percent are split between the "high" and "intermediate" designations.

Water Quality Parameters by Group

Field Parameters generally include: dissolved oxygen, conductivity, pH, temperature, stream flow, flow severity, Secchi disc depth (measurement of how deep light penetrates), and field observations. These measurements provide information about the physical and chemical water quality characteristics at the sample site. The dissolved oxygen concentration and the pH are especially important because they are criteria used in the assessment of water bodies. Dissolved oxygen (DO) is the amount of oxygen dissolved in the water body as elemental oxygen. Some concentration of dissolved oxygen or dioxygen, O_2, is required by many aquatic organisms to survive. The DO concentration is influenced by levels of photosynthetic activity during the day and the amount of respiration at night. Favorable factors include aeration by riffles and wave action. Higher temperatures have a negative impact. The pH is a measure of the acidic or basic characteristic of a water body. It is measured in pH units that typically range from 1 to 14 with "neutral" having a pH of seven (neither acidic nor basic). The pH is also influenced by the amount of photosynthesis and respiration that is taking place in a water body. Photosynthesis causes the pH to rise and respiration causes the pH to fall. The pH in a lake typically goes up during the day and falls at night as the cycle changes from photosynthesis to respiration. The pH can also be impacted by the soil type with soils rich in limestone causing water to be basic. Rain water is slightly acidic and if it absorbs sulphur oxides from the air, its pH becomes more acidic. Rainwater that is more acidic than normal is referred to as "acid rain".

Conventional Parameters are chemical and biological components found in water that typically require laboratory analysis. These parameters generally include several forms of nitrogen and phosphorus, total dissolved solids, and total suspended solids. Within this grouping, nitrate-nitrogen, orthophosphate-phosphorus, and total phosphorus are nutrients. High levels of nutrients can cause excessive plant growth, which can lead to lower levels of dissolved oxygen in the water body and reduce the ability of aquatic organisms to survive. At higher levels, nitrates are a threat to human consumption. Chlorophyll-a is the green pigment in algae cells, and its concentration is measured in order to predict the amount of algae in a water body. Bacteria are monitored to assess health considerations. Usually indicator bacteria, such as E. coli or fecal coli form, are monitored to determine if there is broad

contamination that would necessitate a health warning. High concentrations of algae and bacteria can result in taste and odor problems in drinking water

Metal Parameters generally include the concentration of aluminum, arsenic, chromium, copper, nickel, silver, zinc, barium, molybdenum, calcium, selenium, iron, and manganese. These are measured to evaluate the potential for exposure to toxic concentrations of metals. The concentration of mercury in fish tissue is frequently used to issue consumption warnings for fish taken from contaminated water bodies.

Biological Parameters: The index of biotic integrity (IBI) has been developed in order to determine the health of a biological system, like a stream, river, or lake. Studies are done at selected stream locations by collecting data on fish and invertebrate populations and the condition of the stream and riparian habitat. The data is used to develop metrics (numerical evaluations or indexes) that result in a score that describes the ability of the stream to support aquatic life. The indexes include criteria that reflect fish species richness and composition, number and abundance of indicator invertebrate species, trophic organization and function, reproductive behavior, and the types and availability of habitat. Each dataset is scored based on its numerical range. The numerical ranges of the scores of the indexes are assigned to one of the four ranges: limited, intermediate, high and exceptional. Together the combined indices will determine if the stream is meeting its designated uses for aquatic life support. Biological and habitat studies must be conducted during the index period that runs from March 15 to October 15. Biological monitoring is usually done twice during the year and one of the monitoring events is done during the critical period from July 1 to September 30. This is usually the warmest and driest set of conditions and represents a worst case scenario.

Sites on the stream are selected to represent conditions of the entire water body. The "reach" of the stream that is selected should have a variety of habitats such as runs, pools, glides, and riffles, and should not be impacted by a tributary or discharge. During biological studies, measurements are taken to assess the availability and types of habitat at each site. Measurements include stream width and depth, bank slope, stream type, in stream cover, substrate type, percent erosion and the natural buffer and vegetation along the stream bank. The metrics used to evaluate habitat quality, compare the availability of different types of habitat, bank and substrate stability, and the impacts of flow.

To study the benthic community of a stream, benthic organisms (bottom dwellers) are collected using a kick net sampling method. In this method, an area of the bottom or substrate is disturbed for five minutes with a net positioned downstream to capture the organisms that are carried to the net by the current. The invertebrates are separated by type of feeding method (gatherers, predators, and collectors), as well as into intolerant and tolerant species, along with the ratio of the different invertebrate types found at each site. This data is used to determine the benthic index or metric.

The streams ability to support fish is assessed. Fish are collected using seining and electroshocking techniques. The fish that are collected during the assessment are separated by species, size categories, method of feeding, natives and non-natives, and those with diseases and anomalies. This data is assembled into a metric or score that is used to judge the stream quality.

Sulphur River Basin Water Quality Conditions

Every two years, the state must assess the quality of their water and submit a report to the Environmental Protection Agency (EPA) detailing the extent to which each water body in the state meets water quality standards. The TCEQ publishes this assessment as the *Texas Water Quality Inventory*. This document has three main parts: the *Texas Water Quality Inventory*, which gives the status of all the waters in the state, the Texas Section *303(d) List*, that identifies waters that do not meet one or more of the standards set for their use and the *Texas Section 305(b) List* that identifies waters where concerns exist. The technical process is described by the following:

Classified Segments: To assess and manage surface waters, TCEQ subdivides significant water bodies into classified segments. Most perennial streams, rivers, lakes**,** and bays in the state are classified segments and are individually defined in the *Texas Surface Water Quality Standards*. Each segment is intended to have relatively homogeneous chemical and hydrological characteristics. Classified segments are assigned four-digit numbers. The first two digits correspond to the river basin in which they are located. The last two digits distinguish individual segments within the particular basin. The Sulphur River and its tributaries have been designated as basin "03" and segment 0304 is Days Creek. Tributaries to a segment are distinguished by adding a letter following the four digits. There are seven distinct river and lake segments in the Sulphur River Basin.

Water Quality Standards: The *Texas Surface Water Quality Standards* are made up of two components: designated uses and criteria. A designated use describes one way a water body may be used. They include general use, aquatic life use, contact recreation use**,** and public water supply use. Criteria are usually numeric but are sometimes narrative or verbal categories. Numeric criteria are benchmarks used to evaluate water quality data or conditions.

Designated uses:

General Use-Temperature, pH, chloride, sulfate and total dissolved solids measurements are used to gauge support for this use. As mentioned above, each of these constituents has an associated criterion. For example, the pH criterion in the Sulphur River is a range between 6.5 and 8.5 standard units as outlined in the *Texas Surface Water Quality Standards*. The chloride, sulfate, and TDS criteria for Sulphur River (Segment 0303) are 80 parts per million (ppm), 180 ppm, and 600 ppm, respectively. When parameters are outside the pH criterion or exceed the chloride, sulfate or TDS criterion, the water is less than ideal for general use. The water tends to leave substantial residue when it evaporates, causes metals to corrode, be of limited use in irrigation, and require expensive treatment for many other uses.

Aquatic Life Use- Several criteria have been established to determine support for aquatic life use. Biological monitoring, the measurement of fish and macroinvertebrate populations (insects, etc.) and their habitat, offers the most accurate account of the health of an aquatic ecosystem. Narrative criteria for biological monitoring are exceptional, high, intermediate**,** and limited. Because biological monitoring is resource intensive, cost prohibitive**,** and flow dependent, dissolved oxygen (DO) is the criteria most frequently used to determine if a water body meets its aquatic life use. The DO criterion is usually listed as the minimum 24-hour average that is acceptable at any site within the segment. The DO criterion for Sulphur River is 5.0 ppm. Fish and other biological organisms do not necessarily die when DO levels are low, but they often do not reproduce or compete successfully over time.

Contact Recreation-This use refers to the ability of a water body to safely support activities that involve physical contact with water such as swimming. The applicable water quality criterion for contact recreation is a measure of bacteria levels. In freshwater bodies, E. coli is the preferred indicator organism. For the Sulphur River the criteria is 126 organisms per 100 mL of water. A high level of E. coli bacteria indicates that other pathogenic organisms are likely in the water and swimming and other forms of contact should be avoided.

Public Water Supply-A public water supply (PWS) is a water body used to supply water to a public water system. The raw surface and technical summary of finished water of a PWS may be assessed against human health criteria (metals, organics) or against secondary criteria (total dissolved solids, chloride, and sulfate). While human health criteria may be used to list a water body as impaired, secondary criteria may only be used to designate a concern. Water that does not meet the general use criterion or contains high levels of toxic metals or organic compounds may not be a good candidate for drinking water due to the high cost of treatment to achieve human health standards.

If a water body (or portion thereof) is found not to meet one of its designated uses, it will be considered to be *Impaired* and placed on the *Texas Section 303(d) List of Impaired Waters*. The criteria and conditions necessary for listing of a water body are included in the following table.

Constituent	Criteria	Calculation Used for *Impairment*
Total Dissolved Solids (TDS) Chloride Sulfate	Water body (segment) specific	Average of samples in the segment are above the criteria
Dissolved Oxygen (for High Aquatic Life Use)	3.0 mg/L grab sample 5.0 mg/L 24-hr average	10% of samples are below the criteria 10% of samples are below the criteria
pH	6.5 minimum 9 maximum	10% of samples are above or below the criteria
E. coli	126 394	Geometric mean is greater than the criteria 25% of samples are above the criteria
Enterococci	35 89	Geometric mean is greater than the criteria 25% of samples are above the criteria

A number of Texas streams and water bodies are impacted by eutrophication, a process fueled by excess nutrients. These water bodies are characterized by excessive plant and algae growth and large swings in DO and pH. No numerical criteria are available to use as benchmarks for the levels of nutrients or the impact of eutrophication. The State of Texas is using a set of narratives that simply express the parameter of interest by name. Associated with each parameter is an arbitrary screening level that is calculated based on the 85th percentile level of the nutrient in state waters. When the screening level is exceeded (the parameter exceeds the 85th percentile or is in the poorest 15 percent for water quality), the parameter is said to be of concern. Screening levels are used to determine if there is a water quality *concern* and does not indicate an *impairment.* The following table has the applicable narratives and the screening levels.

Constituent (Narrative)	**Screening Levels**			**Calculation Used for *Concern***
	Stream	Reservoir	Tidal Stream	
Ammonia-Nitrogen, mg/L as N	0.33	0.11	0.46	20% of samples are above the screening level
Nitrate-Nitrogen, mg/L as N	1.95	0.37	1.10	
Ortho-Phosphate-Phosphorus, mg/L as P	0.37	0.05	0.46	
Total Phosphorus, mg/L as P	0.69	0.20	0.66	
Chlorophyll a, µg/L	14.1	26.7	21.0	

Assessment

The data collected during the various types of water quality monitoring are assembled in the TCEQ data base and utilized to do "assessments" of the segments in the basin. Segments are the basic geographic unit used in defining and measuring water quality. To increase the accuracy of the assessment, many segments may be further divided into "assessment units", AUs, in order to evaluate conditions in areas that are more homogeneous in chemical, physical, and hydrological characteristics than are whole segments. The guidance for the assessment process is somewhat complex and usually utilizes the data collected in the last seven years. When water quality criterion are not achieved, the AU is deemed not to meet it's a designated use and is impaired. When an AU is impaired this designation applies to the whole segment. Since more than one use is usually applied to any segment, the water quality may be adequate to support one use, but not another. For instance, the contact recreation use may be impaired, while the aquatic life use is still supported.

One of five categories is assigned to each of the segments. The five categories for segments are:

1. All standards are attained; no evidence that nonattainment of any standard will occur in the near future.
2. Some standards are attained; no evidence that nonattainment of any standard will occur in the near future; and insufficient or no data and information are available to determine if the remaining standards are attained.
3. Insufficient or no data and information to determine if any standard is attained.
4. Standard is not attained or nonattainment is predicted in the near future due to one or more parameters, but no TMDLs are required.

a. All TMDLs have been completed and approved by EPA.

b. Other control requirements are reasonably expected to result in the attainment of all standards.

c. Nonattainment of the standard for one or more parameters is shown to be caused by pollution, not by pollutants and that the water quality conditions cannot be changed by the allocation and control of pollutants through the TMDL process.

5. Standard is not attained or nonattainment is predicted in the near future for one or more parameters.

a. TMDLs are underway, scheduled, or will be scheduled for one or more parameters.

b. A review of the standards for one or more parameters will be conducted before TMDLs are scheduled.

c. Additional data or information will be collected for one or more parameters before TMDLs are scheduled.

The categories indicate the status of water quality in the segment. Categories 4 and 5 are further divided into subcategories that communicate the specific strategies the state is using, or plans to use, to address surface waters that are not meeting standards. The subcategories 5a, 5b, and 5c represent the TCEQ's method for assigning priority for developing Total Maximum Daily Load studies, TMDLs, as required under 40 CFR 130.7(b)(4) and 130.10(b)(2). These studies evaluate the ability of an ecosystem to assimilate pollutants and set limits for pollutants in the watershed. Subcategory 5a is the group with the highest priority for TMDL development, followed by 5c for medium priority and 5b for lowest priority. Strategies for water bodies in Categories 1, 2, and 3 include additional data collection and assessment, and implementation through wastewater permits and other protective measures. Strategies for water bodies in Categories 4 and 5 are summarized in the subcategories, and are targeted for the specific AUs and the uses that are impaired. Strategies for AUs in 4 and 5 include review of water quality standards; projects to characterize the sources, extent, and severity of impairments; and projects to improve water quality or restore support of an impaired use.

For some uses, multiple parameters are measured and examined in combination with each other to determine support of a particular use. This is exemplified with the aquatic life use, in which the following parameters are measured to determine use support: dissolved oxygen, toxic substances in water and sediment, habitat, and fish and macrobenthic communities. If any one of the criteria for these parameters does not attain the standard, then the use is considered impaired unless it can be demonstrated through an examination of all the parameters that there is a healthy, diverse aquatic community.

The DRAFT 2010 Texas 303(d) List (February 5, 2010) was released in February for public review. The segments listed for the Sulphur River Basin are detailed in the following table.

0302 SegID:	**Wright Patman Lake** From Wright Patman Lake Dam in Bowie/Cass County to a point 1.5 kilometers (0.9 miles) downstream of Bassett Creek in Bowie/Cass County, up to the normal pool elevation of 225 feet (impounds the Sulphur River)		
depressed dissolved oxygen		*Category*	*Year First Listed*
0302_02	300 acres at International Paper intake	5a	1996
0302_10	4000 acres in upper portion of lake		
pH		*Category*	*Year First Listed*
0302_02	300 acres at International Paper intake	5a	2000
0302_04	500 acres in the northeast corner of lake	5a	2000
0302_05	200 acres in the northwestern tip of lake	5a	2000
0302_06	Big Creek arm	5a	2000
0302_07	4000 acres mid-lake	5a	2000
0302_08	1600 acres in upper mid-lake	5a	2000
0303B SegID:	**White Oak Creek (unclassified water body)** From the confluence of the Sulphur River north of Naples in Morris County to the upstream perennial portion of the stream east of Sulphur Springs in Hopkins County		
bacteria		*Category*	*Year First Listed*
0303B_01	Portion of White Oak Creek from the confluence with the South Sulphur River approximately 40 km (25 mi) upstream to the confluence with Lacy Creek.	5b	2006
0303B_04	Portion of White Oak Creek from the confluence with the Stouts Creek approximately 46 km (28 mi) upstream to Midget Creek	5b	2006

depressed dissolved oxygen		*Category*	*Year First Listed*
0303B_01	Portion of White Oak Creek from the confluence with the South Sulphur River approximately 40 km (25 mi) upstream to the confluence with Lacy Creek.	5b	2000
0303B_02	Portion of White Oak Creek from the confluence with the Lacy Creek approximately 42 km (26 mi) upstream to the confluence with Ripley Creek.	5b	2000
0303B_03	Portion of White Oak Creek from the confluence with the Ripley Creek approximately 42 km (26 mi) upstream to Stouts Creek.	5b	2000
0303B_04	Portion of White Oak Creek from the confluence with the Stouts Creek approximately 46 km (28 mi) upstream to Midget Creek.	5b	2000
0304A SegID:	**Swampoodle Creek (unclassified water body)** From the confluence of Days Creek in central Texarkana in Bowie County to the upstream perennial portion of the stream in northern Texarkana in Bowie County		
impaired fish community		*Category*	*Year First Listed*
0304A_01	Entire water body	5b	2006
impaired macrobenthic community		*Category*	*Year First Listed*
0304B_01	Entire water body	5b	2006
0304B SegID:	**Cowhorn Creek (unclassified water body)** From the confluence of Wagner Creek in southern Texarkana in Bowie County to the upstream perennial portion of the stream in northern Texarkana in Bowie Coun		
impaired fish community		*Category*	*Year First Listed*

0304B_01	Entire water body	5b	2006
impaired macrobenthic community			
0304B_01	Entire water body	5b	2006
0306 SegID:	**Upper South Sulphur River** From a point 1.0 km (0.6 miles) upstream of SH 71 in Delta/Hopkins County to SH 78 in Fannin County		
pH		*Category*	*Year First Listed*
0306_01	Portion of the Upper South Sulphur River from a point 1 km (.6 mi) upstream of SH 71 upstream approximately 10 km (6 mi) to Dunbar Creek.	5b	2008
0306_02	Portion of the Upper South Sulphur River from the confluence with Dunbar Creek approximately 42 km (26 mi) to Hickory Creek..	5b	2008
0306_03	Portion of the Upper South Sulphur River from the confluence with Hickory Creek approximately 19 km (12 mi) to SH 71.	5b	2008
0307 SegID:	**Cooper Lake** from Cooper Lake dam in Delta/Hopkins County to a point 1.0 kilometers (0.6 mile) upstream of SH 71 on the South Sulphur River arm in Delta/Hopkins County and 300 meters (330 yards) below the confluence of Barnett Creek on the Middle Sulphur River arm in Delta County, up to a conservation pool elevation of 440 feet (impounds the Middle Sulphur/South Sulphur River)		
pH		*Category*	*Year First Listed*
0307_01	Lower 5000 acres near dam	5b	2000
0307_03	Middle 5000 acres	5b	2000
0307_04	Middle 2000 acre Johns Creek arm	5b	2000

Each of the watersheds in the Sulphur River Basin is described in FY 2004-2008 Sulphur River Basin Summary Report that can be found at Sulphurr.org. The descriptions include steams, segments, water bodies, counties, cities, land uses, soil types, and permitted dischargers.

CRP Coordinated Monitoring in FY2009

Coordinated monitoring meetings are held once a year to bring all the monitoring agencies and entities together to discuss streamlining and coordinating monitoring efforts within the Basin. These meetings are one of the key events of the Clean Rivers Program.

On April 9, 2009, a meeting was held to discuss and develop a coordinated basin-wide monitoring schedule for the Sulphur River Basin Fiscal Year 2010 Clean Rivers Program. The meeting was held at the Texarkana College Chemistry Building in Texarkana, Texas. TCEQ personnel participated by telephone conference. The meeting minutes are posted on the SRBA web page at http://www.sulphurr.org. Issues detailed in the report, *Monitoring Priorities for Concerns and Non Supporting Parameters Based on the 2008 Texas Water Quality Inventory*, produced by the TCEQ, were used as a guide for addressing sampling and water quality issues in the Basin.

The monitoring schedule for both FY 2009 and FY 2010 as of the date of this report are included on pages 19 through 22. Changes in the schedule during the year are normal. A detailed up to date monitoring schedule for fiscal year 2010 is available at http://cms.lcra.org/schedule.asp?basin=3&FY=2010, as part of the interactive database for statewide coordinated monitoring schedules. The FY 2011 schedule is currently under development and can be seen at http://cms.lcra.org/schedule.asp?basin=3&FY=2011. A link to this schedule can be found on the SRBA website at http://www.sulphurr.org. Tables and maps showing the location and monitoring entity of all scheduled FY2009 and FY 2010 sampling stations are presented on pages 23 and 24 of this report. In some instances two entities will monitor the same site. This usually represents differences in time of year or the type of monitoring. Occasionally SRBA and TCEQ personnel will monitor the same site for quality assurance purposes.

Coordinated Monitoring Schedule FY 2009													
SEG	tnrccid	LongDesc	source1	source2	Program code	DO 24hr	AqHab	Benthics	Nekton	Conventional	Bacteria	Flow	Field
301	10212	SULPHUR RIVER BRIDGE ON US 59	WC	FO	RT					4	4	4	4
301	13783	SULPHUR RIVER AT KCS RAILROAD BRIDGE	WC	FO	RT					4	4	4	4
302	10214	WRIGHT PATMAN LAKE AT SH 8	SU	TC	BS	6							
302	10214	WRIGHT PATMAN LAKE AT SH 8	SU	TC	RT					4	4		6
302	15061	WRIGHT PATMAN LAKE AT NORTH SHORE	SU	TC	BS	6							
302	15061	WRIGHT PATMAN LAKE AT NORTH SHORE	SU	TC	RT					4	4		6
302	15490	RICE CREEK AT FM 1840	SU	TC	RT					4	4		4
302	15947	RICE CREEK AT FM 1840	SU	TC	BS	2	2	2	2			2	
302	16205	WRIGHT PATMAN LAKE IN OLD RIVER CHANNEL	WC	FO	RT					4	4		4
302	16859	WRIGHT PATMAN LAKE ADJACENT TO IPWATER INTAKE	SU	TC	BS	6							
302	16859	WRIGHT PATMAN LAKE ADJACENT TO IP WATER INTAKE	SU	TC	RT					4	4		6
302	16860	WRIGHT PATMAN LAKE IN BIG CREEK ARM	WC	FO	RT					4	4		4
302	16863	ANDERSON CREEK AT BOWIE CR4126	SU	TC	BS	2						2	
302	16863	ANDERSON CREEK AT BOWIE CR4126	SU	TC	RT					4	4	4	4
302	18555	RICE CREEK IMMEDIATELY DOWNSTREAM OF BOWIE COUNTY ROAD 4125	SU	TC	BS	2	2	2	2				
302	18555	RICE CREEK IMMEDIATELY DOWNSTREAM OF BOWIE COUNTY ROAD 4125	SU	TC	RT					4	4	4	4
303	10198	WHITE OAK CREEK AT US 259	WC	FO	RT					4	4	4	4
303	10199	WHITE OAK CREEK AT US 271	WC	FO	RT					4	4	4	4
303	10200	ROCK CREEK AT FM 69	SU	TC	BS	2	2	2	2			2	

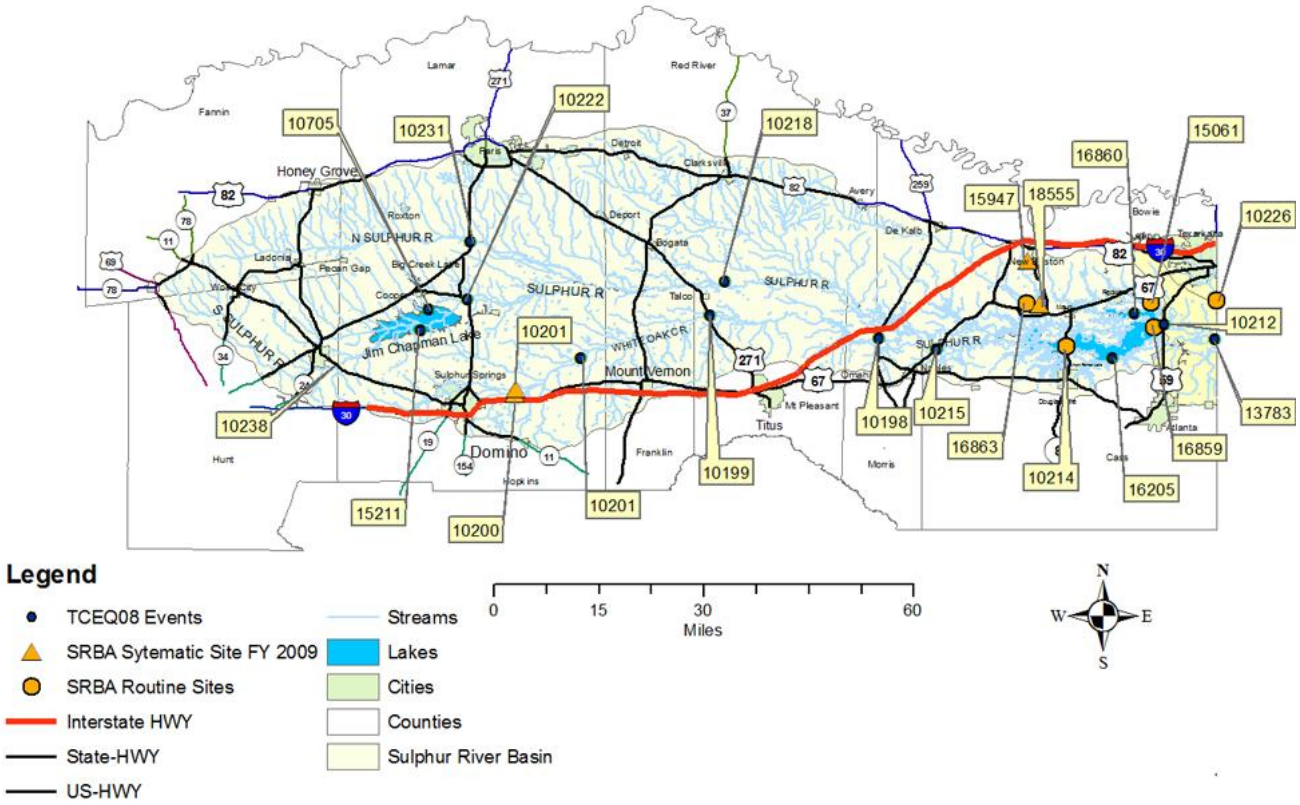
303	10200	ROCK CREEK AT FM 69	SU	TC	RT					4	4	4	4
303	10201	WHITE OAK CREEK AT FM 900	WC	FO	RT					4	4	4	4
303	10215	SULPHUR RIVER AT US 67	WC	FO	RT					4	4		4
303	10218	SULPHUR RIVER AT RED RIVER CR NW 39	WC	FO	RT					4	4	4	4
303	10222	SOUTH SULPHUR RIVER AT SH 19	WC	FO	RT					4	4	4	4
303	20099	WHITE OAK CREEK AT HOPKINS COUNTY FM 69	SU	TC	BS	2	2	2	2			2	
303	20099	WHITE OAK CREEK AT HOPKINS COUNTY FM 69	SU	TC	RT					4	4	4	4
304	10226	DAYS CREEK AT STATELINE ROAD	SU	TC	BS	2						2	
304	10226	DAYS CREEK AT STATELINE ROAD	SU	TC	RT					4	4	4	4
305	10197	AUDS CREEK AT FM 1184 S OF PARIS	SU	TC	RT					4	4	4	4
305	10231	NORTH SULPHUR RIVER AT SH 24/19	WC	FO	RT					4	4	4	4
307	15211	COOPER LAKE MID LAKE	WC	FO	RT					4	4		4
307	17075	COOPER LAKE IN DOCTORS CREEK ARM	WC	FO	RT					4	4		4

Coordinate Monitoring Schedule FY 2010

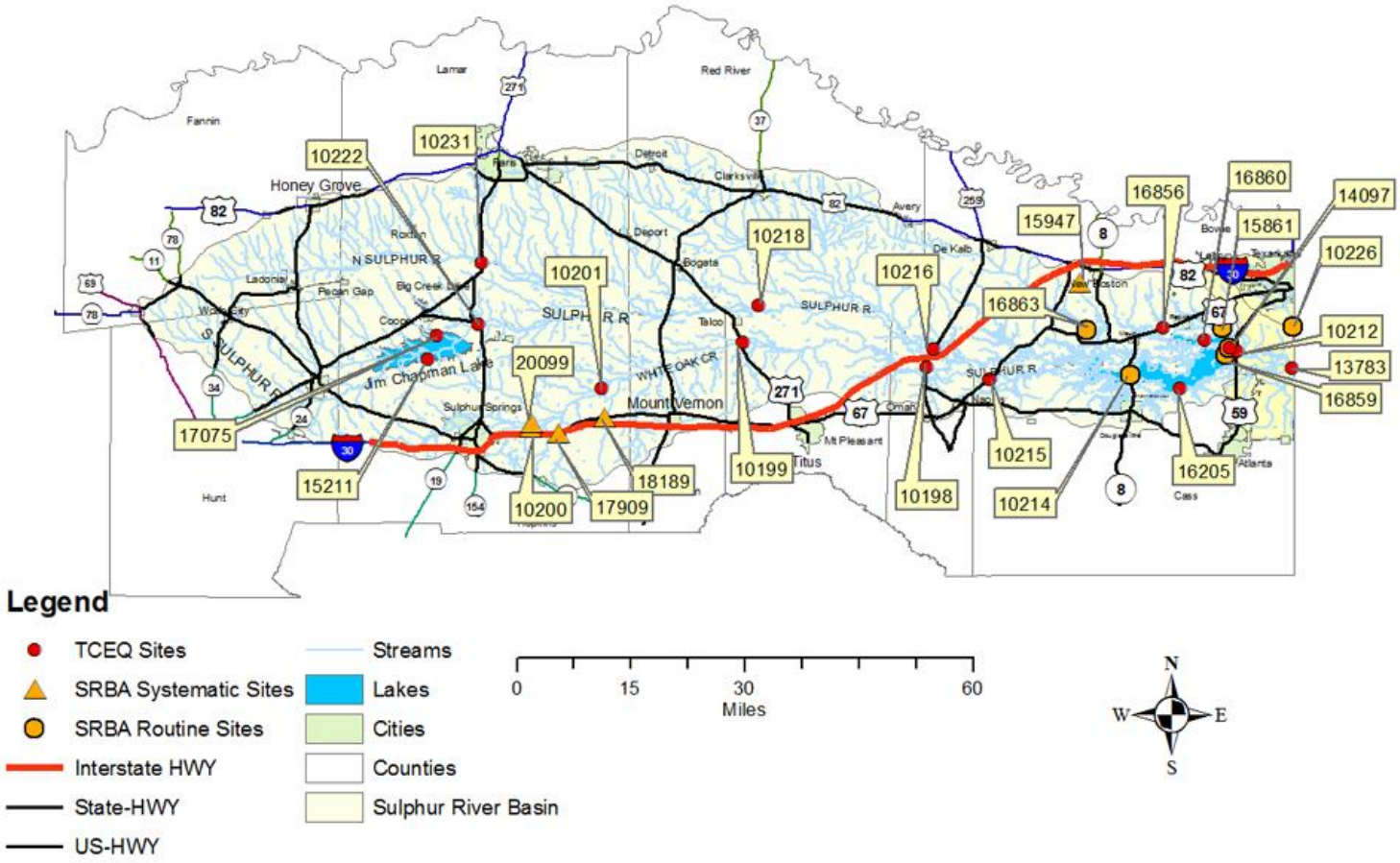
Seg	tnrccid	LongDesc	source1	source2	Program code	DO 24hr	AqHab	Benthics	Nekton	Conventional	Bacteria	Flow	Field
301	10212	SULPHUR RIVER BRIDGE ON US 59	WC	FO	RT					4	4	4	4
301	13783	SULPHUR RIVER AT KCS RAILROAD BRIDGE	WC	FO	RT					4	4	4	4
302	10214	WRIGHT PATMAN LAKE AT SH 8	SU	TC	BS	6							
302	10214	WRIGHT PATMAN LAKE AT SH 8	SU	TC	RT					4	4		6
302	14097	WRIGHT PATMAN LAKE USGS SITE AC	SU	TC	BS	6							
302	14097	WRIGHT PATMAN LAKE USGS SITE AC	SU	TC	RT								6
302	14097	WRIGHT PATMAN LAKE USGS SITE AC	WC	FO	RT					4	4		4
302	15061	WRIGHT PATMAN LAKE AT NORTH SHORE	SU	TC	BS	6							
302	15061	WRIGHT PATMAN LAKE AT NORTH SHORE	SU	TC	RT					4	4		6
302	15947	RICE CREEK AT FM1840	SU	TC	RT					2	2	2	2
302	16205	WRIGHT PATMAN LAKE IN OLD RIVER CHANNEL	WC	FO	RT					4	4		4
302	16859	WRIGHT PATMAN LAKE ADJACENT TO IP WATER INTAKE	SU	TC	BS	6							
302	16859	WRIGHT PATMAN LAKE ADJACENT TO IP WATER INTAKE	SU	TC	RT					4	4		6
302	16860	WRIGHT PATMAN LAKE IN BIG CREEK ARM	WC	FO	RT					4	4		4
302	16863	ANDERSON CREEK AT BOWIE CR4126	SU	TC	BS	2						2	
302	16863	ANDERSON CREEK AT BOWIE CR4126	SU	TC	RT					4	4	4	4
303	10198	WHITE OAK CREEK AT US 259	WC	FO	RT					4	4	4	4
303	10199	WHITE OAK CREEK AT US 271	WC	FO	RT					4	4	4	4

303	10200	ROCK CREEK AT FM 69	SU	TC	BS	2	2	2	2			2	
303	10200	ROCK CREEK AT FM 69	SU	TC	RT					4	4	4	4
303	10201	WHITE OAK CREEK AT FM 900	WC	FO	RT					4	4	4	4
303	10215	SULPHUR RIVER AT US 67	WC	FO	RT	4				4	4		4
303	10216	SULPHUR RIVER AT US 259 BRIDGE	WC	FO	RT	4				4	4		4
303	10218	SULPHUR RIVER AT RED RIVER CR NW 39	WC	FO	RT					4	4	4	4
303	10222	SOUTH SULPHUR RIVER AT SH 19 EAST OF COOPER	WC	FO	RT					4	4	4	4
303	16856	BIG CREEK LAKE AT CITY OF COOPER DRINKING WATER INTAKE STRUCTURE	WC	FO	RT					4	4		4
303	17909	EAST CANEY CREEK AT I-30 SERVICE ROAD SOUTH SIDE	SU	TC	BS	2	2	2	2			2	
303	17909	EAST CANEY CREEK AT I-30 SERVICE ROAD SOUTH SIDE	SU	TC	RT					4	4	4	4
303	18189	STOUTS CREEK AT US HIGHWAY 67 HOPKINS COUNTY	SU	TC	BS	2	2	2	2			2	
303	18189	STOUTS CREEK AT US HIGHWAY 67 HOPKINS COUNTY	SU	TC	RT					4	4	4	4
303	20099	WHITE OAK CREEK AT HOPKINS COUNTY FM 69	SU	TC	BS	2	2	2	2			2	
303	20099	WHITE OAK CREEK AT HOPKINS COUNTY FM 69	SU	TC	RT					4	4	4	4
304	10226	DAYS CREEK AT STATELINE ROAD SOUTH OF TEXARKANA	SU	TC	BS	2						2	
304	10226	DAYS CREEK AT STATELINE ROAD SOUTH OF TEXARKANA	SU	TC	RT					4	4	4	4
305	10231	NORTH SULPHUR RIVER AT SH 24/19 SOUTH OF PARIS	WC	FO	RT					4	4	4	4
307	15211	COOPER LAKE MID LAKE APPROX.	WC	FO	RT					4	4		4
307	17075	COOPER LAKE IN DOCTORS CREEK ARM,	WC	FO	RT					4	4		4

Sulphur River Basin Monitoring Sites FY 2009



Sulphur River Basin Sites, FY 2010



Overview of Monitoring by the SRBA during FY2009

SRBA monitored five routine sites and four systematic sites in FY2009. The site locations are detailed in a map on page 24. Three of the routine sites are on Wright Patman Lake (Segment 0302). These sites were monitored six times during the year. Four of the monitoring events were part of a regular quarterly rotation plus two additional events to make a total of four events in the summer months (May-August). Each of the quarterly monitoring events included field parameters, depth profiles, and conventional water chemistry. Diel studies, 24-hour monitoring, were conducted four times during the summer months. Multiprobe data recording units were deployed to collect sets of 24-hour data for dissolved oxygen, pH, conductivity, and temperature. Several locations on the lake are on the *2008 Texas §303(d) List* for depressed dissolved oxygen and high pH. Additional summer monitoring of the lake sites was designed to further investigate the identified problem conditions of depressed dissolved oxygen and high pH. The low level of dissolved oxygen and high pH values are associated with eutrophication in older lakes like Wright Patman Lake. The dissolved oxygen level and pH tend to soar during the day and fall at night in response to the changing cycle of photosynthesis (day-produces oxygen) and respiration (night-utilizes oxygen). This phenomenon is most pronounced when a large amount of algae is present and adequate nutrients are available to allow growth. Wright Patman Lake is also on the *2008 Water Quality Inventory* for high levels of ammonia and chlorophyll at multiple sites. Ammonia is a nutrient that supports algae growth, and chlorophyll is a good indicator of the amount of algae present. The water chemistry results from the summer monitoring show mostly non-detect analyses for the ammonia parameter. Only 2 of 6 values were slightly greater than the non-detect limits and were well below the screening level. The chlorophyll values at North Shore Site exceeded the *criteria* in the July monitoring, but were within *criteria* for chlorophyll in all other events. The International Paper site exceeded pH *criteria* in August and the North Shore Site exceeded the pH *criteria* in July and August. The Wright Patman Lake Site at Hwy 8 failed to meet minimum dissolved oxygen *criteria* for summer events with the exception August.

The two other routine sites are on streams, Days Creek (Segment 0304) and Anderson Creek (Segment 0302). The Days Creek Site has been monitored by SRBA for a number of years. It is important because it is downstream from Texarkana and the Texarkana Waste Water Treatment Plant. The Anderson Creek Site was selected because it drains a large portion of the northern basin into Wright Patman Lake and has not been regularly monitored in the past. Each of the quarterly monitoring events included field parameters, flow measurements, and conventional water chemistry.

Four systematic sites where studied during FY 2010. Two of the sites, Rock Creek at FM 69, White Oak Creek at FM 69, are located in Hopkins County. The White Oak Creek site is located on Segment 0303B and is several miles below Sulphur Springs Lake. The Rock Creek site is "off" Segment 303B and drains Sulphur Springs and the Sulphur Springs Waste Water Treatment Plant. Quarterly monitoring events at all sites occurred in October of 2008, and February, May, and July of 2009. Field data, flow measurements, and

water samples were collected four times at each site. Biological monitoring was postponed due to high water. During June and July, biological monitoring and Diel studies were conducted. The results for the biological and habitat studies described below are "not official" but were determined by TC personnel. The data collected is reviewed by TCEQ personnel, and they make the official designation by placing the stream officially in one of four categories: *exceptional*, *high*, *intermediate*, and *limited*. (See page 8). White Oak Creek at FM 69 had *intermediate* fish scores for both monitoring events. Its benthic scores were *intermediate* for the first monitoring event and *high* for the second. The Habitat Quality Index for White Oak Creek was *high*. Rock Creek had a fish score of "intermediate" for the June monitoring and "high" for July. The macrobenthic community was *intermediate* for both monitoring events. The Habitat Quality Index for White Oak Creek was "intermediate".

The other two systemic sites were located in Bowie County and "off" segment 0302. Both sites were on Rice Creek. The site located at FM 1840 is southwest of New Boston. The fish score for the two monitoring events in June and July were *exceptional* and *high*. The benthic scores for the two monitoring events were *intermediate* and *limited*. During the second monitoring event, discussions with local residents revealed that site being monitored was not on Rice Creek but was on Campbell Creek a hundred yards west of Rice Creek. The site error was corrected and the second two monitoring events were collected at the Rice Creek site including the two sets of biological and habitat data. In order to have four complete sets of data for Rice Creek, two monitoring events were included in the FY 2010 monitoring schedule for the fall and spring. A site was established at Campbell Creek, and the data in the database was directed to that site. The data collected at Campbell Creek and Rice Creek were quite comparable. During times of high water flow, Rice Creek has a yellow color due to the clay in the runoff from the Western Refuge landfill at New Boston. The Habitat Quality Index for this site was *intermediate.*

The second site on Rice Creek is located at Bowie County Rd 4125 just above Lake Wright Patman but before it enters Anderson Creek. During the June and July monitoring events the fish score for the sites were both *intermediate*. The benthic score for the two events were *limited* and *intermediate*. This site has the disadvantage that in is covered with water when LWP is high and may require extra time to recover when the lake falls. This site will not be included in future monitoring plans. The Habitat Quality Index for this site was *intermediate*.

Public Outreach and Webpage

The main focus of the Sulphur River Basin public outreach effort is the encouragement of public involvement concerning the Clean Rivers Program (CRP) and other Basin activities. This involvement is important to the development of support for the program as a means of gathering recommendations and concerns from the public. The public can get involved through either the steering committee meetings or volunteer activities.

Website:
The website, www.sulphurr.org, provides the citizens of our Basin and other interested parties with a useful tool to summarize water quality information. The SRBA main webpage contains links to information concerning the CRP and specifics concerning activities within the Basin. Some of the links available include:

- Basin Monitoring Schedules
- Monitoring Stations Maps
- Reports
- Steering Committee Members, Schedules, and Meeting Minutes
- Program Partners
- Contact Information
- Quality Assurance Project Plan (QAPP)
- Work Plan and Special Study Information

Our goal is to provide a readily available source of information about local environmental issues to the public, which we hope will encourage citizens of our basin to get involved. Questions or comments concerning any information found on the website are always welcome.

Public Outreach:
Volunteer monitoring activities, events, newsletters, special studies activities, and meeting dates with agendas are posted regularly on the public outreach webpage. Increased public involvement can result in more public awareness and a larger sense of community responsibility. Several Texarkana College students initially involved in the monitoring efforts in the Sulphur River Basin have continued to be active in research within the Basin. The data collected by students has been used to develop a number of research projects that produced posters and presentations submitted by these students at national conventions and regional meetings. More

public involvement in our basin is another important goal. Organizations such as Texas Stream Team (formerly Texas Watch) host statewide and regional meetings, partner certification training, and special events and projects that are designed to aid in increasing public awareness and involvement. Contact information for these events is found on the www.sulphurr.org site map.

Ms. Delores McCright of the Texarkana College Biology Department is a trainer and quality assurance officer for the Texas Stream Team Program. She holds training sessions at TC twice a year and quality assurance sessions as necessary. The training is open to the public. Ms McCright can be reached at dmccright@texarkanacollege.edu. The Ark-Tex Council of Governments sponsors area water quality monitoring. Members of the Texarkana College Chemistry Club are currently active in the monitoring for SRBA and presented posters at the American Chemical Society national convention in the spring.

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TEXARKANA COLLEGE

TCEQ

THE TEXAS CLEAN RIVERS PROGRAM